July 9, 2026

Stasia Ferby
Project Assessment Director
BC Environmental Assessment Office
**By Email:** Stasia.Ferbey@gov.bc.ca

**SUBJECT: Overall Final EAO Water Information Request Response Summary**

Dear Ms. Ferbey:

Telkwa Mining Limited (Telkwa Mining) is pleased to provide an overall summary of our final EAO Water Information Request response summary and organization which proivdes the complete respoonse to the EAO water IR as follows:

ATTACHMENT A provides the January 29, 2026 that represents the Water Information that was approved for submission after discussions with the EAO and the line agencies of Ministry of Environment and Parks (MENV) and Minsitry of Mining and Critical Minerals (MMCM) on the September 15, 2026 EAO Water IR submission for review.

ATTACHMENT B provides the response to the follow up information requests from MENV on April 15, 2026.

ATTACHMENT C provides the response to the follow up information requests from MMCM on May 15, 2026.

ATTACHMENT D provides the response to the follow up information request 8 and 9 from MENVe on May 22, 2026.

ATTACHMENT E provides the response to the follow up Information request 8 from MENV and MMCM on June 25, 2026.

If you have any questions please do not hesitate to contact Dan Farmer at 604-220-5703 or dan.farmer@telkwa-mining.ca.

Sincerely,

Daniel J. Farmer
Project and Development Manager
Telkwa Mining Limited

Cc: Elise Matzanke, Project Assessment Officer, EAO, email: Elise.Matzanke@gov.bc.ca
Matt Scarr, Project Assessment Director, EAO, email: Matthew.Scarr@gov.bc.ca
Jessy Chaplin, Ecosystems Biologist, Telkwa Mining, email: Jessy.chaplin@telkwa-mining.ca
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Attachments:

**Attachment A:** Telkwa Mining Response submitted January 29, 2206 to the Overall EAO Water IR issued by EAO to Telkwa Mining on November 23rd, 2022

**Attachment B:** Telkwa Mining Response to the follow up information requests from MENV on April 15, 2026

**Attachment C:** Telkwa Mining Response to the follow up information requests from MCMM on May 15, 2026

**Attachment D:** Telkwa Mining Response to the follow up information requests 8 and 9 from MENV on May 22, 2026

**Attachment E:** Telkwa Mining Response to the follow up information request 8 from MENV and MCMM on June 25, 2026

# Attachment A: Telkwa Mining Response submitted January 29, 2206 to the Overall EAO Water IR issued by EAO to Telkwa Mining on November 23rd, 2022

# MEMORANDUM

**TO:** Stasia Ferbey, Project Assessment Director, BC Environmental Assessment Office

Elise Matzanke, Project Assessment Officer, BC Environmental Assessment Office

**FROM:** Dan Farmer, Project, and Development Manager, Telkwa Mining Limited

**DATE:** January 29, 2026

**SUBJECT:** **Tenas Project Water Quality EAO Information Request Response**

## 0. INTRODUCTION

In response to the Information Request (IR) related to water dated November 23, 2022, for Telkwa Mining Limited's (Telkwa Mining) Tenas Project's (Project) Environmental Assessment Certificate (EAC) Application submitted in early 2022 please find Telkwa Mining's response to the questions raised by the British Columbia Environmental Assessment Office (BC EAO) working group.

As part of Telkwa Mining's commitment to undertake additional water flow monitoring for Four, Goathorn, and Tenas Creeks as recommended by SRK Consulting (Canada) Inc. (SRK), the water and load balance model (WLBM) has been updated to reflect the water monitoring completed in 2021 and 2022 for these creeks, see **Appendix 1: Tenas Project, Water and Load Balance Modeling Report (Updated 2025), SRK**. In summary the following was found:

- Goathorn Creek high flows were underestimated by the WLBM provided by the EAC Project Case (August 2022). Low flows were slightly overestimated by the WLBM provided by the EAC Project Case (August 2022), so low flows were reduced for Goathorn Creek in the Final EAC Project Cases (2024).
- Tenas Creek flows measured were comparable to the EAC Project Case (August 2022) for low and high flows and if anything were underestimated by the EAC Project Case (August 2022) model, so the parameter concentrations provided were conservative. High flows were updated for Tenas Creek but no change to low flows were made as part of the Final EAC Project Cases (2024).
- Four Creek flows measured were again comparable to the EAC Project Case (2022) for low and high flows and if anything were underestimated by the EAC Project Case

(August 2022) model. High flows were updated for Four Creek but no change to low flows were made as part of the Final EAC Project Cases (2024).

Additional years of precipitation data have been gathered since the EAC Application was submitted, and it was found that precipitation values in the EAC Project Case (August 2022) model were under reporting annual precipitation values, so these were increased in the Updated and Final EAC Project Cases (2024) versus the EAC Project Case (August 2022)'s WLBM. Please see **Appendix 2: Tenas Project, Hydrometeorological Baseline and Model Development Report (Update 2025), SRK**. Telkwa Mining continued monitoring for Four, Tenas, and Goathorn Creeks in October 2023, and will review stream flow levels again if the Project moves into the permitting process.

Telkwa Mining commenced an acid rock drainage (ARD) barrel program in late 2019 to better understand the potential ARD and metal leaching (ML) characteristics of the material rock zones and overburden recovered within the EA Open Pit. Telkwa Mining has continued testing material seepage from these barrels since 2019. Key observations based on this testing is as follows:

- Only one of the potentially acid generating (PAG) barrels (Barrel 6) has gone **acidic after approximately 4 years** of monitoring. The onset of acidic drainage under field conditions may be accelerated because the barrel samples have been crushed to minus 1/4 inch (8 millimetres [mm]) as the material was the same as used in the humidity cells. There will be a mixture of grain sizes in the commercial operation with several grains much larger than the barrel material size. In addition, the barrel contains a mixture of rock from Zones 6, and 7 and had a weighted Neutralizing Potential Ratio (NPR) of Neutralizing Potential (NP) to Acid Potential (AP) of 0.55. The average weighted NPRs of Zones 6, and 7 in the drillhole database were 1.8 and 1.7, respectively (SRK 2025). The material in Barrel 6 therefore provides a conservative estimate of the lag time to the formation of acidic conditions.
- The source terms for some parameters were overstated (higher concentrations) while others were understated (lower concentrations) in the water and load balance provided in the EAC Project Case (August 2022) based on the laboratory measurements of the effluent collected from these barrels due to assumed scaling factors that were not site-specific. SRK developed updated source terms for *non-PAG* rock, PAG rock Flush term, EA Open Pit Walls, and overburden using the barrel results provided in: **Appendix 3: Geochemical Field Barrel Results Interpretation, Tenas Project, SRK;** and **Appendix 4: Updated Water Quality Source Terms, SRK.**

These source terms were further reviewed and modified for the *non-PAG* rock backfilled into the EA Open Pit by Okane Consultants using a more detailed model that accounted for dimensionality in the *non-PAG* rock backfill (backfill) and oxygen convection and diffusion for several different cover scenarios. Okane Consultants developed a distributed 3-dimensional model focused on

water infiltration and storage, and oxygen levels based on the material properties and the rock backfill pile construction methodology employed by the Project with their report included in **Appendix 5: Tenas Project - Suboxic Evaluation of Non-Acid Generating Mine Rock, Okane**. This modelling exercise modified the source terms for parameters being potentially leached from the backfill and was used for the Final EAC Project Case (2024).

Several updates were made in the water and load balance model since the EAC Project Case (August 2022). The new Project Case was titled "Final EAC Project Case (2024) (as found in **Appendix 1, Tenas Project, Water and Load Balance Modeling Report (Updated 2025), SRK)**, and the integrated changes are described as follows:

- Incorporate the effects of progressive reclamation and backfill/dam/buttress development (for progressively covered areas of *non-PAG*).
- Use of seasonal background parameter concentrations (50th percentile) to reflect the seasonality of the background/baseline parameter quality concentrations related to winter (November to March) and summer (April to October) seasons to develop predicted concentrations from the Project more accurately in the receiving environment.
- Incorporation of blasthole liners for the source control of nitrogen species. This Best Management Practice (BMP) was identified through the additional mitigations assessment.
- Revision of how downstream parameter concentrations in relation to groundwater seepage was calculated based on updated values from the hydrogeological model and to account for dilution from non-contact groundwater to the streams.
- Updates to reflect the recently published climate change models from 2023 versus the 2018 versions that were used in the EAC Project Case (August 2022).

Through the Best Achievable Technology (BAT) assessment, it was determined that the introduction of water treatment through In-situ Active Gravel Bed Reactors (GBR) and/or active water treatment using Reverse Osmosis with an Anaerobic Bioreactor and High-Density Sludge Lime Treatment were not recommended but should only be incorporated using a Trigger Action Response Plan based on site monitoring during all phases of the Project. Further information on the Final EAC Project Case (2024) can be found under **Theme 1**.

Error! Not a valid bookmark self-reference. below provides a summary of the EAC Project Case (August 2022) and the Final EAC Project Case (2024) for parameters that were exceeding water quality guidelines for the EAC Project Case (August 2022). As demonstrated the Final EAC Project Case (2024) does not have exceedances in the receiving environment except for parameters that are already in exceedance for background conditions and a short duration (4 year) exceedance of cobalt in Four Creek which is likely not to occur if attenuation mechanisms in groundwater were accounted for in the water model.

## Table 0-1: Water Quality (Maximum Monthly Mean) Results for the EAC Project Case (August 2022) and the Final EAC Project Case (2024) in Post-Closure at Relevant Prediction Nodes Using Expected Source Terms and Average Hydrology Conditions

| Location Creek | Parameter | BC WQG (2025) (mg/L) | EAC Project Case (August 2022) (mg/L) | Final EAC Project Case (2024) (mg/L) |
|---|---|---|---|---|
| WQSEA1 Goathorn Creek | Copper (d) | 0.0013 | Not Available | 0.0016 |
| WQS06 Goathorn Creek | Copper (d) | 0.0013 | 0.0019 | 0.0016 |
| WQS03_DS Four Creek | Cadmium (d) | 0.00023 | 0.00026 | 0.000012 |
| | Cobalt (d) | 0.00050 | 0.00066 | 0.00063 |
| | Nitrite (t) | 0.020 | 0.038 | 0.0090 |
| | Sulfate (t) | 309 | 360 | 33 |
| | Selenium (t) | 0.0020 | 0.0058 | 0.00081 |
| WQS04 Tenas Creek | Cobalt (d) | 0.00045 | 0.00082 | 0.00029 |
| | Copper (d) | 0.0026 | 0.0031 | 0.0013 |
| | Nickel (d) | 0.0025 | 0.0031 | 0.00063 |
| | Nitrite (t) | 0.020 | 0.045 | 0.0056 |
| | Sulfate (t) | 218 | 260 | 24 |
| | Selenium (t) | 0.0020 | 0.0041 | 0.00079 |

**Notes:** BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligrams per litre; WQG=water quality guideline.
Red text indicates exceedances of WQGs.
Please note that dissolved copper exceeds the WQGs under background conditions.

# 1. INFORMATION REQUEST (IR) THEMES 1-8

The IRs provided by the EAO have been grouped into a series of themes for subsequent discussion.

- **Theme 1**: Design alternative treatment options and/or provide additional mitigation measures which are capable of meeting BC Chronic Water Quality Guidelines for the Protection of Aquatic Life (BC WQGs) near appropriately sited discharge locations;
- **Theme 2**: Substantially review the Water Balance Model. The Water Balance Model is key to assessing mitigations against effects to many Valued Components not only water quality;
- **Theme 3**: Have a Qualified Professional (QP) identify lentic areas in the receiving environment which may receive selenium from mine operations, and ensure that background concentrations of selenium in water, sediment, invertebrate, and fish tissues are collected and compiled in those lentic areas;
- **Theme 4**: Conduct additional water quality predictions using recent sensitivity analysis of the semi-permeable pond liner;
- **Theme 5**: Ensure all planned discharges are incorporated into the Water Balance Model and water quality predictions;
- **Theme 6**: Other comments not specified in BC EAO's IR request letter, but provided in the ITT table;
- **Theme 7**: EMLI Geoscience clarifications and information requests; and,
- **Theme 8**: EMLI Geotechnical clarifications and information requests.

**Please note:**

The order in which the themes are addressed is not the same as the list specified above since Themes 5, and 2 need to be completed prior to commencing Theme 1 which entails a BAT assessment to review alternative treatment technologies/additional mitigations as it is dependent on the WLBM being accepted and understood by the Working Group as it forms the basis of the BAT assessment.

# 2. RESPONSES TO INFORMATION REQUEST THEMES 1 THROUGH 8

## THEME 5: ENSURE ALL PLANNED DISCHARGES ARE INCORPORATED INTO THE WATER BALANCE MODEL AND WATER QUALITY PREDICTIONS

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*The WLBM is missing data from all planned discharges.*

***507 ITT TABLE AND 516 ITT TABLE***

*Table 6.2-1 of the Discharge MP lists many surface discharges that are not incorporated into the Water and Load Balance Model. The WLBM application considers the discharges from the Tenas Control Pond, the Management Ponds, and the Rail Infrastructure Pond. For all other discharges, please indicate where each is characterized in the application including source term assessment, water quality predictions, frequency and duration of discharge, mitigation strategies (include liner permeability where applicable), identification of parameters of concern, and residual effects assessment. For all unlined ponds and other discharges to ground, evaluate the discharge following the guidance in ENV "Authorizing Point and Non-point source discharges to ground" (https://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/mining-smelt-energy/guidance-documents/7276_env_rob_dtg_factsheet.pdf) [EA Information Requirement].*

***IR LETTER NEW AND 516 ITT TABLE***

*Table 6.2-1 of the Discharge Management Plan lists many surface discharges that are not incorporated into the WLBM. The WLBM application considers the discharges from the Tenas Control Pond, the Management Ponds, and the Rail Infrastructure Pond.*

1. *For all other discharges, indicate where each is characterized in the Application, including: source term assessment; water quality predictions; frequency and duration of discharge; mitigation strategies (include liner permeability where applicable); identification of parameters of concern; and residual effects assessment.*
2. *For all unlined ponds and other discharges to ground, evaluate the discharge following the guidance in ENV's Authorizing Point and Non-point source discharges to ground.*

**RESPONSE 507 ITT TABLE AND 516 ITT TABLE**

This IR request stems from the fact that some of the sedimentation ponds that discharge to ground were not included as part of the WLBM in the EAC Application prepared by SRK and presented in **Appendix 1.0-E Water and Load Balance Modeling Report of the Environmental Assessment Certificate (EAC) Application**. Specifically, the following sedimentation ponds were not included in the overall WLBM:

- Explosive Facility;
- Explosive Magazine;
- Rock Quarry;
- Gravel Quarry 1 and 2; and,
- East and West TAC.

The Explosive Facility, and Rock Quarry sedimentation ponds are lined with impermeable geomembrane liners or equivalent while the remaining sedimentation ponds are unlined.

The reasons why these sedimentation ponds were not considered in the site WLBM when it was developed were:

- They are geographically separate from the EA Open Pit, management and control ponds, and material storage pile water management systems.
- These sedimentation ponds are small and were developed to manage very defined catchments which are not connected to overall water management system for the open pit and material storage structures and have very low flow rates compared to the discharge from mine components through the Tenas Control Pond.
- These sedimentation ponds are expected to only discharge during freshet and storm events as their watersheds are small and defined.
- These sedimentation ponds collect water from inert material such as gravels and soils currently exposed within their catchment area.
- Total Suspended Solids (TSS) is the main parameter of concern for majority of these sedimentation ponds excluding the Explosive Facility and Rock Quarry Sedimentation Ponds where nitrogen species are also potential parameters of concern.
- To control TSS, the sedimentation ponds have been designed according to BC ENV *Technical Guidance 7: Assessing Design Size and Operation of Sediment Ponds* (December 2015). The sedimentation ponds are designed to produce a monthly mean maximum TSS level of 35 mg/L to align with the proposed federal *Coal Mine Effluent Regulations* which is considered protective of the receiving environment.

**POND DESCRIPTIONS**

The Explosive Magazine Sedimentation Pond captures run off from a 50 by 50-metre (m) pad where the three (3) explosive magazine steel buildings are located. The pad is comprised of crushed gravel at a 1% grade leading to the sedimentation pond. TSS is the only parameter of concern for this pond as no blasting agents are being offloaded or loaded at this location. Furthermore, traffic volumes (4 to 6 trips on dayshift only) at this location will be low as only authorized personnel are permitted to access this location. Only packaged explosive products and blasting accessories are stored at this location inside weatherproof steel buildings and no bulk explosive products are delivered to this location so there is little chance of a spill releasing nitrogen species to the environment. The water discharged from this sedimentation pond will be to the ground via a controlled pumping system and from seepage from the floor of the pond itself.

The Explosive Facility Sedimentation Pond captures run off from a 100 by 100-m pad comprised of crushed gravel at 1 percent (%) grade leading to the sedimentation pond where the one (1)

silo of emulsion (35 tonnes) and one (1) silo of Ammonium Nitrate Prill (50 tonnes) are stored. A closed loop wash bay / maintenance building for washing and maintaining the explosive transport trucks provided by the authorized explosive vendor is also located at this pad. The two parameters of concern identified for this pond are TSS and nitrogen species from potential spills of ammonium nitrate (AN) prill and/or emulsion blasting agents on the pad. This sedimentation pond is lined with a bituminous liner or equivalent and will discharge to ground via a controlled pumping system. Monitoring of the water in the sedimentation pond will be completed in compliance with regulatory approvals and if nitrate/nitrite/ammonia concentrations are above permit approved limits the water will be pumped to the onsite evaporator which is part of the wash bay/maintenance building for the Explosive Facility for treatment. The precipitate will either be shipped offsite for disposal at an approved and licensed facility or combined with blasting agents for detonation as part of the blasting process. In the permitting phase the Explosive Facility Pad and Magazine Pad will be combined into one site with a size of 100 by 100-m thereby reducing the two sedimentation ponds in the EAC application to one for permitting.

The two (2) sedimentation ponds for the Gravel Quarry only collect contact water from activities involving disturbing overburden materials, sands, gravels, and water in contact with gravel from the existing approved Quarry. The two Gravel Quarry Sedimentation Ponds service distinct phases of the Gravel Quarry already approved by Ministry of Mines and Critical Minerals (MCMM) and operated by Telkwa Mining. The two Gravel Quarry Sedimentation Ponds service small catchment areas associated with two gravel pits that will produce approximately 35,000 cubic metres ($m^3$) of material over the life of the Quarries which is approximately 10 years. These two sedimentation ponds will not operate concurrently, rather the Gravel Quarry Sedimentation Pond 1 will operate for roughly four (4) years until the Gravel Quarry 1 area is exhausted and will be reclaimed and then the Gravel Quarry Sedimentation Pond 2 will operate for the remaining six (6) years until the Gravel Quarry 2 area is exhausted. Furthermore, these ponds will also not be used year around but will only be required during when the quarries are active between Jun and September of the first 10 years. Based on the static geochemical test work conducted for the Rock Quarry, Gravel Quarries, and Tenas Access Corridor (TAC), the overburden and rock materials draining to these sedimentation ponds are *non-PAG* material using an NPR cut off of 2 to 1; however, these materials will be subject to verification testing as detailed in the **Metal Leaching/Acid Rock Drainage (ML/ARD) Management Plan (S13.0-C12)** of the **EAC Application**. These ponds only operate during the first 10 years of the Operation Phase at which time both phases of the gravel quarry are exhausted and reclaimed including the sedimentation ponds.

The two (2) sedimentation ponds adjacent to Goathorn Creek are constructed in support of the **Construction Environmental Management Plan (CEMP) (S13.0-S4)** of the **EAC Application** to provide contingency sedimentation capacity for construction activities being undertaken in this valley on both sides of Goathorn Creek. Again, these two sedimentation ponds only service small

catchment areas on either side of Goathorn Creek (approximately 1 hectare [ha] on each side) and will treat contact water from cut and fill activities taking place if already implemented sediment and erosion control measures are insufficient. Again, TSS is the only parameter of concern as only surficial materials are being disturbed by improvements to the Forest Service Roads (FSRs) and no blasting is envisioned for road construction activities in the Goathorn Creek Valley. As these ponds are constructed primarily in highly permeably material, water discharge from these facilities will be to ground either from the base of the ponds. Once the Construction Phase is complete and the reclamation of the cut and fill slopes for the TAC is complete, these ponds will be decommissioned and reclaimed. The materials excavated and disturbed within the Goathorn Creek Valley have been evaluated and been determined to be *non-PAG* using an NPR cut off of 2.0 to 1; however, these materials excavated will be subject to verification testing as detailed in the **Metal Leaching/Acid Rock Drainage (ML/ARD) Management Plan (S13.0-C12)** of the **EAC Application**.

The Rock Quarry Sedimentation Pond services the catchment of Rock Quarry activities roughly 2.5 ha in size and located 7 kilometres (kms) west of the mine site. The materials have been evaluated and been determined to be *non-PAG* using an NPR cut off of 2.0 to 1. This material will be subject to verification testing of blastholes and/or free dig material as specified in the **Metal Leaching/Acid Rock Drainage (ML/ARD) Management Plan (S13.0-C12)** of the **EAC Application**. The Rock Quarry will only be developed once the gravel quarries are completed which is estimated to occur in Year 10 so the Rock Quarry and two Gravel Sedimentation Ponds will not be in operation concurrently. The two parameters of concern identified for this Rock Quarry were TSS and nitrogen species and it will also discharge to ground and is not lined. Roughly 45,000 $m^3$ of material will be excavated for road surfacing materials over its 12-year life. Monitoring of the water in the Rock Quarry Sedimentation Pond will be completed in compliance with regulatory approvals.

**Table 2-1** below summarizes the operating periods of the various sedimentation ponds not included in the overall WLBM.

**Figure 2-1** through **Figure 2-6** illustrate the location of the various sedimentation ponds during four time periods associated with the Project: Construction Phase, Operation Phase Years 1 to 4, Operation Phase Years 5 to 10, Operation Phase Years 11 to 21, Decommissioning and Reclamation Phase, and the Post-closure phase.

## Table 2-1: Summary of Operating Timeframes for Sedimentation Ponds not Included in the WLBM

| Period | Explosive Facility Sedimentation Pond | Explosive Magazine Sedimentation Pond | Goathorn East and West Sedimentation Ponds | Gravel Quary 1 Sedimentation Pond | Gravel Quarry 2 Sedimentation Pond | Rock Quarry Sedimentation Pond |
|---|---|---|---|---|---|---|
| Construction Phase | No | No | Yes | No | No | No |
| Years 0 to 4 | Yes | Yes | No | Yes | No | No |
| Years 5 to 10 | Yes | Yes | No | No | Yes | Yes |
| Years 11 to 21 | Yes | Yes | No | No | No | Yes |
| Decommissioning and Reclamation Phase | No | No | No | No | No | No |
| Post-closure Phase | No | No | No | No | No | No |

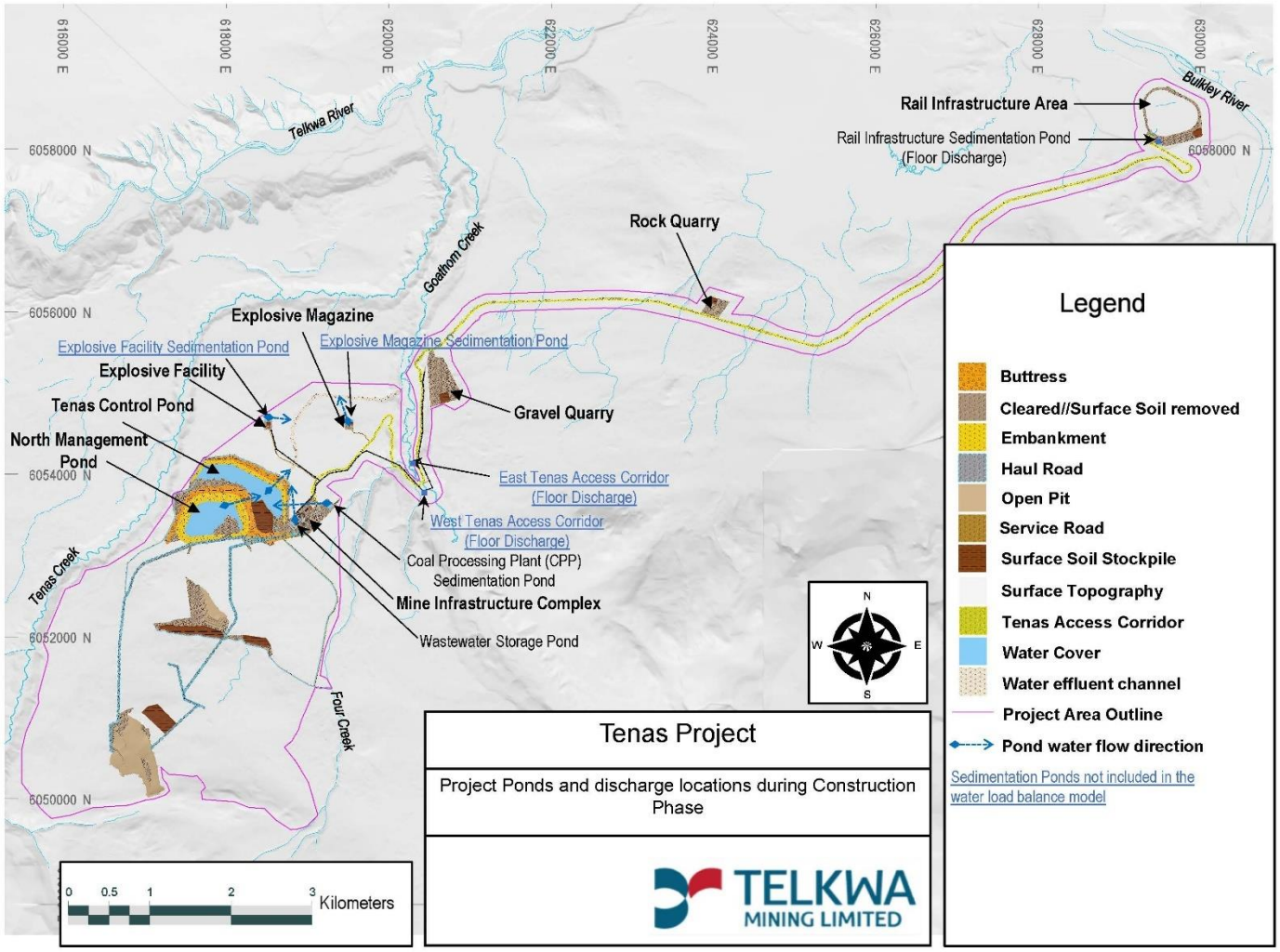


**Figure 2-1: Sedimentation Ponds Location and Operation During Construction Phase not Included in WLBM**

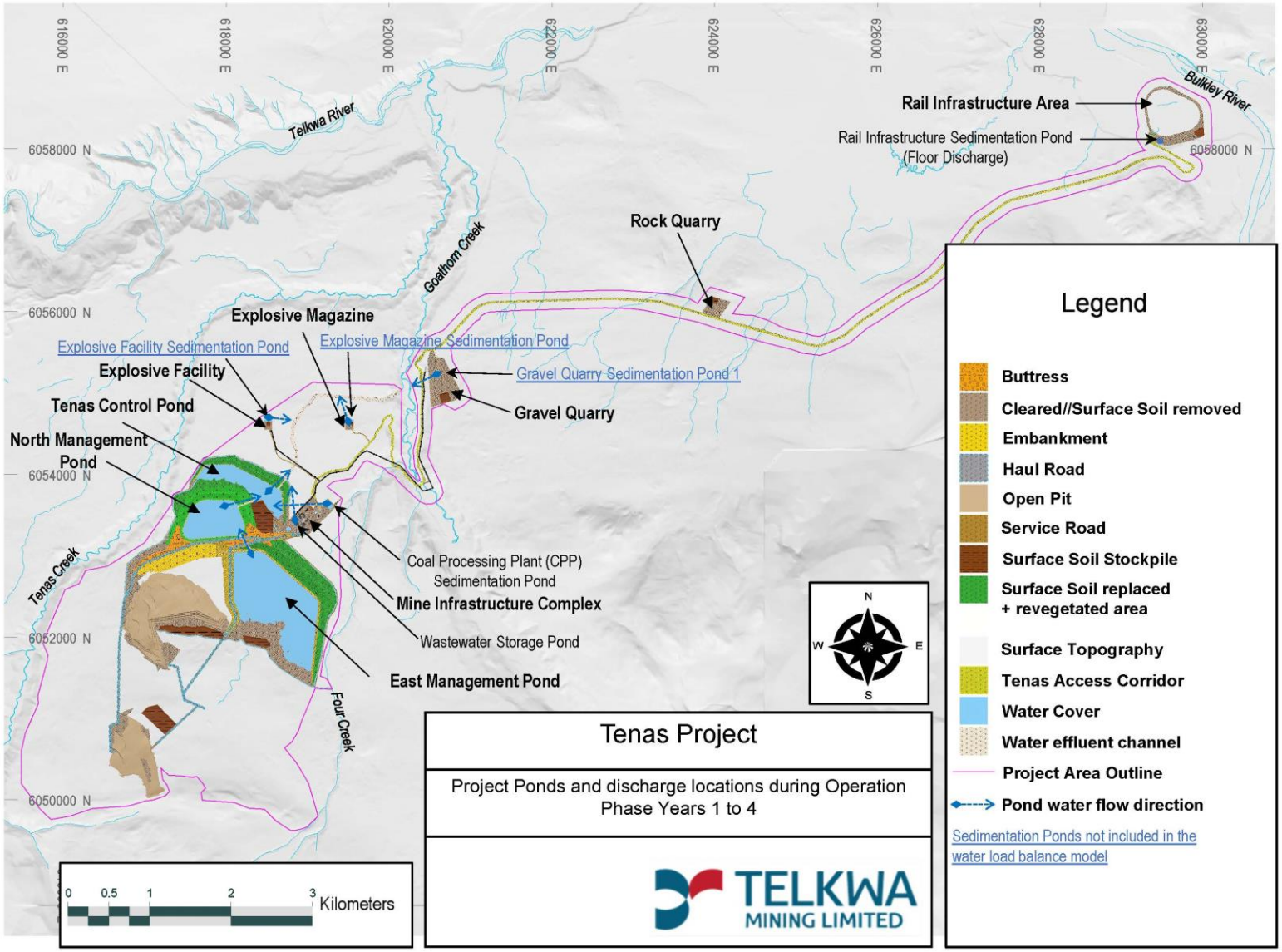


**Figure 2-2: Sedimentation Ponds Location and Operation During Operation Phase Years 1 to 4 not Included in WLBM**

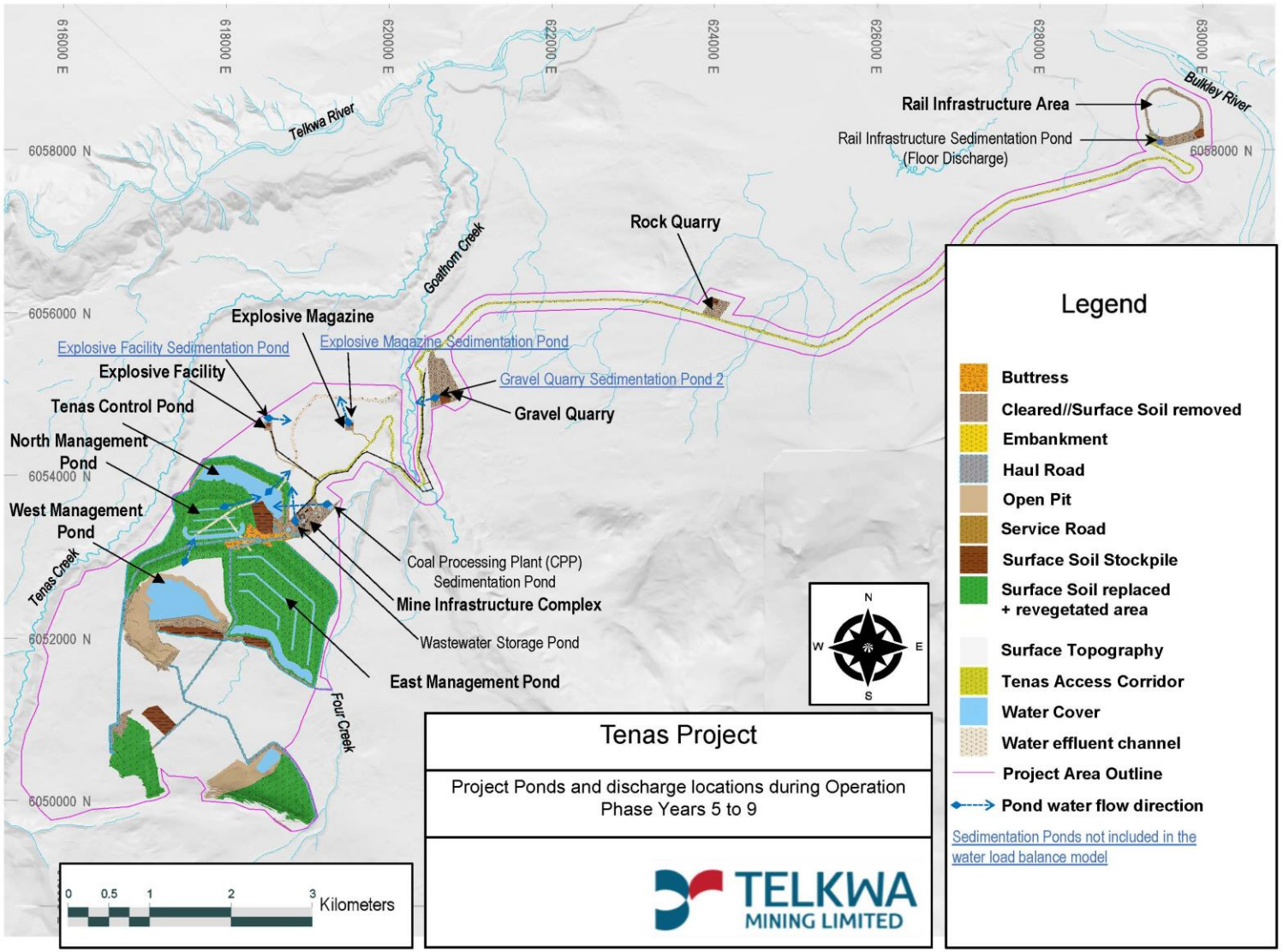


**Figure 2-3: Sedimentation Ponds Location and Operation During Operation Phase Years 5 to 9 not Included in WLBM**

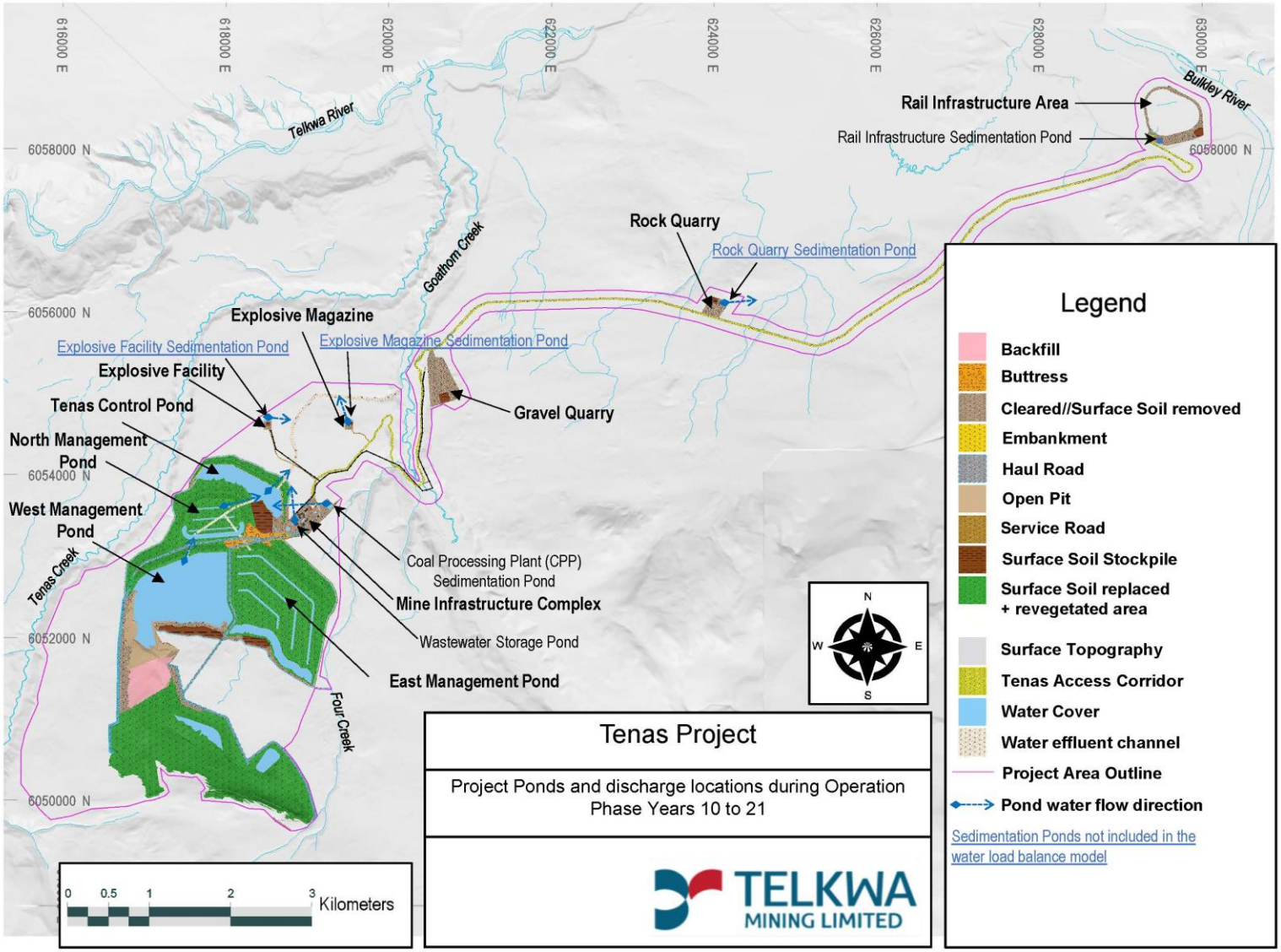


**Figure 2-4: Sedimentation Ponds Location and Operation During Operation Phase Years 10 to 21 not Included in WLBM**

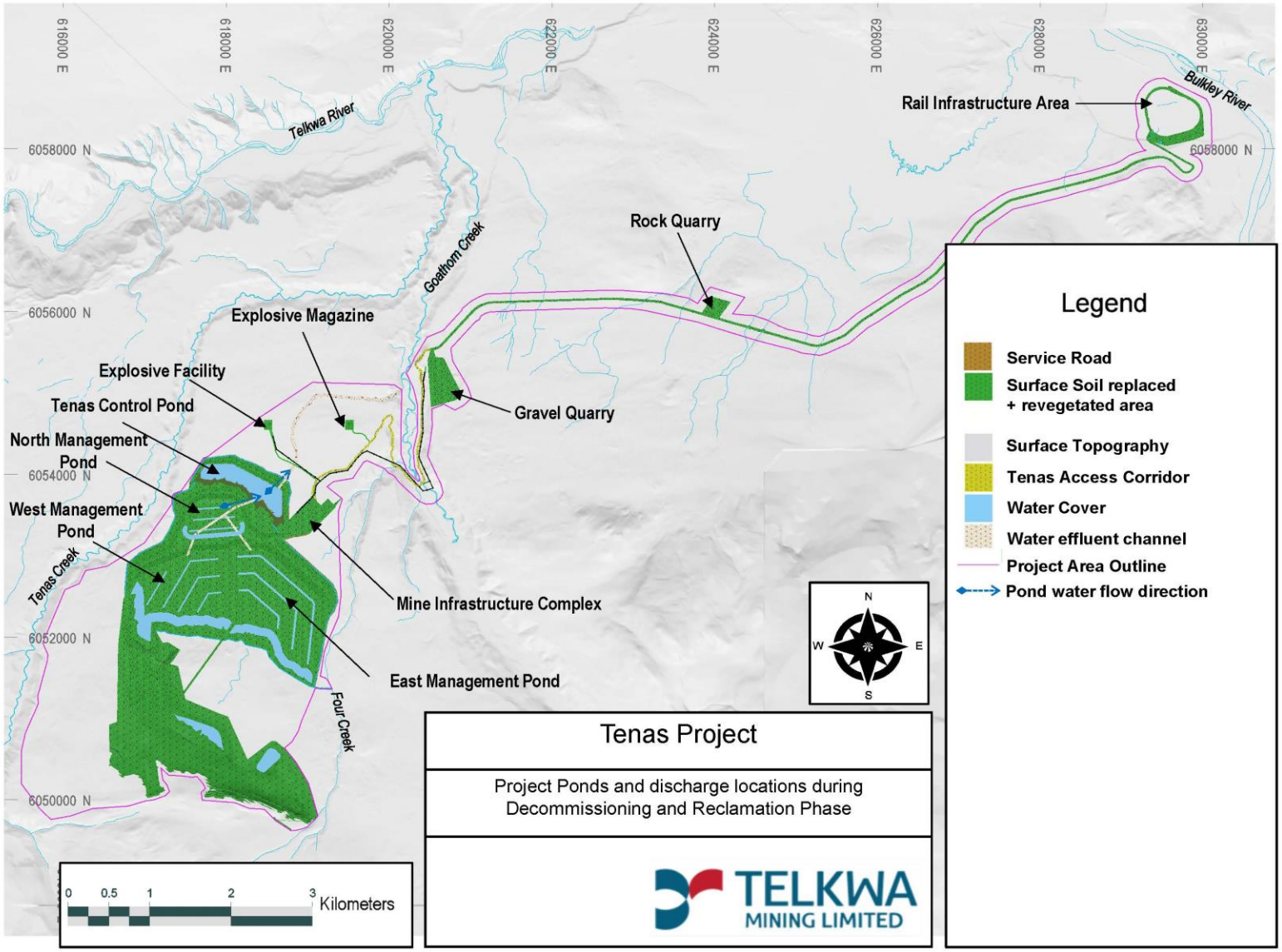


**Figure 2-5: Sedimentation Ponds Location and Operation During Decommissioning & Reclamation Phase not Included in WLBM**

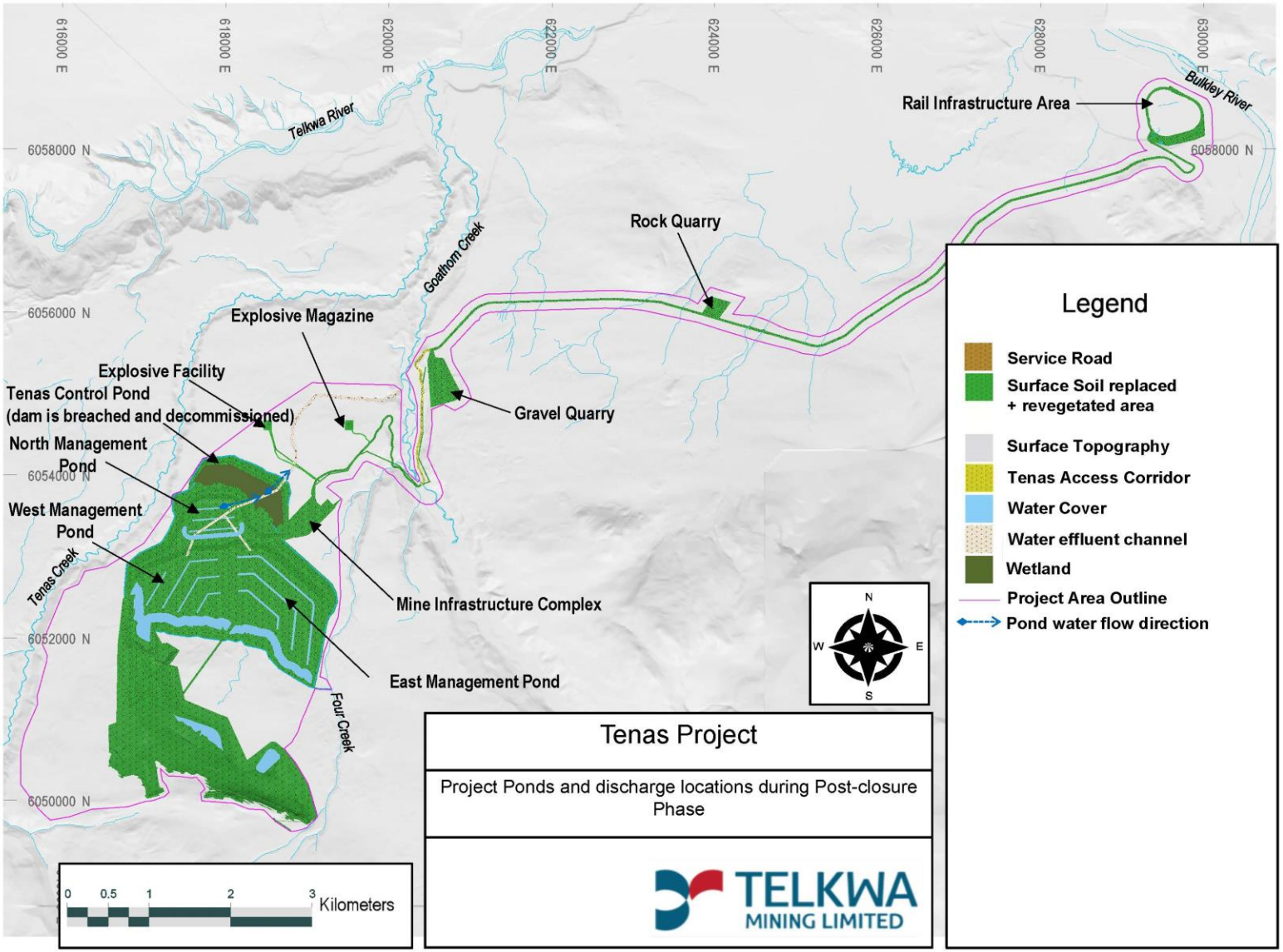


**Figure 2-6: Sedimentation Ponds Location and Operation During Post closure Phase not Included in WLBM**

Based on the above information the sedimentation ponds identified that the:

- Explosive Facility;
- Explosive Magazine;
- Rock Quarry;
- Gravel Quarry 1 and 2; and,
- East and West TAC

were not included in the overall WLBM completed by SRK for the EAC Application for the Project as including them would have no effect on the water quality and quantity modelled values presented for the prediction nodes nor on the subsequent effects assessments conducted for Surface Water Valued Component.

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by the BC Ministry of Environment (ENV) about the WLBM.

The following discharges have been accounted for in the WLBM:

- Tenas Control Pond;
- CPP Sedimentation Pond;
- Rail Infrastructure Sedimentation Pond;
- Potable Water Storage Pond; and,
- Wastewater Storage Pond.

The Tenas Control Pond is described in **subsections 1.9 Existing Infrastructure and Project Phases**, **1.10 Project Component Summary**, **1.16 Mine Infrastructure Complex (MIC)**, and **1.17 Water Management** in **1.0 Overview of Project Proponent Description** of the **EAC Application**. This pond is the main sedimentation pond for the Project and where mine impacted water is released during the open water season via a surface water discharge into an improved upon natural ephemeral water channel to prevent erosion and sediment release that leads into Goathorn Creek.

The CPP Sedimentation Pond is described in **subsections 1.9 Existing Infrastructure and Project Phases**, **1.10 Project Component Summary**, **1.16 Mine Infrastructure Complex (MIC)**, and **1.17 Water Management** in **1.0 Overview of Project Proponent Description** of the **EAC Application**. The EAC Application has water from the CPP Sedimentation Pond being pumped to the Tenas Control Pond and therefore this pond is not uniquely characterized but is combined with the discharge/seepage quality planned for the Tenas Control Pond. The CPP Sedimentation Pond is lined with a bituminous or alternate lining system. The CPP Sedimentation Pond will have a primary pumping system for pumping flows and a complete duplicate system to provide the

necessary redundancy for any potential pump failures. Furthermore, there will be a spare pump for each one of these systems in case of a pump failure and a backup diesel generator to run these pumps in case of grid power outages.

The discharge from the Wastewater Storage Pond is assessed as part of the overall surface flow discharge from the Tenas Control Pond. The Wastewater Storage Pond is lined with a bituminous or alternate lining system. The discharge from this pond will be via a pumped system to ensure a blending target ratio of 10 to 1 is maintained between flow from the Wastewater Storage Pond and the Tenas Control Pond. This pond has been sized to store a full year of treated wastewater from the sewage treatment plant.

The discharge from the Potable Water Storage Pond is non-contact water from water that is collected by the C02 Channel above the East Management Pond and EA Open Pit and directs this water to Four Creek or to the Potable Water Treatment Plant.

***FOLLOWUP COMMENTS***

***FOLLOW UP 302 ITT TABLE***

*The discharge of effluent from sedimentation ponds for overland flow to downstream watercourses does not follow best management practices. Erosion resulting from the discharge has the potential to increase the primary POPC (TSS) to receiving waters. The cumulative effects of these additional discharges to the receiving environment have not been accounted for the IDZ study and need to be quantified. Will any mine contact water be directed to the sedimentation ponds [Clarification]?"*

**RESPONSE FOLLOW UP 302 ITT TABLE**

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM.

***FOLLOWUP COMMENTS***

***508 ITT TABLE***

*This conceptual design brief and budgetary estimate does not state the effluent quality or discharge rate to the receiving environment. Please provide this information in a QP certified memo. If the sediment pond to which the effluent will be collected is not lined, please provide the infiltration rate. [Permitting Information Requirement]*

**RESPONSE 508 ITT TABLE**

The Sewage Treatment Plant proposed is a secondary stage treatment plant and is targeting the following average monthly maximum discharge parameters in milligrams per litre (mg/L) at a maximum rate of 5,400 $m^3$ per year:

- 43 mg/L Nitrate, as nitrogen;
- 0.10 mg/L Nitrite, as nitrogen;
- 2.0 mg/L Ammonia, as nitrogen;
- 20 mg/L Biochemical Oxygen Demand (BOD); and,

- 20 mg/L TSS.

The Sewage Treatment Plant has been designed to allow it to be upgraded to a tertiary style plant in the future if discharge requirements change. The wastewater storage pond where the effluent will be collected from the Sewage Treatment Plant is lined with a bituminous liner or equivalent as is the channel transporting this wastewater to the overall mine discharge channel from the Tenas Control Pond at which point this wastewater is mixed with discharge from the Tenas Control Pond. The wastewater pond has been designed to store a complete year of effluent to provide adequate time for controlled releases from the Wastewater Storage Pond to get an adequate mixing target of approximately 10 to 1 in Goathorn Creek. Please see the attached report from Radloff Engineering and Bionest on the wastewater system in **Appendix 7: Water and Wastewater Treatment Design Report and BioNest Assurance Letter, Radloff**.

Telkwa Mining believes the details above address the requirements set forth in IR **Theme 5**.

## THEME 2: SUBSTANTIALLY REVIEW THE WATER BALANCE MODEL. THE WATER BALANCE MODEL IS KEY TO ASSESSING MITIGATION AGAINST EFFECTS TO MANY VALUED COMPONENTS NOT ONLY WATER QUALITY

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Model input values and resulting predictions for the same management structures are inconsistent between the WLBM and the Groundwater model.*

***509 ITT TABLE***

*Table 3-16 and Table 3-17 present groundwater connections to mining facilities throughout the life of mine for the expected case and high case. There are some notable differences between these tables and the corresponding tables in Appendix 4.4-A (Tables 6-6, 6-7 and 6-11). For example, the WBM does not appear to consider any groundwater connection to the NMP, while the Groundwater Model predicts seepage from the NMP throughout the life of mine. In other instances, the results appear to be different between the version of the groundwater model used in the WBM and the model presented in the application. For instance, the expected seepage rate from the WMP in Post Closure is 720 m3/d in Appendix 4.4-A while the prediction is 610 m3/d in Appendix 4.3-A. This could increase the predicted post-closure exceedances of selenium at WQS04 as both the NMP and WMP contribute to loadings at this location (based on Table 3-20 in Appendix 4.3-A). Conversely, predicted seepage from EMP in post-closure under the expected case are lower in the Appendix 4.4-A than in Appendix 4.3-A (277 m3/d vs 395 m3/d, respectively) which would reduced to the loading to the receiving environment through groundwater pathways, but may impact the expected surface discharge from the EMP, routed through the NMP and into Goathorn Creek. Please provide water balance and water quality results using inputs from the Groundwater Model provided as part of the application. [EA Information Requirement, QP Response Required].*

***IR LETTER NEW AND 517 ITT TABLE***

*There are several inconsistencies in values between Table 3-16 and Table 3-17 and the corresponding groundwater tables in Appendix 4.4-A (Tables 6-6, 6-7 and 6-11) which have provided contradictory information and predictions related to seepage throughout the life of mine, specifically related to selenium loading.*

- *Have a QP provide water balance and water quality results using inputs from the Groundwater Model provided as part of the Application.*

### RESPONSE 517 AND 509 ITT TABLE

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM and **Appendix 8: Tenas Project, Hydrogeology Technical Report, SRK**.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Significant uncertainty remains in WLBM calibration, preventing a scientifically defensible effects assessment.*

***510 ITT TABLE***

*Section 3.1.2 describes the stochastic model used in Alternative Case 6, but this section does not demonstrate that the stochastic model adequately reproduces the temperature and precipitation variation defined in the baseline characterization (Appendix 1-R).*

a) *Please provide plots and tables showing the selected stochastic model parameters produce temperature and precipitation distributions that are representative of the baseline characterization.*

b) *Please provide a rationale to demonstrate 100 model realizations are sufficient to describe climate variability and indicate the range of return periods modeled by this set of realizations. [EA Information Requirement, QP Response Required]*

***IR LETTER NEW AND 518 ITT TABLE***

*Section 3.1.2 describes the stochastic model used in Alternative Case 6, but this section does not demonstrate that the stochastic model adequately reproduces the temperature and precipitation variation defined in the baseline characterization (Appendix 1-R).*

1. *Have a QP provide plots and tables showing the selected stochastic model parameters produce temperature and precipitation distributions that are representative of the baseline characterization.*
2. *Have a QP provide a rationale to demonstrate 100 model realizations are sufficient to describe climate variability and indicate the range of return periods modeled by this set of realizations.*

## RESPONSE 518 and 510 ITT TABLE

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Significant uncertainty remains in WLBM calibration, preventing a scientifically defensible effects assessment.*

***511 ITT TABLE***

*Please provide or indicate where in the application I can find, annual water balance tables for major mine facilities (Open Pit, EMP, NMP, WMP, Tenas Control Pond) quantifying all modeled inflows, outflows and storage for Operations and Post Closure under a range of climate conditions (average, wet and dry). [EA Information Requirement, QP Response Required]*

***IR LETTER NEW AND 519 ITT TABLE***

*Have a QP provide annual water balance tables for major mine facilities (Open Pit, East, West and North Management Ponds, Tenas Control Pond) quantifying all modeled inflows, outflows and storage for Operations and Post Closure under a range of climate conditions (e.g., average, wet and dry).*

## RESPONSE 511 and 519 ITT TABLE

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Model nodes need to be appropriately located near planned discharge locations rather than many kilometers downstream.*

***IR LETTER NEW AND 515 ITT TABLE***

*a) Have a QP add additional model nodes to represent conditions at:*

- *Tributary receiving discharge above confluence with Goathorn Creek.*
- *Goathorn Creek below confluence with tributary receiving discharge.*

*Have a QP provide water quantity and quality results for these nodes over the life of mine for the following assessment cases:*

- *Project Case*
- *Alternative Case 1, 2, 3, 4 and 5*

*Have a QP provide water quality results in figures and table with comparison to relevant water quality guidelines, as provided in Appendix 6 & G of Appendix 4.3-A of the application.*

***IR LETTER OVERVIEW***

*Seasonal and monthly variability of background water quality concentrations may affect predicted water quality parameter concentrations.*

***IR LETTER NEW AND 515 ITT TABLE***

*b) Have a QP clarify if the background water quality inputs used in the model were annual median values or if monthly (or seasonal) median values were used (section 3.10.1 of Appendix 04.3-A, the Water & Load Balance Modeling Report). If monthly or seasonal background concentrations were used, please provide a table describing their values and ranges. If monthly or seasonal median values were not used, have a QP re-run the Project Assessment Case and Alternative Assessment Case 5 (see Table 2-3 in Appendix 04.3-A) to generate water quality predictions using either monthly (or seasonal) median background values or the annual 95th percentile of background; present results in a format similar to Appendix 6 of Appendix 04.3-A.*

**RESPONSE 515 ITT TABLE**

The following prediction node have been added to the WLBM:

- WQEA1 which represents Goathorn Creek below confluence with tributary receiving discharge; and,
- A prediction node was not added for the tributary receiving discharge above confluence with Goathorn Creek as its quality has been assumed to be same as the end of pipe discharge due to the lack of water in this tributary.

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM. In summary the background water quality inputs used in the EAC Project Case (August 2022) WLBM were monthly mean values while seasonal values are used in both the Updated and Final EAC Project Cases (2024).

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Significant uncertainty remains in WLBM calibration, preventing a scientifically defensible effects assessment.*

***FOLLOW UP 293 ITT TABLE***

*"Thank you for the response. I note that the derived synthetic and measured site precipitation appear correlated, as demonstrated in the slides; however, the monthly linear relationships (pg 14) do not demonstrate a relationship approaching 1:1, which would indicate the synthetic approximates the measured data.*

- *a) To clarify, were these monthly relationships used to further adjust the derived synthetic record to improve the fit to the measured data? [Clarification, QP response required]*
- *b) Please provide a figure showing concurrent cumulative precipitation records (i.e., double mass curve) and a table with monthly and annual precipitation from both the measured record and final derived/synthetic record(s) that was:*
  - *i. used as input to the water balance model, and*
  - *ii. used to characterize site precipitation and estimate extreme precipitation. If separate records were used, please present both. [EA information requirement, QP response required]"*

***IR LETTER NEW AND NEW 293 ITT TABLE***

*Monthly linear relationships do not demonstrate a relationship approaching 1:1 which would indicate the synthetic approximates the measured data.*

1. *Have a QP clarify if monthly relationships were used to further adjust the derived synthetic record to improve the fit to the measured data;*
2. *Have a QP provide a figure showing concurrent cumulative precipitation records (i.e., double mass curve) and a table with monthly and annual precipitation from both the measured record and final derived/synthetic record(s) that was:*

a. *used as input to the WLBM; and used to characterize site precipitation and estimate extreme precipitation (if separate records were used, present both).*

## RESPONSE FOLLOW UP 293 ITT TABLE AND NEW 293 ITT TABLE

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Significant uncertainty remains in WLBM calibration, preventing a scientifically defensible effects assessment.*

***FOLLOW UP 294 ITT TABLE***

*Thank you for the response. I'm struggling to understand why this linear regression (Figure 4-16) was selected by the QP as appropriate for this analysis, given the issues described in the response. Without being able to attribute the difference unit runoff/discharge from these similarly located stations to a physical attribute or rationalize an incremental unit runoff of roughly 80 l/s/km2 for the area between these stations, using a 0.8 or 0.85 ratio to scale the historic Goathorn WSC record to the site station represents flawed logic, in my opinion. In particular, the high flow regression is driven, in large part, by the extrapolated high flow section of the site rating curve, where the curve is not supported by stage-discharge measurements.*

*As Goathorn Creek is the receiving environment for surface discharge from the proposed project and seepage from the management ponds in Post-Closure, the selected regression could have a notable impact on water quality predictions in the receiving environment, thus introducing considerable uncertainty into the assessment of impacts from the proposed project. I understand that this synthetic record was used, in part, to calibrate the rainfall-runoff model used in the water balance model. Using an updated regression (scale by drainage area or refined with*

*published data), please describe, and quantify the bias that was introduced into the baseline characterization, model calibration and results and impact assessment by the selected regression. Please consider comments ID 295 and 296 in your response. [EA information requirement, QP response required]*

***294 IR LETTER***

*Given the minor difference in drainage area between Goathorn-Hydro and Goathorn (08EE008) (1% difference), the selected linear regression (Fig 4-16) describes a surprisingly large difference in unit discharge.*
*Have a QP use an updated regression (scale by drainage area or refined with published data) to describe and quantify the bias that was introduced into the baseline characterization, model calibration, and results and impact assessment by the selected regression.*

## RESPONSE 294 IR LETTER AND FOLLOW UP 294 ITT TABLE

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM.

***INITIAL COMMENTS***

***295 ITT TABLE***

*Please provide figures showing mean monthly measured and rainfall-runoff modelled streamflow for Tenas-Hydro, Goathorn-Hydro, and Telkwa-Hydro. It is hard to see the match of hydrograph shape and amplitude at moderate and low flows from the figures provided. As results from the GoldSim model are presented monthly, I am also interested in the visual match at a monthly timestep, over the daily timestep provided. [Information Request]*

## RESPONSE 295 ITT TABLE

See Attachment #295-1 for mean monthly streamflow from measured and modelled datasets. For measured streamflow, monthly average values were only calculated for months missing less than 5 days of data.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Significant uncertainty remains in WLBM calibration, preventing a scientifically defensible effects assessment.*

***FOLLOW UP 295 ITT TABLE***

*Thank you for the plots. It appears the rainfall-runoff model underpredicts the freshet, particular in 2018, and typically predicts that the freshet peaks in June, rather than in April or May as shown in the measured record. In addition, the model appears to be underpredicting summer low flows, with the exception of 2018 at Tenas-Hydro only. As this model was used in the water balance model to predict runoff for unimpacted watersheds as well as reclaimed mine impacted areas, this calibration introduces considerable uncertainty into the water management and water quality predictions. In your response to the following questions, please consider comments ID 294 and 296.*

a) *What sensitivity analysis was completed on this model calibration? Were other rainfall-runoff model frameworks attempted and shown to be worse? In particular, I'm interested to know if a model with a more dynamic infiltration/runoff component was considered given the model application.*

b) *If the model were better calibrated to freshet conditions, please describe, and quantify the impact this would have on predicted surface discharge quantity and quality over the life of mine and over a range of climatic conditions?*

c) *If the model were better calibrated to summer low flow conditions, please describe, and quantify the impact this model improvement would have on predicted water quality in the receiving environment during low flow periods over the life of mine over a range of climatic conditions.*

d) *What data collection efforts are underway to support refining/recalibrating/redeveloping this model?*

e) *Why was this calibration considered sufficient for impact assessment? I note the QP has "strongly suggested that this study be revisited and that the model be recalibrated when longer ... records are available... and when all WSC flow data are published".*

**RESPONSE FOLLOW UP 295 ITT TABLE**

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Significant uncertainty remains in WLBM calibration, preventing a scientifically defensible effects assessment.*

***FOLLOW UP IR LETTER 295/296 AND 295 ITT TABLE***

*The rainfall – runoff model, used in the WLBM to predict runoff from unimpacted and reclaimed watersheds, appears to underpredict the median and range of flow conditions by a sizeable margin in Goathorn Creek, Tenas Creek and Telkwa River when compared to the synthetic records. The rainfall-runoff model also appears to poorly match the hydrograph shape, specifically the magnitude and timing of the freshet and the summer low flows when compared to the measured record. This poor calibration introduces considerable uncertainty into the water management and water quality predictions based on the WLBM results.*

- *Have a QP provide a robust demonstration that the model is sufficiently calibrated to available measured and synthetic datasets with a focus on common flow conditions (the annual range of average flow conditions). Where modeled results deviate considerably from baseline characterization, describe and quantity the impact to predicted surface discharge quantity and quality, and predicted water quality in the receiving environment over the life of mine and for the applicable assessment cases caused by model bias.*

  *OR*

- *Have a QP recalibrate the rainfall-runoff model to provide the evidence outlined above. Describe the impact on surface water discharge quantity and quality, water management (waste management pond water levels), and receiving environment water quality over the life of mine. Provide revised results in a format consistent with Appendix 6 and G Appendix 4.3-A of the application for all assessment cases.*

**RESPONSE FOLLOW UP 295 ITT TABLE**

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Significant uncertainty remains in WLBM calibration, preventing a scientifically defensible effects assessment.*

***FOLLOW UP IR LETTER 295/296 AND 296 ITT TABLE***

*Thank you for the plots. It appears the rainfall-runoff model underpredicts the median and range of flow conditions by a sizeable margin in Goathorn Creek, Tenas Creek and Telkwa River when compared to the synthetic records. The flows at the 50% probability of exceedance in Telkwa River appear to be underestimated by over 10 m3/s and the estimated mean annual discharge (MAD) at this location is 27.3 m3/s (Table 4-24). Based on the provided flow duration curve (FDC) figure in the response, MAD has a 70% probability of exceedance using the synthetic record while the modelled record gives MAD a 45% probability of exceedance. Similarly, for Tenas Creek, at the 50% probability of exceedance, the modelled record is roughly 0.1 m3/s lower than the synthetic record, and the estimated MAD at this location is 0.5 m3/s. Based on the FDC for Tenas, MAD has a 26% probability of exceedance using the synthetic record, and the difference between the synthetic and modeled is roughly 0.15 m3/s, indicating the MAD is modeled roughly a third lower than the synthetic record suggests. At Goathorn Creek, the modeled record underpredicts the synthetic, which is likely also underestimated (see ID 294).*

*a) Why was this calibration considered sufficient for impact assessment?*

*b) Please calibrate the model to the bulk of flow conditions and describe and quantify the impact on surface water discharge quantity and quality, water management (waste management pond water levels), and receiving environment water quality over a range a flow conditions over the life of mine.*

*[EA information requirement, QP response required]*

**RESPONSE FOLLOW UP 296 ITT TABLE**

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM.

Telkwa Mining believes **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** with the answers provided above addresses the requirements set forth in IR **Theme 2**.

## THEME 1: DESIGN ALTERNATIVE TREATMENT OPTIONS WHICH ARE CAPABLE OF MEETING WATER QUALITY GUIDELINES (WQGS) NEAR APPROPRIATELY SITED DISCHARGE LOCATIONS

***FOLLOWUP COMMENTS***

***175 ITT TABLE***

*EMLI is consulting with ENV on water quality monitoring and water management measures for this project. Telkwa Coal will need to propose conceptual design of management structures as part of the current application to demonstrate that the Project as proposed is capable of managing water not suitable for discharge and meeting WQGs.*

***176a ITT TABLE***

*EMLI understands that ENV's review of the surface water quality effects assessment and proposed water quality benchmarks is ongoing. EMLI notes that based on that review additional water quality mitigation for the Project may be required. Should water treatment or other mitigation measures be proposed for the Project, EMLI will review the information at that time. Telkwa Coal is encouraged to engage as soon as possible with EMLI on any proposed water treatment, especially if any passive or semi-passive technologies are proposed.*

### RESPONSE 176a ITT TABLE

Telkwa Mining understands if water treatment becomes a requirement that EMLI will need to be engaged with these technologies, whether they are passive, semi-passive or active. Telkwa Mining has started engagement with EMLI as of Q3, 2024.

***LETTER IR 176 AND 176b ITT TABLE***

1. *Provide conceptual design of alternative treatment options, mitigation measures, and management structures that can manage water not suitable for discharge and that meet BC WQGs.*

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*The Water and Load Balance Model (WLBM) is key to assessing the effectiveness of mitigation against effects to many VCs, including water quality.*

- *Source control and mitigation or treatment options included in the WLBM do not demonstrate that Water Quality Guidelines (WQG) will be met near discharge locations and will lead to exceedance of WQGs over many kilometres of multiple watercourses.*

***FOLLOW UP IR LETTER NEW AND 514 ITT TABLE***

*Provide design alternative treatment options which are capable of meeting WQGs near appropriately sited discharge locations. Describe the reliability, control-effectiveness, and treatment efficiency of each mitigation option including the currently proposed option – refer to BC ENV Best Achievable Technology (BAT) guidance. BAT assessments are required prior to the development of Initial Dilution Zones (IDZs) – also refer to BC IDZ development guidance.*
*When considering discharge standards, follow these best practices and minimum standards:*

a) *The discharge must not be acutely toxic.*

Telkwa Mining completed a two-step process to determine if the discharges are potentially acutely toxic as follows:

1. A review was conducted of the end of pipe discharge concentrations versus the relevant BC Water Quality Acute Guidelines with any parameter having a concentration less than these guidelines not being acutely toxic; and,
2. For the few parameters that had end of pipe concentrations higher than the BC Water Quality Acute Guidelines, Borealis Environmental Consulting Inc was retained to review these concentrations versus the relevant acute toxicity limits for rainbow trout and Daphne Magna and determined that the modelled concentrations at end of pipe are not acutely toxic. Please see **Appendix 9: Evaluation of Acute Daphnia Magna and Rainbow Trout LC50 Toxicity Supporting Tenas Project Best Available Technology Assessment Study – Parameters of Concern: Nitrite, Iron (Total) and Iron (Dissolved)**.

Telkwa Mining commits to toxicity testing of final effluent discharges utilizing the methodology provided by BC government via Section F Toxicity Test Methods (https://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/manuals/environmental-lab-manual/2023-09-18-bc-elm-2022-section-f.pdf).

*b) If the untreated effluent contains constituents that exceed 80% of an applicable WQG, BMPs and BAT must be applied. Chronic WQG for the protection of freshwater aquatic life are most typically used as the guideline. However, if more sensitive uses or values are downstream (e.g., drinking water, irrigation, livestock, wildlife) the most protective WQG will be applied.*

*c) If the effluent still does not meet WQGs, repeat step (b). Document this iterative process.*

*d) If the effluent still does not meet WQGs after all reasonable BMPs and BAT are applied, an IDZ may be considered during the permitting process. Some chronic toxicity may be tolerated in the IDZ, but water quality should meet WQGs at the end of the IDZ. An IDZ will not be considered during permitting without an adequate BAT assessment.*

*e) If the water quality at the end of the IDZ still exceeds chronic WQGs, an SPO may be considered during the permitting process. SPOs must be protective of the site-specific environment. An SPO will not be considered during permitting without an adequate BAT assessment.*

***514 ITT TABLE***

*Within the bounds of the above best practices and minimum standards, the proponent, and their qualified professionals (QPs) are normally best suited to consider which site-specific factors should be evaluated regarding feasibility, reliability, control effectiveness, and cost effectiveness. To improve efficiency, it may be useful to have a conversation with the ENV on the file once an outline for the BAT assessment has been developed. In practice, the depth and detail of the BAT assessment submittal will be proportionate to the projected effluent quality. If the selected BAT will achieve BC WQGs at the point of discharge, the submittal can be brief and will likely be readily advanced. If the selected BAT is not capable of meeting BC WQGs in the receiving environment, the submittal must be more substantial and will be subjected to a more intensive review, as it must justify the greater risk to the environment.*

*Some of the technologies TCL has proposed to consider during the BAT assessment are likely to be effective mitigation measures for the Tenas project. TCL may need to consider a set (a series or train) of technologies to address all contaminants of concern. During an EA process, technologies must be at a readiness level of 7 to be considered as primary mitigation. At permitting, technologies must be at a readiness level of 8 or 9 to be considered as primary mitigation. ENV and EMLI consider some of the proposed technologies to be below the appropriate technology*

*readiness level (TRL) for the Tenas project. The proponent may conduct a Technology Readiness Assessment (TRA) (refer to technical guidance 21 on the Mining and Smelting Guidance webpage) for consideration by ENV and EMLI to demonstrate the technological readiness of any proposed technology. TCL is encouraged to engage with ENV and EMLI prior to undertaking a TRA.*

***FOLLOW UP 353 ITT AND 355 ITT TABLE***

*As a result of the BAT conducted for waste rock and tailings management, the selected strategy (subaqueous storage) will provide a good degree of source control in terms of ML/ARD rate, thereby improving effluent quality. However, a BAT assessment is also required to consider appropriate strategies for the management of mine effluent that will be discharged to the environment.*

*Discharges to ground and non-point source discharges to the environment must be assessed in addition to discharges to surface water. Standard thresholds for discharges to ground are outlined in the ENV guidance document, which is located here: https://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/mining-smelt-energy/guidance-documents/7276_env_rob_dtg_factsheet.pdf*

*The water quality model predicts that, due to a slowly advancing groundwater plume, the project will result in WQG exceedances in Four and Tenas Creeks. Although these impacts may not occur until after the target coal has been extracted, they are predicted to persist for generations.*

*The response to the initial comment includes an explanation that assumes an Initial Dilution Zone (IDZ). Similar to the SPOs, an IDZ will not be assessed or authorized unless a BAT assessment is first conducted (following the ENV guidance document). Following BAT, these considerations (SPOs and IDZ) can be assessed through the permitting process under the Environmental Management Act but are not appropriate for inclusion in this review under the Environmental Assessment Act. [Permitting Information Requirement]*

***IR LETTER OVERVIEW***

*Reviewers have identified that the current Application shows potential for significant adverse effects to water quality and aquatic biota as there is insufficient water quality mitigation measures to protect the receiving environment.*

- *The predicted water quality and the approach to use a few small watercourses as effluent conveyance will result in residual effects to aquatic valued components (VCs) that cannot be reliably managed in BC Environmental Management Act permitting.*

*Alternative treatment options capable of meeting WQGs at appropriately sited discharge locations are missing from the Application.*

*Additional conceptual design of alternative treatment options, mitigation measures, and management structures are needed to prevent the discharge of water that is not suitable for release to the environment.*

***IR LETTER OVERVIEW***

*The Water and Load Balance Model (WLBM) is key to assessing the effectiveness of mitigation against effects to many VCs, including water quality.*

- *Source control and mitigation or treatment options included in the WLBM do not demonstrate that Water Quality Guidelines (WQG) will be met near discharge locations and will lead to exceedance of WQGs over many kilometres of multiple watercourses.*

***LETTER IR 350 AND 350 ITT TABLE***

*Provide additional mitigation measures to address the significant exceedance of WQGs in frequency and duration for selenium, nitrite, sulphate and dissolved cadmium in Four Creek and Tenas Creek.*

**RESPONSE IR 175, 176b, 514, 350, 353, and 355**

## Final EAC Project Case (2024) Development

Telkwa Mining considered incorporating multiple additional mitigation controls in developing the Final EAC Project Case (2024) consisting of the following additional mitigation controls/best management practices (BMP) and/or technologies:

- Management and Control Pond liner design modifications (technology);
- Additional use of water by the CPP (BMP);
- Blasthole Liners (BMP);
- Passive/Active Flocculation(technology);
- Storage and Use of Freshet Water (BMP);
- Water treatment for surface water flows (technology); and
- Water treatment of seepage flows (technology).

The Final EAC Project Case (2024) does not have exceedances in the receiving environment except for parameters that are already in exceedance for background/baseline conditions and a short duration (4 year) exceedance of cobalt in Four Creek which is likely not to occur if attenuation mechanisms in groundwater were accounted for in the water model.

The following sections provide a description of each additional mitigation control/technology and modelled parameter concentrations compared to the Updated EAC Project Case (2024). Please see **Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK.**

### *Management and Control Pond Liner Modifications (technology)*

**Table 2-2** provides a summary of the liner systems presented in the EAC Application. These liners were incorporated into the various management and control ponds for the control of seepage from these structures primarily towards the downstream watercourses of Tenas, Four, and Goathorn Creeks.

### Table 2-2: Environmental Assessment Certificate (EAC) Liner Designs

| Location | Liner Type | Details |
|---|---|---|
| Tenas Control Pond | Bituminous | A bituminous liner installed on compacted existing overburden |

| Location | Liner Type | Details |
|---|---|---|
| North Management Pond (floor, embankment face) | Soil-Bentonite | 30-centimetre (cm)-thick soil bentonite liner that is blended into existing overburden and compacted and then followed by a 16-ounce filter fabric protection layer all installed on top of compacted existing overburden |
| East Management Pond (floor, embankment face) | Soil-Bentonite | 30-cm-thick soil bentonite liner that is blended into existing overburden and compacted and then followed by a 16-ounce filter fabric protection layer all installed on top of compacted existing overburden |
| West Management Pond (overburden floor, overburden in the pit and embankment face) | Soil-Bentonite | 30-cm-thick soil bentonite liner that is blended into existing overburden and compacted and then followed by a 16-ounce filter fabric protection layer all installed on top of compacted existing overburden |
| West Management Pond (bedrock floor) | None | No liner prescribed |
| West Management Pond (bedrock south end EA Open Pit wall) | None | No liner prescribed |

SRK completed an option analysis for Telkwa Mining on various liner modifications with the aim of reducing the potential impact of groundwater seepage to the receiving environment. **Table 2-3** provides two modified liner designs that were considered as a potential technology for BAT assessment provided in **Appendix 11: Tenas Project Best Achievable Technology Assessment Updated, SRK**.

### Table 2-3: Revised Liner Designs Investigated

| Location | Liner Type | Revised Liner Design Details |
|---|---|---|
| Tenas Control Pond | Soil-Bentonite with Bituminous Line Above | 15-centimetre (cm)-thick soil bentonite liner that is blended into existing overburden and compacted and then followed by a bituminous geomembrane liner on top of this installed on compacted existing overburden. |
| North Management Pond (floor, embankment face) | Soil-Bentonite | 56-cm-thick soil bentonite liner that is blended into existing overburden and compacted and then followed by a 30-cm thick layer of compacted overburden protection layer installed above the liner. |
| East Management Pond (floor, embankment face) | Soil-Bentonite with Bituminous | Option 1: 56-cm-thick soil bentonite liner that is blended into existing overburden and compacted and then followed by a 30-cm layer of compacted overburden protection layer installed above the liner.<br>Option 2: 56-cm-thick soil bentonite liner that is blended into existing overburden and compacted and then followed by a bituminous geomembrane liner followed by |

| Location | Liner Type | Revised Liner Design Details |
|---|---|---|
| | | a 30-cm layer of compacted overburden protection layer installed above the liner. |
| West Management Pond (overburden floor, overburden in the pit and embankment face) | Soil-Bentonite | 56-cm-thick soil bentonite liner that is blended into existing overburden and compacted and then followed by a 30-cm layer of compacted overburden protection layer installed above the liner. |
| West Management Pond (bedrock floor)** | None** | No liner prescribed** |
| West Management Pond (bedrock south end wall) | None | No liner prescribed |

**Notes:**

**There is still the possibility to introduce a soil-bentonite liner in the West Management Pond bedrock floor portions during the Operation Phase if parameters of concern are found to be higher in the North, and East Management Ponds than predicted in the EA.

The revised liners specified in **Table 2-3** above were incorporated into the groundwater model to determine seepage levels from these facilities with the revised technical report provided in **Appendix 8: Tenas Project, Hydrogeology Technical Report, SRK**. **Table 2-4** provides a summary of the changes in net seepage values achieved for the above structures.

### Table 2-4: Seepage Values in $m^3$ per day with Revised Liner Designs at End of Mining for Options 1 and 2

| CASE | WMP | NMP | EMP | TCP |
|---|---|---|---|---|
| Updated EAC Project Case (2024) | 836 | 198 | 458 | 140 |
| Option 1 | 373 | 87 | 277 | 8 |
| Option 2 | 373 | 87 | 63 | 8 |

These revised seepage values were then used as inputs for the water and load balance model to look at potential mitigations compared to a base case without the use of liners. This was completed by SRK in Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK with **Table 2-5** providing a summary of these results for relevant prediction nodes. Based on the information in **Table 2-5** it was decided to carry this mitigation control forward into the BAT assessment process to determine if this mitigation control is recommended to be incorporated into the Final EAC Project Case (2024).

**Table 2-5: Water Quality (Maximum Monthly Mean) Results for Revised Liner Designs in Post-closure using Typical Source Terms and Average Hydrology at Relevant Prediction Nodes**

| Location Creek | Parameter | BC WQG (2024) (mg/L) | Updated EAC Project Case (2024) (mg/L) | Liner Option 1 (mg/L) | Liner Option 2 (mg/L) |
|---|---|---|---|---|---|
| WQSEA1 Goathorn Creek | Copper (d) | 0.0013 | 0.0021 | 0.0021 | 0.0021 |
| WQSO6 Goathorn Creek | Copper (d) | 0.0013 | 0.0021 | 0.0021 | 0.0021 |
| WQS03-DS Four Creek | Cobalt (t) | 0.004 | 0.00068 | 0.00092 | 0.00050 |
| | Nitrite (t) | 0.020 | 0.015 | 0.0084 | 0.00027 |
| | Sulphate (t) | 309 | 33 | 18 | 6 |
| | Selenium (t) | 0.0020 | 0.00081 | 0.00045 | 0.00013 |
| WQS04 Tenas Creek | Copper (d) | 0.0026 | 0.0015 | 0.0015 | 0.0015 |
| | Nitrite (t) | 0.020 | 0.0090 | 0.0084 | 0.0080 |
| | Sulfate (t) | 218 | 24 | 22 | 20 |
| | Selenium (t) | 0.0020 | 0.00078 | 0.00072 | 0.00063 |

**Notes:** %=percent; BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligrams per litre; WQG=water quality guidelines.
Red text indicates exceedances of WQGs.
Please note that dissolved copper exceeds the WQGs under background conditions.

### *Additional Water Use by the CPP*

The current EAC application has the CPP producing a dry (25% moisture) processed rock stream that is then hauled and placed into the management ponds. The primary reason for this was to limit water use by the Project. However, as the Project discharges water every year when in operation even during drought conditions there is an opportunity to go to a conventional wet slurry system for the processed rock stream by the CPP. This will increase the amount of water required by the CPP with the benefit of permanently tying up this water into the coarse and fine processed rock products. Water from the open pit would be used for this additional use and would improve water quality discharged by the Project. The change in water use by the CPP was incorporated into the WLBM report completed by SRK which is provided in **Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK** with **Table 2-6** below providing a summary of these results for the relevant prediction nodes. Based on these

results and the increased water usage this mitigation control was not carried forward into the Final EAC Project Case (2024).

**Table 2-6: Water Quality (Maximum Monthly Mean) Results for Additional Water Use by the CPP during Operation in Post-closure using Typical Source Terms and Average Hydrology at Relevant Prediction Nodes**

| Location Creek | Parameter | BC WQG (2024) (mg/L) | Updated EAC Project Case (2024) (mg/L) | Additional CPP Water Use (mg/L) |
|---|---|---|---|---|
| WQSEA1 Goathorn Creek | Copper (d) | 0.0013 | 0.0021 | 0.0021 |
| WQSO6 Goathorn Creek | Copper (d) | 0.0013 | 0.0021 | 0.0021 |
| WQS03-DS Four Creek | Cobalt (t) | 0.004 | 0.00068 | 0.00069 |
| | Nitrite (t) | 0.020 | 0.015 | 0.015 |
| | Sulphate (t) | 309 | 33 | 34 |
| | Selenium (t) | 0.0020 | 0.00081 | 0.00085 |
| WQS04 Tenas Creek | Copper (d) | 0.0026 | 0.0015 | 0.0015 |
| | Nitrite (t) | 0.020 | 0.0090 | 0.0091 |
| | Sulfate (t) | 218 | 24 | 24 |
| | Selenium (t) | 0.0020 | 0.00078 | 0.00082 |

**Notes:** %=percent; BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligrams per litre; WQG=water quality guidelines.
Red text indicates exceedances of WQGs.
Please note that dissolved copper exceeds the WQGs under background conditions.

### *Blasthole Liners*

Telkwa Mining has incorporated the use of blasthole liners for holes in rock requiring the addition of blasting agents into the Final EAC Project Case (2024) using a 75% effectiveness on the portion of nitrogen species being produced from blasting which is conservative compared to the actual 95% effectiveness observed at current operations in BC.

The change in nitrogen species was incorporated into the WLBM report completed by SRK which is provided in **Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK**, with **Table 2-7** below providing a summary of these results for the relevant prediction nodes. Based on these results this mitigation control was incorporated into the Final EAC Project Case (2024).

**Table 2-7: Water Quality (Maximum Monthly Mean) Results for Use of Blasthole Liners during Operation in Post Closure using Typical Source Terms and Average Hydrology at Relevant Prediction Nodes**

| Location Creek | Parameter | BC WQG (2024) (mg/L) | Updated EAC Project Case (2024) (mg/L) | Use of Blasthole Liners (mg/L) |
|---|---|---|---|---|
| WQSEA1 Goathorn Creek | Copper (d) | 0.0013 | 0.0021 | 0.0021 |
| WQSO6 Goathorn Creek | Copper (d) | 0.0013 | 0.0021 | 0.0021 |
| WQS03-DS Four Creek | Cobalt (t) | 0.004 | 0.00068 | 0.00068 |
| | Nitrite (t) | 0.020 | 0.015 | 0.010 |
| | Sulphate (t) | 309 | 33 | 33 |
| | Selenium (t) | 0.0020 | 0.00081 | 0.00081 |
| WQS04 Tenas Creek | Copper (d) | 0.0026 | 0.0015 | 0.0015 |
| | Nitrite (t) | 0.020 | 0.0090 | 0.0060 |
| | Sulfate (t) | 218 | 24 | 24 |
| | Selenium (t) | 0.0020 | 0.00078 | 0.00078 |

**Notes**: %=percent; BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligrams per litre; WQG=water quality guidelines.
Red text indicates exceedances of WQGs.
Please note that dissolved copper exceeds the WQGs under background conditions.

### *Passive/Active Flocculation*

The EAC Application had a target of producing a maximum TSS concentration for 35 mg/L discharging from sedimentation ponds. To reduce total concentrations of parameters such as Iron and Aluminium, passive and active flocculation can be added to the TCP to reduce the designed maximum TSS concentrations from 35 mg/L to 5 mg/L.

The change in TSS was incorporated into the WLBM report completed by SRK which is provided in **Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK**, with **Table 2-8** below providing a summary of these results for the relevant prediction nodes. Based on the information in **Table 2-8** it was decided to carry this mitigation control forward into the BAT assessment process to determine if this mitigation control is recommended to be incorporated into the Final EAC Project Case (2024).

**Table 2-8: Water Quality (Maximum Monthly Mean) Results for the Use of Passive/Active Flocculation During Operation in Post-closure using Typical Source Terms and Average Hydrology at Relevant Prediction Nodes**

| Location Creek | Parameter | BC WQG (2024) (mg/L) | Final EAC Project Case (2024) (mg/L) | Decrease TSS levels to 5 mg/L (mg/L) |
|---|---|---|---|---|
| Tenas Control Pond | Aluminum (t) | 0.27 | 0.39 | 0.07 |
| | Iron (t) | 1.0 | 1.5 | 0.2 |

**Notes**: %=percent; BC=British Columbia; EAC=Environmental Assessment Certificate; WQG=water quality guidelines. Red text indicates exceedances of WQGs.

### *Storage and Use of Freshet Water*

Telkwa Mining has investigated the storage and use of Freshet water from Channel C02 that diverts water around the Project into Four Creek. The use of water from the C02 channel is to improve the robustness of the water cover for PAG material in the management ponds especially the East Management Pond.

The change in the storage and use of freshet water was incorporated into the WLBM report completed by SRK which is provided in **Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK**, with **Table 2-9** below providing a summary of these results for the relevant prediction nodes. Given the minor reductions in parameter concentrations in the receiving environment and that this option is inconsistent with the best management practice of keeping noncontact water out of the Project, this mitigation control was not carried forward into the Final EAC Project Case (2024).

**Table 2-9: Water Quality (Maximum Monthly Mean) Results for the Storage and Use of Freshet Water at Relevant Prediction Nodes**

| Location Creek | Parameter | BC WQG (2024) (mg/L) | Updated EAC Project Case (2024) (mg/L) | Additional C02 Water to MPs (mg/L) |
|---|---|---|---|---|
| WQSEA1 Goathorn Creek | Copper (d) | 0.0012 | 0.0021 | 0.0021 |
| WQSO6 Goathorn Creek | Copper (d) | 0.0012 | 0.0021 | 0.0021 |
| WQS03-DS Four Creek | Cobalt (t) | 0.004 | 0.00068 | 0.00056 |
| | Nitrite (t) | 0.020 | 0.015 | 0.011 |
| | Sulphate (t) | 309 | 33 | 26 |
| | Selenium (t) | 0.0020 | 0.00081 | 0.00063 |

| Location Creek | Parameter | BC WQG (2024) (mg/L) | Updated EAC Project Case (2024) (mg/L) | Additional C02 Water to MPs (mg/L) |
|---|---|---|---|---|
| WQS04 Tenas Creek | Copper (d) | 0.0026 | 0.0015 | 0.0015 |
| | Nitrite (t) | 0.020 | 0.0090 | 0.0079 |
| | Sulfate (t) | 218 | 24 | 22 |
| | Selenium (t) | 0.0020 | 0.00078 | 0.00065 |

**Notes:** %=percent; BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligrams per litre; WQG=water quality guidelines.
Red text indicates exceedances of WQGs.
Please note that dissolved copper exceeds the WQGs under background conditions.

### *Active Water Treatment*

This mitigation control allows for the treatment of surface flows via various methods prior to water being discharged. This mitigation control was reviewed further using the subsequent BAT assessment process to select the appropriate technology for this Project and then determine if this technology was recommended.

### *Summary of BMP Assessment Process*

Based on analysis above, **Table 2-10** below was generated which summarizes the results of the BMP Assessment process indicating which BMPs were selected for incorporation into the Final EAC Project Case (2024) and which technologies should be reviewed further in the BAT Assessment Process.

### Table 2-10: Summary of the BMP Assessment Process

| BMP / Technology | Incorporation into the Final EAC Project Case (2024) | Carried forward into the BAT Assessment Process | Comment |
|---|---|---|---|
| Additional use of water by the CPP | No | N/A | Not effective for the reduction of POCs in either seepage or surface discharge |
| Blasthole Liners | Yes | N/A | Incorporate into Final EAC Project Case (2024) as a source control technology |
| Storage and Use of Freshet Water | No | N/A | Not effective for the reduction of Parameters of Concern (POCs) in either seepage or surface discharges |
| Management and Control Pond Liner Modifications | N/A | Yes | Effective for reduction of seepage reaching downstream creeks |
| Passive/Active Flocculation | N/A | Yes | Effective for reduction some total parameter concentraions such as Iron |
| Active Water Treatment | N/A | Yes | Effective for reduction of POCs in surface water discharge to Goathorn Creek |

### BAT Assessment

As a reminder the Final EAC Project Case (2024) does not have exceedances in the receiving environment except for parameters that are already in exceedance for background/baseline conditions and a short duration (4 year) exceedance of cobalt in Four Creek which is likely not to occur if attenuation mechanisms in groundwater were accounted for in the water model.

As provided above the following mitigations were carried forward into the BAT process:

- Modified liners in the management and control ponds;
- Passive/Active Flocculation; and,
- Active water Treatment.

SRK identified several Parameters of Concern (POCs) based on the guidance definition provide by the Ministry of Environment for the Updated EAC Project Case (2024) WLBM using typical source terms. Potential water treatments could be applied to try and meet BC WQGs at the end of pipe and the receiving environment. To that effect, Telkwa Mining contracted SRK to complete a BAT assessment on available treatment technologies for these POCs using the guidance provided by the BC provincial government and SRK's full report is provided in **Appendix 11: Tenas Project Best Achievable Technology Assessment Updated, SRK**. A multi-step process that mirrored the 2024 guidance provided by BC ENV was followed as summarized by **Figure 2-7** below.

**Table 2-11** below summarizes the results obtained by the MAA for the various water treatment technologies that were carried forward from screening analysis.

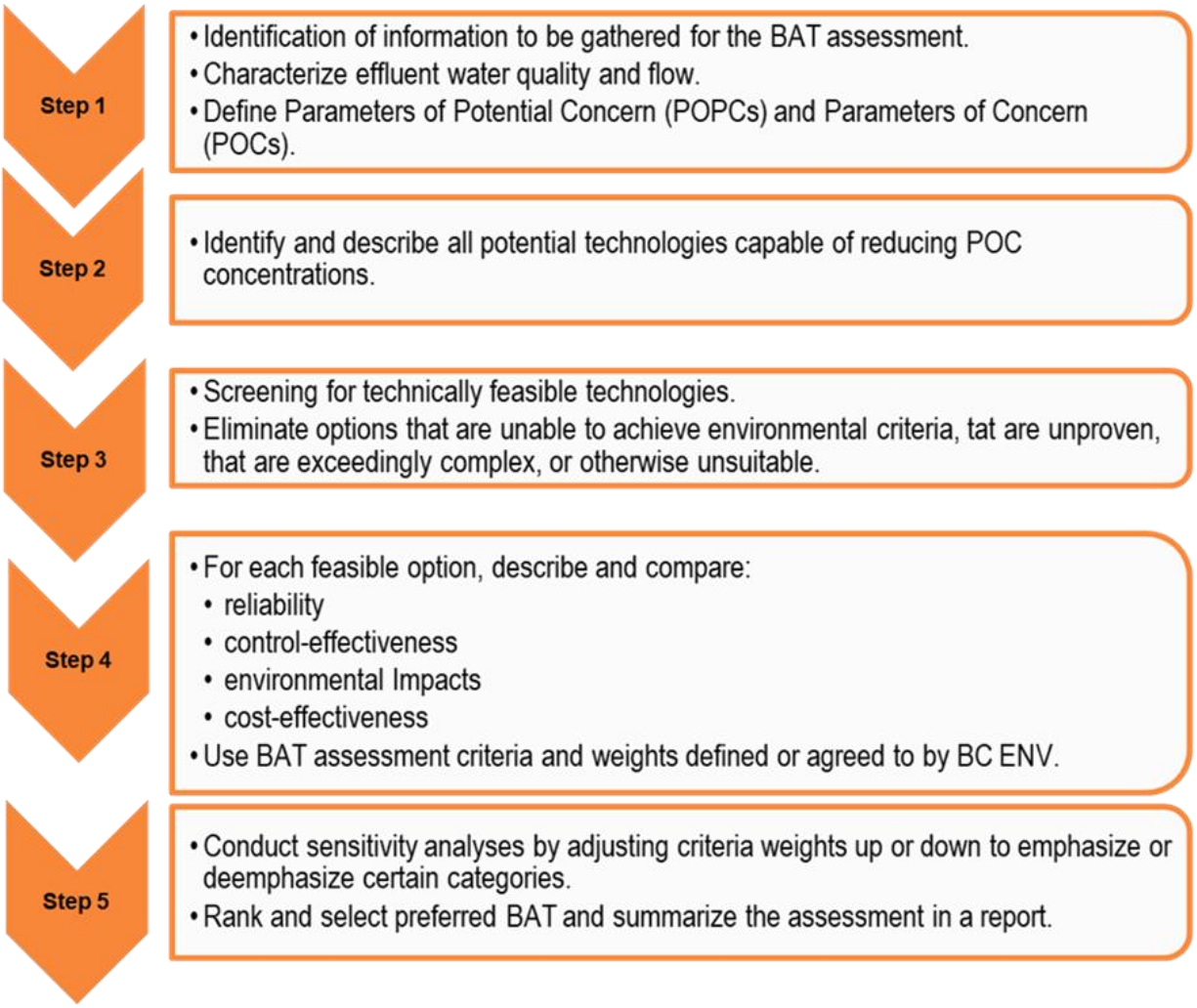


**Figure 2-7: Bat Methodology Based on BC ENV's 2024 Guidance Document**

## Table 2-11: Summary of MAA Rankings for Active Water Treatment Technologies that Met Screening Requirements

| | | Base Case with BMPs | Passive/Active Flocculation | In-situ Active (GBR) | RO + MBBR | RO + MBBR + HDS Lime | RO + MBBR + Sulphide | RO + MBBR + Ferric | RO + MBBR + Ion Exchange | Zero Liquid Discharge | Modified Liners in Water Management Ponds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Assessment Criterion** | **Weight** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** | **Option 6** | **Option 7** | **Option 8** | **Option 9** | **Option 10** |
| **Reliability** | **20** | **17** | **16** | **14** | **15** | **14** | **14** | **15** | **14** | **12** | **16** |
| **Risk Assessment** | 5 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| **Robustness** | 5 | 5 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 5 |
| **Scalability** | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 3 |
| **Long-term Viability** | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 5 |
| **Control-Effectiveness** | **30** | **13** | **13** | **20** | **20** | **22** | **22** | **20** | **26** | **28** | **13** |
| **Pollutant Reduction** | 20 | 1 | 1 | 2.5 | 2.5 | 3 | 3 | 2.5 | 4 | 4.5 | 1 |
| **Toxicity Reduction** | 10 | 4.5 | 4.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4.5 |
| **Environmental & Socio-Cultural Impacts** | **25** | **23** | **23** | **22** | **20** | **17** | **17** | **17** | **17** | **10** | **22** |
| **Energy Efficiency** | 5 | 5 | 5 | 4.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 5 |
| **Greenhouse Gas Emission** | 6 | 5 | 5 | 4.5 | 4 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 3.5 |
| **Footprint** | 4 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 3 | 3 | 5 |
| **Secondary Waste Production** | 5 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 2.5 | 1 | 5 |
| **Adherence to Yintah Management Directives** | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Cost-Effectiveness** | **25** | **25** | **25** | **22** | **14** | **12** | **12** | **12** | **12** | **5** | **19** |
| **Efficient Use of Existing Resources** | 3 | 5 | 5 | 4 | 2 | 2 | 2 | 2 | 2 | 1.5 | 3 |
| **Life Cycle Cost Analysis** | 22 | 5 | 5 | 4.5 | 3 | 2.5 | 2.5 | 2.5 | 2.5 | 1 | 4 |
| **Total** | **100** | **78** | **77** | **78** | **69** | **65** | **65** | **64** | **69** | **55** | **71** |

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/Telkwa BAT Tech Screening REV01.xlsx

Based on the above table, the top ranking of the water treatment technologies is:

1. In-situ Active GBR and Base Case with BMPS/BATS with no additional mitigations;
2. Passive/Active Flocculation;
3. Modified Liners in Management and Control Ponds;
4. RO + MBBR and RO + MBBR + Ion Exchange; and,
5. RO + MBBR + HDS Lime and RO + MBBR + Sulphide.

The modelled water quality output for two selected water treatment systems (Options 1 In-situ Active GBR and 5 RO + MBBR + HDS Lime) is provided in **Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK**, with **Table 2-12** providing a summary of these results for the selected nodes. Given the results of the BAT assessment, and the impact on water quality in the receiving environment these two additional mitigations were not selected to be incorporated into the Final EAC Project Case (2024) as no exceedance was found in the receiving environment but rather these mitigations will only be incorporated via an approved Trigger Action Response Plan in permitting.

**Table 2-12: Water Quality (Maximum Monthly Mean) Results for Active Water Treatment of Surface Flows in Post-closure using Typical Source Terms and Average Hydrology at Relevant Prediction Nodes**

| Location Creek | Parameter | BC WQG (2024) (mg/L) | Updated EAC Project Case (2024) (mg/L) | In-situ Active GBR Treatment (mg/L) | Active Treatment RO+MBBR+HDS Lime (mg/L) |
|---|---|---|---|---|---|
| WQSEA1 Goathorn Creek | Copper (d) | 0.0013 | 0.0021 | 0.0021 | 0.0020 |
| WQSO6 Goathorn Creek | Copper (d) | 0.0013 | 0.0021 | 0.0021 | 0.0020 |
| WQS03-DS Four Creek | Cobalt (t) | 0.004 | 0.00068 | 0.00075 | 0.00069 |
| | Nitrite (t) | 0.020 | 0.015 | 0.010 | 0.015 |
| | Sulphate (t) | 309 | 33 | 44 | 34 |
| | Selenium (t) | 0.0020 | 0.00081 | 0.00066 | 0.00085 |
| WQS04 Tenas Creek | Copper (d) | 0.0026 | 0.0015 | 0.0016 | 0.0015 |
| | Nitrite (t) | 0.020 | 0.0090 | 0.0033 | 0.0091 |
| | Sulfate (t) | 218 | 24 | 36 | 24 |
| | Selenium (t) | 0.0020 | 0.00078 | 0.00033 | 0.00079 |

**Notes**: %=percent; BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligram per litre; WQG=water quality guidelines.
Red text indicates exceedances of WQGs.

Please note that dissolved copper exceeds the WQGs under background conditions.
Please note the current proposed configuration active water treatment does not affect groundwater seepage which is the causes of elevated POCs in Four and Tenas Creeks

### *Incorporation of Further Mitigations for the Final EAC Project Case (2024) based on the BAT and BMP Assessments*

A review of the mitigation options was completed based on the BMP and BAT assessments completed above with the results summarized in the **Table 2-13** below to help guide how and when mitigations will be incorporated into the Final EAC Project Case (2024).

**Table 2-13: Summary of Further Mitigations/Technologies Incorporated or Discarded for the Final EAC Project Case (2024) Based on the BAT and BMP Assessments**

| Mitigation | BAT or BMP | Recommendations |
|---|---|---|
| Management and Control Pond Liners | BAT | • Do not adopt in the Final EAC Project Case (2024).<br>• Adopt as a contingency to be implemented via a Trigger Action Response Plan in permitting for West Management Pond.<br>• Submit during Permitting phase for regulatory approvals. |
| Use of Blasthole Lines | BMP | • Adopt this option for the Final EAC Project Case (2024). |
| Use of passive/active flocculation in TCP and Rail Infrastructure Sedimentation Pond | BAT | • Do not adopt in the Final EAC Project Case (2024).<br>• Adopt as a contingency to be implemented via a Trigger Action Response Plan in permitting.<br>• Submit during Permitting phase for regulatory approvals. |
| Active Treatment of surface flows using RO+MBBR+HDS Lime | BAT | • Do not adopt in the Final EAC Project Case (2024).<br>• Adopt as a contingency to be implemented via a Trigger Action Response Plan in permitting.<br>• Develop Permit level Design.<br>• Submit during Permitting phase for regulatory approvals. |
| Passive Treatment of surface and seepage flows via Gravel Bed Reactors | BAT | • Do not adopt in the Final EAC Project Case (2024).<br>• Adopt as contingency to be implemented via a Trigger Action Response Plan in permitting.<br>• Develop Permit Level Design.<br>• Submit during Permitting phase for regulatory approvals. |

Based on the above information the Final EAC Project Case (2024) will incorporate blasthole liners as a further BMP beyond those already provided in the Updated EAC Project Case (2024) and EAC Project Case (August 2022).

### *Contingency Mitigations, in accordance with a Trigger Action Response Plan*

Following a meeting with EAO, BC Ministry of Environment, and BC Ministry of Mining & Critical Minerals on December 8, 2025, Telkwa Mining understands that the Province of BC is concerned

with potential uncertainty associated with the predictive modelling of water quality from greenfield mining projects and the use of In-situ Active GBRs as a primary mitigation means for addressing POCS. Telkwa Mining had SRK review and modify the BAT report to:

- Clearly recommend that RO+MBBR+HDS Lime is the primary mitigation to address future water quality concerns.

To deal with potential technology readiness concerns with the In-situ Active GBR water treatment technology, Telkwa Mining will commit to designing, permitting, and constructing a pilot In-situ Active GBR water treatment system in the CPP Sedimentation Pond or alternative pond as part of the Construction Phase so that this system is in place for monitoring its effectiveness for treating contact water and seepage from the Project to increase the technology level of this method to 8 or 9 for identified POCs (such as nitrogen species, selenium, metals).

Furthermore, to deal with potential uncertainty risks in the WLBM Telkwa Mining commits to designing both a permit level In-situ Active GBR and RO+MBBR+HDS Lime water treatment systems and applying for permit approvals for both contingency mitigations. By having permit approvals and permit level designs in place for constructing the In-situ Active GBR and/or the RO+MBBR+HDS Lime active water treatment systems will allow them to be constructed within approximately one year of making a final execution decision based on measured POC concentrations at the end of pipe, in the seepage, in the management and control ponds, and in the receiving environment during the Construction and Operation Phases prior to the POCs exceeding the BC WQGs in the receiving environment.

During annual monitoring specified during the permitting process, if it becomes evident that POCs will trend to be above the BC WQGs in the future, some or all the following additional contingency mitigations can be implemented for the Project based on a Trigger Action Response Plan that will be provided and approved during permitting:

- Implement water treatment for surface and seepage water flows using the In-situ Active GBR water treatment method in the management ponds as these ponds will be constructed with the necessary infrastructure already incorporated to allow for the construction of this water treatment process.
- Implement passive/active flocculation for the reduction of total parameter concentrations in sedimentation and control ponds.
- Implement RO+MBBR+HDS lime active water treatment into the Water Management Plan.
- As the liner for the WMP will not be constructed till after year 5 which allows the implementation of liner Modifications for the WMP prior to PAG being placed into the management pond if TARP indicates this is a requirement.

Construction and implementation of any of these contingency mitigations will be contingent upon, and in accordance with, an agreed upon consensus-based Trigger Action Response Plan (TARP) to be developed during the BC provincial permitting process. As an example, exceedances of defined parameter of concern concentrations measured by the water quality monitoring program at agreed upon locations, all as defined in the TARP, would trigger the construction of the RO+MBBR+HDS Lime (TRL 8 or 9) water treatment system. Construction of the water treatment system will not necessarily be during the Construction Phase or even during the Operation Phase of the Project, but rather will be based on monitoring of Parameters of Concern and modelling demonstrating that there will be exceedances of the identified permit limits in the future that will likely cause measured adverse impacts to aquatic receptors, and that the RO+MBBR+HDS Lime system would be able to treat. The TARP would have similar provisions for the other contingency mitigations noted above. This commitment is also contingent on the responsible permitting agencies agreeing to not incorporate the permitted water treatment facility (or other contingency mitigations) into bonding requirements until such time as the treatment facility (or other contingency mitigation) achieves commercial operation.

The Final EAC Project Case (2024) does not reflect the impact of adding these contingency mitigations to the predictions provided in the WLBM. However, TML had SRK investigate adding active water treatment technology **in Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK** and is also included in **Appendix 12: Environmental Effects Assessment - Surface Water Valued Component** and provided in **Table 2-12** above. The Final EAC Project Case (2024) was included in the WLBM completed by SRK without active water treatment and is provided in **Appendix 1: Tenas Project, Water and Load Balance Modeling Report (Updated 2025), SRK**.

### Summary of Final EAC Project Case (2024) Submitted

With the completion of the BAT assessment process and implementation of recommended additional mitigation controls the modelled effluent still does not meet all WQGs at discharge(end of pipe).

Telkwa Mining's and SRK's view is that all reasonable BMPs and BATs have been implemented for the Project and while the Project is not in the permitting phase, the implementation of an IDZ can be considered during the EAC application process for point source surface water discharges to provide modelled parameters in the receiving environment. After applying an IDZ which is provided in **Appendix 13, Tenas Project - Initial Dilution Zone Assessment (Final), SRK**, identified that POCs due to the Project meet the BC WQGs for the protection of aquatic life at the edge of the IDZ except for parameters that already exceed the guidelines under background/baseline conditions.

**Table 2-14** below summarizes the results of the EAC Project Case (August 2022), and the Final EAC Project Case (2024) against the BC WQGs at selected prediction nodes after the application of an IDZ for surface water discharge into Goathorn Creek. The Final EAC Project Case (2024) is provided in **Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK**.

### Table 2-14: Water Quality (Maximum Monthly Mean) Results for EAC Project Case (August 2022), Updated EAC Project Case (2024), and Final EAC Project Case (2024) in Post-closure at Relevant Prediction Nodes

| Location Creek | Parameter | BC WQG (2025) (mg/L) | EAC Project Case (August 2022) (mg/L) | Final EAC Project Case (2024) (mg/L) |
|---|---|---|---|---|
| WQSEA1 Goathorn Creek | Copper (d) | 0.0013 | Not Available | 0.0016 |
| WQS06 Goathorn Creek | Copper (d) | 0.0013 | 0.0019 | 0.0016 |
| WQS03_DS Four Creek | Cadmium (d) | 0.00023 | 0.00026 | 0.000012 |
| | Cobalt (d) | 0.00050 | 0.00066 | 0.00063 |
| | Nitrite (t) | 0.020 | 0.038 | 0.0090 |
| | Sulfate (t) | 309 | 360 | 33 |
| | Selenium (t) | 0.0020 | 0.0058 | 0.00081 |
| WQS04 Tenas Creek | Cobalt (d) | 0.00045 | 0.00082 | 0.00029 |
| | Copper (d) | 0.0026 | 0.0031 | 0.0013 |
| | Nickel (d) | 0.0025 | 0.0031 | 0.00063 |
| | Nitrite (t) | 0.020 | 0.045 | 0.0056 |
| | Sulfate (t) | 218 | 260 | 24 |
| | Selenium (t) | 0.0020 | 0.0041 | 0.00079 |

**Notes**: %=percent; BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligram per litre; WQG=water quality guidelines.
Red text indicates exceedances of WQGs.
Please note that dissolved copper exceeds the WQGs under background conditions.

In the EAC Application, Telkwa Coal submitted water quality and quantity predictions based on a Project development scenario. Telkwa Mining, with support from SRK, then completed an assessment of implementing new mitigations requested by the ENV and EMLI to determine if POC concentrations can get closer and ideally below BC WQGs in the receiving environment. The additional mitigation of incorporating blasthole liners was incorporated into what is now considered the Final EAC Project Case (2024) for water quality and quantity predictions. This case does not have exceedances of any parameters in the receiving environment except for dissolved cobalt for a short duration (four years) at one of the downstream Prediction Node in Four Creek.

Dissolved copper was also in exceedances in Goathorn Creek, but this parameter was above the WQG in the background/baseline. The effects assessment on the Surface Water Valued Component was updated to reflect the results of the Final EAC Project Case (2024) and using a local study area which is provided **Appendix 12: Environmental Effects Assessment - Surface Water Valued Component**. In summary, there is no change to the conclusion that was presented in the EAC Application submitted in 2022 which stated "**no significant adverse residual effects**" from the Project on the Surface Water Valued Component are expected.

Telkwa Mining believes the information in the attached appendices and the above information addresses the requirements set forth in IR **Theme 1**.

## THEME 4: CONDUCT ADDITIONAL WATER QUALITY PREDICTIONS USING RECENT SENSITIVITY ANALYSIS OF THE SEMI-PERMEABLE POND LINER

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Recent sensitivity analysis of the semi-permeable pond liner to conduct additional water quality predictions is missing from the Application.*

***FOLLOW UP 1 - 356a ITT TABLE***

*Thank you for conducting the additional analysis and presenting the results at WQS03_DS and WQS04 at (post?) closure in the memo. Neither of these locations would be affected by the resultant increase in the surface discharge to Goathorn Creek, which was the concern underlying the original comment.*

*For discussion purposes, please consider Figure 4-8 of Appendix 4.3A: Water and Load Balance Modelling Report. Between 2045 and 2050, the cover water in the NMP has a higher selenium concentration than the pore water. Assuming a lower permeability liner, more cover water would be discharged to Goathorn Creek via the proposed surface discharge, commensurate with the reduction in pore water seepage under the ponds. This could result in an increase in selenium concentration in Goathorn Creek downstream from the discharge point.*

*Cover water concentrations also exceed pore water concentrations while the ponds are being actively loaded with the PAG material.*

*Using the 15% seepage reduction model (and commensurate increase in surface discharge), please provide a QP certified memo, including graphs predicting water quality (POCs only) at WQS06 from operations through post closure. Estimate water quality in Goathorn Creek at the effluent discharge point and WQS06. [EA Information Requirement]*

***IR LETTER 356 AND FOLLOW UP 2 – 356b ITT TABLE***

*Have a QP run three new WLBM scenarios:*

- *Reduce the seepages through the management pond liners by 90% relative to the project case (with a commensurate increase in surface discharge). This scenario simulates blinding of the pond liners.*
- *Reduce the seepages through the management pond liners by 90% and assume low flow conditions (modified alternate case 5: 7Q10 low flow).*
- *Reduce the seepages through the management pond liners by 90% and assume high source term conditions (modified alternate case 2: high source terms).*

**RESPONSE 356 ITT TABLE AND 356 ITT TABLE**

This request is in relation to the request by ENV about the range in permeability that the soil-bentonite liner may experience due to construction variability which was provided during the round 1 IR as +/- 15%. Telkwa Mining has been requested to provide revised water quality predictions at EA1 assuming a 15% decrease in seepage under typical hydrology conditions, an 90% decrease in seepage under typical hydrology conditions, 90% decrease in seepage using 7Q10 low flows, and for a 90% decrease in seepage and high source terms under typical hydrology conditions.

While Telkwa Mining understands the need to review various scenarios, the 7Q10 scenario is not likely as during low flows the various management and control ponds will not be discharging to the environment as the Project will be keeping all water on site during this event to ensure the water covers are maintained for the various management ponds.

**Table 2-15** below provides the summary of the results at relevant prediction nodes for the various parameters.

## Table 2-15: Water Quality Results (Maximum Monthly Mean) for Seepage Scenarios at in Post-closure using Typical Source Terms and Average Hydrology at Relevant Prediction Nodes

| Location Creek | Parameter | BC WQG (2025) (mg/L) | Final EAC Project Case (2024) (mg/L) | 15% reduction in seepage and expected source terms (mg/L) | 90% reduction in seepage and expected source terms (mg/L) | 90% reduction in seepage, 7Q10 flows, and expected source terms (mg/L) | 90% reduction in seepage and High source terms (mg/L) |
|---|---|---|---|---|---|---|---|
| WQSEA1 Goathorn Creek | Copper (d) | 0.0013 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 |
| | Selenium (t) | 0.0020 | 0.0013 | 0.0011 | 0.0020 | 0.0025 | 0.0032 |
| WQSO6 Goathorn Creek | Copper (d) | 0.0012 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 |
| | Selenium (t) | 0.0020 | 0.0015 | 0.0011 | 0.0020 | 0.0025 | 0.0032 |
| WQS03-DS Four Creek | Cadmium (d) | 0.00023 | 0.000012 | NA | 0.0000079 | 0.000011 | 0.0000089 |
| | Cobalt (d) | 0.00056 | 0.00063 | NA | 0.00015 | 0.00060 | 0.00039 |
| | Nitrite (t) | 0.020 | 0.0090 | NA | 0.0016 | 0.0079 | 0.0049 |
| | Sulphate (t) | 309 | 33 | NA | 6.4 | 31 | 19 |
| | Selenium (t) | 0.0020 | 0.00081 | NA | 0.00013 | 0.00073 | 0.00048 |
| WQS04 Tenas Creek | Cobalt (d) | 0.00045 | 0.00029 | NA | 0.00025 | 0.00021 | 0.00072 |
| | Copper (d) | 0.0026 | 0.0013 | NA | 0.0013 | 0.0012 | 0.0013 |
| | Nitrite (t) | 0.020 | 0.0056 | NA | 0.0049 | 0.0039 | 0.016 |
| | Sulfate (t) | 218 | 24 | NA | 20 | 17 | 67 |
| | Selenium (t) | 0.0020 | 0.00079 | NA | 0.00063 | 0.00050 | 0.0024 |

**Notes**: %=percent; BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligram per litre; WQG=water quality guidelines.
Red text indicates exceedances of WQGs.
Please note that dissolved copper exceeds the WQGs under background conditions.

***FOLLOWUP COMMENTS***

***IR LETTER 356 AND 356 ITT TABLE***

*Add a new node to the WLBM in Goathorn Creek, 100m downstream of the confluence with the tributary into which the effluent is discharged. For the 3 scenarios listed above, for each node where a parameter is predicted to exceed a chronic BC WQG PAL, graphically illustrate water quality (for the exceeding parameters only) at those nodes from baseline through to post closure. On each graph, show the chronic BC WQG for the most sensitive use or value.*

**RESPONSE 356 ITT TABLE**

This prediction node has been added to the WLBM and is identified as WQSEA1. Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** which is a technical memo addressing the IR questions posed by ENV about the WLBM for a complete list of parameter concentrations and supporting graphs.

***IR LETTER 356 AND 356 ITT TABLE***

*[Figures 2.2-2.4 of Appx 4.3 (WLBM report) show Four Creek joining Goathorn Creek at WQS05, instead of WQS06. Is this an error in the diagram? If so, has this error been incorporated into the model?]*

Four Creek joins Goathorn Creek above WQSO6 (even above EA1) while Tenas Creek joins Goathorn Creek above WQS05 which has been verified as correct in the model. The figures have been corrected and included in **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK**.

Telkwa Mining believes the responses above in addition to those provided in the attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK** address the requirements set forth in IR **Theme 4**.

## THEME 3: HAVE A QUALIFIED PROFESSIONAL IDENTIFY LENTIC AREAS IN THE RECEIVING ENVIRONMENT WHICH MAY RECEIVE SELENIUM FROM MINE OPERATIONS, AND ENSURE THAT BACKGROUND CONCENTRATIONS OF SELENIUM IN WATER, SEDIMENT, INVERTEBRATE, AND FISH TISSUES ARE COLLECTED AND COMPILED IN THOSE LENTIC AREAS

***FOLLOWUP COMMENTS***

***IR LETTER NEW AND 520 ITT TABLE***

*Have a qualified professional identify lentic areas in the receiving environment which may receive selenium from mine operations, and ensure that background concentrations of selenium in water, sediment, invertebrate, and fish tissues are collected and compiled in those lentic areas.*

**RESPONSE 520 ITT TABLE**

There are no lentic areas in the current receiving environment based on a review by Palmer Environmental as provided in **Appendix 14: Tenas Coal Mine Information Request # 498, 500-504, and 520 - Expert Advice Regarding Fish and Fish Habitat Within the Project Area, Palmer Environmental, Palmer Environmental** attached.

As part of permitting an Aquatic Effects Monitoring Program (AEMP) will be submitted describing the monitoring that will be completed in relation to all aspects of the Project including selenium concentrations and their species.

Telkwa Mining believes the responses provided above and in **Appendix 14: Tenas Coal Mine Information Request # 498, 500-504, and 520 - Expert Advice Regarding Fish and Fish Habitat Within the Project Area, Palmer Environmental, Palmer Environmental**, address the requirements set forth in IR **Theme 3**.

## THEME 6: OTHER ITT TABLE COMMENTS

***FOLLOWUP COMMENTS***

***FOLLOW UP 306 ITT TABLE***

*Due to the high consequence and likelihood of selenium speciation occurring as a result of reducing conditions commonly observed in lentic waters these processes should be included in the modelling. In addition, in order to have informative data to base impacts to the receiving environment on a water sampling node should be created a maximum of 100 meters downstream of the proposed discharge location. Currently, it appears that WQS06 is the nearest downstream node at approximately 4.3 km from the proposed discharge (refer to comment 319) [EA Information Requirement].*

**RESPONSE FOLLOW UP 306 ITT TABLE**

Telkwa Mining acknowledges the comment and after discussion with EMLI in 2023 and QPs, the model cannot include the required modelling included in the model as it is difficult to predict with any degree of confidence what species of selenium produced and what concentrations might be present. It was agreed at the last meeting with the water sub-working group that this modelling would no longer be required.

Telkwa Mining has added a new prediction node labelled EA1 at point approximately 100 m from the discharge point into Goathorn Creek for the Project. As the selenium concentration in the Final EAC Project Case (2024) is below the BC WQGs no adverse effect is expected as the value in this guideline is protective for all selenium species as there is no distinction provided in the guidelines in terms of selenium species. The requirement of additional selenium and selenium species monitoring in the existing environment and during the Construction and Operation Phases can be made a condition of the EAC Certificate.

***FOLLOWUP COMMENTS***

***FOLLOW UP 307 ITT TABLE***

*Due to the potential for impacts to aquatic biota and resident fish populations, these impacts should be considered in a local context [EA Information Requirement].*

***LETTER IR 307 AND FOLLOW UP 307 ITT TABLE***

*Consider the impacts of exceeded BC water quality guidelines (WQGs), particularly to aquatic biota and resident fish populations, at a local scale rather than regional scale.*

**RESPONSE FOLLOW UP 307 ITT TABLE**

Please find the response for this ITT in the attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK**.

Telkwa Mining has implemented an additional mitigation use a pipeline to transport discharge from the Tenas Control Pond to Goathorn Creek in the Construction, Operation and Decommissioning and Reclamation Phases and will only use the existing channel once end of pipe parameter concentrations will not cause effects to fish and fish habitat in this channel.

In summary Telkwa Mining had SRK revise the effects assessment for the Surface Water Valued Component based on the Local Study Area versus the Regional Study Area and still found there were no significant adverse effects due to the Project on the Surface Water Valued Component.

***FOLLOWUP COMMENTS***

***FOLLOW UP 310 ITT TABLE***

*It sounds like this stream will no longer provide any significant ecological function. This is an issue under the federal Fisheries Act and may need attention from MLWRS and/or DFO.*

**RESPONSE FOLLOW UP 310 ITT TABLE**

The stream currently does not have flow for most of the year and only in major storm events and for a brief period in freshet is there any water flows present in this ephemeral channel, as its catchment is extremely limited under background/baseline conditions. Based on the background/baseline site assessment completed for fish and fish habitat as part of the EAC Application this tributary does not provide viable fish habitat according to QPs. The photo **(Figure 2-8 below)** below illustrates this stream during the October 2023 rainy season with no signs of water by the leaf debris left in the channel.

**Figure 2-8: Tributary to Goathorn Creek During the October 2023 Rainy Season**

***FOLLOWUP COMMENTS***

***FOLLOW UP 319 ITT TABLE***

*Thank you for your response. It appears as though the closest downstream prediction node from the discharge location is WQS06, located approximately 4.3 km from the point of discharge. It would be useful to have a prediction node closer to the point of discharge, perhaps 100 meters downstream of confluence of unnamed tributary to Goathorn Creek and Goathorn Creek [EA Information Requirement].*

## RESPONSE FOLLOW UP 319 ITT TABLE

Telkwa Mining has added a new prediction node labeled EA1 at the point approximately 100 m from the discharge point into Goathorn Creek for the from the ephemeral tributary.

***FOLLOWUP COMMENTS***

***FOLLOW UP 350 ITT TABLE***

*It appears that Water Quality Guidelines for selenium, nitrite, and sulphate (and dissolved cadmium in Four Creek) will be exceeded in approximately 4 or more kilometres of Four Creek, and 5 or more kilometres of Tenas Creek for up to half of the year (Nov-Apr) for more than ten years of the mine life. This is significant in magnitude, geographic extent, frequency, and duration. [Comment]*

***FOLLOW UP 350 ITT TABLE***

*Response for Comment 351 applies to this Round 1 Comment, however, Comment 351 remains unresolved, and that Round 1 Response does not address frequency and duration effects characteristics.*

***FOLLOW UP 351 ITT TABLE***

*I remain in disagreement with the scale at which effects to Valued Components are being assessed and, because of that, the residual effects characterization. TCL has changed this specific assessment metric to stream length, however, they still assess affects at the RSA scale. The fish, invertebrates and other VCs in Tenas and Four Creeks are predicted to be subject to potential impacts from multiple water quality constituents in more than 4 kilometres of creek (over 20 and 25% of the entire stream length per Attachment 351-1) during half of each year for 10 years of mine life. This is not low residual effects at the scale of the individual stream (most appropriate), or even at the scale of the entire Tenas Creek watershed (the LSA, more appropriate than the RSA).*

## RESPONSE FOLOW UP 351/350 ITT TABLE

Please find attached **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK**, for a signed and stamped response.

Telkwa Mining has implemented an additional mitigation use a pipeline to transport discharge from the Tenas Control Pond to Goathorn Creek in the Construction, Operation and Decommissioning and Reclamation Phases and will only use the existing channel once end of pipe parameter concentrations will not cause effects to fish and fish habitat in this channel.

In summary Telkwa Mining had SRK revise the effects assessment for the Surface Water Valued Component based on the Local Study Area versus the Regional Study Area and still found there were no significant adverse effects due to the Project on the Surface Water Valued Component.

***FOLLOWUP COMMENTS***

***352 ITT TABLE***

*This section of App4.3-A indicated that total selenium exceedances are expected in both winter and summer months. The characterization of residual effects in 4.3 Surface Water Quality chapter contradicts this. Clearly indicate when total selenium will be exceeded. [EA Information Requirement]*

**FOLLOW UP RESPONSE 352 ITT TABLE**

The Final EAC Project Case (2024) Model results in the downstream node in Four Creek (WQS03DS) show no exceedances of the WQG for selenium during any period. The maximum Final EAC Project Case (2024) maximum mean monthly modelled concentration through this period is 0.00081 mg/L.

Similarly, the Final EAC Project Case (2024) Model results for the downstream node of Tenas Creek (WQS04), show no exceedances of the WQG for selenium during any period. The maximum mean monthly modelled concentration through this period is 0.00015 mg/L for the Final EAC Project Case (2024).

***FOLLOWUP COMMENTS***

***385/387 ITT TABLE***

*Table 5.2-1 provides the screening of water quality parameters to determine COPCs for wildlife, and ECCC notes that maximum modelled mean monthly values were used. ECCC recommends using a more conservative water quality statistic (e.g., maximum concentrations) to determine COPC values that would not be protective of acute effects during sensitive life stages for wildlife (e.g., amphibian egg and tadpole development).*

***385/387 ITT TABLE***

*Comment provided by Provincial ENV Reviewer: TCL's previous response is that a mean value is a maximum value ("the maximum modelled mean monthly value means the maximum concentration that is predicted."). I would ask them to have a QP confirm whether any single discrete sample is predicted to exceed an acute BC Water Quality Guideline for the protection of the most sensitive use/value (wildlife or avian in this case).*

**RESPONSE 385/387 ITT TABLE**

Please see **Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK**.

***FOLLOWUP COMMENTS***

***FOLLOW UP 388 ITT TABLE***

*Provincial Reviewer Response: Adequately addressed. Aquatic receptors are expected to be more sensitive to aluminum than avian spp or wildlife (ENV 2021. Reformat of 1988 Aluminum Water Quality Guidelines). Despite this, I would recommend they include aluminum in their residual effects characterizations.*

**RESPONSE FOLLOW UP 388 ITT TABLE**

Aluminum was not carried forward into a residual effects characterization as Aluminum concentrations with the Project are within the natural variability of background/baseline conditions. This is demonstrated by the Telkwa River having exceedances of Aluminum under background/baseline conditions while upstream prediction nodes do not have exceedances from the Project for Aluminum. If monitoring indicates that Aluminum is trending above WQGs in

Goathorn, Four, and/or Tenas Creeks, Telkwa Mining will implement a water treatment strategy for this parameter. **Table 2-16** below summarizes the Aluminum results for selected prediction node.

### Table 2-16: Water Quality Results (Maximum Monthly Mean) for Aluminum at Relevant Prediction Nodes for Updated EAC Project Case (2024)

| Location Creek | Parameter (total) | BC WQG (2024) (mg/L) | EAC Project Case (August 2022) (mg/L) | Updated / Final EAC Project Case (2024) (mg/L) | Comments |
|---|---|---|---|---|---|
| WQSOEA1 Goathorn Creek | Aluminium | 0.27 | N/A | 0.099 | Upstream of WQS06 and WQS05 P50 background/baseline 0.034 P95 background/baseline is 0.66 |
| WQSO5 Goathorn Creek | Aluminium | 0.27 | 0.17 | 0.0089 | Upstream of WQS09 |
| WQS03_DS Four Creek | Aluminium | 0.69 | 0.25 | 0.15 | Upstream of WQSEA1 P50 background/baseline is 0.081 P95 background/baseline is 1.1 |
| WQS04 Tenas Creek | Aluminium | 0.35 | 0.10 | 0.068 | Upstream of WQS05 P50 background/baseline is 0.047 P95 background/baseline is 1.7 |
| WQSO9 Telkwa River | Aluminium | 0.19 | 0.26 | 0.267 due to background/baseline conditions | P50 background/baseline is 0.12 * P95 background/baseline is 1.5 |
| WQS011 Bulkley River Upstream | Aluminium | 0.18 | 0.14 | 0.11 | Downstream of Rail Loadout P50 background/baseline is 0.088 P95 background/baseline is 1.2 |
| WQS012 Bulkley River Downstream | Aluminium | 0.18 | 0.16 | 0.15 | Downstream of confluence with the Telkwa River P50 background/baseline is 0.088 P95 background/baseline is 1.2 |

**Notes**: %=percent; BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligram per litre; WQG=water quality guidelines.
Red text indicates exceedances of WQGs.

***FOLLOWUP COMMENTS***

***FOLLOW UP 389 ITT TABLE***

*Not adequately addressed. TCL's response is to argue why SPOs are appropriate thresholds for screening COPCs. ENV (and apparently ECCC) disagrees and believes unapproved SPOs are inappropriate to use in an EA process. Using WQGs to screen COPCs, we would screen, at the least, Aluminum, Cobalt, and Sulphate as parameters for further effects assessment and characterization, including for wildlife, avian and aquatic receptors.*

**RESPONSE FOLLOW UP 389 ITT TABLE**

**Table 2-17** (Table 5.2-1 from EAC Application) was revised based on the most stringent WQG available for fresh water/wildlife/avian and the Final EAC Project Case (2024) using the format of Table 5.2-1 from the EAC application. Please note Table 5.2-2 did not appear in the EAC Application.

Based on **Table 2-17** below no parameters were identified as Parameter of Interest in the receiving environment beyond Cobalt which as short-term exceedance (four years) of the WQGs. This parameter was also identified as POC in the BAT analysis provided in **Appendix 11: Tenas Project Best Achievable Technology Assessment Updated, SRK**. Based on this analysis no further mitigations are recommended beyond the best management practices and technologies already employed by the Project.

## Table 2-17: (Table 5.2-1 in EAC application) Water Quality (Maximum Monthly Mean) Results for the Final EAC Project Case (2024) in Post Closure versus Relevant Guidelines

| Parameter | Units | Final EAC Project Case (2024) (mg/L) | Location of Greatest Parameter Concentration | BC AWQG or BC WWQG (Aquatic, Livestock, or Wildlife)*, if none exist use CCME (mg/L) | Guideline Source | Exceedance Factor WQG (Final EAC Project Case (2024)) Maximum Modelled Result/Guideline |
|---|---|---|---|---|---|---|
| Aluminum (t) | mg/L | 0.15 | Four Creek, WQS03_DS | 0.69 | BC AWQG | 0.22 |
| Arsenic (t) | mg/L | 0.0011 | Four Creek, WQS03_DS | 0.005 | BC AWQG | 0.22 |
| Beryllium (t) | mg/L | 0.00011 | Four Creek, WQS03_DS | 0.00013 | BC WWQG | 0.85 |
| Boron (t) | mg/L | 0.023 | Four Creek, WQS03_DS | 1.2 | BC AWQG | 0.020 |
| Cadmium (d) | mg/L | 0.000012 | Four Creek, WQS03_DS | 0.00023 | BC AWQG | 0.050 |
| Chloride (t) | mg/L | 0.47 | Four Creek, WQS03_DS | 150 | BC AWQG | 0.0030 |
| Chromium (VI) (t) | mg/L | 0.00074 | Four Creek, WQS03_DS | 0.001 | BC WWQG | 0.74 |
| Cobalt (d) | mg/L | 0.00063 | Four Creek, WQS03_DS | 0.00056 | BC AWQG | 1.1 |
| Copper (d) | mg/L | 0.0019 | Four Creek, WQS03_DS | 0.0047 | BC AWQG | 0.40 |
| Fluoride (t) | mg/L | 0.11 | Four Creek, WQS03_DS | 1.4 | BC AWQG | 0.080 |
| Iron (d) | mg/L | 0.12 | Telkwa River, WQS09 | 0.35 | BC AWQG (acute) | 0.34 |
| Lead (t) | mg/L | 0.000060 | Four Creek, WQS03_DS | 0.0061 | BC AWQG | 0.0001 |
| Manganese (t) | mg/L | 0.012 | Four Creek, WQS03_DS | 1.1 | BC AWQG | 0.010 |
| Mercury (t) | mg/L | 0.0000038 | Four Creek, WQS03_DS | 0.000020 | BC AWQG | 0.19 |
| Molybdenum (t) | mg/L | 0.0012 | Four Creek, WQS03_DS | 0.034 | BC AWQG (ruminant) | 0.035 |
| Nickel (d) | mg/L | 0.0012 | Four Creek, WQS03_DS | 0.0047 | BC WWQG | 0.26 |
| Nitrate (t) | mg/L | 0.43 | Four Creek, WQS03_DS | 3.0 | BC AWQG | 0.14 |
| Nitrite (t) | mg/L | 0.0090 | Four Creek, WQS03_DS | 0.02 | BC AWQG | 0.45 |

| Parameter | Units | Final EAC Project Case (2024) (mg/L) | Location of Greatest Parameter Concentration | BC AWQG or BC WWQG (Aquatic, Livestock, or Wildlife)*, if none exist use CCME (mg/L) | Guideline Source | Exceedance Factor WQG (Final EAC Project Case (2024)) Maximum Modelled Result/Guideline |
|---|---|---|---|---|---|---|
| Selenium (t) | mg/L | 0.00081 | Four Creek, WQS03_DS | 0.002 | BC AWQG | 0.41 |
| Silver (t) | mg/L | 0.0000050 | Four Creek, WQS03_DS | 0.0015 | BC AWQG | 0.00 |
| Strontium (t) | mg/L | 0.33 | Four Creek, WQS03_DS | 2.5 | ECCC FEQG for Aquatic Life | 0.13 |
| Sulfate (t) | mg/L | 33 | Four Creek, WQS03_DS | 309 | BC AWQG | 0.11 |
| Thallium (t) | mg/L | 0.000013 | Four Creek, WQS03_DS | 0.0008 | BC AWQG | 0.016 |
| Uranium (t) | mg/L | 0.00025 | Four Creek, WQS03_DS | 0.0085 | BC AWQG | 0.030 |
| Zinc (d) | mg/L | 0.0025 | Four Creek, WQS03_DS | 0.014 | BC AWQG | 0.18 |

**Notes:** * = Wildlife and Aquatic guidelines were selected as there no plans on using the water from the Project for Irrigation Purposes.

* = WQG for stream with highest modelled concentration

BC=British Columbia; EAC=Environmental Assessment Certificate; mg/L=milligram per litre; WQG=water quality guidelines

Red text indicates exceedances of WQGs.

Telkwa Mining believes the details above and provided in attached appendices address the requirements set forth in IR **Theme 6**.

## THEME 7: EMLI GEOSCIENCE CLARIFICATIONS

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*EMLI does not support the application of the concept that an entire zone can be designated potentially acid generating (PAG) or non-PAG based on an average weighed NPR. Application of an average weighed NPR implies that a portion of the material from that unit will become acid generating at some point in the future. Although the overall drainage from that storage area may be pH-neutral due to mixing with the non-PAG portion of the unit or non-PAG material from another unit, the current Management Plan does not address blending and the current source terms do not account for a blended non-PAG / PAG rock piles or covers that are exposed to allow advanced stage weathering and acidic hot-spots within the pile. Additional information should therefore be presented by the proponent to support this approach.*

**RESPONSE IR LETTER OVERVIEW**

Telkwa Mining assumes the concern outlined in the statement above from EMLI is with *non-PAG* zones as the statement has no bearing on the PAG zones as the entire zone is submerged underwater as stated in the EAC Application section 1 even if portions of these zones are potentially *non-PAG* unless operational verification sampling provides evidence that portions of these zones could be managed as *non-PAG* based on operational NPR cut-off values and that they are also large enough to efficiently separate with the equipment available.

Telkwa Mining has identified that, even though an entire zone might be classified as *non-PAG* based on a comparison of its bulk composition to an NPR cut off of 2.0, that there might be a component of PAG rock both within the overall aerial extent of the zone and within the vertical thickness of the zone that may have to be managed appropriately to ensure ARD does not occur from separable PAG materials not being placed underwater. The source term for *non-PAG* material placement has assumed that appropriate segregation and mixing/blending has occurred within the vertical thickness during the mining process that a non-PAG landform (NPR > or equal to 2.0) is established for storage piles, embankments, and buttresses. If operational verification testing is conducted on PAG zones the same methodology will be used as what is used for *non-PAG* zones to identify any potential separable *non-PAG* material within PAG zones.

The following zone polygons can be identified as *non-PAG* using an NPR cutoff of 2.0 AP to 1.0 NP and their bulk geochemical properties:

- Overburden (Zone 0);
- Portions of Zone 1;
- Portions of Zone 4; and,
- Portions of Zone 8 (not mined as part of the EA Open Pit).

**Table 2-18** summarizes the zone classification for materials at the Tenas Deposit based on their bulk geochemical properties.

### Table 2-18: Material Zone Classification Based on NPR of 2.0

| Material Zone Name | ARD Assignment in Mine Plan and EAC Application Based on an NPR of 2.0 | Stratigraphic Location | Average Zone Weighted NPR |
|---|---|---|---|
| Zone 0 / Overburden | *non-PAG* | Till and overburden – topography to bedrock | 17.5 |
| Zone 1 | *non-PAG* with potentially separable PAG zones | Bedrock surface to top of Seam e (minus Zone 1a) | 3.1 |
| Zone 1a | PAG | Select area above Seam e to bottom of Seam e | 0.7 |
| Zone 2 & 3 | PAG | Bottom of Seam e to bottom of Seam c | 0.8 |
| Zone 4 | *non-PAG* with potentially separable PAG zones | Bottom of Seam c to top of Seam b | 2.6 |
| Zone 5 | PAG | Top of Seam b to top of Seam 1U | 1.2 |
| Zone 55 | PAG | Top of Seam 1U to bottom of Seam 1L | 1.9 |
| Zone 6 | PAG | Bottom of Seam 1L to bottom of Seam 1Lc | 1.8 |
| Zone 7** | PAG | Below Seam 1Lc to the bottom of Seam 1Ld | 1.7 |
| Zone 8** | *non-PAG* with potentially separable PAG zones | Below Seam 1Ld | 5.0 |

** **Notes:** Zones 7 and 8 are not currently recovered within EA open pit design; (1) As understood all zones even bulk non-PAG zones contain some PAG material and in some cases these PAG materials could be large enough to segregate out during the mining process.

ARD=acid rock drainage; NPR=neutralization potential ratio; PAG=potentially acid generating

**Figure 2-9** through **Figure 2-15** below illustrate the distribution of the average overall exploration drillhole weighted NPR values for rock zones mined within the EA Open Pit with polygons illustrated using an NPR cut-off of 2.0 with green exploration drillhole polygons being classified as *non-PAG* and red exploration drillhole polygons being classified as PAG.

Please note the **entirety** of Zones 1a, 2/3, 5, 55, and 6 were planned to be placed underwater in the EAC application and will continue to be planned to be placed underwater until verification testing is completed on blastholes demonstrate that *non-PAG* regions of a suitable size and thickness is present using an NPR cut off criteria of 2.0.

**Please note this is for illustration purposes only as verification testing will be based on blastholes which will be completed on a much tighter spacing and be completed for every bench mined versus the entire length of an exploration drillhole.**

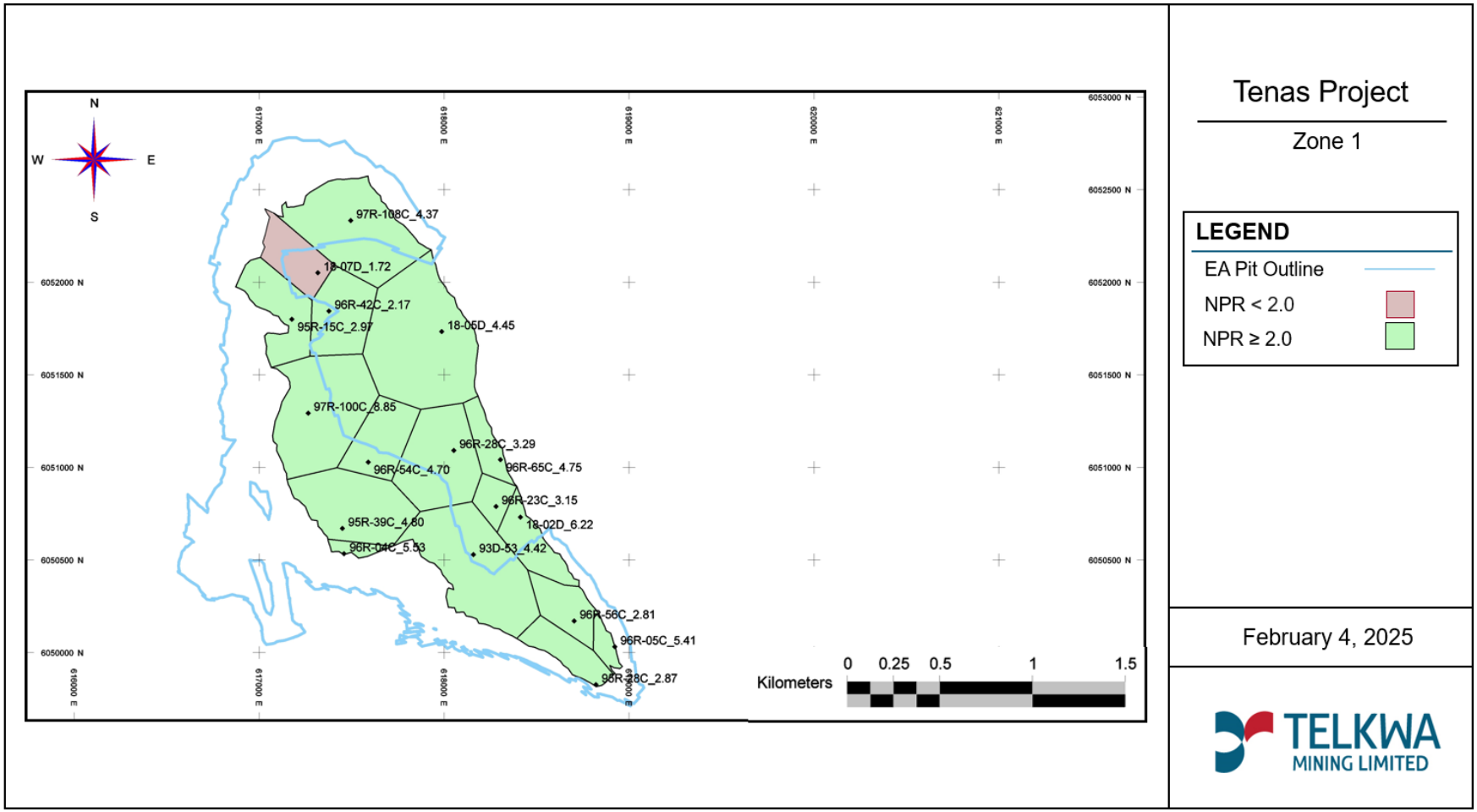


**Figure 2-9: Zone 1 PAG and *non-PAG* Polygons Classified Against an NPR Cut-Off of 2.0, with Zones in Red Being Submerged Underwater in the EAC Application**

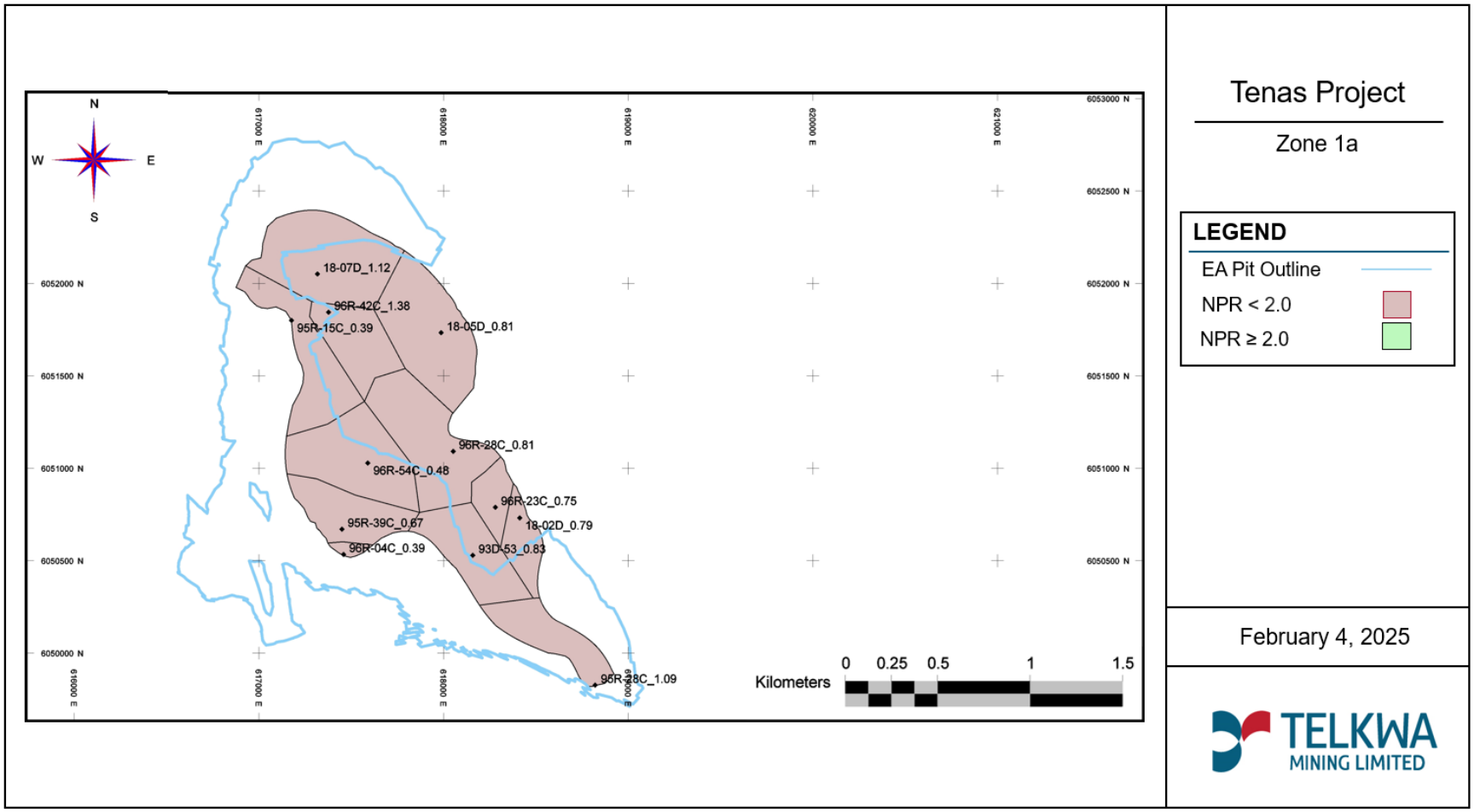


**Figure 2-10: Zone 1a PAG and *non-PAG* Polygons Classified Against an NPR Cut-Off of 2.0, Entire Zone Treated as PAG in EAC Application and Submerged Underwater**

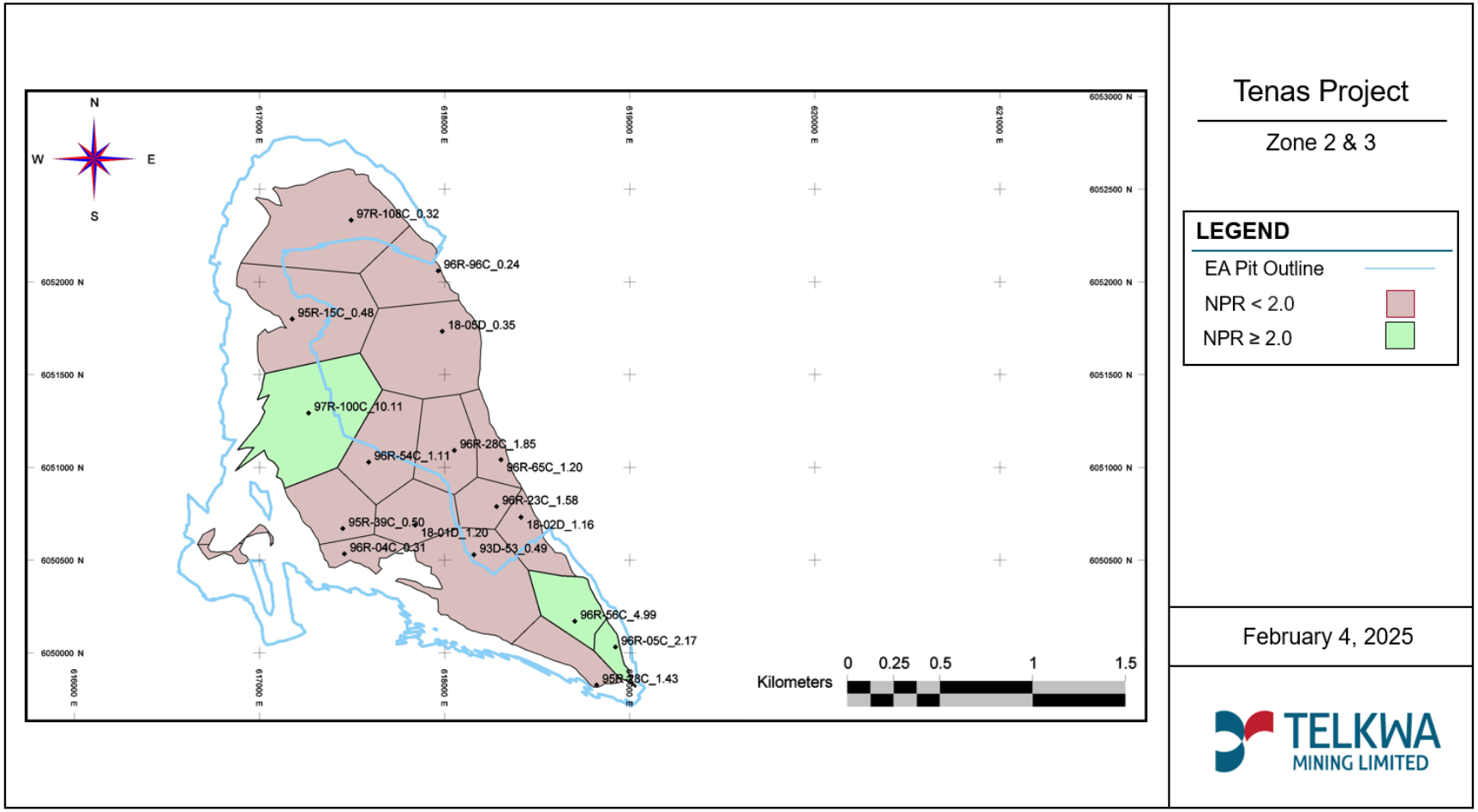


**Figure 2-11: Zone 2/3 PAG and *non-PAG* Polygons Classified Against an NPR Cut-Off of 2.0, Entire Zone Treated as PAG in EAC Application and Submerged Underwater**

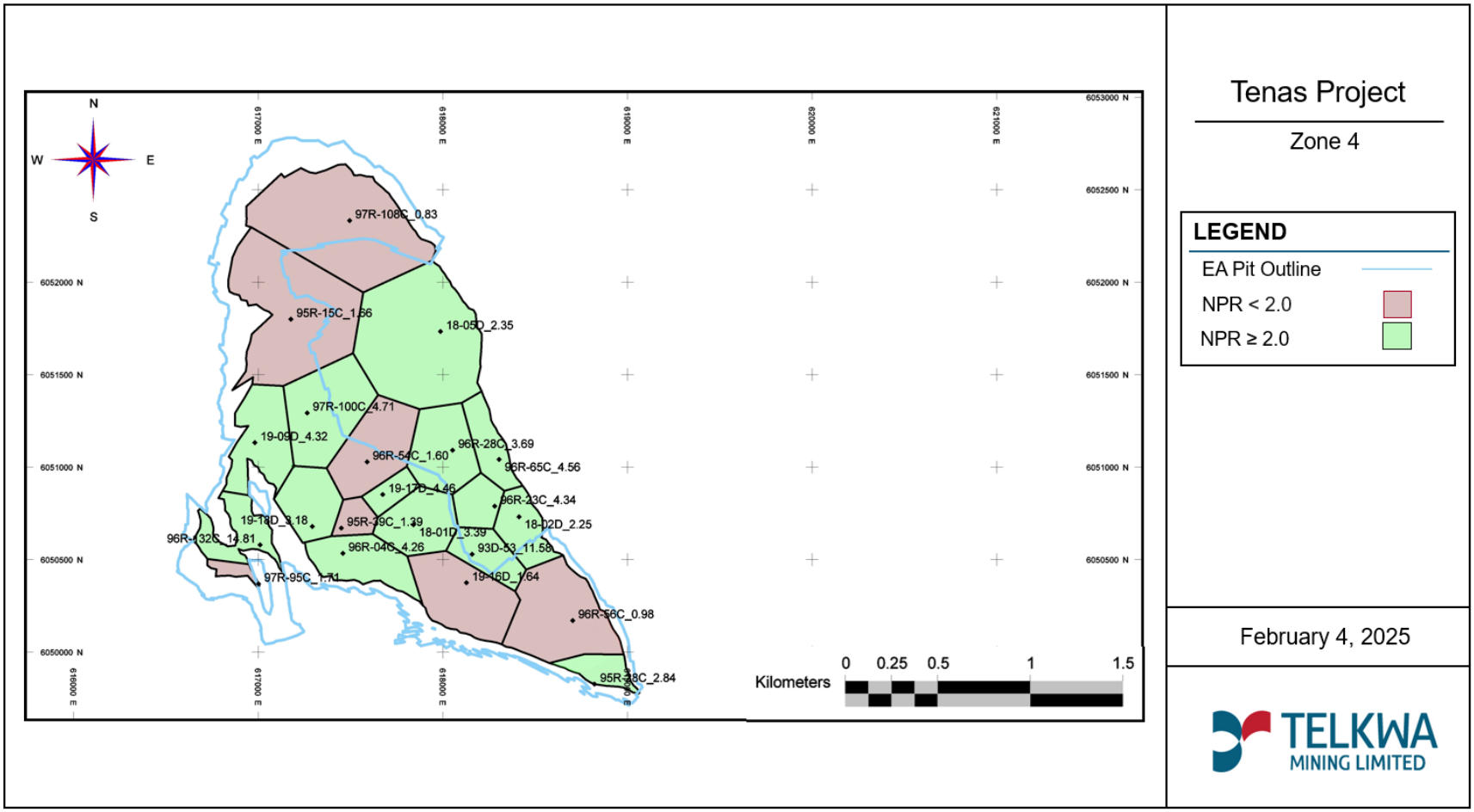


**Figure 2-12: Zone 4 PAG and *non-PAG* Polygons Classified Against an NPR Cut-Off of 2.0, Red Polygons Submerged Underwater in the EAC Application**

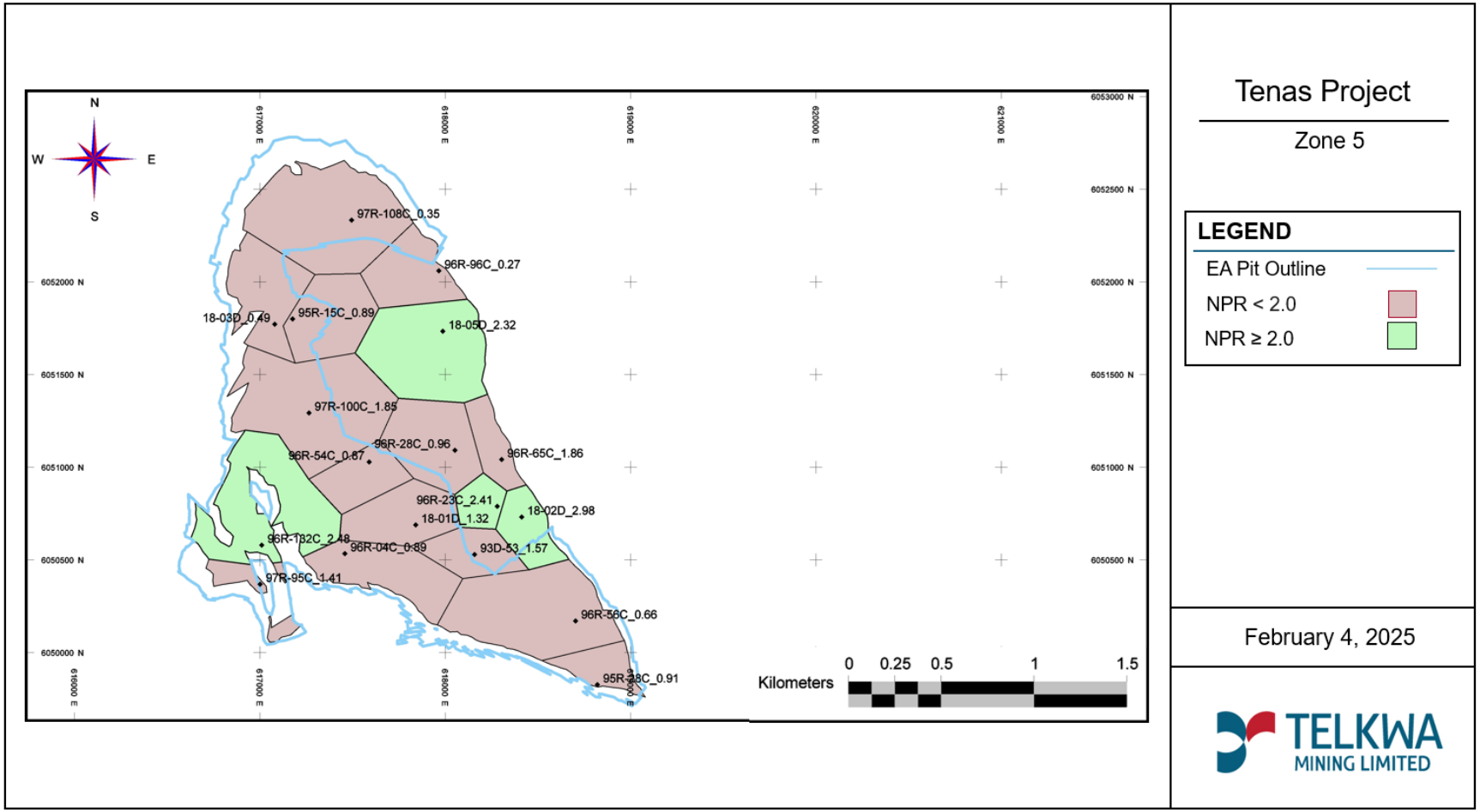


**Figure 2-13: Zone 5 PAG and *non-PAG* Polygons Classified Against an NPR Cut-Off of 2.0, Entire Zone Treated as PAG in EAC Application and Submerged Underwater**

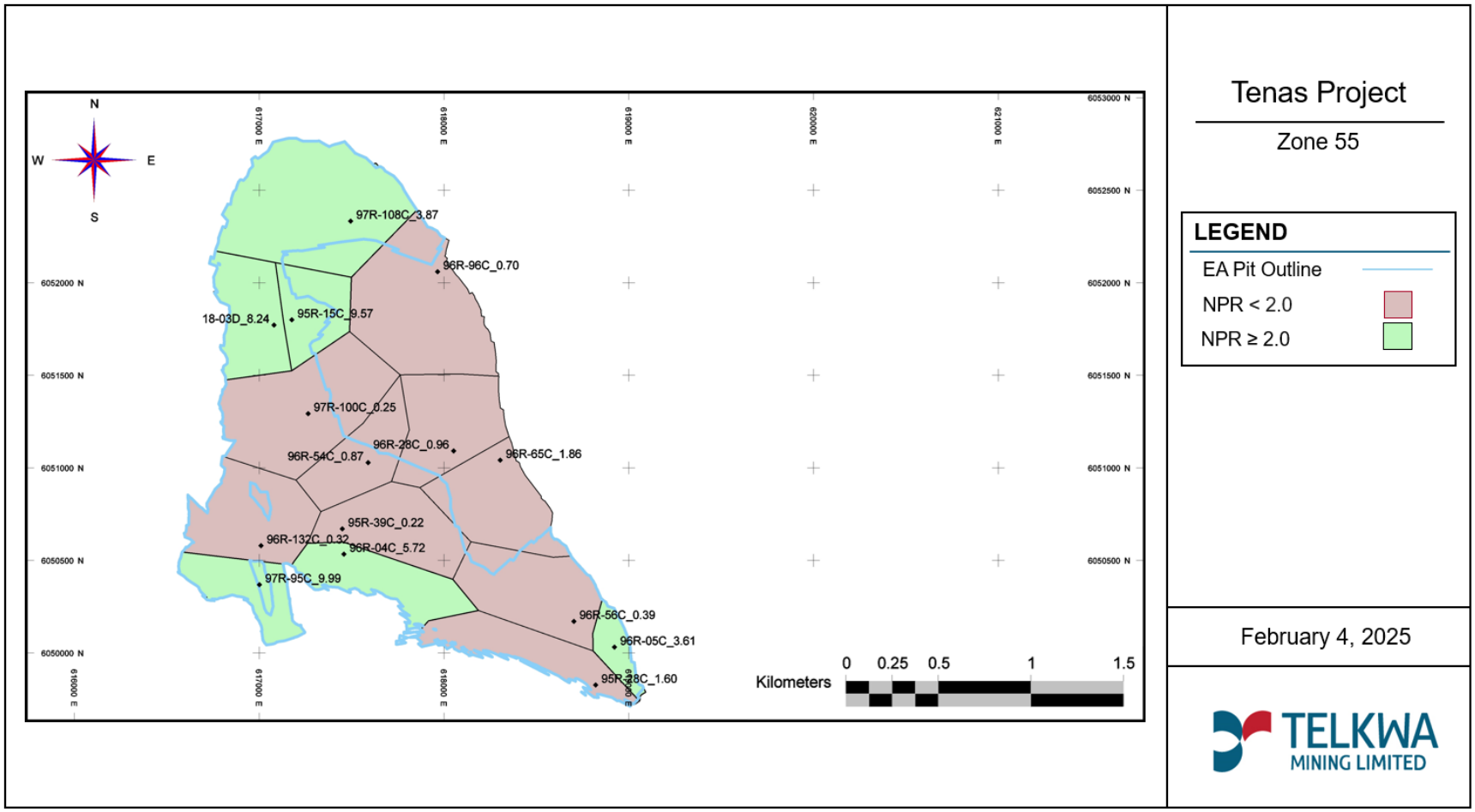


**Figure 2-14: Zone 55 PAG and *non-PAG* Polygons Classified Against an NPR Cut-Off of 2.0, Entire Zone Treated as PAG in EAC Application and Submerged Underwater**

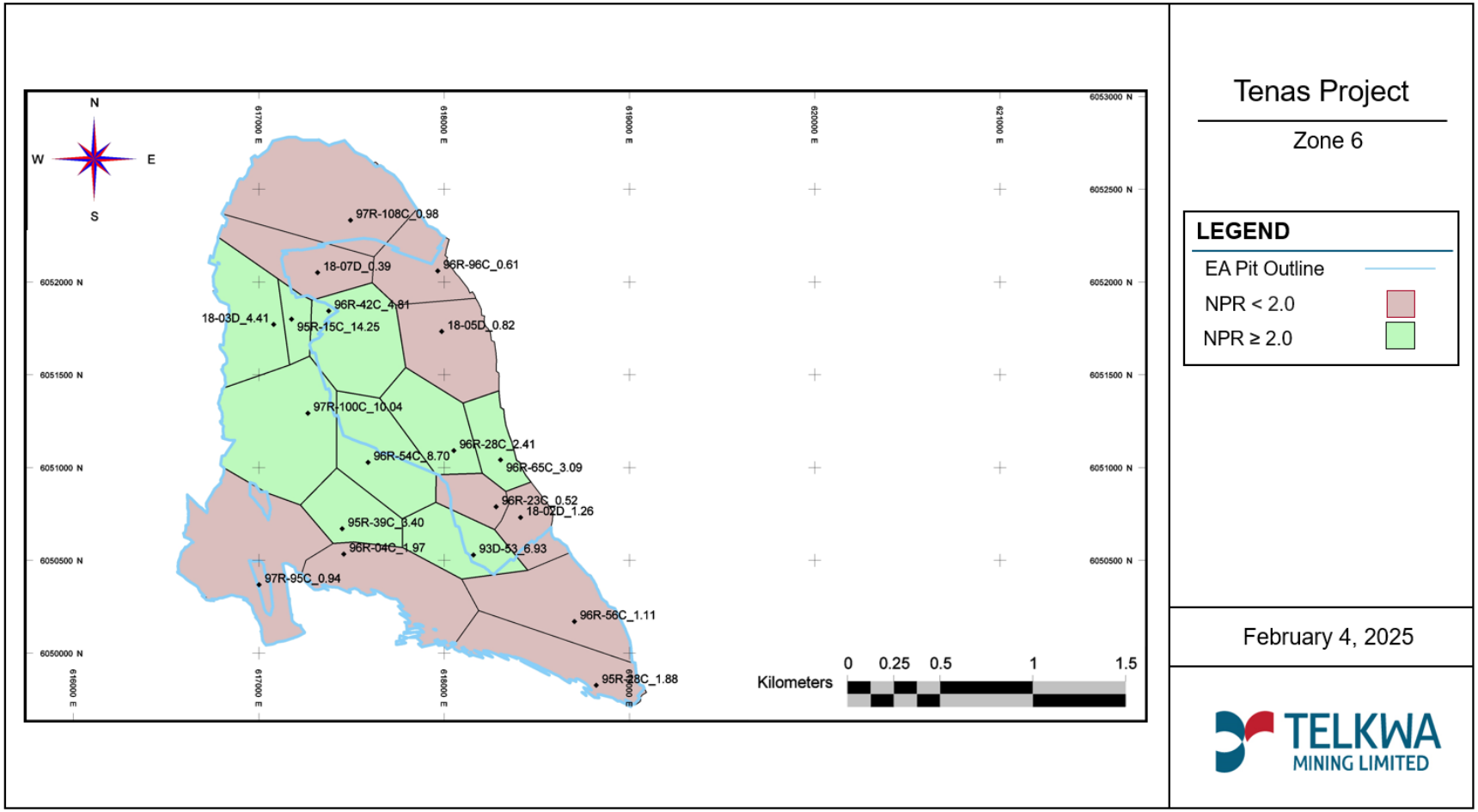


**Figure 2-15: Zone 6 PAG and *non-PAG* Polygons Classified Against an NPR Cut-Off of 2.0, Entire Zone Treated as PAG in EAC Application and Submerged Underwater**

As illustrated by the figures above, Zone 1 is the only zone that is almost entirely *non-PAG* on an aerial basis with only one exploration drillhole having an NPR less than 2.0 on an aerial extent (1.80) and Zone 1a is all PAG with no exploration drillholes having an NPR greater than or equal 2.0. Zones 7, and 8 have not been provided as there are no plans for mining of either of these zones and neither zone forms part of the EA Open Pit walls. Zones 1, 2/3, 4, 5, 55, and 6 have exploration drillholes that are both *non-PAG* and PAG based on the geochemical data collected using an NPR cutoff of 2.0. However, in the EAC application submission **all of zones 1a, 2/3, 55, 5, and 6 material** were classified as PAG and assumed to be placed underwater into the management ponds to be conservative for planning purposes while Zones 1, and 4 were demarcated into *non-PAG* and PAG polygons for the EAC Application based on the individual exploration drillhole NPR values on an aerial basis, distribution of material within the vertical column of exploration drillholes, and their locations respective to economic coal seams.

**Note** that these NPR values are only used for planning purposes and regulatory applications such as the EAC Application as the actual segregation of PAG from *non-PAG* will be based on field sampling and testing of blastholes with material being designated as PAG using a cutoff of an NPR 2.0 during the Construction and Operation Phases. The spacing of the blastholes will be on a much tighter spacing than exploration drilling can ever practically achieve.

**Appendix 15: Tenas Project, Mine Material Management based on an NPR Cut-Off of 2.0, 1.80, 1.60, and 1.20, Telkwa Mining** provides how Telkwa Mining would manage the various material zones would be managed if blasthole verification testing confirmed the exploration drillhole data and an NPR cut-off of 2.0 was used, or the EAC Application Methodology was used to classify PAG from *non-PAG* material. As demonstrated by **Table 2-19,** even when using an NPR value 2.0, a drillhole (exploration and/or blasthole) with a bulk property that would classify the entire drillhole polygon as *non-PAG* (NPR greater than 2.0) may have portions within the vertical length of a drillhole that may get placed underwater due to PAG intervals being present that can effectively be segregated (**Table 2-19**). **Table 2-19** indicates segregation is possible based on the drillhole interval NPR values.

Furthermore, some minor PAG units within an overall *non-PAG* drillhole polygon will become blended vertically within a polygon through the mining and blasting process into the surrounding *non-PAG* material so that the entire drillhole polygon can be considered *non-PAG* if these PAG zones are too small to be separated as illustrated by **Table 2-20**.

Finally, some geochemical zones in the EAC application that were classified as PAG might have polygons that could be managed as *non-PAG* during the Construction and Operation Phases. **Table 2-21** shows a Zone 6 exploration drillhole with a bulk NPR greater than 4.0 for this drillhole which could clearly be managed as *non-PAG* if confirmed by blasthole confirmation testing.

## Table 2-19: Mining Plan for Zone 1 with a Bulk NPR of 3.29 for Drillhole T96R-28C

| Hole-ID | Sample Depth and Thickness (m) | | | ABA Zones | Mine Plan Inputs | | | | BULK ZONE NPR | EAC Application Plan | Mining Plan at NPR of 2.00 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | Thickness | | Sulfide | AP | NP | NPR | | | |
| T96R-28C | 12.50 | 14.32 | 1.82 | 1 | 0.53 | 16.59 | 22.3 | 1.34 | | Place underwater | Place underwater |
| T96R-28C | 14.32 | 14.68 | 0.36 | 1 | 0.71 | 22.12 | 9.73 | 0.44 | | | |
| T96R-28C | 14.68 | 15.08 | 0.4 | 1 | 3.79 | 118.57 | 47.42 | 0.40 | | | |
| T96R-28C | 15.08 | 17.07 | 1.99 | 1 | 0.79 | 24.7 | 23.2 | 0.94 | | | |
| T96R-28C | 17.07 | 17.86 | 0.79 | 1 | 1.48 | 46.31 | 19.6 | 0.42 | | | |
| T96R-28C | 17.86 | 18.40 | 0.54 | 1 | 1.02 | 32.03 | 7.04 | 0.22 | | | |
| T96R-28C | 18.40 | 19.66 | 1.26 | 1 | 1.10 | 34.36 | 21.4 | 0.62 | | | |
| T96R-28C | 19.66 | 20.11 | 0.45 | 1 | 0.26 | 8.1 | 29.5 | 3.62 | 3.29 | non-PAG | non-PAG |
| T96R-28C | 20.11 | 20.99 | 0.88 | 1 | 0.10 | 3 | 49 | 15.45 | | non-PAG | non-PAG |
| T96R-28C | 20.99 | 26.93 | 5.93 | 1 | 0.23 | 7.3 | 36.7 | 5.05 | | non-PAG | non-PAG |
| T96R-28C | 26.92 | 35.09 | 8.17 | 1 | 0.61 | 19.2 | 42.9 | 2.24 | | non-PAG | non-PAG |
| T96R-28C | 35.09 | 35.93 | 0.84 | 1 | 0.31 | 10 | 416 | 43.38 | | non-PAG | non-PAG |
| T96R-28C | 35.93 | 45.03 | 9.10 | 1 | 0.42 | 13.1 | 43.8 | 3.35 | | non-PAG | non-PAG |
| T96R-28C | 45.03 | 47.83 | 2.80 | 1 | 0.24 | 7.6 | 43.8 | 5.80 | | non-PAG | non-PAG |
| T96R-28C | 47.83 | 55.72 | 7.89 | 1 | 0.12 | 4 | 114 | 30.21 | | non-PAG | non-PAG |
| T96R-28C | 55.72 | 63.86 | 8.14 | 1 | 0.27 | 8.4 | 44.7 | 5.31 | | non-PAG | non-PAG |

## Table 2-20: Mining Plan for Zone 6 with a Bulk NPR of 2.97 for Drillhole T96R-15C

| Hole-ID | Sample Depth and Thickness (m) | | | ABA Zones | Mine Plan Inputs | | | | BULK ZONE NPR | EAC Application Plan | Mining Plan at NPR of 2.00 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | Thickness | | Sulfide | AP | NP | NPR | | | |
| T95R-15C | 6.50 | 7.62 | 1.12 | 1 | 0.129884 | 4.1 | 26.8 | 6.60 | | non-PAG | non-PAG |
| T95R-15C | 7.62 | 7.92 | 0.30 | 1 | -0.0183676 | -1 | 473.6892 | -825.26 | | non-PAG | non-PAG |
| T95R-15C | 7.92 | 9.90 | 1.98 | 1 | 0.1802336 | 5.6 | 25.0 | 4.44 | | non-PAG | non-PAG |
| T95R-15C | 9.90 | 11.34 | 1.44 | 1 | 0.2007464 | 6.3 | 48.3 | 7.70 | | non-PAG | non-PAG |
| T95R-15C | 11.34 | 13.04 | 1.70 | 1 | 0.2016788 | 6.3 | 25.9 | 4.11 | | non-PAG | non-PAG |
| T95R-15C | 13.04 | 14.18 | 1.14 | 1 | 0.2473664 | 7.7 | 22.3 | 2.88 | | non-PAG | non-PAG |
| T95R-15C | 14.18 | 15.43 | 1.25 | 1 | 0.3452684 | 10.8 | 28.6 | 2.65 | | non-PAG | non-PAG |
| T95R-15C | 15.43 | 17.05 | 1.62 | 1 | 0.2688116 | 8.4 | 25.0 | 2.97 | | non-PAG | non-PAG |
| T95R-15C | 17.05 | 19.57 | 2.52 | 1 | 0.4711424 | 14.7 | 28.6 | 1.94 | **2.97** | Blend into surrounding units | Blend into surrounding units |
| T95R-15C | 19.57 | 21.51 | 1.94 | 1 | 0.7881584 | 24.6 | 51.9 | 2.11 | | non-PAG | non-PAG |
| T95R-15C | 21.51 | 24.15 | 2.64 | 1 | 0.922424 | 28.8 | 30.4 | 1.05 | | Blend into surrounding units | Blend into surrounding units |
| T95R-15C | 24.15 | 25.96 | 1.81 | 1 | 0.6016784 | 18.8 | 72.6 | 3.86 | | non-PAG | non-PAG |
| T95R-15C | 25.96 | 27.30 | 1.34 | 1 | 0.5858276 | 18.3 | 32.2 | 1.76 | | Blend into surrounding units | Blend into surrounding units |

## Table 2-21: Mining Plan for Zone 6 with a Bulk NPR of 4.41 for Drillhole T18-03D

| Hole-ID | Sample Depth and Thickness (m) | | | ABA Zones | Mine Plan Inputs | | | | BULK ZONE NPR | EAC Application Plan | Mining Plan at NPR of 2.00 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | Thickness | | Sulfide | AP | NP | NPR | | | |
| T18-03D | 17.500 | 17.650 | 0.15 | 6 Coal Cleaning | | | | | 4.41 | Place underwater | Place underwater |
| T18-03D | 17.650 | 18.6 | 0.95 | 6 | 1.1 | 35.31 | 33.8 | 0.96 | | | Blend into surrounding units |
| T18-03D | 18.6 | 19.4 | 0.8 | 6 | 0.1 | 4.2 | 12.5 | 2.96 | | | non-PAG |
| T18-03D | 19.4 | 19.6 | 0.2 | 6 | 0.4 | 12.8 | 26.0 | 2.03 | | | non-PAG |
| T18-03D | 19.6 | 20.5 | 0.9 | 6 | 0.1 | 2.2 | 15.5 | 7.09 | | | non-PAG |
| T18-03D | 20.5 | 22.25 | 1.75 | 6 | 0 | 2 | 37 | 23.87 | | | non-PAG |
| T18-03D | 22.25 | 23.16 | 0.91 | 6 | 0 | 1 | 55 | 87.20 | | | non-PAG |
| T18-03D | 23.16 | 23.56 | 0.4 | 6 | 0 | 2 | 51 | 32.51 | | | non-PAG |
| T18-03D | 23.56 | 25 | 1.44 | 6 | 0 | 1 | 94 | 74.80 | | | non-PAG |
| T18-03D | 25 | 26.12 | 1.12 | 6 | 0 | 2 | 77 | 49.15 | | | non-PAG |
| T18-03D | 26.12 | 28 | 1.88 | 6 | 0.4 | 13.8 | 27.8 | 2.02 | | | non-PAG |
| T18-03D | 28 | 29.06 | 1.06 | 6 | 0.5 | 14.4 | 70.3 | 4.89 | | | non-PAG |
| T18-03D | 29.06 | 30 | 0.94 | 6 | 0.3 | 8.8 | 34.3 | 3.92 | | | non-PAG |
| T18-03D | 30 | 32.25 | 2.25 | 6 | 0.3 | 10.6 | 18.8 | 1.77 | | | Blend into surrounding units |
| T18-03D | 32.25 | 32.65 | 0.4 | 6 | 1.48 | 46.25 | 6.0 | 0.13 | | | |

As the material zones mined with excavators/shovels will occur in approximately 12-m benches and a ML/ARD verification process will be conducted in advance of mining, any potential PAG or *non-PAG* material will be identified at a bench scale (12 m) as the sample interval recovered will be based on the planned mining horizon for the rock units within a blasthole. If sampling identifies separable PAG units within a mining horizon that require active management that can be mined efficiently with an excavator/shovel they will be managed as per the procedure provided as follows:

- For any separable PAG rock within blasthole polygons (defined as 2 times the burden and spacing distances) identified with an NPR less than 2.0 will need to be placed underwater within an average of 6 months and no longer than 12 months to mitigate the generation of ARD;
- Rock resulting from coal cleaning will be treated as PAG even if surrounding materials is *non-PAG* due to the inclusion of coaly materials into the rock;
- Rock materials will be treated as *non-PAG* if verification testing shows an NPR greater than or equal to 2.0 within blasthole polygons (defined as 2 times the burden and spacing distances);
- For overburden, surface soils, processed rock, rock construction materials, and non-rock construction materials will be treated as PAG if their NPR is less than 2.0, and verification testing will need to be done for these materials if they are to be treated as *non-PAG* as per the **ML/ARD Management Plan (ML/ARDMP; S13.0-C12)**; and,
- If verification testing is not completed, rock and processed rock will be treated as PAG.

Operational sampling committed to under the **ML/ARD Management Plan (ML/ARDMP; S13.0-C12)** provides sufficient data for final decision making on material segregation and placement as it has the necessary density and sample frequency needed to provide the certainty required for the protection of water quality and downstream environmental integrity.

Furthermore, at least one confirmation sample will be taken for each blast pattern which will be sourced from the reserve samples kept from the blasthole samples from the blast pattern. This sample confirmation requirement applies if only one type of geochemical material is consistently present for the entire blast being mined (i.e., all PAG or *non-PAG*). If more than one material type is identified based on the NPR cut off of 2.0 within an individual blast pattern a confirmation sample will be taken from each identified geochemical material which will be identified by material type, geochemical classification, zone, bench, lift number, blasthole, and blast pattern identifiers.

Lastly, random quarterly *non-PAG* rock pile samples will be taken from active *non-PAG* rock lifts in areas where rock has been placed during the last quarter. The number of samples will be based on an approximate 200 by 200-m grid pattern and taking a sample on every node of this grid. The

same criteria will be used as for operational blasthole verification testing with material having an NPR less than 2.0 being designated as PAG, while materials with an NPR greater than 2.0 being designated as *non-PAG*. If PAG material is identified by these grid points additional sampling will be conducted on approximately 25-m offset concentric circles from this location until a *non-PAG* sample is measured as illustrated by **Figure 2-16** below.

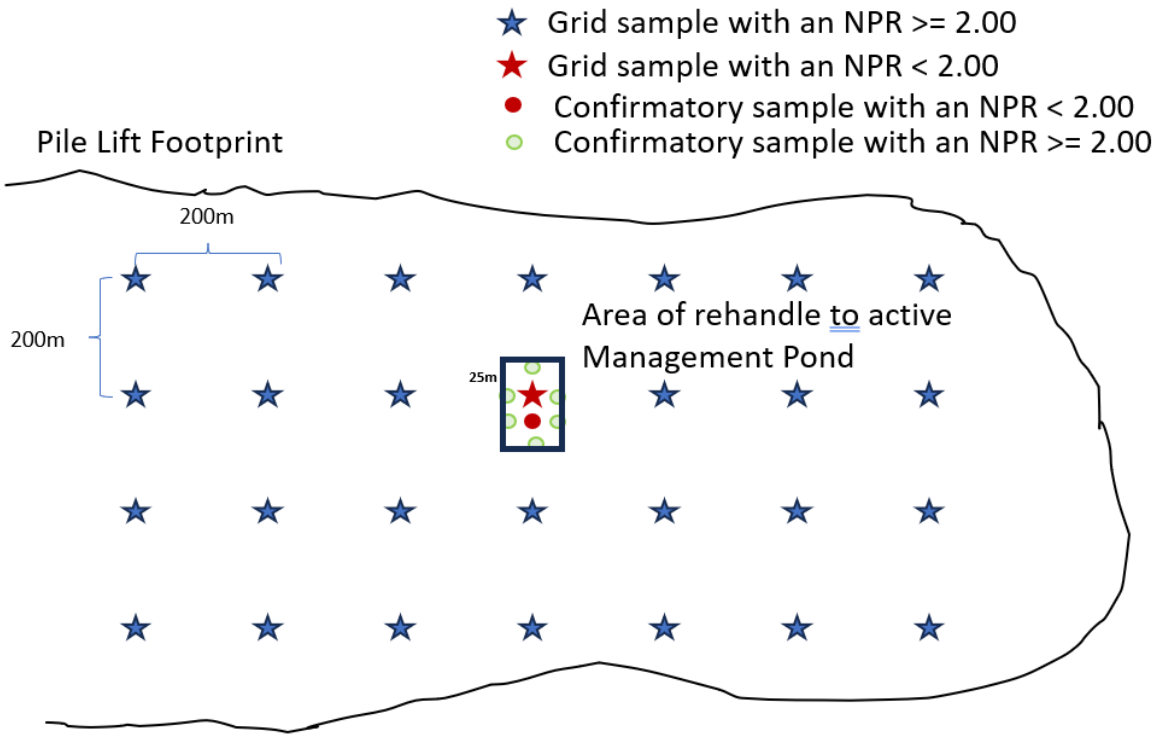


**Figure 2-16: *Non-PAG* Pile Lift Material Confirmation Testing**

Once the *non-PAG* rock pile lift area is defined by confirmatory testing and a bulk NPR and sulfur % has been calculated based on the sample testing completed; the following actions will be taken:

- If the bulk NPR for the sample is less than 2.0 an investigation will be completed, including a survey of the material's location and review of material that was placed there via the site electronic tracking system.
- Then a risk assessment will be conducted to determine if this this material will be rehandled and placed underwater in one of the active management ponds.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*The current sampling frequency does not provide adequate information to define or refine PAG volume estimates beyond what they have specified in the ML/ARD Management Plan. Monitoring the geochemical characterization of ore, waste, and overburden must be based on proper sampling frequency representative of the proportional volume of sampled materials.*

***LETTER IR 136 AND 136 ITT TABLE***

*Indicate what additional sampling and characterization studies are planned to meet BC ML/ARD Guidelines. For instance, Zone 4 is underrepresented in the static test database.*

*2 Available from: https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/permitting/ml-ard*

***RESPONSE LETTER IR 136 AND 136 ITT TABLE***

SRK has provided responses to this geoscience IR in **Appendix 16: Telkwa Coal Tenas Project Environmental Assessment Application – Responses to 2022 Supplemental Geochemistry Information Requests from the Ministry of Energy, Mines and Low Carbon Innovation, SRK**.

***FOLLOWUP COMMENTS***

***OVERVIEW IR LETTER***

*The metal leaching/acid rock drainage (ML/ARD) Management Plan in Section 6.4 specifies that all materials excavated from zones 1a and 2/3 will be managed as potentially acid generating (PAG). Material from zones 5, 55, and 6 were characterized as non-PAG but will be initially classified and managed as PAG unless testing can demonstrate otherwise. To facilitate the shorter turnaround times that are required to make operational decisions for placement of blasted rock, rejects, and other materials, the results of the geochemical characterization are used to develop operational proxies for determining NP and AP in an onsite laboratory that will be equipped with a Leco furnace. Section 6.1.3 of the ML/ARD Management Plan specifies an NPR of 1.2 is proposed to classify PAG mine rock at the Project. Clarifications and justifications on the ML ARD management plan and use of NPR 1.2 and 2 criteria as cutoff for verification and planning purposes should be provided.*

***IR LETTER 140, 142, 143, 146 and 148 AND 140a ITT TABLE***

*The ML/ARD Management Plan Section 6.4 specifies that all materials excavated from zones 1a and 2/3 will be managed as PAG. Material from zones 5, 55, and 6 were characterized as non-PAG but will be initially classified and managed as PAG unless testing can demonstrate otherwise. To facilitate the shorter turnaround times that are required to make operational decisions for placement of blasted rock, rejects, and other materials, the results of the geochemical characterization are used to develop operational proxies for determining NP and AP in an onsite laboratory that will be equipped with a Leco furnace. Section 6.1.3 of the ML/ARD Management Plan specifies an average weighted NPR of 1.2 is proposed to classify PAG mine rock at the Project.*

1. *Provide clarifications and justifications for the proposed ML ARD management plan and use of weighed average NPR 1.2 and 2 criteria as cutoff for verification and planning purposes.*

**RESPONSE 140a ITT TABLE**

SRK has provided a response to this geoscience IR in **Appendix 16: Telkwa Coal Tenas Project Environmental Assessment Application – Responses to 2022 Supplemental Geochemistry Information Requests from the Ministry of Energy, Mines and Low Carbon Innovation, SRK.**

Telkwa Mining contracted SRK to provide a scientifically defensible NPR criterion for segregating *non-PAG* material from PAG material for the planning/regulatory and operational verification phases based on site-specific data for the Tenas Deposit and best practices provided in the MEND (2009) prediction manual for drainage chemistry from sulphidic geologic materials.

SRK determined that a site-specific NPR cut off criteria of 1.20 for this deposit was appropriate to characterize blasthole rock as PAG (NPR less than 1.2) or *non-PAG* (NPR greater than or equal to 1.2). However, Telkwa Mining has elected to use a more conservative NPR criterion of 2.0 as a cut off versus the site-specific value of 1.20 to identify exploration drillhole and blasthole rock as PAG and non-PAG. This criterion was selected to ensure that Telkwa Mining will not classify PAG rock as *non-PAG rock*. This criterion will be reviewed as additional information is gathered for the permitting application at which point if the data supports it, Telkwa Mining will apply to revise the proposed NPR criterion.

The following provides a clear definition for the NPR cut off criterion used for the Tenas Project.

**Planning, Regulatory, and Operational Stages**

For mine planning processes, regulatory submissions such as the EAC application and operational verification testing, an NPR cut off criteria of 2.0 will be used to segregate *non-PAG* from PAG in exploration drillhole and/or blasthole. All rock with an NPR value less than 2.0 will be designated as PAG while rock having an NPR >= 2.0 will be classified as *non-PAG* based on verification testing specified in the ML/ARD management plan attached in **Appendix 17: Metal Leaching/Acid Rock Drainage Management Plan, SRK**.

Non-rock materials such as surface soils, overburden, processed coal, processed rock, and run-of-mine coal were characterized as PAG or *non-PAG* also using a cut-off of 2.0.

The justification to use an NPR cutoff of 2.0 for the planning, regulatory submission and operational stages for rock and non-rock materials is based on other deposits in BC, and an understanding of the site-specific geochemical information for this Project. The NPR criterion of 2.0 is also supported by the static geochemical testing results which showed that positive correlation of calcium and magnesium to the modified-NP indicating carbonate minerals are available to neutralize acid production (SRK 2024b).In addition, as noted above, kinetic testing results (SRK 2024b) indicate that an NPR of 1.2 is sufficient to identify rock as PAG or *non-PAG*. Selection of an operational NPR greater than the site-specific value is therefore suitable for identifying rock as PAG or *non-PAG*.

***FOLLOWUP COMMENTS***

***IR LETTER 140, 142, 146 and 140a ITT TABLE***

2. *Clarify what NPR criterion of 1.2 or 2 will be applied to manage waste material from zones 5, 55, and 6 and define them as non-PAG or PAG.*

**RESPONSE 140a ITT TABLE**

An NPR criterion of 2 will be applied to manage rock material from all zones including zones 5, 55 and 6.

SRK has provided a response to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***148 ITT TABLE***

*Please provide an updated management plan that addresses comments discussed in comments EMLI 140, 142, 143, and 146*

***IR LETTER 140, 142, 146 and 148 AND 140a ITT TABLE***

3. *Based on responses to comments EMLI 140, 142, 143, and 146 indicate if updates to the proposed Metal Leaching (ML) Acid Rock Drainage (ARD) management plan are needed to address blending of material.*

**RESPONSE 140a ITT TABLE**

No blending beyond what is provided through the normal mining process is planned for this Project.

The ML/ARDMP has been updated to reflect the proposed change in NPR criterion and is attached in **Appendix 17: Metal Leaching/Acid Rock Drainage Management Plan, SRK**.

SRK has provided a response to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*The ability to maintain a consistent water cover and to coordinate staged flooding and PAG placement was not demonstrated within the WLBM inputs or through contingencies in the waste management plan or mine plan.*

***168 ITT TABLE***

*The model assumes that all rock will be submerged underwater within 6 to 12 months. Please provide the contingencies in the waste management plan or mine plan to ensure maintenance of a consistent water cover and to coordinate staged flooding and PAG placement.*

***IR LETTER 140, 142, 146 and 148 AND 140a ITT TABLE***

4. *Provide contingencies in the waste management plan or mine plan to maintain a consistent water cover and to coordinate staged flooding and PAG placement.*

**RESPONSE 140a ITT TABLE**

SRK has provided a response to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***LETTER IR 140, 142, 143, 146, and 145, AND 140b ITT TABLE***

*To address overestimation of available NP, please specify the best-fit linear regression of the data in Figure 8 and do not fix the line through the origin. A review of Figure 8 of Appendix 1.0-M that illustrates the relationship between TIC-Fe Corrected and Modified NP also indicates that the Modified NP may on occasion overestimate available NP and as a result, revising the NPR criterion to the minimum NPR cut-off value of 1.2 may result in PAG rock being managed as Non-PAG mine rock.*

a) *Provide a greater range of percentile values in Table 2-4 and provide discussion of how spatially extensive a full PAG interval would be encountered for each zone in the pit.*

***Regulatory Clarification provided via email from Morgan Dyas on February 9th, 2024***

*The request to "provide a discussion of how spatially extensive a full PAG interval would be encountered for each zone in the pit" is based on the implications stemming from the statement in Appendix 1.0 M (SRK, 2022) that a unit is NPAG based on an average NPR > 1.2. The characterization results indicate that the Tenas Project geologic units contain both PAG and NPAG strata. For example, more than 10 of the 20 boreholes that intersected Unit 5 have NPR < 1.2, thus over ½ of the strata in this unit is PAG. By stating that overall a unit is NPAG implies that the mixing and blending associated with the standard mining procedures of a unit will prevent localized ARD from forming within a waste rock pile. To prevent localized ARD, published blending studies (Andrina, 2009; Mehling, 1998) indicate that blended quantities greater than 1:1 are required. This could not be achieved for Unit 5 without active management and may be difficult for units such as Unit 6 or Unit 7 that have median NPR of 1.7 and 1.6, respectively.*

*An understanding of the spatial distribution of PAG and NPAG within a stratigraphic unit would be required to allow effective blending to occur. The request to provide the spatial distribution of PAG strata was to determine if there is currently enough data to support that units designated as NPAG could actually be handled and placed as NPAG. Handling the entire zone for units 1a, 2/3, 5,55 and 6 as PAG and placing them in permanent flooded storage the average thickness and aerial map extent of each unit within the pit limits is adequate. However, if another type of PAG management is considered, more detailed characterization and identification of NPAG zones would be requested.*

*Information required for units 1 and 4 where NPAG is proposed to be segregated from PAG provide a map with average thickness and extent of the PAG and NPAG zones within the pit limits and show data points that were used to define the zones. This information would be helpful to inform additional characterization that may be required to allow segregation decisions to be made during permitting and/or operations.*

*Reference:*

*Andrina, J., 2009. Physical and Geochemical Behaviour of Mine Rock Stockpiles in High Rainfall Environments. A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in the Faculty of Graduate Studies (Mining Engineering), the University of British Columbia.*

*Mehling, P. 1998. BLENDING AND LAYERING WASTE ROCK TO DELAY, MITIGATE OR PREVENT ACID ROCK DRAINAGE AND METAL LEACHING: A CASE STUDY REVIEW MEND Project 2.37.1 April 1998.*

**RESPONSE 140b ITT TABLE**

SRK has provided responses to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

To clarify, SRK (2022) does not state that zones whose bulk properties are *non-PAG* will be mined as *non-PAG*. SRK (2022) states that all zones contain both PAG and *non-PAG* zones. The classification on the bulk properties was completed to provide an estimate of the *non-PAG* and

PAG quantities for the purpose of mine planning. As described in the ML/ARD Management Plan, verification will be conducted for *non-PAG* zones and separable PAG intervals in *non-PAG* zones will be segregated and submerged in the management ponds, in the same manner as rock from zones that were characterized as PAG based on their bulk quantities.

Telkwa Mining has stated that no blending is occurring for *non-PAG* units on a horizontal aerial basis to achieve a higher NPR, rather *non-PAG* areas will not be placed underwater while PAG areas will be placed underwater. The only blending that will occur is within the vertical horizon of a mining bench of 12 meters which is expected to occur from drilling/blasting and mining activities within the dig face.

**Figure 2-17** shows how Zone 5 would be segregated if verification testing agreed with the exploration drillhole polygons and an NPR cut-off of 2.0 was used with blocks in green being treated as *non-PAG* while blocks in red and yellow are treated as PAG. The above methodology follows a very similar and proven process used in metal mines to designate ore from mine rock, with this Project is using it to designate PAG from *non-PAG* rock. However, in the EAC Application the entire Zone 5 was classified as PAG and placed underwater. The same exercise could be completed using a different NPR criterion value if Telkwa Mining were successful in amending the NPR value of 2.0 being used in the EAC application.

Zones 5 and 6 are both entirely placed underwater in the EAC application so there is currently no segregation of polygons above an NPR of 2 versus below 2 so the statement above is not applicable to the EAC application. As stated earlier, Zones 7 and 8 are not mined within the EA open pit so the reference to Zone 7 above is not relevant to this application, however it would be subject to the same verification testing as other zones if it were to be encountered and to be treated as non-PAG.

**Figure 2-18** and **Figure 2-19** illustrate how zones 1, and 4 were split into PAG and *non-PAG* zones for the EAC application using a cut off of 2.0. Polygons coloured in red and yellow were treated as PAG while polygons colored green were treated as *non-PAG*.

The methodology proposed is like that used to define ore and non-ore at a metal mine based on the blastholes and blending is currently not planned to occur.

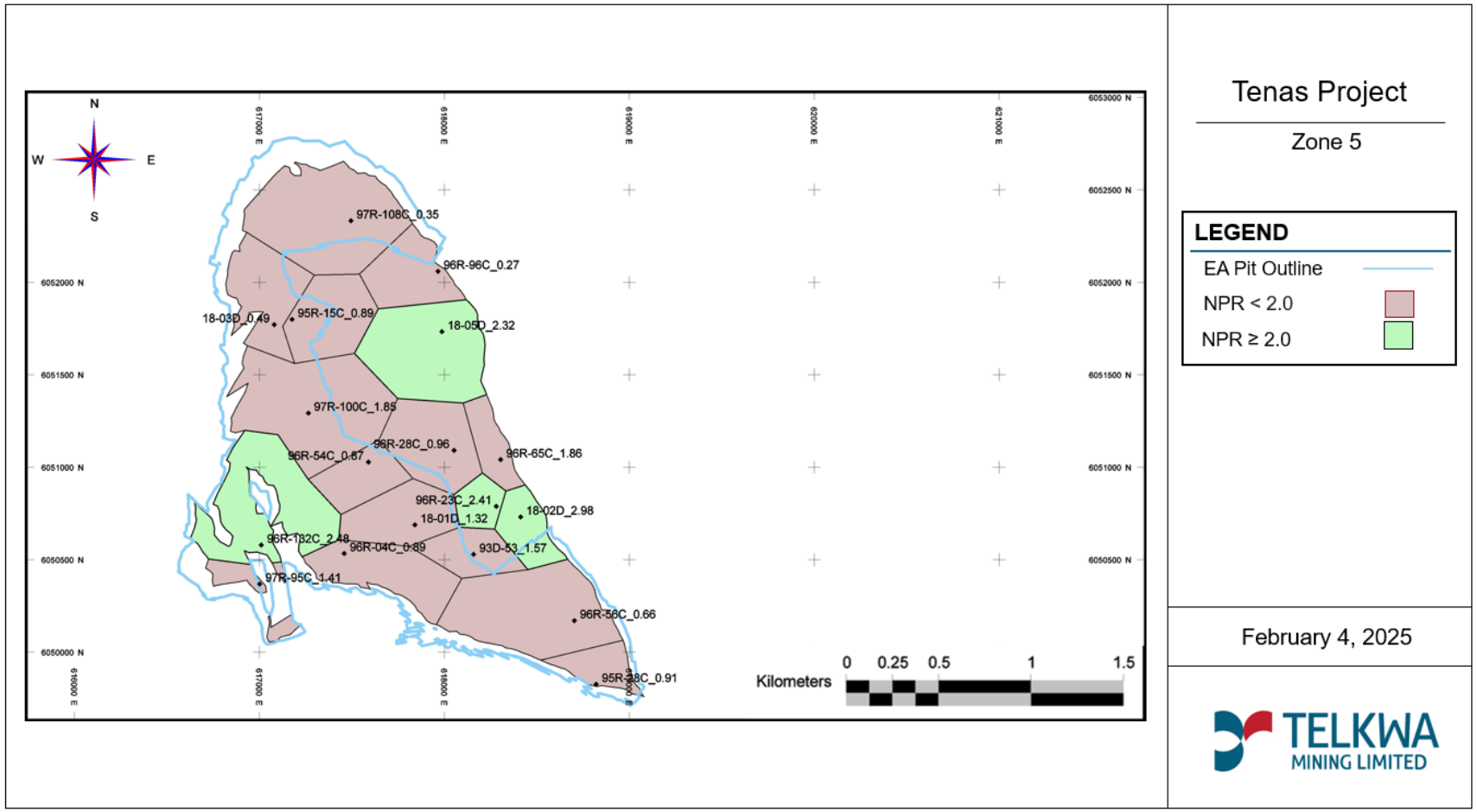


**Figure 2-17: Zone 5 Classification Based on Using an NPR Cutoff of 2.0 with Red Polygons Being Classified as PAG and Green Polygons Being Treated as *non-PAG***

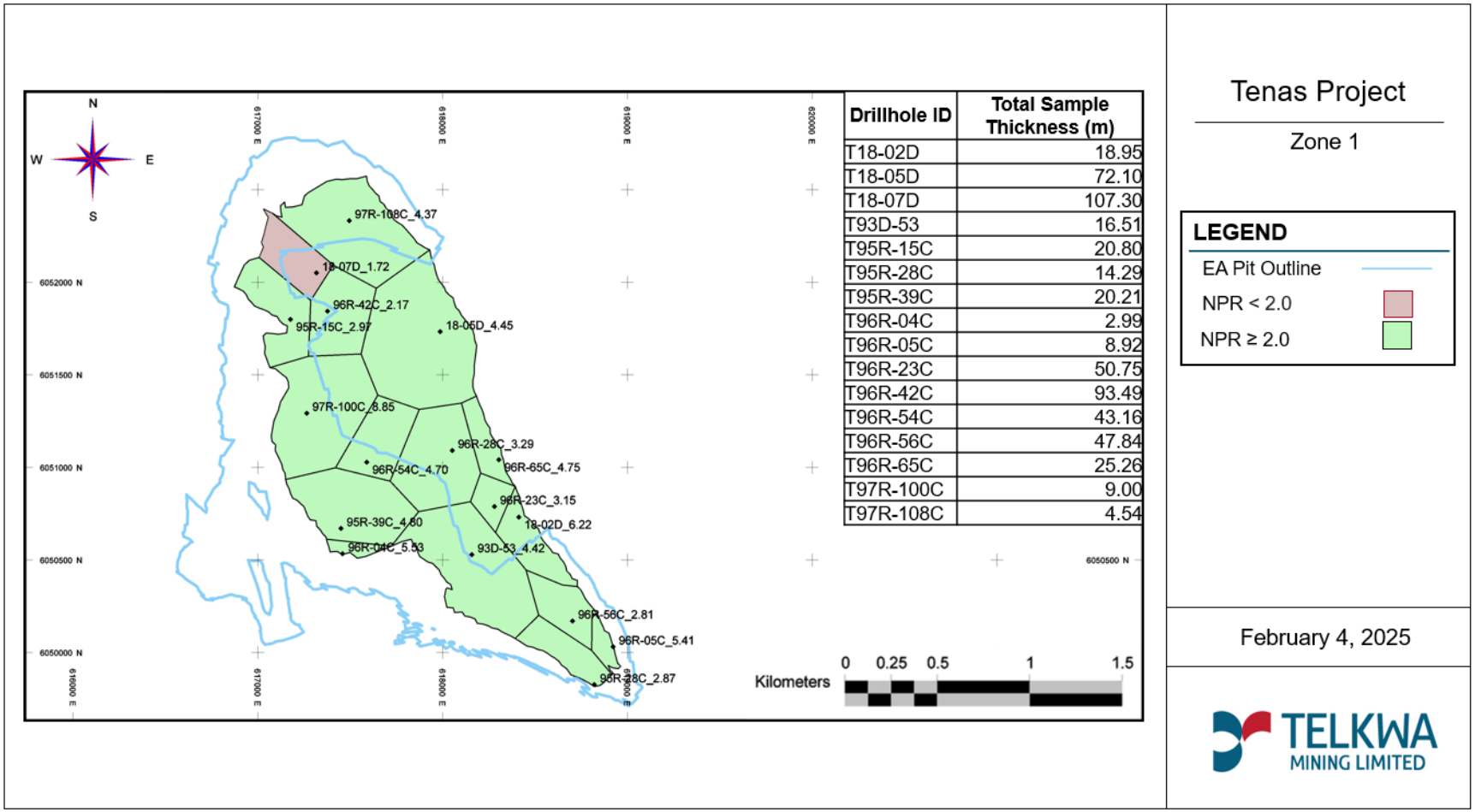


**Figure 2-18: Zone 1 PAG and non-PAG Polygons Classified Against an NPR Cut-Off of 2.0, with Zones in Red Being Submerged Underwater in the EAC Application**

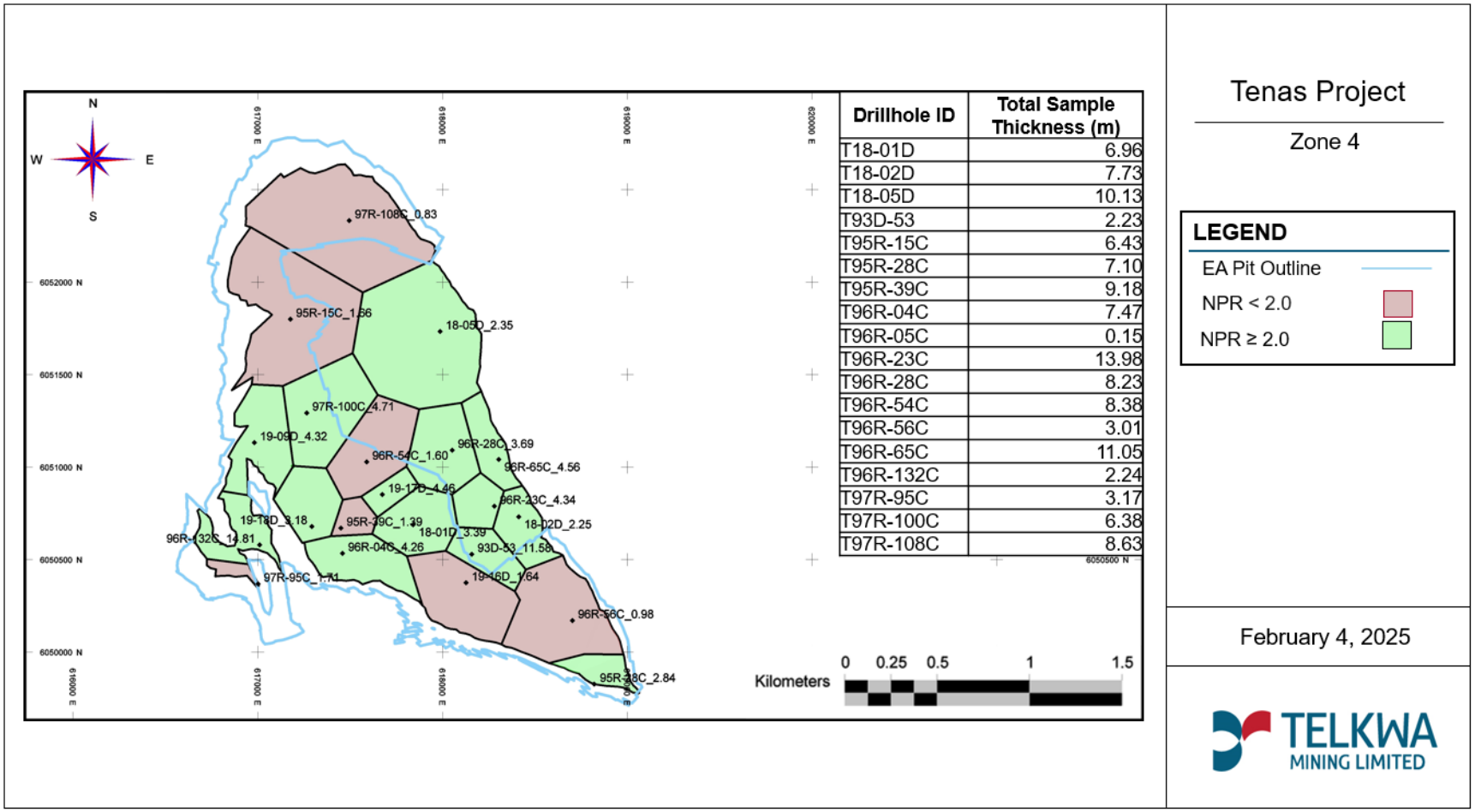


**Figure 2-19: Zone 4 PAG and non-PAG Polygons Classified Against an NPR Cut-Off of 2.0, Red Polygons Submerged Underwater in the EAC Application**

**Table 2-22** below summarizes the zone distribution and volumes within the EA Open Pit.

### Table 2-22: Summary of Zone Thicknesses, Extents, and Volumes with the EA Open Pit

| Zone | Average Thickness (m) | Aerial Extent ($m^2$) | Volume (kbcm) |
|---|---|---|---|
| 0 *non-PAG* | 8.1 | 2,650 | 21.409 |
| 1 PAG | 12.1 | 115 | 0.538 |
| 1 *non-PAG* | 18.1 | 1,200 | 21.501 |
| 1a PAG | 1.8 | 1,250 | 2.197 |
| 2/3 PAG | 9.2 | 1,350 | 12.427 |
| 4 PAG | 7.4 | 600 | 4.948 |
| 4 *non-PAG* | 7.0 | 1,000 | 7.205 |
| 5 PAG | 3.8 | 1,940 | 7.380 |
| 55 PAG | 1.2 | 1,725 | 2.110 |
| 6 PAG | 5.2 | 1,815 | 2.228 |
| **PAG Rock** | **Variable** | **Variable** | **31,828** |
| **Non-PAG Rock** | **Variable** | **Variable** | **28.706** |
| **Non-PAG Overburden** | 8.1 | 2,650 | 21.409 |

***FOLLOWUP COMMENTS***

***142 ITT Table***

*Carbonate molar ratio (CMR) is a critical assessment because it has implications on estimates for the time to onset of ARD, the volume of PAG rock that requires management and the design of the ARD management facilities at site. As noted in the TCL response, the flattening of the CMR vs. sulphate trend shown on Figure 14 represents the minimum NPR cut-off as the CMR evaluation does not account for other factors that need to be accounted for when assigning NPR criteria such as NP availability and other factors as outlined in MEND 2009 ARD Prediction Manual. It is the opinion of the reviewer that assigning a NPR cutoff criteria solely based on the CMR and not taking into account other factors that may affect the on-set of ARD, such as available NP, is not supported by the presented data and contributing factors at a mine scale. This comment is related to Comment #140 #143, and #146.*

**RESPONSE 142 ITT TABLE**

SRK has provided responses to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***FOLLOW UP 143 ITT TABLE***

*EMLI understands that the average weighted NPR of 1.2 did not account for other factors that may affect the onset of ARD, such as blended PAG and non-PAG strata in an unsaturated embankment or pile. EMLI understands that the NPR cutoff of NPR = 1.2 did not account for other factors that may affect the onset of ARD, such as available NP. The proponent should therefore provide an extended evaluation of these other factors if they wish to apply for an average*

*weighted NPR less than 2.0. Until this demonstration is done the Proponent should use a uniform approach based on NPR criterion of 2 to designate zoning of material as PAG or non-PAG and ensure their ML ARD management plan is updated accordingly.*

***OVERVIEW IR LETTER***

*The geochemical characterization report defines non-PAG material based on weighed NPR of 1.2. If the application of a weighted average NPR of 1.2 to define non-PAG and PAG zones is not conservative, it may impact the quantity of PAG waste rock to manage and configuration of the project during the life of mine. Additional information should therefore be presented by the proponent to demonstrate the conservativeness of this approach.*

- *EMLI understands that the neutralization potential ratio (NPR) cutoff of NPR = 1.2 did not account for other factors that may affect the on-set of acid rock drainage (ARD), such as available NP blended PAG and non-PAG strata in an unsaturated embankment or pile. An evaluation of these other factors with an average weighted NPR less than 2.0 was not provided.*

***LETTER IR 143 AND 143 ITT TABLE***

*EMLI understands that the weighted NPR cutoff of NPR = 1.2 to define non-PAG zones 5, 55, and 6. This did not account for other factors that may affect the on-set of ARD, such as available NP blended PAG and non-PAG strata in an unsaturated embankment or pile.*

1. *Provide an extended evaluation of these other factors if an average weighted NPR less than 2.0 is applied.*
2. *Provide a demonstration of the conservativeness of application of an average weighted NPR of 1.2*

## RESPONSE 143 ITT TABLE

SRK has provided responses to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*The metal leaching potential of overburden may not be driven by the same processes as sulphidic mine rock ARD and as a result, basic static testing [e.g., acid base accounting (ABA) and metal content] alone may not quantify the risk associated with overburden. The proposed geochemical characterization and monitoring program must also include testing methods to assess the metal leaching potential.*

***LETTER IR 145 AND 145 ITT TABLE***

*Conduct a geochemical characterization and monitoring program using methods to assess the ML potential.*

*a) Specify what additional methods will be employed as part of the geochemical characterization and monitoring program to characterize the metal/contaminant leaching potential at the expected pH of the material on the mine site.*

*b) b) Evaluate the metal/contaminant leaching potential and duration at the expected pH from the samples already collected to characterize the overburden.*

## RESPOSNE 145 ITT TABLE

SRK has provided responses to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***Follow up to 146 ITT Table***

Please propose a more conservative development of the Tenas mine rock NP designation and the ARD criterion of NP/AP = 1.2 based on responses to comments EMLI 140, 142 and 143.

***LETTER IR 140, 142, 143, 146, and 145, AND 140b ITT TABLE***

a) *Propose a more conservative development of the Tenas mine rock NP designation and the ARD criterion of NP/AP = 1.2.*

***EMLI Clarification provided on April 18, 2024***

*The EMLI request is requesting the proponent to determine a more conservative approach to define PAG strata for the Tenas Project. The request is based on the individual IRs provided in the Round 2 EMLI Geoscience IRs 140, 142, 143 and 146. The request may be fulfilled by revising the approach to calculate available NP and/or revising the NP/AP criterion for PAG strata. It may be best summarized by point 3 of IR 143 outlined below.*

SRK has provided responses to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

Telkwa Mining contracted SRK to provide a scientifically defensible NPR criterion for segregating *non-PAG* material from PAG material for the planning/regulatory and operational verification phases based on site-specific data for the Tenas Deposit and best practices provided in the MEND (2009) prediction manual for drainage chemistry from sulphidic geologic materials.

SRK determined that a site-specific NPR cut off criteria of 1.20 for this deposit was appropriate to characterize blasthole rock as PAG (NPR less than 1.2) or *non-PAG* (NPR greater than or equal to 1.2). However, Telkwa Mining has elected to use a more conservative NPR criterion of 2.0 as a cut off versus the site-specific value of 1.20 to identify exploration drillhole and blasthole rock as PAG and *non-PAG*. This criterion was selected to ensure that Telkwa Mining will not classify PAG rock as *non-PAG* rock. This criterion will be reviewed as additional information is gathered for the permitting application at which point if the data supports it, Telkwa Mining will apply to revise the proposed NPR criterion.

The following provides a clear definition for the NPR cut off criterion used for the Tenas Project.

**Planning, Regulatory, and Operational Stages**

For mine planning processes, regulatory submissions such as the EAC application and operational verification testing, an NPR cut off criteria of 2.0 will be used to segregate *non-PAG* from PAG in exploration drillhole and/or blasthole. All rock with an NPR value less than 2.0 will be designated as PAG while rock having an NPR >= 2.0 will be classified as *non-PAG* based on verification testing specified in the ML/ARD management plan attached in **Appendix 17: Metal Leaching/Acid Rock Drainage Management Plan, SRK**.

Non-rock materials such as surface soils, overburden, processed coal, processed rock, and run-of-mine coal were characterized as PAG or *non-PAG* also using a cut-off of 2.0.

***FOLLOWUP COMMENTS***

***FOLLOWUP COMMENTS LETTER IR 153 AND 153 ITT TABLE***

*EMLI understands that precipitation of these mineral phases, and the predicted concentrations, will be validated through operational water quality monitoring.*

1. *Specify how the minerals or other attenuation processes identified through speciation modelling will be confirmed by mineralogical or geochemical characterization of the material.*

**RESPONSE 153 ITT TABLE THEME #1**

SRK has provided responses to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***LETTER IR 153 AND 153 ITT TABLE***

2. *Describe the field or laboratory studies that will be conducted to validate these assumptions (e.g., field barrel program).*

**RESPONSE 153 ITT TABLE THEME #2**

Telkwa Mining initiated a field barrel program in October of 2019 and includes a discussion of the available results up to October 2023 which is four years of data. The report is provided in **Appendix 3: Geochemical Field Barrel Results Interpretation, SRK**. Key findings of this program are:

- After four plus years of testing only one barrel has gone acid using material from the drill program.
- Source terms for some parameters were updated in the Final EAC Project Case (2024) to reflect what the monitoring has shown to date.

Telkwa Mining will continue monitoring the barrel samples for the foreseeable future with SRK providing a follow up analysis every 2 to 3 years.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*Additional sensitivities are needed to refine the water quality modelling predictions:*

- *Exposed PAG rock in the management pond during a period of early closure;*
- *PAG rock exposures on pit wall;*
- *Upper-case prediction that is representative of challenging blasting conditions that could lead to higher nitrogen loading to blasted rock.*

***LETTER IR 154, 157, AND 161 AND 154a ITT TABLE***

1. *Prepare a sensitivity within the WLBM to evaluate how a 4-meter thickness of PAG rock left exposed in a management pond during a period of early closure would affect water quality.*
2. *Provide a sensitivity in the water quality model to allow PAG exposures on pit wall to understand how exposure of PAG may affect downstream water quality.*
3. *Develop an upper-case prediction that is representative of challenging blasting conditions that could lead to higher nitrogen loading to blasted rock.*

## RESPONSE LETTER IR 154, 157, AND 161 AND 154a ITT TABLE

SRK has provided responses to this geoscience IR in **Tenas Project – Water and Load Balance Modeling Report (Updated 2025), SRK**.

***FOLLOWUP COMMENTS***

***LETTER IR 154, 164 AND 154, 164 ITT TABLE***

1. *Clarify what loading rates were used for developing mine rock source terms, including differences in Table 2-6 and Attachment 2 and Table A-4.*
2. *Provide annual non-PAG material quantities required to construct the embankments and the location of where this material will be sourced.*

## RESPONSE LETTER IR 154, 164, AND 154, 164 ITT TABLE

SRK has provided responses to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*EMLI understands that the App 13.5 reports that calcite precipitation is likely to occur in seepage from mine site facilities and in site water management ponds in varying degrees during operations, closure, and post-closure. However, predictions indicate that calcite precipitation is not expected to occur downstream of the proposed project footprint based on current observations and baseline concentrations. Additional information should be provided on:*

- *The demonstration that calcite precipitation is not expected to occur downstream of the proposed project including all seepage and surface pathways.*
- *The mechanisms that might lead to calcite precipitation.*
- *Proposed calcite monitoring, management plan, and contingency measures to prevent or treat the onset of calcite precipitation downstream of the project discharge.*

***174 LETTER IR AND ITT TABLE***

*EMLI understands that, based on the conclusions made in Appendix 13.5-K, calcite precipitation is likely to occur in seepage from mine site facilities and in site water management ponds in varying degrees during operations, closure, and post-closure. However, predictions indicate that calcite precipitation is not expected to occur downstream of the proposed project footprint based on current observations and baseline concentrations.*

1. *What are the uncertainty and gaps around the current assessment that calcite precipitation is not expected to occur downstream of the proposed project footprint based on current observations and baseline concentrations? Please describe how the baseline observations and related conclusions relate to the projected load from the mine and propose recommendations to address these uncertainties and gaps.*
2. *Please update the calcite conceptual model provided in App 13.5K to include seepage pathways through groundwater or provide a rationale for its omission.*
3. *Provide clarifications on the mechanisms and likelihood of calcite precipitation in the immediate downstream environment including all pathways (i.e., surface and groundwater) below the end-of-pipe discharge location in Goathorn Creek.*
4. *Provide details of the calcite monitoring and management plan to prevent onset of calcite precipitation downstream of the project discharge and contingency measures to be implemented if specific triggers on the mine site are reached.*

## RESPONSE 174 ITT TABLE

SRK has provided responses to this geoscience IR in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***175 ITT TABLE***

*EMLI is consulting with ENV on water quality monitoring and water management measures for this project. Telkwa Coal will need to propose conceptual design of management structures as part of the current application to demonstrate that the Project as proposed is capable of managing water not suitable for discharge and meeting WQGs.*

***176a ITT TABLE***

*EMLI understands that ENV's review of the surface water quality effects assessment and proposed water quality benchmarks is ongoing. EMLI notes that based on that review additional water quality mitigation for the Project may be required. Should water treatment or other mitigation measures be proposed for the Project, EMLI will review the information at that time. Telkwa Coal is encouraged to engage as soon as possible with EMLI on any proposed water treatment, especially if any passive or semi-passive technologies are proposed.*

***IR LETTER OVERVIEW***

*Additional conceptual design of alternative treatment options, mitigation measures, and management structures are needed to prevent the discharge of water that is not suitable for release to the environment.*

***LETTER IR 176 AND 176b ITT TABLE***

1. *Provide conceptual design of alternative treatment options, mitigation measures, and management structures that can manage water not suitable for discharge and that meet BC WQGs.*

## RESPONSE 176 ITT TABLE

This was previously addressed by IR **Theme 1 RESPONSE IR 175, 176b, 514, 350, 353, and 355** above.

Telkwa Mining believes the details above and the attached appendices address the requirements set forth in IR **Theme 7**.

## THEME 8: EMLI GEOTECHNICAL CLARIFICATIONS

***FOLLOWUP COMMENTS***

***IR LETTER OVERVIEW***

*The proponent does not identify the processed rock waste as tailings and does not identify the North, East, and West Management Ponds as tailings storage facilities (TSFs). As per the Health, Safety and Reclamation Code for Mines in British Columbia (the Code), the definition of "tailings" is: "the residue remaining from the preparation of a concentrate of minerals or coal;" and a "tailings storage facility" (TSF) is: "a facility that stores tailings." As per these definitions, the "processed rock" described in the Application is considered tailings and the North, East and West Management Ponds are TSFs.*

- *TSFs have different minimum requirements than water dams in BC, including, but not limited to, minimum factors of safety, minimum design requirements for larger flood (return event and duration) and seismic events, downstream slopes, and many other requirements related to water management, performance, monitoring and surveillance, governance, etc.*

**RESPONSE IR LETTER OVERVIEW**

Telkwa Mining and SRK classified the management ponds as water holding ponds versus tailings storage ponds due to the following reasons:

- Embankment construction does not use tailing materials as a construction material but rather used engineered specified materials from mining activities;
- The ratio of PAG rock to processed rock (tailings) is approximately 11.25 to 1 on a volume basis so PAG rock will be the predominant material dictating performance of the materials contained within the embankment;
- Processed rock did not match definition of tailings provided by Vick; and,
- Processed rock is dewatered to less than 25% moisture prior to placement within the management ponds.

However, even though Telkwa Mining and SRK did not classify the management and control ponds as tailings storage facilities, due to the size of the management and control ponds, closeness to population centers such as the Village of Telkwa, and fish habitat Telkwa Mining/SRK utilized the guidelines for design requirements that matched the tailings pond design guidelines as these were the most conservative parameters to reference as summarized by **Table 2-23** below.

### Table 2-23: Canadian Dam Association Guidelines for Design of Tailings Dams[1]

| Dam Class | Annual Exceedance Probability - Floods[2] | Annual Exceedance Probability - Earthquakes | Minimum Static Factor of Safety | | | Downstream Slope No Steeper Than |
|---|---|---|---|---|---|---|
| | | | End of Construction | Long Term | Full or Partial Drawdown | |
| Low | 1/3 between 1/975 and PMF | 1/2,475 | 1.5 | 1.5 | 1.5 | 2H:1V |
| Significant | 1/3 between 1/975 and PMF | 1/2,475 | | | | |
| High | 1/3 between 1/1,000 and PMF | 1/2,475 | | | | |
| Very High | 2/3 between 1/1,000 and PMF | ½ between 1/2475 and 1/10,000 or MCE | | | | |
| Extreme | PMF | 1/10,000 or MCE | | | | |

Notes:

1. Adapted from CDA Dam Safety Guidelines, 2013. Further context and guidance provided there.
2. The Code required that a facility that stores the inflow design flood use a minimum event duration of 72 hours.

Source: BC MEMLI 2022

MCE=Maximum Credible Earthquake; PMF=probable maximum flood.

Telkwa Mining has adopted a more conservative approach to the design of the management ponds than is required for even some of the parameters for a Tailings Storage Facility (TSF).

For example, the Factor of Safety (FOS) that Telkwa Mining has put in place is 1.60 for all periods versus 1.50 provided in **Table 2-23** above and a downstream slope no steeper than 3H to 1V and an upstream slope no steeper than 2.5H to 1V versus 2H to 1V downstream requirement specified by **Table 2-23** above.

Given their proximity to the Village of Telkwa, the more stringent requirements of TSF embankments will be applied to management and control pond embankments regarding but not limited to the following parameters:

- minimum FOS;
- minimum design requirements for larger flood (return event and duration);
- seismic events;
- downstream and upstream slopes;
- water management;

- performance;
- monitoring and surveillance;
- governance;
- emergency response plan; and,
- etc.

Please find additional information on this IR provided in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOW UP COMMENTS***

***LETTER IR 171 AND 171 ITT TABLE***

*The report FINAL Tenas Project Dam Breach Assessment Report dated April 2021, by SRK (Canada) Ltd., included as Appendix 1.0-AA of the Application, has not been appropriately sealed in accordance with Engineers and Geoscientists BC requirements. Provide appropriately sealed documents, as required, including the Dam Breach Analysis included as Appendix 1.0-AA of the Application.*

**RESPONSE 171 ITT TABLE**

Please find attached **Appendix 19: Tenas Project Dam Breach Assessment Report, SRK**.

***FOLLOW UP COMMENTS***

***IR LETTER OVERVIEW***

*Completion of an alternative means of undertaking the proposed project with respect to options for tailings management that considers technology, siting, and water balance has not been demonstrated.*

***LETTER IR 178 AND 178 ITT TABLE***

*Applications must include an alternatives assessment for the Management Ponds/Tailings Storage Facilities and the alternatives assessment completed should be consistent with the Guidelines for the Assessment of Alternative for Mine Waste Disposal.*

*1. Provide a detailed review of tailings storage alternatives assessed to support the proposed mine plan*
*3. Available from: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/environmental-assessments/guidance-documents/eao-guidance-tailingsmanagement.pdf*
*4 Available from: https://www.canada.ca/en/environment-climate change/services/managing-pollution/publications/guidelines-alternatives-mine-waste-disposal/chapter- 1.html*

**RESPONSE 178 ITT TABLE THEME #1**

Based on the geochemical work conducted, processed rock has been classified as PAG material and as such placement of this material underwater is the recommended management strategy for this material to prevent potential ARD in the future. This was the conclusion of **Tenas Project PAG Management Alternative Means Assessment for managing this material, SRK**, provided by SRK with the EAC Application and included again as **Appendix 20: PAG Management Alternatives Assessment, SRK** with this response.

This requirement influences all future decisions with respect to this material, which is why this assessment was completed first. In response to this IR, SRK completed an **PAG Alternative Materials Storage Assessment** using the guidelines provided by Environment and Climate Change Canada *Guidelines for the Assessment of Alternatives for Mine Waste Disposal, July 2014* which is provided in **Appendix 21: Tenas Project Potential Acid Generating Material Storage Alternatives Assessment, SRK**. Based on the guidelines a multiple-stage process was completed as follows:

1. Step 1 involved completing a screening exercise to determine potential viable location for the storage of materials.
2. Step 2 involved completing a Multiple Accounts Analysis (MAA) for the identified preferred locations and configurations to identify the preferred option going forward.
3. Step 3 involved completing a sensitivity analysis to determine if the preferred option was robust enough to remain the preferred option under several conditions.

**Figure 2-20** and **Figure 2-21** below illustrate the results of the MAA and sensitivity analysis which demonstrated that the option submitted in the EAC Application was the preferred option to carry forward into detailed design during the permitting phase of the Project.

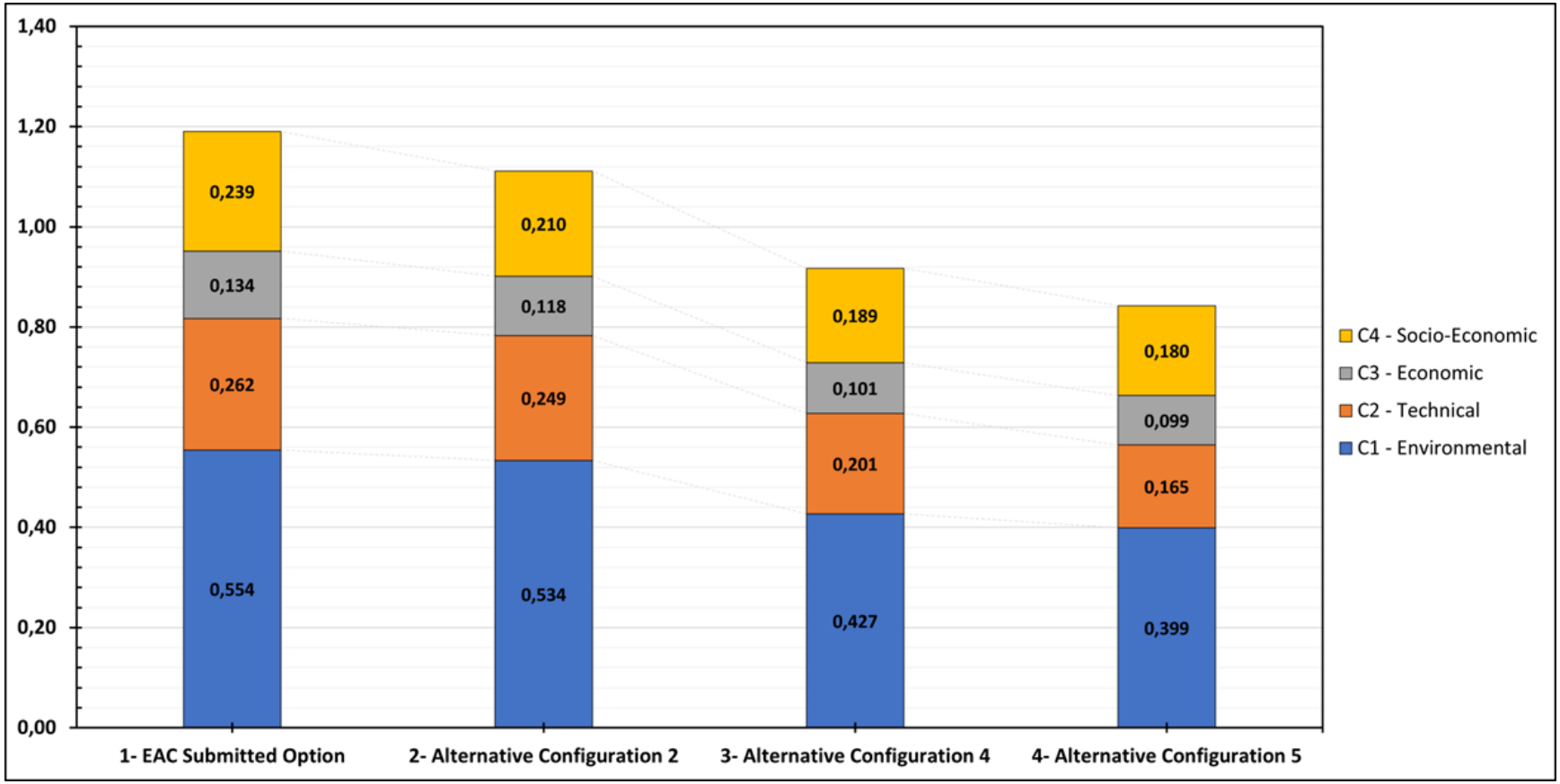


**Figure 2-20: Multiple Accounts Analysis Results of the Final EAC Project Case (2024) Location versus Alternatives**

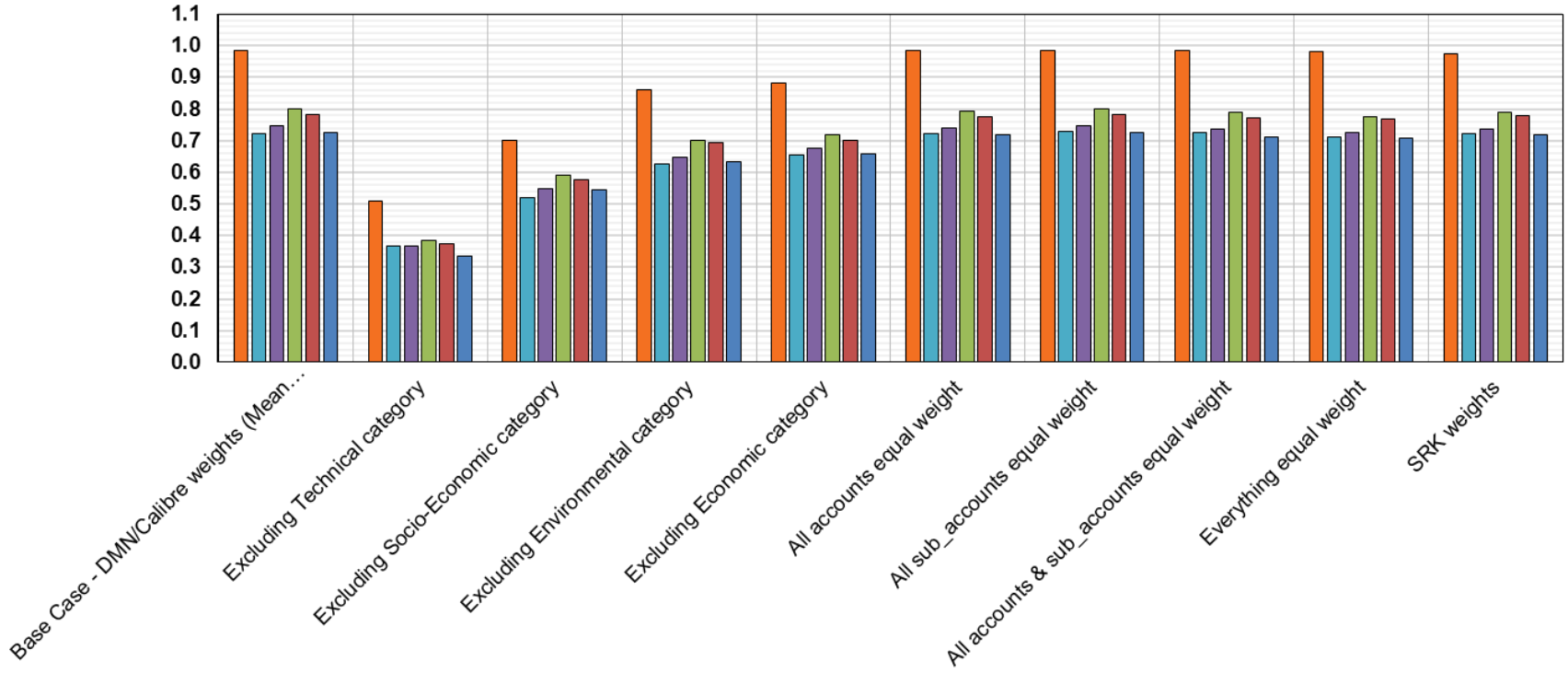


**Figure 2-21: Multiple Accounts Analysis Sensitivity Results of the Final EAC Project Case (2024) Location versus Alternatives**

Please find additional information on this IR provided in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

***FOLLOWUP COMMENTS***

***OVERVIEW LETTER IR***

*Results of the Dam Breach Analysis (DBA) does not clearly support the selected Consequence Classification Ratings for Dams or the seismic design criteria required by the Code given that the DBA reports that over 100 people could be impacted or at risk in the event of a breach of one of more of the management pond embankments. The Consequence Classification and seismic design criteria are lower than what is anticipated from the results of the Dam Breach Analysis, which could result in use of design criteria that are not consistent with regulatory requirements or accepted industry practice.*

***LETTER IR 181 AND FOLLOW UP 181 ITT TABLE***

1. *Provide justification for the selection of the failure scenarios considered, including descriptions of the findings of all cascading failure modes/scenarios assessed.*
2. *Provide justification for selection of a "Very High" Consequence Classification given the findings of the Dam Breach Analysis that over 100 people could be impacted or at risk in the event of potential failure or breach of one or more of the management pond embankments.*
    a. *Include the relevant TSF regulations and guidelines that support this determination.*
    b. *Indicate what evaluation of possible environmental impacts due to the release of the contents of the North, West or East Management Ponds was used as a basis for selection of Consequence Classification. The environmental impacts should be consistent with the current understanding of the project (PAG tailings, etc.) and include appropriate references to the sources of information considered.*
3. *Provide justification for selection of the TSF design flood events (Inflow Design Flood and Environmental Design Flood). Include the relevant TSF regulations and guidelines that support this design event selection.*
4. *Provide justification for selection of an earthquake with a return period of 1 in 2,475 years for the Management Ponds/TSFs stability assessment. Include the relevant TSF regulations and guidelines that support this design event selection.*

**RESPONSE FOLLOW UP 181 ITT TABLE**

Please find additional information on this IR provided in **Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK**.

Telkwa Mining believes the details above and provided in attached appendices address the requirements set forth in IR **Theme 8**.

# 3. FIRST NATION FEEDBACK

The Office of the Wet'suwet'en (OW) provided comment on these submissions on February 28, and March 12, 2025, which are summarized in

Table 3-1 below. Responses have been provided in **Appendix 22 Tenas Project Information Request Responses from Office of the Wet'suwet'en – Final, SRK**.

Telkwa Mining is expecting further input could be provided from Wet'suwet'en during their Assessment Process. Where modifications or clarifications of responses are appropriate Telkwa Mining will provide supplemental information to both the EAO and OW.

## Table 3-1: February 28, March 12, and May 15, 2025, Comments from OW

| Comment ID | Master ITT Comment ID (BC EAO) | OW Comment from Feb 28 or Mar 12 Letters/Report | OW Recommendations from Feb 28 or Mar 12 Letters/Report |
|---|---|---|---|
| OW-011 | 175, 176, 307, 350, 353, 355, 356, 514 | As mentioned, a presentation from TML is welcome. However, OW has its own priorities and objectives related to protecting aquatic resources in the territory. OW is working to identify Project-related issues related to water quality, water and load balance modeling, water treatment, and hydrology. | To address this IR, the Proponent should:<br>• Provide all the information requested in OW's forthcoming responses to TML's IR responses.<br>• Consider forthcoming information from OW regarding how all concerns related to Project impacts on aquatic resources have been identified and characterized.<br>• Consider forthcoming information from OW regarding whether monitoring and mitigation plans are adequate to address adverse impacts to aquatic resources. Impacts to water may also be considered in the RIA being conducted by OW.<br>This IR will remain open until OW is satisfied with how information from the RIA and the outcomes of OW's review of TML documents and engagement with TML on this issue are incorporated into Project monitoring, mitigation, and adaptive management plans. |
| OW-038 | 350 and 351 | The Proponent provides 11 mitigation options (6 single treatment options and 5 that are combinations of 3 or more of the single treatment options) and models the results. The results show options for reduction of max monthly concentrations and reduction of WQG for Four Creek and Tenas Creek. All of the viable options for reduction include a combination of multiple treatments and would result in some periods of time of reduced downstream natural streamflow. | The Proponent provides viable options for reducing concentrations of selenium, sulfate, cadmium, and nitrate/nitrite including a combination of multiple treatments. In some cases (Table 9), exceedances still occur (e.g., selenium, nitrate) at the end of pipe, even when multiple treatments are applied, particularly from the Tenas Control Pond. While the right combination of mitigation treatments will definitely improve downstream water quality, there are impacts to local streamflow and in some cases other constituents (e.g., increases in selenium). The most concerning reductions in streamflow for both Tenas and Four Creek are during late summer months (August) and winter baseflows. It doesn't appear that these reductions in streamflow have been modelled within the Water Load Balance Model to predict how the lower flows will impact downstream WQ at prediction nodes, although reduced concentrations in surface and groundwater should help, reduced water flow could end up balancing that reduction and total constituent loading may ultimately not change much. This warrants further investigation. To resolve these issues, TML must:<br>• Provide more information on how the reduction of water flow in the Tenas and Four Creek is involved in mitigations for reducing concentrations of selenium, sulfate, cadmium, and nitrate/nitrite;<br>• Provide data for how this reduction is incorporated into the Water Load Balance Model to predict how the lower flows will impact water quality downstream, especially during late summer months (August) and winter baseflows;<br>• Provide more information on the proposed water mitigations, including the reliability and risks of each option associated with failure of effective treatment, in addition to the expected beneficial change and the expected consequences of each treatment option; |
| OW-039 | 350 and 351 | As above, the Proponent provides 11 mitigation options and describes aspects of treatment efficiency and effectiveness for each option, including modelled water quality outcomes. The Proponent provides information on the expected beneficial change and the expected consequences of each treatment option but does not provide risks associated with failure of effective treatment. | The reliability and risks of each option are not discussed, and very little information is provided on situations where the mitigation option may be less effective/ ineffective (i.e., high, or low run off conditions, liner failure, etc.). The water treatment plan option (Control 5) appears to be one of the most effective options, particularly when combined with other options. However, the design details of the water treatment plant have not been developed (which the proponent acknowledged in the document), and the reductions in constituent concentrations are only assumed. This would require additional storage and appropriate treatment rates, along with additional energy and waste disposal costs. As water treatment, in combination with other approaches, is the most effective way of reducing exceedances from the ponds, this option should be pursued but TML must provide more information on the details of that process (including detailed operations of the treatment facility over time, energy and water use, and efficiency of treatments, etc.). TML must provide further information on alternative treatment plans and outcomes that describe how the water treatment facility would be designed, what standards would be used, the operation, and the duration. |
| OW-040 | 356 | The Proponent developed a new node (WQSEA1) of water quality measures for the Water and Load Balance Model (WLBM), 100 m downstream of the confluence with the unnamed tributary for Project discharge on Goathorn Creek. The Proponent developed and ran new WLBM scenarios to review the impacts of changes in seepage rates on expected water quality and says, "Water quality results will be presented at the new node (WQSEA1), WQS06, WQS05, WQS04, and WQS03_DS with the Final EA Water and Load Balance results". We have been unable to find the aforementioned document containing the results. There were some errors in the figure from the WLBM report (Fig 2.2-2.4 of App 4.3) that showed incorrect connections of the three creeks (Four | We are unable to find the documents containing the results of this IR response, "Final EA Water and Load Balance results", or Attachment IR 356-1 as the IR response does not provide further information regarding where these documents are located. We are unable to find any documents with that name in the review materials provided to us and therefore could not review the IR. Please provide these documents, including figures for each of the requested scenarios in the IR (Tributary receiving discharge above confluence with Goathorn Creek, and Goathorn Creek below confluence with tributary receiving discharge); projected water quality from baseline through to post-closure; and updated figures from the WLBM report (Fig 2.2-2.4 of App 4.3) that showed incorrect connections of the three creeks (Four Creek, Tenas Creek, Goathorn Creek). |

| Comment ID | Master ITT Comment ID (BC EAO) | OW Comment from Feb 28 or Mar 12 Letters/Report | OW Recommendations from Feb 28 or Mar 12 Letters/Report |
|---|---|---|---|
| | | Creek, Tenas Creek, Goathorn Creek), but the proponent claims the errors in the figure were NOT incorporated into the model and that the model correctly accounts for the mixing of streams. There are final figures presented in Attachment IR 356-1; however, we also cannot find this document as the attachment with that name at the end of App F contains no information. We are also unclear whether this is the location of the other results the authors describe (e.g., figures for each of the requested scenarios and projected WQ from baseline through to post-closure). Because we were unable to locate this document, we could not completely review the response to the IR. | |
| OW-041 | NEW | Same comment as previous. The Proponent developed a new node (WQSEA1) of water quality measures for the Water and Load Balance Model (WLBM), 100 m downstream of the confluence with the unnamed tributary for Project discharge on Goathorn Creek. The Proponent developed and ran new WLBM scenarios to review the impacts of changes in seepage rates on expected water quality and says, “Water quality results will be presented at the new node (WQSEA1), WQS06, WQS05, WQS04, and WQS03_DS with the Final EA Water and Load Balance results”. We have been unable to find the aforementioned document containing the results. There were some errors in the figure from the WLBM report (Fig 2.2-2.4 of App 4.3) that showed incorrect connections of the three creeks (Four Creek, Tenas Creek, Goathorn Creek), but the proponent claims the errors in the figure were NOT incorporated into the model and that the model correctly accounts for the mixing of streams. There are final figures presented in Attachment IR 356-1; however, we also cannot find this document as the attachment with that name at the end of App F contains no information. We are also unclear whether this is the location of the other results the authors describe (e.g., figures for each of the requested scenarios and projected WQ from baseline through to post-closure). Because we were unable to locate this document, we could not completely review the response to the IR. | We are unable to find the documents containing the results of this IR response, “Final EA Water and Load Balance results”, or Attachment IR 356-1 as the IR response does not provide further information regarding where these documents are located. We are unable to find any documents with that name in the review materials provided to us and therefore could not review the IR. Please provide these documents, including figures for each of the requested scenarios in the IR (Tributary receiving discharge above confluence with Goathorn Creek, and Goathorn Creek below confluence with tributary receiving discharge); projected water quality from baseline through to post-closure; and updated figures from the WLBM report (Fig 2.2-2.4 of App 4.3) that showed incorrect connections of the three creeks (Four Creek, Tenas Creek, Goathorn Creek). |
| OW-042 | NEW | The IR document says, "In summary, the background water quality inputs used in the EAC Project Case (August 2022) were monthly mean values while seasonal values are used in both the Updated and Final EAC Project Cases (2024)". However, in Appendix F, Section 4.18.2, SRK says "The EA WLBM used statistics from the full water quality baseline monitoring record, including the 50th percentile and 95th percentile for each stream. Monthly or seasonal background source terms were not used". This is relatively confusing as responses in the IR in different locations are providing different answers to the initial question. In Appendix F, they follow up by saying they generated new baseline statistics for the Final EAC Project Case (2024) based on updated data, including a new 50th percentile for the winter months and a 50th percentile for the "rest of the year" (May to October). They say the Final EA Water and Load Balance Report will include the seasonal source terms for background concentrations on the in-stream water quality conditions, so we assume this is the 50th percentile or the median. However, it is unclear if this will be presented as the main WQ prediction scenario or alternative assessment scenario(s). We were unable to locate the document referred to as Final EA Water and Load Balance Report to further review. | Reporting the use of different time scales is troublesome, especially in a region with high seasonal variability. The caching of all "open water" months into one "summer season" is not appropriate as there are very different climate and ecosystem processes influencing or influenced by spring vs summer vs fall water quality dynamics. The use of one seasonal value may be skewed by over-represented high or low values that occur during more months, and therefore not representative of periods exhibiting seasonally low or high values. Monthly values would be more appropriate to capture full seasonal variability. Please provide this information. In addition, we were unable to fully review this IR because we could not locate the referenced document "Final EA Water and Load Balance Report". Please provide this information. |
| OW-043 | NEW | Some of the sedimentation ponds that discharge to the natural ground were not included as part of the WLBM in the EAC application (the proponent lists 6). Four of the ponds are lined with impermeable geomembrane liners or equivalent and the remaining 2 are unlined. They were not considered in the site water and load balance model when it was developed because: 1) they are geographically separate from the EA Open Pit, management and control ponds, and material storage pile water management systems, 2) they are small and manage very defined catchments with low flow rates compared to discharge from mine components through Tenas Control Pond, 3) TSS is the main POC for most of these ponds but some also include nitrogen species, 4) they are designed to produce TSS well below the BC (35 vs 50 ppm) requirement so deemed protective of aquatic environment, 5) the remaining pond doesn't discharge to the environment it gets pumped | The organization of various ponds and their connectivity, as well as the lack of data associated with each pond is an obvious source of confusion in the application. This theme arises in many comments throughout the proponent’s IR response. Discharges from sedimentation ponds (excluding Tenas Control Pond/North Management Pond and Rail Infrastructure Pond) are directed towards natural ground. The Proponent plans to convey this water along natural flow pathways to eventually reach downstream watercourses. Despite use of pumps and other structures for controlled release, there is risk of overflow and higher amounts of release during high rain events, which may increase downstream erosion potential. The Proponent must provide a clear map of the location and connectivity of each pond along with an associated table that includes all the requested information from the IR. |

| Comment ID | Master ITT Comment ID (BC EAO) | OW Comment from Feb 28 or Mar 12 Letters/Report | OW Recommendations from Feb 28 or Mar 12 Letters/Report |
|---|---|---|---|
| | | to the Tenas Control Pond, and 6) they describe how they deal with material from the Explosive Magazine Pond. | |
| OW-044 | NEW | The only discharge that will be directed into a stream is the Tenas Control Pond (and North Management Pond after closure). An IDZ study was prepared to evaluate discharge from Tenas Control Pond, which found that discharge would not be acutely toxic. This discharge was simulated in the Water and Load Balance Model to quantify the expected effect in streams. They do not reference the IDZ study used to evaluate discharge, so we were unable to review in the context of this IR.<br>The Proponent ensures that when the ponds are discharging, they will be monitored on a “regular basis” (frequency not mentioned) and monthly when not discharging. Monthly monitoring proposed with various (3) "action steps" proposed to address WQ exceedances if they should occur. Some of these involve reactions to chemical parameter exceedances of BC WQG over a "period of months". | Note that an IDZ will not be considered during permitting without an adequate BAT assessment. Given that a new BAT assessment has been performed with alternative treatment options, the IDZ study would need to be redone to account for water quality differences derived from various different treatment options. The comment does not address the need to also evaluate cumulative effects around the IDZ. In addition, the proposed frequency of monitoring for exceedances is inadequate given the risk to downstream fish. These ponds will be monitored monthly to evaluate toxicity results against authorized limits for lethality of Rainbow Trout. If exceedances exist, a number of actions are proposed to reduce exceedance, but given the frequency of monitoring (monthly) and the amount of time required for implementation of the proposed actions, it is possible exceedances (and downstream negative effects) could persist for a substantial amount of time (months) before any resolution. This presents a considerable prolonged threat to fish and ecosystem health. TML must correct these discrepancies. |
| OW-045 | 520 | There are no lentic (i.e., lakes or ponds) water bodies located in the near-field or far-field receiving environments of the Project. | The concern here is sedimentation and conversion of selenium species, so there may be opportunities for this in micro-lentic environments such as back channels and pool environments along the stream course, but according to the proponent in this local study and regional study region there are no lentic environments. |
| OW-046 | 176 | Mitigation control scenarios are discussed and compared, including the pros and cons of expected changes in water quality. The most effective treatments for reduction of selenium and nitrate-nitrite in both control ponds are combinations of multiple mitigation strategies, many of which include the strategy of water quality treatment (listed as "mitigation control 5").There are no plans or outcomes developed that describe how the water treatment facility would be designed or operate, some of the benefits are based on assumed targets met through treatment. | However, there are no actual plans or outcomes developed that describe how the water treatment facility would be designed or operate, some of the benefits are based on assumed targets met through treatment. This is acceptable but should be fleshed out further, and it should be confirmed that these targets can actually be met if this is considered a feasible option. The Proponent is also assuming the water quality treatment would persist past the end of closure as the model shows results out to 2100.<br>Additional information on water treatment facility is needed (design, standards, operation, and duration) and should not be assumed if this is considered as an option, in conjunction with other mitigation strategies (it is included on the list of combined best options). There are also effects on streamflow in Four and Tenas Creek, which should be explored more with the water load balance model. Goat Creek was not included in the model outputs, although this is acknowledged by the authors. Impacts on Goat Creek should be included in additional assessment of further mitigation strategies. |
| OW-047 | 154, 157, 161 | The Proponent claims that the evaluation of how a 4-meter thickness of PAG left exposed in a management pond would affect water quality is not possible because of the way the pumping system is set up and that the management ponds are always built ahead of PAG placement to ensure that the PAG is below water level. We are concerned that the Proponent dismissed this request saying that under properly managed scenarios this would not be a concern. " | We are concerned that the Proponent dismissed this request saying that under properly managed scenarios this would not be a concern. However, it doesn't provide information on the effects of exposed PAG to water quality under scenarios where the management pond techniques fail, such as failure of a pond dam or failure of the pumping system to work as designed. The Proponent must provide this information and include scenarios in the water quality model for estimating impacts where management actions fail, to provide a clear picture of the downstream impacts of PAG under less-than-ideal conditions, but conditions that could possibly occur if there are situations where proper management cannot occur (failure of pumping system or pond dam, or some other instance where a 2m cover of water cannot be maintained). |
| OW-048 | 154, 157, 161 | It is unclear where the information is associated with this IR. Within App D they cite a ""SRK 2024a"" (page 16) with the results of the model output using the various source terms but the reference is not included at the end of the document under ""References"". Appendix A- Water Balance Report. contains source terms but has not been updated to include a sensitivity like requested in the IR. | We were unable to review this IR responses as we were unable to find the supporting information. Please provide this information. |
| OW-049 | 174 | The predictions provided in SRK (2022d) indicate that calcite is not expected to form in downstream tributaries since predicted alkalinity, calcium and magnesium concentrations are like existing conditions and there is currently no visual evidence of calcite precipitation even though surface water in these drainages is supersaturated with respect to calcite under baseline conditions. Because of this, they suggest that site-specific Saturation Indices (SI) may need to be developed once sufficient monitoring data are available. They describe how if calcite formation is identified as part of the operational monitoring program, TML will develop a mitigation plan that will be submitted to EMLI for approval. The most common calcite prevention mitigation strategy is | 1. The response to the IR states that the estimated SI do not suggest calcite precipitation, but detailed discussion is not in the reference. They do not specify what additional monitoring data is required for site-specific calculation of site-specific SIs for calcite. Is TML referring to monitoring data from this post-project operations, or baseline data? It is unclear where in the referenced SRK (2022d) document they specifically address calcite, as the term “calcite” only appears once in the document. TML must update the Discharge Management Plan and provide further information on how operation and a post-closure increase in conductivity in ponds and the receiving environment will affect the SI for calcite and predictions for precipitation.<br>2. Higher pCO2 in groundwater will be more likely to precipitate calcite at possible groundwater seepage locations (contact with atmosphere). Some accounting for this should be included in the conceptual model. |

| Comment ID | Master ITT Comment ID (BC EAO) | OW Comment from Feb 28 or Mar 12 Letters/Report | OW Recommendations from Feb 28 or Mar 12 Letters/Report |
|---|---|---|---|
| | | addition of antiscalant to site effluent. This would be the most likely mitigation strategy should it be required. They also say there is no need to include groundwater seepage in the conceptual model as there is no reason for CO2 off-gassing to occur along groundwater pathways at the Project, and calcite is therefore not expected to precipitate in groundwater pathways. | 3. Within the referenced SRK 2022d (Tenas Project Water and Load Balance Modeling Report REV1), we cannot find discussion of calcite precipitation, including mechanisms, contributing factors, predictions, etc. The response to the IR states that the estimated SI do not suggest calcite precipitation, but detailed discussion on this topic is not in the reference. According to the IR response, "predictions provided in SRK (2022d) indicate that calcite is not expected to form in downstream tributaries since predicted alkalinity, calcium and magnesium concentrations are like existing conditions". However, there are multiple examples of increases in alkalinity and magnesium (in particular) in the load model. Therefore, TML must explore conditions in terms of potential for calcite precipitation.<br>4. There is no plan, other than including calcite in the surface water quality monitoring program. If calcite formation is observed, then they will develop a mitigation plan. This plan will likely include mitigation using antiscalants. The proponent does not discuss this option further but should include considerations and possible impacts and interactions of the use of antiscalant for reducing calcite precipitation considering the high background conditions of aluminum in these watersheds. |
| OW-050 | 181 | The statement "The effect of the rainy-day breach on aquatic habitat is low given the PMF/Q200 conditions already present" is not supported given the discharge at the mouth of Tenas Creek is estimated to be 1100 $m^3/s$ in comparison to a PMF of 168 $m^3/s$, and that maximum water velocity and rate of discharge increase from a flood wave are not accounted for. However, we do agree that the risk to aquatic life for a breach of the East Dam or West Dam should be 'Very High' due to the likelihood of major long-term deterioration of critical steelhead spawning habitat. We believe that the 'Very High' classification would be more appropriate for a breach of the North or Tenas Dams as well given the likelihood of major long-term deterioration of critical steelhead spawning habitat in Tenas and Goathorn Creeks. | Given the likelihood of major long-term deterioration of critical steelhead spawning habitat in Tenas and Goathorn Creeks, a 'Very High' risk classification should be used for a breach of the North Dam or Tenas Dam. |
| OW-118 | NEW | To help OW better assess how TML is protecting the Environmental Flow Needs, provide details on how and/or TML will manage flows to avoid high risk levels and maintain environmental flow needs (reduction of <10% of mean average by season) during operation. To help OW better assess how TML is protecting the Environmental Flow Needs, provide details on how and/or TML will manage flows to avoid high risk levels and maintain environmental flow needs (reduction of <10% of mean average by season) during operation. | Commit to appropriate planning for contaminant areas, which requires a proactive approach to mitigating contaminant leakage (rather than attempting to mitigate once problems have been identified); |
| OW-120 | NEW | To help OW better assess how TML is protecting the Environmental Flow Needs, provide details on how and/or TML will manage flows to avoid high risk levels and maintain environmental flow needs (reduction of <10% of mean average by season) during operation. To help OW better assess how TML is protecting the Environmental Flow Needs, provide details on how and/or TML will manage flows to avoid high risk levels and maintain environmental flow needs (reduction of <10% of mean average by season) during operation. | Consider the appropriateness of water and load balance models and correct seepage migration rates and timing of peak contaminant concentrations; |
| OW-122 | NEW | For Surface Water, Ground Water, and Aquatic Resources VCs, TML must: | Provide the cited document in Appendix D: "SRK 2024a" (page 16), which is missing from the end of the document under "References". Appendix A- Water and Load Balance Model Report. |
| OW-123 | NEW | For Surface Water, Ground Water, and Aquatic Resources VCs, TML must: | Update the Discharge Management Plan - Calcite Precipitation document to include:<br>• How operation and a post-closure increase in conductivity in ponds and the receiving environment affect the Saturation Indices (SI) for calcite, and predictions for precipitation;<br>• Accounting for higher pCO2 in groundwater, which is more likely to precipitate calcite;<br>• Further accounting for increased calcite precipitation in instances where alkalinity and magnesium in the water increase; and<br>• A separate calcite monitoring and management plan, which considers possible impacts and interactions of the use of antiscalants for reducing calcite precipitation, considering the high background conditions of aluminum in these watersheds. |
| OW-124 | NEW | For Surface Water, Ground Water, and Aquatic Resources VCs, TML must: | Provide additional information and figures for the Water and Load Balance Model Report that we have not been able to locate, including:<br>• Final figures presented in "Attachment IR 356-1 as the attachment with that name at the end of App F contains no information; |

| Comment ID | Master ITT Comment ID (BC EAO) | OW Comment from Feb 28 or Mar 12 Letters/Report | OW Recommendations from Feb 28 or Mar 12 Letters/Report |
|---|---|---|---|
| | | | • Figures for each of the requested scenarios in the IR (Tributary receiving discharge above confluence with Goathorn Creek, and Goathorn Creek below confluence with tributary receiving discharge) and projected water quality from baseline through to post-closure;<br>• Updated figures from the WLBM report (Fig 2.2-2.4 of App 4.3) that originally showed incorrect connections of the three creeks (Four Creek, Tenas Creek, Goathorn Creek); and<br>• TML's response to the IR, labelled "Final EA Water and Load Balance results", or Attachment IR 356-1. |
| OW-125 | NEW | For Surface Water, Ground Water, and Aquatic Resources VCs, TML must: | Use climate change predictions in the understanding of potential impacts throughout the operation and post-closure periods (e.g., changes in flow and changes in stream temperature due to changes in flow and air temperature). |
| OW-126 | NEW | For Surface Water, Ground Water, and Aquatic Resources VCs, TML must: | Resolve outstanding technical questions regarding PAG Rock management and seepage including:<br>• If PAG rock is to be submerged prior to the onset of ARD/ML, why would seepage tailings facilities contain the products of ARD/ML?<br>• How much seepage is expected out of tailings facilities, both in groundwater and in surface water? |

## 4. CLOSING

Thank you again for providing Telkwa Mining with the opportunity to respond to the Water Quality IRs from ENV and MEMLI. Telkwa Mining believes the responses provided close out the information requests that fall under Items 1 through 8. If there are any further questions or concerns, please do not hesitate to contact me.

Sincerely Yours,

Daniel J. Farmer, P.Eng.
Project and Development Manager
Telkwa Mining Limited
Email: dan.farmer@telkwa-mining.ca
Phone: 778-643-2843
Cell: 604-220-5703

Cc: File

## 5. ATTACHMENTS

### BC EAO AND OFFICE OF THE WET'SWUET'EN INFORMATION REQUESTS

Appendix 1: Tenas Project, Water and Load Balance Modeling Report (Updated 2025), SRK
Appendix 2: Tenas Project, Hydrometeorological Baseline and Model Development Report (Update 2025), SRK
Appendix 3: Geochemical Field Barrel Results Interpretation – Tenas Project, SRK
Appendix 4: Updated Water Quality Model Source Terms, SRK
Appendix 5: Tenas Project - Suboxic Evaluation of Non-Acid Generating Mine Rock, Okane
Appendix 6: Tenas Project Information Request Responses Related to Surface Water Valued Component, SRK
Appendix 7: Water and Wastewater Treatment Design Report and Bionest Assurance Letter, Radloff
Appendix 8: Tenas Project, Hydrogeology Technical Report, SRK
Appendix 9: Evaluation of Acute Daphnia Magna and Rainbow Trout LC50 Toxicity Supporting Tenas Project Best Available Technology Assessment Study – Parameters of Concern: Nitrite, Iron (Total) and Iron (Dissolved)
Appendix 10: Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, SRK
Appendix 11: Tenas Project Best Achievable Technology Assessment Updated, SRK
Appendix 12: Environmental Effects Assessment - Surface Water Valued Component

Appendix 13: Tenas Project, Initial Dilution Zone Assessment, SRK
Appendix 14: Tenas Coal Mine Information Request # 498, 500-504, and 520 - Expert Advice Regarding Fish and Fish Habitat Within the Project Area, Palmer Environmental
Appendix 15: Tenas Project, Mine Material Management Based on an NPR Cut-Off of 2.0, 1.80, 1.60, and 1.20, Telkwa Mining
Appendix 16: Telkwa Coal Tenas Project Environmental Assessment Application – Responses to 2022 Supplemental Geochemistry Information Requests from the Ministry of Energy, Mines and Low Carbon Innovation, SRK
Appendix 17: Metal Leaching/Acid Rock Drainage Management Plan, SRK
Appendix 18: Tenas Project Information Request Responses Related to Geotechnical Aspects, SRK
Appendix 19: Tenas Project Dam Breach Assessment Report, SRK
Appendix 20: PAG Management Alternatives Assessment, SRK
Appendix 21: Tenas Project Potential Acid Generating Material Storage Alternatives Assessment, SRK
Appendix 22: Tenas Project Information Request Responses from Office of the Wet'suwet'en – Final, SRK

# APPENDIX 1: TENAS PROJECT, WATER AND LOAD BALANCE MODELING REPORT (UPDATED 2025), SRK

# APPENDIX 2: TENAS PROJECT, HYDROMETEOROLOGICAL BASELINE AND MODEL DEVELOPMENT REPORT (UPDATE 2025), SRK

# APPENDIX 3: GEOCHEMICAL FIELD BARREL RESULTS INTERPRETATION – TENAS PROJECT, SRK

# APPENDIX 4: UPDATED WATER QUALITY MODEL SOURCE TERMS, SRK

# APPENDIX 5: TENAS PROJECT - SUBOXIC EVALUATION OF NON-ACID GENERATING MINE ROCK, OKANE

# APPENDIX 6: TENAS PROJECT INFORMATION REQUEST RESPONSES RELATED TO SURFACE WATER VALUED COMPONENT, SRK

# APPENDIX 7: WATER AND WASTEWATER TREATMENT DESIGN REPORT AND BIONEST ASSURANCE LETTER, RADLOFF

August 29, 2023

Attn: Dan Farmer
Suite 1210-409 Granville Street
Vancouver, BC
V6C 1T2

Dear Dan Farmer,

**RE: Bionest Performance Comparison**

This letter is to certify that the Bionest Wastewater System designed for your application, if operated and maintained by qualified wastewater operators, certified by the Environmental Operators Certification Program, is capable of meeting the following performance parameters:

- BOD 20 mg/l
- TSS 20 mg/l
- Ammonia (as Nitrogen) 2.0 mg/l
- Nitrate (as Nitrogen) 43 mg/l
- Nitrite (as Nitrogen) 1.0 mg/l

If you have any questions or concerns, please do not hesitate to contact me at: bob.radloff@radloffeng.com or 250-562-6861.

Yours Sincerely,

Bob Radloff, P.Eng.

Senior Engineer

R. Radloff & Associates Inc.

Radloff

Helping build a better tomorrow.

# TENAS PROJECT

## Water and Wastewater Treatment Design Report

**Prepared For:**
Telkwa Coal Ltd.

November 2022
#885-001-03

www.radloffeng.com
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# 1 WATER TREATMENT

## 1.1 Flow Requirements

Potable water system flow requirements were determined based on provisions for the Administration / Mine Dry building, servicing 100 persons across site. This resulted in the design flows shown below:

**Table 1: Potable Water Demands**

| | |
|---|---|
| Average Day Demand | 17.3 $m^3/d$ |
| Maximum Day Demand | 34.6 $m^3/d$ |
| Peak Water Demand | 3.0 L/s |

Details on these calculations are provided in Appendix D: Water System Demand Calculations Memo.

## 1.2 Source Water – By Others

There are currently no water wells on site to provide water to the office. It was decided that runoff water was to be used for the raw water source. This water is collected on site, directed through a sedimentation pond, held in a control pond, then pumped through site mains as process water. This process water main is to be connected to the potable water treatment plant. *All systems upstream of the water treatment plant are designed by others.*

Surface water samples were sampled by Telkwa Coal over the period they deemed flows and turbidity to be at their highest (during spring melt) and sent to FilterCo for testing and analysis. These results were used to inform the water treatment plant design.

Influent water quality results used for water treatment design are shown below:

**Table 2: Source water quality**

| Parameter | Value | Units |
|---|---|---|
| Temperature | 5-10 | deg C |
| Turbidity | 17 | NTU |
| TSS | 26 | ppm |
| COD | 30 | ppm |
| BOD5 | 8 | ppm |
| TOC | 15 | ppm |
| FE | 0.05 | ppm |
| Alkalinity | 100 | ppm as CaCO3 |
| Total Hardness | 75 | ppm as CaCO3 |

## 1.3 Water Treatment Plant – BI Pure Water

Traditionally surface water sources require a much higher level of treatment than groundwater sources since the water source are variable and can contain higher levels of contaminates. Parameters that must be considered for treating surface water include:

- Physical (Color, Turbidity, Temperature, Taste, Odor…)
- Chemical (Chemicals such as fluoride, sulfide, and acids…)
- Biological (Viruses, bacteria, algae…)
- Radiological (Radium, Uranium, Radon…)

Surface water was sampled by Allegiance Coal over the period they deemed flows and turbidity to the at their highest (spring melt) and sent to Filterco for testing and analysis. These water quality results were analyzed, and a packaged water treatment system was designed by BI Pure Water (see Appendix A for design brief and drawings).

The water treatment system is designed to be mounted inside of two side-by-side 40 ft long high cube shipping containers complete with easily accessible inlet and outlet fittings. The containers are outfitted with R20+ insulation, heat, exhaust, lighting and access doors. A separate chemical room will hold caustic, sulfuric acid, hypochlorite, and coagulant, also equipped with a safety shower and eyewash station.

The water treatment plant can treat up to a peak flow of 36.3 cubic meters over 20 hours, with a larger volume treated if the treatment extends to 23.5 hours per day. The plant control system will automatically start and stop the raw water feed, booster and product pumps. Water supply lines to the water treatment plant and water delivery lines from the water treatment to the building are the responsibility of Telkwa Coal.

## 1.4 Power Requirements

The water treatment plant requires connection to three phase power at 208 to 600 volts at 60 Hz. Total power requirement with all components running is 30 kW.

The contractor is responsible for connection to power, including electrical engineering design of this connection.

# 2 WASTEWATER TREATMENT

## 2.1 Design Flow

To properly size the treatment capacity of the wastewater treatment plant, Radloff used the daily flow rate guide for non-residential systems from the Standard Practice Manual. The flow rate for Office/Factory without cafeteria and with showers were used. With an anticipated max population of 100 people onsite, the required design flowrate of the wastewater treatment plant is 12.5 cubic meters per day. Design flow estimates can be found below.

**Table 3: Estimated Sanitary Flow**

| | |
|---|---|
| Population | 100 |
| Average flow per capita (L/day) | 125 |
| Daily Design Flow ($m^3$/day) | 12.5 |
| Designed Bionest system capacity ($m^3$/day) | 14.8 |

## 2.2 Wastewater Treatment System – Bionest

The level of wastewater treatment required varies depending on the disposal method of the treated effluent. Radloff's scope is treat the wastewater sufficiently to allow for it to be added to the main sedimentation pond. The discharge point and final effluent quality required to meet discharge requirements is being assessed by others.

To help reduce the effect of the wastewater on the sediment pond effluent quality, an attached growth wastewater treatment system (Bionest) has been specified (see Appendix B). This system consists of a multi chamber septic tank complete with effluent filter, to settle out large solids, and an aerated attached growth chamber.

The septic tank in combination with the attached growth system is designed to reduce BOD and TSS levels to 20 mg/L BOD and 20 mg/L TSS, assuming incoming wastewater strength of 280 mg/L BOD or less. See Memo: Tenas Project Wastewater Influent Quality (R. Radloff and Associates Inc., 2022).

## 2.3 Power Requirements

The attached growth treatment system utilizes aeration to improve the microbiological treatment process. Seven blowers are specified, and heating may be added in the final design. Blowers are contained in a sea can which includes lighting. In addition, two 1/2 hp effluent pumps are required to pump effluent through the forcemain to the sedimentation pond. Total power requirements for this are **to be determined.** To ensure uninterrupted power, a back up generator is to be included, at an estimated 15 kW.

The contractor is responsible for connection to power, including electrical engineering design of this connection.

# Appendix A

Water Treatment System Design Brief and Drawings

# Water Treatment Plant

BIPW Project: 3717  R05

## Design Brief

**Telkwa Coal Tenas Project**
**Water Treatment Plant**

Nov. 6, 2022

Submitted by:

George Thorpe, P.Eng. E.P.

**BI Pure Water Canada Inc.**

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October 21, 2022

**FOR**

**R. Radloff & Associates Inc.**

# 1 Water Treatment

## Summary

The purpose of this brief is to outline the available information regarding a Construction Permit for a proposed new Water Treatment Plant (WTP) for the Tenas Project. The goal is to cost-effectively provide safe and reliable potable water to the end-users.

The location of the treatment plant will be on the West side of the mine site admin and dry maintenance building. It is approximately 25 km south of Smithers and 7 km southwest of Telkwa, BC. See Figure 2 below.

The main contact for the owner Telkwa Coal Ltd. 409 Granville Street, Suite 1410, Vancouver, BC V6C 1T2 is Dan Farmer (Tel) 604 220 5703

Consulting Engineers - R. Radloff & Associates Inc. 1820 3rd Ave. Prince George BC V2M 1G4 (Radloff Engineering) are the consulting engineers for the project. The contacts for Radloff are Erik Groenenberg egroenenberg@radloffeng.com , Stuart Radloff sradloff@radloffeng.com and Bob Radloff bob.radloff@radloffeng.com. (Tel) 250.562.6861 (Fax) 250.562.6826 (Cell) 250.649.9206

BI Pure Water Canada Inc. (BIPW) is the system designer and water treatment system supplier and has been in the treatment package plant business since 1995. Contacts are project manager Gerard Merced, EIT 604 882-6650 gerardm@bipurewater.com and George Thorpe, P.Eng. EP. Cell 604 970 2591 georget@bipurewater.com

## 1.1 Flow Requirements

Potable water system flow requirements were determined based on provisions for the administration/mine dry building, servicing 100 persons across site. This resulted in the design flows shown below:

**Table 1: Potable Water Demands**

| | | |
|---|---|---|
| Average Day Demand (ADD) | 17.3 M3/Day | 4570 USg/Day |
| Maximum Day Demand (ADD) | 34.6 M3/Day | 9141 USg/Day |
| Peak Hour Water Demand | 3.0 L/s | 47.56 USg/m |
| Design Water Treatment Rate | 0.5 L/s | 8 USg/m over 20 hours |
| Design Water Distribution Rate | 3.03 L/s | 48 USg/m |
| Design Treated Water Storage | 22.7 M3 | 6000 USg |

Details on these calculations are provided in Appendix D: Water System Demand Calculations Memo.

## 1.2 Source Water

There are currently no water wells on site to provide water to the office. The potable water treatment system services an administration building located at the Tenas Mine site. The administration building is comprised of a lunchroom, showers, bathrooms, a First Aid room, a 764 sq.ft. office space, storage lockers, change space, and other basic amenities. The administration building will be used by employees at the site totaling approximately 100 persons, and the potable water treatment system will be designed to service this population.

Water from the nearby creek will be used for the raw water source. This creek water is considered as surface water as per the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems This water is pumped to the potable water treatment plant. All systems upstream of the water treatment plant are designed by others.

Surface water samples were sampled by Telkwa Coal over the period they deemed flows and turbidity to be at their highest (during spring melt) and sent to FilterCo for testing and analysis. These results were used to inform the water treatment plant design.

Influent water quality results used for water treatment design are shown below:

Table 2: Source water quality

| Parameter | Value | Units |
|---|---|---|
| Temperature | 5-10 | deg C |
| Turbidity | 17 | NTU |
| TSS | 26 | ppm |
| COD | 30 | ppm |
| BOD5 | 8 | ppm |
| TOC | 15 | ppm |
| FE | 0.05 | ppm |
| Alkalinity Total | 100 | ppm as CaCO3 |
| Hardness | 75 | ppm as CaCO3 |

| Water | Grains / Gallon | Mg / l or ppm |
|---|---|---|
| • Soft | < 1.0 | 0 - 17.1 |
| • Slightly Hard | 1.0 - 3.5 | 17.1 - 60 |
| • Moderately Hard | 3.5 - 7.0 | 60 - 120 |
| • Hard | 7.0 - 10.5 | 120 - 180 |
| • Very Hard | > 10.5 | 180 + |

## 1.3 Water Treatment System

Traditionally surface water sources require a much higher level of treatment than groundwater sources since the water source are variable and can contain higher levels of contaminates. Parameters that must be considered for treating surface water include:

• Physical (Color, Turbidity, Temperature, Taste, Odor, Organics, Manganese, Radon, etc.…)

• Chemical (Chemicals such as fluoride, sulfide, and acids…)

• Biological (Viruses, bacteria, algae…)

• Radiological (Radium, Uranium, Radon…)

Water quality results were analyzed, and a packaged water treatment system was designed by BI Pure Water (see Appendix A for PID and layout drawings).

As shown on the process diagram, the water treatment system comprises the following major components:

- Source surface water pumps by owner
- Dual rough filtration basket strainers
- Flow meter
- Turbidity meter
- Coagulation and pH adjustment system
- Static mixer
- One 7.95 CuM (2100 USG) raw water storage and sedimentation tank
- Sediment removal from raw water storage tank through an air scour and bottom drain
- Booster pumps for raw water extraction with tank exit line to pumps 60 cm above base
- Dual Multimedia water filters
- Dual Ion Exchange water softeners with brine tank
- Fine filtration utilizing 5 micron and 1 micron absolute cartridges
- Ultraviolet disinfection with dual UV units (one in use and one on standby)
- Chlorine analyzer with transmitter
- Chlorination solution tank and dual metering pumps
- Three 7.95 CuM (2100 USG) contact and peak flow water storage tanks
- Dual Distribution pumps to move treated water to distribution lines
- Chlorine analyzer with transmitter
- Bladder pressure tank
- Flow meter
- Backflow preventer
- Waste tank and waste pump
- Small air compressor
- An electrical panel has the following components: A main breaker and Circuit breakers for lights, receptacles, heat, pumps, controls, etc.
- A NEMA 4 control panel, 12 Volt powered, will house a PLC and HMI, which has the following inputs and components:
    a) Data touch screen on front of panel for reservoir water depth real time display from a transducer and digital voltage display.
    b) Alarms - Reservoir tank low level, Reservoir tank high level, Generator/battery low power output,
    c) Controls – Raw water pump start to fill reservoir,
    d) Run light, hour meter and undercurrent relay
    e) Pumps ON/OFF/AUTO switch
- The level switch in the reservoir will signal the PLC to control the well pump stop/start operation. Water level sensors inside the reservoir tank will also alert the operator to a system malfunction in the event that the water level inside the tank drops below the setpoint.
- An operator and standby operator will be trained to operate the water disinfection system as required by regulation.

Included are both a process drawing and an equipment layout drawing for the water treatment plant with 3D views.

All treatment components are duplicated for redundancy and to allow maintenance and replacement of components.

This equipment will be installed in an enclosure constructed in the BI Pure Water plant and tested before shipping.

The Chlorine level, pH, TDS, and temperature will be monitored and checked with treated water sample testing. The TDS reduction will generally indicate that the Sodium level is low.

When the water level in the treated water storage tank goes below the setpoint, the controls signal one of two raw water pumps to start until the tanks are filled. The Chlorine level is sensed and transmitted before entering the storage tanks. Sensors and transmitters will also monitor the final pH, temperature and Chlorine reading and transmit this to the PLC control system.

A laptop is supplied to allow for operator changes or determine trends in Chlorine level or flow rates. The operator will also be able to remotely obtain information on the plant operations, thereby saving valuable time travelling to site. If the Chlorine level going to distribution is below the setpoint, an automatic valve is actuated and the stored water will start to be recirculated to the tanks and then rechlorinated by the dosing system.

Mag flow meters record and transmit the inlet water flow rate from each well and the distribution flow rate. Biological water quality information will be available with treated water sample testing.

The water treatment system is designed to be mounted inside of two side-by-side 40 ft long high cube shipping containers complete with easily accessible inlet and outlet fittings. The containers are outfitted with R20+ insulation, heat, exhaust, lighting and access doors. A separate chemical room will hold caustic, sulfuric acid, hypochlorite, and coagulant, also equipped with a safety shower and eyewash station.

The water treatment plant can treat up to a peak flow of 36.3 cubic meters over 20 hours, with a larger volume treated if the treatment extends to 23.5 hours per day. The plant control system will automatically start and stop the raw water feed, booster and product pumps. Water supply lines to the water treatment plant and water delivery lines from the water treatment to the building are the responsibility of Telkwa Coal.

## 1.4 Power Requirements

The water treatment plant requires water pumps, chemical pumps, and UV lamps to provide potable water, in addition to heat and lighting. To keep the structure at an optimal temperature for water treatment, a heater units and exhaust fans will be installed in the sea can.

Most efficient is 3 phase power at 208 to 600 volts at 60Hz. The method which the VFD charges and discharges in order to vary the speed gets put under much higher stress when only a single phase is present. As such, we require to up-size the VFD dramatically. The rule of thumb here is double the size, so the HP motors would have to be treated as double the HP if only single phase. The VFDs will also create a much larger harmonic distortion when supplied with only a single phase supply, coupling this with the large current draw that this size of VFD is pulling will cause a drastic drop in efficiency.

The total power to the water treatment plant, assuming all components are running, is in the range of 25 to 30 KW.

# 1.5 Operation and Maintenance

### 1.5.1 Maintenance Management Plan (MMP)

An MMP will be developed in collaboration with system operators that takes into account the following:

a) Preventative maintenance (PM) is the systematic and periodic maintenance work to prevent breakdown, reduce wear, improve efficiency, and extend the life of equipment and structures.
b) Corrective maintenance (CM) is unplanned work required for repairs and replacements.

The main objective of an MMP is to prevent unplanned corrective maintenance. It is far more effective to regularly spend time and money to carry out preventative maintenance activities. contain at least the following four basic components:

1. Asset Inventory and Asset Record Cards: A list of maintenance tasks to be performed, their frequency, and a list of replacement parts for each system component to be maintained.
2. Task Description Cards: A description of each maintenance task, by whom, necessary tools, consumable materials/equipment including H&S gear, rental equipment, and other information.
3. Maintenance Schedule and Checklist forming an annual maintenance plan for all assets of a system, with resources and budget information.
4. Maintenance Tracking Tool to support operators and direct contracted parties according to planned activities and to track maintenance work done.

### 1.5.2 Basket Strainers

The dual basket strainers will filter out rough sediment and other items such as vegitation. During the spring melt there may be more sediment, which will be trapped in the basket strainers and in the raw water contact tank.

### 1.5.3 Raw Water Contact Tank

A 7.95 CuM (2100 USG) raw water storage and sedimentation tank is used to capture some of the sediment. The tank can be filled overnight or at non peak use times. A coagulation system is located upstream of the tank and will cause small particles to join together. The heavier particles then drop to the bottom of the tank. These particles can then be drained off with the assistance of compressed air, which is distributed throughout the bottom of the tank. When the booster pumps aren't drawing raw water for treatment, the tank can be drained. This reduces the sediment load on the multimedia filters.

### 1.5.4 VFD Operation of Pumps

The Variable Frequency Drive (VFD) shown in the control panel is used to operate the speed of the electric motor (revolutions per minute). In starting a motor, a VFD initially applies a low frequency and voltage, thus avoiding high inrush current associated with direct on line starting. After the start of the VFD, the applied frequency and voltage are increased at a controlled rate or ramped up to accelerate the load. This starting method typically allows a motor to develop 150% of its rated torque while the VFD is drawing less than 50% of its rated current from the mains in the low speed range. A VFD can be adjusted to produce a steady 150% starting torque from standstill right up to full speed. However, motor cooling deteriorates and can result in overheating as speed decreases such that prolonged low speed motor operation with significant torque is not usually possible without separately-motorized fan ventilation.

With a VFD, the stopping sequence is just the opposite as the starting sequence. The frequency and voltage applied to the motor are ramped down at a controlled rate. When the frequency approaches zero, the motor is shut off.

### 1.5.5 Media Filtration

Dual FRP vessels of 500mm dia (20” dia) will filter the remaining sediment in the water. A Multi Media Filter is used to reduce the level of suspended solids (turbidity) in incoming feed water. Suspended solids consist of small particles such as silt, clay, grit, organic matter, algae and other microorganisms. Incoming feed water that is high in suspended solids can cause a high pressure drop and reduce the effect. A Multi Media Filter typically contains three layers of media consisting of anthracite coal, sand and garnet, with a supporting (non filtering) layer of gravel at the bottom.

Since the water must be treated with several layers of media, a small percent of the water must be used to backwash the media and after that, the backwash water is drained to a disposal pit. The normal wastewater rate would be less than 1 percent of total flow. In this case, more than 99 percent of the treated water is utilized. Backwash timing can be set to occur during the night, with one vessel backwashed at a time.

### 1.5.6 Ion Exchange Water Softeners

Dual FRP vessels of 406mm dia (16” dia) will contain Ion Exchange media to reduce hardness and remove any calcium or other minerals in the raw water. Hard minerals such as calcium and magnesium, when evaporated from water or combined with heat, can form hard, chalky deposits known as lime scale. These deposits can clog pipes, reducing flow, and coat heating elements, requiring more energy to heat water.

Cation exchange water softeners remove the calcium and magnesium ions found in hard water by exchanging them with sodium (or potassium) ions. Once all the ions are fully exchanged, the water softener undergoes a regeneration process to flush the system of excess ions and recharge with new sodium ions. A brine tank holds salt that is used to regenerate the media. The brine tank will need to be checked and refilled on a regular basis.

### 1.5.7 Cartridge Filtration

To prepare the cartridge filters for startup, complete the following tasks:

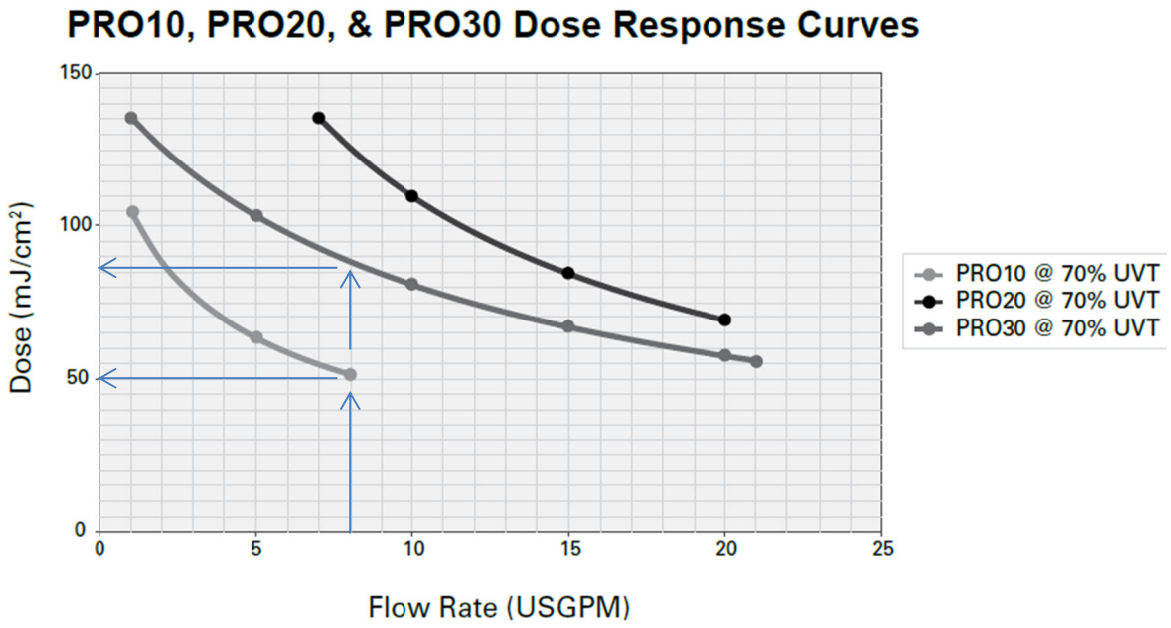
a) Open the cartridge filter housings.
b) Load the cartridges into the filter housings
c) Set the O-rings in place and tighten the filter housings hand tight.
d) Check for leaks when pressurized and release air trapped in the housing.

The differential pressure over the cartridge filter is obtained by subtracting the reading of pressure indicator PI-02 from that of PI-01. When the differential pressure reaches 30 psi, the cartridges must be washed or replaced.

### 1.5.8 Ultraviolet Disinfection

Ultraviolet (UV) irradiation of water is an effective solution for disinfecting most pathogens, especially chlorine-resistant Cryptosporidium and Giardia. Also harmful disinfection byproducts are reduced because less chlorine concentration is required when UV is utilized.

UV energy is electromagnetic radiation with a wavelength shorter than that of visible light, but longer than soft x-rays. All UV ranges and bands are invisible to the human eye. The UV spectrum can be subdivided into following bands:
• UV-A (long-wave; 400 to 315 nm): the most abundant in sunlight, responsible for skin tanning and wrinkles
• UV-B (medium-wave; 315 to 280 nm): primarily responsible for skin reddening and skin cancer
• UV-C (short-wave; 280 to 200 nm): the most effective wavelengths for germicidal control
• Radiation below 200 nm is also called vacuum UV and can produce ozone (O3) in air
For higher reliability, UV units are normally mounted in parallel with one in operation and one in standby mode.
If a Viqua Pro10 is used at a flow of 8 USgpm, the Dose will be 50 mJ/cm2, but the pressure drop will be over 10 psi.
If a Viqua Pro 20 is used at a flow of 8 USgpm, the Dose will be 80 mJ/cm2, and the pressure drop will only be about 3 psi.




### 1.5.9 Sodium Hypochlorite Post Treatment Disinfection

Sodium hypochlorite is normally purchased at approximately 12% solution and injected into the treated water to impart a residual chlorine content to the distribution system. Even if the chlorine analyzer readings are within acceptable range, it is imperative that the distribution line chlorine residual be tested on a daily basis by sampling with a hand-held analyzer. If water has been in the distribution tanks for several days due to low demand, the chlorine level may drop below safe levels (approximately 0.2 mg/L). Sodium hypochlorite in 12% or 6% diluted form must then be added to the distribution tanks before the water is distributed to consumers.

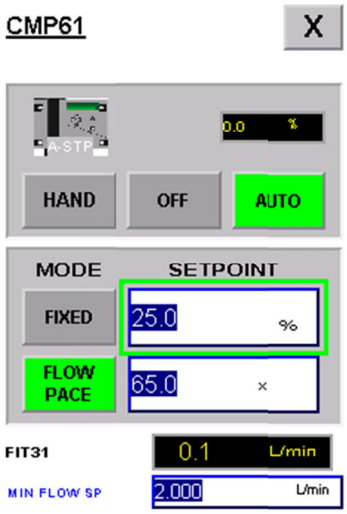
Safety precautions must be taken as sodium hypochlorite must be respected and dealt with in a safe manner. Before using hypochlorite for disinfection, a couple of personal eye wash bottles should be purchased along with a protective apron, rubber gloves, goggles, and a face shield. Procedures for handling and dispensing sodium hypochlorite should be carefully read and reviewed before commencement. The solution tank for the hypochlorite should be monitored for fill level. An automatic alarm will be initiated on low solution level.

Sodium hypochlorite is injected into the truckfill and the treated water storage line using Grundfos DDA metering pumps.

The dosing pump will START and operate automatically with flow instruction from the control panel, if:

- there are no critical alarms
- There is a Call For Water from the main PLC
- FIT31 measures flow above a minimum flow rate (default: 0.2 L/min)

Speed Control
The dosing pump speed will be flow paced to the treated water flow meter.
Adjusting flow on HMI
The dosing rate can be increased or decreased by adjusting the “Flow Pace Multiplier” (FPM) on the HMI. The Flow Pace default value is 2.




Treated Water Typical Chlorine Pump Controls

Flow Pace Multiplier - Initial Value
The expected dosing rate is based on flow rate, the required chlorine residual (0.5 to 0.6 mg/L), and the chlorine solution strength (12% = 120,000 mg/L).
The flow pace factor should be adjusted during commissioning to achieve the desired chlorine residual.
Fixed Speed
There is an option to run the dosing pump in fixed speed mode.
Hand
HAND mode is active if:
the pump HOA switch on the control panel is in HAND
the pump HOA switch on the control panel is in AUTO and the HMI is set to HAND

In HAND, the pump will start and dose based on the speed output from the PLC, i.e. flow paced or fixed.
Chlorine Pump Troubleshooting
The pumps and chlorination system require regular maintenance, cleaning and check. The pump will display when it requires maintenance, or a fault number. See the pump manual part #3058-4B-005M Grundfos DDA Dosing Manual.
Chemical Injectors (injection quills)

Scaling and blockage can occur in the injector. The solution tube and check valve internals should be inspected regularly to ensure that scaling/build up is not impeding operation. A blocked injector can result in too much chlorine or not enough. Scale can be cleaned by soaking solution tube in warm water and then working the scale free, or using a rod or brush. Do not use rod or brush on units with Tips. See SAF-T-Flo manual in the Parts binder.

| Symptom | Cause / Remedy |
|---|---|
| **No chlorine flow or high flow** | Failure of chlorine injection valve/point. Try cleaning or replacing the injection valve |
| **Chlorine is low on initial startup** | The backpressure valve is set too low and chemical is siphoning into the line.<br>There is a leak in the chemical line. |

### 1.5.10 Operation

The Chlorine level, pH, TDS and sodium concentration will be monitored and logged. These items will be checked with treated water sample testing.

When the water level in the treated water storage tank goes below the setpoint, the controls signal one of two surface raw water pumps to start until the tanks are filled. The inlet Chlorine level is sensed and transmitted before entering the storage tanks. Sensors and transmitters will also monitor the final pH, temperature and Chlorine reading and transmit this to the PLC control system.

A laptop is supplied to allow for operator changes or determine trends in Chlorine level or flow rates. The operator will also be able to remotely obtain information on the plant operations, thereby saving valuable time travelling to site.

If the Chlorine level going to distribution is below the setpoint, an automatic valve is actuated and the stored water will start to be recirculated to the tanks and then rechlorinated by the dosing system.

Mag flow meters record and transmit the inlet water flow rate from each well and the distribution flow rate. Biological water quality information will be available with treated water sample testing.

### 1.5.11 Data Collection and Water Sampling

#### 1.5.11.1 Sample Taps

See P&ID drawing 3482- PI -101 for locations of the small valves used to take water samples. The sample taps are numbered and named S01, S02, etc.

When collecting water samples for bacterial analysis, special procedures are needed to avoid contamination and obtain samples that are representative of the water being tested.

The following guidelines will help you develop Standard Operating Procedures for collecting samples from your automated water treatment system.

### 1.5.11.2 Sample Frequency

a) Depending on the number of users and regulations, either daily, weekly, monthly, or quarterly (4 times/year) sampling is most common. See the local regulatory requirements.

b) When starting a sampling program, sample more frequently at first to determine the range and variability of bacteria counts.

### 1.5.11.3 Suggested Sample Locations

a) Before and after any water treatment (e.g. filtration, UF, RO, UV disinfection).

b) After any storage tank.

c) Room distribution piping: Sample from the last quick disconnect (QD) in several rooms of the automated watering system. For a worst case, pick rooms farthest from the water treatment system or water source to the building.

d) Rack manifold: Sample either from a drinking valve or from the rack drain valve.

### 1,5.11.4 Sampling Procedures

The laboratory doing the analysis should approve and confirm sample containers and procedures. The following general guidelines are taken from Standard Methods for the Examination of Water and Wastewater.

a) Use sterilized sample bottles.

b) For water containing chlorine, add sodium thiosulfate or other reducing agent to the bottles before sampling. The reducing agent neutralizes any residual chlorine and prevents continued bactericidal action during sample transit.

c) The tap used as a sampling point should be without attachments (ex. tubing attached to a barbed sample valve).

d) Keep sample bottle closed until the moment it is to be filled. Remove stopper/cap taking care not to touch the inside surfaces of the cap or neck of the bottle.

e) Open and flush the tap for 2-5 minutes before collecting the sample. This procedure ensures that the tap is clean and does not contribute bacteria to the sample. Reduce water flow to permit filling bottle without splashing.

f) If tap cleanliness is questionable, apply a solution of sodium hypochlorite (100-ml bleach/L) to faucet before sampling. Let water run for additional 2 or 3 minutes after treatment. Discard the first 50-200 ml of water before collecting the sample.

g) Fill bottle without rinsing. You will remove some or all of its preservative and ruin the sample.

h) Leave ample air space in the bottle (at least 2.5 cm) to facilitate mixing by shaking before examination. Replace stopper/cap immediately.

i) Label the bottle before using with utility name, sample tap location, date, time & sampler name.

### 1.5.11.5 Holding Time and Temperature

a) Submit your drinking water test sample to the in-house laboratory or licensed laboratory as quickly as possible after collection. The earlier the laboratory gets your drinking water sample, the quicker it can be tested and the more accurate your test results will be. Ship early in the week to avoid having your sample sit in the laboratory over the weekend before testing.

b) If samples cannot be processed within 1 hour after collection, use an iced cooler for storage during transport to the laboratory (hold temperature below 10 degrees Celsius). Don't pack the bottles with loose ice as this may contaminate the sample. If you only have loose ice, encase it in waterproof packaging or a sealed container.

c) The recommended maximum transport time is 6 hours, but when this isn't possible it should not exceed 24 hour.

d) Send the completed Chain-of-Custody form to the laboratory along with the collected sample. If sending it inside the cooler containing the sample, ensure that the form is enclosed inside a waterproof package, e.g., a new zip-lock bag.

e) Record time, low rate and temperature of storage of all samples and consider this information in the interpretation of data.

### 1.5.11.6 Data Collection

a) Collect data and write it on the log sheets at least once every day of the test period. If on site more often, write the data down twice a day.

b) Daily log sheets are to be maintained for all the activities that occurred during the plant operation, such as when filters are changed or other maintenance take place. In addition, the total number of hours the plant was running is to be documented.

c) Sign the operator's name on the log so the test reviewer knows who to contact for questions.

d) See the Testing Plan for further details.

### 1.5.12 Water Disinfection Calculation

Based on a review of the water quality and hydrogeological information, the proposed water system requires only Chlorine disinfection. A Sodium Hypochlorite system will be utilized for its ease of use and the fact that it doesn't add more Sodium to the water. A concentrated solution is injected into the product water line running from the filter system. The water flows to the distribution lines from the storage tanks. A small water sample line returns to the analyzers so the Chlorine level can be monitored. The Chlorine level of the water will be analyzed and controlled by an ATI Chlorine Analyzer, which automatically samples the treated water and feeds data back to the PLC, which controls the Chlorine injection pump.

Alarms notify the operator that the Chlorine level is low, the Sodium Hypochlorite level is low, or a pump has failed to start. The ATI model Q45H/62 system includes three main components, the Q45H analyzer, a constant head flow cell, and a free chlorine sensor. The separate flow cell has a sensor mounted in it and water continuously runs past the sensor at a flow rate under a liter per minute. Unlike on-line colorimetric and most amperometric monitors, Q45H systems utilize a membrane-covered polarographic sensor that does not require the addition of chemical reagents. There are no reagents to purchase or flowcells that require frequent cleaning. The Q45H system has no moving parts. The Chlorine level is continuously sampled, transmitted and logged.

BC Interior Health Requirements
The 4-3-2-1-0 drinking water objective provides a performance target for water suppliers to ensure the provision of microbiological safe drinking water. Interior Health supports water suppliers to meet this objective. All water suppliers serving populations greater than 500 people should have an implementation plan to meet this as a standard.
This objective will be applied as a performance standard for all new water systems. Many existing water systems already meet most of the standard. Risk to human health is substantially reduced when water suppliers meet this objective.
Water suppliers will be required to provide long term plans to reach the goals of:
_ 4 log inactivation of viruses
_ 3 log removal or inactivation of Giardia Lamblia and Cryptosporidium
_ 2 refers to two treatment processes for all surface drinking water systems
_ 1 for less than 1 NTU of turbidity with a target of 0.1 NTU
_ 0 total and fecal coliforms and E. Coli

Definitions:
4 log inactivation of viruses:
Viruses are easily inactivated by the use of chlorine. The common practice of maintaining 0.5 mg/L of free chlorine for 20 minutes is adequate in most cases.
3 log removal or inactivation of giardia lamblia and cryptosporidium protozoa
The 3 log removal or inactivation of these protozoa is the minimum level required of water systems that have a source that is considered “low risk” by Interior Health and have not had an outbreak of either disease. Giardia may be inactivated by large doses of free chlorine, ultraviolet light, ozone and chlorine dioxide, or removed by filtration. The US EPA has developed design guidelines to determine that the proposed treatment will provide the inactivation desired. For example, chemically assisted rapid sand filtration with sedimentation is given a credit of 3.0 log inactivation. Log inactivation credits of 3.0 for slow sand filtration and 2.5 for direct filtration are given The remaining credit must be accomplished by another means such as ultraviolet disinfection or free chlorine with a long contact time.
The Guidelines for Canadian Drinking Water Quality for Cryptosporidium have developed design guidelines to determine that the proposed treatment will provide the inactivation desired. Systems with optimized conventional rapid sand filtration are given a credit of 3.0 logs. Membrane filtration may be required to demonstrate removal efficiency through challenge testing and verified by direct integrity testing. Ultraviolet disinfection is given a credit of 3.0 logs if the dose is a minimum of 40mj/sq. cm.
2 treatment barriers are a minimum for all surface water sources. A multiple barrier approach to water treatment is associated with providing potable water:
The main risk to water quality is from microbiological agents. Some of these microbial risks are more resistant to some forms of treatment than others. It is recognized that effective treatment for all microbial risks by a single treatment barrier is not effective. A minimum dual barrier of treatment is required for all surface water to reduce the risk of microbial or health threats to drinking water. Water filtration and disinfection will become the norm for surface water supplies in order to meet the 4-3-2-1-0 performance objectives. For other sources where the turbidity standard can be met without filtration (for example, a well beside a lake), dual treatment may mean chlorination and UV light disinfection. Ground water sources that are not under the influence of surface water will be given credit for filtration.
<1 NTU of turbidity (less than)
The Guidelines for Canadian Drinking Water Quality currently specify that the filtered treated water turbidity should have a target of less than 0.1 NTU at all times. Specific filtration technologies may have target turbidity ranges from 0.1 to 1.0 NTU. Exemptions for filtration may be considered for those systems that use two disinfectants plus maintain chlorine residual in the distribution system and can demonstrate compliance with the GCDWQ for exemption for

filtration..
0 Fecal coliform or E. coli bacteria
The Drinking Water Protection Act requires water suppliers to provide water with 0 E.Coli sample results. Coliform bacteria are easily controlled with chlorine, UV light and can be reduced by filtration.

Calculation of the Chlorine contact time follows:

Using a Peak Hour Demand (PHD) of 3.0 L/s (47.56 USg/m) for the treatment system, the Chlorine contact time (CT) in the storage tanks is more than 125 minutes. The three tanks in series, 22.7 M3 (6000 USg) total, provide adequate contact time. Spray heads are utilized into the first tank and baffles are installed around the bottom outlet to reduce short circuiting. The next tank would have similar spray at the top and baffles to make the water circulate to reduce short circuiting. The baffle factor would be about 0.4 to 0.5 with this arrangement. Distribution piping to the first users connection will add extra contact time. A Chlorine residual of more than 0.2 ppm will be maintained at all locations in the distribution system.

The disinfection credits provided for the proposed chlorination disinfection of treated water:

| Technology | Log Credit Requested | | |
|---|---|---|---|
| | Giardia & Crypto | Viruses* | Coliforms/Bacteria |
| - Chlorination >20min. CT | 1 | 4 | 3 |
| - UltraViolet @ 40MJ/cm2 NSF55 | 4 | 1 | 4 |
| Total | 5 | 5 | 7 |

**1.5.9 Maintenance**

**1.5.12.1 Preventive Maintenance**

a) The maintenance procedures for each component can be found in the equipment section of the manual.

b) Trained and qualified personnel who are knowledgeable about the system should perform maintenance. The safety of the person performing the maintenance is paramount, therefore all relevant devices and components should be isolated electrically (via local disconnects which are locked), and isolated fluidly (via isolation valves), BEFORE maintenance begins. The latest procedures must be consulted for appropriate lockout procedures, confined entry procedures and other relevant procedures.

c) Personnel performing maintenance also affect the health and safety of people who consume the water and as such, personnel performing maintenance should be mindful of their practices, tools, and procedures during maintenance operations.

- Hands and clothing should be clean when in the treatment plant.
- The water treatment building should not be used for general storage of tools and equipment.
- The water treatment plant should have its own tools for servicing, which should not be used for anything other than water treatment plant service.
- Buckets used for mopping floors and general washing should be labeled as such and should NOT be used for washing water treatment components such as filters or pump parts. There should be a dedicated bucket for washing parts, which should be stored up on the shelf, labeled and covered when not in use. Do not use sponges.

- A weak sodium hypochlorite solution (5.7%) should be used for disinfecting parts, such as pump parts and filters.

### 1.5.12.2 Predictive Maintenance

Predictive maintenance is a technique that uses data analysis tools to detect possible defects in equipment to give warning so that they can be repaired before they fail.

Six practical predictive maintenance tools that can be utilized:

Vibration Analysis – VA is a process that monitors the levels and patterns of vibration signals within a component, machinery or structure, to detect abnormal vibration events and to evaluate the overall condition of the test object. Accelerometers gather data about the vibration signature along 3 axis (vertical, horizontal and axial) and quantify the magnitude of the vibration (by velocity, acceleration and displacement).

Ultrasound Analysis – Many failure conditions produce detectable levels of ultrasound before they are severe enough to be audible to humans. The equipment electronically transposes these sounds into audible signals that can be heard and viewed on a display. Areas to consider include bearing faults, machinery wear, pressure leaks, etc.

Oil Analysis – This task helps to monitor the lubricant oils in machinery for characteristics such as viscosity, contamination, chemical content and water. To extend life by preventing excessive wear and surface degradation, the oil needs to be monitored closely.

Motor Current Signature – Faults that are developing can cause distortions in the current drawn by an electric motor. Motor current signature analysis (MCSA) detects impending problems by measuring the current drawn by the motor and analyzing distortions that appear as peaks in a frequency spectrum. By assessing the size of the peak and its frequency, users can deduce the probable cause of the distortion and its severity.

Infrared Thermography – IR thermography instruments use a special camera to detect IR electromagnetic radiation emitted from equipment surfaces. The IR energy is converted into a visual image in which a heat map of the object is generated. Items that can be monitored include bearing temperature, overloaded electrical circuits and leaks.

Partial Discharge Monitoring – Partial Discharges (PDs) are small electrical sparks that do not completely bridge the electrodes. Discharges are a result of an electrical breakdown of an air pocket within the insulation, and can be detected by sensors. Partial discharges are an early indication of insulation deterioration.

### 1.5.12.3 Maintenance Schedule

| Description | Water Treatment System Task | Maintenance Frequency | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Monthly | Annually |
| **Overall visual inspection or alternate:** | Complete visual inspection to check for alarms, all equipment is operating to design, there are no leaks, and safety systems are in place. Log data. | **X** | | | |
| **Full remote monitoring** | Alternate remote monitoring system to email the operator's smartphone of alarms, etc. 24/7/365. | **X** | | | |
| **Overall audio inspection** | Complete overall audio inspection to be sure all equipment sounds normal when in operation. | **X or** | **X** | | |
| **Cartridge filters** | Check the differential pressure across cartridge filters to determine when to change cartridges. | **X** | | | |
| **Strainer Filters** | Check the differential pressure across filters and adjust set-point if operation not satisfactory. | | **X** | | |
| **Sedimentation Tank** | Check that the sediment in the tank isn't rising and that it is draining out of the tank when required. | **X or** | **X** | | |
| **Chlorine concentration** | Check levels of chlorine in water (mg/l = ppm) adjust as necessary to maintain min. of 0.2 ppm. | **X** | | | |
| **Brine Tank** | Check levels of salt in the brine tank and keep filled | | **X** | | |
| **Consumables** | Check consumables to allow lead time for reorder and delivery | | **X or** | **X** | |
| **Building systems** | Check building heat, vent, power, alarms, shutdown, breakers/overloads, moisture accumulation, etc. | | **X or** | **X** | |
| **Tanks** | Check the cleanliness of tanks and clean/disinfect if fouled. | | | **X** | |
| **Check lubrication** | Assure that all bearings are lubricated per the manufacturer's recommendation. | | | **X** | |
| **Motor & pump alignment** | Align the pump/motor coupling to allow for efficient torque transfer to the pump. | | | | **X** |
| **Check pump packing** | Check packing for wear and repack as necessary. Consider replacing packing with mechanical seals. | | | **X or** | **X** |
| **Check mountings** | Check and secure all pump and equipment mountings. | | | **X or** | **X** |
| **Pump motor condition** | Check the motor for sound and temperature. Inspect bearings for wear. Adjust, repair as required. | | | **X** | |
| **Ultraviolet units** | Clean quartz sleeve and sensor quartz as required by the water quality. | | | **X** | |
| **Ultraviolet units** | Replace UV lamp before reaching end of life - 9000 hours, clean quartz sleeve and sensor quartz. | | | | **X** |
| **General** | Test each input, alarm condition, output devices, breakers/overloads, etc. | | | | **X** |

# 1.6 Certification

### 1.6.1 Report

This report was prepared by BIPW for Telkwa Coal. The information in it reflects BIPW's best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. BIPW accepts no responsibility for any damage suffered by a third party as result of decisions made or actions based on this report.

### 1.6.2 Engineering Supervision

We confirm that BIPW has been engaged to design and document in a manner that is adequate to prepare For Construction and As-Built drawings and certify the satisfactory completion and operation of the works. We will promptly inform the Authority having jurisdiction if this arrangement changes during the course of this work.

Prepared by:

George Thorpe, P.Eng. E.P.

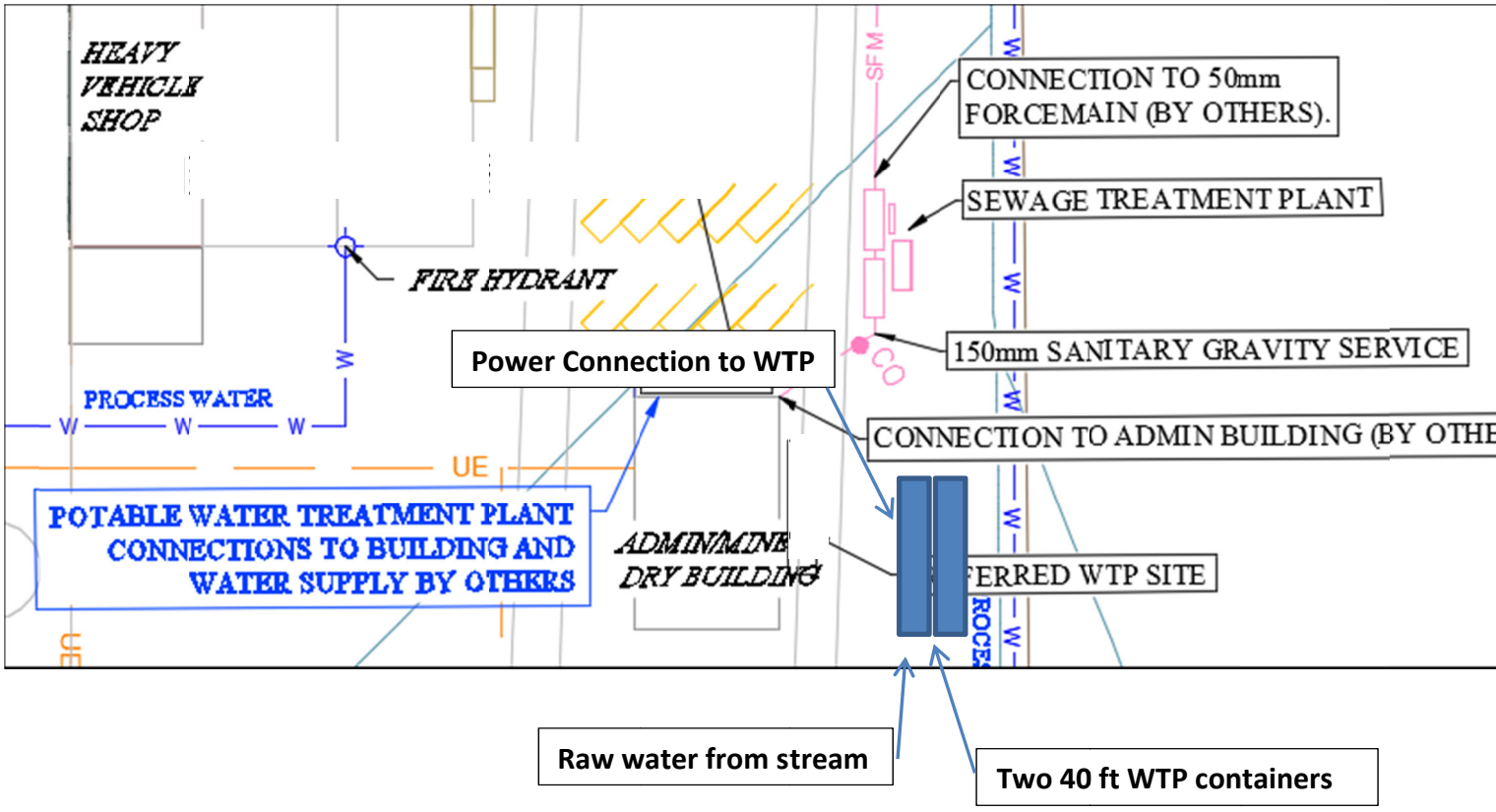



Figure 1 – Proposed Telkwa Water Treatment Plant Site Layout

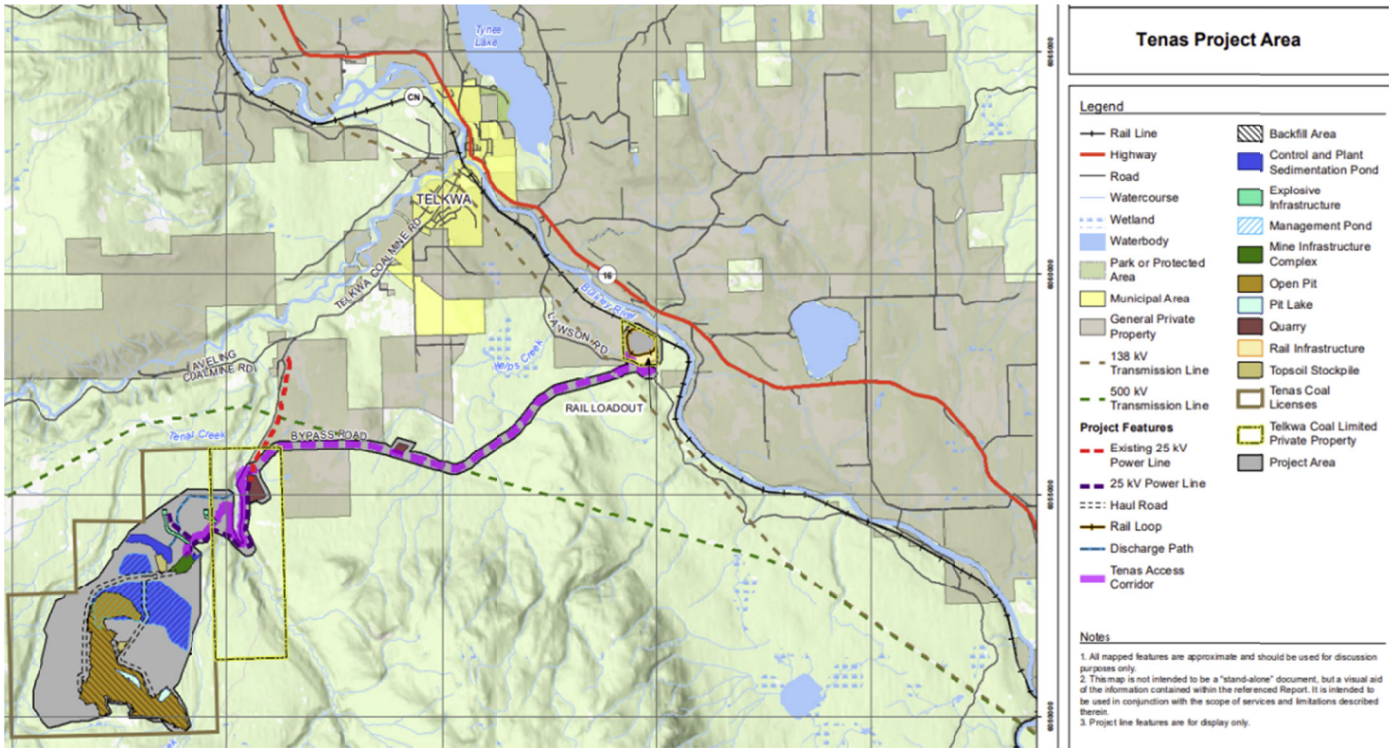
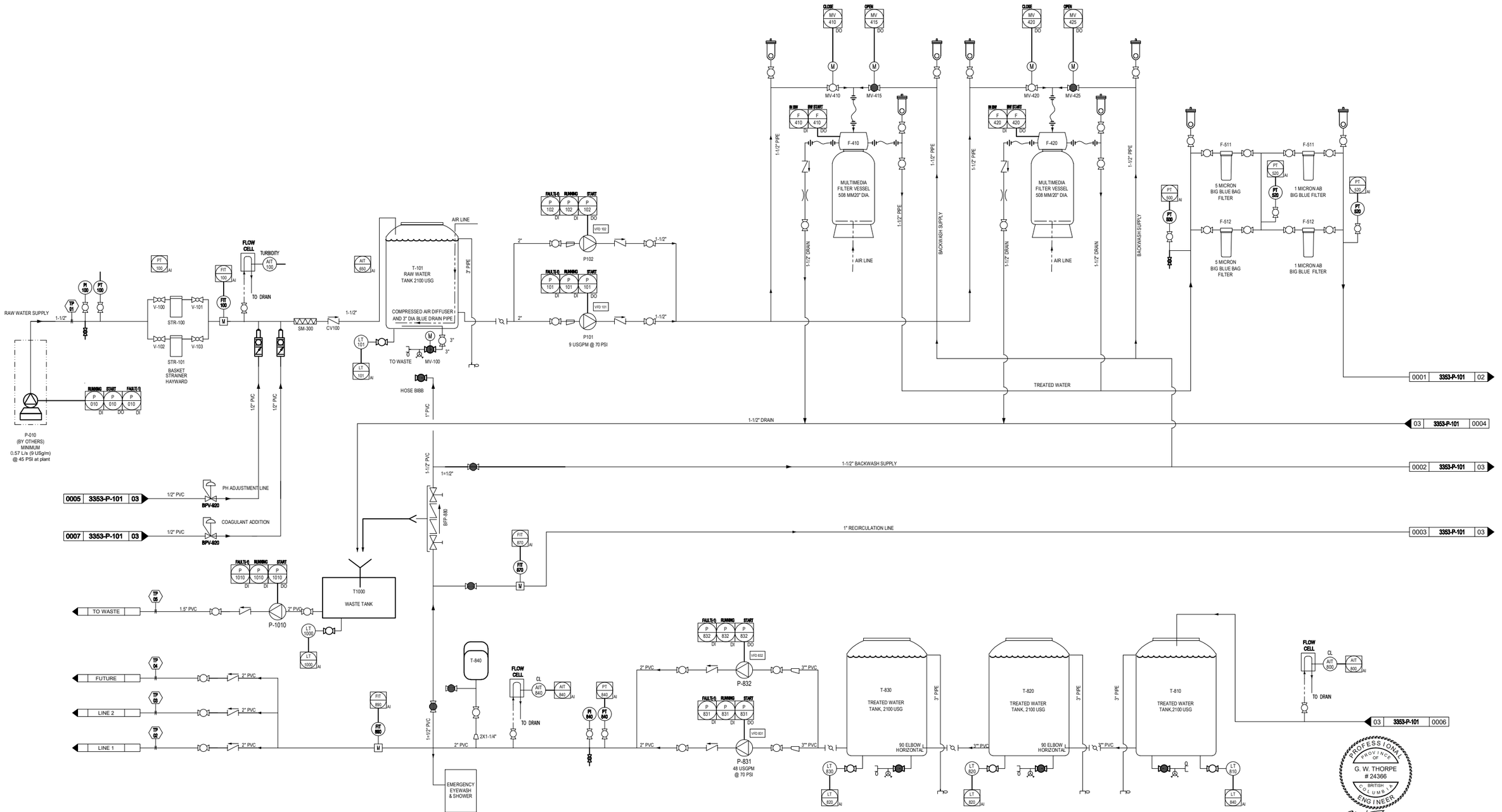



Figure 2 – Telkwa Site Location




PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
G. W. THORPE
# 24366

Nov. 6, 2022

| | | | |
|---|---|---|---|
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| Issue | Date | Appd | Revision Description |
|---|---|---|---|
| 02C | 2022/05/27 | | PRELIMINARY - FOR APPROVAL |
| 01 | 2022/04/04 | | PRELIMINARY - NOT FOR CONSTRUCTION |

Client: **TELKWA COAL LIMITED**

| | |
|---|---|
| Title: | PROCESS & INSTRUMENTATION DIAGRAM |
| Project: | TENAS PROJECT<br>CAMP WTP<br>RADLOFF #885-001-03 |
| Drawing #: | 3643-P-101 |
| Scale | |
| Date | 2022/04/12 |
| Sheet | 2 of 3 |
| Job# | 3643 |
| Rev. | 02C |

BI Pure Water (Canada) Inc.
#2, 9790 - 190th Street Surrey, BC V4N 3M9
Phone: (604) 882-8850
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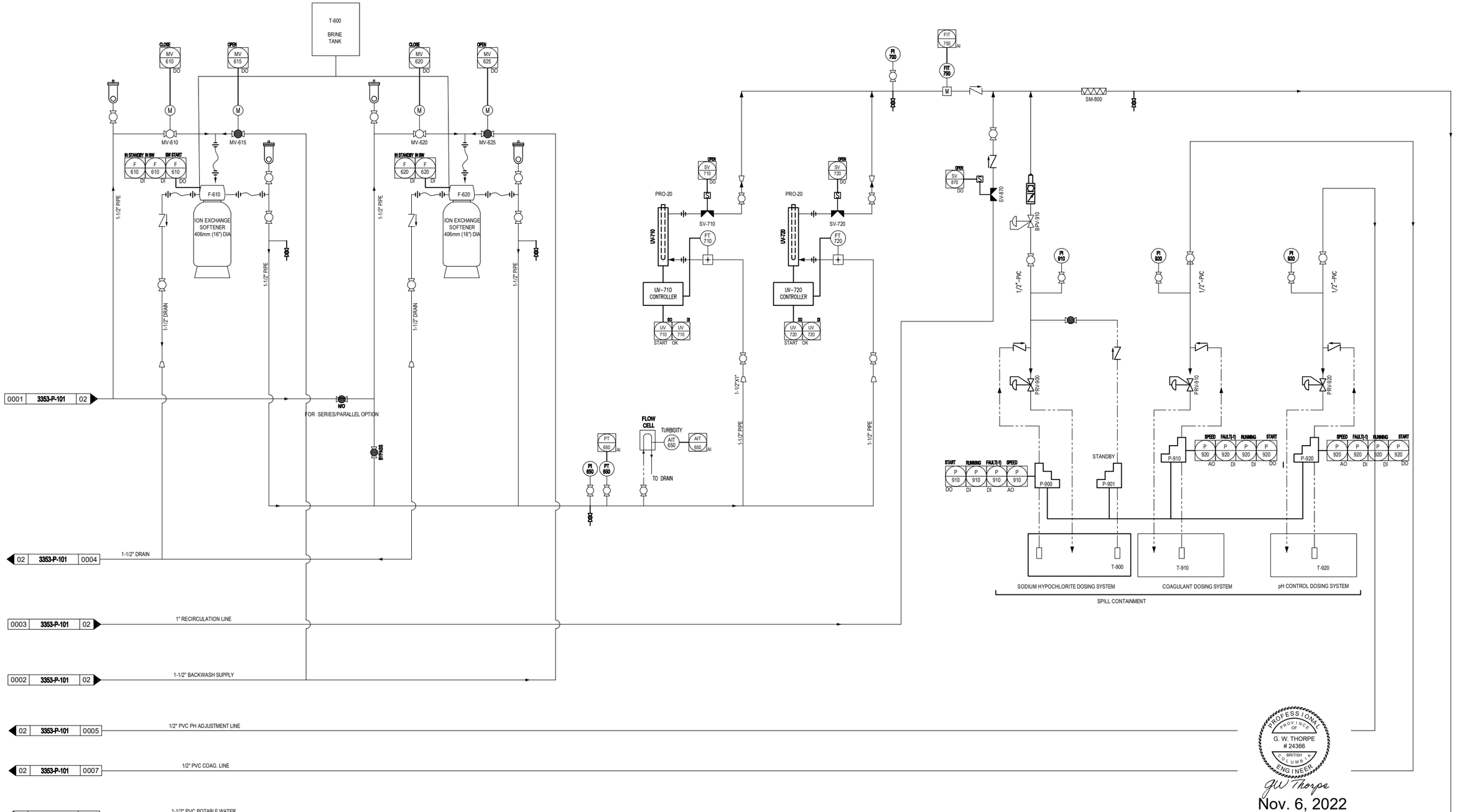
http://www.bipurewater.ca

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Nov. 6, 2022


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Design By: JT
Drawn By: PS
Checked By:
Submitted
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Client: **TELKWA COAL LIMITED**

Title: PROCESS & INSTRUMENTATION DIAGRAM
Project: TENAS PROJECT CAMP WTP RADLOFF #885-001-03
Drawing #: 3643-P-101

Scale
Date 2022/04/04
Sheet 3 of 3
Job# 3643
Rev. 02C

40'-0"
[12192]

ADMINISTRATION BUILDING WALL

RAW WATER TANK
2100 USGAL

MULTI-MEDIA
FILTER VESSELS

BASKET STRAINERS

1-MICRON
FILTERS

5-MICRON
FILTERS

ION EXCHANGE
SOFTENERS

BACKWASH WASTE

BRINE TANK

CHEMICAL DOSING SYSTEMS
- pH CONTROL
- COAGULANT
- SODIUM HYPOCHLORITE

FEED PUMPS

PROCESS
ROOM

VALVE
ACCESS
HATCHES

NOP SINK

CHEMICAL
ROOM

SAFETY EYEWASH/
EYEWASH

8'-0"
[2438]

16'-0"
[4876]

A

A

B

B

HOT WATER
TANK

CONTROL
PANEL

HVAC
PANEL

PRODUCT
TRANSFER
ROOM

8'-0"
[2438]

ELECTRICAL PANEL

OVERFLOW

CHLORINE CONTACT TANK
2100 USGAL

TREATED WATER TANK
2100 USGAL

TREATED WATER TANK
2100 USGAL

Ø1½"
EFFLUENT

PRODUCT
PUMPS

ROADWAY

PROFESSIONAL ENGINEER
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G. W. THORPE
# 24366

Nov. 6, 2022

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Status: ISSUED FOR APPROVAL BY BC NO. HEALTH

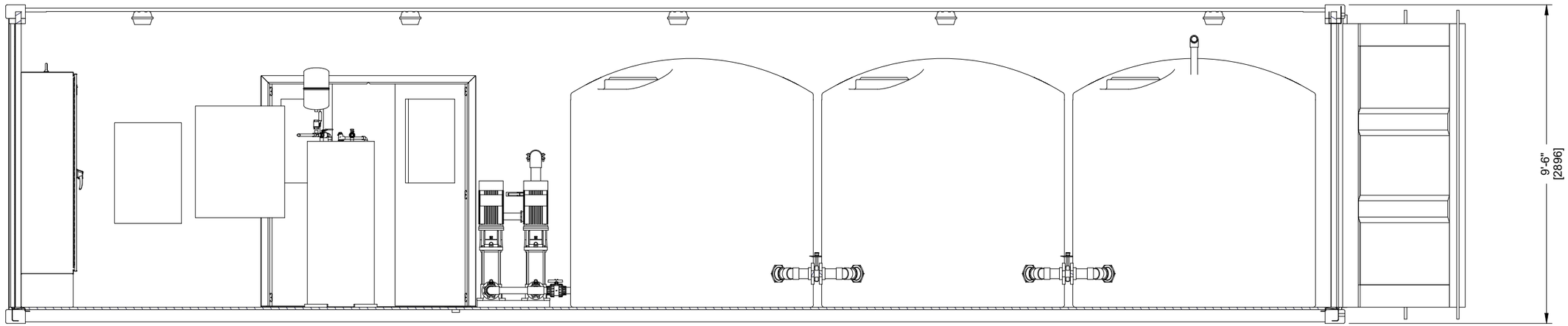
| Issue | Date | App'd | Revision Description |
|---|---|---|---|
| C | 2022-10-07 | | BRINE & HOT WATER TANKS ADDED |
| B | 2022-07-05 | | ISSUED FOR APPROVAL |
| A | 2022-04-29 | | ISSUED FOR COMMENTS |

Design By: GT
Drawn By: RT
Checked By:
Submitted
Approved

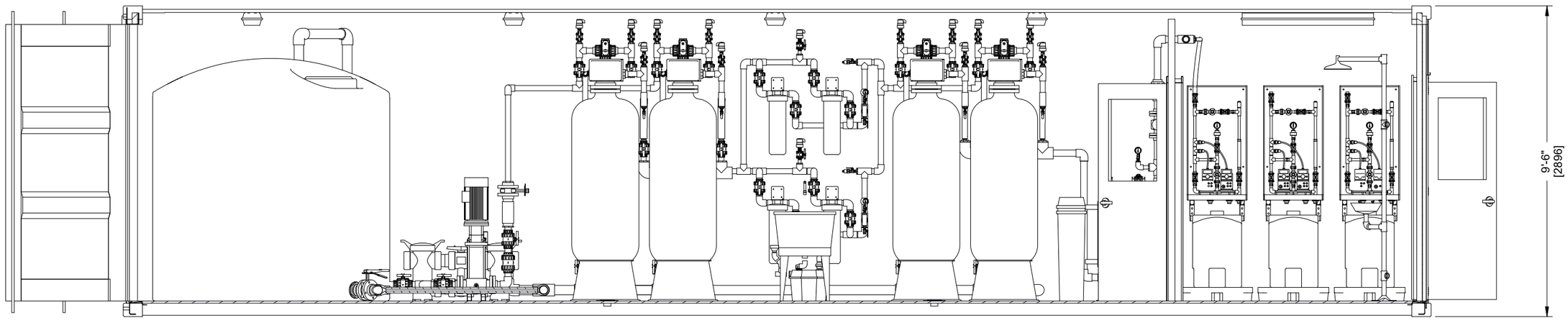
Client: RADLOFF ENGINEERING

Title: GENERAL ARRANGEMENT
Project: TELKWA COAL WTP
Drawing #: 3643-G-101

Scale: AS NOTED
Date: 2022-04-04
Sheet 1 of 3
Job# 3643
Rev: C




SECTION B-B




SECTION A-A

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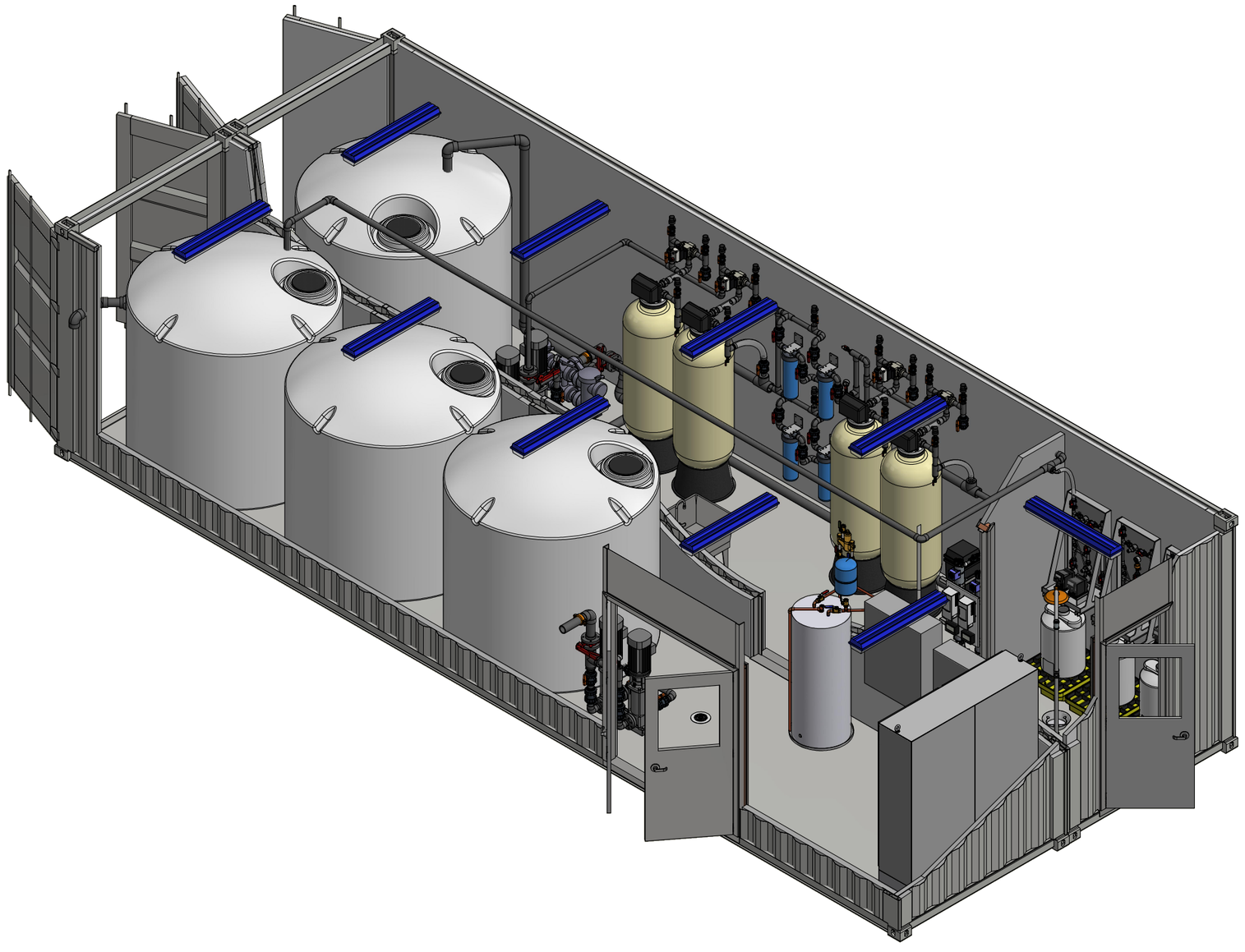


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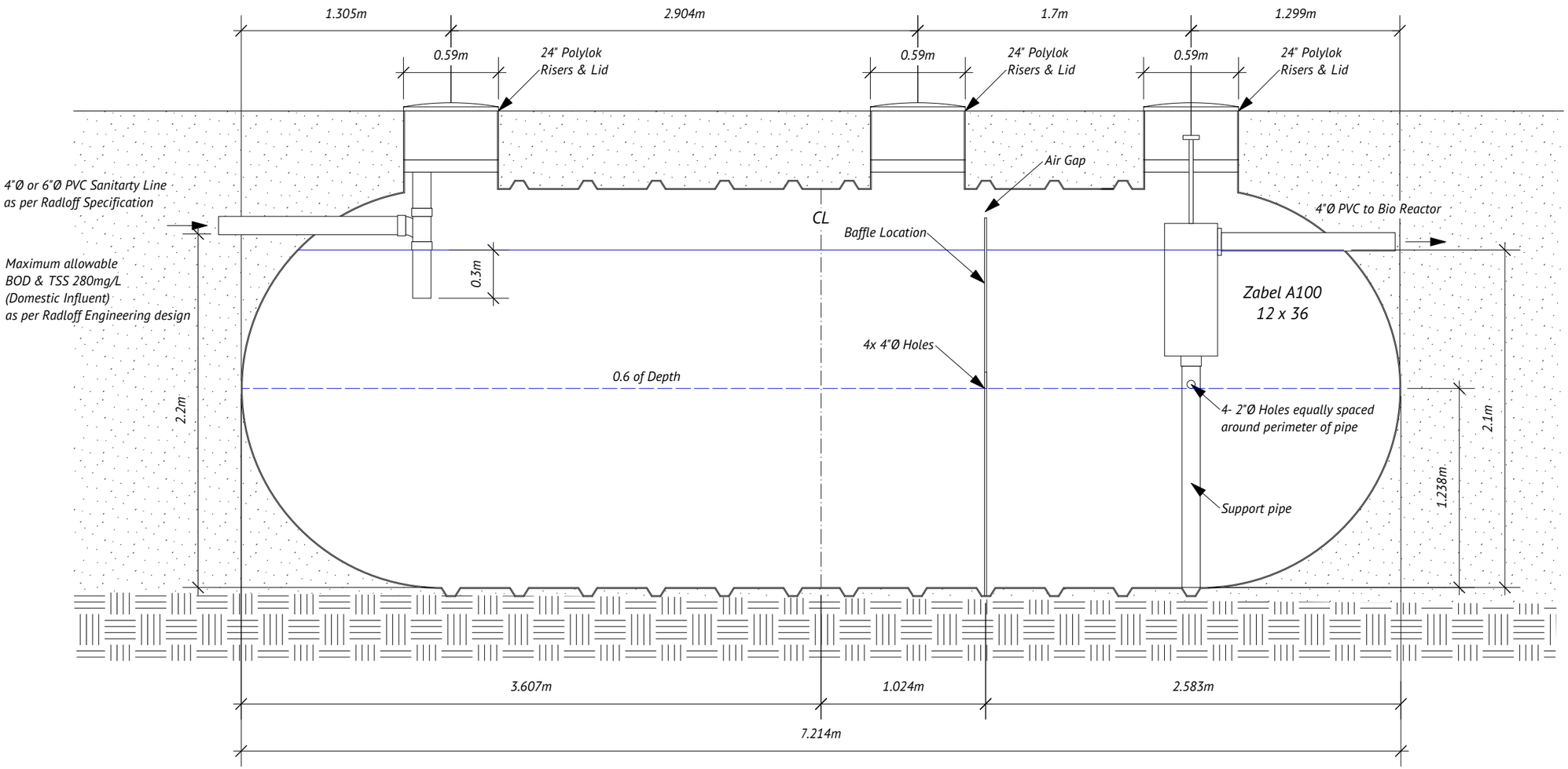
Drawing #: 3643-G-101

Scale: AS NOTED
Date: 2022-04-04
Sheet: 3 of 3
Job#: 3643
Rev: C

# Appendix B

Wastewater Shop Drawings




1 / S1 *2 Chamber Septic Tank*
*Scale: 1:30*

***Xerxes by Shawcor- 2 Chamber***
***8000 US Gal (30,000 L) Tank***
*with Zabel A100 12x36*
*Effluent Filter*

0.0 0.5 1.0 1.5 2.0 m


CLEAR POINT
*8598 Bourne Terrace*
*Victoria, BC V8L 1M1*
*Phone 250-961-5208*


*Professional Engineer Seal*

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. V. BRIZAN
# 14502

Darryl V Brizan

2022-08-16
***EGBC Permit Number 1001087***

| ***Revisions/ Issue*** | | |
|---|---|---|
| V5 | June 21/22 | IFC |
| V6 | Aug 15/22 | Revised DDF- IFC |
| | | |
| | | |
| | | |

***Notes***

B4 ENGINEERING INC

***EGBC Permit Number 1001087***

***Engineer:*** *Clearpoint/ Radloff/ B4*

***Drawn By:*** *TWR*

***Date Drawn:*** *March 22/ 2021*

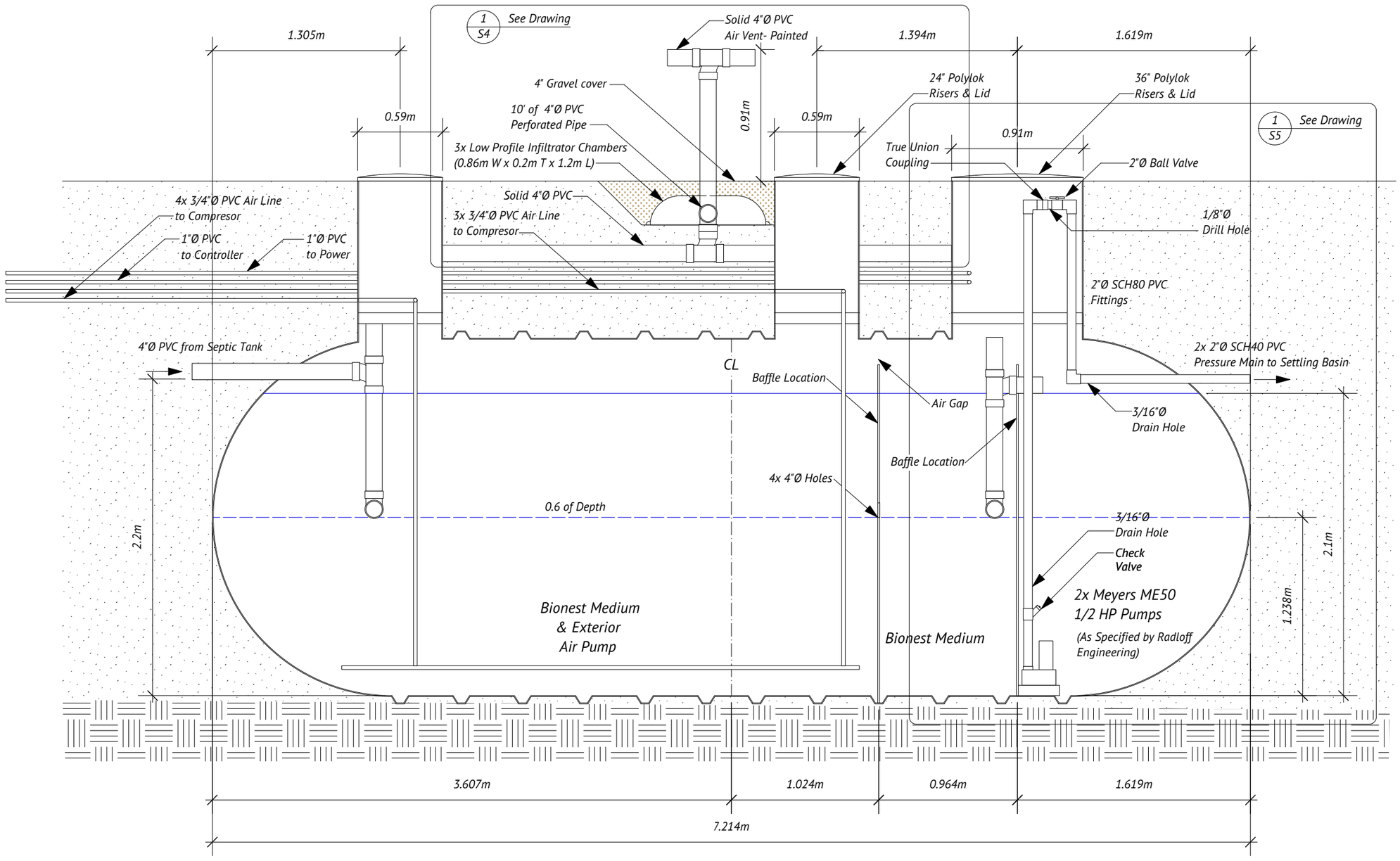
***Drawing File:*** *B4 1034-01-V1*

***Project Address:***
*Telkwa Coal Limited*
*Telkwa, BC*

***Project Number:***
*1034-01*

***Drawing Title:***
*Septic Tank Layout*
*Drawing For Construction*

***Sheet***
***S1***




1 / S2 *3 Chamber Bioreactor Tank*
*Scale: 1:30*

***Xerxes by Shawcor- 3 Chamber 8000 US Gal (30,000 L) Tank***
*with Bionest Medium and Air Pumps and 2x Meyers ME50- 1/2 HP Pumps*

0.0 0.5 1.0 1.5 2.0 m


CLEAR POINT
8598 Bourne Terrace
Victoria, BC V8L 1M1
Phone 250-961-5208


*Professional Engineer Seal*

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. V. BRIZAN
# 14502

2022-08-16
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***Notes***

B4 ENGINEERING INC

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***Date Drawn:*** *March 22/ 2021*

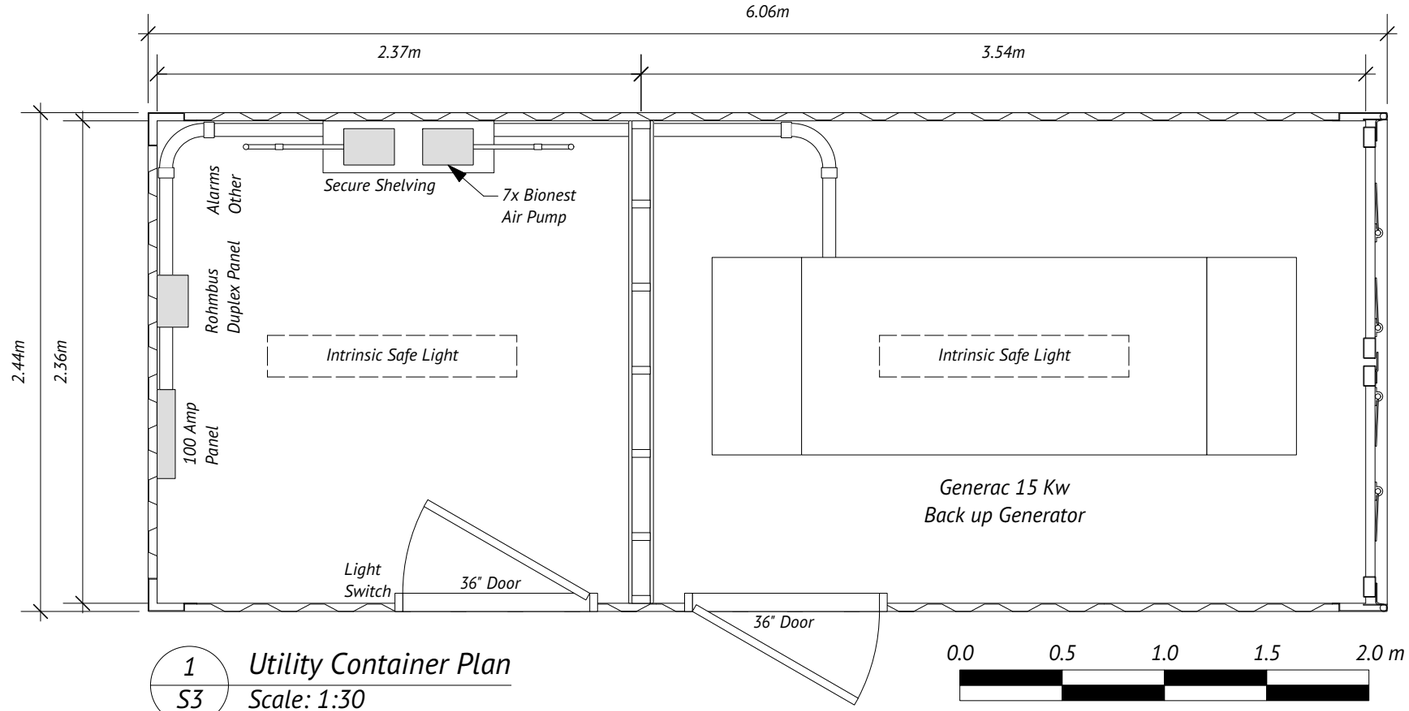
***Drawing File:*** *B4 1034-01-V1*

***Project Address:***
*Telkwa Coal Limited*
*Telkwa, BC*

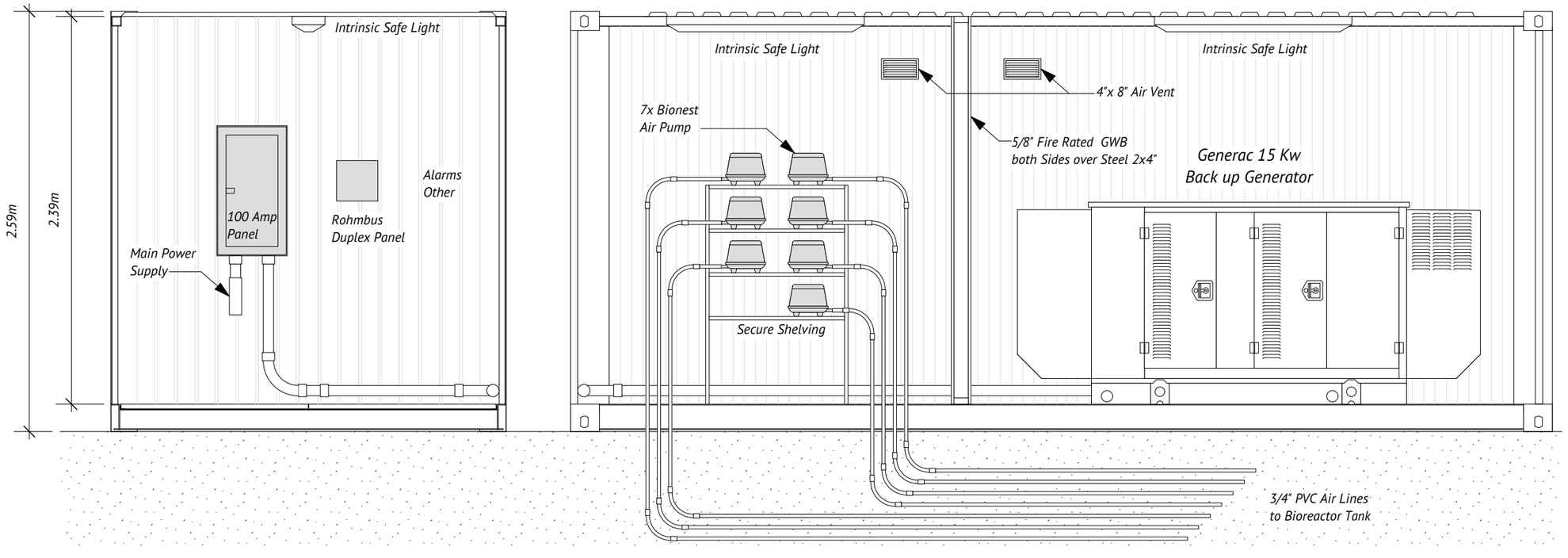
***Project Number:***
*1034-01*

***Drawing Title:***
*Bioreactor Tank Layout*
*Drawing For Construction*

***Sheet***
**S2**




1 / S3 *Utility Container Plan*
*Scale: 1:30*




2 / S3 *Utility Container Elevations*
*Scale: 1:30*

CLEAR POINT
8598 Bourne Terrace
Victoria, BC V8L 1M1
Phone 250-961-5208

*Professional Engineer Seal*

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. V. BRIZAN
# 14502

Darryl V Brizan

2022-08-16

***EGBC Permit Number 1001087***

| ***Revisions/ Issue*** | | |
|---|---|---|
| V5 | June 21/22 | IFC |
| V6 | Aug 15/22 | Revised DDF- IFC |
| | | |
| | | |
| | | |

***Notes***

B4 ENGINEERING INC

***EGBC Permit Number 1001087***

***Engineer:*** *Clearpoint/ Radloff/ B4*

***Drawn By:*** *TWR*

***Date Drawn:*** *March 22/ 2021*

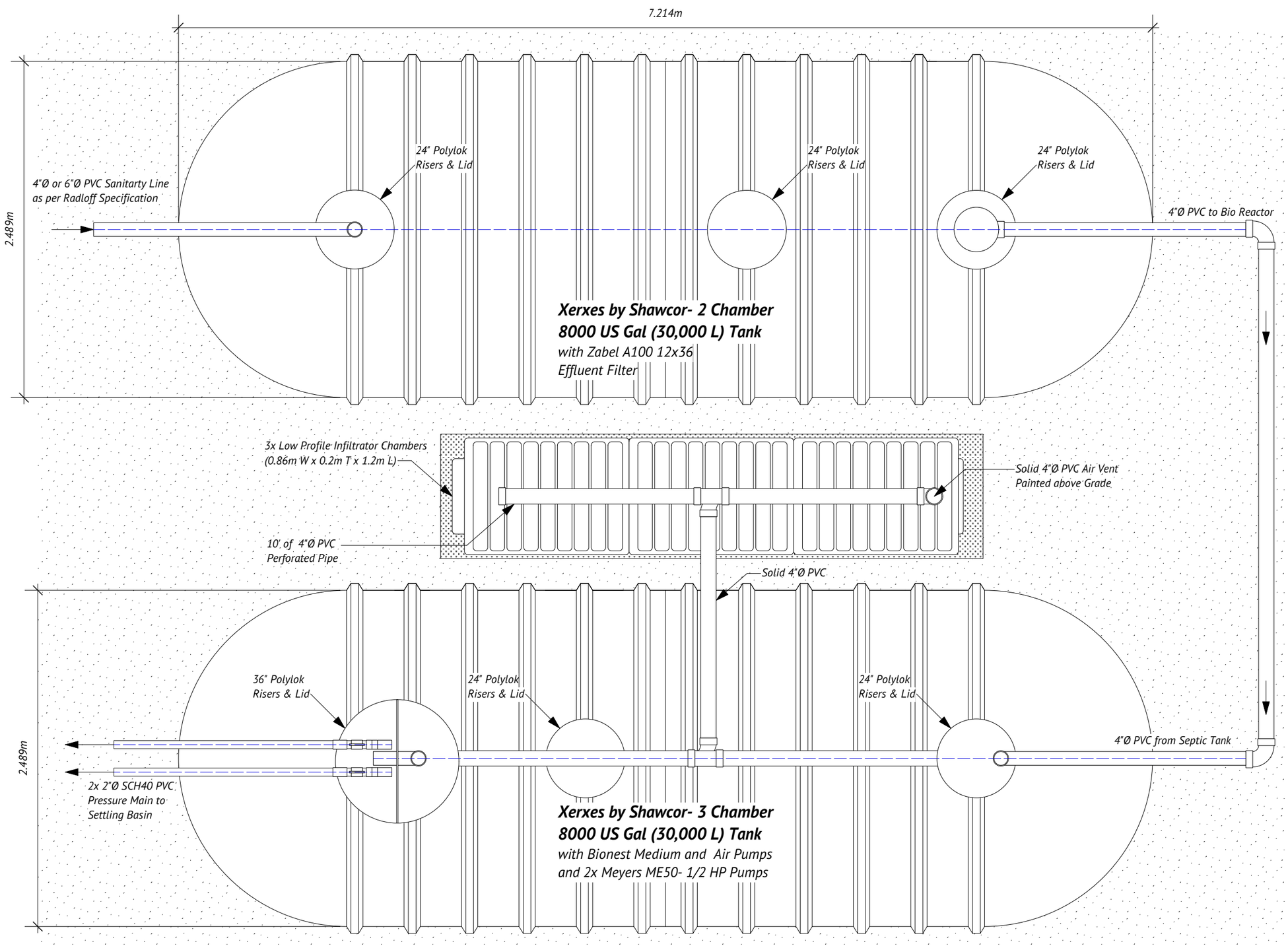
***Drawing File:*** *B4 1034-01-V1*

***Project Address:***
*Telkwa Coal Limited*
*Telkwa, BC*

***Project Number:***
*1034-01*

***Drawing Title:***
*Utility Container*
*Plan and Elevation*

***Sheet***
***S3***




1/S4 Tank Layout Plan
Scale: 1:30


CLEAR POINT

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Victoria, BC V8L 1M1
Phone 250-961-5208


Professional Engineer Seal

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. V. BRIZAN
# 14502

Darryl V Brizan

2022-08-16

**EGBC Permit Number 1001087**

**Revisions/ Issue**

| | | |
|---|---|---|
| V5 | June 21/22 | IFC |
| V6 | Aug 15/22 | Revised DDF- IFC |
| | | |
| | | |
| | | |

**Notes**

B4 ENGINEERING INC

**EGBC Permit Number 1001087**

**Engineer:** Clearpoint/ Radloff/ B4

**Drawn By:** TWR

**Date Drawn:** March 22/ 2021

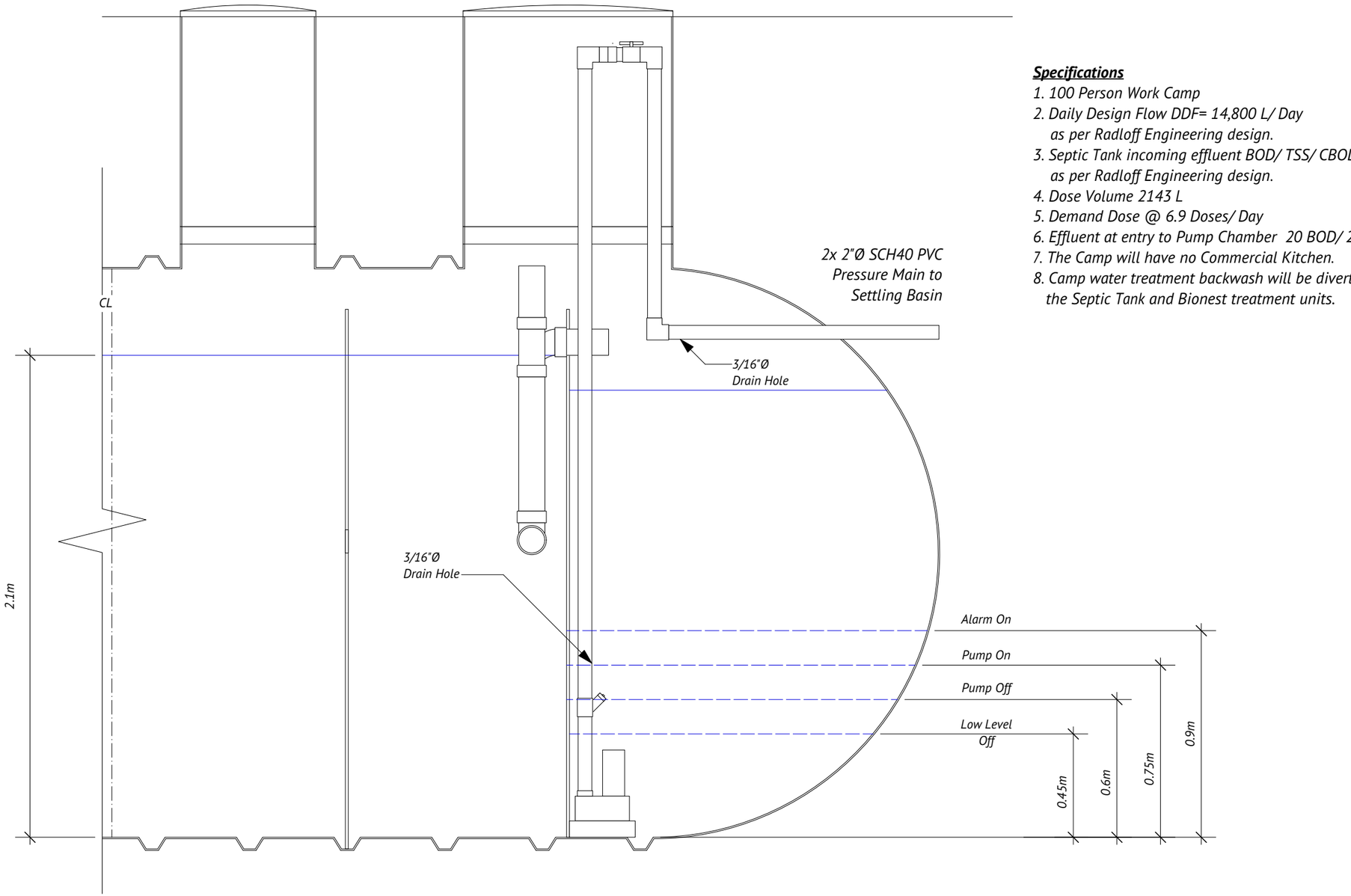
**Drawing File:** B4 1034-01-V1

**Project Address:**
Telkwa Coal Limited
Telkwa, BC

**Project Number:**
1034-01

**Drawing Title:**
Tank Layout Plan
Drawing For Construction

**Sheet**
S4




1 / S4 *Pump Chamber Dose Settings*
*Scale: 1:20*

0 0.5 1.0 1.5 m

***Specifications***

1. *100 Person Work Camp*
2. *Daily Design Flow DDF= 14,800 L/ Day as per Radloff Engineering design.*
3. *Septic Tank incoming effluent BOD/ TSS/ CBOD 280 mg/L or less, as per Radloff Engineering design.*
4. *Dose Volume 2143 L*
5. *Demand Dose @ 6.9 Doses/ Day*
6. *Effluent at entry to Pump Chamber 20 BOD/ 20 TSS.*
7. *The Camp will have no Commercial Kitchen.*
8. *Camp water treatment backwash will be diverted away from the Septic Tank and Bionest treatment units.*

CLEAR POINT
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*Phone 250-961-5208*

*Professional Engineer Seal*

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — D. V. BRIZAN # 14502

Darryl V Brizan

2022-08-16

***EGBC Permit Number 1001087***

| ***Revisions/ Issue*** | | |
|---|---|---|
| *V5* | *June 21/22* | *IFC* |
| *V6* | *Aug 15/22* | *Revised DDF- IFC* |
| | | |
| | | |
| | | |

***Notes***

B4 ENGINEERING INC

***EGBC Permit Number 1001087***

***Engineer:*** *Clearpoint/ Radloff/ B4*

***Drawn By:*** *TWR*

***Date Drawn:*** *March 22/ 2021*

***Drawing File:*** *B4 1034-01-V1*

***Project Address:***
*Telkwa Coal Limited*
*Telkwa, BC*

***Project Number:***
*1034-01*

***Drawing Title:***
*Specifications*
*Pump Settings*

***Sheet***
***S5***

# Appendix C

Civil Drawings

# ALLEGIANCE COAL LIMITED

## TENAS PROJECT WATER AND SEWER PHASE 2

### DRAWING INDEX

| SHEET | DESCRIPTION |
|---|---|
| C01 | OVERALL SITE PLAN |
| C02 | ADMIN. BUILDING SITE PLAN |
| C03 | ADMIN. SANITARY SERVICE PLAN & PROFILE |
| C04 | ADMIN. WATER SERVICE PLAN & PROFILE |
| C05 | CONSTRUCTION DETAIL |

### BIONEST WASTEWATER SYSTEM

| | |
|---|---|
| S1 | SEPTIC TANK LAYOUT |
| S2 | BIOREACTOR TANK LAYOUT |
| S3 | UTILITY CONTAINER |
| S4 | TANK LAYOUT PLAN |
| S5 | SPECIFICATIONS |

### BI PURE WATER SYSTEM

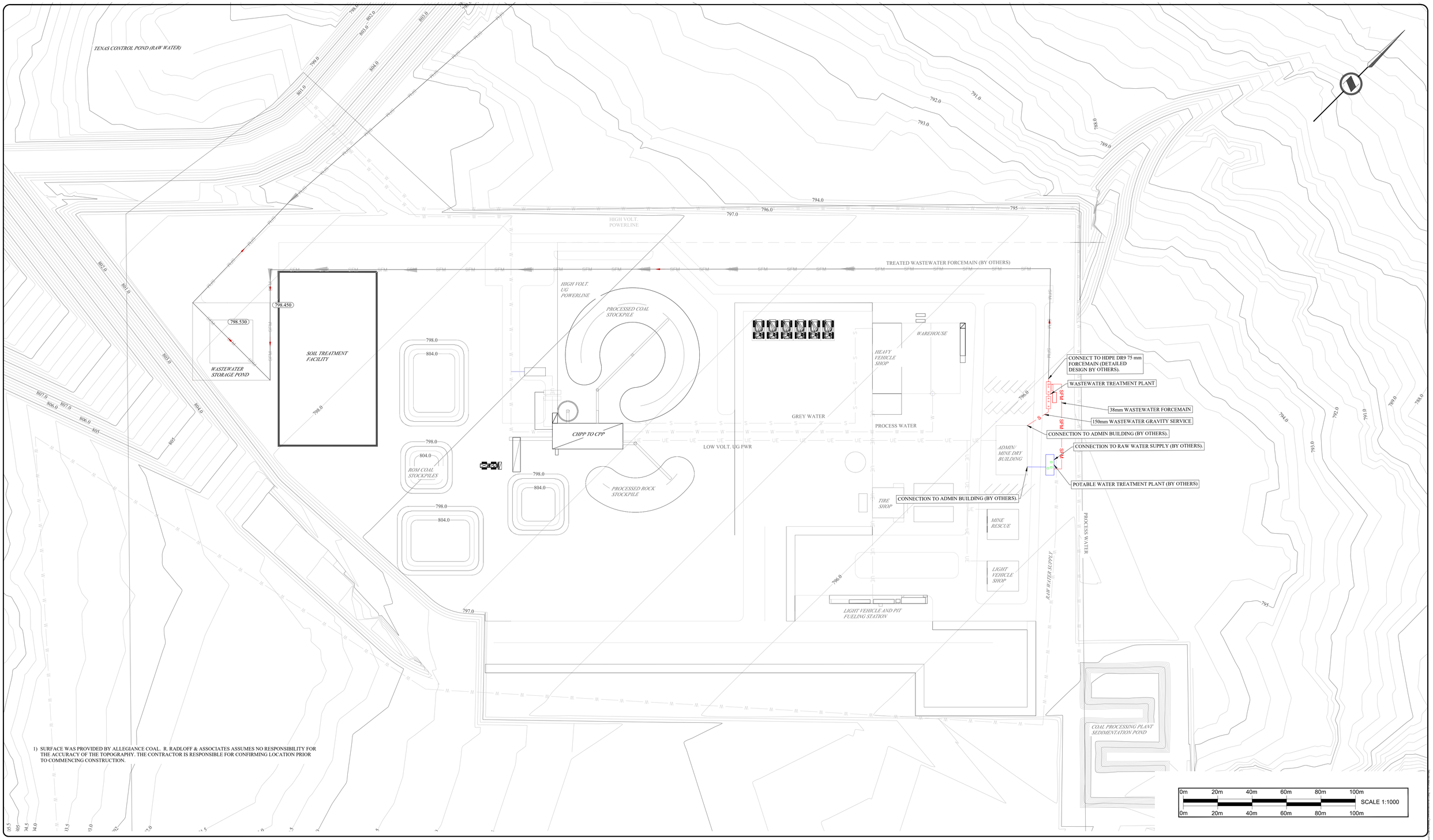
| | |
|---|---|
| 1 OF 3 | GENERAL ARRANGEMENT PLAN VIEW |
| 2 OF 3 | GENERAL ARRANGEMENT SECTION VIEWS |
| 3 OF 3 | GENERAL ARRANGEMENT 3D MODEL VIEW |

### LEGEND

- WATERLINE
- WASTEWATER
- WASTEWATER FORCEMAIN
- STORM SEWER
- DITCHING
- CULVERT
- LEGAL BOUNDARY
- FENCE LINE
- ROAD SHOULDER
- POWERLINE
- TELEPHONE LINE
- GASLINE
- NATURAL WATER
- UTILITY POLE
- VALVE
- CURB STOB
- BLOW-OFF HYDRANT
- FIRE HYDRANT
- WATER WELL
- MANHOLE SANITARY/STORM
- CLEAN OUT
- OLD IRON PIN
- SURVEY HUB
- SURVEY BENCHMARK
- TEST PIT


Radloff
R. Radloff & Associates Inc.
Engineering, Planning & Consulting
1820 3rd Ave
Prince George, B.C. V2M 1G4
Ph: (250) 562-6861, Fax: (250) 562-6826


PROJECT #: 885-001-03
DATE: NOV 2022




1) SURFACE WAS PROVIDED BY ALLEGIANCE COAL. R. RADLOFF & ASSOCIATES ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE TOPOGRAPHY. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING LOCATION PRIOR TO COMMENCING CONSTRUCTION.


R. Radloff & Associates Inc.
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STAMP

| NO. | (YY/MM/DD) | BY | REVISIONS | ENG. |
|---|---|---|---|---|

| | |
|---|---|
| DESIGN BY EJG | DATE 22/02/18 |
| DRAWN BY EJG | DATE 22/02/18 |
| CHECKED BY RPR | DATE 22/02/18 |
| APPROVED BY RPR | DATE 22/02/18 |

| NO. | (YY/MM/DD) | BY | DRAWING ISSUE | ENG. |
|---|---|---|---|---|
| 02 | 22/10/28 | CWA | FOR TENDER | RPR |
| 01 | 22/05/26 | EJG | FOR DISCUSSION | RPR |

CLIENT

ALLEGIANCE COAL LIMITED

SCALE HORIZ. 1:1000 SCALE VERT.

SHEET C01 OF C05

ENG PROJECT NUMBER 885-001-03

PROJECT

TENAS PROJECT
WATER AND SEWER PHASE 2

SHEET TITLE

OVERALL SITE PLAN

ELECTRICAL DESIGN TO CONNECT WATER AND WASTEWATER TREATMENT PLANTS TO POWER TO BE DONE BY CONTRACTORS ELECTRICAL ENGINEER.

38mmØ PREINSULATED & HEAT-TRACED PVC BACKWASH FORCEMAIN

SEACAN W/ GENERATOR & AIR PUMPS
INSTALL AS PER SHOP DRAWINGS AND SPECIFICATIONS

3 X LOW PROFILE INFILTRATOR CHAMBERS
INSTALL AS PER SHOP DRAWINGS AND SPECIFICATIONS

30,000L XERXES BY SHAWCOR
2 CHAMBER SEPTIC TANK
INSTALL AS PER SHOP DRAWINGS AND MANUFACTURERS SPECIFICATIONS

RAW WATER SUPPLY (BY OTHERS)

BACKWASH WASTE CONNECTION

CONSTRUCT FOUNDATION FOR PACKAGE WATER TREATMENT PLANT AS PER DESIGN BY CONTRACTOR'S ENGINEER

INSTALL CLEAN OUT
SEE DETAIL (SHEET C05)

CONSTRUCT 1m x 1m x 1m ROCK PITS UNDER EACH FUTURE FLOOR DRAIN

POTABLE WATER TREATMENT PLANT (BY OTHERS)

CONNECT TWO 50mmØ SCH40 PVC FORCEMAIN PIPES TO ONE 75 mmØ DR9 HDPE FORCEMAIN. FORCEMAIN ASSUMED TO BE 589 m LONG WITH 2.5 M RISE. DETAILED FORCEMAIN DESIGN BY OTHERS.

30,000 L XERXES BY SHAWCOR
3 CHAMBER BIOREACTOR TANK.
INSTALL AS PER SHOP DRAWINGS AND SPECIFICATIONS

150Ø PREINSULATED & HEAT-TRACED HDPE DR11 @ 2%

50mmØ PREINSULATED AND HEAT-TRACED PVC WATER SERVICE

*ROADWAY*

CONNECTION TO ADMIN. BUILDING. (BY OTHERS)

ADMIN./DRY BUILDING

0m 2m 4m 6m 8m 10m
SCALE 1:100
0m 2m 4m 6m 8m 10m


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|---|---|---|---|---|
| | | | RPR | |

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|---|---|
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| APPROVED BY RPR | DATE 22/02/18 |

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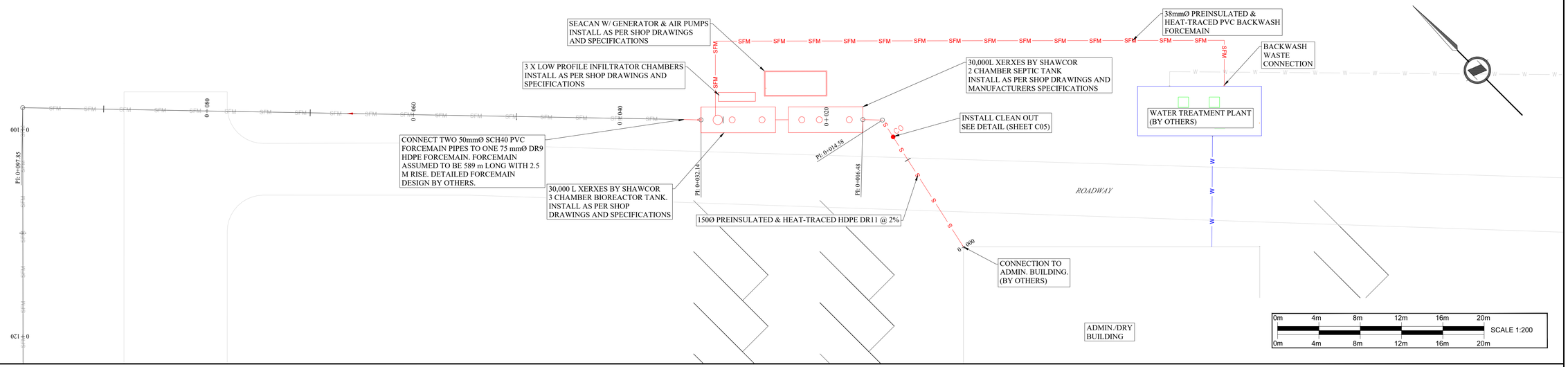
|---|---|---|---|---|
| 02 | 22/10/28 | CWA | FOR TENDER | RPR |
| 01 | 22/05/26 | EJG | FOR DISCUSSION | RPR |

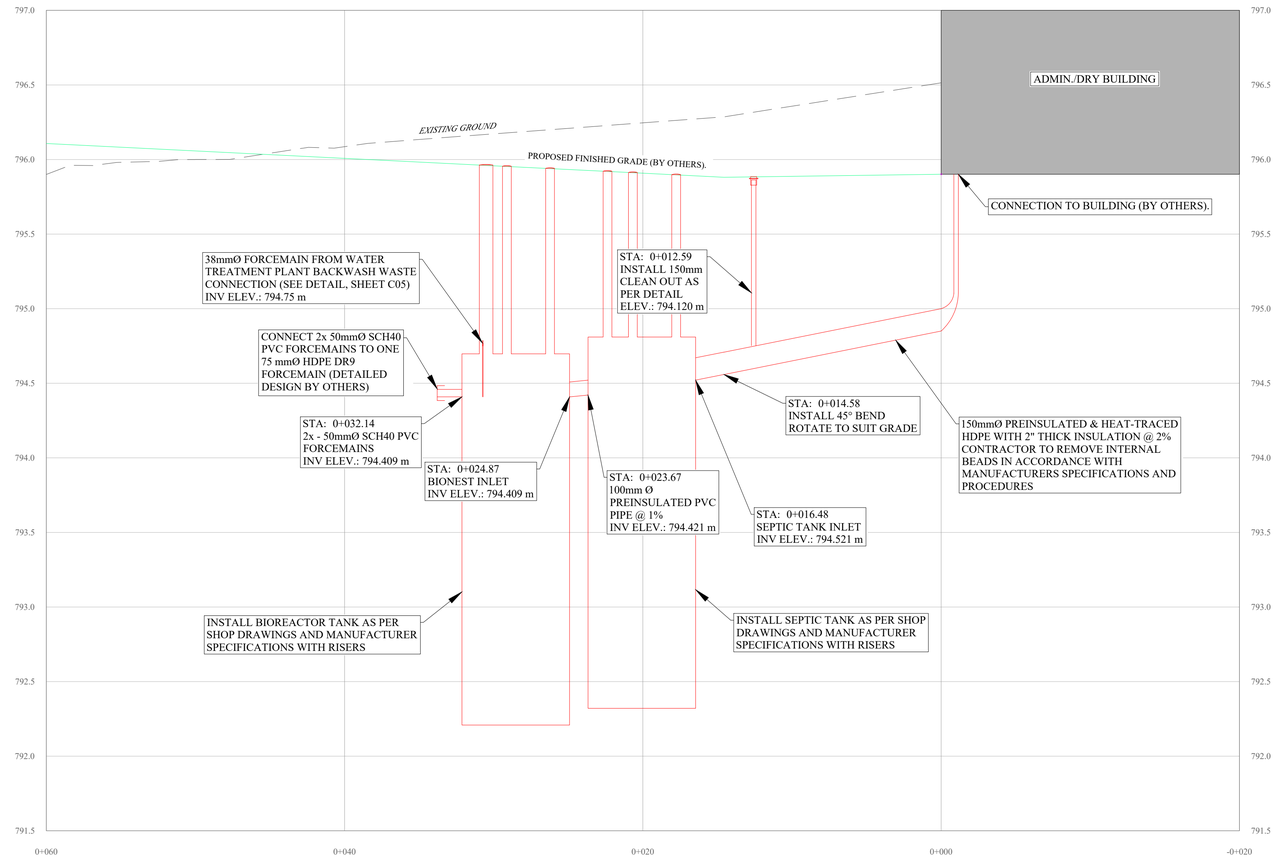
CLIENT
ALLEGIANCE COAL LIMITED

SCALE HORIZ. 1:100 SCALE VERT.
SHEET C02 OF C05
ENG PROJECT NUMBER 885-001-03

PROJECT
TENAS PROJECT
WATER AND SEWER PHASE 2

SHEET TITLE
ADMIN. BUILDING
SITE PLAN

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|---|---|---|---|---|
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| 01 | 22/05/26 | EJG | FOR DISCUSSION | RPR |

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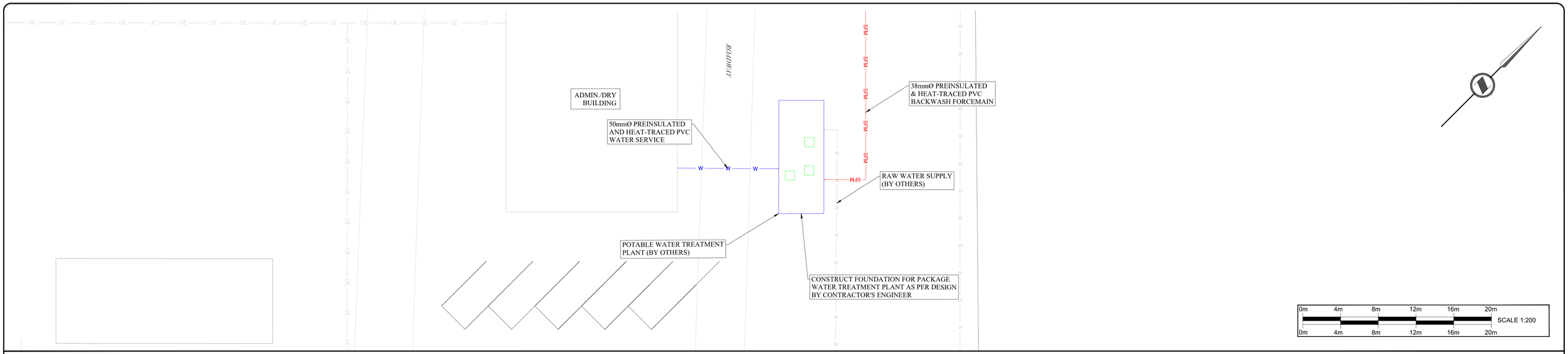
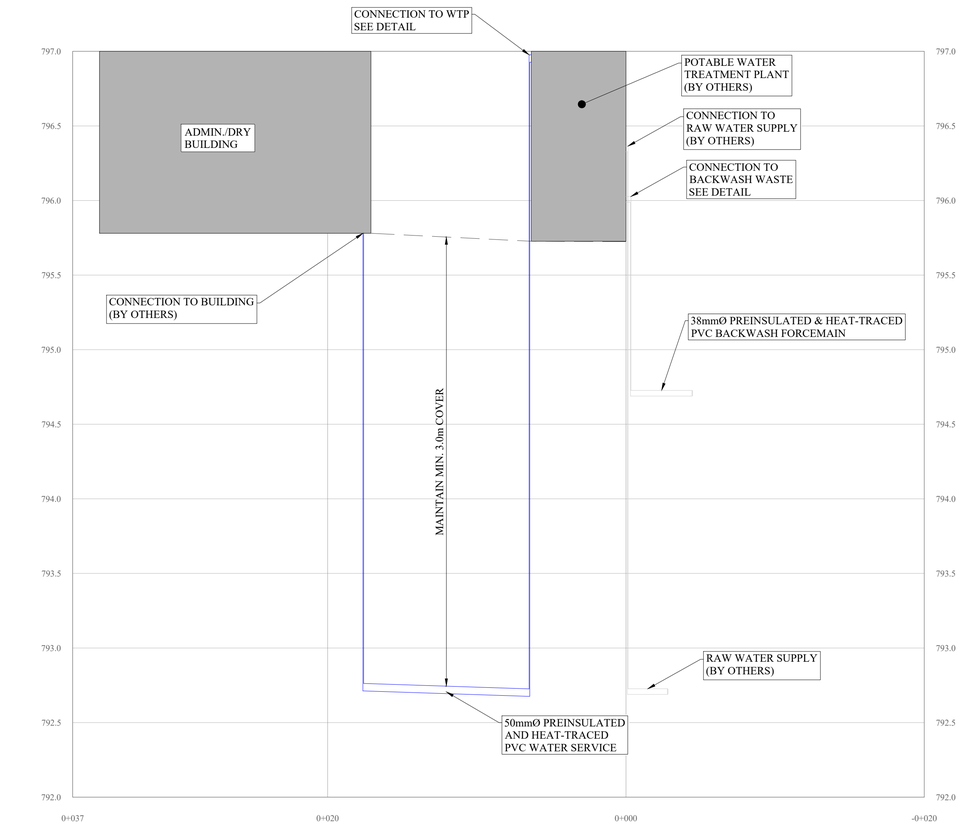
ALLEGIANCE COAL LIMITED

SCALE HORIZ. 1:200 SCALE VERT. 1:20
SHEET C03 OF C05
ENG PROJECT NUMBER 885-001-03

PROJECT
TENAS PROJECT
WATER AND SEWER PHASE 2

SHEET TITLE
ADMIN. SANITARY SERVICE PLAN & PROFILE

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|---|---|---|---|---|
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SCALE HORIZ. 1:200 SCALE VERT. 1:20
SHEET C04 OF C05
ENG PROJECT NUMBER 885-001-03

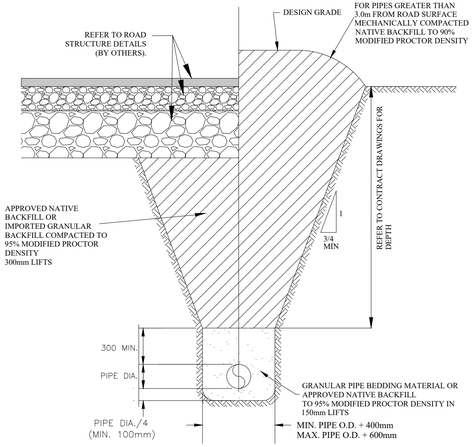
PROJECT
TENAS PROJECT
WATER AND SEWER PHASE 2

SHEET TITLE
ADMIN. WATER SERVICE
PLAN & PROFILE

STANDARD DETAIL DRAWINGS

SUP G-4

ROADWAY SURFACES NON-TRAVELLED SURFACES




NOTES: 1. TRENCHING COMPLIES WITH ALL REQUIREMENTS OF WORKSAFE BC.
2. REFER TO CONTRACT DRAWINGS, SECTION. 31 23 01 FOR DETAILED SPECIFICATIONS.
3. REFER TO RRA G-4a IF INSULATION IS REQUIRED.

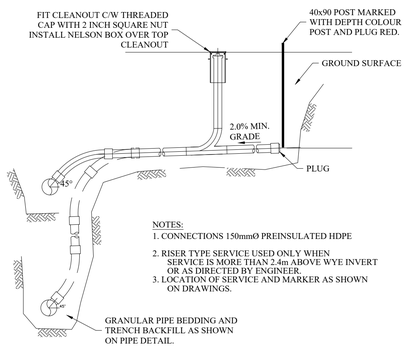
NOT TO SCALE

2013

**TYPICAL PIPE TRENCH** | DRAWING NUMBER: ***SUP G-4***

STANDARD DETAIL DRAWINGS

SUP S-7

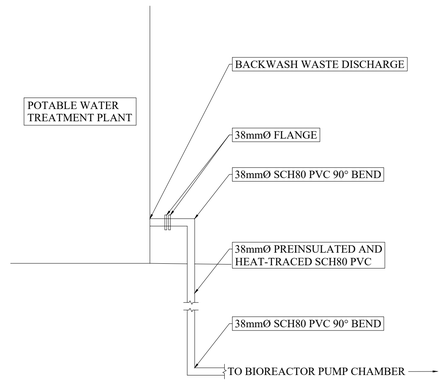



NOTES:
1. CONNECTIONS 150mmØ PREINSULATED HDPE
2. RISER TYPE SERVICE USED ONLY WHEN SERVICE IS MORE THAN 2.4m ABOVE WYE INVERT OR AS DIRECTED BY ENGINEER.
3. LOCATION OF SERVICE AND MARKER AS SHOWN ON DRAWINGS.

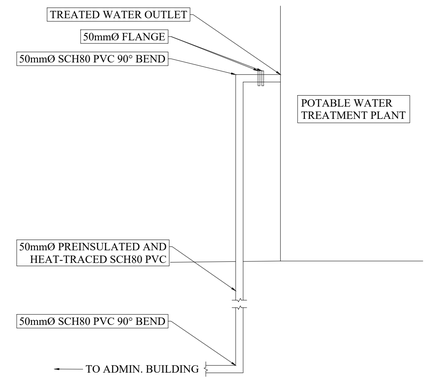
ELEVATION

NOT TO SCALE

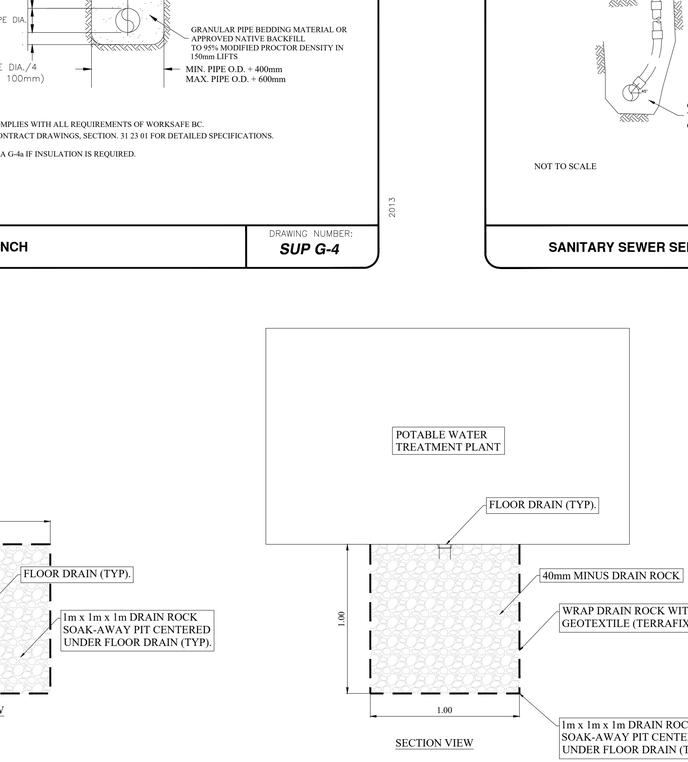
**SANITARY SEWER SERVICE CONNECTION** | DRAWING NUMBER: ***SUP S-7***



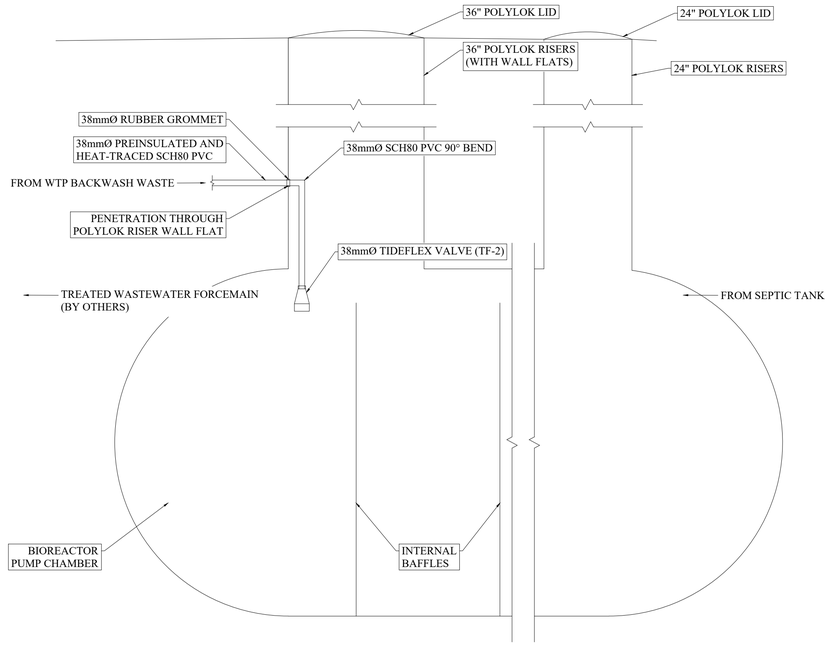

BACKWASH WASTE CONNECTION DETAIL
N.T.S.




TREATED WATER CONNECTION DETAIL
N.T.S.




FLOOR DRAIN SOAK-AWAY PIT DETAIL
N.T.S.




WTP BACKWASH TO BIOREACTOR PUMP CHAMBER CONNECTION DETAIL
N.T.S.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CLIENT
ALLEGIANCE COAL LIMITED

SCALE HORIZ. N.T.S. SCALE VERT.
SHEET C05 OF C05
ENG PROJECT NUMBER 885-001-03

PROJECT
TENAS PROJECT
WATER AND SEWER PHASE 2

SHEET TITLE
DETAIL CONSTRUCTION

# Appendix D

Water System Demand Calculations Memo

# MEMORANDUM

**DATE:** February 26, 2021

**SUBJECT:** **Telkwa Coal Potable Water System ADD, MDD, and Peak Water Demand Calculations**

**FROM:** R. Radloff & Associates Inc.

**TO:** Sedgman Ltd., FilterCo Water Treatment Ltd., Dan Farmer, P.Eng.

## ADD, MDD, and Peak Water Demand Calculations

The potable water treatment system services an administration building located at the Tenas Mine site. The administration building is comprised of a lunchroom, showers, bathrooms, a First Aid room, a 764 S.F. office space, storage lockers, change space, and other basic amenities. The administration building will be used by employees at the site totaling approximately 100 persons, and the potable water treatment system will be designed to service this population. The calculations for the Average Day Demand (ADD), Maximum Day Demand (MDD), and Peak Water Demand of the potable water treatment system, with assumptions, are provided below.

The calculation for the ADD assumes all 100 people at the site use the facilities (fixtures), except for the showers, where a usage rate of 80% is assumed. In calculating the usage from the 14 shower units, the following assumptions were made

- 80 of the 100 employees take a shower once per day (80% daily usage)
- Each employees shower has a duration of  10 minutes, and
- The shower heads provide a flowrate of 10 L/min.

Using the assumptions noted above, the ADD from the showers is as follows:

$$\mathrm{ADD}_{Showers} = (10\ \mathrm{LPM}) \times (10\ \mathrm{minutes}) \times (80\ \mathrm{people}) = \mathbf{8{,}000\ L = 8.0\ m^3}$$

A similar rational was followed for the sink faucets, toilets, dishwashers, and clothes washers. The usage assumptions for these are as follows:

- The sink faucets have a flowrate of 0.3 L/s and are used for 90 seconds/person/day,
- The toilet and urinals have a usage of 5 L/flush and are used 3 times per day per person
- The dishwashers are rated for 15 L/cycle at a rate of 2 cycles/day, and
- The clothes washers are 32 kg/load commercial units that are rated for 320 L/cycle and complete 6 cycles/day

The total flows for the administration building are calculated in Table 1 below.

**Table 1: Estimated Average Daily Water Demand Calculation**

| Fixture Description | Units | Fixture Usage Rate | Unit Usage Rate | Demand Vol. (L) | Demand Vol. ($m^3$) |
|---|---|---|---|---|---|
| Shower | 80 persons* | 10 L/min | 10 min/day/person | 8,000 L/day | 8.0 $m^3$/day |
| Faucet or Sink | 100 persons | 0.3 L/s | 90 s/day/person | 2,700 L/day | 2.7 $m^3$/day |
| Toilet or Urinal | 100 persons | 5 L/flush | 3 flushes/day/person | 1,500 L/day | 1.5 $m^3$/day |
| Dishwasher | 2 units | 15 L/cycle | 2 cycles/day/unit | 60 L/day | 0.060 $m^3$/day |
| Clothes washer | 4 units | 320 L/cycle | 4 cycles/day/unit | 5,120 L/day | 5.12 $m^3$/day |
| | | | **TOTAL** | **17,380 L/day** | **17.4 $m^3$/day** |

**80 persons is an estimate based on occupations that would typically require showers daily.*

The Maximum Day Demand (MDD) is calculated by multiplying the Average Day Demand (ADD) calculated above by a peaking factor of 2.0. A peaking factor of 2.0 was used instead of a Harmon's peaking factor of 4.0 (Harmon's peaking factor based on a population of 100 people) because detailed information on fixture counts and usages is available which provides a more accurate estimate of the ADD. The calculation for MDD is provided below:

$$\text{MDD} = (2.0) \times \left(\frac{17.4\ m^3}{\text{day}}\right) = \mathbf{34.8\ m^3/day}$$

Based on the preceding rationale, the estimated Average Day Demand (ADD) of the administration building is 17.4 $m^3$/day and the corresponding Maximum Day Demand (MDD) is 34.8 $m^3$/day.

The peak flow demand is another key design element required when sizing the potable water treatment system. Calculation of Peak Water Demand is based on fixture units of the building and is in L/s. The total fixture units of the administration building are listed in Table 2.

**Table 2: Administration Building Fixture Unit Count [1]**

| Fixture Type | # Fixtures | units/fixture | Fixture Units |
|---|---|---|---|
| Shower head, 9.5 LPM or less per head | 14 | 1.4 | 19.6 |
| Clothes Washer, 6.8 kg | 4 | 4 | 16 |
| Dishwasher, Domestic* | 2 | 1.4 | 2.8 |
| Sink, bar | 9 | 2 | 18 |
| Sink, clinic service faucet | 1 | 3 | 3 |
| Sink, kitchen commercial | 4 | 4 | 16 |
| Sink, washup or mop basin | 1 | 3 | 3 |
| Urinal with flush tank | 5 | 3 | 15 |
| Water closet, 6LPF with flush tank | 9 | 2.2 | 19.8 |
| | | **TOTAL** | **113.2** |

***BC Plumbing Code does not provide fixture units for commercial dishwashers.*

[1] Source: 2018 BC Plumbing Code, Table 2.6.3.2 - A Sizing of Water Distribution Systems

The total Fixture Unit count (of 113.2) was converted to a maximum probable water demand utilizing the conversion chart shown in Figure 1 below (sourced from the BC Plumbing Code 2018) resulting in a predicted Peak Water Demand flowrate of 3.0 L/s. This Peak Water Demand is expected to occur intermittently throughout the day and it is anticipated that the potable water storage system would attenuate these peak events.

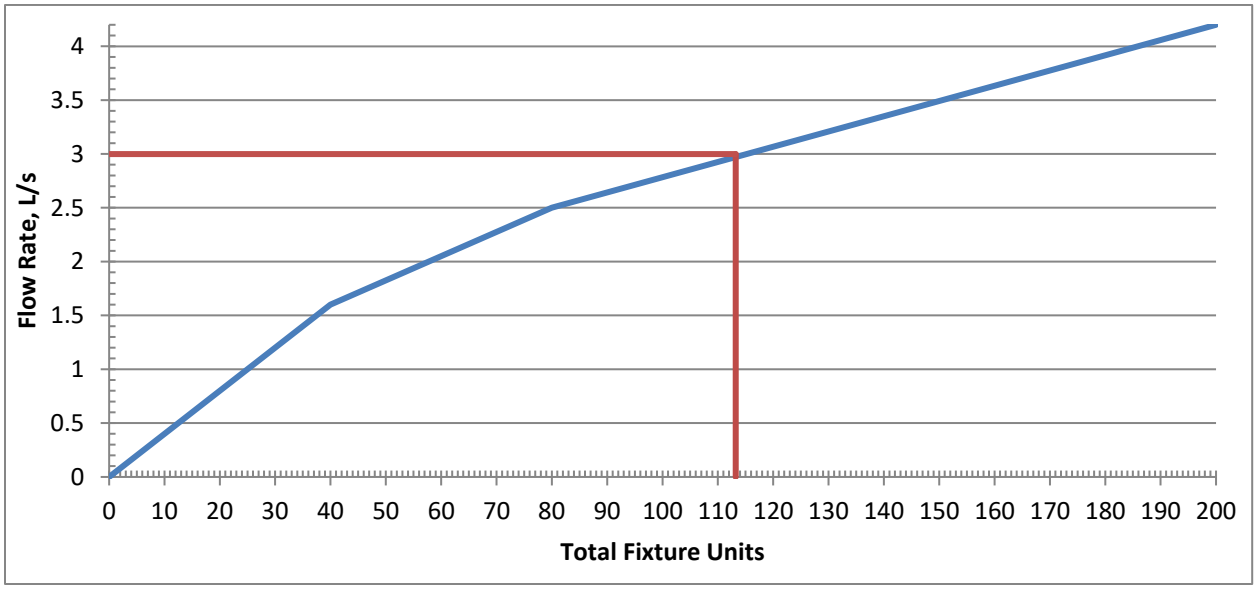


**Figure 1: Peak Water Demand Conversion Chart**

Based on the above rationale, the design flows that should be used to size the potable water treatment system are summarized in Table 3.

**Table 3: Design Flows**

| | |
|---|---|
| Average Day Demand (ADD) | **17.3 $m^3$/day** |
| Maximum Day Demand (MDD) | **34.6 $m^3$/day** |
| Peak Water Demand | **3.0 L/s** |

## Confirming Average Day Demand

To confirm if the Average Day Demand (ADD) of 17.3 $m^3$/day is a reasonable estimate for the administration building, a cross-check was completed by calculating the ADD using the Standard Practice Manual Version 3 (SPM v3)[2] for sewage system design and then multiplying by a factor to convert wastewater flows to water demand.

[2] Source: SPM v3, Table III-11 Non-residential Average Daily Flow Rates

Assumptions and inputs for calculating the ADD using the above rationale are as follows:

- 140 L/person/day water demand for "Residential or work camps, flush toilets, no meals" (SPM v3)
- 1.10 conversion factor to convert wastewater flows to potable water flows by accounting for water usage not entering the sewage drainage system

Using these assumptions, ADD is calculated as follows:

$$\mathrm{ADD}_{Check} = 154\ \frac{\mathrm{L/person}}{\mathrm{day}} \times 100\ \text{persons} \times \frac{1\ \mathrm{m^3}}{1000\ \mathrm{L}} = \mathbf{15.4\ m^3/day}$$

Using the above rationale yields an ADD of 15.4 $m^3$/day and is therefore within 12% of the previously calculated ADD of 17.3 $m^3$/day. To be conservative, the **ADD of 17.3 $m^3$/day, the MDD of 34.6 $m^3$/day, and the Peak Water Demand of 3.0 L/s** are considered reasonable and should be used in the design of the potable water treatment system.

# Appendix E

Water Influent Quality Memo

# MEMORANDUM

**To:** Colin Boog
**From:** Erik Groenenberg
**Date:** August 19, 2022
**RE:** **Tenas Project Wastewater Influent Quality**

## Background

The Tenas Project Mine site will contain an administration building which requires a wastewater treatment system. In order to design a sufficient treatment system, the flow and strength of the wastewater must be known. Wastewater flow has already been determined in a February 26, 2021 Memo titled "Telkwa Coal Potable Water System ADD, MDD, and Peak Water Demand Calculations". This memo deals with the estimated strength of the wastewater.

## Serviced Building

The wastewater system will only serve the building, and not any other mine site facilities. The administration building will be comprised of a lunchroom, showers, bathrooms, a first aid room, a 764 sq. m office space, laundry facilities, storage lockers, change space, and other basic amenities. Approximately 100 personnel will be on the Tenas Mine site at any one time.

## Influent Strength Calculations

The Standard Practice Manual v3 (SPMv3) has guidelines for non-residential flow and biological oxygen demand (BOD) depending on the type of facility or fixture (Table III-11). The facility closest in description to the administration building was determined to be the "Office/factory without cafeteria and with showers", which calculations are shown for below.

| | Office/factory without cafeteria and with showers |
|---|---|
| Units | 100 |
| Average Flow (L/day/unit) | 125 |
| **Flow (L/day)** | **12,500** |
| Average day BOD (g/day/unit) | 35 |
| BOD (g/day) | 3,500 |
| **BOD (mg/L)** | **280** |

Our understanding is that the only amenity difference between this SPM facility and the planned administration building is the presence of laundry facilities, and possibly dishwashers. SPMv3 also gives flow and BOD for individual fixtures, so calculations were done for those in order to check that the BOD above is reasonable.

| Fixture | SPM Flow (l/d/unit) | SPM BOD (g/d/unit) | SPM Unit | Quantity | Flow (L/d) | BOD (g/d) | BOD (mg/L) |
|---|---|---|---|---|---|---|---|
| Shower | 40 | 6 | Use | 100 persons x 1 shower/day/person | 3,200 | 480 | 150 |
| Faucet / Sink | None | None | | | ? | ? | ? |
| Toilet or Urinal | 5 | 2 | Use | 100 persons x 3 flushes/day/person | 1,200 | 360 | 300 |
| Dishwasher | None | None | | 2 machines | ? | ? | ? |
| Clothes washer | 2,400 | 530 | machine | 4 machines | 9,600 | 2,120 | 221 |
| | | | | **Totals:** | **14,000** | 2,960 | **211** |

SPMv3 does not have data on faucet or dishwasher flow or BOD listed, so they are not included. Faucets are estimated to have diluting effect on the BOD, and dishwashers were determined to be only 0.3% of the daily flow in our water demand memo, so should not substantially increase BOD.

The clothes washer BOD is lower than the 280 mg/L for our chosen SPM facility, so the presence of laundry machines is unlikely to increase BOD concentration.

Both flows calculated here are lower than in our water demand memo, as a different method was used there, however the BOD concentrations established here are conservative and should be used for design purposes.

## Conclusion

Wastewater influent strength can be estimated at 280 mg/L for the purposes of calculating wastewater treatment requirements.

Reviewed by:

Bob Radloff, P.Eng.

Prepared by:

Erik Groenenberg, EIT

# APPENDIX 8: TENAS PROJECT, HYDROGEOLOGY TECHNICAL REPORT, SRK

TELKWA COAL
LIMITED

# Tenas Project, Hydrogeology Technical Report

**Prepared for**

Telkwa Mining Ltd

**Prepared by**

srk consulting

SRK Consulting (Canada) Inc.
CAPR002055
October 2024

# Tenas Project, Hydrogeology Technical Report

October 2024


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File Name: Telkwa_HydrogeolTechnicalReport_CAPR002055_20241021.docx



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# Executive Summary

Telkwa Mining Ltd (TML) is proposing to develop the Tenas Project (the Project), a surface coal mine designed to produce metallurgical coal. The proposed mine site is in northwestern British Columbia (BC), approximately 25 kilometres south of Smithers and seven kilometres southwest of Telkwa, within the Wet'suwet'en Nation's traditional territory. This report presents the results of a groundwater study prepared by SRK Consulting (Canada) Inc. (SRK) on behalf of TML in support of a Joint Application for a Mines Act permit, and an effluent discharge permit. The objectives were to establish baseline conditions and to quantify the potential changes to the groundwater system that could occur because of the Project.

**Project Background**

The climate and hydrological conditions were characterized by SRK (2020). The average total precipitation between 2018 and 2019 was 587 mm/y, with snow comprising 71% and 31% in 2018 and 2019, respectively. The streamflow regime is nival (snowmelt) with the majority of runoff (MAR 367 mm/year) occurring in the spring and early summer.

The deposit is hosted in a coal-bearing sedimentary rock sequence, associated with the Lower Cretaceous age Skeena Group (marine and continental sediments interbedded with coal seams), and overlies unconformably the Jurassic-age Hazelton volcanic group (andesite, trachyte, and basalt with associated tuffs and breccias). The sedimentary sequence in the open pit area is folded into a syncline. Faulting is generally near-vertical, and can be subdivided into two main groups, one which strikes approximately northwest/southeast, and the other northeast/southwest.

The surficial geology consists of glacial clay- silt-rich till, and glaciofluvial sand-gravel-rich till. South of the proposed open pit, the bedrock outcrops are close to ground surface; North of the proposed open pit and towards Tenas Creek and Goathorn Creek, the till deepens and exceed 100 m. Other deposits are present locally; patches of glaciolacustrine deposits scattered throughout the morainal landscape in low ridges and depressions; and fluvial deposits found in the narrow-incised floodplains of Goathorn and Tenas Creek, and the wide floodplains of the Telkwa and Bulkley River.

The estimated total area disturbed by the Project is 840 ha, including the open pit (289 ha), the coal processing plant (10 ha), material storage facilities (137 ha), sediment ponds (40 ha), and management ponds (227 ha). The Projected mine life is approximately 25 years, including construction, operations, and reclamation phases.

In terms of materials at the Project Site, TML identified several types of material that will need to be managed. Surface Soils (i.e., top organic soil,) will be salvaged and stockpiled for future reclamation requirements. The overburden will be placed into the compaction zones and/or buttress components of the dams for the management and control ponds, or otherwise placed as backfill within the open pit. The low sulfur rock will be placed within the buttress region of the dams for the management ponds, or otherwise backfilled within the open pit. The high sulfur and processed rocks will be placed into external flooded management ponds or within flooded portions of the open pit.

In terms of water management, the facilities will include ditches, sedimentation ponds, control ponds, and management ponds. Three storage management ponds will collect the groundwater and surface water pumped from the open pit during operation. These ponds are designed for underwater permanent storage of potentially acid generating material. A fourth pond(Tenas Control Pond) will collect surface runoff from the mine infrastructure and overflows from the management ponds. This pond is designed to ensure that no water discharge occurs during operations between October 31 and March 31 period and to control the sedimentation for the overall site. It also provides contingency water to ensure PAG material is submerged, and a location for water displaced during management pond operations. All the ponds will be lined with the management ponds lined with an engineered soil-bentonite compacted layer, and the Tenas Control Pond with a bituminous geomembrane or equivalent.

Make-up water for the Coal Processing Plant and make-up water for the mine infrastructure complex will be sourced from precipitation and melting snow collected onsite. Potable water for domestic facilities will be sourced from surface runoff and/or groundwater. A potable water treatment plant will be onsite to ensure that drinking water standards are met. Another 1.5 million $m^3$/year of make-up water is assumed for additional contingency and robustness to the water balance. This water would be sourced from Goathorn Creek (i.e., approx. 2.5% of Goathorn's Creek and less than 1% of the Telkwa River's annual flow respectively) via water supply wells located along the edge of Goathorn Creek.

**Groundwater Baseline Studies**

To assess the potential effects of the Project to groundwater, two spatial boundaries were considered: The Local Study Area (LSA) and the Regional Study Area (RSA). The LSA was defined where the Project may have a direct influence on the groundwater system and/or groundwater users, and the RSA by the fish habitat present in the Telkwa River watershed and in the tributaries to the Bulkley River. The time-steps considered for the evaluation included 2020 (construction), 2023 (End-of-Year 1, End of North Management Pond), 2029 (End-of-Year 7, End of East Management Pond), End of Mining, and post-closure (post-2043).

SRK consulted the BC regulations and guidelines relevant to groundwater and reviewed the Project desktop information and the groundwater site data collected between 1983 and 2016. The level of details, methods, and quality of the information were considered adequate for a Joint Application for a Mines Act permit, and for an effluent discharge permit.

**Groundwater Baseline Data**

The bedrock is characterized by a low to moderate hydraulic conductivity (i.e., K geomean of $2x10^{-7}$m/s). K geomean values sorted by lithological types, from the least permeable to the most permeable, are conglomerate ($2x10^{-8}$ m/s), mudstone/siltstone ($7x10^{-8}$ m/s), volcanic rock ($1x10^{-7}$ m/s), sandstone ($2x10^{-7}$ m/s), and coal ($5x10^{-7}$ m/s). For the overburden, K in the clay-silt-rich till is relatively low ($9x10^{-9}$ m/s), and in the sand-gravel-rich till moderately high ($1x10^{-6}$ m/s). There is no site measurement for specific storage or specific yield.

The groundwater in both systems flows towards the valleys, moving away from the Tenas open pit towards Tenas Creek, the Telkwa River, and Goathorn Creek. Static water levels are generally less than 2 mbgs (meters below ground surface) in the south Tenas Area, to more than 20 mbgs in the north, where overburden changes to a thick sequence of sand-gravel-rich till deposits. The overburden well showed water level highs in spring following freshet and lows in winter. The seasonal observations in bedrock wells were divided in two groups. One group showed seasonal variations like overburden, with highs in spring, lows in fall/winter, suggesting it has a connection with overburden. The other group showed highs in winter, lows in summer/fall, implying recharge is delayed by several months, potentially by the low permeability of the silt-clay-rich till.

The groundwater chemistry in overburden wells is classified as a calcium-magnesium-bicarbonate type; while groundwater in bedrock wells is sodium-bicarbonate type. The groundwater quality statistics, the exceedances, and the baseline average groundwater quality are presented in the report. Exceedances above the BC water quality guidelines for freshwater aquatic life (approved or working) were observed for fluoride, ammonia, total arsenic, total copper, total chromium, total and dissolved iron, total zinc, and selenium. The differences observed in historical wells over time, and the correlations between turbidity and total/dissolved metals concentrations suggest exceedances of total metals were likely caused by suspended particles generated by disturbances (i.e., drilling and well installation). Exceedances above the BC water quality guidelines for drinking water sources were observed for fluoride, and dissolved metals (i.e., arsenic, iron, cobalt, manganese, antimony, mercury, lead, and uranium – the last four parameters exceeded the guideline values only once).

The aquifer database of the ministry of Environment reports six aquifers of limited extent with low to moderate productivity, all located near the town of Telkwa, where the Telkwa River joins the Bulkley River, about 8 to 10 km northeast from the Project. The closest private wells, located along the expected flow paths between the Project and the Telkwa River, are about 3.8 km north of the Project. In terms of human activities, small-scale underground and surface mining occurred sporadically about 3.6 km north and northeast from the Project between 1918 and 1985; nowadays there are no significant human activities other than mining exploration and forestry.

**Conceptual Groundwater Model**

Conceptually, the groundwater system is divided into two sub-systems: deep bedrock and shallow overburden. The deep bedrock is composed of the Skeena sedimentary rock group, the volcanic group, fractures, and faults. At the scale of the Telkwa watershed, the fractured rock is assumed to act as an equivalent porous medium, a hydrogeological term that refers to a simplified representation of a heterogeneous aquifer as if it were a homogeneous material. In this approach, the complex variations in the properties of fractured rock are averaged out, treating it as a single, uniform medium with consistent properties. The hydrogeology of the bedrock is assumed to be represented as a single unit characterized by an anisotropy ratio perpendicular to sedimentary bedding planes (i.e. K parallel to beddings higher than K perpendicular to beddings). Data collected does not indicate influences from known faults (i.e., preferential flow pathways and/or barriers), and there is no mapped structure directly connecting the Project and the private well locations.

The lateral extent of bedrock is characterized by confined flow, relatively long residence times in the subsurface, and higher concentrations of dissolved solids. Groundwater levels indicate generally north-oriented flow lines, from upland areas to streams, namely the Telkwa River and its tributaries, Tenas Creek, and Goathorn Creek.

Shallow overburden is composed of two units: silt-clay–rich glacial till and glaciofluvial sand-gravel-rich till. Its hydraulic characteristics are controlled by the distribution of fine materials, with silt-clay-rich till acting as an aquitard, and impeding flow between the higher permeability sand-gravel-rich layers. The 3D geometries of the hydrostratigraphic units were generated from the analyses of drillhole intercepts (TML's database), geological maps (surface and bedrock geology, regional and local maps, 2D cross sections; Clague 1984, MEMPR 1993, BCGS 2005, TML 2018), and considerations on the ability of a unit to convey groundwater.

The shallow overburden is characterized as a local unconfined system with relatively short residence times and low concentrations of dissolved solids. Groundwater flows in a north-easterly direction towards Four Creek and in a north-westerly direction towards Tenas Creek, moving from topographic highs to adjacent lows. Discharge from overburden is expected to occur in the valleys of Tenas, Four and Goathorn Creeks.

**Groundwater Effect Predictions**

Numerical groundwater modeling was completed to predict open pit inflows and evaluate the potential groundwater effects from the Project. This included potential changes to baseflows, and contributions/travel times of mine-affected groundwater to creeks and private wells. The calibrated achieved the best fit to field data, with a final Normalized Root Mean Square Error (NRMSE) of 3.2% for hydraulic heads and 3.6% for baseflows.

Modeling was based on pseudo steady-state conditions for both calibration and forward predictions. Model uncertainties were assessed through a sensitivity analysis. Details on the modeling assumptions, model designs, and calibration are included in the report.

The model may be classified as moderate complexity (Wels et al., 2012), defined as follows: "These (…) are based on a reasonable, though limited, dataset and having limited calibration. These models may be used to determine the potential range of change or to "bracket" potential effects that may occur due to a given stress." The model is based on a unique conceptualisation of the 3D geology; detailed characterization of aquitards or aquicludes are not well characterized; baseflows are estimated from historical stream flow records; the model was calibrated to steady state conditions, and the results have highest confidence in the vicinity of the mine area where there are relatively more data.

The key conclusions for EOM conditions were as follows:

- The open pit inflows ranged between 320 and 890 $m^3/d$. Under groundwater conditions alone, inflows of these magnitudes are typically managed with open pit sumps and do not require active dewatering systems.
- The seepage rate underneath the Tenas Control Pond was 140 $m^3/d$.
- The total seepage rate underneath the management ponds at end-of mine was 1,490 $m^3/d$.
- Neither the drawdown cone nor groundwater mound are predicted to reach private well locations.
  - The drawdown induced by dewatering extended up to a maximum of extent of 18 $km^2$.
  - The management ponds and the control pond influence the progression of the drawdown to the north; in this area the model predicted a groundwater mound of about 14 $km^2$.
  - Sensitivity analysis evaluated the worst-case drawdown extents (i.e., open pit fully excavated, dewatering active, but no ponds). The predicted drawdown extended to a surface of approximately 34 $km^2$ but did not reach private well locations.
- The maximum reductions in baseflows are expected to occur before the construction and completion of the management ponds. Predicted reductions to the entire creeks are approximately 6% for Tenas Creek, 5% for Four Creek, and 2% for both Goathorn Creek and the Telkwa River.
- The first particle of mine-affected groundwater was predicted to discharge into Tenas Creek after 16 years. No particles were predicted to discharge in the first 25 years into Four Creek, Goathorn Creek, Telkwa River, or near private wells.
- The forecasts of potential contributions of mine affected groundwater to baseflows, after 25 years of operations, were 0.8% for Tenas Creek, less than 0.3% for Goathorn Creek, and less than 0.2% for the Telkwa River. The model predicted no contribution to Four Creek.

The key conclusions based on the modeling of post-closure conditions were as follows:

- The seepage rate (i.e., outflow) underneath the saturated mine rock and open pit lake was 10 $m^3/d$; these features predominantly act as a sink, with an inflow of 380 $m^3/d$.
- The total seepage rate underneath the management ponds was 1,480 $m^3/d$ at the end of mining.
- The long-term drawdown induced by the Project is projected to extend up to a maximum of 15 $km^2$ and the mound to about 13 $km^2$. Neither the drawdown nor mounding is predicted to reach the private wells.
- Modeling suggests that baseflows to the entire creeks will either remain unchanged or slightly increase due to the influence of the management ponds on groundwater levels, with a 3% increase at Tenas Creek, 4% at Four Creek, 2% at the Goathorn Creek, and 1% at the Telkwa River.

- In terms of effect to private groundwater users, the model predicted particles would travel for more than 400 years before reaching the private wells.
- The predicted long-term contributions of mine affected groundwater to baseflows were less than 9.3% for Tenas Creek, less than 4.6% for Goathorn Creek, and less than 0.8% for the Telkwa River.
- The average time for a particle to reach the creeks was predicted to be 65 years for Tenas creek, 320 years for Goathorn Creek, and over 400 years for the Telkwa River.
  - The WBLM assumed conservatively that 100% of the potential waste and water management pond loads discharged into creeks via groundwater paths after 25 years.
- Three private wells (Goalder, Mapletoft, and Baker) located in the Telkwa River valley are potentially within the path of mine affected groundwater. No constituent is predicted to exceed the BC-DWG. The processes of diffusion, dispersion, or natural attenuation and the predicted travel times (i.e., > 400 years) between the Project and the Telkwa alluvial floodplain were not considered in the analysis. These are expected to reduce constituent levels below what has been modelled.
- The sensitivity analysis showed that the model was most sensitive to recharge and the hydraulic conductivity of the tills and Skeena group units. The parameters impacted the predictions as follow:
  - The highest sensitivity open pit inflow was 1,550 $m^3/d$.
  - None of the sensitivity models predicted drawdown or mounding to reach the private wells.
  - The maximum sensitivity reduction to baseflows was about 14% for the Tenas Creek, and 3% for the Goathorn Creek.
  - The travel time in all sensitivity runs to private wells was more than 170 years.
  - The maximum sensitivity contribution of mine affected groundwater to baseflows was 11% in Tenas Creek, and 1% in the Goathorn Creek.

The modeling presented herein provides forecasts of the expected Project behavior, derived from the available hydrogeological information. Upgrades to the model should be considered as additional information becomes available. Additional modeling should be completed if there are changes to the design basis or if any new information alters the parameters used in the modeling.

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# Appendices

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Appendix C – Groundwater Levels Measurements

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Appendix E - Liner Seepage Assessment and Preliminary Cost Estimate for Tenas Management Ponds

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Appendix G - Model Calibration

Appendix H – Analysis of the Potential Groundwater Quality at Post-closure in the Private Wells Area

# List of Abbreviations

| | |
|---|---|
| ° | Degree |
| °C | Degree Celsius |
| 3D | Three dimensional |
| ARD | Acid Rock Drainage |
| BC | British Columbia |
| BDR | Bedrock |
| CPP | Coal preparation plant |
| CUB | Calibrated unit baseflow |
| d | Day |
| DEM | Digital Elevation Model |
| DWS | Drinking water sources |
| EA | Environmental Assessment |
| EMP | East management pond |
| EOM | End-of-mine |
| EoY | End-of-year |
| FAL | Freshwater aquatic life |
| Ha | Hectare |
| K | Hydraulic conductivity |
| km | Kilometer |
| $km^2$ | Kilometer square |
| kV | Kilovolt |
| LIDAR | Light detection and ranging |
| LSA | Local study area |
| L/s | Litre per second |
| m | Meter |
| $m^2$ | meter square |
| $m^3$/day | meter cube per day |
| m/s | meter per second |
| MAP | Mean annual precipitation |
| MAR | Mean annual runoff |
| masl | Meters above sea level |
| mbgs | Meters below ground surface |
| MEMPR | Ministry of Energy, Mines and Petroleum Resources |
| mg/l | milligram per litre |
| ML/ARD | Metal leaching / acid rock drainage |
| mm/yr | Millimetre per year |
| Mt | Million tons |
| MW | Monitoring well |
| Non-PAG | Non-Potentially acid generating |
| NMP | North management pond |
| NRMSE | Normalized root mean square error |
| NTU | Nephelometric turbidity unit |
| OVB | Overburden |
| PAG | Potentially Acid-Generating |
| Project | Tenas Project |
| PSD | Particle size distribution |
| QA | Quality assurance |
| QC | Quality control |
| R | Recharge |
| ROM | Run-of-mine |
| RPD | Relative Percent Difference |
| RSA | Regional study area |
| s | Second |
| SRK | SRK Consulting (Canada) Inc. |
| $S_s$ | Specific storage |
| $S_y$ | Specific yield |
| TML | Telkwa Mining Ltd |
| TDS | Total dissolved solids |
| TSS | Total suspended solids |
| WBLM | Water balance and load model |
| WMP | West management pond |
| WQG | Water quality guidelines |
| WSC | Water survey of Canada |

# 1 Introduction

Telkwa Mining Ltd (TML) is proposing to develop the Tenas Coal Project (the Project), a surface coal mine designed to produce metallurgical coal at a planned annual production rate of between 775,000 and 825,000 tonnes. The mine life of the Project will be approximately 25 years, including construction, operations, decommissioning, and reclamation phases.

This report presents the results of hydrogeological studies in support of a Joint Application for a Mines Act permit issued by the Ministry of Energy, Mines and Petroleum Resources, and an effluent discharge permit issued under the Environmental Management Act by the Ministry of Environment. It was prepared by SRK Consulting (Canada) Inc. (SRK), on behalf of TML.

## 1.1 Objectives

The objectives of the work presented here are to establish the baseline groundwater conditions and to quantify the potential changes to the groundwater system that could occur because of the Project. The baseline information was used to construct and calibrate a three-dimensional (3D) numerical model, which was then utilized to predict the Project's potential effect on groundwater during mining and long-term closure (post-closure) phases, and to inform the waste and water management system designs (Part A, Section 1 of the EAC Application) and the surface water and load balance model (WBLM, Section 4, Chapter 3 of the EAC Application). The WBLM was used to evaluate the overall effects of the Project on the hydrology and surface water quality at both local and regional scales.

## 1.2 Report Layout

The report is organized as follows:

- Section 2 presents background information relevant to hydrogeological studies.
- Section 3 defines the groundwater assessment boundaries, and presents the regulatory guidelines relevant to the study, the sources of desktop and field information, and the methodologies for the field data collection, data management, and QA/QC methods.
- Section 4 reviews the hydrogeological data supporting the characterization of the groundwater flow system and groundwater quality.
- Section 5 presents the groundwater conceptual model of the Project area for baseline, mining, and post-closure conditions.
- Section 6 describes a numerical groundwater modelling assessment and presents the predictions of the potential changes to the groundwater system.
- Section 7 presents the conclusions of the study.

# 2 Project Background

## 2.1 Location

The proposed mine site is in the Regional District of Bulkley-Nechako in northwestern British Columbia (BC), approximately 25 kilometres south of Smithers and seven kilometres southwest of Telkwa, within the Wet'suwet'en Nation's traditional territory, which includes the majority of the Bulkley River drainage. The Telkwa River, the Tenas Creek and the Goathorn Creek run through the coalfield, dissecting it into three coal exploration areas known locally as Tenas, Goathorn, and North. The proposed open pit and the waste and water management facilities are in the Tenas Area, approximately 54°36'48" north latitude and 127°09'32" west longitude. Figure 1 and Figure 2 shows the Project locations.

## 2.2 Topography

The Project is located within the Coast Mountains (Bulkley Ranges) of the Cordillera Region. The Project is centered on a remnant glacial terrace; upland areas are characterized by moderate to steeply incised valleys separated by moderately undulating terrain; and lowland areas are characterized by relatively flat to moderately rolling topography.

## 2.3 Climate

The climate conditions were characterized in the Hydrometeorological Baseline and Model Development Report (SRK 2020). Observations for years 2017, 2018, and 2019 are compiled in Table 2-1 and shown in Figure 3. The average total precipitation was 587 mm/y between 2018 and 2019, with snow comprising 71% and 31% in 2018 and 2019, respectively.

**Table 2-1: Mean and Annual Precipitation, and Temperature at the Telkwa Project**

| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | Total Precipitation [mm] | | | | | | | | | | 147 | 134 | 10 | - |
| | Rainfall [mm] | | | | | | | | | | 114 | 0 | 0 | - |
| | Snowfall [mm SWE] | | | | | | | | | | 33 | 134 | 10 | - |
| | Average Snow Depth [cm] | | | | | | | | | | 4 | 28 | 47 | - |
| | Mean temperature [°C] | | | | | | | | | | 1.9 | -5.6 | -8.9 | - |
| 2018 | Total Precipitation [mm] | 50 | 150 | 81 | 14 | 14 | 42 | 50 | 2 | 50 | 54 | 51 | 113 | 672 |
| | Rainfall [mm] | 0 | 0 | 1 | 3 | 14 | 42 | 50 | 2 | 30 | 42 | 9 | 0 | 195 |
| | Snowfall [mm SWE] | 50 | 150 | 80 | 10 | 0 | 0 | 0 | 0 | 20 | 11 | 42 | 113 | 477 |
| | Average Snow Depth [cm] | 63 | 101 | 119 | 110 | 12 | 0 | 0 | 0 | 1 | 0 | 9 | 38 | - |
| | Mean temperature [°C] | -7.6 | -9.8 | -3.3 | 1.1 | 9.4 | 10.6 | 15.5 | 15.3 | 5.9 | 3.0 | -1.0 | -6.1 | - |
| 2019 | Total Precipitation [mm] | 60 | 19 | 8 | 13 | 26 | 57 | 83 | 21 | 47 | 93 | 73 | 2 | 502 |
| | Rainfall [mm] | 5 | 0 | 0 | 7 | 26 | 57 | 83 | 21 | 46.5 | 69 | 32 | 0 | 346 |
| | Snowfall [mm SWE] | 55 | 19 | 8 | 6 | 0 | 0 | 0 | 0 | 0.5 | 24 | 41 | 2 | 156 |
| | Average Snow Depth [cm] | 66 | 75 | 74 | 32 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 14 | - |
| | Mean temperature [°C] | -3.8 | -12.7 | -1.3 | 2.4 | 10.5 | 10.9 | 12.9 | 12.9 | 8.2 | 0.7 | -1.9 | -7.9 | - |

Source: SRK report Oct 2020: Tenas Project – Hydrometeorological Baseline and Model Development Report.

**Note**:

Na, not available

## 2.4 Hydrology

The main drainages in the Project area are the Bulkley River, the Telkwa River, Goathorn Creek, Tenas Creek, Cabinet Creek, and Four Creek. Figure 4 shows a map of the drainages, surface water monitoring stations, and watershed boundaries. Table 2-2 provides a short description of the main drainages.

The streamflow regime in the Project area is nival (snowmelt) with the majority of runoff (MAR 367 mm/year) occurring in the spring and early summer due to the melting winter snowpack. After the snowmelt-driven high flow, there is typically a period of low flow throughout the late summer and early fall, although high intensity rain during the fall period can produce substantial peak events. Annual low flows occur during the winter when the air temperatures remain below freezing; precipitations fall as snow and are stored in the snowpack. During the winter low flow period, the streams are mostly supplied by groundwater discharge; some streams in the region have glacial inputs but this is less prominent in the Project area.

**Table 2-2: Description of the Main Rivers and Creeks**

| River/Creek Name | Description |
|---|---|
| Bulkley River | The Bulkley River is a tributary of the Skeena River. It originates southeast of the project and flows in a north-south trending valley approximately 6 km east of the Project area. Discharge into the Skeena is approximately 100 km downstream from its confluence with the Telkwa River. The size of the watershed is about 12,400 km$^2$. The Bulkley River is a known fish-bearing stream. |
| Telkwa River | The Telkwa River is a substantial tributary to the Bulkley River. It originates west of the Project and flows east, discharging into the Bulkley River approximately 6 km east of the confluence with Goathorn Creek. The size of the watershed is about 830 km$^2$. The Telkwa River is a known fish-bearing stream. |
| Goathorn Creek | Goathorn Creek is a tributary to the Telkwa River. It is a moderately wide and extensively braided creek, with a floodplain approximately 20 to 100 m wide. It flows north along the east side of the Project then discharges into the Telkwa River approximately 8 km downstream of the proposed open pit. The size of the watershed is about 130 km$^2$. The Goathorn Creek is a known fish-bearing stream. |
| Tenas Creek | Tenas Creek is a tributary to Goathorn Creek. It is a small watercourse that flows north and northwest, along the northwest side of the Project, then discharges into Goathorn Creek approximately 8 km downstream of the proposed open pit. The size of the watershed is about 60 km$^2$. The Tenas Creek is a known fish-bearing stream. |
| Cabinet Creek | Cabinet Creek is a small tributary to Goathorn Creek. It is a small watercourse that flows north of the Project, then discharges into Goathorn Creek approximately 6 km east of the proposed open pit. The size of the watershed is about 54 km$^2$ |
| Four Creek | Four Creek is a small tributary to Goathorn Creek. It drains northeast, bordering the Project to the east before discharging into Goathorn Creek in the immediate vicinity of the Project. The size of the watershed is about 14 km$^2$ |

Baseflow is defined as the groundwater discharges into surface streams (i.e., water seeping into the creeks and rivers from groundwater). The rate at which groundwater discharges into surface streams was characterized based on the historical data recorded at the WSC Goathorn station using a recursive digital filter to separate baseflow from surface runoff (SRK 2020). A single filter parameter, typically ranging from 0.90 to 0.99, is used to separate total streamflow into a baseflow and surface runoff component (Nathan and McMahon 1990). The filter parameter was selected based on parsing flow records from 2000 to 2019. A filter parameter of 0.99 was found to best fit the data after three passes (n=3). The unit baseflows and monthly baseflows estimated are provided Table 2-3 and plotted in Figure 5.

**Table 2-3: Estimated average unit and monthly baseflows**

| Month | Unit Baseflow (L/s/km$^2$) | Baseflows (L/s) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Cabinet Ck at Goathorn (54 km$^2$) | Four Ck at Goathorn (14.2 km$^2$) | Goathorn Ck at Cabinet (50.3 km$^2$) | Goathorn Ck at Four (116.7 km$^2$) | Goathorn Ck at 08EE008 (133.5 km$^2$) | Tenas Ck at Goathorn (58.6 km$^2$) |
| Jan | 2.03 | 109.9 | 28.7 | 102.2 | 237 | 271 | 119 |
| Feb | 1.96 | 106 | 27.7 | 98.6 | 228.6 | 261 | 114.8 |
| Mar | 1.93 | 104.3 | 27.3 | 97.1 | 225 | 257 | 113 |
| Apr | 1.98 | 106.9 | 28 | 99.5 | 230.6 | 264 | 115.8 |
| May | 2.60 | 140.5 | 36.7 | 130.7 | 303 | 347 | 152.1 |
| Jun | 4.05 | 219.1 | 57.3 | 203.9 | 472.7 | 541 | 237.3 |
| Jul | 4.91 | 265.5 | 69.4 | 247 | 572.7 | 655 | 287.5 |
| Aug | 4.49 | 243.2 | 63.6 | 226.2 | 524.5 | 600 | 263.4 |
| Sep | 3.76 | 203.3 | 53.2 | 189.1 | 438.5 | 502 | 220.2 |
| Oct | 3.17 | 171.7 | 44.9 | 159.7 | 370.3 | 424 | 185.9 |
| Nov | 2.51 | 135.8 | 35.5 | 126.3 | 292.9 | 335 | 147.1 |
| Dec | 2.09 | 113 | 29.5 | 105.1 | 243.6 | 279 | 122.3 |

Source: SRK report Oct 2020: Tenas Project – Hydrometeorological Baseline and Model Development Report.

**Note**:

Calibrated Unit Baseflow (CUB) = 1.81 L/s/km$^2$

## 2.5 Bedrock Geology

The project is located within the northeast/southwest trending Skeena Arch, which separates Jurassic-age sedimentary rocks of the Bowser Basin in the north from the Jurassic to Cretaceous-age sedimentary rocks of the Nechako Basin to the south. The coal-bearing sedimentary rock sequence is associated with the Lower Cretaceous age Skeena Group and overlies unconformably the Jurassic-age Hazelton volcanic group. Figure 6 presents a simplified stratigraphic column of the Tenas, Goathorn, and North regions.

Figure 7 shows the geological map of the Telkwa Coal field based on the MEMPR geological map (B.D. Ryan, 1993-21) and modified by TML (2018), and Figure 8 three cross-sections associated with the MEMPR geological map. Figure 9 presents the local geological map of the Tenas Area from TML, and Figure 10 to 13 four cross sections associated with the local geology map.

### 2.5.1 Jurassic Hazelton Volcanic Group

The volcanic rocks (i.e., Figure 7: Telkwa formation - volcanic rocks) include andesite, trachyte, and basalt with associated tuffs and breccias. Figure 14 shows samples of the volcanic rock collected from a diamond core drilling rig in the Tenas Area.

### 2.5.2 Lower Cretaceous Skeena Group

The Lower Cretaceous Skeena Group includes marine and continental sediments interbedded with coal seams, often correlated over long lateral distances. It is subdivided into four units (Units I through IV) and a unit of undivided sediments overlying the four units (Figure 6). The economic coal seams in the Tenas Area (coal zone 1, Lower and Upper) are located within Unit I; Unit III is absent from the Tenas Area but present in the Goathorn and North areas.

- Unit I consist of more than 100 m of fine to coarse-grained cross-bedded sandstone, conglomerate, siltstone, mudstone and coal (coal zone 1). Overall, Unit I fines upward, from primarily conglomerate and sandstone to almost entirely carbonaceous mudstone, seatearth and coal (1A to 1G). The conglomerate and sandstone were deposited in braided channels and bars, and mudstone accumulated in floodplains. Thin coal seams formed in poorly drained, peat-forming backswamps, and seatearths formed under leaching conditions in less submerged areas. With denudation of the volcanic source area, braid plains were abandoned and extensive low-energy, peat-forming swamps were established, resulting in the formation of thick coal seams in the upper part of the Unit.
- Unit II separates coal zone 1 and coal zone 2. It consists of up to 140 m of primarily of a monotonous silty mudstone, occasionally interbedded with beds of chert-rich, micaceous, bioturbated or cross-bedded sandstone. The sediments were deposited in a deltaic/shallow marine environment following a regional marine transgression. The mudstone accumulated in bays, and the sandstones in distributary channels and mouthbars. Locally, thin discontinuous peat beds formed in salt marshes.
- Unit III comprises about 90 m of chert-rich, micaceous sandstone, siltstone and mudstone, and up to nine coal zones (coal zones 2 through 10). The sandstone and mudstone were deposited and biogenically reworked in a tidal flat environment; siltstone accumulated in a restricted, nearshore marine environment. Peat accumulated in freshwater coastal marshes which periodically prograded over tidal flats.
- Unit IV consists of approximately 150 m of a laterally extensive, bright green, chert-rich, chloritic sandstone or siltstone bed at the base, overlain by massive grey silty mudstone like that of Unit II. The basal sandstone is a transgressive lag deposit, and silty mudstone, the predominant lithofacies, was deposited in a quiet, nearshore, shallow marine environment.

Figure 15 shows samples of the Skeena Group sediment rocks collected from a diamond core drilling rig in the Tenas Area.

### 2.5.3 Intrusions

Tertiary and Cretaceous-age porphyritic dykes and sills (i.e., Figure 7: Bulkley plutonic suite – intrusive rocks) are present, the most notable of which includes a large Tertiary granodiorite plug located on the north side of the Telkwa River.

### 2.5.4 Geological Structures

Figure 7 and Figure 9 show the geological structures at the scale of the Telkwa Coal Field and Tenas Area respectively.

The sedimentary sequence in the Tenas Area is folded into an upright syncline in which the gently (typically 10 to 20°) northeast-dipping western limb of the syncline subcrops on the western side of the open pit area, while the moderately (40 to 45°) southwest-dipping eastern limb subcrops on the eastern side of the open pit. Faulting is generally near-vertical, and can be subdivided into two main groups, one which strikes approximately northwest/southeast and the other northeast/southwest. A few east/west striking faults have also been interpreted.

The Goathorn area is located within an outlier of the Lower Cretaceous Skeena Group. The structural geology is somewhat more complex than the Tenas Area and is characterized by a complex series of sub-parallel north-south trending reverse faults, and to a lesser extent east-west, trending normal faults.

Northeast striking faults are related to emplacement of the Bulkley intrusions in the Late Cretaceous.

## 2.6 Surficial Geology

The surficial geology consists primarily of glacial clay- silt-rich till, and glaciofluvial sand-gravel-rich till (Figure 16). The 2018 and 2019 drilling investigations showed the till was generally a sandy lean clay with gravel. The clay-silt-rich till typically contained silt and fine sand with some gravel, was commonly very-stiff to hard in consistency with low to medium plasticity, and well graded. Sand, silt and gravel lenses were commonly encountered within the till at depth across the north of the project site. The sand-gravel rich till was dense to very dense as assessed by standard penetration testing during the sonic drilling. Figure 17 shows typical samples of overburden collected with a diamond core or a sonic core drilling rig, and Figure 18 shows particle distribution curves (PSD) of samples classified as clay-silt-rich tills, and sand-gravel-rich tills. At upper elevations and south of the proposed open pit, the bedrock outcrops are close to ground surface, with mantles of clay-silt-rich tills between 3 m and 10 m thick. North of the proposed open pit and towards Tenas Creek and Goathorn Creek, drillholes report thin mantles of clay- silt-rich tills deposits, between 3 m and 10 m thick, underlain by a thick sand-gravel-rich till that can exceed 100 m.

Other deposits are present locally. Patches of glaciolacustrine deposits are scattered throughout the morainal landscape in low ridges and in depressions, comprising bedded and laminated mud, and minor sand and gravel (Clague 1984). Recent fluvial deposits are present in the narrow floodplains of Goathorn Creek and Tenas Creek, which are 40 m to 80 m deep incised into the

subdued morainal landscape, and the wide floodplains of the two-wandering gravel-bed rivers, the Telkwa River and the Bulkley River. The fluvial deposits range from extremely coarse, poorly sorted gravel on steep alluvial fans to moderately to well-sorted sand and mud on low-gradient floodplains (Clague 1984).

## 2.7 Project Description

The following description consists of an overview of the proposed mine components, adapted from Section 1 of the main EA document.

### 2.7.1 Mine Plan

The Project configuration is shown on Figure 19. It will consist of a conventional shovel and truck coal extraction operation, like other rock quarry and surface mine operations in the region. The estimated total area disturbed by the Project is 840 ha, including the open pit (289 ha), the coal processing plant (10 ha), material storage facilities (137 ha), sediment ponds (40 ha), and management ponds (227 ha).

The Project will include the following major components:

- Open pit.
- Coal Processing Plant (CPP).
- Coal handling systems for run-of-mine (ROM) coal, processed rock, and processed coal (including plant conveyors, storage bins, and stockpiles).
- Storage piles and stockpiles for rock (non-PAG), overburden, growth media, and processed coal.
- Three management ponds for storage of potentially acid generating (PAG) rock: the North (NMP), the East (EMP), and the West Management Ponds (WMP).
- One control pond.
- Four sedimentation ponds: The Plant Sedimentation Pond, Rail Infrastructure Sedimentation Pond, Explosives Site Sedimentation Pond, and Explosives Magazine Sedimentation Pond.
- Surface water ditches.
- Water supply wells, storage, and distribution network.
- Fuel and lubricant storage facilities and distribution network.
- Explosive’s magazine, storage silos, and vehicle wash and maintenance facilities.
- Propane storage facilities and distribution network (no longer required).
- Solid waste management systems including landfill, recycling and composting facilities.

- Administration, first aid, maintenance/warehouse, mine dry, laboratory, light vehicle, mine rescue, and warehouse buildings.
- Haul roads and access roads within the minesite.
- Tenas Access Corridor which encompasses a 11 km newly constructed Bypass Road and improvements to approximately 5.0 km of an existing forestry service road.
- A 3.5 km long 25 kV powerline and a 25 to 600 kV substation adjacent to the CPP.
- A rail infrastructure consisting of processed coal stockpiles, scales, dust control facilities and a 2.5 km rail loop connected to the Canadian National Railway track.
- A permanent bridge over Goathorn Creek.

### 2.7.2 Material Management

TML has identified several types of material associated with coal extraction that will need to be managed:

- **Surface Soils (topsoil) (Non-PAG)** is the top 0.20 to 0.50 m of material and contains the bulk of organic material and material acceptable for the growth of vegetation. There is approximately 1.75 million $m^3$ of this material. This material will be stockpiled in designated locations for reclamation activities or direct placed on areas available for growth media placement.
- **Overburden (Non-PAG)** is the non-rock material between growth media material unit and the rock unit that consists of primarily till material with almost no organic material. There is approximately 24 million $m^3$ of this material. This material will be placed into the critical compaction zones and/or buttress components of the dams required for the management ponds, otherwise it will be placed as backfill within the open pit.
- **Low sulfur rock (Non-PAG)** is the rock present in the Project's open pit area that has sulfur levels with little potential to cause ARD. This material is also known as non-acid-generating (Non-PAG) rock. There is approximately 29 million $m^3$ of this material. This material will be placed within the buttress region of the dams for the management ponds otherwise it will be backfilled within the open pit.
- **High sulfur rock (PAG)** is the rock present in the Project's open pit area that has sulfur levels that are elevated and will have the potential to cause ARD. This material is also known as PAG rock. There is approximately 31 million $m^3$ of this material. All PAG material will be placed into external flooded management ponds or within flooded portions of the open pit.
- **Processed rock (PAG)** is the rock produced during coal processing to produce a processed coal suitable for the marketplace that will be separated from the coal through gravity separation methods, such as cyclones. This material is classified as PAG material. There is approximately 3.3 million $m^3$ of this material. All PAG material will be placed into external flooded management ponds or within flooded portions of the open pit.

- **Run-of-mine (ROM) coal (PAG)** is the coal that is recovered in the open pit from mining operations and then hauled to the CPP to be placed into one of two stockpiles. These stockpiles are expected to be constantly changing in response to open pit production sequence, marketing requirements, and plant production requirements. There is approximately 22.0 Mt of ROM coal recovered during the life of this Project.
- **Processed coal (PAG)** is the coal after it has been washed in the CPP removing unwanted rock from the coal so that it is suitable for the marketplace. Based on the work completed, there is approximately 16.0 Mt of processed coal.

### 2.7.3 Water Management

Surface water management features (i.e., ditches, sedimentation ponds, control ponds and management ponds) are illustrated in Figure 19.

Upslope diversion ditches will divert non-contact water away from the material storage piles and surface mine areas into existing natural watercourses. Downslope collection ditches will collect runoff from the material storage areas and divert it into sedimentation/control ponds for treatment with approved flocculants to reduce total suspended solid levels if required.

The management ponds (i.e., NMP, EMP, and WMP) will collect the groundwater and surface pumped from the open pit during operation. These ponds are designed for underwater long-term storage of potentially acid generating (PAG) material to limit its potential exposure to oxygen. The Tenas Control Pond will collect surface runoff from the mine infrastructure complex, run off from the management pond dams, contact water ditches, and overflows from the management ponds. It is designed to ensure that no water discharge will occur during operations between the October 31 and March 31 period and to control the sedimentation for the overall site. It provides contingency water to ensure PAG material is submerged, and a location for water displaced during management pond operations. The storage management ponds, EMP, NMP, and WMP will be lined with engineered soil-bentonite (S/B) compacted layers (i.e., 0.30 m thick), and the Tenas Control Pond with a bituminous geomembrane or equivalent. Only parts of the WMP will be lined: the portions outside the open pit (WMP Ex pit), and the portions inside the open pit (WMP In pit) that intercept overburden. The design details of the management ponds and control pond are documented in Part A, Section 1 of the EAC Application.

Water is required for CPP make-up water and for the mine infrastructure complex, i.e., heavy vehicle and explosive facility wash bays, workshop hoses, potable water requirements, and non-potable water requirements. Raw water is estimated at approximately 15,000 $m^3$ per month (180,000 $m^3$ per year) or about 20 $m^3/h$) and will be sourced from precipitation and melting snow collected onsite. Potable water for domestic facilities will be sourced from surface runoff and/or groundwater; a potable water treatment plant will be onsite to ensure that potable water standards are met.

Another 1.5 million $m^3$/year of make-up water is assumed for additional contingency and robustness to the water balance. This water would be sourced from Goathorn Creek (i.e., approx. 2.5% of Goathorn's Creek yearly flow and less than 1% of the Telkwa River's annual flow respectively) via water supply wells located along the edge of Goathorn Creek.

### 2.7.4 Project Phases and Scheduling

The Projected mine life is approximately 26.5 years, including approximately 1.5 years of construction, 21 years of operations, and 4 years of decommissioning and reclamation.

Major activities during construction will include site clearing, pre-stripping, building construction, road development, rail loop construction, bridge construction, and development of onsite utilities and services.

Mining operations are scheduled to commence in the north portion of the open pit to excavate overburden, and to construct the initial embankment structures for the Tenas Control Pond and the NMP. The Tenas Control Pond will be constructed first along with the Coal Processing Plant Sedimentation Pond, then the NMP will follow. Once the NMP reaches approximately 50% of its planned capacity, excavation of PAG rock will start to expose the first coal. Between 2023 and 2025 mining will continue west to produce overburden for the management ponds while for coal release, mining will move towards the south. In 2025 and continuing through to 2031 mining will start to construct the EMP and the initial phases of the open pit will be available for backfill. Mining will also continue working west producing overburden for the embankments associated with the management ponds. In 2032, mining will move to the far southern tip of the open pit and proceed towards the central area of the open pit through to the completion of mining in 2043.

Once mining is complete, decommissioning and reclamation activities will commence with the removal of all buildings and structures. Any material storage piles or open pit walls that have not been sloped will be sloped and have topsoil placed on them. Vegetation and monitoring activities will then complete the reclamation phase. Once water encountering the mine and flowing through the Tenas Control Pond meets acceptable turbidity values for several years, this structure will be allowed to drain, and a wetland will be established in the former bottom of this pond.

# 3 Groundwater Baseline Studies

This section summarizes important information for understanding how the baseline groundwater conditions were evaluated.

## 3.1 Spatial Boundaries

The spatial boundaries define the limits within which changes to the groundwater system will be evaluated. Two spatial boundaries were considered for the groundwater assessment: the Local Study Area (LSA) and the Regional Study Area (RSA).

The LSA is defined as where the Project may have a direct influence on the groundwater system and/or groundwater users. The area was delimited based on watersheds and to include the project footprint, and the private domestic wells located downgradient of the Project. The RSA is a larger area defined by the fish habitats in the Telkwa River watershed and in the tributaries to the Bulkley River crossed by the haul road; it is used to provide context for the assessment of potential Project effects and represents the cumulative effects assessment study area. The extent of the LSA and RSA are shown on Figure 20.

## 3.2 Temporal Boundaries

The temporal boundaries encompass the periods during which the Project is expected to have potential effects on the Hydrogeology. The relevant time-steps used for the assessment are presented in Table 3-1.

**Table 3-1: Temporal Boundaries for Hydrogeology**

| Phase | Project Year | Description of Activities |
|---|---|---|
| Construction | 2021 | Site clearing, pre-stripping, construction of the buildings, roads, rail loop, bridge, and onsite utilities and services |
| End-of-Year 1 (EoY1) | 2023 | Excavation of the open pit and development of material storage piles. Coal processing. Dewatering of the open pit. The Control Pond and NMP are constructed. |
| End-of-Year 7 (EoY7) | 2029 | Excavation of the open pit and development of material storage piles. Coal processing. Dewatering of the open pit. The Control Pond, NMP, and EMP are constructed. |
| End-of-Mine (EOM) | 2043 | The mine is fully excavated. Dewatering of the open pit. The Control Pond and all the management ponds are constructed, and water levels are at their maximum. |
| Post-closure | To be determined from monitoring | No activities. All infrastructures removed and reclaimed except the storage ponds. |

## 3.3 Regulations and Guidelines

The groundwater baseline studies for the Project were designed to meet the requirements of a Joint Application for *Mines Act and Environmental Management Act Permits* (BC MEM & BC MOE, 2016). Groundwater is a valued component of the biological and physical environment and is protected under the Groundwater Protection Regulation of the British Columbia (BC) *Water Sustainability Act* (2016).

The environmental guidelines listed below were consulted to help with the characterization of the groundwater baseline conditions and the assessment of potential Project influences on the groundwater system:

- *Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities*, prepared by BC MOE (2012).
- *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators,* prepared by the BC MOE (Version 2, 2016).
- *Draft Guidelines for the Preparation of an Environmental Impact Statement, December 2015*. Prepared by the Canadian Environmental Assessment Agency.

- Framework for a Hydrogeologic Study in support of an Application for an Environmental Assessment Certificate under the Environmental Assessment Act and Regulations (BC Ministry of Environment, Water Stewardship Division 2019).
- Information Sources
- SRK reviewed the information listed in the next two sections. The level of details, methods, and quality of the information were adequate for a Joint Application for a Mines Act permit, and for an effluent discharge permit.

### 3.3.1 Desktop Information

- TML 2018 drillhole database (dated 27 Nov. 2018)
- Technical reports from Klohn Leonoff Consulting Engineers (Klohn, 1985), Piteau Engineering Ltd (Piteau 1990, 1994, 1995, 1996a, 1996b, 1997a, 1997b, 1998), Stantec (Stantec 2016) and field and technical baseline memo/reports produced ERM (2017, 2020), Cassiar (2020ab), or SRK (2018, 2019) between 2018 and 2020.
- Groundwater baseline data – Hydrogeology and groundwater quality (ERM 2020).
- Digital Elevation Model (DEM) from a LIDAR survey conducted in August 2017 on behalf of TML.
- Geological publications and maps (Clague 1984, Plasgrove 1991, Massey 2005, BC Gov 2018).
- Digital maps and databases of aquifers, domestic and private wells, and water licences (BC Government 2018, BC MOE 2018abc).
- Monthly precipitation grids for Alaska, British Columbia, and Yukon (Stavros 2016).
- Raster grid of a global estimation of groundwater recharge (Jasechko 2014).

### 3.3.2 Field Investigations

Baseline studies were initiated between 1983 and 1998 by the former owners of the Project property, Crowsnest Resources and Manalta Coal Ltd. TML continued and expanded on these studies since 2016, after acquiring the property. Table 3-2 lists all the field programs related to groundwater and Table 3-3 compiles a summary of the available groundwater field data.

**Table 3-2: List of the hydrogeological field investigation conducted for the project**

| Author | Date | Area | Description |
|---|---|---|---|
| Klohn Leonoff (1) | 1982-1984 | Open pit 3 (4) | Borehole drilling and installation of 20 piezometers within bedrock. Falling head permeability tests and packer tests in selected coal horizons. Groundwater sampling. |
| Piteau (2) | 1989 | Open pit 7&8 (4) | Borehole drilling and installation of 5 piezometers within bedrock. Rising head permeability tests. Measurements of groundwater levels in piezometers and open boreholes. Groundwater sampling. |
| | 1993 | Open pit 7&8 (4) | Borehole drilling and installation of 5 monitoring wells within bedrock and 1 within surficial till. Rising head permeability tests. Groundwater sampling. |
| | 1995 | Tenas Open pit | Borehole drilling and installation of 5 monitoring wells within bedrock. Rising head permeability tests. Groundwater sampling. |
| | 1996 | Tenas Open pit | Preliminary assessment of potential groundwater inflows and dewatering requirements for the Tenas Open pit. Borehole drilling and installation of 5 monitoring wells within bedrock and 6 within surficial sediments. Rising head permeability tests. Groundwater sampling. |
| | 1996 | Open pit 3 (4) | Borehole drilling and installation of 5 monitoring wells within bedrock and 6 within surficial sediments. Rising head permeability tests. Groundwater sampling. |
| | 1996 | Former Tailings Pond | Borehole drilling and installation of 6 monitoring wells within surficial sediments. Rising head permeability tests. Groundwater sampling.<br>Mapping of the surficial geology based on air-photo interpretations. |
| | 1997 | Open pit 3, Tenas Open pit, Open pit 7 & 8 (4) | A 7h aquifer test in the northern portion of Open pit 3. Domestic well survey in area extending three to five km north of Open pit 3. Borehole drilling and installation of 27 piezometers in Reclamation Open pit (test open pit originally excavated in 1983). Groundwater sampling from nearby domestic wells and from all piezometers, where possible |
| Stantec (3) | 2016 | Tenas Area | Inspection of 6 monitoring wells around the northern portion of the Tenas Open pit. Of the 6 wells inspected, only 1 was not dry or damaged. Groundwater samples were taken from 3 wells. |
| ERM, Cassiar Geoscience, and SRK | 2017-2019 | Tenas Area, Access Road, Rail loadout | Hydrogeology baseline monitoring program:<br>Inspection of 22 existing monitoring wells to determine their usability for the baseline program on July 25 and 26, 2017;<br>Field reconnaissance of seeps along Tenas and Four Creek;<br>Drilling of 26 boreholes, and installation of one pumping test well, 18 single screen and 2 nested monitoring wells (8 screens in bedrock and 15 in surficial sediments), and three vibrating wire piezometers. Development of all the new wells;<br>One pumping test, 13 packer injection tests performed in 3 boreholes, 12 rising or falling head permeability tests completed in 11 monitoring wells, and 19 K values inferred from PSD analyses in overburden at 17 locations.<br>Automatic measurements of continuous groundwater levels at 5 monitoring wells since Sep.2017, and 16 campaigns of manual measurements at the monitoring wells between Jul.2017 and Nov. 2019.<br>Quarterly groundwater quality monitoring at 13 monitoring wells initiated in July 2017. |

**Notes**:

1. Klohn Leonoff Consulting Engineers (1985).

   This original report could not be found, but the associated data is included in Piteau's technical report (1998).

2. Piteau (1990, 1994, 1995a, 1996a, 1996b, 1997a, 1997b).

3. Stantec (2016).

4. Open pit names have changed compared to the EA mine plan described by Manalta Coal Ltd. in 1998. The Tenas Area englobes the Tenas North Open pit and the Tenas West Open pit, the Goathorn Area englobes the Open pit 3 and Open pit 6, and the North Area englobes the Open pit 7 and Open pit 8.

**Table 3-3: Summary of the available groundwater data**

| Parameter | Method/Type | Tenas Area (1) | Goathorn Area | North Area |
|---|---|---|---|---|
| Hydraulic conductivity tests (K) | Grain size analyses | 19 (ovb) | - | - |
| | Rising head tests | 10 (ovb), 19 (bdr) | 2 (ovb), 19 (bdr) | 8 (bdr) |
| | Packer injection tests | 13 (bdr) | - | - |
| | Pumping tests | 1 (bdr) | 1 (bdr) | - |
| Monitoring wells (MW) | Screen within ovb. | 26 | 6 | 1 |
| | Screen within bdr. | 19 | 22 | 7 |
| | Multiple screen MW | 6 | 7 | 2 |
| Groundwater level observations | Manual | Up to 28 levels measured in ovb in a single event and 26 in bdr (i.e., Mar/Apr 2019). Period of records: Aug.94 to Nov.19. | 6 levels measured in ovb, and 28 in bdr. Period of records: Sep.96 to Sep.97. | 2 levels measured in ovb, and 22 in bdr. Period of records: Nov.89 to Sep.97. |
| | Automated | 5 loggers (2 in ovb, 3 in bdr). Period of records: Sep.17 to Aug.20. | - | - |
| Groundwater samples (2) | 3 in Oct.1995 (bedrock).<br>7 in Sep./Oct.1996 (4 bedrock / 3 overburden).<br>8 in Aug./Sep.1997 (4 bedrock / 4 overburden).<br>99 between Nov.2016 to Nov.2019 (50 from bedrock and 49 from overburden). | | | |

**Notes:**
Ovb, Overburden; Bdr, Bedrock
1. Tenas Area includes the Tenas, access road, and rail loadout areas.
2. Samples collected in the Tena area.

## 3.4 Field Data Collection Methodology, QAQC, and Data Management

The methodologies, QA/QC procedures, and observations of the groundwater baseline monitoring program are detailed in Section 17 of the EAC Application. SRK reviewed the information and compiled the data into excel spreadsheets, and GIS databases (ArcMap and Leapfrog) for analyses and mapping. All monitoring locations (hydraulic conductivity (K) tests intervals, groundwater levels, and seep locations) were plotted in 3D space based on the high-resolution LIDAR or surveyed collar elevation, and Telkwa database of drillhole surveys.

# 4 Groundwater Baseline Data

This section summarizes the groundwater data collected to date, as of August 2020, that supports the characterization and understanding of the groundwater system at the Project.

## 4.1 Monitoring Network

Figures 21 to 23 shows the monitoring well locations. Table 1A in 7Appendix A provides detailed information on each well.

## 4.2 Hydraulic Conductivity

A total of 92 values of hydraulic conductivity (K) values were obtained since the exploration of the Telkwa coal field started. Table 4-1 compiles a statistical summary of the test results. Figure 25 shows a 3D perspective views of the K tests, Figure 26 and Figure 27 box plots and histograms of K frequencies by lithological unit, Figure 28 a plot of K values versus elevation, and Figure 29 a plot of K values versus depth. Additional details are provided for the individual tests in Table 1B, Appendix B.

**Table 4-1: K statistics**

| SUB-CLASS | | TENAS AREA | | | | | | GOATHORN AREA | | | | | | NORTH AREA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n | K min | K harm | K geo | K arith | K max | n | K min | K harm | K geo | K arith | K max | n | K min | K harm | K geo | K arith | K max |
| | | # | m/s | m/s | m/s | m/s | m/s | # | m/s | m/s | m/s | m/s | m/s | # | m/s | m/s | m/s | m/s | m/s |
| ALL TESTS | | 62 | $7x10^{-11}$ | $2x10^{-9}$ | $1x10^{-7}$ | $2x10^{-6}$ | $5x10^{-5}$ | 22 | $8x10^{-12}$ | $2x10^{-10}$ | $1x10^{-8}$ | $3x10^{-7}$ | $4x10^{-6}$ | 8 | $3x10^{-9}$ | $1x10^{-8}$ | $4x10^{-8}$ | $1x10^{-7}$ | $4x10^{-7}$ |
| BEDROCK | | 33 | $3x10^{-9}$ | $3x10^{-8}$ | $2x10^{-7}$ | $7x10^{-7}$ | $6x10^{-6}$ | 20 | $8x10^{-12}$ | $1x10^{-10}$ | $1x10^{-8}$ | $3x10^{-7}$ | $4x10^{-6}$ | 8 | $3x10^{-9}$ | $1x10^{-8}$ | $4x10^{-8}$ | $1x10^{-7}$ | $4x10^{-7}$ |
| Bedrock Lithologies | Coal seams | 12 | $2x10^{-8}$ | $1x10^{-7}$ | $5x10^{-7}$ | $1x10^{-6}$ | $6x10^{-6}$ | 16 | $2x10^{-10}$ | $1x10^{-9}$ | $2x10^{-8}$ | $4X10^{-7}$ | $4x10^{-6}$ | 8 | $3x10^{-9}$ | $1x10^{-8}$ | $4x10^{-8}$ | $1x10^{-7}$ | $4x10^{-7}$ |
| | Sandstone | 3 | $4x10^{-8}$ | $9x10^{-8}$ | $2x10^{-7}$ | $3x10^{-7}$ | $5x10^{-7}$ | 1 | $1x10^{-6}$ | | | | | 0 | n/a | | | | |
| | Mudstone, Siltstone | 9 | $8x10^{-9}$ | $3x10^{-8}$ | $7x10^{-8}$ | $7x10^{-7}$ | $5x10^{-6}$ | 2 | $8x10^{-12}$ | $2x10^{-11}$ | $1x10^{-10}$ | $1x10^{-9}$ | $3x10^{-9}$ | 0 | n/a | | | | |
| | Conglomerate | 2 | $7x10^{-9}$ | $2x10^{-8}$ | $2x10^{-8}$ | $3x10^{-7}$ | $6x10^{-8}$ | 0 | n/a | | | | | 0 | n/a | | | | |
| | Volcanic rock | 7 | $3x10^{-9}$ | $1x10^{-8}$ | $1x10^{-7}$ | $4x10^{-8}$ | $9x10^{-7}$ | 0 | n/a | | | | | 0 | n/a | | | | |
| | Not defined | 0 | n/a | | | | | 1 | $2x10^{-9}$ | | | | | 0 | n/a | | | | |
| OVERBURDEN | | 29 | $7x10^{-11}$ | $1x10^{-9}$ | $6x10^{-8}$ | $3x10^{-6}$ | $5x10^{-5}$ | 2 | $8x10^{-9}$ | $1x10^{-8}$ | $1x10^{-8}$ | $1x10^{-8}$ | $1x10^{-8}$ | 0 | n/a | | | | |
| Overburden Lithologies | Clay/Silt | 17 | $7x10^{-11}$ | $7x10^{-10}$ | $9x10^{-9}$ | $1x10^{-7}$ | $7x10^{-7}$ | 2 | $8x10^{-9}$ | $1x10^{-8}$ | $1x10^{-8}$ | $1x10^{-8}$ | $1x10^{-8}$ | 0 | n/a | | | | |
| | Sand/Gravel | 5 | $6x10^{-8}$ | $2x10^{-7}$ | $1x10^{-6}$ | $3x10^{-6}$ | $1x10^{-5}$ | 0 | n/a | | | | | 0 | n/a | | | | |
| | Mixed grains | 7 | $7x10^{-9}$ | $4x10^{-8}$ | $7x10^{-7}$ | $8x10^{-6}$ | $5x10^{-5}$ | 0 | n/a | | | | | 0 | n/a | | | | |

**Note:**

| | |
|---|---|
| n | Number of tests. |
| K min | Minimum K value. |
| K harm | Harmonic mean |
| K geo | K geomean. |
| K arith | Arithmetic mean |
| K max | Maximum K value. |
| n/a | Not applicable. |

### 4.2.1 Bedrock

- Bedrock has a low to moderate hydraulic conductivity. K values in the Tenas Area are generally higher than in the Goathorn and North areas, with a geomean of $2x10^{-7}$m/s, $1x10^{-8}$ m/s and $4x10^{-8}$ m/s respectively. The differences between Tenas, Goathorn, and North may result from the heterogeneity of the overall sedimentary sequence; the tested unit in the Tenas Area is the Unit I of the Skeena group, and in the Goathorn and North areas it is Unit III.
- Geomean K values sorted by lithology for the Tenas Area, from the least permeable to the most permeable, are conglomerate ($2x10^{-8}$ m/s), mudstone/siltstone ($7x10^{-8}$ m/s), volcanic rock ($1x10^{-7}$ m/s), sandstone ($2x10^{-7}$ m/s), and coal ($5x10^{-7}$ m/s).
- A progressive reduction of K values with depth (Figure 29) is interpreted to occur due to a reduction of fracture apertures with depth as lithostatic load increases.
- Piteau (1998) conducted a pump test in the Goathorn area as a mean to assess the potential role of faults. Pumping lasted seven hours at a constant rate of 15.8 $m^3$/day. The test did not conclusively confirm the hydraulic role of the faults in that area. The transmissivity of the bedrock (interval between coal seam #2 and top of bedrock) was determined to be relatively low, in the range of 0.02 and 0.24 $m^2$/day. The observations in nearby wells suggested limited lateral hydraulic connection within the coal seam #2, and between the seam and underlying mudstone. No measurable drawdown occurred in observations wells completed in coal, the closest of which was approximately 170 m away, nor in a well installed in the underlying mudstone, less than 10 m away from the pumping well.
- In March 2019, Cassiar Geoscience and SRK conducted a pump test in T18-01D (ARD2), in the Tenas Area, to estimate the physical properties of the sandstone aquifer and test if there was a hydraulic connection between the sandstone and the overlying coal seam units. Pumping lasted 20 hours at a constant average rate of 7.5 $m^3$/day. There was no drawdown observed in T95R-64, the closest well available, approximately 440 m away; therefore, the test did not confirm the hydraulic connection with the overlying coal seams. The interpretation of the drawdown and recovery curves indicated hydraulic conductivity of the sandstone was consistent with the other K measurements; Theis Recovery Analysis – $4x10^{-7}$ m/sec, and Theis Step Test (Drawdown and Recovery) – $1x10^{-7}$ m/sec. The test also showed a boundary started to influence drawdown after about five and half hours of pumping; the interpretation of the derivative drawdown curve indicated test was potentially influenced by a leaky aquifer (Cassiar 2020a).

### 4.2.2 Overburden

K in overburden varies according to lithologies. K in the clay-silt-rich till is relatively low, with a geomean of $9x10^{-9}$ m/s, and K in the sand-gravel-rich till is moderately high, with a geomean of $1x10^{-6}$ m/s.

## 4.3 Storage Properties

The specific storage ($S_x$) and specific yield ($S_y$) influence the volumetric water release in an aquifer induced per unit change of hydraulic head under saturated conditions, and the pressure response

of the material. A specific storage value of $1.2x10^{-4}$ in bedrock was estimated from the pump test analysis in T18-01D (Cassiar 2020a); however, this analysis was based on groundwater level observations from the pumping well, which are less reliable than analysis based on observation wells. According to lithology, scientific literature (Domenico 1990, Singhal 2010), and professional experience (Piteau 1997, SRK 2018), the expected ranges are:

- In Bedrock, $S_x$ between $1x10^{-7}$ and $1x10^{-4}$ $m^{-1}$ and $S_y$ between 0.01 and 0.2.
- In clay/silt deposits, $S_x$ between $1x10^{-5}$ and $1x10^{-2}$ $m^{-1}$ and $S_y$ between 0.05 and 0,15.
- In sand/gravel deposits, $S_x$ between $5x10^{-5}$ and $1x10^{-3}$ $m^{-1}$ and $S_y$ between 0.1 and 0.3.

## 4.4 Groundwater Levels

Table 1C in Appendix C reports the number of available monitored wells by area and dates; Table 2C the groundwater level statistics for each location; Table 3C vertical gradients estimated from dual/nested wells; and Table 4C the raw manual level data.

Figure 30 shows a map of the Tenas Area with the inferred water tables associated with the overburden and bedrock units. The groundwater in both systems is interpreted to flow under an average horizontal hydraulic gradient of approximately 0.04 m/m in the overburden and 0.09 m/m in the bedrock, towards the valleys, moving away from the Tenas open pit towards Tenas Creek, the Telkwa River, and Goathorn Creek. Static water levels are generally less than 2 mbgs (meters below ground surface) in the south part of the Tenas Area, to more than 20 mbgs in the north part of the Tenas Area, where overburden changes to thick sequence of sand-gravel-rich till deposits. Six wells[1] screened in bedrock indicated flowing artesian conditions, at least on a seasonal basis, and are interpreted to be controlled by topography. Six wells[2] showed small upward gradients from bedrock to overburden: and four wells[3] downward gradients from overburden to bedrock or from bedrock upper layer to lower layers.

Figure 31 shows continuous groundwater level measurements recorded from Sep. 2018 to Aug. 2019, in TOB96-02-06 and TOB96-02-20 (screened in till, and sand and gravel respectively), and T95R64, T95R-15C, and T96R-16-19 (all screened in Coal unit 1). TOB96-02-20 is dry, the water levels dropped below the well screen bottom. The records at T95R-15C have a data gap between April and June.

The overburden well (TOB96-02-06) shows highs occur in spring with freshet and lows in winter; amplitude between highs and lows is about 3 m. The 2018 and 2019 records have differences; the peaks associated with freshet are offset (i.e., mid-May 2018 and mid-July 2019), and an increase of 1 m is observed between November 2017 and January 2018 but not in 2019. These differences correlate with the differences in precipitations (i.e., high rainfall in Oct. 2017, high snowfall in Feb. 2018, and a total precipitation of 672 and 502 mm/yr in 2018 and 2019 respectively with the snow equivalent to 70% of total precipitation in 2018 versus 30% in 2019).

[1] T18-04D#2 (W01#D), T95R-15C, T95R-39C, T96R-34-67, T96R-34-87, T96R-56C-83
[2] 18-04D, 96R-16 (0.001 to 0.03)
[3] 18-08D, 96R-34, OB96-02, OB96-11 (0.006 to 0.7, and >1 where groundwater perched in overburden)

The bedrock wells can be divided in two groups: one with T96R-16-19, the other with T95R-64 and T95R 15C. T96R-16-19 shows highs in spring with freshet, and lows in fall and winter; amplitude between highs and lows is about 1 m. The variations are like those observed in TOB96-02-06 which suggest the well is connected with overburden. Differences with overburden wells are noted but difficult to interpret: The winter 2017-2018 peak occurs earlier (Nov.17 versus Jan.18); level is low in August 2018 then increases gradually by a small amplitude, and contrary to the overburden well the 2018 and 2019 peak have similar magnitudes. T95R-64 and T95R 15C show a different trend: the highs are observed in winter and lows in summer and fall; amplitude is about 0.4 m. This implies recharge from precipitation is delayed by several months, potentially by the low permeability of the silt-clay-rich till. Differences between the two wells are noted but difficult to interpret: the highs and lows are offsets by about 1 to 2 months; and in the last three months of records the trends diverge (i.e., levels decline in T95R-15C, and increase in T95R-64).

## 4.5 Groundwater Seepages

In November and December 2018, ERM searched for seeps along the Tenas and Four creeks. The survey was completed via helicopter and during winter conditions to aid visual identification of seeps from the air. One seep was located and photographed on Tenas Creek. (Easting 617555 Northing, 6055416; Plate 17). The survey line, seep location and photo of the seep are shown on Figure 32. The geological control of this resurgence is uncertain. It could be linked to a perched system on top of clay. There is no mapped geological structure aligned with the seep.

## 4.6 Groundwater Quality

The baseline groundwater quality program and data (i.e., TML's MW and residential wells) are detailed in EA Chapter 6; the locations of the monitoring well screens are shown in Figure 33.

Statistics for groundwater quality constituents in the overburden and bedrock units are provided in Table 4-2, exceedances compared the British Columbia water quality guidelines – freshwater aquatic life (BC WQG FAL, MOE 2020d) and drinking water sources (BC WQG DWS, MOE 2020e) are mapped in Figure 34, and a summary of the groundwater quality is presented in Appendix D. Piper plots of the observed groundwater quality are shown in Figure 35. The analysis of the groundwater quality shows:

- The pH value for the bedrock and the overburden wells ranges from 7 to 9 except for T18-04 (W1D, W1S) and T18-08D (W3S). This is within the range of the British Columbia water quality guidelines – freshwater aquatic life (BC WQG FAL,) for pH of 6.5 to 9.0. The pH above 9 were observed in two opposite areas, to the west and south sides of the deposit respectively in W1D (9.1 to 9.6, seven out of eight events), W1S (9.1 to 9.6, three out of eight events), and W3S (7.8 to 9.2, one out eight events). They correlated with high turbidity values, which may indicate incomplete development within the holes.
- Turbidity was below the BC WQG – FAL value of 50 NTU (Nephelometric Turbidity Unit), except for 19 samples in 8 monitoring wells (T95R-40, T95R-15C, T96R-34-87, T18-04, TOB96-02-20, TOB96-01-05, and T18-06 D). Turbidity values were generally slightly higher in the

overburden wells in comparison to the bedrock wells due to the fine-grained nature of the glacially deposited material.

- Hardness ($CaCO_3$) - The bedrock groundwater is 'considered soft' and overburden groundwater 'hard'. Hardness in the bedrock wells ranged from 3.9 to 138.0 mg/L, with an average concentration of 51.3 mg/L, and in the overburden wells from 57.9 to 423.0 mg/L, with an average concentration of 222.8 mg/L.

- Anions and nutrients - Fluoride exceeded the BC WQG – FAL guideline of 0.4 to 2.0 mg/L (hardness dependent). In bedrock wells, fluoride ranged from 0.32 to 5.55 mg/L, with an average concentration of 1.68 mg/L; in the overburden wells from 0.086 to 0.383 mg/L, with an average concentration of 0.18 mg/L. Fluoride also exceeded the BC WQG - DWS guideline of 1.5 mg/L at T95R-64, T96R-34-87, T95R-15C, and T18-04D (W1D). Nitrate concentrations were below detection limits, except for two bedrock wells (T18-04D, T18-08D) and three overburden wells (TOB96-01-05, TOB96-02-06 and TOB-11-04). Low concentrations of nitrite were detected in one bedrock well (T18-08D) and four overburden wells (TOB96-02-06, TOB96-11-04, TOB96-02-20, and T18-08S). Ammonia concentrations exceeded the BC FWQ-FAL guidelines in two overburden wells (T18-08S March 2019, T18-06D September 2018, and April, June, August and November 2019).

- Exceedances of dissolved and total metals above BC WQG – FAL approved or working guidelines are summarized below; the complete dataset is provided in Section 17 of the EAC Application:
  - Exceedances of total arsenic (>0.005 mg/L): T95R-15C, T95R-40, T96R-34-87, TOB96-02-20, T18-08S (W3S) and T18-06D (W2).
  - Exceedances of total copper (>0.002 - 0.026 mg/L [hardness dependent]): T18-04D (W1D), and -04S (W1S), T18-08D (W3D), T95R-40, T95R-64, TOB96-02-20, TOB96-01-05, and T18-06D (W2).
  - Exceedances of total chromium ($Cr^{III}$ >0.0089 mg/L; $Cr^{IV}$ >0.001mg/L): T95R-15C, T95R-40, T95R-64, T96R-34-87, TOB96-02-20, and T18-06D (W2).
  - Exceedances of total iron (>1 mg/L): T95R-15C, T95R-40, T96R-34-87, T18-04D (W1D), and -04S (W1S), TOB96-02-20, TOB96-11-04, TOB96-01-05, and T18-06D (W2).
  - Exceedances of dissolved iron (>0.35 mg/L): T95R-40, T95R-64, and T96R-34-87.
  - Exceedances of selenium (>0.002 mg/L): TOB96-02-20.
  - Exceedances of total zinc (>0.033-0.265 mg/L, [hardness dependent]): T95R-15C, T95R-40, T95R-64, T96R-34-87, T18-08D (W3D), and T18-06D (W2).

  The wells installed before 2017 reported more exceedances for total and dissolved metals before 2017 than between 2017 to 2019, which suggest the historical exceedances were caused by suspended particles derived from the formation (i.e., drilling and well installation disturbances) rather than natural dissolved metals in groundwater. This is also likely the case for the wells recently installed (i.e., 2017 to 2019) that reported exceedances of total metals; for the same metals and during the same sampling event, dissolved metal concentrations were below guideline values and generally below detection limits.

- Exceedances of dissolved and total metals above BC WQG DWS guidelines are summarized below:
  - Exceedances of dissolved antimony (>0.006 mg/L): T95R-64, T95R-40, T95R-15C (noted in only one sampling event at each location).
  - Exceedances of dissolved arsenic (>0.01 mg/L): T18-06D (W2).
  - Exceedances of dissolved iron (>0.3 mg/L): T95R-64, T95R-40, T96R-34-87, and T95R-15C.
  - Exceedances of dissolved cobalt (>0.001 mg/L): T95R-64, T95R-40, T95R-15C, T0B96-02-06, T0B96-02-20, T0B96-11-04, and T0B96-01-05.
  - Exceedances of dissolved mercury (>0.001 mg/L): T95R-64, T95R-40, T96R-34-87, T95R-15C, T0B96-01-05 (noted in only one sampling event at each location).
  - Exceedances of dissolved lead (>0.005 mg/L): T95R-64, T95R-40, T95R-15C, and T0B96-02-20 (noted in only one sampling event at each location).
  - Exceedances of dissolved manganese (>0.12 mg/L): T0B96-01-05, T18-06D (W2), and T18-08D (W3D), and noted in only one sampling event at T95R-64, T95R-40, T96R-34-87, T95R-15C, and T0B96-11-04.
  - Exceedances of dissolved uranium (>0.02 mg/L): T95R-64, T95R-40 and T95R-15C (noted in only one sampling event at each location).
- The piper plots show there are distinct hydrochemical differences between the shallow overburden wells (TOB96-11-04, TOB96-01-05, and TOB96-02-06), the deep confined overburden wells (T18-06D and T18-08D#1), the bedrock wells (T95R-15C, T95R-40, T95R-64, T94R-34-87, T18-04D#1 and #2, T18-08D#2) These differences are indicative of different residence time.
  - Groundwater from shallow overburden wells is classified as a calcium-magnesium-bicarbonate (Ca-Mg-HCO3) type. TDS range: 167 to 427 mg/L. TOB96-02-20 and TOB96-01-05 show minor cation variability between sampling events/seasons, while TOB96-11-04 and TOB96-02-06 have very consistent hydrochemistry between sampling events/seasons.
  - Groundwater from the bedrock wells, and from one of the new deeper overburden wells (T18-06D), is classified as sodium-bicarbonate type with minor calcium, magnesium, sulphate and chloride. TDS range: 365 to 1,910 mg/L. There are minor ionic differences between the Skeena Group coal seam bedrock wells and the Hazelton Group volcanic bedrock wells, with the volcanic rocks having a slightly higher percentage of sulfate than the coal seam bedrock wells. All the coal seam bedrock wells have similar chemistry. The groundwater from deep overburden is interpreted to have interactions with the underlying volcanic rock unit.
  - Groundwater in the newly installed nested well T18-08 is also classified as a sodium-bicarbonate (Na-HCO3) water type, although percentage of calcium + magnesium and sulfate are higher. The similar chemistry between upper and lower well screen may imply a hydraulic connection between the two lithologic units; a strong downward vertical hydraulic gradient is observed between the two wells.

**Table 4-2: Average groundwater quality in overburden and in bedrock**

| Parameter | Units | Overburden Water Quality | | | | Bedrock Water Quality | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Avg. | P50 | P95 | Count | Avg. | P50 | P95 | Count |
| TSS | mg/L | 840 | 15 | 2000 | 48 | 55 | 13 | 230 | 69 |
| TDS | mg/L | 330 | 340 | 410 | 48 | 920 | 820 | 1800 | 69 |
| pH (Field) | - | 7.9 | 7.7 | 8.8 | 46 | 8 | 7.7 | 9.2 | 68 |
| Alkalinity, total | mg CaCO3/L | 290 | 290 | 400 | 48 | 800 | 760 | 1700 | 69 |
| Hardness, total | mg CaCO3/L | 220 | 190 | 390 | 48 | 51 | 44 | 120 | 69 |
| Specific Conductance | µS/cm | 530 | 540 | 700 | 48 | 1400 | 1300 | 2800 | 69 |
| Bromide | mg/L | 0.061 | 0.05 | 0.1 | 39 | 0.35 | 0.25 | 1 | 57 |
| Chloride | mg/L | 1.5 | 0.52 | 3.3 | 48 | 4.2 | 2.5 | 10 | 69 |
| Fluoride | mg/L | 0.17 | 0.13 | 0.35 | 41 | 1.7 | 1.5 | 5.1 | 61 |
| Sulfate | mg/L | 18 | 11 | 42 | 48 | 24 | 6 | 75 | 69 |
| Ammonia, | mg-N/L | 0.15 | 0.025 | 0.61 | 44 | 0.32 | 0.32 | 0.69 | 69 |
| Nitrate | mg-N/L | 0.04 | 0.005 | 0.17 | 41 | 0.07 | 0.025 | 0.16 | 58 |
| Nitrite | mg-N/L | 0.0016 | 0.001 | 0.005 | 41 | 0.0072 | 0.005 | 0.02 | 58 |
| Nitrogen, total | mg/L | 1.3 | 0.54 | 5.9 | 40 | 0.81 | 0.38 | 2.2 | 64 |
| Aluminum, dissolved | mg/L | 0.032 | 0.005 | 0.034 | 44 | 0.033 | 0.0086 | 0.1 | 69 |
| Antimony, dissolved | mg/L | 0.00052 | 0.0005 | 0.00054 | 37 | 0.022 | 0.0005 | 0.00097 | 61 |
| Arsenic, dissolved | mg/L | 0.0034 | 0.00081 | 0.011 | 44 | 0.0011 | 0.0006 | 0.002 | 69 |
| Barium, dissolved | mg/L | 0.12 | 0.093 | 0.25 | 45 | 0.85 | 0.33 | 3.6 | 69 |
| Beryllium, dissolved | mg/L | 0.00034 | 0.0001 | 0.0002 | 44 | 0.00079 | 0.0001 | 0.005 | 69 |
| Boron, dissolved | mg/L | 0.084 | 0.10 | 0.10 | 44 | 0.19 | 0.16 | 0.34 | 69 |
| Cadmium, dissolved | mg/L | 0.00012 | 0.000021 | 0.00027 | 45 | 0.00022 | 0.000012 | 0.0016 | 69 |
| Calcium, dissolved | mg/L | 51 | 50 | 86 | 46 | 16 | 14 | 35 | 68 |
| Chromium, dissolved | mg/L | 0.0015 | 0.001 | 0.001 | 44 | 0.0011 | 0.001 | 0.002 | 69 |
| Cobalt, dissolved | mg/L | 0.0009 | 0.0003 | 0.0041 | 44 | 0.00057 | 0.0003 | 0.0026 | 69 |
| Copper, dissolved | mg/L | 0.0016 | 0.001 | 0.005 | 45 | 0.0019 | 0.001 | 0.0039 | 69 |
| Iron, dissolved | mg/L | 0.043 | 0.03 | 0.099 | 44 | 0.2 | 0.065 | 0.59 | 69 |
| Lead, dissolved | mg/L | 0.0021 | 0.0005 | 0.00093 | 44 | 0.0014 | 0.0005 | 0.001 | 69 |
| Lithium, dissolved | mg/L | 0.0048 | 0.0028 | 0.0067 | 45 | 0.054 | 0.05 | 0.1 | 66 |
| Magnesium, dissolved | mg/L | 21 | 14 | 51 | 46 | 3 | 1.9 | 8.6 | 68 |
| Manganese, dissolved | mg/L | 0.13 | 0.052 | 0.57 | 45 | 0.061 | 0.017 | 0.25 | 69 |
| Mercury, dissolved | mg/L | 0.0012 | 0.000005 | 0.00018 | 44 | 0.0029 | 0.000005 | 0.03 | 69 |
| Molybdenum, dissolved | mg/L | 0.0053 | 0.001 | 0.015 | 45 | 0.0044 | 0.001 | 0.015 | 69 |
| Nickel, dissolved | mg/L | 0.0027 | 0.001 | 0.017 | 44 | 0.0021 | 0.001 | 0.005 | 69 |
| Phosphorus, dissolved | mg/L | 0.18 | 0.012 | 0.89 | 40 | 0.023 | 0.016 | 0.06 | 61 |
| Potassium, dissolved | mg/L | 1.8 | 2 | 2 | 44 | 2.2 | 2 | 3.5 | 68 |
| Selenium, dissolved | mg/L | 0.00032 | 0.0002 | 0.00096 | 45 | 0.00026 | 0.00014 | 0.001 | 69 |
| Sodium, dissolved | mg/L | 46 | 20 | 110 | 45 | 350 | 320 | 720 | 68 |
| Silver, dissolved | mg/L | 0.0001 | 0.00002 | 0.00027 | 44 | 0.059 | 0.00002 | 0.0001 | 68 |
| Thallium, dissolved | mg/L | 0.00019 | 0.0002 | 0.0002 | 37 | 0.0002 | 0.0002 | 0.0002 | 58 |
| Tin, dissolved | mg/L | 0.001 | 0.0005 | 0.0049 | 36 | 0.00061 | 0.0005 | 0.00053 | 51 |
| Titanium, dissolved | mg/L | 0.012 | 0.01 | 0.024 | 44 | 0.013 | 0.01 | 0.05 | 66 |
| Uranium, dissolved | mg/L | 0.0017 | 0.0011 | 0.0032 | 45 | 0.023 | 0.0004 | 0.0071 | 69 |
| Vanadium, dissolved | mg/L | 0.0027 | 0.001 | 0.005 | 45 | 0.0039 | 0.00053 | 0.03 | 69 |
| Zinc, dissolved | mg/L | 0.011 | 0.005 | 0.012 | 44 | 0.0067 | 0.005 | 0.011 | 69 |

Source: GWQuality_Summary_Stats_rev08_smh.xlsx, (2020/11/19)

**Note:**

Avg., average

P50, 50th percentile

P95, 95th percentile

## 4.7 Groundwater Resources

The MOE Aquifer Classification Database (BC MOE 2020a) reports six aquifers located near the town of Telkwa, where the Telkwa River joins the Bulkley River, about 8 to 10 km northeast from the Project. Each aquifer is described in Table 4-3. Their outlines are mapped in Figure 36.

**Table 4-3: Description of the minor aquifers (BC MOE Well database)**

| Ref. Number | Class (1) | Rank (2) | Size ($km^2$) | Description | Productivity |
|---|---|---|---|---|---|
| 569 | IIC | 7 | 2.4 | Confined sand and gravel aquifers within undifferentiated sediment, overlain by fluvial and glaciomarine sediments (silt and clay). | Moderate. Well yields reported range between 0.23 and 3.0 L/s, median 0.95 L/s. |
| 576 | IIC | 11 | 5 | Confined sand and gravel aquifers within undifferentiated sediment, overlain by fluvial and glaciomarine sediments (silt and clay). | High. Well yields reported range between 0.30 and 1.5 L/s, median 0.83 L/s. |
| 578 | IIC | 8 | 159.8 | Confined bedrock aquifer. Predominately Middle Jurassic extrusive igneous rock. Minor sedimentary rocks are also noted (i.e., sandstone, conglomerate, and shale). | Low. Well yields reported range between 0.005 and 1.5 L/s, median 0.15 L/s. |
| 581 | IIIC | 9 | 26.7 | Confined sand and gravel aquifers within undifferentiated sediment, overlain by fluvial and glaciomarine sediments (silt and clay). | Moderate. Well yields reported range between 0.15 and 8.18 L/s, median 0.76 L/s. |
| 582 | IIB | 9 | 0.83 | Unconfined sand and gravel aquifer. | Moderate. Well yields reported range between 0.38 and 3.8 L/s, median 1.1 L/s. |
| 583 | IIA | 10 | 2.47 | Unconfined sand and gravel aquifer. | Moderate. Well yields reported range between 0.23 and 1.9 L/s, median 0.91 L/s. |

**Note:**

1 Development subclass: the level of development of an aquifer is determined by assessing demand verses the aquifer's yield or productivity - high (I), moderate (II), or low (III); Vulnerability subclass: the vulnerability of an aquifer to contamination from surface sources is assessed based on: type, thickness and extent of geologic materials overlying the aquifer, depth to water (or top of confined aquifers), and the type of aquifer materials - high (A), moderate (B), or low (C)

2 A numerical measure of an aquifer's priority is provided by the aquifer's ranking value. The ranking value is determined by summing the point values for each of the following hydrogeologic and water use criteria: productivity, size, vulnerability, demand, type of use, quality concerns (that have health risk implications), and quantity concerns. Possible ranking scores range from a low of 5 to a high of 21; the higher the ranking score, the greater the aquifer's priority.

## 4.8 Groundwater Users

Figure 36 shows known locations of private wells within the LSA (Sources: BC MOE 2020b, and TML March and July 2020). The closest private domestic wells are located:

- About 3.8 km (i.e., Goalder, Baker, and Mapletoft wells) north of the Project, to the west of Goathorn Creek, along the expected groundwater flow paths towards the Telkwa River.
- About 3.1 km (i.e., Alain's well), and 4.5 to 5.4 km (i.e., Kerr, Schmike, Shearer, Beukema wells, etc.) northwest of the Project, to the east of Goathorn Creek; there are located downgradient of the Project but not along the expected groundwater flow paths towards the Goathorn Creek or the Telkwa River.

As part of the baseline program, one residential well (Kerr well) was sampled quarterly during the groundwater sampling events from June 2018 to April 2019. Four additional residential wells (Schmike, Shearer, Ragula, and Beukema) were each sampled once during winter 2019.

The groundwater type for each of the residential wells (Figure 35) is categorized as a Ca+Mg bicarbonate type with the Schmike well containing a higher relative abundance of sulfate in relation to the other tested residential wells. Total arsenic, iron, manganese, and dissolved iron exceeded BC WQG FAL and the maximum acceptable concentration for drinking water sources in the Kerr well. Total phosphorus and TOC also exceeded the BC WQG DWS guidelines. Total copper exceeded the BC WQG FAL approved guideline in both the Schmike and Shearer wells. The Shearer well also had an exceedance of BC WQG DWS for total organic carbon. Total iron and manganese exceed the BC WQG DWS in the Ragula well. There were no exceedances in the Beukema well.

## 4.9 Past and Current Human Activities

Coal was reportedly discovered in the Telkwa area around 1900. Small-scale underground and surface mining began in 1918 and continued sporadically until 1985, resulting in the recovery of over 400,000 tonnes of coal at about 3.6 km north and northwest from the Project (Figure 36). Modern exploration of the Project to delineate further exploitable coal reserves started in 1978. Nowadays there are no significant human activities other than mining exploration and forestry; current human activities (i.e., mostly agriculture and forestry) are concentrated in the village of Telkwa and along roads, trails, and rail tracks.

# 5 Conceptual Groundwater Model

Groundwater is a key component of the biophysical environment, based on linkages to other ecosystem components, including surface water quantity, surface water quality, human health, aquatic resources, and wetlands.

This section presents conceptual models of the groundwater system for baseline, mining, and post-closure conditions. These models are simplified representations of the essential features of the groundwater system.

The development of conceptual models is an iterative process; therefore, it should be updated as new data becomes available, as the understanding of the system is improved, or as questions and modelling objectives evolve (Wels 2012).

The baseline conceptual model was developed from the data presented in Section 3. The mining, and post-closure conceptual models were developed from a scoping exercise that identified the Project components and activities having a potential to interact with the groundwater flow system; the identification was based on professional experience with other mining projects in British Columbia and through multi-disciplinary consultation with TML and external consultants working on behalf of TML.

## 5.1 Baseline Conditions

### 5.1.1 Hydrostratigraphic Units

The groundwater system is divided into two sub-systems: a deep bedrock system, and a shallow overburden system. Figure 37 shows how the Project K data generally compares to published K values.

#### Deep Bedrock System

The deep bedrock groundwater system is interpreted to be controlled by the hydraulic properties of the Skeena sedimentary rock group, the volcanic group, fractures and faults. At the scale of the Telkwa watershed the fractured rock system is assumed to be equivalent to a porous medium. Table 5-1 presents the two conceptualized hydrostratigraphic units in bedrock.

**Table 5-1: Hydrostratigraphic units conceptualized for the bedrock system**

| Unit | Type | Expected Permeability | $K_{xy}$ range (m/s) | Extent |
|---|---|---|---|---|
| Skeena Group | Confined aquifer interbedded with aquitards/aquicludes | Moderate $K_{xy} > K_z$ (1) | $K_{xy}$ $10^{-8}$ to $10^{-6}$ Anisotropy Ratio 2 to 4 | Tenas and Goathorn synclines |
| Volcanic Group | Confined aquifer | Moderate $K_{xy} \approx K_z$ | $K_{xyz}$ $10^{-8}$ to $10^{-6}$ | Entire Project area |

**Note:**

[1] $K_{xy}$, hydraulic conductivity parallel to beddings, and Kz, hydraulic conductivity perpendicular to beddings

The complex sedimentary sequence of the Skeena group is simplified and represented as a single unit characterized by an anisotropy ratio perpendicular to bedding planes (i.e., K parallel to beddings higher than K perpendicular to beddings). The rational for this simplification and the approach to estimate the ratio are described below:

- The hydraulic tests show that coal seams and sandstones tend to be characterized by a moderate K and mudstone and siltstones by a lower K; as a result, the coal seams and sandstone beds should act as preferential pathways to groundwater, and the mudstone and

siltstone beds as aquitards or aquicludes. This behavior is equivalent to a bedding-aligned anisotropy[1], with K perpendicular to bedding ($K_z$) lower than K parallel to bedding ($K_x$, $K_y$);

- The anisotropic ratio can be estimated based on TML drillhole logs and K measurements. The analysis is summarized in Table 5-2; the details of the analysis are provided in Table 2B in Appendix B.

It is also noted that the drillhole logs and the TML geological model generally indicate relatively thick layers of mudstone between the open pit floor and the top of the volcanic group, which could limit the transmission of groundwater to and from the open pit. This complexity is not accounted in the conceptual models because the current dataset does not guarantee the absence of connections between upper and lower sub-units separated by mudstone, for example along faults where displacements may have created connections between layers previously separated.

**Table 5-2: Assumptions and summary of the Skeena group equivalent K analysis**

| **Lithology** | **$K_i$ (m/s)** | **$B_i$ (m)** | **$K_{xy}$ (m/s)** | **$K_z$ (m/s)** | **Kxy/Kz ratio** |
|---|---|---|---|---|---|
| Coal seams | $5x10^{-7}$ m/s | Drillhole logs | Min=$3x10^{-8}$<br>Max=$4x10^{-7}$<br>Geomean=$1x10^{-7}$ | Min=$3x10^{-8}$<br>Max=$2x10^{-7}$<br>Geomean=$5x10^{-8}$ | Min=1.0<br>Max=4.7<br>Average=3.0 |
| Sandstone | $3x10^{-7}$ m/s | | | | |
| Mudstone/Siltstone | $3x10^{-8}$ m/s | | | | |

**Note:**

The equivalent K parallel to bedding ($K_{xy}$) and equivalent K perpendicular to bedding ($K_z$) are calculated for each drillhole using the formula:

$K_{xy} = (\sum_{i=1}^{n} B_i \times K_i) \ / \ (\sum_{i=1}^{n} B_i)$ and $K_z = (\sum_{i=1}^{n} B_i) \ / \ (\sum_{i=1}^{n} \frac{B_i}{K_i})$. (Freeze and Cherry, 1979)

Where $B_i$ and $K_i$ are respectively the thickness and hydraulic conductivity of the layer i, and $K_i$ corresponds to the K geomean of each lithology calculated from the TML K database (Section 4.2).

Two other conceptual simplifications are assumed:

1. No major geological structure is represented as preferential flow pathway and/or barrier. Data collected to date does not indicate influences on the flow system from known faults mapped in the Project area. There is no groundwater spring or seep identified along the projected interpreted fault lines, no significant change of hydraulic conductivity associated with fractures or faults, no apparent change in water levels or hydraulic gradients caused by faults, and no structure linking directly the Project and the private well locations.

2. The intrusions located at about 5 km east and 7 km northwest from the open pit are merged with the Volcanic Group. The intrusive rocks are located away from the potential flow paths where groundwater originating from the Project would potentially discharge at surface. They are not expected to influence the groundwater predictions.

[1] Based on the nature of the testing performed to date, the K data is interpreted as representative of the hydraulic conductivity parallel to bedding.

### Shallow Overburden System

The shallow overburden system is influenced by the distribution of fine material within the till, which is conceptualized and simplified to have two main units: the silt- or clay–rich glacial till, and the glaciofluvial sand-gravel-rich till or outwash. Where present, the silt-clay-rich till act as an aquitard that limits the infiltration of precipitation and promotes runoff, whereas the sand-gravel-rich till act as an aquifer that connects the groundwater system to the stream valleys. The sand-gravel-rich till unit contains fines (Figure 17) and is characterized by moderate K ($1x10^{-6}$ m/s); it is not a clean sand and gravel unit with homogeneously high K. Lenses of sand and/or gravels interbedded in silt-clay-rich till may be present locally; these are expected to have limited influence on the system because of the low permeability material surrounding them. Table 5-3 presents the three conceptualized hydrostratigraphic units in overburden.

**Table 5-3: Hydrostratigraphic units conceptualized for the overburden system**

| Unit | Type | Expected Permeability | $K_{xy}$ range (m/s) | Extent |
|---|---|---|---|---|
| Fluvial sand/gravel | Unconfined aquifer | High $K_{xy} \approx K_z$ | $K_{xyz}$ $10^{-4}$ to $10^{-2}$ | Stream beds and alluvial valleys |
| Glaciofluvial sand-gravel rich till | Unconfined aquifer | High $K_{xy} \approx K_z$ | $K_{xyz}$ $10^{-7}$ to $10^{-3}$ | Bedrock depressions north of the open pit |
| Glaciofluvial silt-clay-rich till | Aquitard or aquiclude | Low $K_{xy} \approx K_z$ | $K_{xyz}$ $10^{-9}$ to $10^{-7}$ | Cover almost all the Project area |

### 3D Geometries of the Hydrostratigraphic Units

The 3D geometries of the hydrostratigraphic units were generated with the software Leapfrog Geo v4.4.2 (i.e., a 3D geological modelling tool) from the analyses of drillhole intercepts (TML's database), geological maps (surface and bedrock geology, regional and local maps, 2D cross sections; Clague 1984, MEMPR 1993, BCGS 2005, TML 2018), and considerations on the ability of a unit to convey groundwater (i.e., permeability or hydraulic conductivity).

SRK generated the initial 3D solids of the sand-gravel-rich till and extended the 3D surface of the top Hazelton volcanic group contact based on the regional geology map (Figure 7). The fluvial sand/gravel deposits present in the creek/river valleys were not explicitly represented; they were merged with the sand-gravel-rich till on the basis that site data was not available and that groundwater flow to creeks is controlled by the lower K units (i.e., bedrock or fine-grained overburden) surrounding the fluvial deposits.

To control the quality of the interpolation, surfaces were verified visually in cross sections with respect to the reported borehole lithologies. Corrections and further interpretations of the hydrostratigraphic contacts were based on professional judgement, for example where density of borehole data is low. The extrapolation of the overburden geometries outside the Tenas Area, where drillhole information is limited or absent, was constrained by the following assumptions:

- In areas located downstream of the Project and flow paths expected to connect to the creeks, the potential connections between the mine area and the streams through thick permeable sand and gravel deposits are emphasized.
- Elsewhere overburden consists of fine textured glacial deposits with a relatively low thickness of about 5 to 10 m (i.e., based on TML drillhole database the median thickness is 7 m).

TML's chief geologist, Ron Parent, reviewed the initial SRK 3D solids and used TML's drillhole database (as of May 2019) to refine the distribution of silt-clay-rich till and sand-gravel-rich units. The update was provided to SRK as 3D surfaces (i.e., bedrock/overburden contact, upper silt-clay-rich till/sand-gravel-rich till contact, and sand-gravel-rich till/lower silt-clay-rich till contact). The distinction between upper and lower silt-clay-rich till is predicated on the presence of an intervening sand (or gravel) layer; so, although both sub-units are comprised of similar material, they are given this distinction to facilitate modeling. Figure 38 isopach thickness for the overburden, Figure 39 for the sand-gravel outwash deposits, and Figure 40 for the silt-clay-rich till cover. Figure 41 shows the isopach thickness (i.e., total thickness) map for the Skeena group.

### 5.1.2 Groundwater Flow

Conceptual cross-sections of the baseline groundwater flow system are presented in Figure 42 to 46. The deep bedrock groundwater system has a large lateral extent and is characterized by confined flow, relatively long residence times in the subsurface, and higher concentrations of dissolved solids. The bulk of recharge to the bedrock system occurs from the infiltration of precipitation and runoff in the upland area of the Tenas Creek and Goathorn Creek watersheds, where the silt-clay-rich till coverage is limited. Groundwater level measurements indicate that hydraulic gradients (and inferred groundwater flow) are from the upland areas in a northerly direction towards the major drainage features of the area, namely the Telkwa River and its tributaries, Tenas Creek and Goathorn Creek. Discharge from the bedrock system is expected to be dominant in these three drainages because of the difference of elevation between the valleys and the terraces. Infiltration from the creeks to the bedrock or overburden system may occur locally in floodplains but will be likely limited to shallow flow paths (i.e., water from the streams getting into bedrock, flowing subsurface superficially, and daylighting further downstream).

The shallow overburden system is characterized by local unconfined groundwater systems with relatively short residence times and lower concentrations of dissolved solids. Groundwater flows in a north-easterly direction towards Four Creek and in a north-westerly direction towards Tenas Creek, from topographic highs to adjacent topographic lows (Figure 30). A downward vertical gradient is observed between the upper and lower water-bearing surficial deposits, and between overburden units and bedrock units. Locally the groundwater can be disconnected (i.e., perched) above the bedrock groundwater system. Groundwater discharge from overburden is expected to occur in the valleys of Tenas Creek, in Four Creek and in Goathorn Creek, at least those portions known to be connected to the water table, as well as marshes and swamps.

Recharge from precipitation to groundwater is expected to range between 5 and 30% of MAP (Table 5-4).

**Table 5-4: Estimated recharge and baseflows for the Tenas Creek, Goathorn Creek, and Telkwa River**

| Creek/River name | Estimated range of recharge ($m^3/d$) | | Estimated baseflow [2] ($m^3/d$) |
|---|---|---|---|
| | Recharge = 5% MAP[1] | Recharge = 30% MAP [1] | |
| Tenas Creek (watershed 60 $km^2$) | 5,823 | 34,940 | 9,383 |
| Goathorn Creek (watershed 130 $km^2$) | 19,049 | 114,294 | 20,330 |
| Telkwa River (watershed 830 $km^2$) | 82,315 | 493,892 | 129,799 |

**Note:**

[1] MAP = 721 mm/y (SRK 2020)

2 Based on estimated average unit baseflows in Table 2-3 (SRK, 2020).

## 5.2 Mining and Post-closure Conditions

During the pre-construction and construction phases, activities will modify the characteristics of the subsurface but their influence on the groundwater system is anticipated to be minor and localized to the immediate footprints of the respective infrastructures.

During mining and until closure, the development and dewatering of the open pit, and the construction and operation of the material and water management facilities will change the physical properties of the ground and subsurface, site drainage patterns, and groundwater flows at and around the mine (i.e., pore pressures behind slopes, drawdown cone). Dewatering activities will result in a drawdown of the water table that will gradually expand over time, and possibly induce a seasonal reduction of baseflow in the Tenas Creek and Goathorn Creek. Mining activities may impact the groundwater quality; mine-affected water (i.e., from PAG/NAG rocks, blasting, dust, potential spillage of chemicals, oils, and fuels, etc.) will infiltrate into the ground and migrate through the groundwater system into the valleys (i.e., Tenas River, Goathorn Creek, Telkwa River) or private domestic wells. The NMP, EMP, WMP, and Tenas Control Pond are designed with low permeability liners and ditches along their peripheries to minimize the infiltration of mine-affected water and intercept water discharges downgradient of the dams. The whole footprints of the NMP, EMP, and Tenas Control Pond, and 57% of the WMP's footprint will be lined (i.e., the natural ground located outside the open pit, and the open pit walls intercepting overburden; the open pit walls and open pit floors intercepting bedrock will not be lined). The storage management will be lined with engineered soil-bentonite compacted layers, and the Tenas Control Pond with a bituminous geomembrane or equivalent. The design details of the management ponds and Control Pond are documented in Part A, Section 1 of the EAC Application.

At closure, the total footprint of the Project will correspond respectively to about 5.5% and 2.2% of the Tenas Creek and Goathorn Creek watersheds; dewatering of the open pit will stop, and the groundwater system will progressively return to steady post-closure conditions. The management ponds will remain, and the Tenas Control Pond will be eventually decommissioned. The mine affected water that entered the groundwater system during operation will continue migrating while new post mine-affected water from weathering of open pit walls, open pit lakes and management ponds will enter and migrate through the groundwater system. Conceptual cross-sections of the groundwater flow system at post-closure are presented in Figure 47 to 51.

Table 5-5 summarizes the potential effects of the Project to the groundwater system. The key potential issues are the effects on groundwater discharges into nearby creeks, and the migration of mine-affected water to private domestic wells located immediately downstream of the Project.

**Table 5-5: Potential Project Interactions with the Groundwater System**

| Project Component or Activity | Potential Effect / Pathway of Interaction with Hydrogeology |
|---|---|
| **Construction Phase** | |
| Site clearing, pre-stripping, building construction, road development, rail loop construction, bridge construction, and development of onsite utilities and services. | Changes to site drainage patterns and subsurface characteristics due to construction works. Changes to groundwater quality resulting from dust deposition or accidental spillage. |
| **Mining Phase** | |
| Excavate the open pit. | Changes to watercourses, site drainage patterns, subsurface characteristics and groundwater flow caused by mining and dewatering. Changes to groundwater quality because of metal leaching and acid rock drainage. |
| Establish and operate waste management facilities. | Changes to watercourses, site drainage patterns, subsurface characteristics and groundwater flow caused by construction, diversions, and infiltration underneath stockpiles or storage management ponds (NMP, EMP, and WMP). Changes to groundwater quality caused by infiltration of mine-affected water underneath waste management facilities. |
| Establish and operate water management facilities. | Changes to watercourses, site drainage patterns, subsurface characteristics and groundwater flow caused by construction, diversions, and infiltration underneath the Control Pond, sedimentation ponds, and ditches. Changes to groundwater quality caused by infiltration of mine-affected water underneath water management facilities. |
| Pump groundwater for domestic facilities. | Changes to groundwater flow at the vicinity of the well caused by pumping. |
| Temporarily store hazardous substances including fuel, explosives, and mine supplies | Changes to groundwater quality from the use of chemicals and fuel and the potential for spills |
| Contingency pumping of water from water supply wells along the edge of Goathorn Creek. | Changes to groundwater flows in the alluvial bed of Goathorn Creek caused by pumping. |
| **Closure and Reclamation Phase** | |
| Decommission and reclaim of all buildings and structures. Re-contour slopes and re-vegetate. | Changes to site drainage patterns due to decommissioning activities; changes to groundwater flow through changes to local scale flow or drainage pathways. Changes to groundwater quality because of erosion, sedimentation, and changes to infiltration rates. |
| Stop dewatering, open pit reflood, and formation of open pit lakes. | Changes to groundwater flows. Changes to groundwater quality caused by infiltration of mine-affected water underneath the open pit lakes. |
| Maintenance of the material management facilities. | Changes to groundwater quality caused by infiltration of mine-affected water underneath waste management facilities. |

# 6 Groundwater Effects Predictions

This section presents the 3D-numerical model developed for the EA Application to assess the effects of the Project on the groundwater. The predictions include estimates of groundwater quantities intercepted by the mine, potential changes to groundwater baseflows in creeks, and potential contributions and average travel times of mine-affected groundwater to creeks and private wells.

## 6.1 Model Software

Numerical groundwater modeling was completed using the software, FEFLOW 7.4 (DHI, 2020). FEFLOW is a professional software package for modeling fluid flow and transport of dissolved constituents and/or heat transport processes in the subsurface. This program is used extensively for groundwater mining projects around the world. The code is based on a finite element solution of the partial differential equations for flow and transport.

## 6.2 Model Assumptions

The numerical model required several simplifying assumptions. These include:

- The groundwater system can be simulated using unconfined saturated flow equations.
- Groundwater flow can be approximated by an equivalent porous media model.
- Heterogeneity in the stratigraphic layering can be approximated using anisotropic conditions.
- Faulting does not have a significant influent on the regional scale flow system, with no major structures identified that act as significant conduits and/or barriers.
- Groundwater flow states can be approximated based on steady-state flow conditions.
- Material storage piles do not significantly alter the sub-surface flow conditions.

## 6.3 Groundwater Model Setup

### 6.3.1 Model Domain

The model domain (Figure 52) covers an area of approximately 20 x 15 km, with a total area of 280 $km^2$. The domain is set to encompass the Goathorn Creek watershed, and to be bounded by the Telkwa River and the Bulkley River.

The upper surface of the model is defined based on the DEM provided by TML (Email dated May 2019). The base of the model is set at a fixed depth of 400 mbgs projected downward from the surface topography, which is 3.3 times deeper than the proposed open pit (120 mbgs).

### 6.3.2 Model Mesh

The finite element mesh (Figure 52) is constructed with 30 layers. Each model layer has a constant thickness (Table 6-1) and comprises 85,595 prismatic elements. The top elevation corresponds to

the topographical surface. Horizontal spacing is refined in the Project area and along the creeks (i.e., an element length of approximately 30 m at the Project and along creeks and increasing to a maximum of 500 m).

**Table 6-1: Thicknesses of the model layers**

| Layer # | Thickness (m) |
|---|---|
| 1 and 2 | 0.5 |
| 4 | 3 |
| 5 to 23 | 5 |
| 24 and 25 | 25 |
| 26 to 30 | 50 |

### 6.3.3 Boundary Conditions

The boundary conditions are described below and illustrated in Figure 53.

**In-Situ Boundaries**

- No flow (i.e., zero-flux) boundaries are assigned to:
  - Model edges which correspond to the upper reaches of the surface water catchment divides,
  - The top surface of the model, except where creeks/rivers or mine workings are present,
  - The base of the model.
- Constant head (i.e., Dirichlet) boundaries are assigned to:
  - Lower reaches of the creeks/rivers.
    Head values were assigned based on ground surface elevations.
- Seepage (i.e., flux constrained Dirichlet) boundaries are assigned to:
  - Upper reaches of the creeks/rivers.
    Head values were assigned based on ground surface elevations and are constrained to only allow flow out of the model. For example, flow can discharge into the creeks when heads exceed the creek levels, but the reverse is not allowed (i.e., ingress into the model if heads drop below creek levels). This represents the fact that small streams have limited capacity and do not significantly contribute to the recharge when dry.
- Source/sink (i.e., modified Neuman) boundaries are assigned to:
  - Top layer of model to simulate vertical recharge into the model.

**Mine Working Boundaries**

- Seepage (i.e., flux constrained Dirichlet) boundaries are assigned to:
  - Open pit walls (e., EoY1, EoY7, EOM, and post-closure conditions).
    Head values were assigned based on open pit wall elevations.
- Constant head (i.e., Dirichlet) boundaries are assigned to:
  - Unlined portions of the WMP, saturated waste rock, and open pit lake during post-closure. Assigned head values correspond to maximum water level at the WMP and spill point elevations (Table 6-2).

**Table 6-2: Head levels at WMP saturated waste rock, and open pit lake**

| Feature | Period | Head Elevation (masl) |
|---|---|---|
| Open pit lake | Post-closure | 909 |
| Saturated mine rock south end of open pit | Post-closure | 901 |
| WMP (not lined) | Operation, Post-closure | 851 |

- Well (point-source fluid-flux) boundaries were assigned to lined water management facilities (i.e., management ponds and Control Pond). Seepage rates for the facilities were calculated using:
  - NMP, EMP, and WMP.
    Seepage rates were calculated from 2D Seep W modelling documented in 7Appendix E Results are presented in Table 6-3.
  - Control Pond.
    Seepage rates were calculated using the analytical solution presented in Giroud (1997) for the migration of liquid through composite liners with geomembrane defects. The analysis is documented in 7Appendix F; results are presented in Table 6-3.

**Table 6-3: Estimated seepage rates through designed liners**

| **Total seepage rate under liners** ($m^3/d$) | **Control Pond** (bituminous geomembrane) | **EMP** (S/B0.30) | **NMP** (S/B0.30) | **WMP Ex pit** (S/B0.30) |
|---|---|---|---|---|
| | 140 | 458 | 198 | 568 |

Sources: Appendix E, F, and surface areas from TML 2020.

### 6.3.4 Model Properties

Each model element was assigned with the property of one of the conceptual hydrostratigraphical units (i.e., sand-gravel rich till, silt-clay-rich till, Skeena group, or volcanic Group) based on the 3D geometries illustrated in Figure 40 to 41 (Section 5.1.1). Table 6-4 compiles the properties of the calibrated numerical model.

**Table 6-4: Groundwater model properties**

| Hydrostratigraphic Unit | Parameter | Unit | Value |
|---|---|---|---|
| Sand-Gravel-rich till<br>- Homogeneous and isotropic. | $K_{xyz}$ | m/s | $2.9x10^{-6}$ |
| | $S_y$ | - | 0.23 |
| | $S_x$ | 1/m | $4x10^{-4}$ |
| Silt- clay-rich Till<br>- Homogeneous and isotropic. | $K_{xyz}$ | m/s | $2.4x10^{-7}$ |
| | $S_y$ | - | 0.11 |
| | $S_x$ | - | $2x10^{-5}$ |
| Sedimentary rocks<br>- Homogeneous and anisotropic. The highest conductivity ($K_{xy}$) is parallel to bedding dip and the lowest ($K_z$) is perpendicular; the bedding orientation matches the 3D surfaces of the Hazelton Volcanic Group contact (Section 5.1.1) | $K_{xy}$ | m/s | $3.6x10^{-7}$ |
| | $K_z$ | m/s | $1.8x10^{-8}$ |
| | $S_y$ | - | 0.09 |
| | $S_x$ | - | $5x10^{-6}$ |
| Volcanic & Intrusive rocks<br>- Homogeneous and isotropic. | $K_{xyz}$ | m/s | $2.1x10^{-8}$ |
| | $S_y$ | - | 0.05 |
| | $S_x$ | - | $5x10^{-6}$ |
| Recharge (1)<br>- Uniform and constant. | R | mm/yr | 57.62 |

**Note:**

1 The modeled annual recharge is equivalent to about 8% of MAP.

## 6.4 Model Calibration

Calibration was conducted manually and based on steady-state conditions.

The calibrated model corresponds to the best fit to head observations between the 6th and 15th of September 2018 and average annual baseflows estimated from the historical WSC Goathorn station data. The fit was adjusted by varying the hydraulic conductivities (Kxyz), and the recharge. Calibration plots and a map of the residual errors are presented in Figure 55; full details on the calibration dataset provided in Table 1F of 7Appendix G.

The overall fit is considered reasonable for both heads and baseflows, with a Normalized Root Mean Square Error (NRMSE) of 3.2% for hydraulic heads and 3.6% for baseflows (Figure 55). A minor north-south trend is observed in the residual error structure, which may reflect a minor unaccounted-for geological control. The sensitivity of the model to the calibration is addressed in Section 6.8.

## 6.5 Model Scenarios and Applications

The modeling scenarios are presented in Table 6-5. The steady state groundwater predictions are used to support the evaluation of Project effects to groundwater users, for both quantity and quality. Particle tracks are used to estimate the flow paths of mine affected groundwater and their potential contribution to creeks, rivers, and private wells. The Water Balance and Load Model (WBLM, Section 4, Chapter 3 of the EAC Application) combines the groundwater predictions (flow rates, changes to baseflows, contributions of mine affected groundwater to creeks), the direct precipitation, the runoff, the surface flows of the waste and water management systems, and the loads to evaluate the effects of the Project to surface water, for both quantity and quality.

**Table 6-5: Summary of the Model Simulations**

| Temporal Boundary | Assumptions | Objectives |
|---|---|---|
| *Current conditions:* | No mining activities. The system is driven by the recharge I at surface, and the discharges at drainages (rivers, creeks, swamps). | To estimate the calibrated properties of model and simulate the baseline conditions of the groundwater system. |
| *Pre-construction and construction phases* | These periods are not considered. The influences from site clearing; pre-stripping; construction of the buildings, road, rail loop, bridge, and onsite utilities and services on groundwater are expected to be minimal. | |
| *Mining* EoY1 | The mine has been excavated for one year. Open pit dewatering is active (1). The Control Pond and NMP are constructed, and water levels are at their maximum. | To estimate open pit inflow rates, changes to groundwater baseflow in creeks, mine-affected infiltration rates, pathways, travel times, and potential contributions to creeks and domestic wells. |
| *Mining* EoY7 | The mine has been excavated for seven years (1). Open pit dewatering is active. Rock storage piles are not explicitly modelled (2). The Control Pond, NMP, and EMP are constructed, and water levels are at their maximum. | |
| *Mining* EOM Y22 | The mine is fully excavated (1) (i.e., 22 years). Open pit dewatering is active. Rock storage piles are not explicitly modelled (2). The Control Pond and all the management ponds are constructed, and water levels are at their maximum. | |
| *Mining* EOM hypothetical worst-case drawdown | The mine is fully excavated (1). The open pit dewatering is active. Rock storage piles are not explicitly modelled (2). There are no Tenas Control Pond or management ponds impeding the progression of groundwater drawdown. | To estimate worst case drawdown extent. |

| Temporal Boundary | Assumptions | Objectives |
|---|---|---|
| *Post-closure:*<br>EoY30 | The mine is fully excavated (1). Dewatering pumps are shut off and open pit is allowed to re-flood; the groundwater systems return to equilibrium. Rock storage piles are not explicitly modelled (2). The Tenas Control Pond has been decommissioned. The NMP, WMP, and EMP are constructed, and water levels are at their maximum. | To estimate the changes to groundwater baseflow in creeks, mine-affected infiltration rates, pathways, travel times, and potential contributions to creeks and domestic wells. |

**Note:**

1 The progressive incremental excavation of the open pit is not simulated. At the start of a simulation (time, t = 0), the predictive scenarios assume excavations correspond to the open pit shell of the simulated year (EoY1, EoY7, EOM, and Post-closure). This is considered acceptable because the predictions of the effects of the Project to the groundwater flow system are expected to be overestimated because of bigger stresses.

2 The rock storage piles are expected to be characterized by hydraulic conductivities several magnitudes higher than overburden and bedrock due to high porosities between the rocks. The recharge over the rock storage piles is assumed to remain unaffected (i.e., reduced or increased compared to baseline) and transmitted quickly to the base of the piles.

## 6.6 Model Results for the Proposed Pond Designs

This section presents the model predictions for the proposed EA mine plan (i.e., EMP, NMP, and WMP lined with engineered 0.30 m thick soil-bentonite (S/B) compacted layers, and the Tenas Control Pond with a bituminous geomembrane or equivalent). Only parts of the WMP are lined: the portions outside the open pit (WMP Ex pit), and the portions inside the open pit (WMP In pit) that intercept overburden.

### 6.6.1 Current Conditions

The predictions of hydraulic heads are mapped in Figure 56.

### 6.6.2 Mining Conditions

**Open pit inflows and seepages underneath the mine facilities**

Table 6-6 compiles the groundwater inflow and outflow rates predicted at the open pit, the Tenas Control Pond, and the management ponds. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to design the water management system and evaluate the overall effects of the Project to surface water.

The open pit inflows range between 320 and 890 $m^3/d$. Under groundwater conditions alone, inflows of these magnitudes are typically managed with open pit sumps and do not require active dewatering systems. The seepage rate underneath the control pond is 140 $m^3/d$. The total seepage rate underneath the management ponds at end-of mine is 1,490 $m^3/d$.

**Table 6-6: Forecasts of open pit inflows and seepages during operations**

| Feature | | Groundwater flow rate ($m^3/d$) | | | |
|---|---|---|---|---|---|
| | | EoY1 | EoY7 | EOM | *Worst case (1)* |
| Open pit inflows | IN | 0 | 0 | 0 | 846 |
| | OUT | 0 | 0 | 0 | na |
| Control Pond | IN | 140 | 140 | 140 | na |
| | OUT | 0 | 0 | 0 | na |
| NMP | IN | 198 | 198 | 198 | na |
| | OUT | 0 | 0 | 0 | na |
| EMP | IN | 0 | 458 | 458 | na |
| | OUT | 0 | 0 | 0 | na |
| WMP | IN | 0 | 0 | 836 | na |
| | OUT | 0 | 0 | 139 | Na |
| Total: Management ponds (NMP, EMP, WMP) | IN | 198 | 656 | 1492 | na |
| | OUT | 0 | 0 | 139 | 846 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01l-lc, 08-02l-lc, 08-03l-lc, 08-04-lc.

**Notes:**

[1] Worst case drawdown scenario: no MPs (i.e., no infiltration), only open pit dewatering
IN = flow into the model (i.e., seepage or infiltration)
OUT = flow out of the model (i.e., discharges into surface)
na, not applicable

### Predicted levels and changes compared to baseline conditions

Figures 57 to 59 present the predicted hydraulic heads and changes to heads compared to baseline conditions for EoY1, EoY7, and EOM. The model predicts the drawdown induced by the open pit dewatering (i.e., long term, EOM conditions) could extend up to a maximum of 18 $km^2$. The influence of the management ponds and the control pond stop the progression of the drawdown to the north; in this area the model predicts a groundwater mound of about 14 $km^2$. Neither the drawdown cone nor the groundwater reaches private well locations.

Figure 60 shows the hypothetical worst-case drawdown extent, when the open pit is assumed to be fully excavated, open pit dewatering active, but no Control Pond or management ponds impede the progression of groundwater drawdown. These hypothetical models predicted a drawdown area of approximately 34 $km^2$; but did not reach private well locations.

### Predicted changes to surface water baseflows

Table 6-7 compiles the predicted differences of groundwater baseflow between baseline and operations at surface water stations. Figure 4, and Figure 56 to 66 show the locations of the WQS stations. The results are expressed in relative percent differences (RPD). These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-7: Forecasts of changes to creek baseflows during operations**

| Stations | Changes to net baseflows compared to baseline (%) | | | |
|---|---|---|---|---|
| | EoY1 | EoY7 | EOM | *Worst case* [(1)] |
| **Tenas Creek stations** | | | | |
| WQS01 | -0.1% | -0.2% | -0.4% | -0.4% |
| WQS02 | -1.1% | -3.9% | 1.7% | -5.2% |
| WQS22 | -1.0% | -5.9% | 3.4% | -9.2% |
| WQS04 | -0.9% | -5.6% | 3.3% | -8.7% |
| Tenas Creek U/S Goathorn Creek | -0.9% | -5.5% | 3.2% | -8.6% |
| **Four Creek stations** | | | | |
| WQS03 | -0.7% | -20.5% | -29.8% | -29.7% |
| WQS21 | -1.5% | -22.0% | -34.4% | -37.6% |
| WQS20 | -2.6% | -21.3% | -32.8% | -38.3% |
| WQS03DS | -4.2% | -5.0% | -0.3% | -33.7% |
| Four Creek U/S Goathorn Creek | -4.1% | -4.9% | -0.2% | -33.0% |
| **Goathorn Creek stations** | | | | |
| WQS13 | 0.0% | 0.0% | 0.0% | 0.0% |
| WQS06US | 0.0% | -0.2% | -0.2% | -0.1% |
| WQS06 | -0.3% | -0.5% | -0.1% | -2.6% |
| WQS05 | -0.5% | -1.9% | 0.8% | -4.3% |
| Goathorn Creek U/S Telkwa River | -0.5% | -1.9% | 0.8% | -4.2% |
| **Telkwa River stations** | | | | |
| WQS09 | -0.4% | -1.6% | 0.7% | -3.7% |
| Telkwa River U/S Bulkley River | -0.4% | -1.5% | 0.7% | -3.5% |
| **Bulkley River stations** | | | | |
| WQS11 | <0.1% | <-0.1% | <-0.1% | <0.1% |
| WQS12 | <-0.1% | <-0.1% | <0.1% | <0.1% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01l-lc, 08-02l-lc, 08-03l-lc, 08-04-lc.

**Notes:**

[1] Worst case drawdown scenario: no MPs (i.e., no infiltration), only open pit dewatering

### Potential migration of mine-affected water

Figures 62 to 66 show the predicted particle paths for EoY1 (one year of travel time), EoY7 (seven years of travel time), and EOM (25 years of travel time). No particles are predicted to discharge into creeks by the EoY1 or EOY7. The models predict mine-affected groundwater could potentially start discharging into Tenas Creek after about 16 years. In the first 25 years, no particle is predicted to discharge into Four Creek, Goathorn Creek, Telkwa River, or near the private wells downstream of the Project.

Table 6-8 compiles the EOM forecasts of the potential contributions of mine affected baseflows by sources after 25 years. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-8: Forecasts of mine affected baseflow at EOM**

| ID | Potential contributions of mine affected groundwater after 25 years in % of baseflow under EOM conditions | | | |
|---|---|---|---|---|
| | NMP | EMP | WMP | Tenas Control Pond |
| **Tenas Creek** | | | | |
| WQS02 | - | - | 0.5% | - |
| WQS22 | 0.2% | - | 0.7% | - |
| WQS04 | 0.1% | - | 0.7% | - |
| **Four Creek** | | | | |
| WQS03 | - | - | - | - |
| WQS21 | - | - | - | - |
| WQS20 | - | - | - | - |
| WQS03DS | - | - | - | - |
| **Goathorn Creek** | | | | |
| WQS06US | - | - | - | - |
| WQS06 | - | - | - | - |
| WQS05 | <0.1% | - | 0.2% | - |
| **Telkwa Creek** | | | | |
| WQS09 | <0.1% | - | <0.1% | - |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-03l-lc

**Note:**

-, no discharge predicted

### 6.6.3 Post-Closure Conditions

#### Open pit inflows and seepages underneath the mine facilities

Table 6-9 compiles the groundwater inflow and outflow rates predicted at the open pit and the management ponds. These predictions served as inputs to the Water Balance and Load Model (WBLM) to design the water management system and evaluate the overall effects of the Project to surface water.

**Table 6-9: Forecasts of open pit inflows and seepages at Post-closure**

| Feature | | Groundwater flow rate ($m^3/d$) |
|---|---|---|
| Open pit walls | IN | 0 |
| | OUT | 120 |
| Open pit Lake (909 masl) | IN | 0 |
| | OUT | 213 |
| Saturated waste rock (901 masl) | IN | 7 |
| | OUT | 51 |
| Total: open pit walls, open pit lake, and saturated waste rock | IN | 7 |
| | OUT | 384 |
| NMP | IN | 198 |
| | OUT | 0 |
| EMP | IN | 458 |
| | OUT | 0 |
| WMP | IN | 819 |
| | OUT | 137 |
| Total: Management ponds | IN | 1475 |
| | OUT | 137 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05l-lc

**Notes:**

IN = flow into the model (i.e., seepage or infiltration)
OUT = flow out of the model (i.e., discharges into surface)

### Predicted levels and changes compared to baseline conditions

Figure 61 shows the predicted hydraulic heads and changes to heads compared to baseline conditions for post-closure. The model predicts a drawdown extending up to a maximum of 15 $km^2$ and a mound of about 13 $km^2$. The models predict neither the drawdown cone nor the groundwater mound reach private well locations.

### Predicted changes to surface water baseflows

Table 6-10 compiles the predicted differences of groundwater baseflow between baseline conditions and post-closure conditions. The results are expressed in RPD. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-10: Forecasts of changes to creek baseflows Post-closure**

| Station | Changes to net baseflows compared to baseline (%) |
|---|---|
| **Tenas Creek stations** | |
| WQS01 | -0.3% |
| WQS02 | 1.9% |
| WQS22 | 3.1% |
| WQS04 | 3.0% |
| Tenas Creek U/S Goathorn Creek | 2.9% |
| **Four Creek stations** | |
| WQS03 | -22.7% |
| WQS21 | -25.0% |
| WQS20 | -22.3% |
| WQS03DS | 4.0% |
| Four Creek U/S Goathorn Creek | 4.0% |
| **Goathorn Creek stations** | |
| WQS13 | 0.0% |
| WQS06US | 0.0% |
| WQS06 | 0.3% |
| WQS05 | 1.1% |
| Goathorn Creek U/S Telkwa River | 1.1% |
| **Telkwa River stations** | |
| WQS09 | 1.0% |
| Telkwa River U/S Bulkley River | 0.9% |
| **Bulkley River stations** | |
| WQS11 | <0.1% |
| WQS12 | <0.1% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05l-lc

### Potential migration of mine-affected water

Figure 62 to 66 show the predicted post-closure particle paths at different times including long term paths; Table 6-11 and Figure 67 summarize the predicted travel times before particles discharge into creeks; and Table 6-12 compiles the predicted long term contribution of mine affected baseflows by sources. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

Three private wells (Goalder, Mapletoft, and Baker) are in the Telkwa River valley are shown to be potentially within the paths of mine affected groundwater. These wells pump groundwater from a fluvial aquifer at a relatively shallow depth (i.e., 15 to 30m deep according to MOE's database) in the Telkwa River valley bottom. The potential maximum effects from the Project on quality of the pumped well water was calculated using the following loading equation:

$$Q_w \times C_w = Q_b \times C_b + \Sigma (Q_i \times C_i)$$

$Q_w$, groundwater flow into the Telkwa River valley.
$C_w$, concentration of the groundwater into the Telkwa River valley.
$Q_b$, flow contribution from background groundwater.
$C_b$, concentration of background groundwater (baseline).
$Q_i$, flow contribution from mine feature i.
$C_i$, concentration of from mine feature I (source terms).

For a unit volume of $Q_w$, $C_w$ can be expressed using percentage contributions relative to each source, as predicted by the particle path analyses.

$$C_w = P_b \times C_b + P_m \times \Sigma (P_i \times C_i)$$

$P_b$, percentage contribution of background groundwater into the Telkwa River valley.
$P_m$, percentage contribution of mine affected groundwater into the Telkwa River valley.
$P_i$, percentage contribution of from a mine feature I to the total mine affected groundwater.

Calculations assumed:

- The loads from the mine are permanent, and constituents migrated to the Telkwa River and constantly discharging into the fluvial aquifer (i.e., post-closure, pseudo -steady state conditions). The predicted travel times (i.e., > 400 years) are not considered in the analysis.
- The private wells pumps groundwater exclusively from the southern side of the Telkwa River valley, upstream of WQS09. The potential contributions from the northern side of the Telkwa River catchment, and from upstream of the project influence (i.e., western limit of the model domain) are not accounted.
- The mass of constituents in groundwater is conserved. The mine affected groundwater is transported by advection (i.e., no diffusion, dispersion, nor natural attenuation mechanisms).
- The parameter's concentrations can be calculated based on the post-closure predictions of mine affected baseflow contributions from the southern side of the Telkwa River valley, upstream of WQS09 (i.e., groundwater numerical model predictions), the average baseline groundwater quality (see Section 4.6), and the water quality at the open pit lake, open pit backfill, NMP, EMP, WMP, and Control Pond (average winter concentrations predicted by the WBLM).

The analysis is provided in Appendix H. The results show that no constituents are predicted to exceed the BC-DWG.

**Table 6-11: Predicted travel times before discharges into creeks**

| | |
|---|---|
| Tenas Creek | First particle discharged into Tenas Creek after 15 years. 50% of particles discharged after 65 years, 72% after 400 years |
| Four Creek | First particle discharged into Four Creek after 38 years. 50% of particles discharged after 95 years, all particles discharged after 180 years. |
| Goathorn Creek | First particle discharged into Goathorn Creek after 184 years. 50% of particles discharged after 320 years, 62% after 400 years |
| Telkwa River | First particle discharged into Telkwa River after 400 years. |

**Table 6-12: Forecasts of mine affected baseflow at Post-closure**

| ID | Potential long-term contributions of mine affected groundwater under post-closure conditions | | | | |
|---|---|---|---|---|---|
| | NMP | EMP | WMP | PL | SWr |
| **Tenas Creek** | | | | | |
| WQS02 | - | - | 4.3% | - | - |
| WQS22 | 1.5% | - | 7.2% | - | <0.1% |
| WQS04 | 1.5% | 0.3% | 7.4% | - | <0.1% |
| **Four Creek** | | | | | |
| WQS03 | - | - | - | - | - |
| WQS21 | - | - | - | - | - |
| WQS20 | - | - | - | - | - |
| WQS03DS | - | 17.0% | - | - | - |
| **Goathorn Creek** | | | | | |
| WQS06US | - | - | - | - | - |
| WQS06 | - | 2.1% | 0.2% | - | - |
| WQS05 | 0.5% | 1.5% | 2.5% | - | <0.1% |
| **Telkwa River** | | | | | |
| WQS09 | 0.1% | 0.2% | 0.4% | - | <0.1% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05l-lc

**Note:**

PL, post-closure open pit lake (909 masl)

SWr, post-closure saturated waste rock (901 masl)

-, no discharge predicted

## 6.7 Model Results For Modified Designs of the Ponds

This section presents mining and post-closure model predictions for two variations of the pond designs [1]:

- Mitigation design #1:
  - S/B0.56 for EMP, NMP, and WMP (excluding WMP End Wall rock);
  - B0.15 for the Tenas Control Pond.
- Mitigation design #2:
  - B0.30 for EMP;
  - S/B0.56 for NMP and WMP (excluding WMP End Wall rock);
  - B0.15 for the Tenas Control Pond.

Table 6-13 compiles the Well (point-source fluid-flux) boundary seepage flows calculated for these designs. Seepage rates through soil-bentonite liners calculated from 2D Seep W modelling documented in 7Appendix E. Seepage rates through bituminous geomembrane on top of soil-bentonite liners were calculated using the analytical solution presented in Giroud (1997) for the migration of liquid through composite liners with geomembrane defects. The analysis is documented in 7Appendix F.

**Table 6-13: Mitigations - Estimated seepage rates through designed liners at the end of Mining**

| Case | Total seepage rate under liners ($m^3/d$) | | | |
|---|---|---|---|---|
| | **Control Pond** (B0.15) | **EMP** (S/B0.56) | **NMP** (S/B0.56) | **WMP** (S/B0.56) |
| Mitigation #1 | 8 | 277 | 87 | 373 |
| Mitigation #2 | 8 | 63 | 87 | 373 |

Sources: Appendix E, F, and surface areas from TML 2020.

### 6.7.1 Mining Conditions

#### Open pit inflows and seepages underneath the mine facilities

Table 6-14 and Table 6-15 compile the groundwater inflow and outflow rates predicted at the open pit, the Control Pond, and the management ponds. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

For the Mitigation #1 scenario, the open pit inflows range between 240 and 700 $m^3/d$. The total seepage rate underneath the management ponds at end-of mine is 740 $m^3/d$.

[1] S/B signifies this is a soil-bentonite liner.
B signifies that a bituminous liner is placed on top of a soil-bentonite liner
The value indicates the thickness in meter of the soil-bentonite liner.

For the Mitigation #2 scenario, the open pit inflows range between 240 and 670 $m^3/d$. The total seepage rate underneath the management ponds at end-of mine is 520 $m^3/d$.

**Table 6-14: Mitigation#1 - Forecasts of open pit inflows and seepages during operations**

| Feature | | Groundwater flow rate ($m^3/d$) | | |
|---|---|---|---|---|
| | | EoY1 | EoY7 | EOM |
| Open pit inflows | IN | 0 | 0 | 0 |
| | OUT | 237 | 699 | 381 |
| Tenas Control Pond | IN | 8 | 8 | 8 |
| | OUT | 0 | 0 | 0 |
| NMP | IN | 87 | 87 | 87 |
| | OUT | 0 | 0 | 0 |
| EMP | IN | 0 | 277 | 277 |
| | OUT | 0 | 0 | 0 |
| WMP | IN | 0 | 0 | 373 |
| | OUT | 0 | 0 | 0 |
| Total: Management ponds (NMP, EMP, WMP) | IN | 87 | 364 | 737 |
| | OUT | 0 | 0 | 0 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01z-lc, 08-02z-lc, 08-03z-lc

**Notes:**

IN = flow into the model (i.e., seepage or infiltration)
OUT = flow out of the model (i.e., discharges into surface)

**Table 6-15: Mitigation#2 - Forecasts of open pit inflows and seepages during operations**

| Feature | | Groundwater flow rate ($m^3/d$) | | |
|---|---|---|---|---|
| | | EoY1 | EoY7 | EOM |
| Open pit inflows | IN | 0 | 0 | 0 |
| | OUT | 237 | 675 | 377 |
| Control Pond | IN | 8 | 8 | 8 |
| | OUT | 0 | 0 | 0 |
| NMP | IN | 87 | 87 | 87 |
| | OUT | 0 | 0 | 0 |
| EMP | IN | 0 | 63 | 63 |
| | OUT | 0 | 0 | 0 |
| WMP | IN | 0 | 0 | 373 |
| | OUT | 0 | 0 | 560 |
| Total: Management ponds (NMP, EMP, WMP) | IN | 87 | 150 | 523 |
| | OUT | 0 | 0 | 560 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01zb-lc, 08-02zb-lc, 08-03zb-lc

**Notes:**

IN = flow into the model (i.e., seepage or infiltration)
OUT = flow out of the model (i.e., discharges into surface)

### Predicted levels and changes compared to baseline conditions

For the Mitigation #1 scenario, the models predict the drawdown induced by the open pit dewatering (i.e., long term, EOM conditions) could extend up to a maximum of 32 $km^2$. The models predict neither the drawdown cone nor the mound reach private well locations.

For the Mitigation #2 scenario, the models predict the drawdown induced by the open pit dewatering (i.e., long term, EOM conditions) could extend up to a maximum of 34 $km^2$. The models predict neither the drawdown cone nor the mound reach private well locations.

### Predicted changes to surface water baseflows

Table 6-16 and Table 6-17 compile the predicted differences of groundwater baseflow between baseline and operations at surface water stations. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-16: Mitigation #1 - Forecasts of changes to creek baseflows during operations**

| Stations | Changes to net baseflows compared to baseline (%) | | |
|---|---|---|---|
| | EoY1 | EoY7 | EOM |
| **Tenas Creek stations** | | | |
| WQS01 | -0.2% | -0.3% | -0.4% |
| WQS02 | -3.3% | -5.1% | -3.6% |
| WQS22 | -6.8% | -9.2% | -6.8% |
| WQS04 | -6.5% | -8.8% | -6.4% |
| Tenas Creek U/S Goathorn Creek | -6.4% | -8.6% | -6.3% |
| **Four Creek stations** | | | |
| WQS03 | -5.3% | -22.3% | -29.6% |
| WQS21 | -8.3% | -26.4% | -37.1% |
| WQS20 | -9.2% | -27.2% | -37.7% |
| WQS03DS | -20.8% | -21.5% | -26.7% |
| Four Creek U/S Goathorn Creek | -20.4% | -21.1% | -26.2% |
| **Goathorn Creek stations** | | | |
| WQS13 | 0.1% | 0.0% | 0.0% |
| WQS06US | 0.0% | -0.1% | 0.0% |
| WQS06 | -1.6% | -1.7% | -2.0% |
| WQS05 | -2.9% | -3.7% | -3.2% |
| Goathorn Creek U/S Telkwa River | -2.9% | -3.6% | -3.2% |
| **Telkwa River stations** | | | |
| WQS09 | -2.5% | -3.2% | -2.8% |
| Telkwa River U/S Bulkley River | -2.4% | -3.0% | -2.7% |
| **Bulkley River stations** | | | |
| WQS11 | 0.0% | 0.0% | 0.0% |
| WQS12 | 0.0% | 0.0% | 0.0% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01z-lc, 08-02z-lc, 08-03z-lc

**Table 6-17: Mitigation #2 - Forecasts of changes to creek baseflows during operations**

| Stations | Changes to net baseflows compared to baseline (%) | | |
|---|---|---|---|
| | EoY1 | EoY7 | EOM |
| **Tenas Creek stations** | | | |
| WQS01 | -0.2% | -0.3% | -0.4% |
| WQS02 | -3.3% | -5.2% | -3.7% |
| WQS22 | -6.8% | -9.6% | -7.1% |
| WQS04 | -6.5% | -9.1% | -6.8% |
| Tenas Creek U/S Goathorn Creek | -6.4% | -9.0% | -6.7% |
| **Four Creek stations** | | | |
| WQS03 | -5.3% | -22.4% | -29.7% |
| WQS21 | -8.3% | -27.5% | -37.8% |
| WQS20 | -9.2% | -28.3% | -38.4% |
| WQS03DS | -20.8% | -31.7% | -36.7% |
| Four Creek U/S Goathorn Creek | -20.4% | -31.1% | -36.0% |
| **Goathorn Creek stations** | | | |
| WQS13 | 0.1% | 0.0% | 0.0% |
| WQS06US | 0.0% | -0.1% | -0.1% |
| WQS06 | -1.6% | -2.4% | -2.8% |
| WQS05 | -2.9% | -4.3% | -3.9% |
| Goathorn Creek U/S Telkwa River | -2.9% | -4.3% | -3.9% |
| **Telkwa River stations** | | | |
| WQS09 | -2.5% | -3.7% | -3.4% |
| Telkwa River U/S Bulkley River | -2.4% | -3.5% | -3.2% |
| **Bulkley River stations** | | | |
| WQS11 | 0.0% | 0.0% | 0.0% |
| WQS12 | 0.0% | -0.1% | 0.0% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01zb-lc, 08-02zb-lc, 08-03zb-lc

#### Potential migration of mine-affected water

In the first 25 years, there is no particle predicted to discharge into Tenas Creek, Goathorn Creek, Telkwa River, or private wells downstream of the project. The models predict mine-affected groundwater could potentially start discharging into Tenas Creek after about 40 years for the Mitigation #1 scenario, and after about 43 years for the Mitigation #2 scenario.

### 6.7.2 Post-Closure conditions

#### Open pit Inflows and seepages underneath the mine facilities

Table 6-18 compiles the groundwater inflow and outflow rates predicted at the open pit and the management ponds. These predictions served as inputs to the Water Balance and Load Model (WBLM) to design the water management system and evaluate the overall effects of the Project to surface water.

**Table 6-18: Mitigations - Forecasts of open pit inflows and seepages at Post-closure**

| Feature | | Groundwater flow rate ($m^3/d$) | |
|---|---|---|---|
| | | Mitigation #1 | Mitigation #2 |
| Open pit walls | IN | 0 | 0 |
| | OUT | 91 | 94 |
| Open pit Lake (909 masl) | IN | 0 | 0 |
| | OUT | 212 | 214 |
| Saturated waste rock (901 masl) | IN | 11 | 9 |
| | OUT | 47 | 48 |
| Total: open pit walls, open pit lake, and saturated waste rock | IN | 11 | 9 |
| | OUT | 350 | 356 |
| NMP | IN | 87 | 87 |
| | OUT | 0 | 0 |
| EMP | IN | 63 | 277 |
| | OUT | 0 | 0 |
| WMP | IN | 709 | 692 |
| | OUT | 119 | 129 |
| Total: Management ponds | IN | 859 | 1056 |
| | OUT | 119 | 129 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05z-lc, 08-05zb-lc

**Notes:**

IN = flow into the model (i.e., seepage or infiltration)

OUT = flow out of the model (i.e., discharges into surface)

### Predicted levels and changes compared to baseline conditions

For the Mitigation #1 scenario, the model predicts a drawdown extending up to a maximum of 17 $km^2$ and a mound of about 5 $km^2$. The models predict neither the drawdown cone nor the groundwater mound reach private well locations.

For the Mitigation #2 scenario, the model predicts a drawdown extending up to a maximum of 26 $km^2$ and a mound of about 2 $km^2$. The models predict neither the drawdown cone nor the mound reach private well locations.

### Predicted changes to surface water baseflow

Table 6-19 compiles the predicted differences of groundwater baseflow between baseline conditions and post-closure conditions. The results are expressed in RPD. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-19: Mitigation #1 - Forecasts of changes to creek baseflows at Post-closure**

| Station | Changes to net baseflows compared to baseline (%) | |
|---|---|---|
| | Mitigation #1 | Mitigation #2 |
| **Tenas Creek stations** | | |
| WQS01 | -0.3% | -0.3% |
| WQS02 | 0.8% | 0.8% |
| WQS22 | 0.0% | 0.0% |
| WQS04 | 0.0% | 0.0% |
| Tenas Creek U/S Goathorn Creek | 0.0% | 0.0% |
| **Four Creek stations** | | |
| WQS03 | -22.7% | -22.7% |
| WQS21 | -25.8% | -25.8% |
| WQS20 | -26.2% | -26.2% |
| WQS03DS | -8.4% | -8.4% |
| Four Creek U/S Goathorn Creek | -8.2% | -8.2% |
| **Goathorn Creek stations** | | |
| WQS13 | 0.0% | 0.0% |
| WQS06US | 0.0% | 0.0% |
| WQS06 | -0.6% | -0.6% |
| WQS05 | -0.4% | -0.4% |
| Goathorn Creek U/S Telkwa River | -0.4% | -0.4% |
| **Telkwa River stations** | | |
| WQS09 | -0.4% | -0.4% |
| Telkwa River U/S Bulkley River | 0.0% | 0.0% |
| **Bulkley River stations** | | |
| WQS11 | 0.0% | 0.0% |
| WQS12 | 0.0% | 0.0% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05z-lc, 08-05zb-lc

### Potential migration of mine-affected water

Table 6-20 and Table 6-21 compile the predicted long-term contribution of mine affected baseflow by source. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

At the three private wells (Goalder, Mapletoft, and Baker), located in the Telkwa River valley and potentially within the long-term paths of mine affected groundwater, no constituents are predicted to exceed the BC-DWG.

**Table 6-20: Mitigation #1 - Forecasts of mine affected baseflow at Post-closure**

| ID | Potential long-term contributions of mine affected groundwater under post-closure conditions | | | | |
|---|---|---|---|---|---|
| | NMP | EMP | WMP | PL | SWr |
| **Tenas Creek** | | | | | |
| WQS02 | - | - | 2.6% | - | - |
| WQS22 | 0.5% | - | 7.9% | - | - |
| WQS04 | 0.5% | <0.1% | 7.8% | - | - |
| **Four Creek** | | | | | |
| WQS03 | - | - | - | - | - |
| WQS21 | - | - | - | - | - |
| WQS20 | - | - | - | - | - |
| WQS03DS | - | 2.9% | - | - | - |
| **Goathorn Creek** | | | | | |
| WQS06US | - | - | - | - | - |
| WQS06 | - | 0.3% | 0.1% | - | - |
| WQS05 | 0.1% | 0.2% | 2.3% | - | - |
| **Telkwa River** | | | | | |
| WQS09 | <0.1% | <0.1% | 0.4% | - | - |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05z-lc

**Note:**
PL, post-closure open pit lake (909 masl)
SWr, post-closure saturated waste rock (901 masl)
-, no discharge predicted

**Table 6-21: Mitigation #2 - Forecasts of mine affected baseflow at Post-closure**

| ID | Potential long-term contributions of mine affected groundwater under post-closure conditions | | | | |
|---|---|---|---|---|---|
| | NMP | EMP | WMP | PL | SWr |
| **Tenas Creek** | | | | | |
| WQS02 | - | - | 2.7% | - | - |
| WQS22 | 0.5% | - | 7.5% | - | <0.1% |
| WQS04 | 0.4% | <0.1% | 7.6% | - | <0.1% |
| **Four Creek** | | | | | |
| WQS03 | - | - | - | - | - |
| WQS21 | - | - | - | - | - |
| WQS20 | - | - | - | - | - |
| WQS03DS | - | 2.9% | - | - | - |
| **Goathorn Creek** | | | | | |
| WQS06US | - | - | - | - | - |
| WQS06 | - | 0.3% | 0.2% | - | <0.1% |
| WQS05 | 0.1% | 0.2% | 2.3% | - | <0.1% |
| **Telkwa River** | | | | | |
| WQS09 | <0.1% | <0.1% | 0.4% | - | <0.1% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05zb-lc

**Note:**
PL, post-closure open pit lake (909 masl)
SWr, post-closure saturated waste rock (901 masl)
-, no discharge predicted

## 6.8 Model Sensitivity

The sensitivity analysis consisted of a comparison between the model outputs of the calibrated model and the sensitivity models listed in Table 6-22. The outputs included, for baseline conditions, the NRMSE of observed versus predicted heads and estimated versus predicted baseflows, and for EOM and post-closure conditions, the predictions of drawdown extent, changes to creek baseflows, travel times from Project to creeks, and contributions of mine affected water to creeks. The sensitivity models corresponded to scenarios where properties were varied without recalibration of the model (i.e., sensitivity simulations do not represent alternative conceptualisations of the site). They included variations to hydraulic conductivities and specific yields; storage compressibility was excluded because this parameter influences the release of groundwater from storage, which is negligible under steady state conditions. Alike storage compressibility, specific yield controls the release of storage hence has negligible influence on steady state heads and baseflows; it influences however the predicted travel times of mine affected groundwater to creeks. Feflow uses specific yield as a proxy for the effective porosity (i.e., drainable porosity) to calculate the groundwater velocity (i.e., $q = K/n_e$ with q, velocity of groundwater, K, hydraulic conductivity, and $n_e$ effective porosity).

**Table 6-22: Sensitivity scenarios**

| Parameter | Description | ID |
|---|---|---|
| K All Units | Outlier condition where K maximized (2.7 x $K_{calibrated\ model}$) while calibration held near 10% NRMSE) | HighK |
| Recharge | R= 30% MAP (R baseline x3.50) | R+ |
| | R= 5% MAP (R baseline x0.58) | R- |
| K sand-gravel-rich till | plus one standard deviation (Kxyz baseline x11.5) | Kst+ |
| | minus one standard deviation (Kxyz baseline x0.09) | Kst- |
| | Lower effective porosity value of 0.3 | Nst+ |
| | Higher effective porosity of 0.1 | Nst- |
| K silt-clay-rich till | plus one standard deviation (Kxyz baseline x10.71) | Kct+ |
| | minus one standard deviation (Kxyz baseline x0.09) | Kct- |
| | Lower effective porosity value of 0.2 | Nct+ |
| | Higher effective porosity of 0.05 | Nct- |
| K Skeena group | plus one standard deviation (Kxyz baseline x17.26) | Ksk+ |
| | minus one standard deviation (Kxyz baseline x0.06) | Ksk- |
| | Ratio Kxy/Kz=10 | Anisk+ |
| | Ratio Kxy=Kz (no anisotropy) | Anisk- |
| | Lower effective porosity value of 0.25 | Nsk+ |
| | Higher effective porosity of 0.05 | Nsk- |
| K Volcanic rocks | plus one standard deviation (Kxyz baseline x7.1) | Kvl+ |
| | minus one standard deviation (Kxyz baseline x0.14) | Kvl- |
| | Lower effective porosity value of 0.1 | Nvl+ |
| | Higher effective porosity of 0.02 | Nvl- |

**Note:** The standard deviations of K respective to each hydrostratigraphic unit were calculated using the site-specific K measurements distributed on a log scale (i.e., Table 4-1).

The specific yield values correspond to the lower and higher ranges for sand, silt, sandstone, and basalt, as reported in *Singhal BBS, and RP Gupta. 2010. Applied hydrogeology of fractured rocks: second edition. Springer, New York, USA. 408 p*.

'xyx' refers to the principal directions of the hydraulic conductivity tensor; x and y correspond to the horizontal plane or directions parallel to beddings, and z corresponds to the vertical plane or directions perpendicular to the bedding planes.

The relative percent differences (RPD) between the calibrated model scenarios and the sensitivity scenarios were rated according to the definitions listed in Table 6-23. The ratings of the calibration outputs took into consideration that a difference of about less than 6% with the calibrated heads or baseflows NRMSE implied the calibration target would remain close to the minimum 10% threshold generally accepted in BC. The ratings for prediction outputs were based on differences of less than 10% with predicted values. A ten percent difference compared to EOM or post-closure predictions corresponds to a maximum open pit inflow of 605 $m^3$/d, a maximum drawdown and mound extent of 34 $km^2$, a maximum of 13% change to baseflow at Tenas Creek upstream of Goathorn Creek and 11% at Goathorn Creek upstream of Telkwa River, a minimum travel time of 14 years before the first particle discharges at Tenas Creek upstream of WQS04, and a maximum contribution of mine affected groundwater of 15% at Tenas Creek upstream of WQS04m and 10% at Goathorn Creek at WQS06).

**Table 6-23: Ratings of sensitivity model calibration and prediction**

| Significance | Calibration | Prediction |
|---|---|---|
| Null | <1% difference with calibrated NRMS. | <5% RPD of predicted value. |
| Low | 1 to 3% difference with calibrated NRMS. | 5–10% RPD of the predicted value. |
| Medium | 3 to 6% difference with calibrated NRMS. | 10–30% RPD to the predicted value. |
| High | >6% difference with calibrated NRMS. | >30% RPD of the predicted value. |

Parameters were classified into sensitivity types as defined by Brown (1996):

- **Type I:** There are insignificant effects for both model calibration residuals and predictive model results (relative to modelling objectives). In other words, within a reasonable range of parameter values, the model outcomes are not significantly affected. This parameter type does not need further data collection or monitoring. Type I sensitivities are of little concern because the impact on predictions is insignificant.
- **Type II:** There is a significant effect on model calibration, but an insignificant effect on predictive model results (relative to modelling objectives). The model calibration is affected (residuals increase for some part of the parameter range being tested) so the parameter influences the calibration goodness of fit. However, the results of the predictive model are still insensitive to this parameter. Type II sensitivities are of little concern because the impact on predictions is insignificant.
- **Type III:** There are significant effects on both model calibration and model prediction results (relative to modelling objectives). The parameter influences the calibration goodness of fit and a corresponding effect on the predictive model results. Type III sensitivity is of concern only for an uncalibrated model, or where a wide range of calibrations are possible, and proper calibration of this parameter is the solution. The sensitivity is important, but it is known and can be avoided by model calibration.

- **Type IV:** There is an insignificant effect on model calibration, but a significant effect on predictive model results (relative to modelling objectives). The model calibration is not affected and does not help constrain this parameter value, while the results of the predictive model are sensitive to this parameter. Type IV sensitivity is cause for concern because non-uniqueness, the model input may allow for a range of valid calibrations, but the choice of value significantly impacts model prediction. It is important to determine the actual value of this parameter and not rely on model calibration to estimate this parameter. It should be measured with robust data (model field audit) and, ideally, the data should represent the same stresses as in the predictive model simulations.

Table 6-24 to Table 6-26 compile the results of the sensitivity analysis, and Table 6-27 the sensitivity types assigned to each parameter. The analysis shows that:

- The hydraulic head calibration is sensitive to global variations of hydraulic conductivity, recharge, and to the increase only of K in the sand-gravel-rich till and Skeena group units.
- The baseflow calibration is sensitive to global variations of hydraulic conductivity, recharge, and to the increase of K in the silt-clay-rich till, sand-gravel rich till and Skeena group units.
- The maximum open pit inflow predicted by the sensitivity models was about 1,550 $m^3/d$ in the case of a higher recharge at 30%, or when the Skeena group K increased by one standard deviation. The open pit inflow predictions are found to be sensitive to all parameters except specific yield, and type IV sensitivities are found with a:
  - Decrease to the silt-clay rich till K
  - Decrease to the sand-gravel rich till K
  - Increase or decrease to the Skeena group unit K anisotropy
  - Increase or decrease to the volcanic rocks K
- None of the scenarios predicted that groundwater drawdowns our mounds would reach the areas where private wells are located, downstream of the Project. Drawdown predictions are found to be sensitive to all parameters except for the increase to the sand-gravel rich till K, decrease to Skeena group K, and Skeena group anisotropy, and variations to specific yield. Type IV sensitivities are found with a:
  - Decrease to the silt-clay rich till K
  - Decrease to the sand-gravel rich till K
  - Increase or decrease to the volcanic rocks K
- All the sensitivity scenarios show larger effects of the Project on the baseflows in Tenas Creek compared to Goathorn Creek. Significant reductions to baseflows in Tenas Creek occur only in a few cases, when the recharge is increased (-14%) or the sand-gravel rich till K is varied by one standard deviation (- 21%); the other scenarios predict low changes. In Goathorn Creek, the maximum reduction predicted by the sensitivity models is -3%. Baseflow predictions are most sensitive to variations in recharge and sand-gravel rich till K. The variations to K in volcanic rock and the decrease to K in sand-gravel rich till are categorized as Type IV, which emphasizes the importance of actual site values for these parameters.

- The predicted times to private wells are more than at least 170 years for all scenarios. The travel times predictions are sensitive to all the tested parameters. Type IV sensitivities are found with a:
  - Decrease in sand-gravel rich till K
  - Decrease in silt-clay-rich till K
  - Decrease in Skeena group K
  - Variations the anisotropy in the Skeena group
  - Variations to the specific yield for all units
- The predictions of mine affected groundwater contribution to creeks were not found to be sensitive to any of the tested parameters. The sensitivity scenarios predicted a maximum contribution of 11% in Tenas Creek in the case of the Skeena group K increased by one standard deviation, and 1% in the Goathorn Creek. In terms of travel times, the WBLM (Section 4, Chapter 3 of the EAC Application) assume conservatively that 100% of the loads from potential waste and water management ponds are discharged into creeks after 25 years.

**Table 6-24: Sensitivity of the model calibration**

| ID | RPD (%) between calibrated model and sensitivity baseline scenarios | |
|---|---|---|
| | **Sensitivity to head calibration** | **Sensitivity to baseflow calibration** |
| Calibrated model | NRMSE: 3.2% | NRMSE: 3.6% |
| HighK | **4.0%** | **7.7%** |
| R+ | **3.8%** | **233.8%** |
| R- | 1.8% | **23.2%** |
| Kst+ | **4.0%** | **20.9%** |
| Kst- | 2.0% | -0.9% |
| Nst+ | 0.0% | 0.0% |
| Nst- | 0.0% | 0.0% |
| Kct+ | 1.9% | **5.7%** |
| Kct- | 0.2% | -0.9% |
| Nct+ | 0.0% | 0.0% |
| Nct- | 0.0% | 0.0% |
| Ksk+ | **6.9%** | **8.9%** |
| Ksk- | 1.9% | -1.4% |
| Anisk+ | 0.2% | 0.2% |
| Anisk- | 0.5% | 0.7% |
| Nsk+ | 0.0% | 0.0% |
| Nsk- | 0.0% | 0.0% |
| Kvl+ | 1.9% | 1.7% |
| Kvl- | 0.1% | -0.3% |
| Nvl+ | 0.0% | 0.0% |
| Nvl- | 0.0% | 0.0% |

Sources: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx

**Note**s:

The significance of effects to the model calibration and prediction are indicated by the format of the cell, with dark grey indicating high sensitivity, light grey medium sensitivity, pale yellow low sensitivity, and white no sensitivity.

**Table 6-25: Sensitivity analysis of the EOM outputs**

| ID | RPD (%) between calibrated model and sensitivity EOM scenarios | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Open pit inflow | Total extent of drawdown and mound | Changes to baseflow rates: | | Travel time of first particle discharged to: | | Contributions of mine affected groundwater to: | |
| | | | Tenas Ck u/s Goathorn Ck | Goathorn Ck u/s Telkwa Rv. | Tenas Ck u/s WQS04 | Four Ck u/s WQS03DS | Tenas Ck u/s WQS04 | Goathorn Ck u/s WQS06 |
| Calibrated model | $Q_{open\ pit}$ = 550 $m^3/d$ | Extent = 31 $km^2$ | dQ = 3.2% | dQ = 0.8% | T = 16 years | No particle | Q = 0.4% | Q = 0% |
| HighK | **+22%** | **+41.8%** | **+27.6** | +6.1% | **-50.0%** | 0.0% | +8.4% | +8.9% |
| R+ | **+180.5%** | **-20.0%** | **-10.5%** | -3.6% | -4.0% | **Particle at 11 yr** | -0.3% | -0.2% |
| R- | **-75.8%** | **+234.8%** | **+12.0%** | +3.2% | +8.8% | 0.0% | -0.2% | -0.2% |
| Kst+ | **-12.0%** | -2.5% | **-17.7%** | +7.9% | **-66.7%** | **Particle at 18 yr** | +1.4% | -0.2% |
| Kst- | **+127.7%** | **+33.4%** | **-10.6%** | -2.9% | **-77.0%** | **Particle at 5 yr** | -0.1% | -0.1% |
| Nst+ | 0.0% | 0.0% | 0.0% | 0.0% | **+24.3%** | 0.0% | 0.0% | 0.0% |
| Nst- | 0.0% | 0.0% | 0.0% | 0.0% | **-61.6%** | **Particle at 18 yr** | 0.0% | 0.0% |
| Kct+ | **-36.8%** | **+24.1%** | +6.8% | +1.2% | **+35.5%** | 0.0% | -0.5% | -0.2% |
| Kct- | **+24.7%** | **+12.4%** | -1.1% | -0.1% | **-12.2%** | 0.0% | -0.2% | -0.2% |
| Nct+ | 0.0% | 0.0% | 0.0% | 0.0% | -3.6% | 0.0% | 0.0% | 0.0% |
| Nct- | 0.0% | 0.0% | 0.0% | 0.0% | **-11.2%** | 0.0% | 0.0% | 0.0% |
| Ksk+ | **+160.3%** | **-12.0%** | +6.4% | +2.5% | **-78.3%** | 0.0% | +2.2% | -0.2% |
| Ksk- | **-79.6%** | -7.0% | -2.1% | +0.3% | **35.3%** | 0.0% | -0.6% | -0.2% |
| Anisk+ | **+31.5%** | **+10.4%** | +1.3% | +0.1% | **-15.9%** | 0.0% | -0.3% | -0.2% |
| Anisk- | **+88.9%** | +3.7% | +0.3% | +0.1% | +4.4% | 0.0% | 0.0% | -0.2% |
| Nsk+ | 0.0% | 0.0% | 0.0% | 0.0% | **-15.6%** | 0.0% | 0.0% | 0.0% |
| Nsk- | 0.0% | 0.0% | 0.0% | 0.0% | -1.2% | 0.0% | 0.0% | 0.0% |
| Kvl+ | **-11.5%** | **+291.6%** | +1.1% | +0.6% | +0.8% | 0.0% | -0.3% | -0.2% |
| Kvl- | **-47.4%** | **-20.2%** | -1.2% | -0.9% | +6.6% | 0.0% | -0.3% | -0.2% |
| Nvl+ | 0.0% | 0.0% | 0.0% | 0.0% | +6.8% | 0.0% | 0.0% | 0.0% |
| Nvl- | 0.0% | 0.0% | 0.0% | 0.0% | **-10.4%** | 0.0% | 0.0% | 0.0% |

Sources: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx, and Telkwa_EIA_Mdl travel time analz_20210119.xlsx

**Note**s:

The significance of effects to the model calibration and prediction are indicated by the format of the cell, with dark grey indicating high sensitivity, light grey medium sensitivity, pale yellow low sensitivity, and white no sensitivity.

u/s, upstream

**Table 6-26: Sensitivity analysis of the post-closure outputs**

| ID | RPD (%) between calibrated model and sensitivity post-closure scenarios | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total extent of drawdown and mound | Changes to baseflow rates: | | Travel time to discharge 50% of all particles respectively migrating to WQS04, WQS03DS or WQS06 | | | Contributions of mine affected groundwater to: | |
| | | Tenas Ck u/s Goathorn Ck | Goathorn Ck u/s Telkwa Rv. | Tenas Ck u/s WQS04 | Four Ck u/s WQS03DS | Goathorn Ck u/s WQS06 | Tenas Ck u/s WQS04 | Goathorn Ck u/s WQS06 |
| Calibrated model | Extent = 28 km$^2$ | dQ = 2.9% | dQ = 1.1% | T = 60 years | T = 96 years | T = 125 years | Q = 6% | Q = 0.3% |
| HighK | **+39.4%** | -26.7% | -5.9% | **-61.6%** | **-53.4%** | **-40.0%** | +8.2% | +13.9% |
| R+ | **-15.0%** | -7.0% | -2.6% | **-33.3%** | **-13.1%** | **+32.4%** | -4.4% | -0.4% |
| R- | **+265.1%** | +14.2% | +4.1% | -7.9% | +7.4% | **+84.7%** | +2.2% | +1.1% |
| Kst+ | -5.2% | -14.0% | 8.7% | **-74.3%** | **-56.4%** | **-63.8%** | -1.4% | 0.6% |
| Kst- | **+33.5%** | -7.6% | -2.1% | **+190.1%** | **+90.6%** | **+343.1%** | -1.8% | +0.1% |
| Nst+ | 0.0% | 0.0% | 0.0% | +1.7% | **+32.9%** | **+20.0%** | -0.1% | 0.0% |
| Nst- | 0.0% | 0.0% | 0.0% | **-59.0%** | **-50.3%** | **-52.3%** | +0.1% | 0.0% |
| Kct+ | +4.4% | +9.7% | +2.3% | **-18.7%** | -7.6% | **+205.5%** | +1.1% | -0.4% |
| Kct- | **+12.5%** | +1.8% | +0.8% | **-20.4%** | +6.0% | **-15.1%** | -1.9% | 0.3% |
| Nct+ | 0.0% | 0.0% | 0.0% | **-11.0%** | **+10.9%** | +3.7% | -0.1% | +0.1% |
| Nct- | 0.0% | 0.0% | 0.0% | **-18.8%** | -3.8% | -9.4% | 0.0% | 0.0% |
| Ksk+ | **+19.2%** | +10.2% | +4.5% | -1.5% | -10.2% | **-19.1%** | +4.6% | -0.5% |
| Ksk- | -2.2% | +0.6% | +0.9% | -1.2% | **+19.9%** | -6.4% | -2.1% | 0.0% |
| Anisk+ | +9.3% | +3.2% | +1.1% | **-31.3%** | +2.9% | **+70.5%** | -0.9% | +0.8% |
| Anisk- | +2.1% | +4.3% | +1.3% | **-22.6%** | 2.4% | 4.5% | -0.5% | +0.4% |
| Nsk+ | 0.0% | 0.0% | 0.0% | -7.9% | +1.3% | -2.7% | -0.1% | 0.0% |
| Nsk- | 0.0% | 0.0% | 0.0% | **-20.3%** | +3.3% | +1.2% | 0.0% | 0.0% |
| Kvl+ | **+315.7%** | +4.6% | +0.7% | -7.3% | +8.0% | **+89.1%** | +0.3% | +0.1% |
| Kvl- | **-18.3%** | +3.8% | +1.8% | **-12.2%** | +4.6% | **-8.0%** | -0.4% | +0.4% |
| Nvl+ | 0.0% | 0.0% | 0.0% | **-12.1%** | +2.9% | -4.9% | -0.1% | 0.1% |
| Nvl- | 0.0% | 0.0% | 0.0% | **-21.5%** | +0.5% | -2.4% | 0.0% | 0.0% |

Sources: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx, and Telkwa_EIA_Mdl travel time analz_20210119.xlsx

**Notes:**

The significance of effects to the model calibration and prediction are indicated by the format of the cell, with dark grey indicating high sensitivity, light grey medium sensitivity, pale yellow low sensitivity, and white no sensitivity.

u/s, upstream

**Table 6-27: Sensitivity types related for the predictions of changes to heads**

| Change in prediction results | Change in calibration: Insignificant | | | | | Change in calibration: Significant | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Type I** | | | | | **Type II** | | | | |
| **Insignificant** | **Open pit inflow** | **Changes to head** | **Changes to baseflow** | **Travel times** | **Mine affected contributions to baseflows** | **Open pit inflow** | **Changes to head** | **Changes to baseflow** | **Travel times** | **Mine affected contributions to baseflows** |
| | Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | *Ksk-*<br>*Anisk+/-*<br>Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | *Kct-*<br>*Ksk-*<br>*Anisk+/-*<br>Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | *Kvl+/-* | *Kst-*<br>*Kct-*<br>*Ksk-*<br>*Anisk+/-*<br>*Kvl+/-*<br>Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | - | *Kst+* | *HighK*<br>*Kct+*<br>*Ksk+* | - | *HighK*<br>*R+/-*<br>*Kst+*<br>*Kct+*<br>*Ksk+* |
| | **Type IV** | | | | | **Type III** | | | | |
| **Significant** | **Open pit inflow** | **Changes to head** | **Changes to baseflow** | **Travel times** | **Mine affected contributions to baseflows** | **Open pit inflow** | **Changes to head** | **Changes to baseflow** | **Travel times** | **Mine affected contributions to baseflows** |
| | *Kst-*<br>*Kct-*<br>*Ksk-*<br>*Anisk+/-*<br>*Kvl+/-* | *Kst-*<br>*Kct-*<br>*Kvl+/-* | *Kst-*<br>*Kvl+/-* | *Kst-*<br>*Kct-*<br>*Ksk-*<br>*Anisk+/-*<br>Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | - | *HighK*<br>*R+/-*<br>*Kst+*<br>*Kct+*<br>*Ksk+* | *HighK*<br>*R+/-*<br>*Kct+*<br>*Ksk+* | *R+/-*<br>*Kst+* | *HIghK*<br>*R+/-*<br>*Kst+*<br>*Kct+*<br>*Ksk+* | - |

## 6.9 Limitations of the Groundwater Model

The British Columbia Groundwater Modeling Guidelines (BC MOE 2012) defines three levels of modeling complexity based on potential impacts, modeling objectives, hydrogeological framework and data availability. The model developed here may be classified as moderate complexity, defined as follows: *"These are conceptual or numerical models based on a reasonable, though limited, dataset and having limited calibration. These models may be used to determine the potential range of change or to "bracket"* potential effects that may occur due to a given stress." Hence, while specific results are calculated during the modelling process, there always remains a degree of uncertainty associated with these estimates.

- The model is based on a unique conceptualisation of the 3D geology, constructed from the analyses of drillhole intercepts (TML's database), geological maps (surface and bedrock geology, regional and local maps, 2D cross sections; Clague 1984, MEMPR 1993, BCGS 2005, TML 2018), and considerations on the ability of a unit to convey groundwater. While geological structures have been mapped and do not appear to influence the flow system, it is not possible to confirm if other large-scale fractures and/or faults are connected and if they act as a conduit or as barrier to flows.
- The characterization of aquitards or aquicludes is uncertain because historical hydraulic conductivity measurements tended to be biased towards specific units (coal) and high permeability intervals in bedrock and overburden. The local heterogeneities that cause perched groundwater lenses in the till, and the potential influence of thick low K mudstone are not well characterized.
- The calibrated model results are deemed reasonable considering the calibrated properties are aligned with the average site observations and model integrated all the available data. However, model was only calibrated to steady state conditions and the results have highest confidence in the vicinity of the mine area, where there are relatively more data. Actual ground conditions and properties may vary locally where data are not available; additional collection of K and Sy values would increase the confidence in the model predictions, where parameters are identified as Type IV.
- The groundwater drawdowns and baseflow reductions predicted by the numerical model during mining conditions are biased high because the modelling assumes steady state conditions have been reached, when they most likely won't have by the end of operations.

# 7 Conclusions

The models developed for the Tenas Project were based on climate and hydrology data, regional and local geology, site drillholes, and site groundwater data. The level of details, methods, and quality of the information were adequate for a Joint Application for a Mines Act permit, and for an effluent discharge permit.

The hydrogeological conceptual model was used as a basis to develop a numerical model calibrated to field data, with a final NRMSE of 3.2% for hydraulic heads and 3.6% for baseflows. The models relied on steady-state conditions to predict at EoY1, EoY7, EOM, and post-closure conditions.

The conclusions of the modelling can be summarized as follows:

- Open pit inflows are expected to range between 320 and 890 $m^3$/d. Under groundwater conditions alone, inflows of these magnitudes are typically managed with open pit sumps and do not require active dewatering systems.
- Neither mining induced drawdown nor mounding are expected to reach the private well locations.
- The mining scenario shows maximum reductions of baseflows occur prior to construction of the material and water management facilities (i.e., reductions to the entire creeks of about 6% at Tenas Creek, 5% at Four Creek, 2% at the Goathorn Creek, and 2% at the Telkwa River). The potential contributions of mine affected groundwater to baseflows, after 25 years of operations, were 0.8% for Tenas Creek at WQS04, less than 0.3% for Goathorn Creek at WQS05, and less than 0.2% for the Telkwa River at WQS09.
- The post-closure scenario indicates baseflows to the entire creeks will either remain unchanged or slightly increase due to the influence of the management ponds on groundwater levels, with a 3% increase at Tenas Creek, 4% increase at Four Creek, 1% increase at the Goathorn Creek, and 1% increase at the Telkwa River. The predicted long-term contributions of mine affected groundwater to baseflows were less than 9.3% for Tenas Creek at WQS04, less than 4.6% for Goathorn Creek at WQS05, and less than 0.8% for the Telkwa River at WQS09.
- Mine affected particles are predicted to slowly migrate towards three private wells 3.8 km north of the Project and west of Goathorn Creek (Goalder, Baker, and Mapletoft); however, travel times are expected to be in excess of 400 years, and less than 170 years for sensitivities. The wells located east of Goathorn Creek are not located along particle paths.
- Three private wells (Goalder, Mapletoft, and Baker) located in the Telkwa River valley are potentially within the paths of mine affected groundwater. No constituent is predicted to exceed the BC-DWG. The processes of diffusion, dispersion, or natural attenuation, and the predicted travel times (i.e., > 400 years) between the Project and the Telkwa alluvial floodplain were not considered in the analysis which means results are conservative and will be lower when Project is developed.

The modeling presented herein provides forecasts of the expected Project behavior, derived from the available hydrogeological information. The steady state conditions were found to reasonably simulate the site observations and the regional behaviour, with the highest confidence in the vicinity of the Project. Upgrades to the model should be considered as additional information becomes available.

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

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Piteau Engineering Ltd., 1997b. Geotechnical and Hydrogeological Assessment Proposed Tailings Pond Area, Telkwa Coal Project. Unpublished report prepared for Manalta Coal

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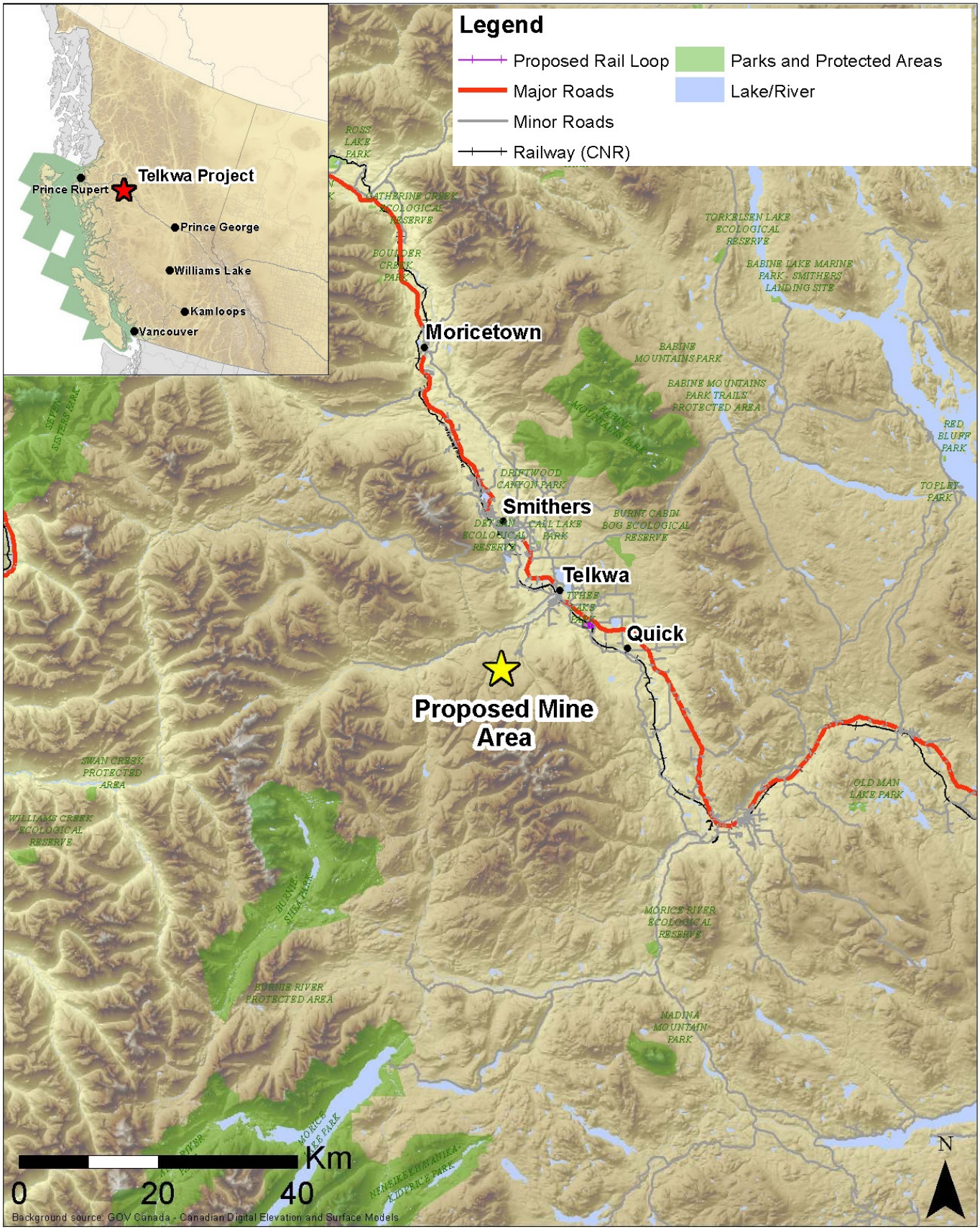
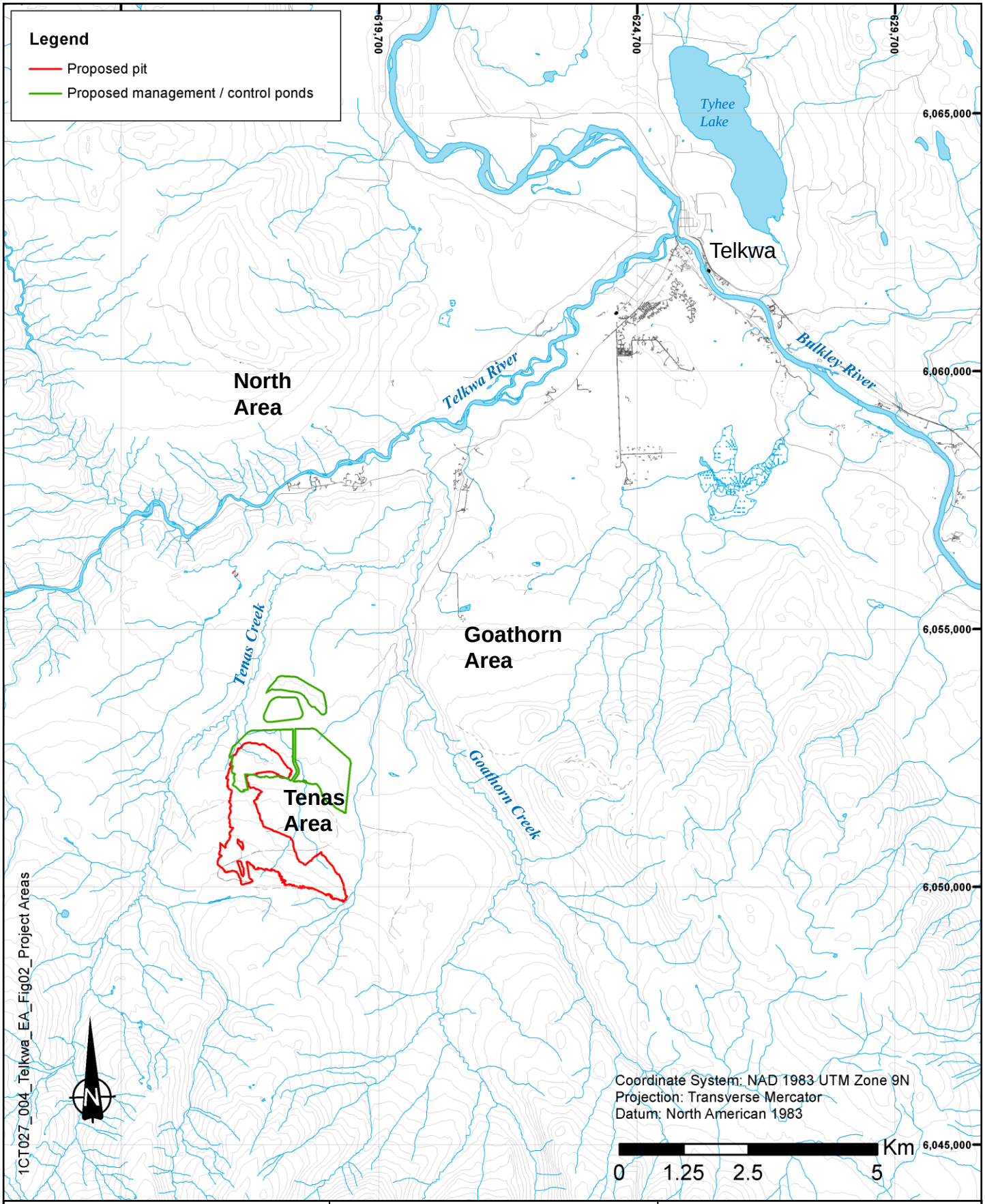
TML, 2018. Tenas Project – Project Description. August 2018. Version B.1. Submitted by Telkwa Coal Ltd to the BC Environmental Assessment Office, and Canadian Environmental Assessment Agency.

Figures




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Project Location** |
| Job No: 1CT027.004<br>Filename: Fig1_Projet Location.pptx | Tenas Project | Date: 12/11/2018 \| Approved: GF \| Figure: 1 |

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Groundwater Technical Report

**Project Areas**

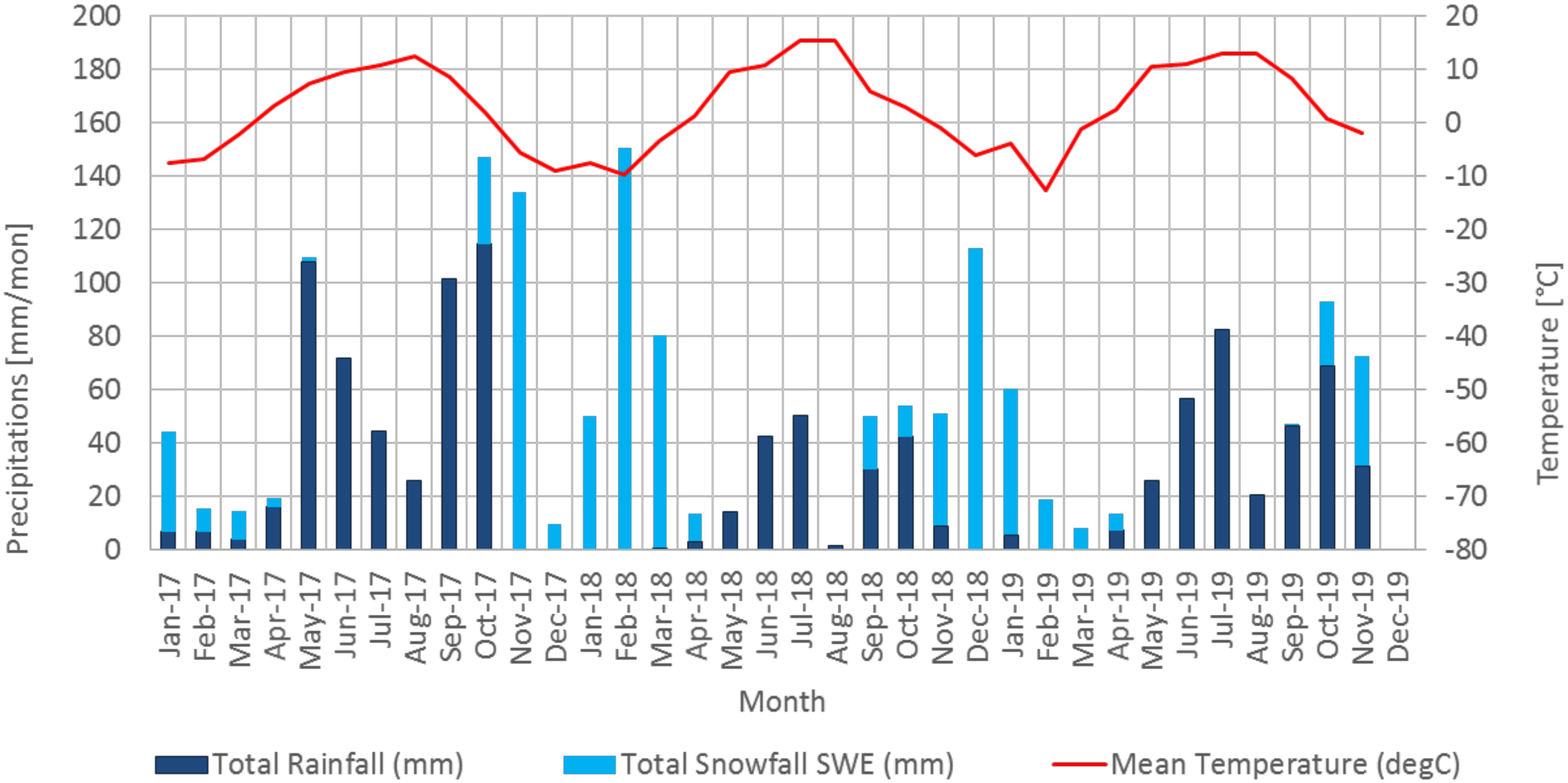
Job No: 1CT027.004

Filename: Fig02_Project Areas.pptx

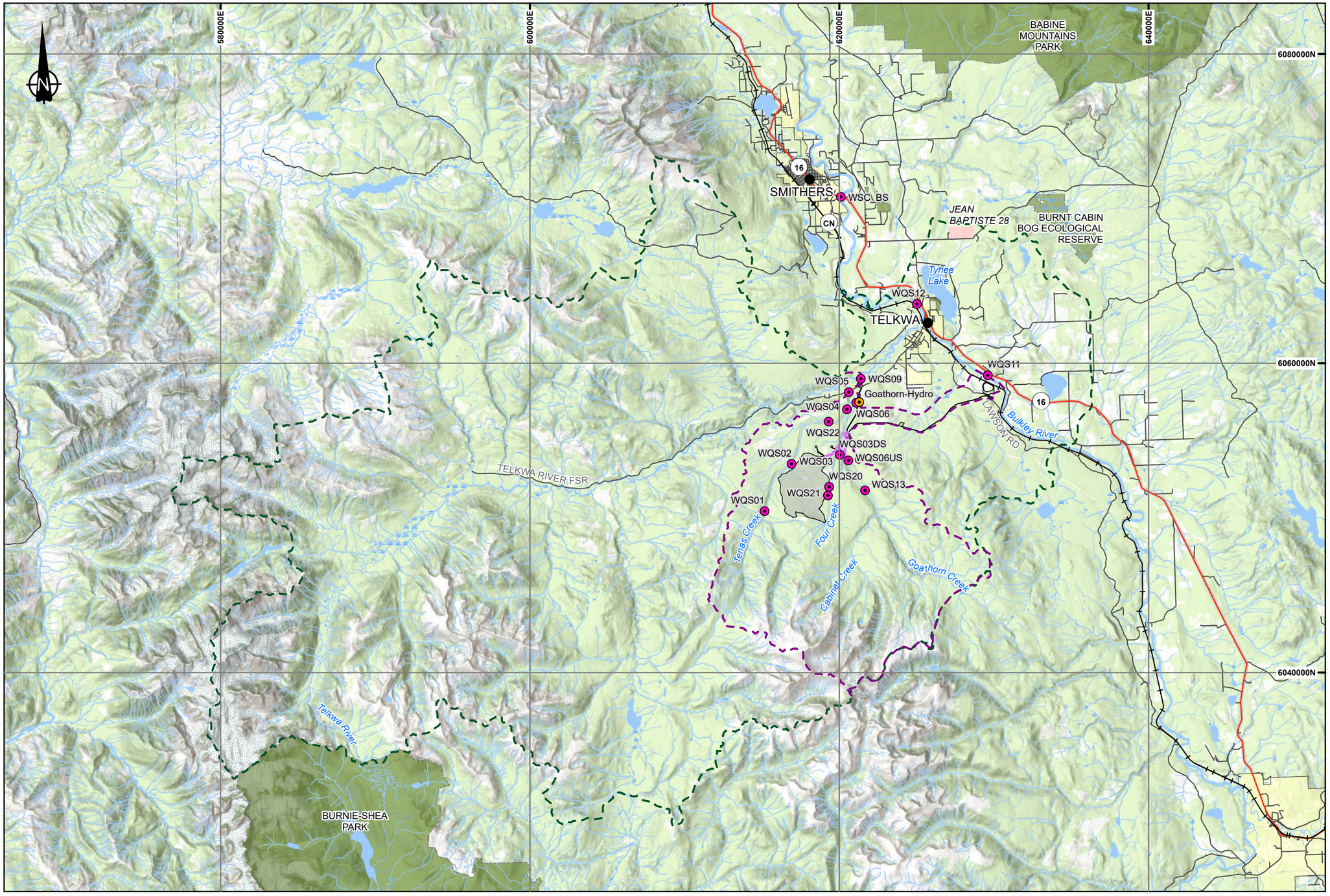
Tenas Project

| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 2 |

*Source: Tenas Deposit met 2017-2019 daily comp.xlsx*




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Precipitations and Temperatures** |
| Job No: 1CT027.004<br>Filename: Fig3_Precip&Temp.pptx | Tenas Project | Date: Oct. 2020 / Approved: GF / Figure: **3** |




**LEGEND**

- WBLM Nodes
- Hydrometric Stations
- City/Town
- LSA Boundary
- RSA Boundary
- Tenas Access Corridor
- Rail Line
- Highway
- Road
- Project Area
- Waterbody
- Wetland
- Watercourse
- Park or Protected Area
- First Nation Reserve
- Municipal Area

**NOTES**

1. All mapped features are approximate and should be used for discussion purposed only.

**REFERENCES**

NAD 1983 UTM Zone 9N
Project features: Allegiance Coal, 2020
Basedata: Government of British Columbia
Basemap: World Topo Base

0 2500 5000 7500 10000
Meters

srk consulting

SRK JOB NO: 1CT027.004

FILENAME: Fig04_Topo_main_Drainage_basins.pdf

ALLEGIANCE COAL LIMITED

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Groundwater Technical Report

# Topography of the Main Drainage Basins

| Date: | Approved: | Figure: |
|---|---|---|
| Jan 2021 | GF | **04** |

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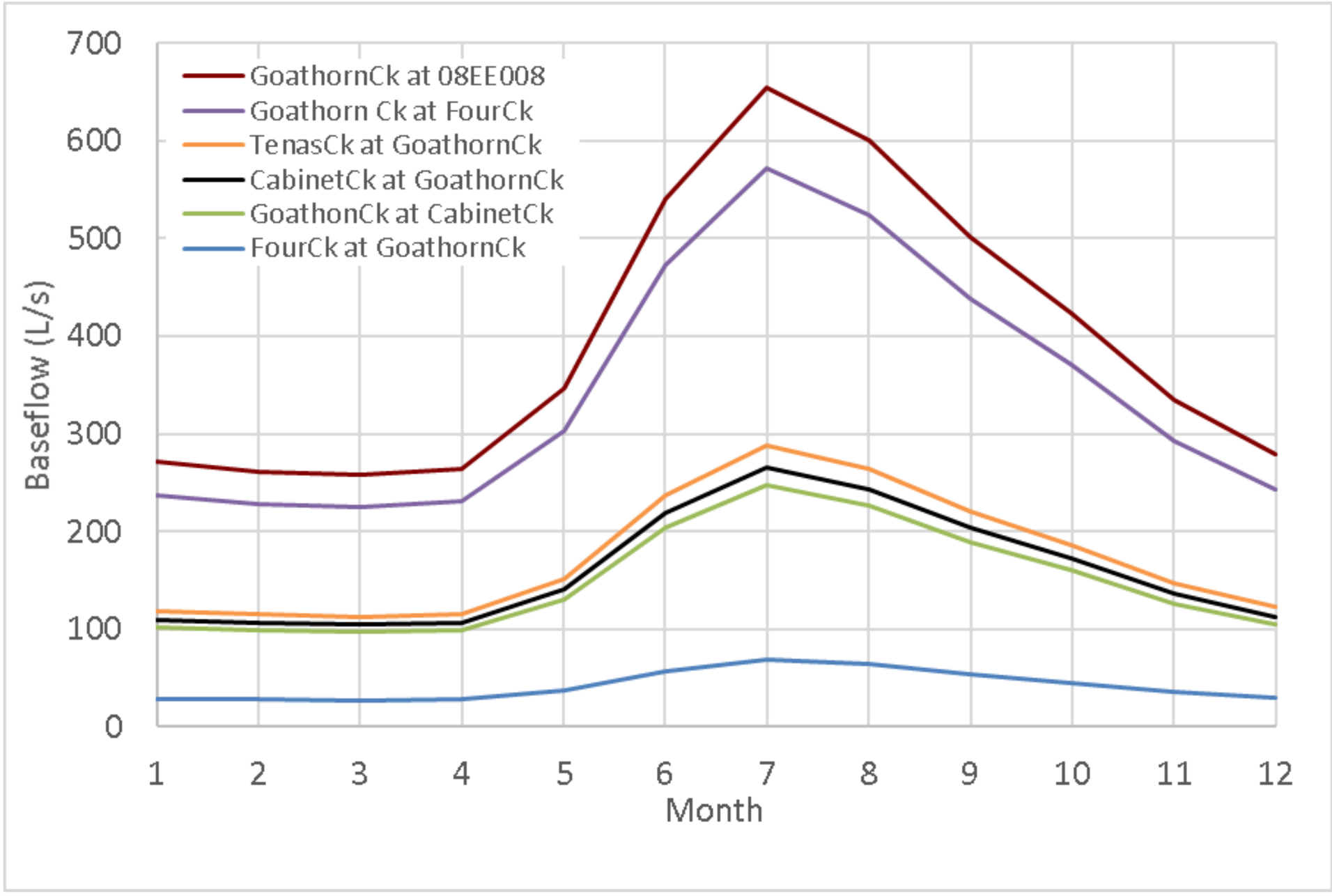
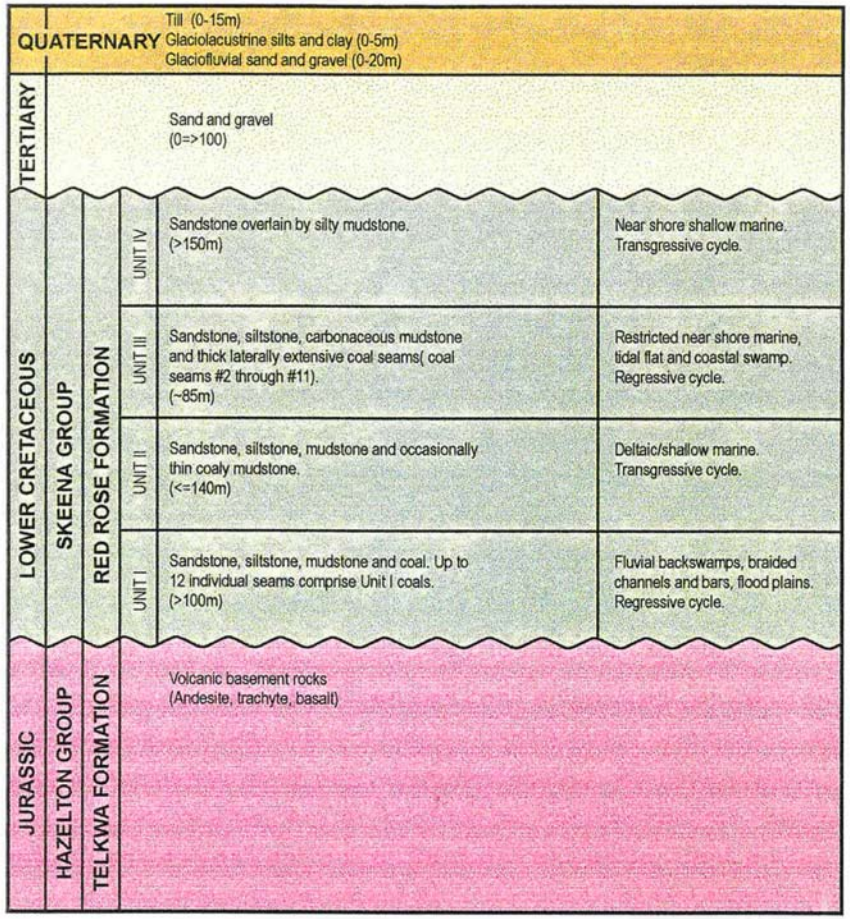
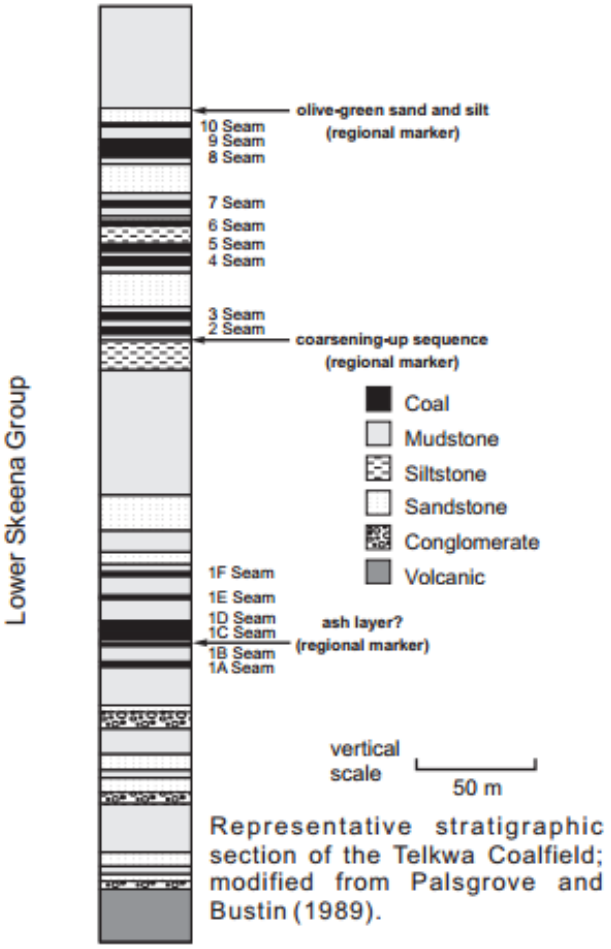



| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Estimated Baseflows** |
| Job No: 1CT027.004<br>Filename: Fig5 Estimated_Baseflows.pptx | Tenas Project | Date: Oct. 2020 / Approved: GF / Figure: **5** |




Notes:
1. All formation thicknesses are approximate and could locally vary significantly (esp. Quaternary and Tertiary).
2. Bedrock geology after Manalta (1998).

**Simplified Stratigraphic Column (Piteau, 1998).**




Representative stratigraphic section of the Telkwa Coalfield; modified from Palsgrove and Bustin (1989).

| | | |
|---|---|---|
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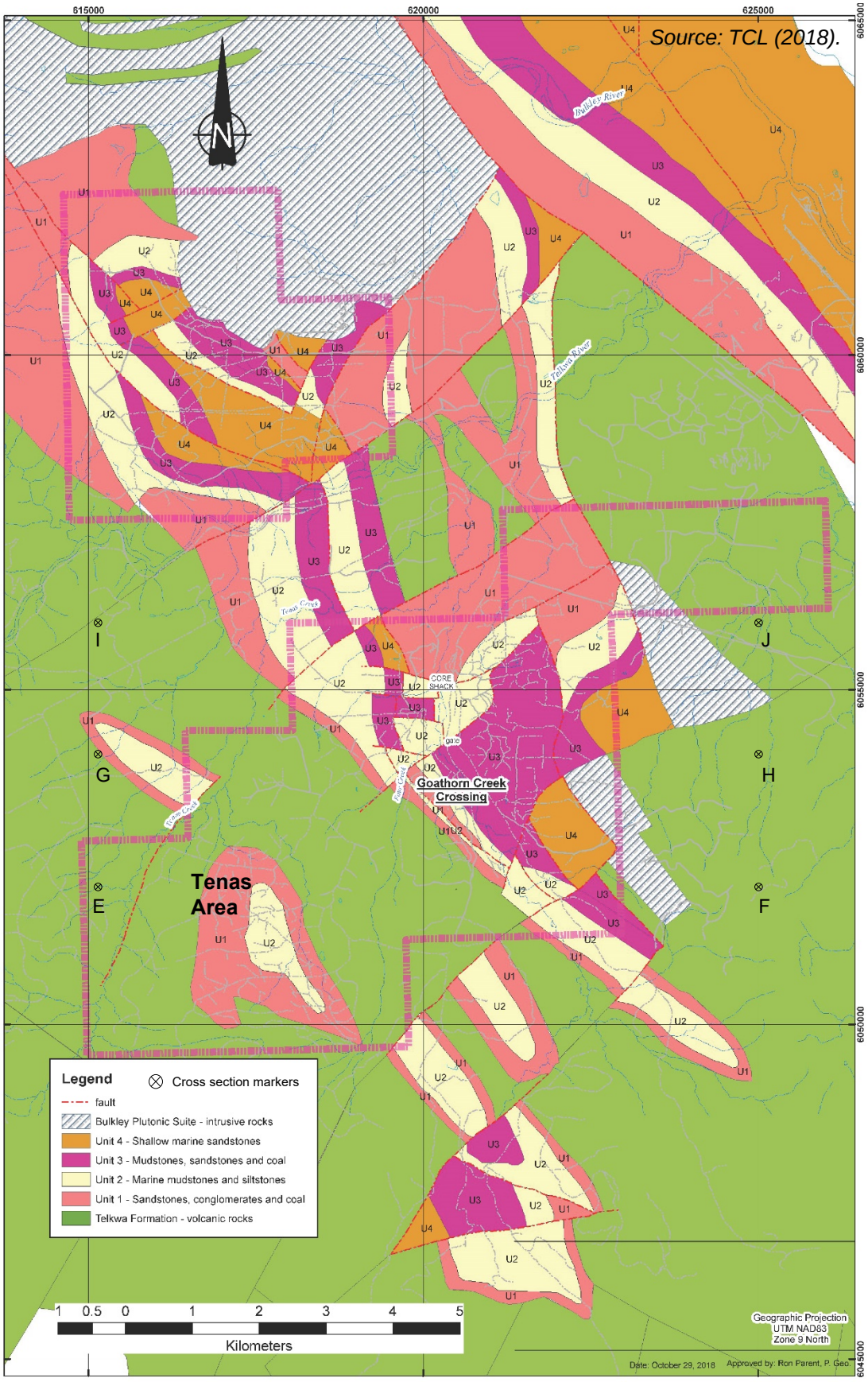
| | | **Stratigraphic column of the Telkwa Project area** |
| Job No: 1CT027.004<br>Filename: Fig6_Strat Colums.pptx | Tenas Project | Date: Nov. 2018 / Approved: GF / Figure: 6 |

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Groundwater Technical Report

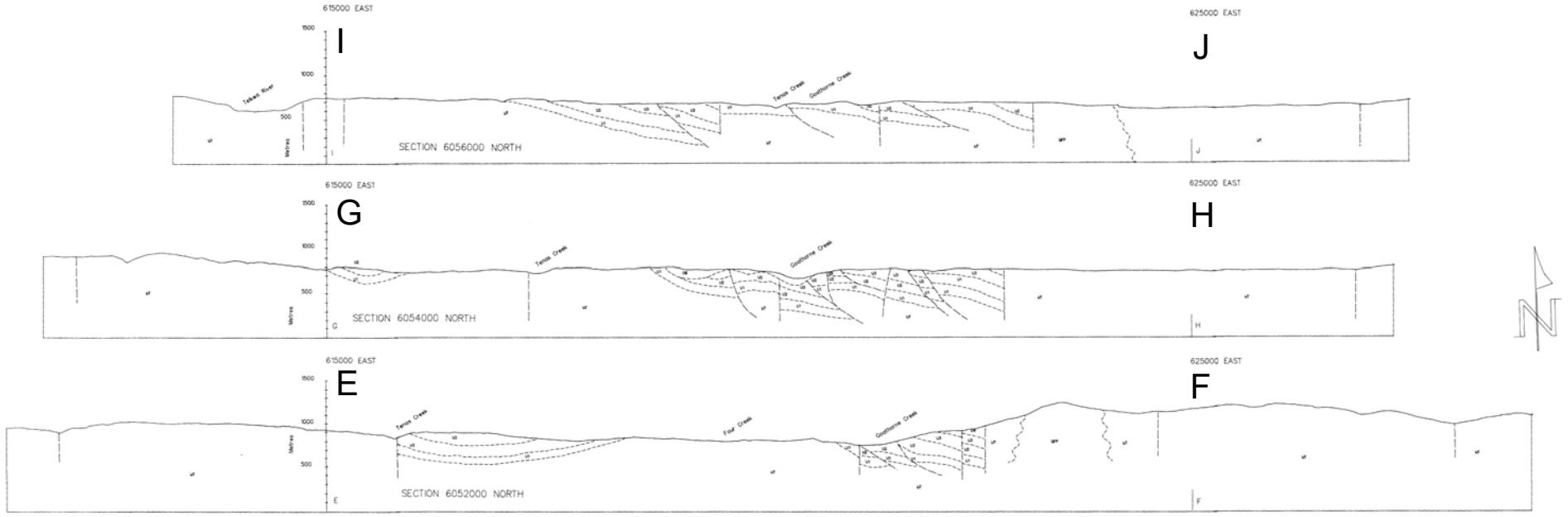
**Geological map of the Telkwa coal field**

Job No: 1CT027.004

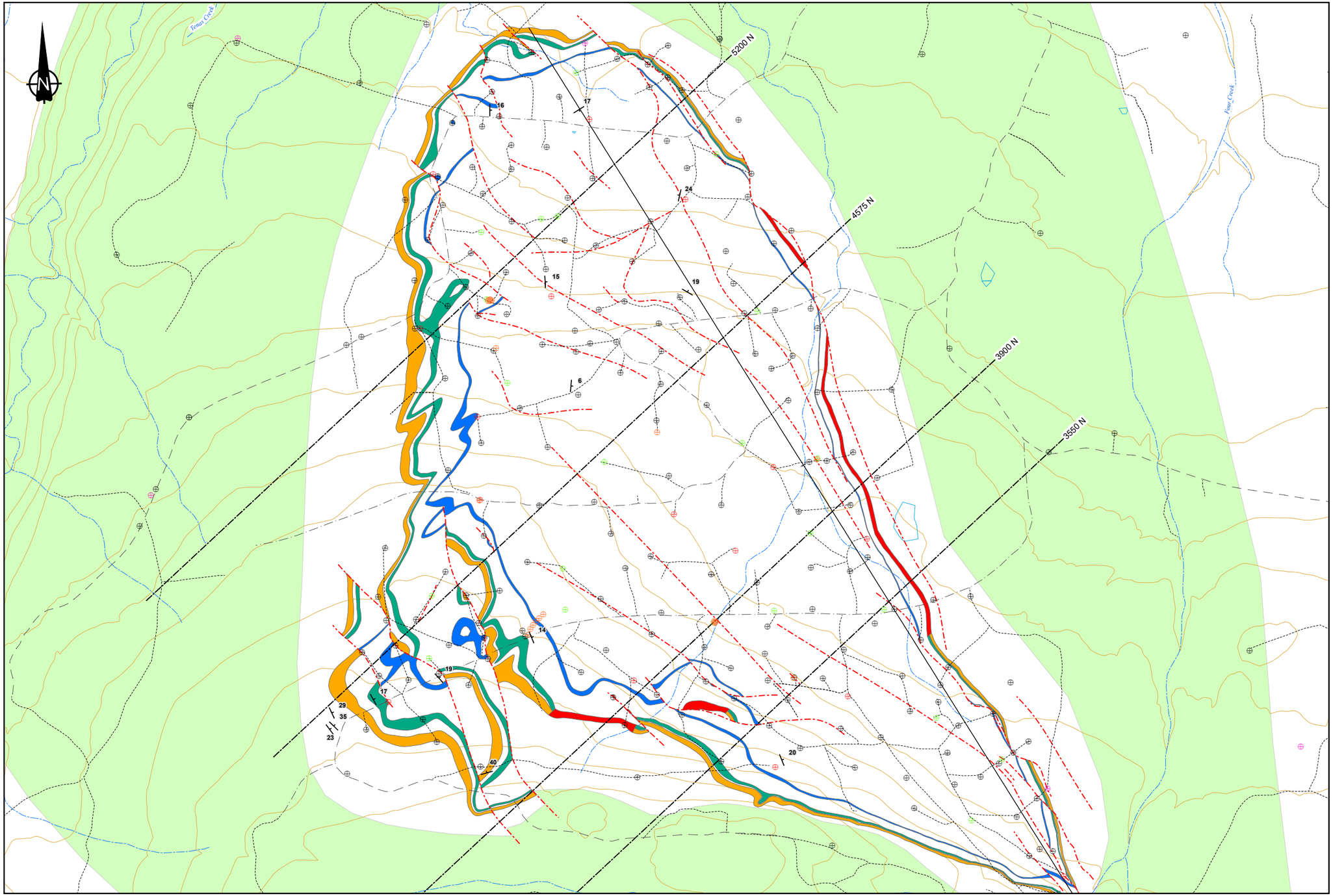
Filename: Fig7_Geol Map Telkwa Coal Field.pptx

Tenas Project

| Date: | Approved: | Figure: |
|---|---|---|
| Nov. 2018 | GF | 7 |




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Cross sections of the Telkwa coal field (Palsgrove, 1991)** |
| Job No: 1CT027.004<br>Filename: Fig8_CS Telkwa coal field.pptx | Tenas Project | Date: Nov.2018 / Approved: GF / Figure: **8** |




**LEGEND**

Existing Drillholes

- ARD Core
- Bulk Sample Core
- Core
- Rotary Core
- Rotary Bulk Samples
- Rotary
- Bedding
- Syncline
- Fault
- Seam C
- Seam 1 Lower
- Seam 1 Upper
- Seam 1
- Hazleton Volcanics
- Creeks
- Cross Sections
- Forest Service Road
- Existing Trails
- Contours (20m)

**NOTES**

1. All mapped features are approximate and should be used for discussion purposed only.

**REFERENCES**

NAD 1983 UTM Zone 9N

Figure produced by SRK, project features provided by Allegiance Coal, 2020

0 250 500 750

Meters

srk consulting

SRK JOB NO: 1CT027.004

FILENAME: Fig09_Tenas_Geological_Map.pdf

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Groundwater Technical Report

# Geological Map of the Tenas Area

| Date: | Approved: | Figure: |
|---|---|---|
| Jan 2021 | GF | **9** |

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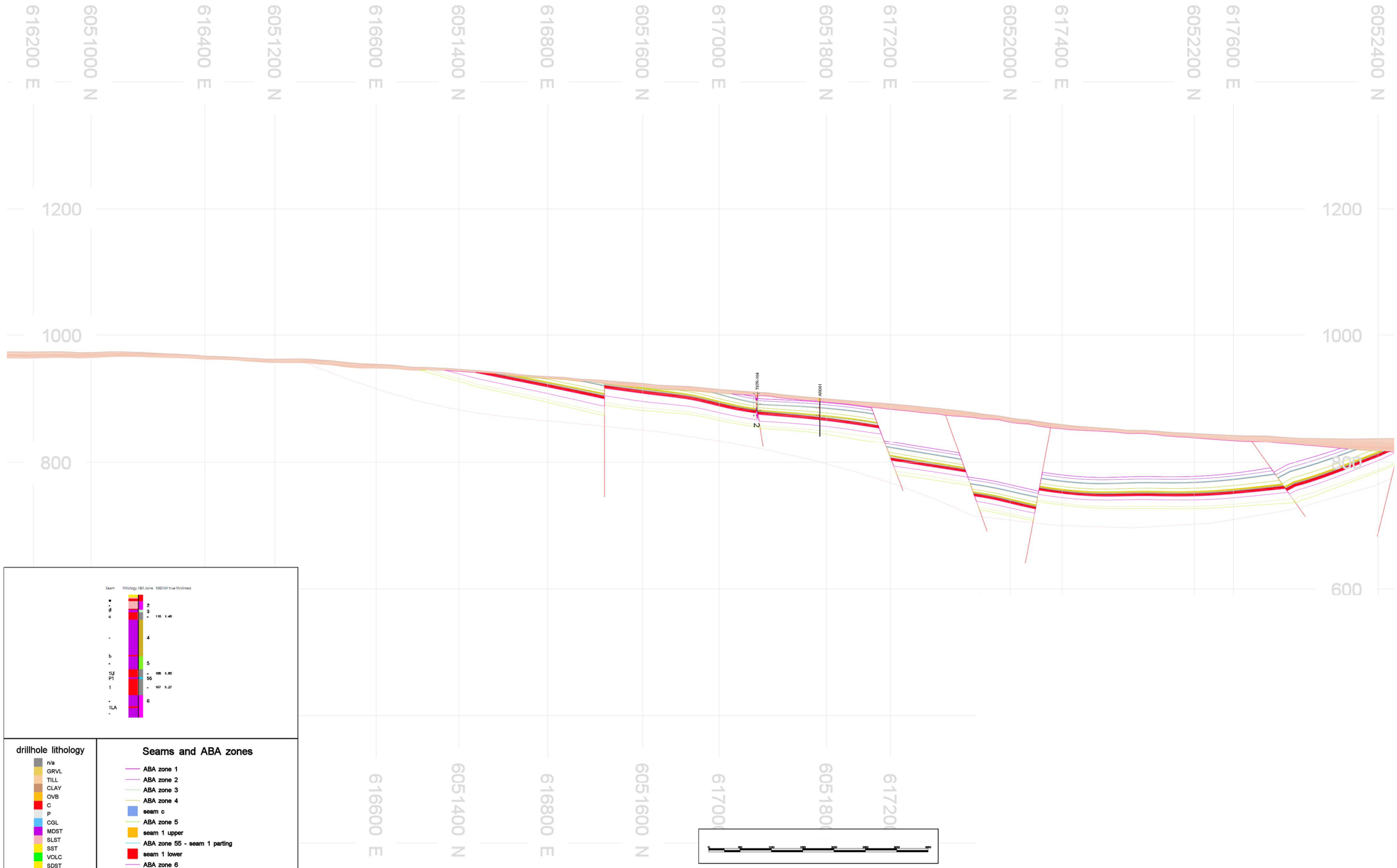


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Groundwater Technical Report

SEC 5200 facing NW (317 az)

SRK JOB NO.: 1CT027.004

FILE NAME: 1CT027.004 Tenas Geological Model Sections.dwg

Tenas Project

DATE: January 2021

APPROVED: GF

FIGURE: 10

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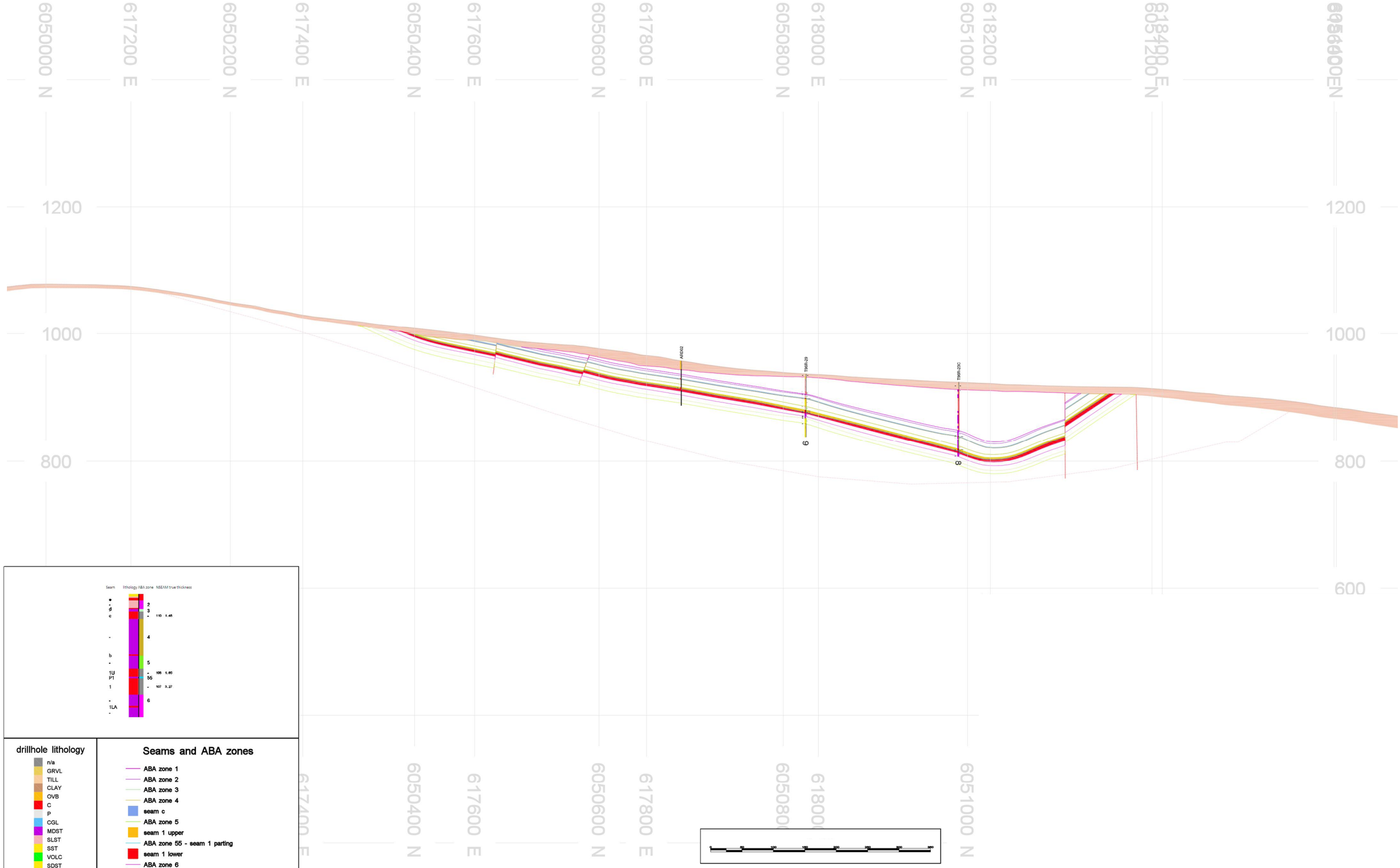





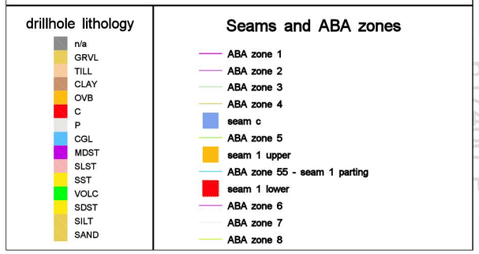





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Groundwater Technical Report

SEC 3900 facing NW (317 az)

| | |
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| FILE NAME: | 1CT027.004 Tenas Geological Model Sections.dwg |

Tenas Project

| DATE: | APPROVED: | FIGURE: |
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| January 2021 | GF | 11 |

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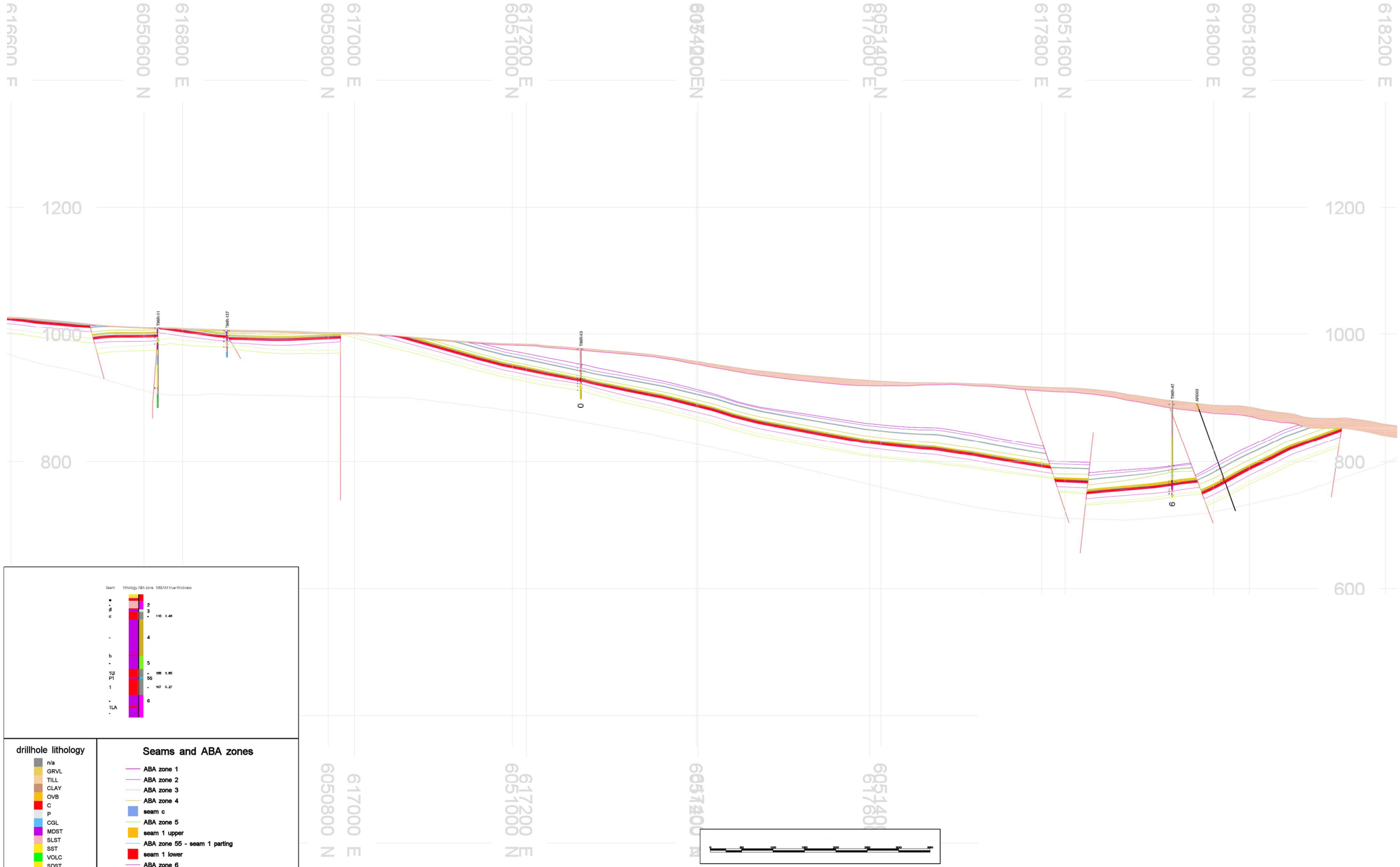





**drillhole lithology**

- n/a
- GRVL
- TILL
- CLAY
- OVB
- C
- P
- CGL
- MDST
- SLST
- SST
- VOLC
- SDST
- SILT
- SAND

**Seams and ABA zones**

- ABA zone 1
- ABA zone 2
- ABA zone 3
- ABA zone 4
- seam c
- ABA zone 5
- seam 1 upper
- ABA zone 55 - seam 1 parting
- seam 1 lower
- ABA zone 6
- ABA zone 7
- ABA zone 8




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SEC 4575 facing NW (317 az)

| | |
|---|---|
| SRK JOB NO.: | 1CT027.004 |
| FILE NAME: | 1CT027.004 Tenas Geological Model Sections.dwg |

Tenas Project

| DATE: | APPROVED: | FIGURE: |
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| January 2021 | GF | 12 |

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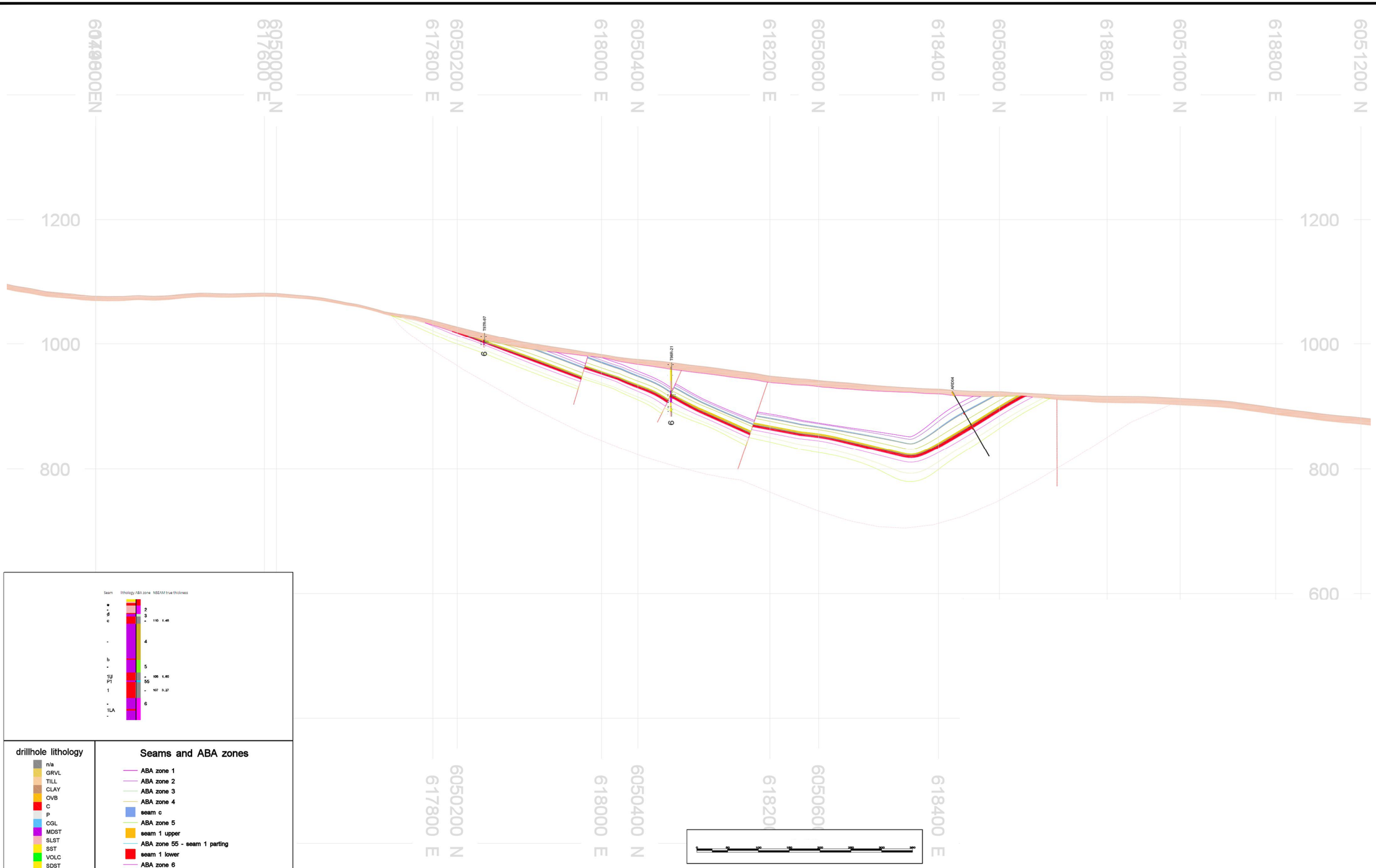





**drillhole lithology**

- n/a
- GRVL
- TILL
- CLAY
- OVB
- C
- P
- CGL
- MDST
- SLST
- SST
- VOLC
- SDST
- SILT
- SAND

**Seams and ABA zones**

- ABA zone 1
- ABA zone 2
- ABA zone 3
- ABA zone 4
- seam c
- ABA zone 5
- seam 1 upper
- ABA zone 55 - seam 1 parting
- seam 1 lower
- ABA zone 6
- ABA zone 7
- ABA zone 8




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Groundwater Technical Report

SEC 3550 facing NW (317 az)

| | |
|---|---|
| SRK JOB NO.: | 1CT027.004 |
| FILE NAME: | 1CT027.004 Tenas Geological Model Sections.dwg |

Tenas Project

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| January 2021 | GF | 13 |

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## Volcanics

## Volcanics

## Weathered Volcanics

| | | | |
|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | |
| | | **Example Photos of Volcanic Units** | |
| Job No: 1CT017.004<br>Filename: Fig14_Volcanics_Photos.pptx | Tenas Project | Date: Apr 2019 | Approved: GF | Figure: **14** |

## Sandstone

## Coal

## Mudstone/Siltstone

## Interbedded Coal and Siltstone

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT017.004<br>Filename: Fig15_SkeenaGp_Photos.pptx | Tenas Project | **Example Photos of Skeena Group Units**<br>Date: Apr 2019 / Approved: GF / Figure: **15** |

614000E
616000E
618000E
620000E
622000E
6054000N
6052000N
6050000N

**LEGEND**

- Test Pit
- Sonic
- Upper Till
- Lower Till
- Sand and Gravel
- Creeks
- Roads

**NOTES**

1. All mapped features are approximate and should be used for discussion purposed only.

**REFERENCES**

NAD 1983 UTM Zone 9N

Figure produced by SRK, data provided by Allegiance Coal, 2020

0 250 500 750 1000

Meters

srk consulting

SRK JOB NO: 1CT027.004

FILENAME: Fig16_Surficial_Geology.pdf

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**Tenas Project**

Groundwater Technical Report

Tenas Creek
Surficial Geology

| Date: | Approved: | Figure: |
|---|---|---|
| Jan 2021 | GF | **16** |

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## Till (Diamond)

## Till (Shelby)

## Clayey/Silty Sand

## Sand and Gravel

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Example Photos of Overburden Units** |
| Job No: 1CT017.004<br>Filename: Fig17_Overburden_Photos.pptx | Tenas Project | Date: Apr 2019 / Approved: GF / Figure: 17 |

# Till

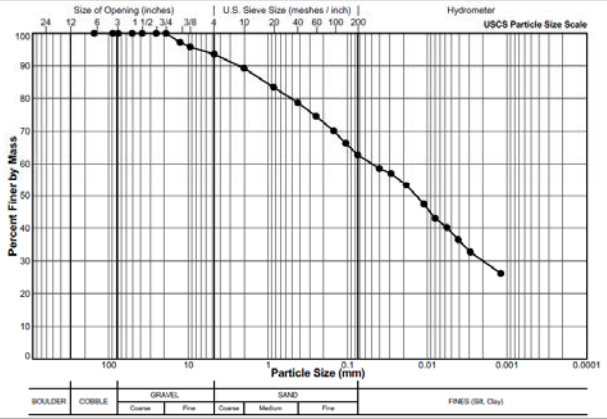
GOLDER

**SUMMARY OF PARTICLE SIZE DISTRIBUTION**

ASTM D 422

**Client:** SRK Consulting (Canada) Inc.
**Project:** Telkwa Coal Limited, Physical Properties Testing
**Location:** Prince Rupert, BC
**Project No.:** 1784620 **Phase:** 2000

**Sample Location:** T18-13S
**Sample No.:** SPT-01
**Depth Interval (m):** 1.50 to 1.95
**Lab Schedule No.:**




**Legend**

| Sieve Size (USS) | (mm) | Particle Size (mm) | Percent Passing |
|---|---|---|---|
| 6" | 152.4 | | 100.0 |
| 3.5" | 88.9 | | 100.0 |
| 3" | 76.2 | | 100.0 |
| 2" | 50.8 | | 100.0 |
| 1 1/2" | 38.1 | | 100.0 |
| 1" | 25.4 | | 100.0 |
| 3/4" | 19.1 | | 100.0 |
| 1/2" | 12.7 | | 97.2 |
| 3/8" | 9.5 | | 95.8 |
| #4 US MESH | 4.75 | | 93.6 |
| #10 US MESH | 2 | | 89.2 |
| #20 US MESH | 0.85 | | 83.4 |
| #40 US MESH | 0.425 | | 78.8 |
| #60 US MESH | 0.25 | | 74.6 |
| #100 US MESH | 0.15 | | 70.1 |
| #140 US MESH | 0.106 | | 66.3 |
| #200 US MESH | 0.075 | | 62.7 |
| | | 0.0402 | 58.5 |
| | | 0.0287 | 57.1 |
| | | 0.0185 | 53.4 |
| | | 0.0111 | 47.5 |
| | | 0.0080 | 43.0 |
| | | 0.0057 | 40.3 |
| | | 0.0041 | 36.6 |
| | | 0.0029 | 32.7 |
| | | 0.0012 | 26.2 |

| DC | 3/28/2018 | LH | 5/4/2018 |
|---|---|---|---|
| Tech | Date | Checked | Date |


Golder Associates Ltd.
#300 - 3611 North Fraser Way Burnaby, British Columbia, Canada V5J 5J2
Tel: +1 (604) 412 6999 Fax: +1 (604) 412 6816 www.golder.com


# Sand and Gravel

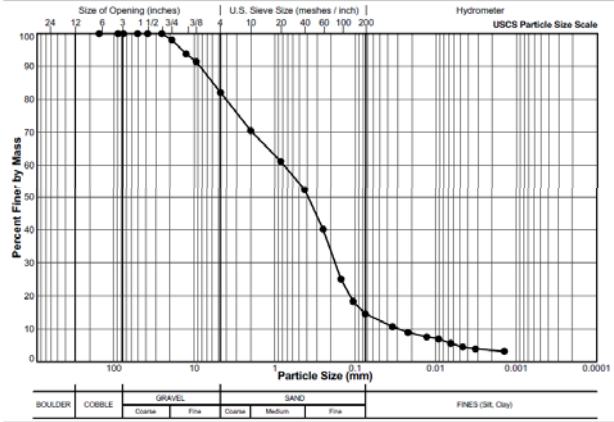
GOLDER

**SUMMARY OF PARTICLE SIZE DISTRIBUTION**

ASTM D 422

**Client:** SRK Consulting (Canada) Inc.
**Project:** Telkwa Coal Limited, Physical Properties Testing
**Location:** Prince Rupert, BC
**Project No.:** 1784620 **Phase:** 2000

**Sample Location:** T18-03S
**Sample No.:** BLK-02
**Depth Interval (m):** 9.00 to 9.30
**Lab Schedule No.:**




**Legend**

| Sieve Size (USS) | (mm) | Particle Size (mm) | Percent Passing |
|---|---|---|---|
| 6" | 152.4 | | 100.0 |
| 3.5" | 88.9 | | 100.0 |
| 3" | 76.2 | | 100.0 |
| 2" | 50.8 | | 100.0 |
| 1 1/2" | 38.1 | | 100.0 |
| 1" | 25.4 | | 100.0 |
| 3/4" | 19.1 | | 98.1 |
| 1/2" | 12.7 | | 93.8 |
| 3/8" | 9.5 | | 91.4 |
| #4 US MESH | 4.75 | | 82.1 |
| #10 US MESH | 2 | | 70.1 |
| #20 US MESH | 0.85 | | 61.1 |
| #40 US MESH | 0.425 | | 52.3 |
| #60 US MESH | 0.25 | | 40.2 |
| #100 US MESH | 0.15 | | 25.1 |
| #140 US MESH | 0.106 | | 18.3 |
| #200 US MESH | 0.075 | | 14.6 |
| | | 0.0344 | 10.7 |
| | | 0.0221 | 8.9 |
| | | 0.0129 | 7.6 |
| | | 0.0092 | 6.9 |
| | | 0.0065 | 5.6 |
| | | 0.0046 | 4.5 |
| | | 0.0032 | 3.9 |
| | | 0.0014 | 3.2 |

| SJ/DC | 4/26/2018 | LH | 5/4/2018 |
|---|---|---|---|
| Tech | Date | Checked | Date |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Job No: 1CT017.004
Filename: Fig18_OverburdenPSD.pptx

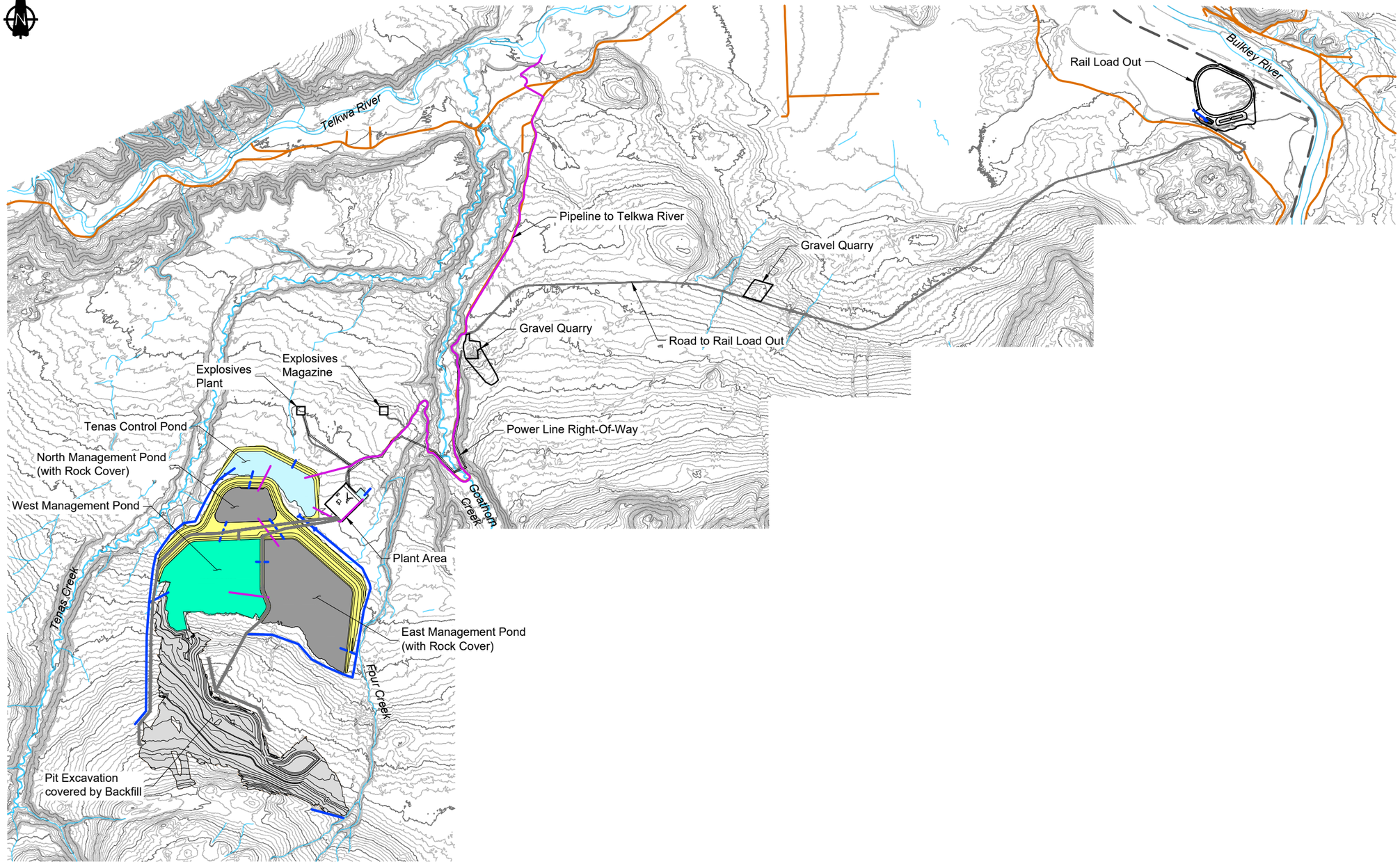
TELKWA COAL LIMITED

Tenas Project

Groundwater Technical Report

**Example of Overburden Particle Size Distribution**

| Date: | Approved: | Figure: |
|---|---|---|
| Apr 2019 | GF | 18 |




## LEGEND

- Water Management Feature
- Spillway
- Existing Watercourse
- Pipeline
- Existing Road
- Proposed Road
- Dams and Buttresses
- Control Pond
- Management Pond
- Backfill / NAG Pile
- Rock Cover

## NOTES

1. Contours shown at 5.0m intervals.
2. All dimensions shown in meters unless otherwise stated.
3. Pile designs by SRK Consulting Ltd.

## REFERENCE

NAD83 UTM Zone 9.

0m 500 1000 1500 2000

srk consulting

ALLEGIANCE COAL LIMITED

Groundwater Technical Report

Mine Plan

SRK JOB NO.: 1CT027.004

FILE NAME: Fig19_Mine_Plan.pdf

**Tenas Project**

DATE: Jan 2021 | APPROVED: GF | FIGURE: 19

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**LEGEND**

- City/Town
- Groundwater LSA
- Groundwater RSA
- Tenas Access Corridor
- Rail Line
- Highway
- Road
- Project Area
- Waterbody
- Wetland
- Watercourse
- Park or Protected Area
- First Nation Reserve
- Municipal Area

**NOTES**

1. All mapped features are approximate and should be used for discussion purposed only.

**REFERENCES**

NAD 1983 UTM Zone 9N
Project features: Allegiance Coal, 2020
Basedata: Government of British Columbia
Basemap: World Topo Base

0 2500 5000 7500 10000
Meters

srk consulting

SRK JOB NO: 1CT027.004
FILENAME: Fig20_Groundwater_RSA_LSA.pdf

ALLEGIANCE COAL LIMITED

**Tenas Project**

Groundwater Technical Report

Local Study Area (LSA) and Regional Study Area (RSA)

| Date: | Approved: | Figure: |
|---|---|---|
| Jan 2021 | GF | **20** |

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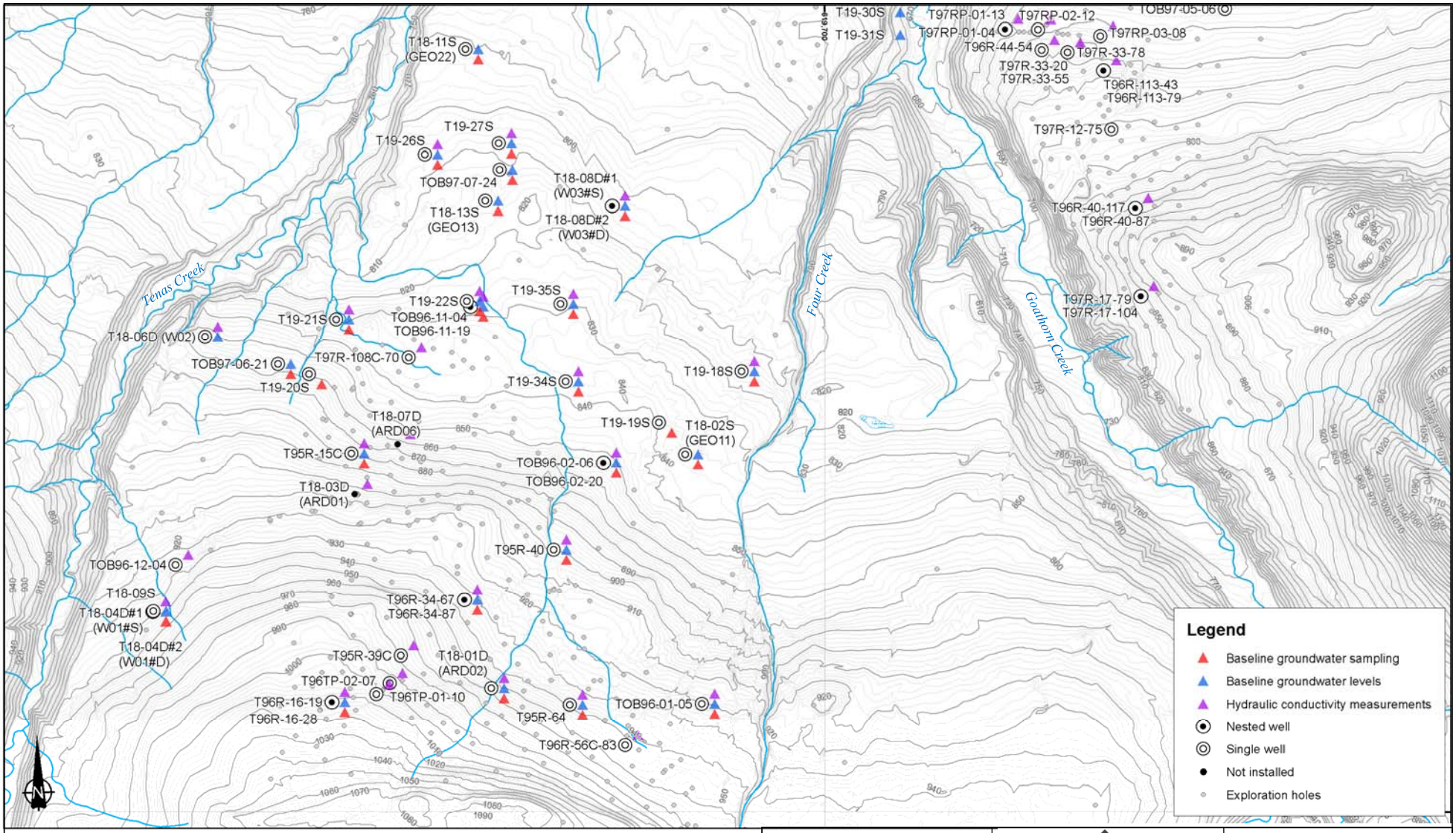
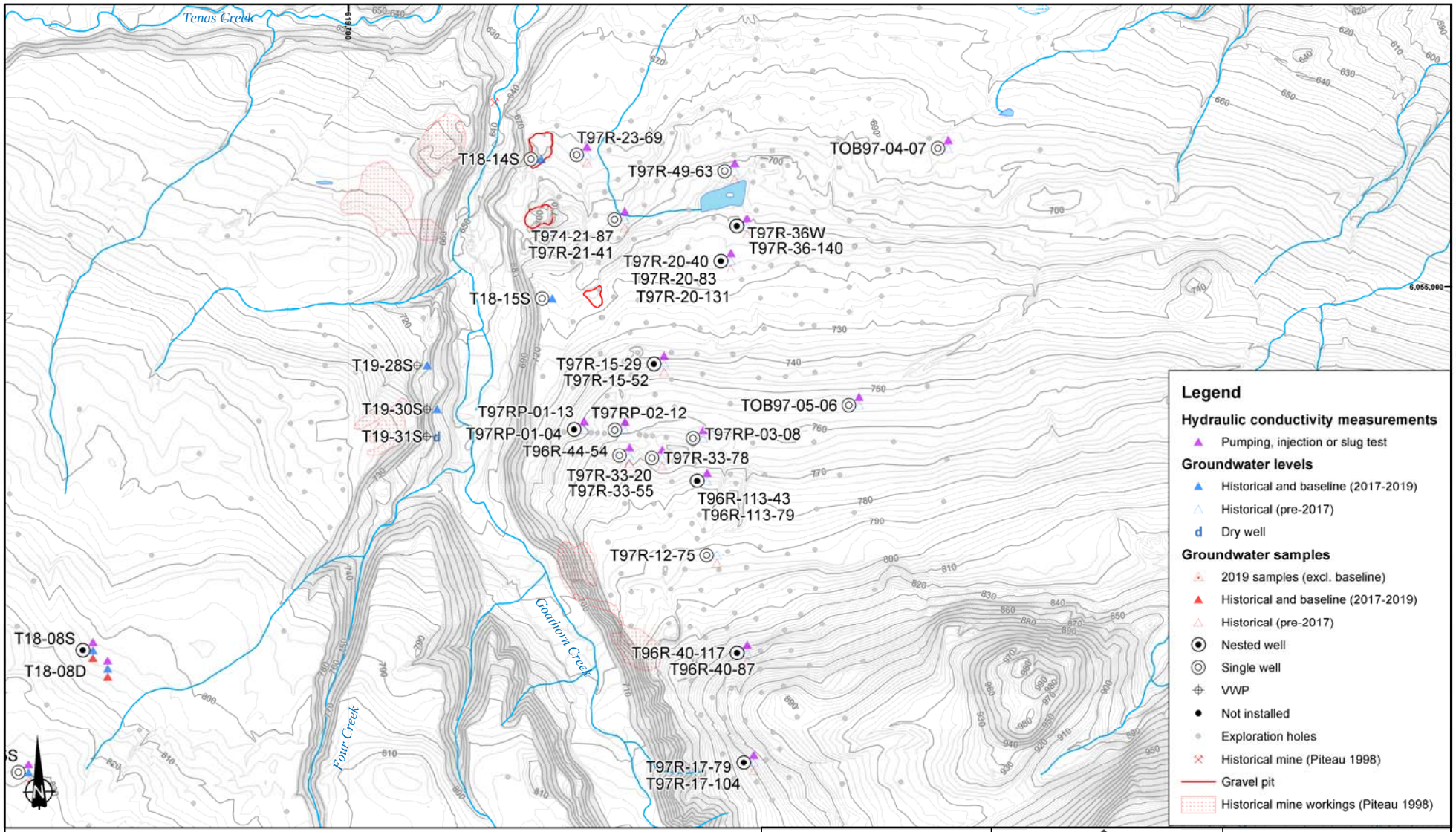

T18-11S (GEO22)
T19-27S
T19-26S
TOB97-07-24
T18-13S (GEO13)
T18-08D#1 (W03#S)
T18-08D#2 (W03#D)
T19-30S
T19-31S
T97RP-01-13
T97RP-02-12
T97RP-01-04
T97RP-03-08
T96R-44-54
T97R-33-78
T97R-33-20
T97R-33-55
T96R-113-43
T96R-113-79
T97R-12-75
T96R-40-117
T96R-40-87
T97R-17-79
T97R-17-104
T19-35S
T19-22S
T19-21S
TOB96-11-04
TOB96-11-19
T18-06D (W02)
TOB97-06-21
T97R-108C-70
T19-20S
T19-34S
T19-18S
T19-19S
T18-02S (GEO11)
T18-07D (ARD06)
T95R-15C
TOB96-02-06
TOB96-02-20
T18-03D (ARD01)
T95R-40
TOB96-12-04
T18-09S
T18-04D#1 (W01#S)
T18-04D#2 (W01#D)
T96R-34-67
T96R-34-87
T95R-39C
T18-01D (ARD02)
T96TP-02-07
T96TP-01-10
T96R-16-19
T96R-16-28
T95R-64
TOB96-01-05
T96R-56C-83
Tenas Creek
Four Creek
Goathorn Creek
Legend
Baseline groundwater sampling
Baseline groundwater levels
Hydraulic conductivity measurements
Nested well
Single well
Not installed
Exploration holes
Kilometers
0 0.325 0.65 1.3
Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983
srk consulting
Job No: 1CT027.004
Filename: Fig21_MW locations in Tenas Area
TELKWA COAL LIMITED
Tenas Project
Groundwater Technical Report
Monitoring well locations in Tenas Area
Date: Nov 2020
Approved: GF
Figure: 21
\\VAN-SVR0\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_Fig20_TenasMW.mxd




\\VAN-SVR0\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_Fig21_GoathornMW.mxd

0 0.25 0.5 1 Kilometers

Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983

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Job No: 1CT027.004
Filename: Fig22_MW locations in Goathorn Area.pptx

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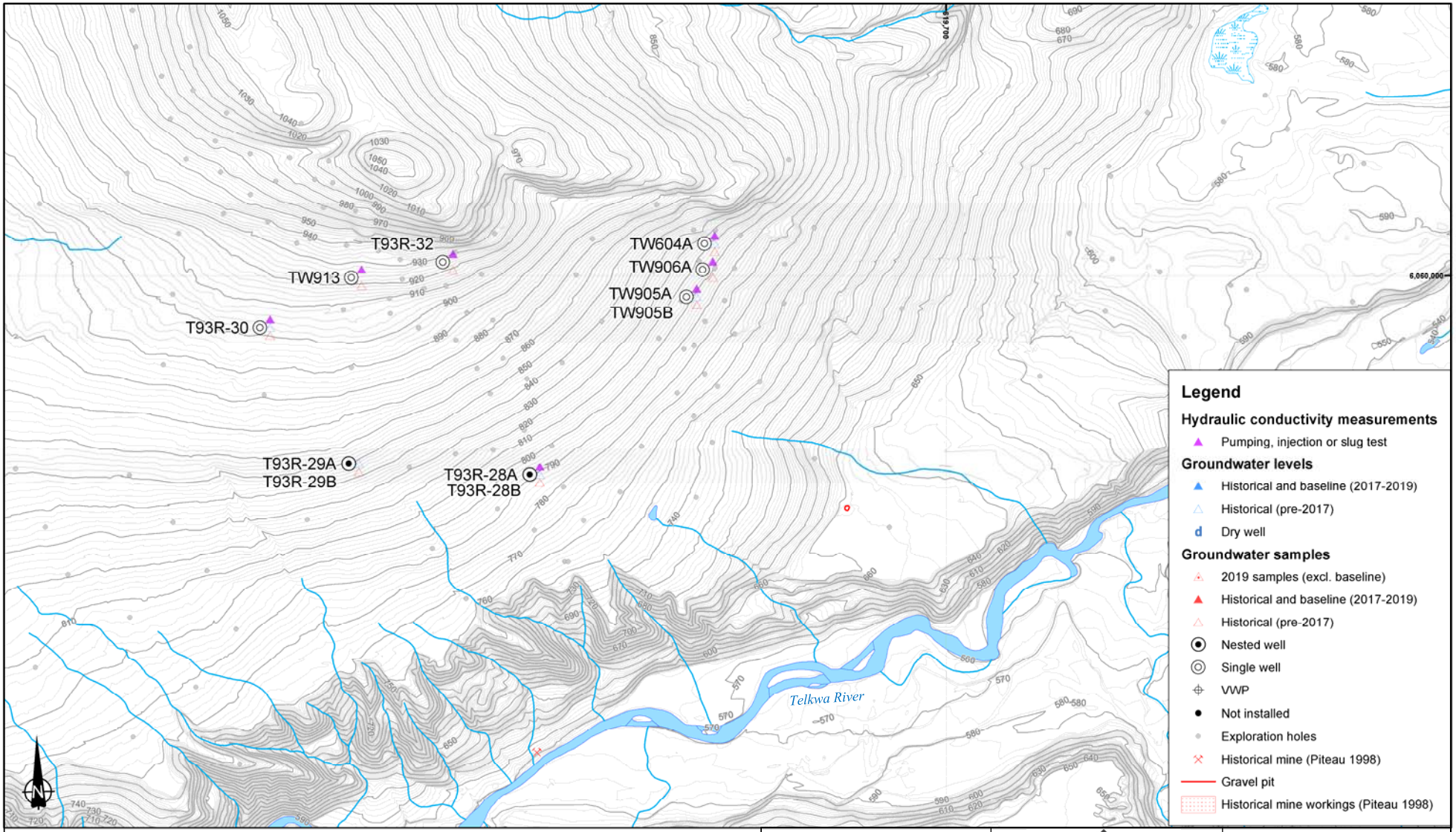
**Monitoring well locations in Goathorn Area**

| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 22 |




\\VAN-SVR0\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_Fig22_NorthMW.mxd

0 0.25 0.5 1 Kilometers

Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983

srk consulting

Job No: 1CT027.004
Filename: Fig23_MW locations in North Area.pptx

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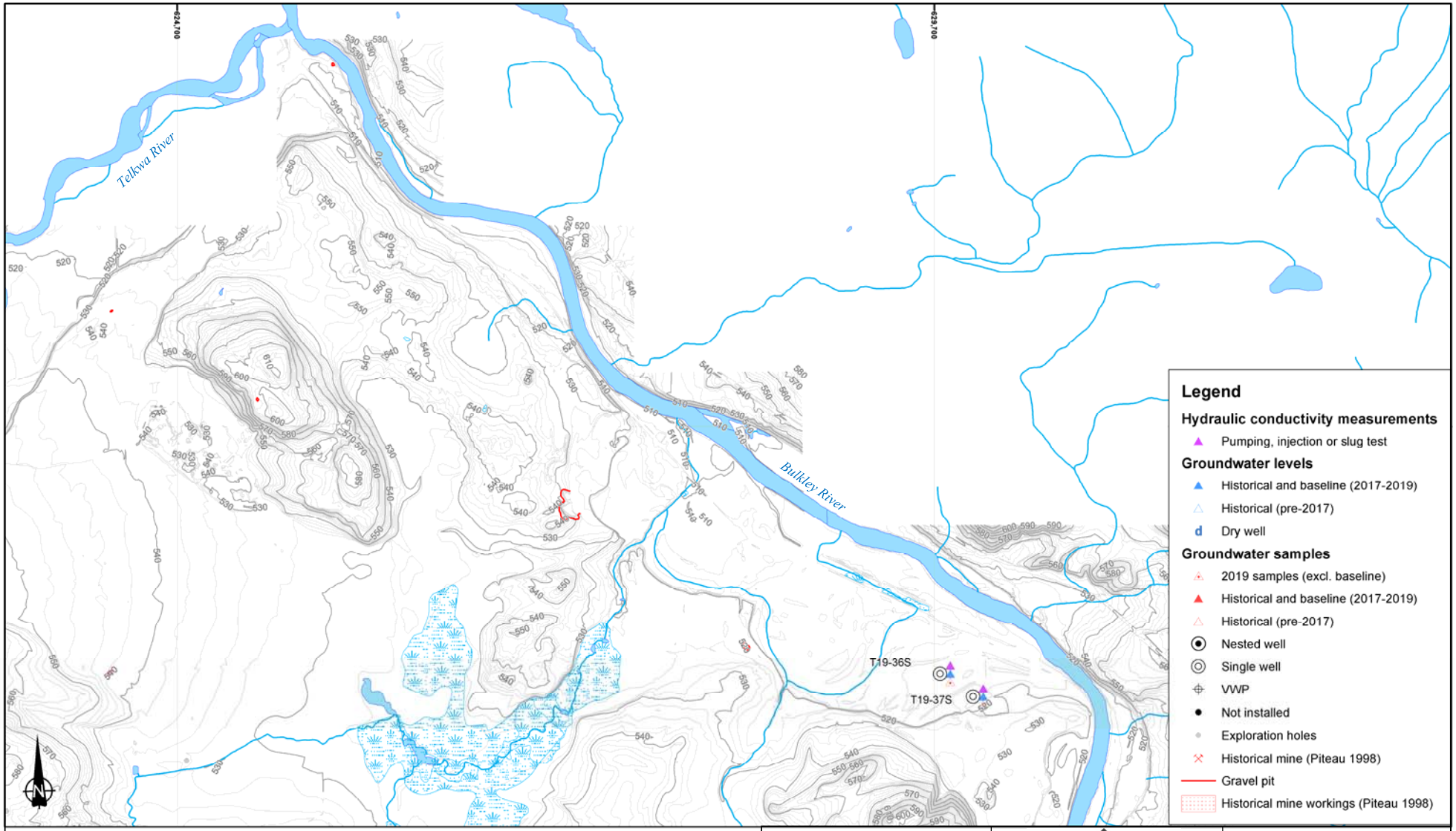
**Monitoring Well Locations in North Area**

| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 23 |




\\VAN-SVR0\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_Fig23_RailLoadoutMW.mxd

Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983

srk consulting

Job No: 1CT027.004
Filename: Fig24_MW locations in Rail Loadout Area.pptx

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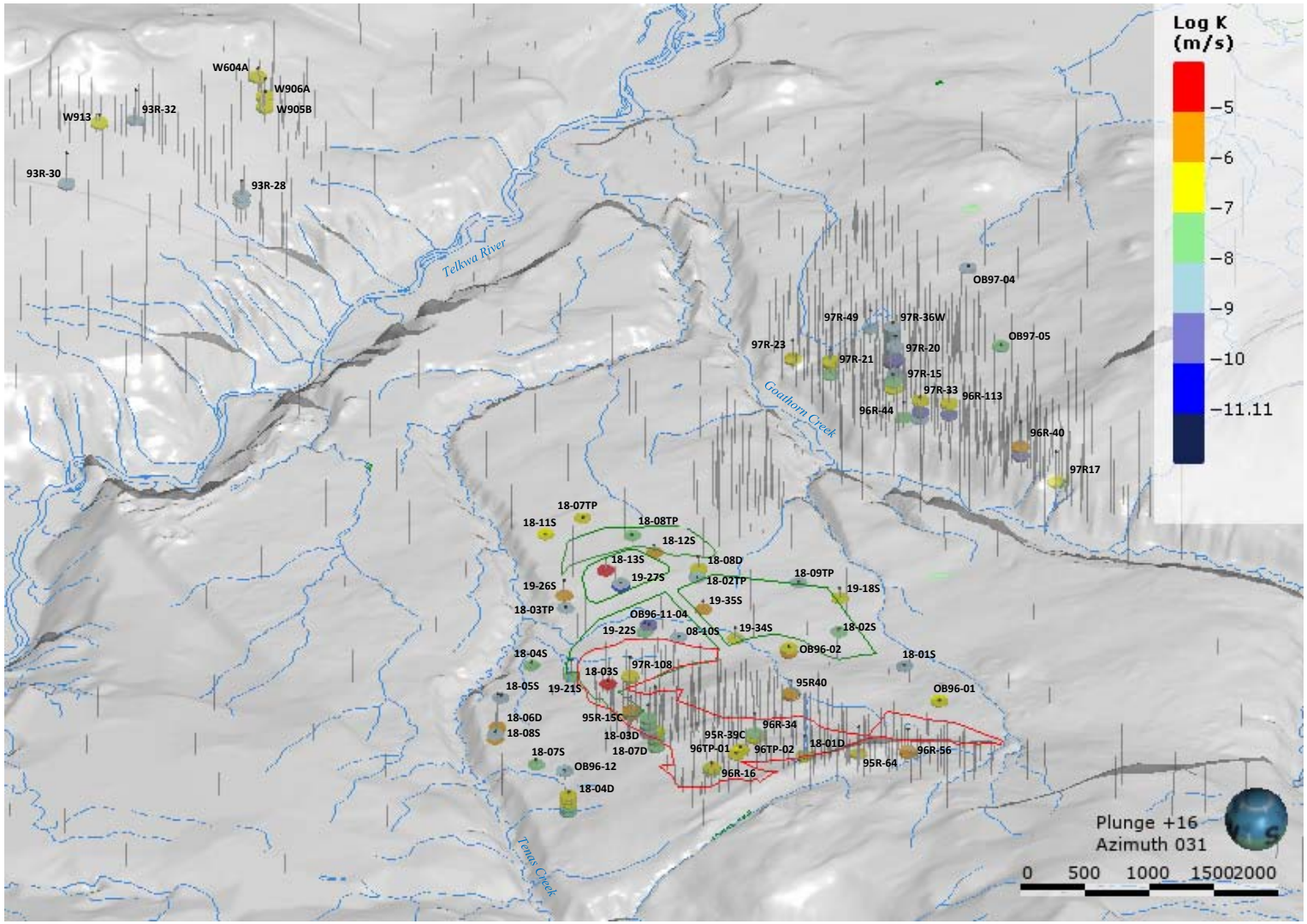
**Monitoring Well Locations in Rail Loadout Area**

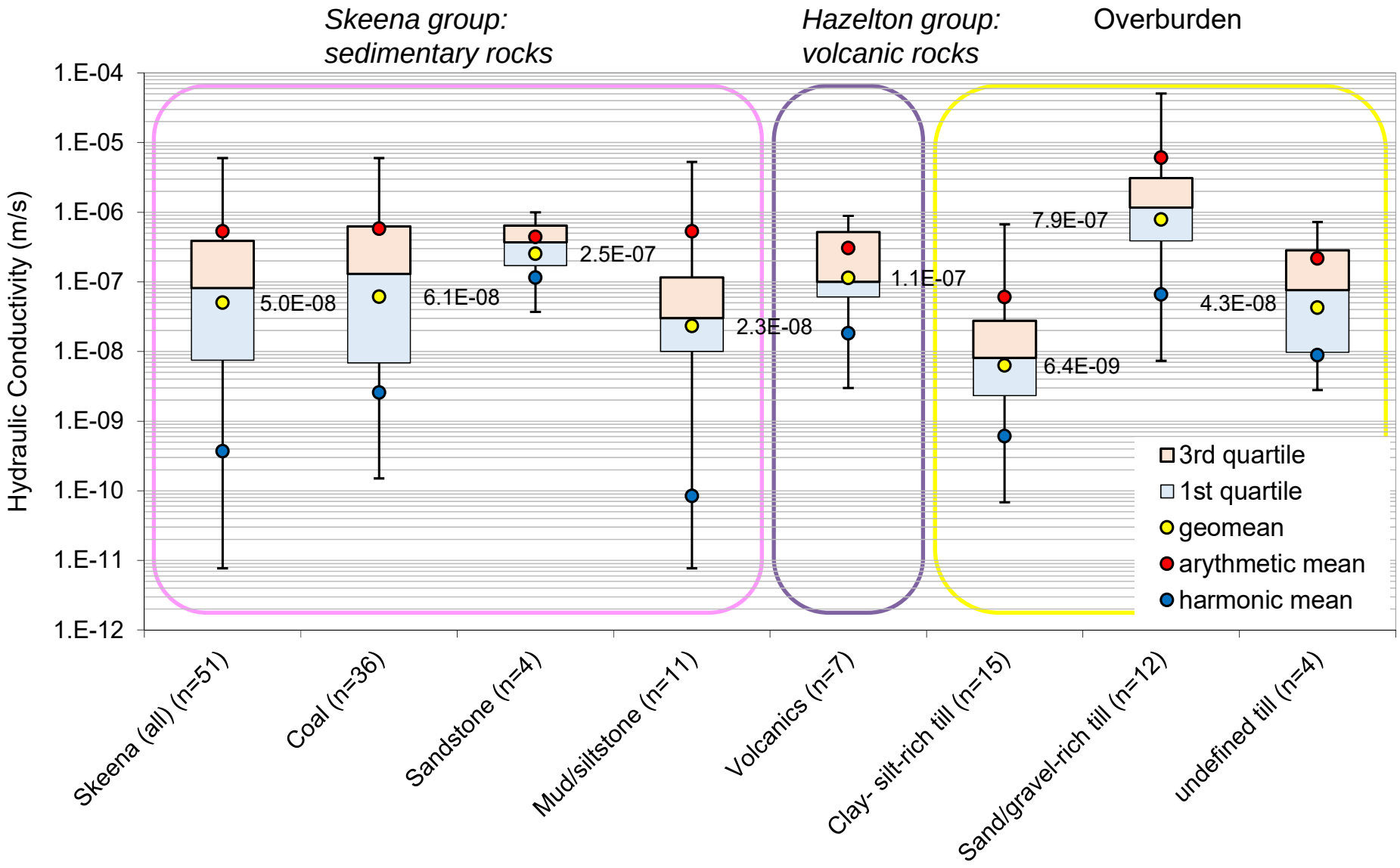
| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 24 |



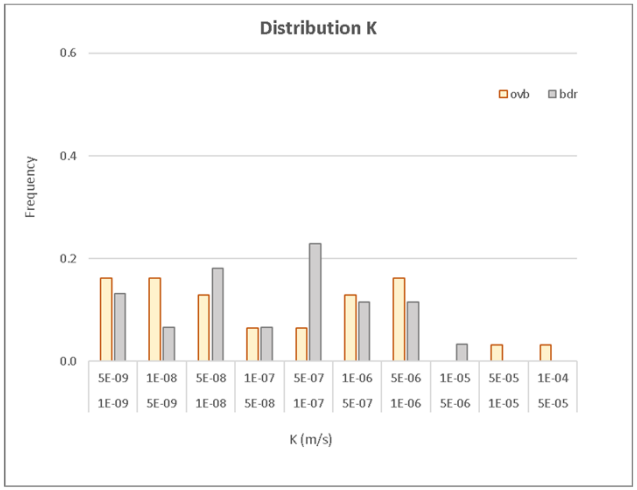

Footprint of the proposed management ponds and control pond

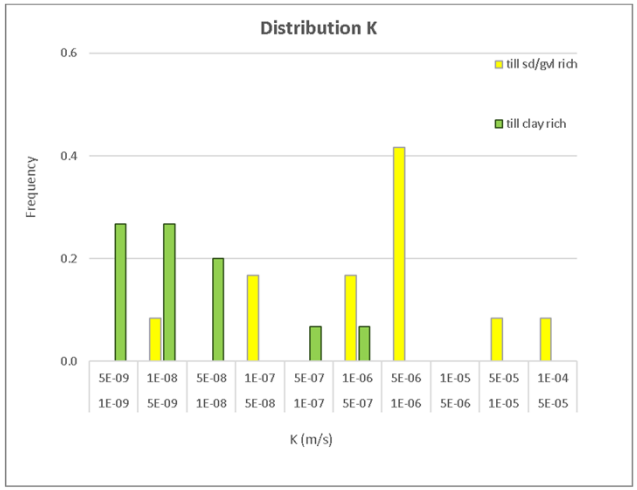
Footprint of the proposed pit

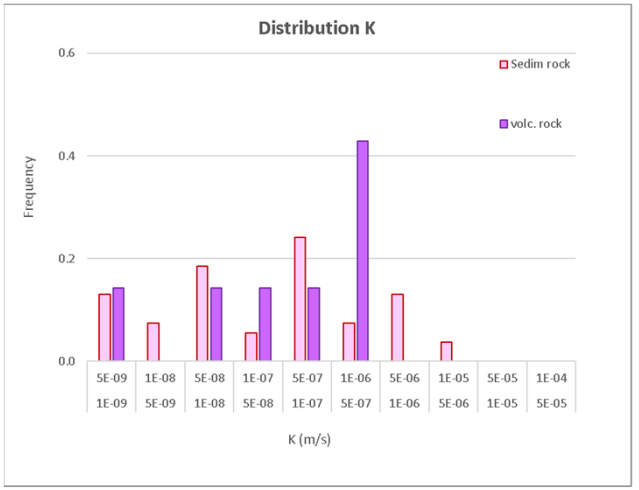
| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **3D perspective view of the hydraulic conductivity measurements** |
| Job No: 1CT027.004<br>Filename: Fig25_3d perspctv K tests.pptx | Tenas Project | Date: Oct 2020 / Approved: GF / Figure: 25 |

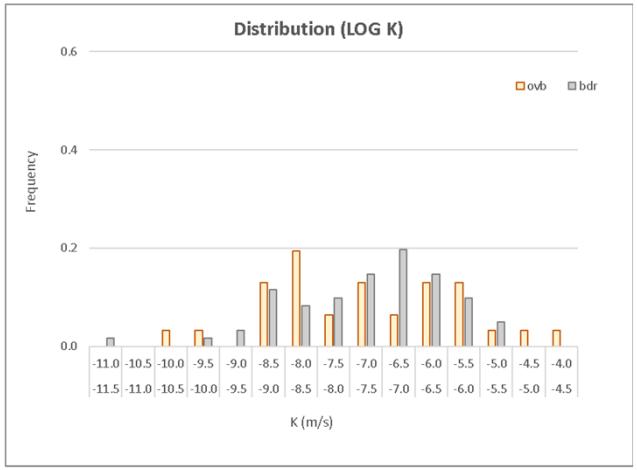


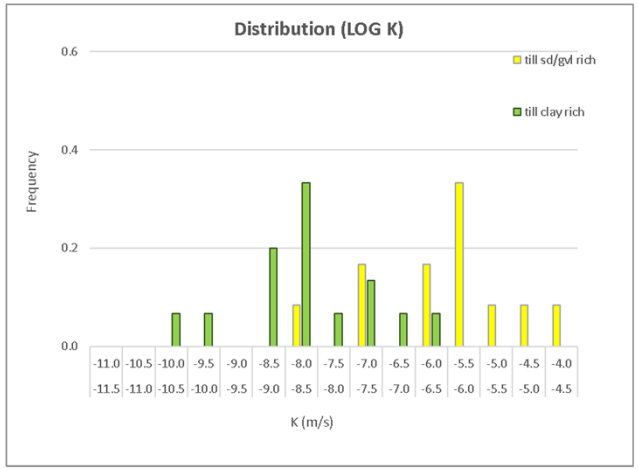

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Box plots of K conductivity measurements by lithology** |
| Job No: 1CT027.004<br>Filename: Fig26_Box plots of K measurements.pptx | Tenas Project | Date: Oct 2020 / Approved: GF / Figure: **26** |

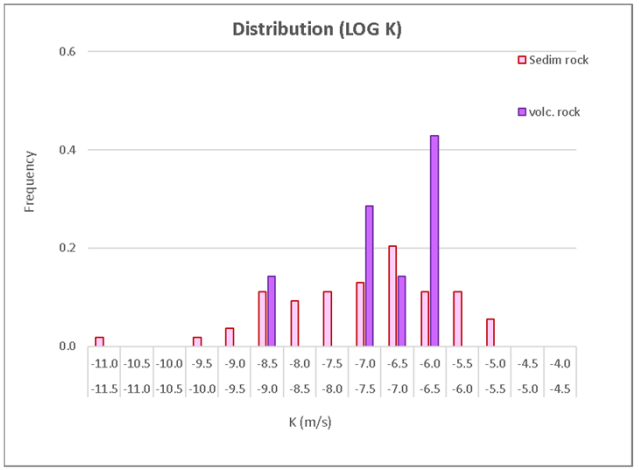



**Note:**
ovb, overburden.
bdr, bedrock.
till sd/gvl rich, sand-gravel-rich till.
till clay rich, silt-clay rich till.
sedim rock, sedimentary rocks.
volc rock, volcanic rocks.

| | | |
|---|---|---|
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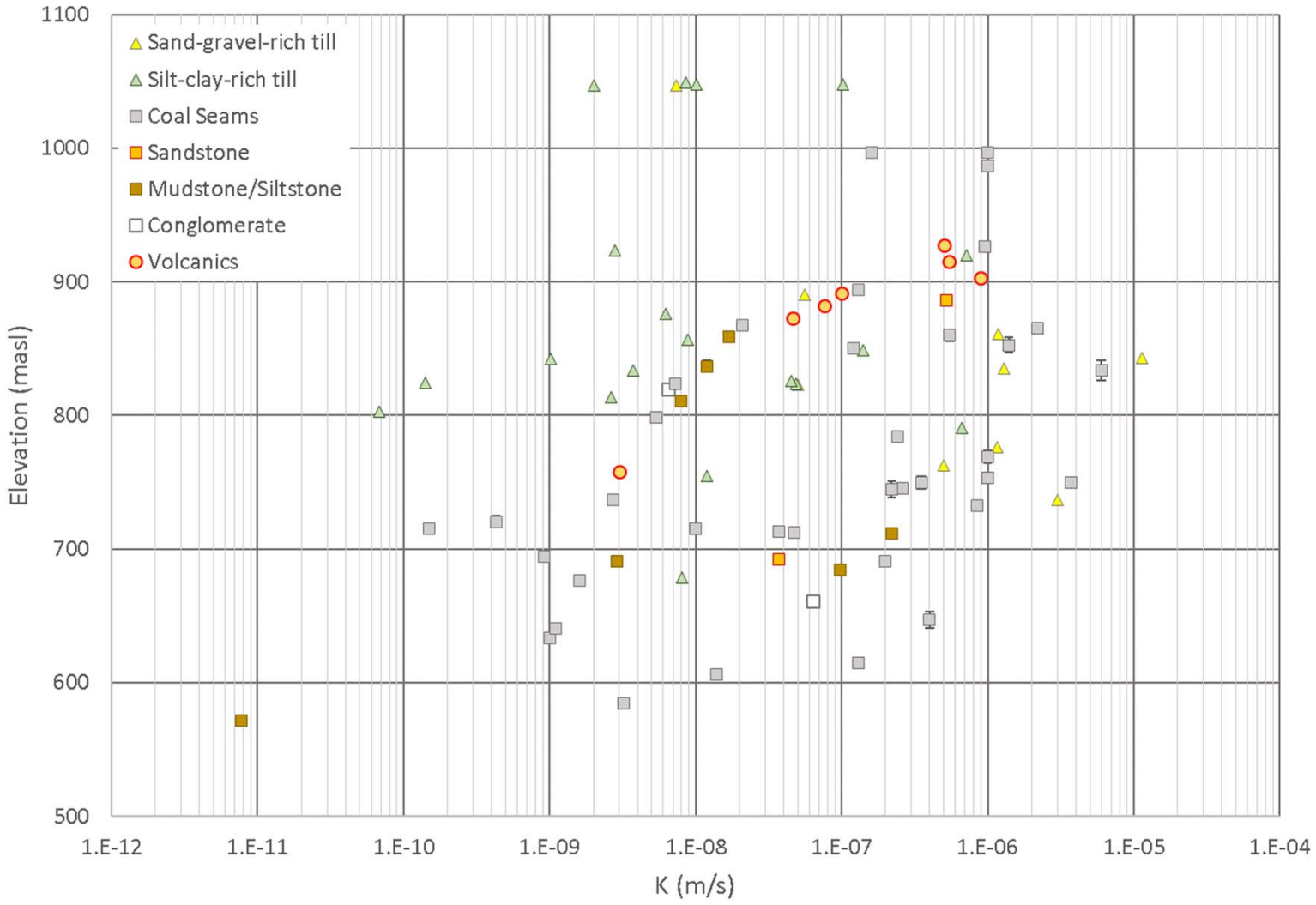
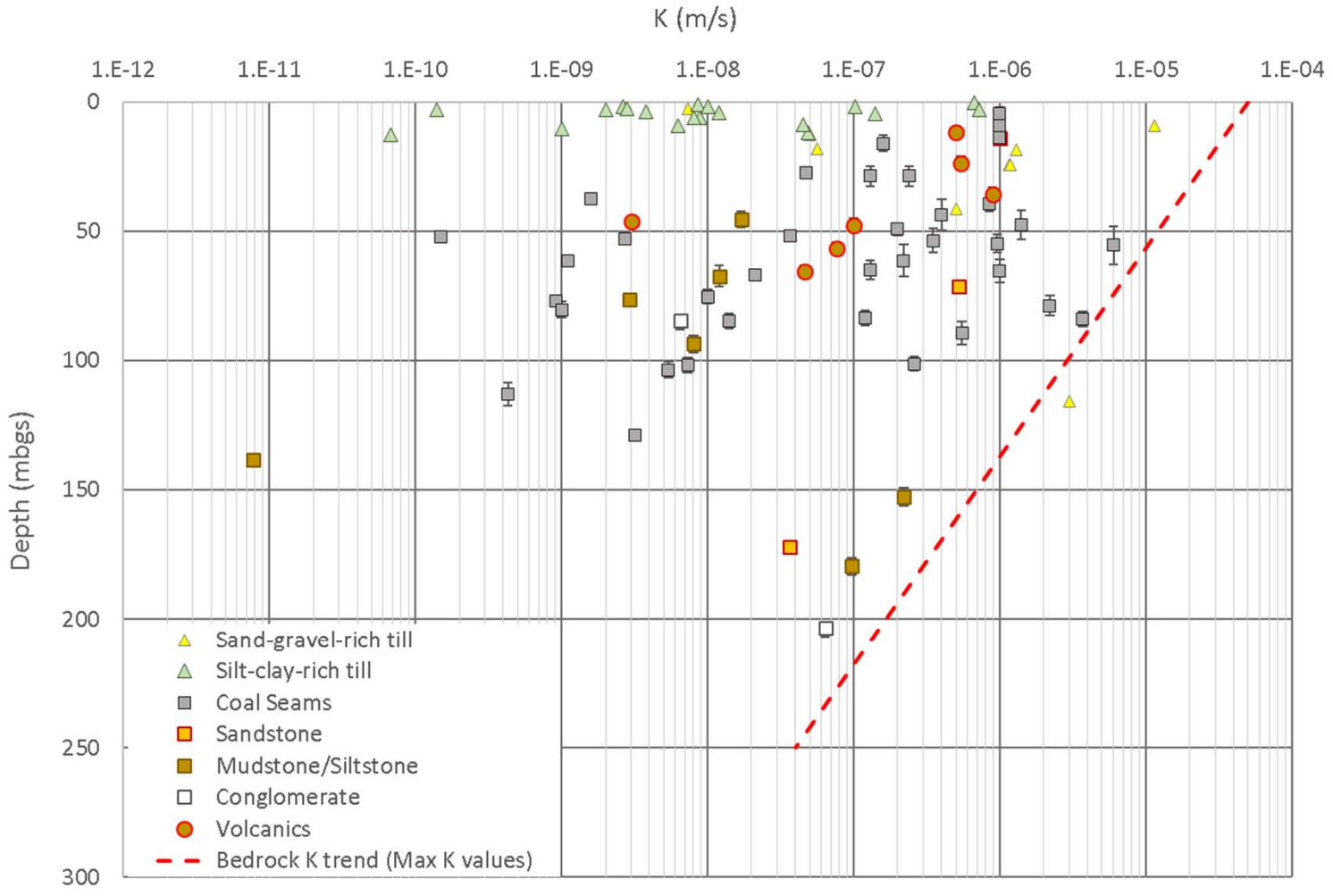
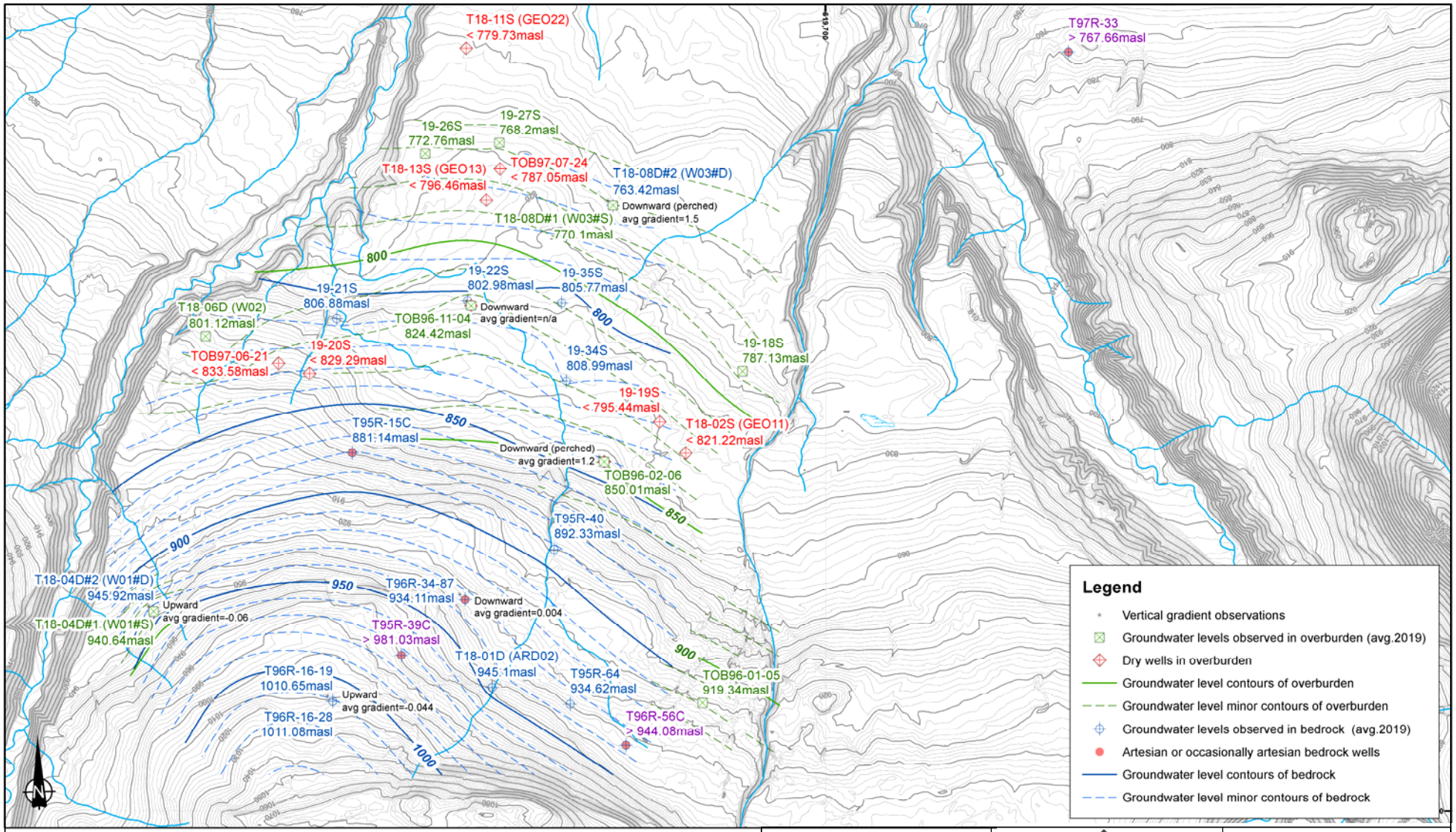
| Job No: 1CT027.004<br>Filename: Fig27_K distributions.pptx | Tenas Project | **Distribution of K measurements by lithological types** |
| | | Date: Oct 2020 / Approved: GF / Figure: **27** |




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **K versus Elevation (Tenas, Goathorn and North Areas)** |
| Job No: 1CT027.004<br>Filename: Fig28_KvsZ | Tenas Project | Date: Oct 2020 / Approved: GF / Figure: **28** |




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig29_KvsD | Tenas Project | **K versus Depth (Tenas, Goathorn and North Areas)** |
| | | Date: Oct 2020 / Approved: GF / Figure: **29** |

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0 0.325 0.65 1.3 Kilometers

Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983

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Job No: 1CT027.004
Filename: Fig30_Groundwater Tenas 2019.pptx

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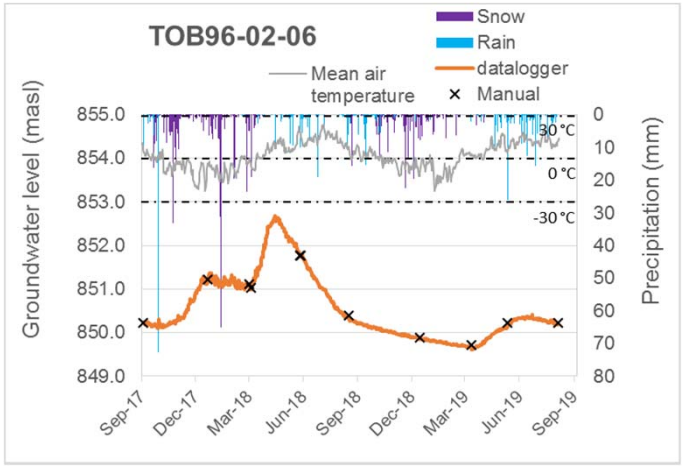
Tenas Project

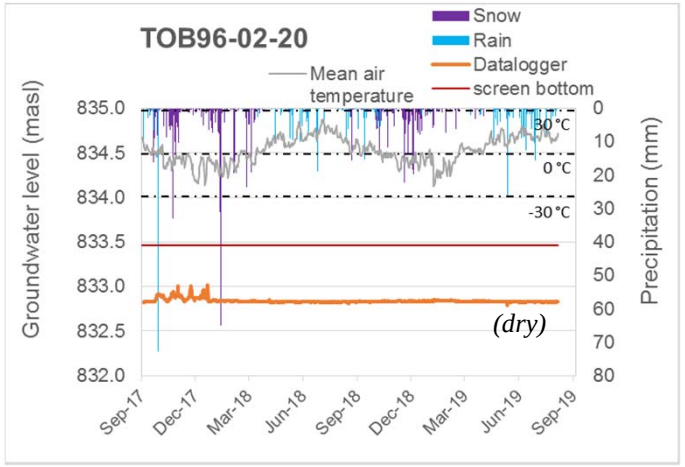
Groundwater Technical Report

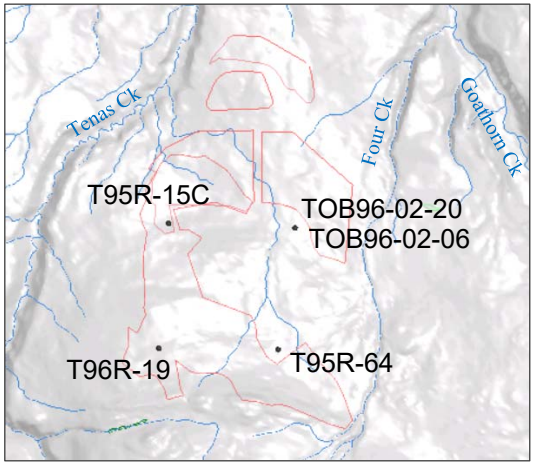
**Groundwater tables in overburden and bedrock in the Tenas area**

| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 30 |

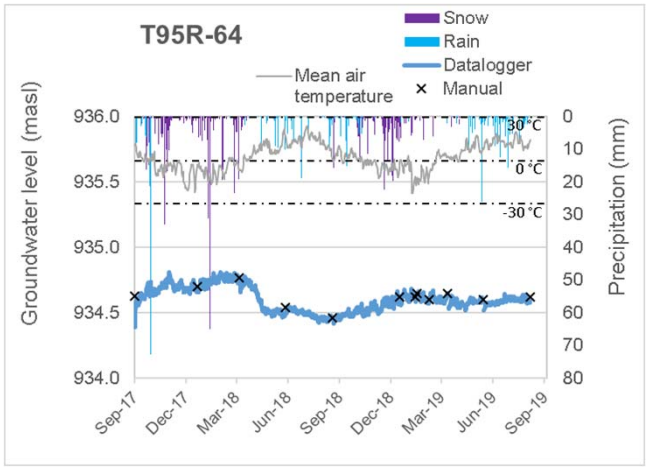
## Level observations in overburden

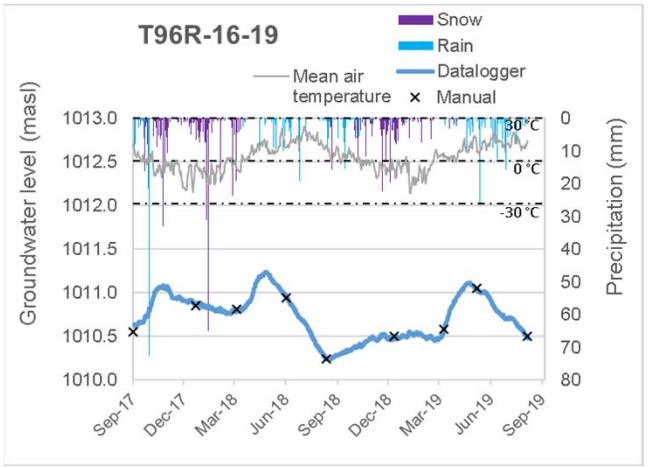


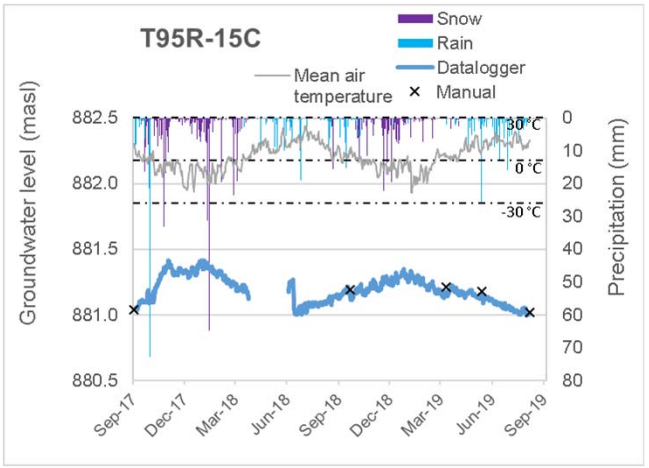



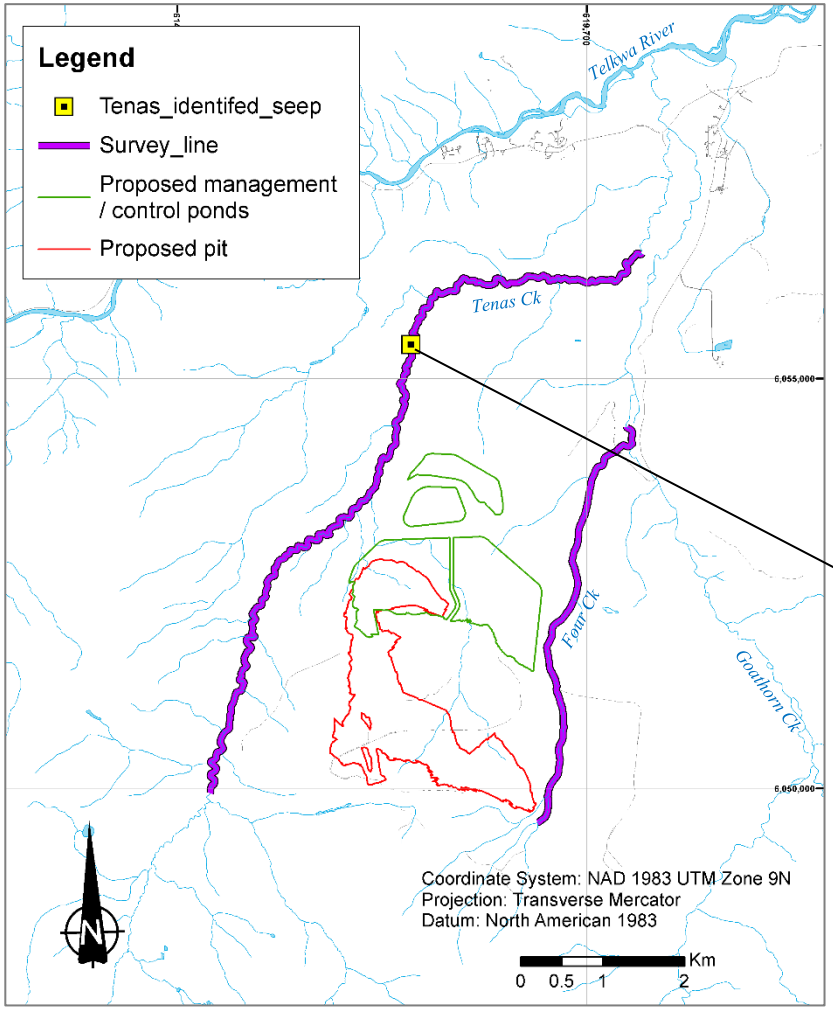

## Level observations in bedrock



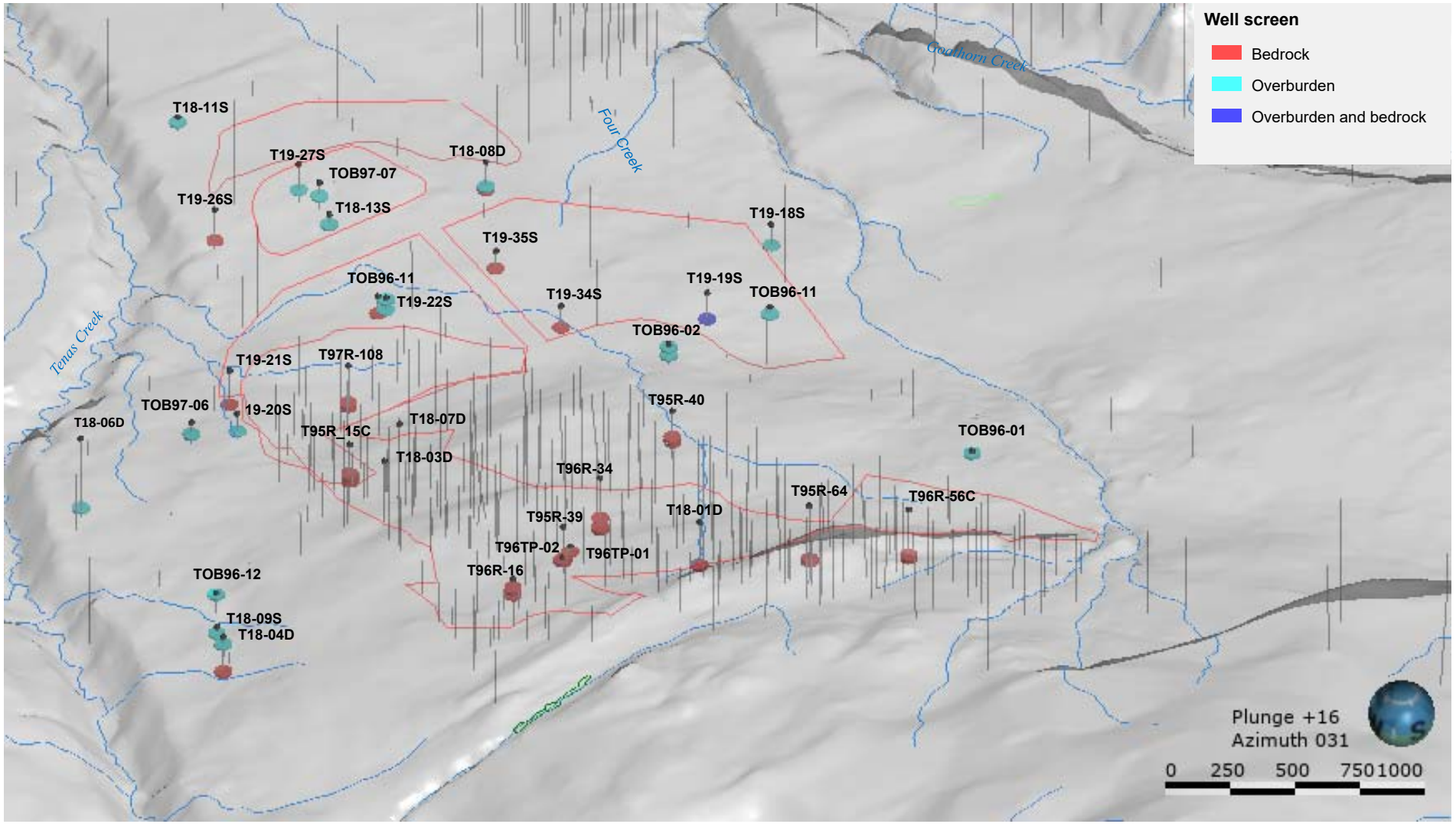




| | | | |
|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | |
| Job No: 1CT027.004<br>Filename: Fig31_SeasonalGWL.pptx | Tenas Project | **Seasonal Groundwater Level Observations** | |
| | | Date: Oct 2020 | Approved: GF | Figure: **31** |

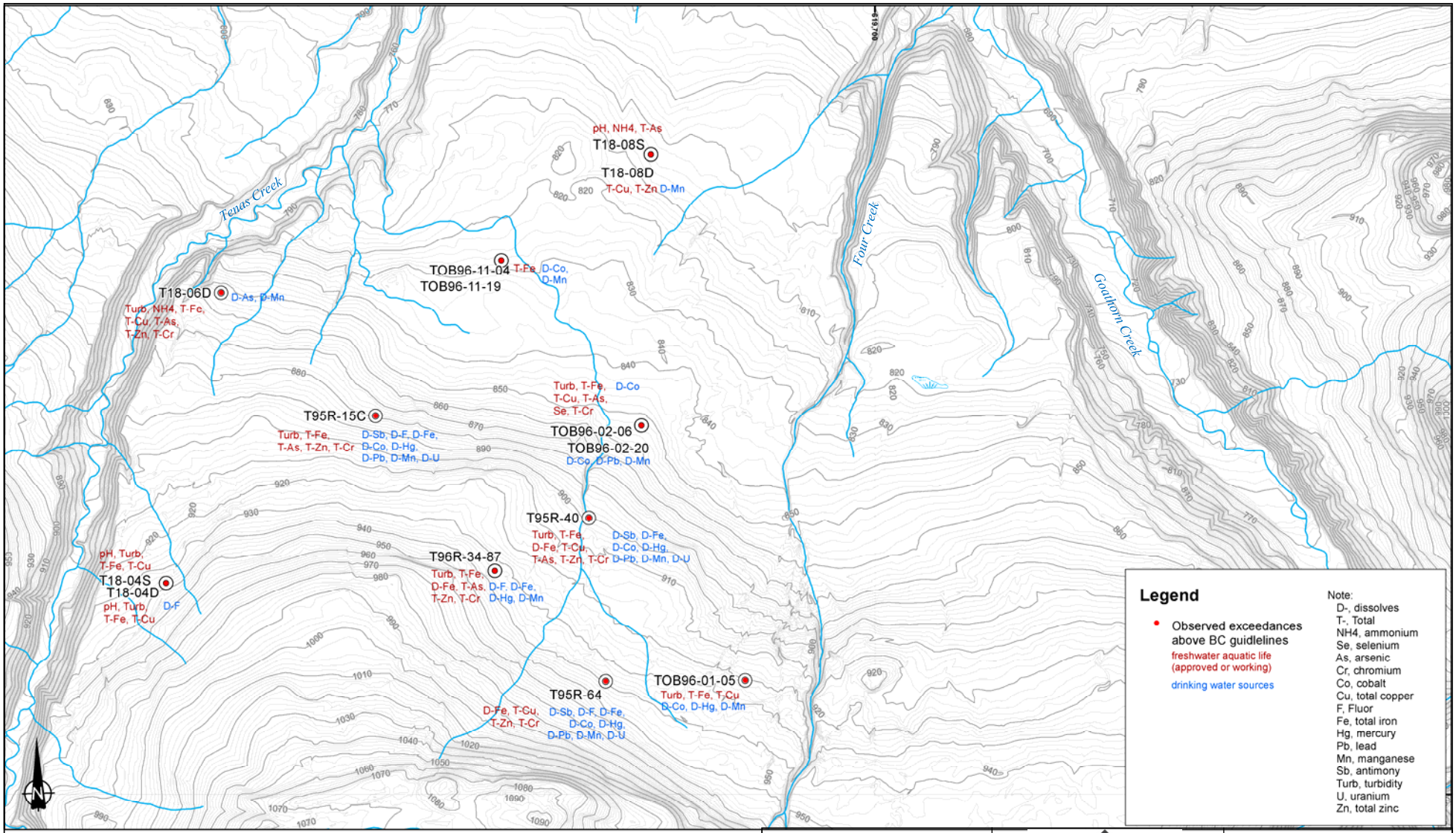



Tenas seep located at E 617555 N6055416.
Photographed on Dec. 15th 2017.

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Seep survey** |
| Job No: 1CT027.002<br>Filename: Fig32_Seep Survey.pptx | Tenas Project | Date: 12 Nov. 2018 / Approved: GF / Figure: **32** |




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | 3D perspective view of the monitoring well screens |
| Job No: 1CT027.004<br>Filename: Fig33_3d perspctv well screen.pptx | Tenas Project | Date: Nov 2020 / Approved: GF / Figure: 33 |




Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983

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Job No: 1CT027.004
Filename: Fig34_GWQ-Exceedances Tenas Area.pptx

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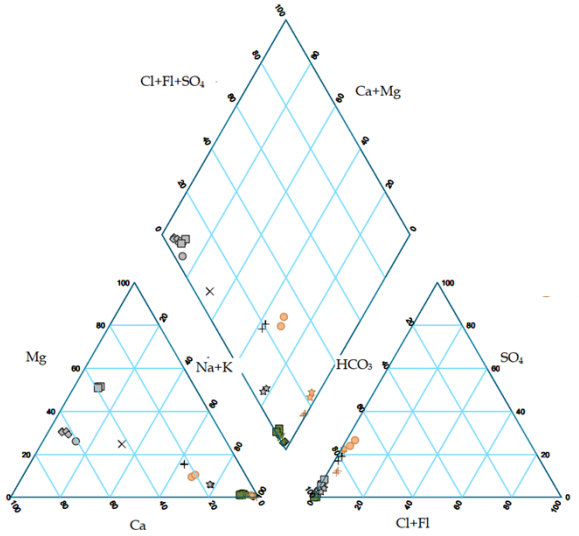
Tenas Project

Groundwater Technical Report

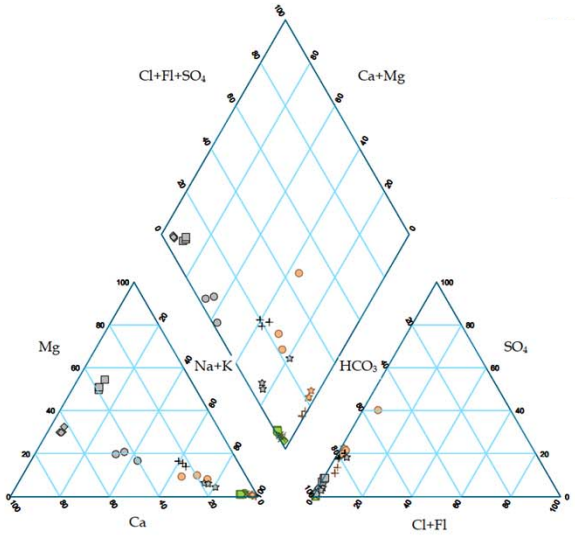
**Groundwater quality exceedances observed in the 2020 Tenas baseline data**

| Date: | Approved: | Figure: |
|---|---|---|
| Jan 2021 | GF | 34 |

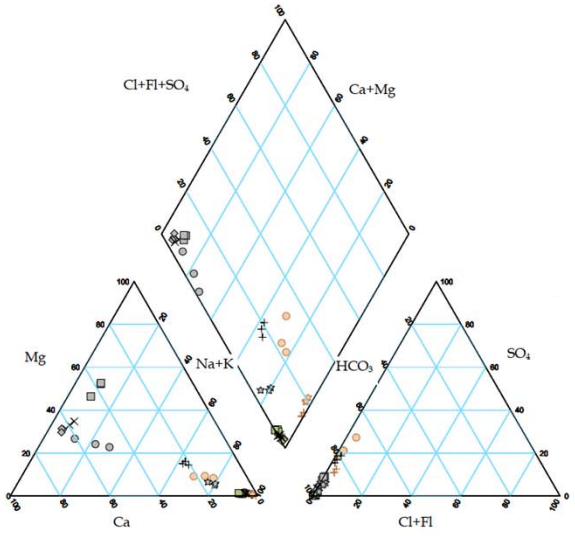
\\VAN-SVR01\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_GWQ Exceedances.mxd



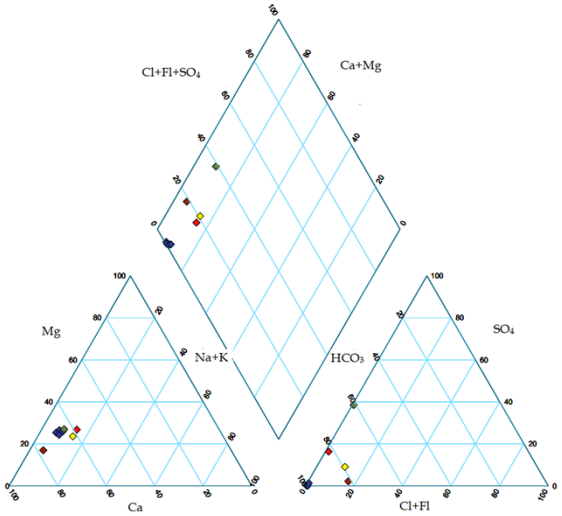

**Project wells, September to November Historical, and 2017 to 2019 Baseline Data [1]**




**Project wells, January and March/April 2018 and 2019 Baseline Data [2]**




**Project wells, June to August, Historical, and 2017 to 2019 Baseline Data [3]**




**Residential wells, Yearly average 2019**

## Project wells

Bedrock Wells

- T95R-15C
- T95R-40
- T95R-64
- T96R-34-87
- W1 Deep (T18-04D#2)
- W1 Shallow (T18-04D#1)
- W3 Deep (T18-08D#2)

Overburden Wells

- TOB96-01-05
- TOB96-02-06
- TOB96-11-04
- W2 (T18-06D)
- W3 Shallow (T18-08D#1)

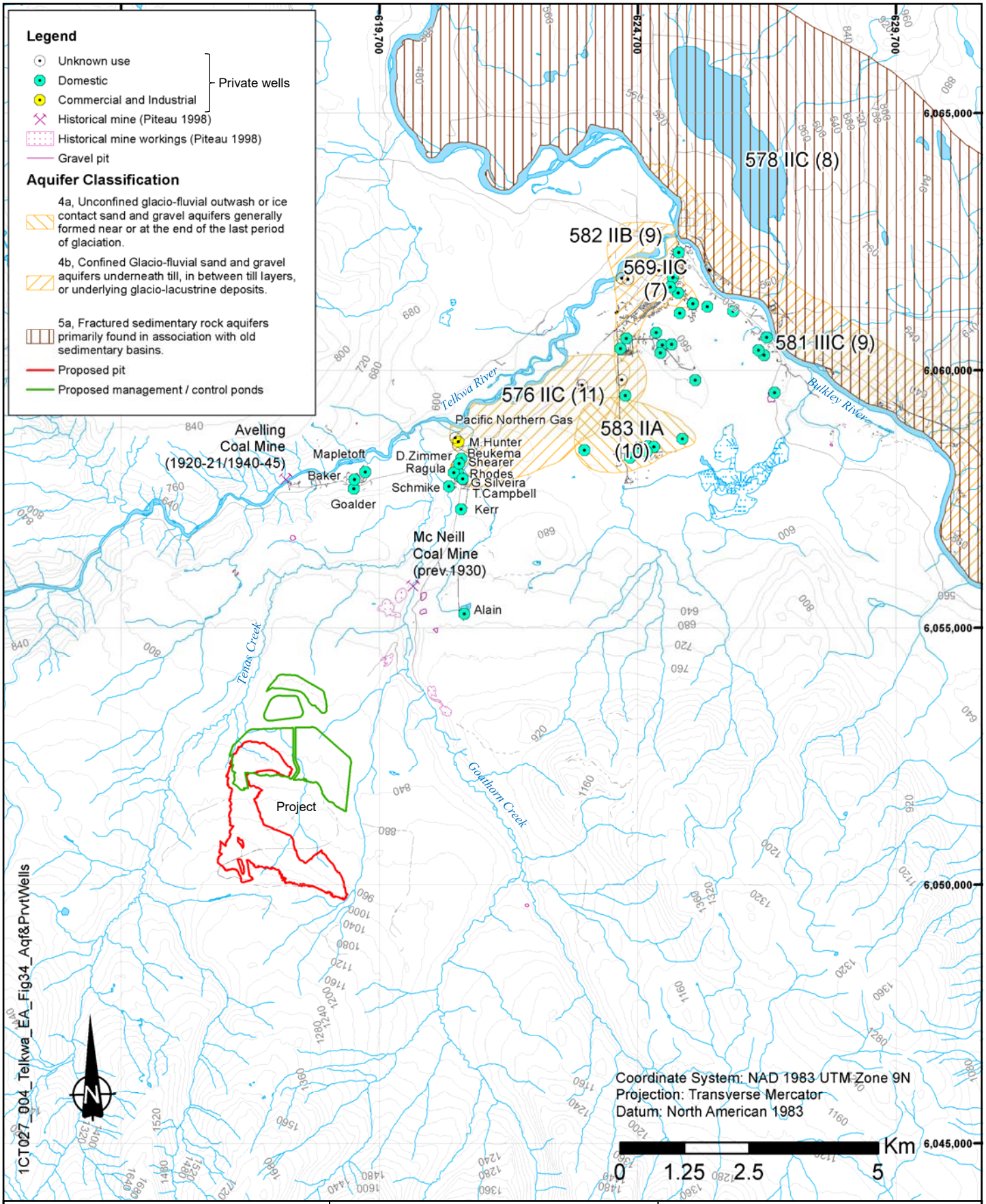
## Private domestic wells

- Beukema
- Kerr
- Ragula
- Schmike
- Shearer

Source: 2017 to 2019 Baseline Report, March 2020. Project #0403488. Cassiar geosciences and ERM (2020)

**Notes:**
[1] Data from October 1995, September and October 1996, November 2016, September 2017, September 2018, and November 2019.
[2] Date from January 2018, March/April 2018, January 2019, and March/April 2019.
[3] Data from August 1997, August 2017, June 2018, June 2019, and August 2019.

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Piper plots of the groundwater quality at Project wells, and residential wells** |
| Job No: 1CT027.004<br>Filename: Fig35_GWQ diagram.pptx | Tenas Project | Date: Nov 2020 / Approved: GF / Figure: 35 |




| | | |
|---|---|---|
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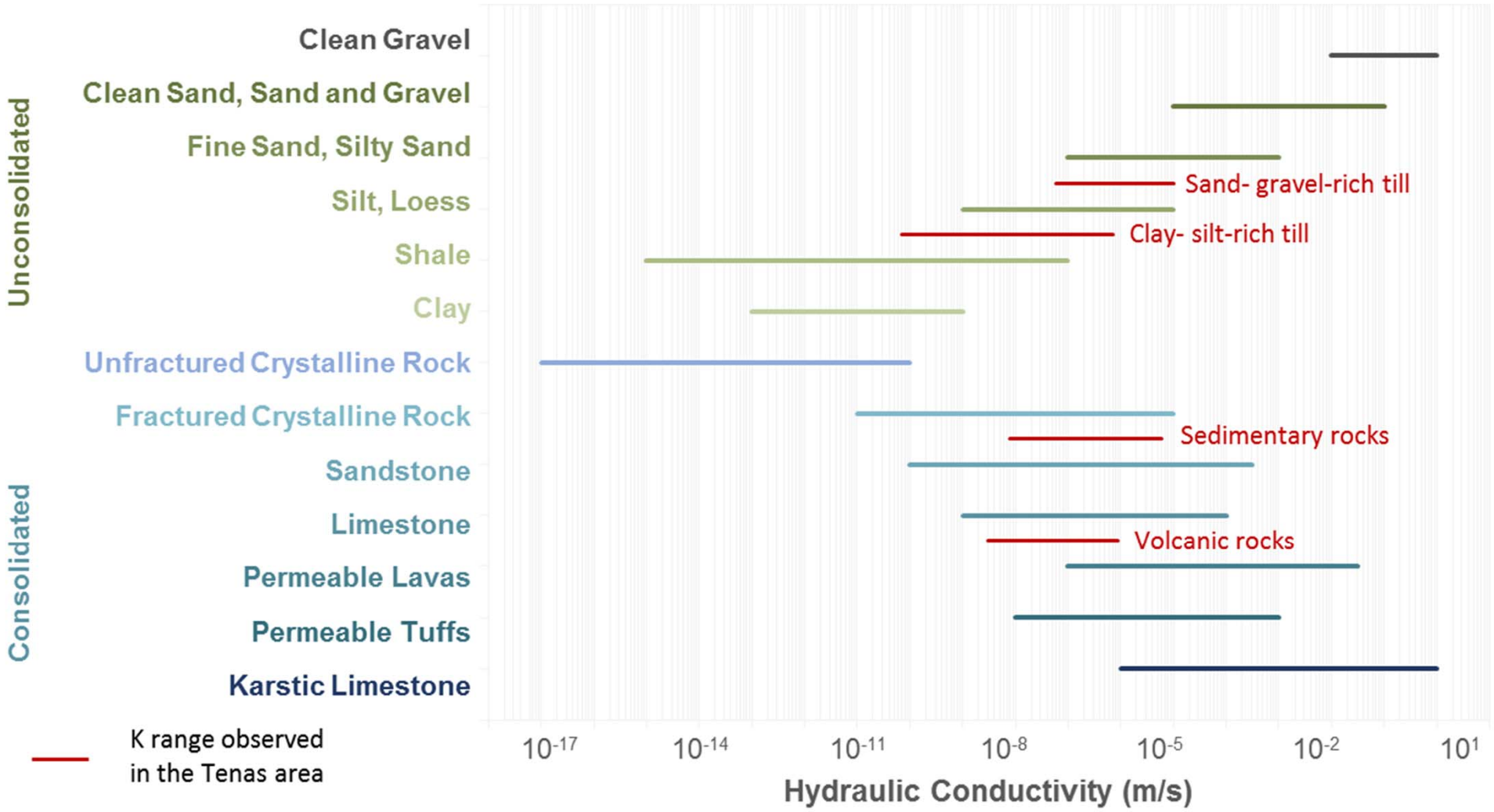
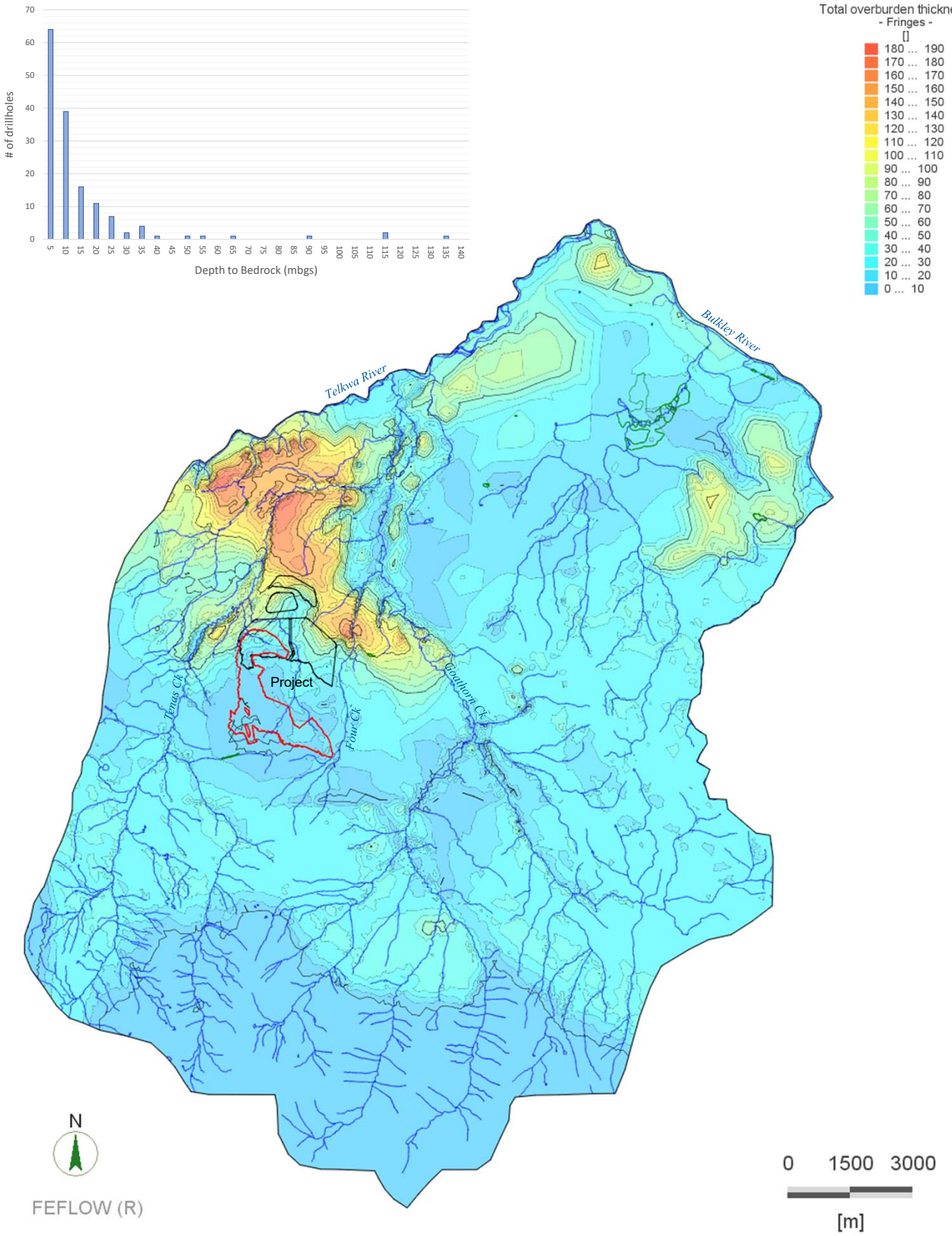
| | | **Aquifers and private wells** |
| Job No: 1CT027.004<br>Filename: Fig36_Aqf&PrvtWells.pptx | Tenas Project | Date: Oct 2020 \| Approved: GF \| Figure: **36** |



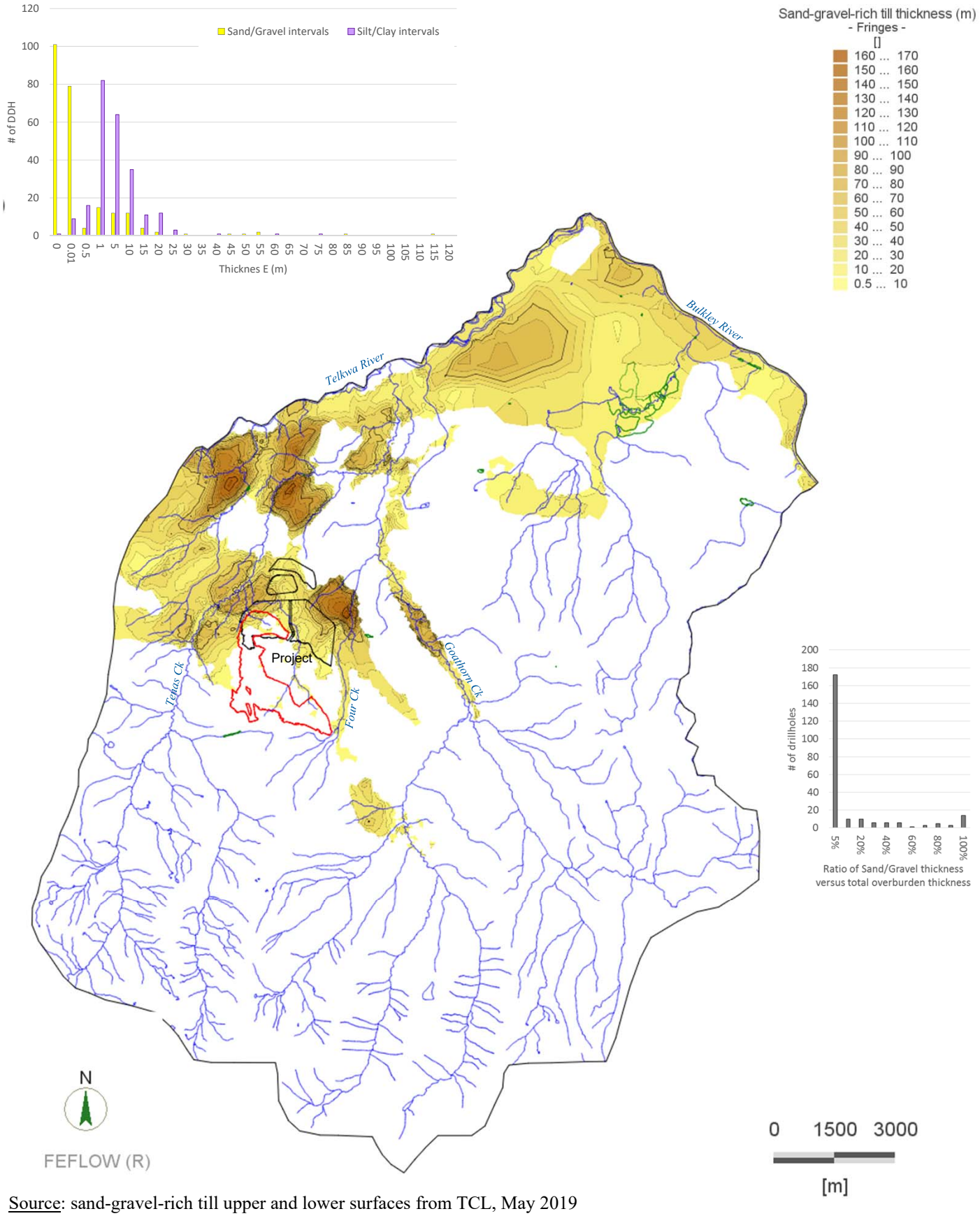

Source K range: Beale G, and J Reed. 2013. Guidelines for evaluating water in pit slope stability. CSIRO Publishing, Collingwood, Australia. 600 p.

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Comparison of Telkwa K values to other hydrostratigraphic units** |
| Job No: 1CT027.004<br>Filename: Fig37_Compar_K_Other_Hydrostrat.pptx | Tenas Project | Date: Nov 2020 / Approved: GF / Figure: **37** |



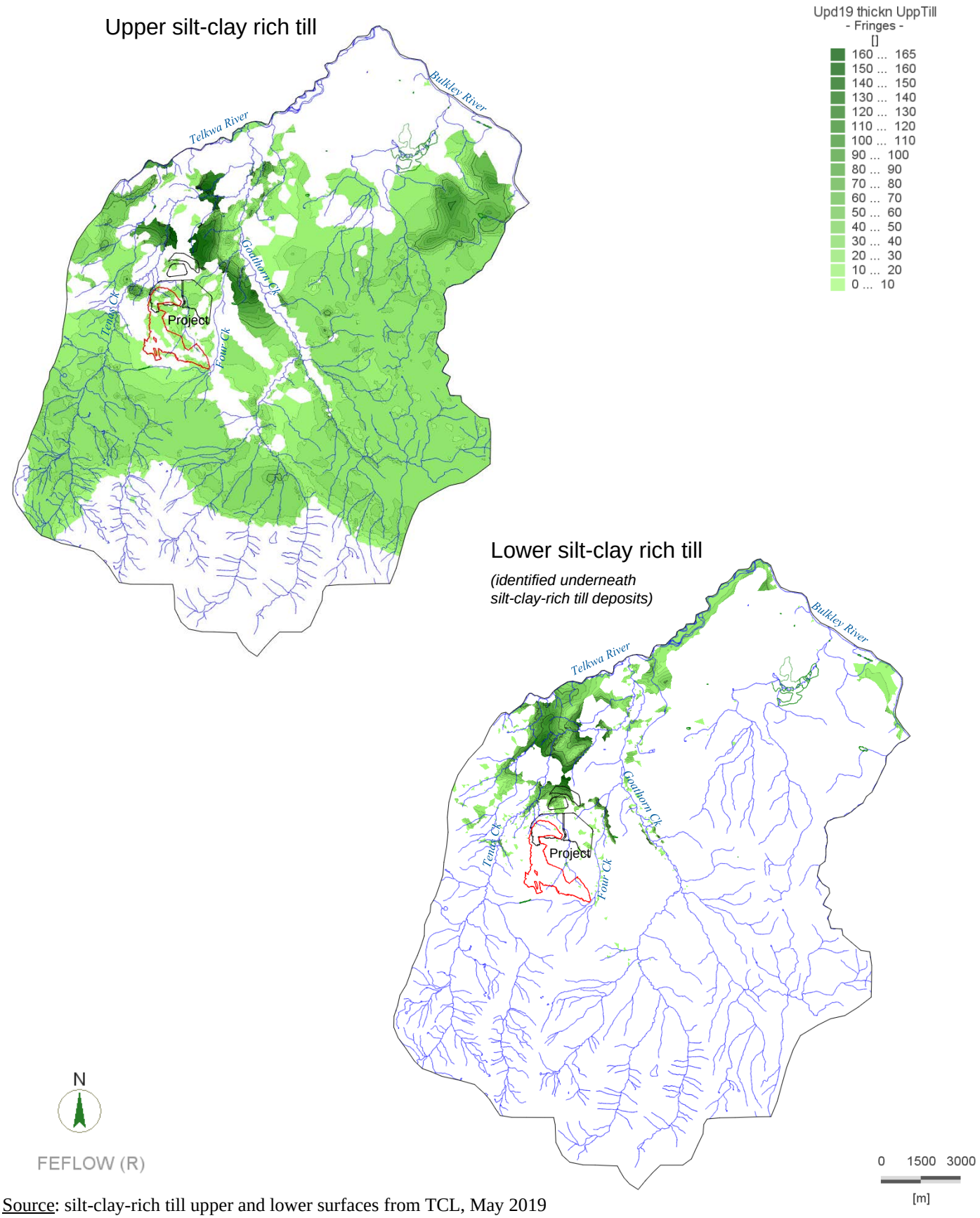

Source: overburden contact surfaced from TCL, May 2019

| | | | | |
|---|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | | |
| | | **Total modelled thickness of the overburden** | | |
| Job No: 1CT027.004<br>Filename: Fig38_ThckOVB.pptx | Tenas Project | Date: Dec 2020 | Approved: GF | Figure: **38** |




Source: sand-gravel-rich till upper and lower surfaces from TCL, May 2019

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled thickness of the sand-gravel-rich till** |
| Job No: 1CT027.004<br>Filename: Fig39_ThckSdGvl.pptx | Tenas Project | Date: Dec 2020 \| Approved: GF \| Figure: **39** |




Source: silt-clay-rich till upper and lower surfaces from TCL, May 2019

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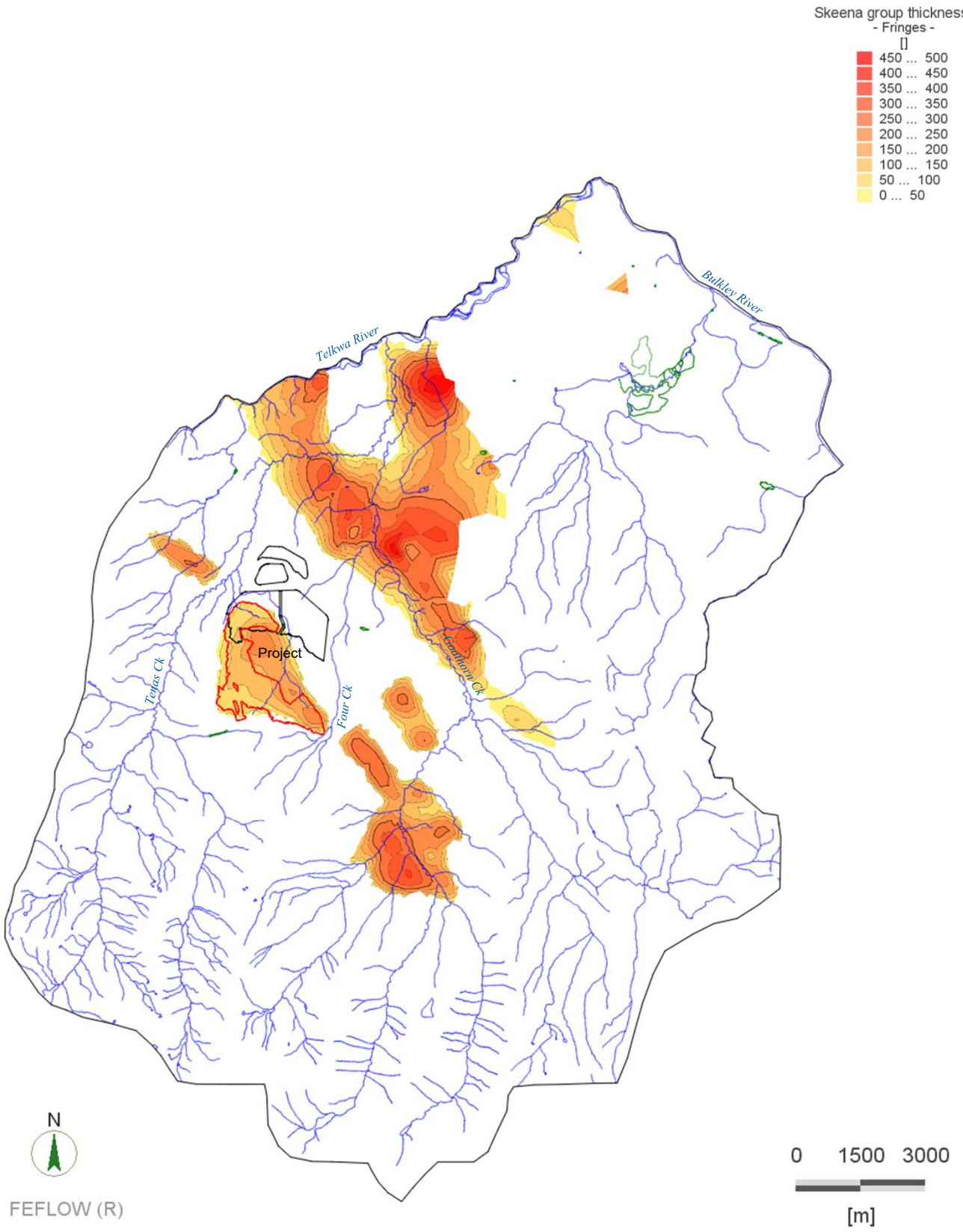
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | | |
| | | **Modelled thickness of the silt-clay-rich till** | | |
| Job No: 1CT027.004<br>Filename: Fig40_ThckOVB.pptx | Tenas Project | Date: Dec 2020 | Approved: GF | Figure: **40** |




Source: Interpolation based on geological maps, digitized plan view geological maps and vertical cross sections from TCL and MEMPR 1991

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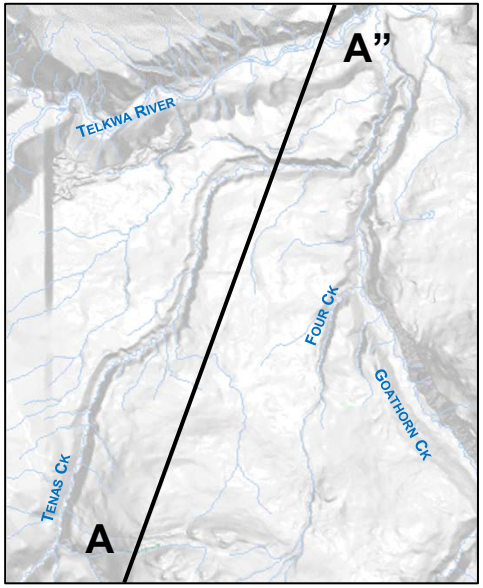
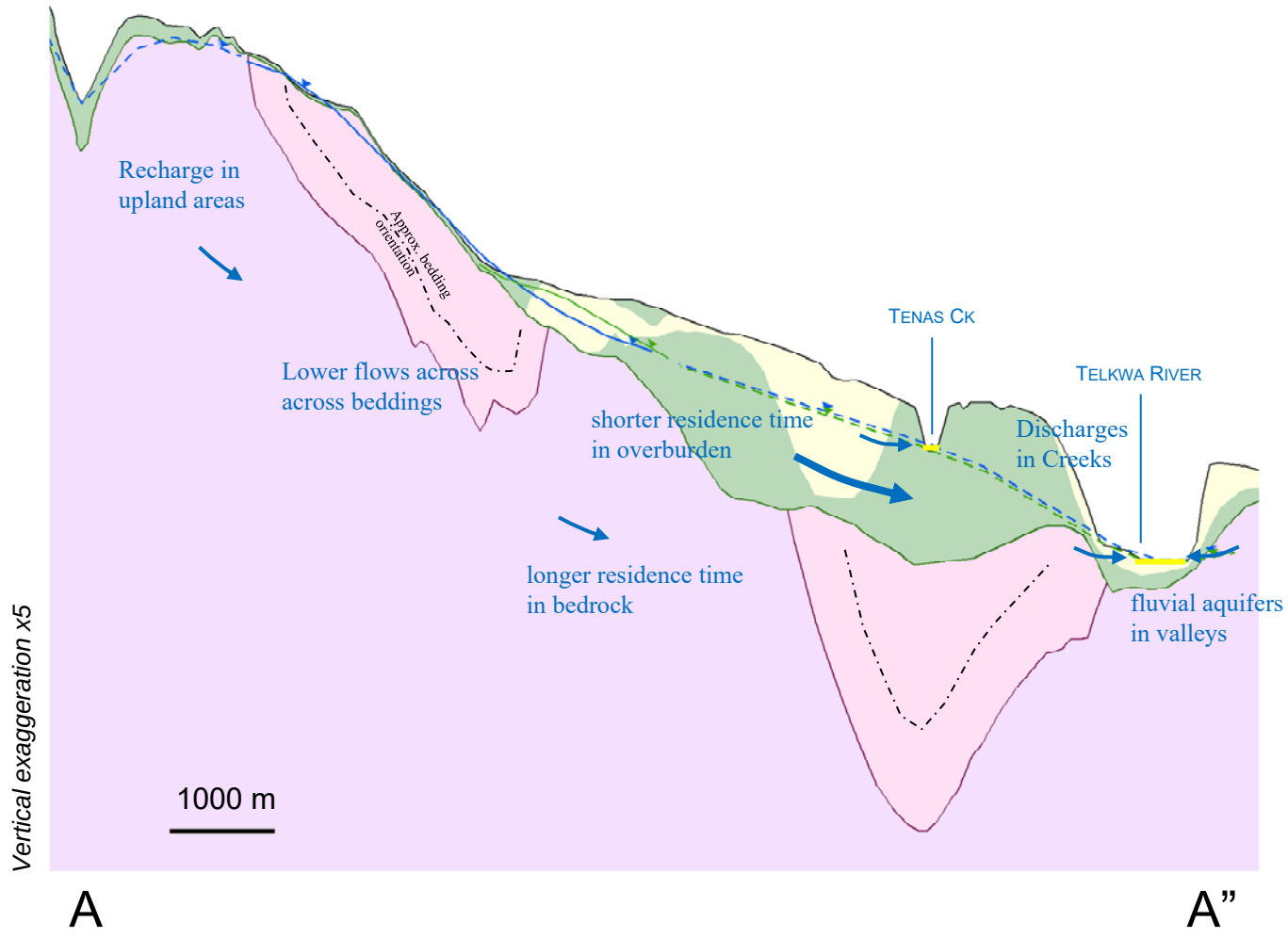
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | | |
| | | **Modelled thickness of the sedimentary rocks (Skeena group)** | | |
| Job No: 1CT027.004<br>Filename: Fig41_ThckSKN.pptx | Tenas Project | Date: Dec 2020 | Approved: GF | Figure: **41** |




**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

| | | |
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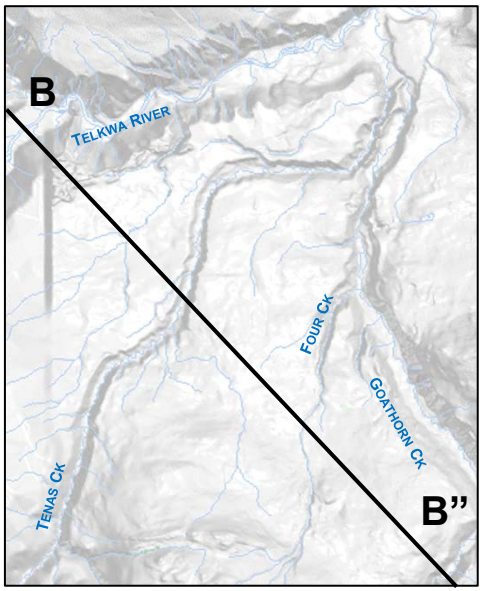
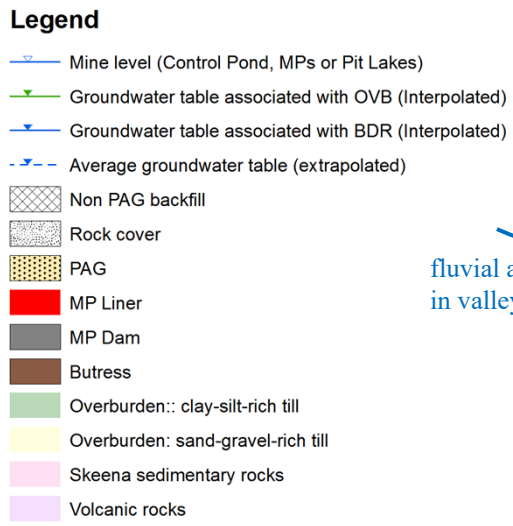
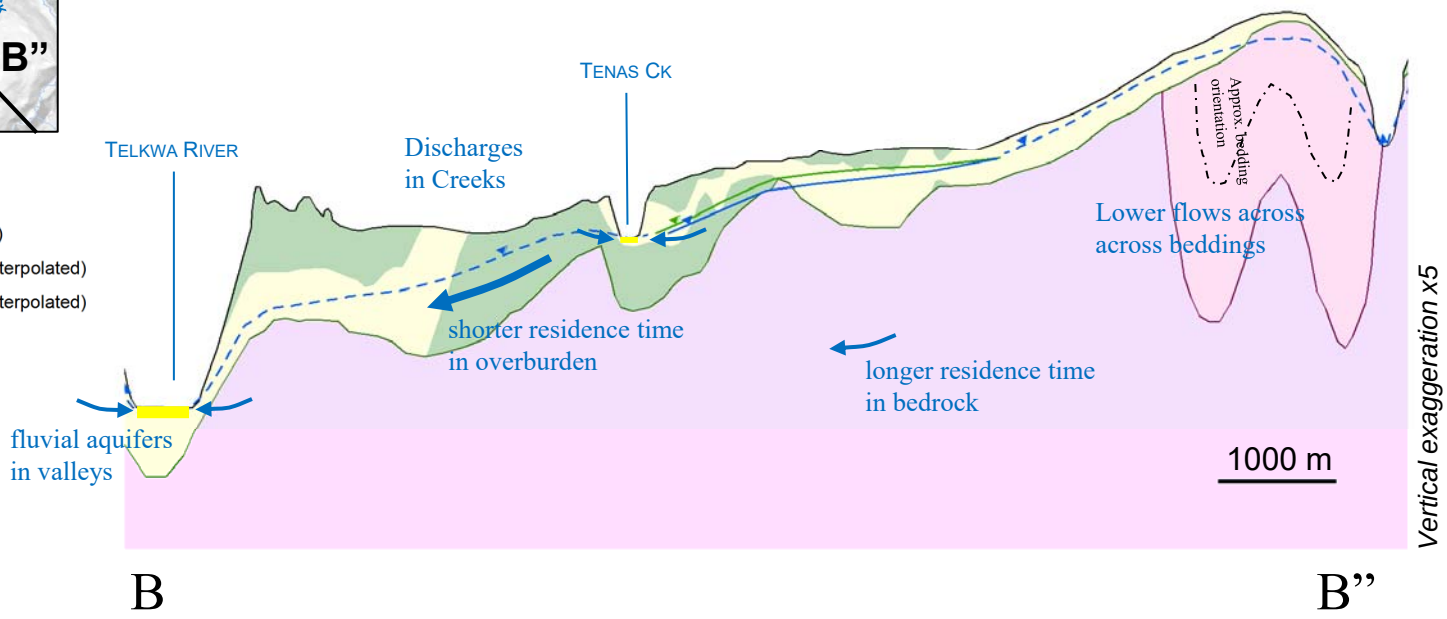
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section AA” Baseline**<br>Date: Dec.2020 \| Approved: GF \| Figure: **42** |

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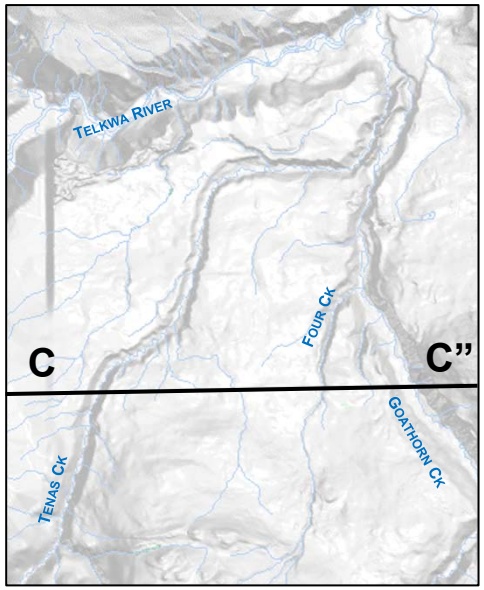
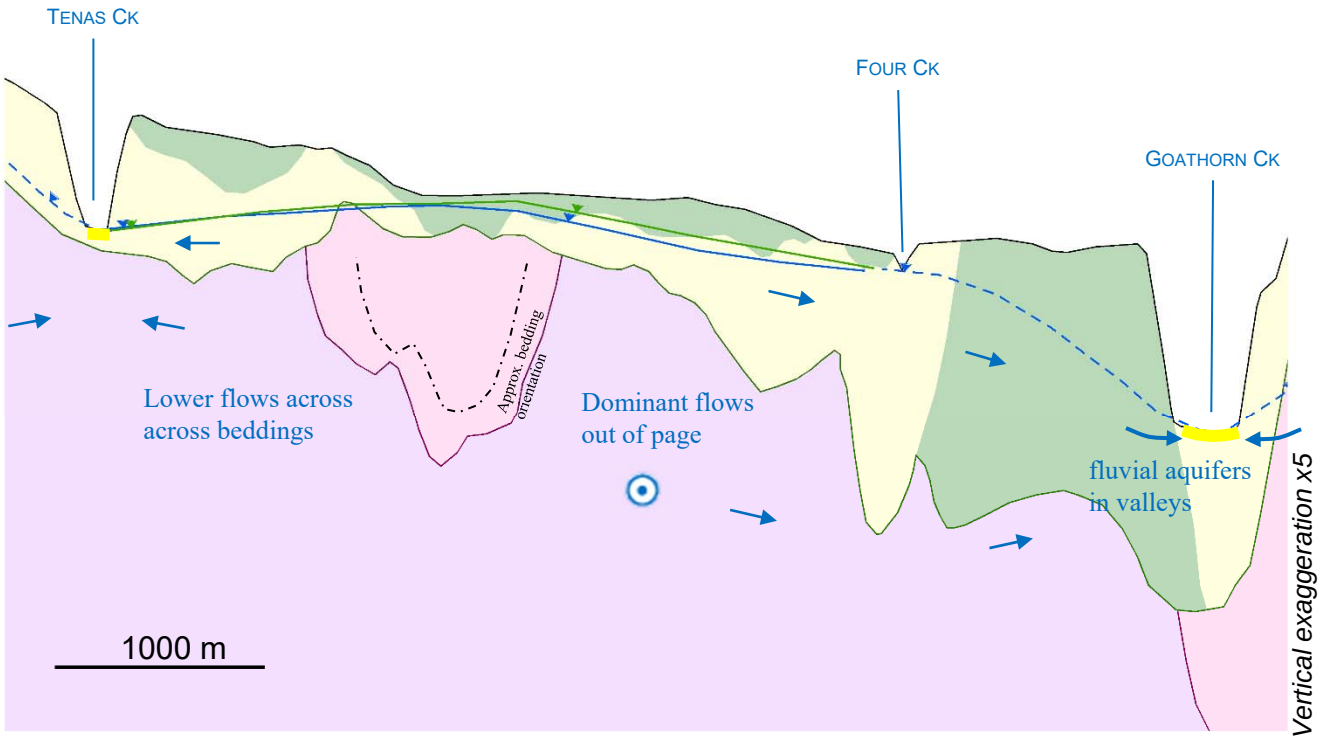
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section BB” Baseline**<br>Date: Dec.2020 \| Approved: GF \| Figure: **43** |




**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

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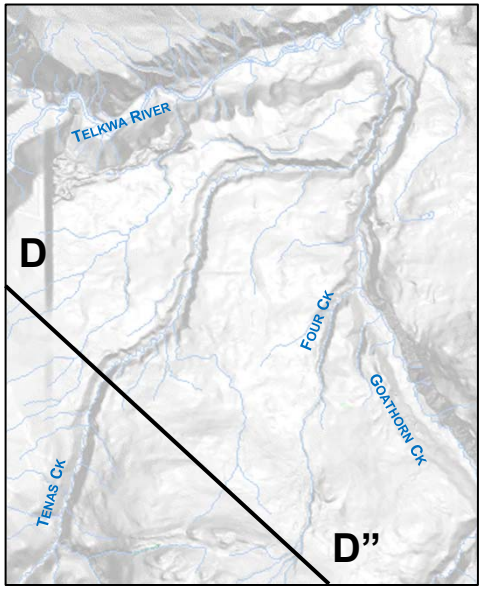
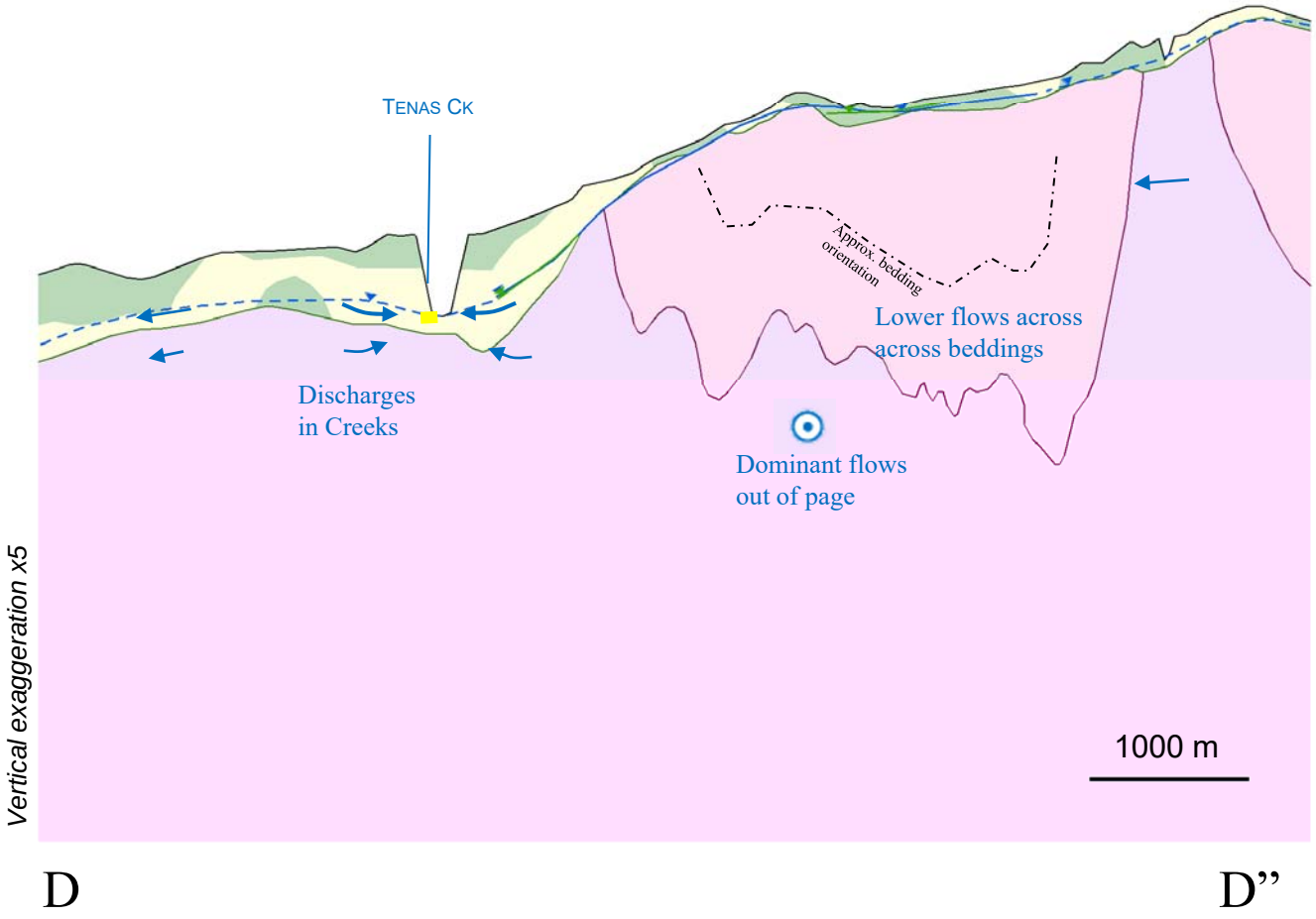
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | |
| | | **Conceptual Cross Section CC” Baseline** | |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | Date: Dec.2020 | Approved: GF | Figure: **44** |




**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

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**Conceptual Cross Section DD” Baseline**

Job No: 1CT027.004

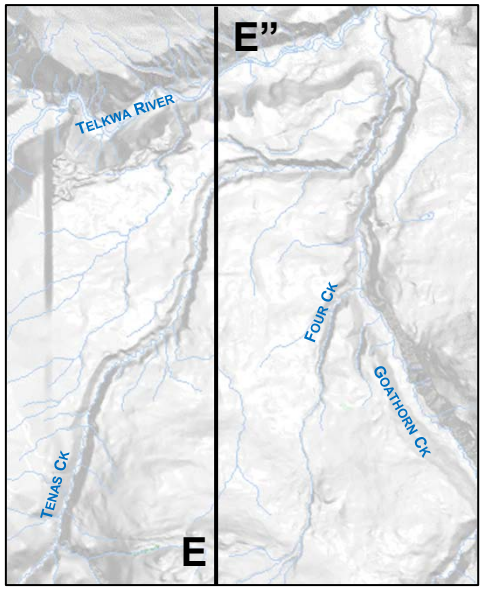
Filename: Fig42to51_ConceptualCrossX.pptx

Tenas Project

Date: Dec.2020

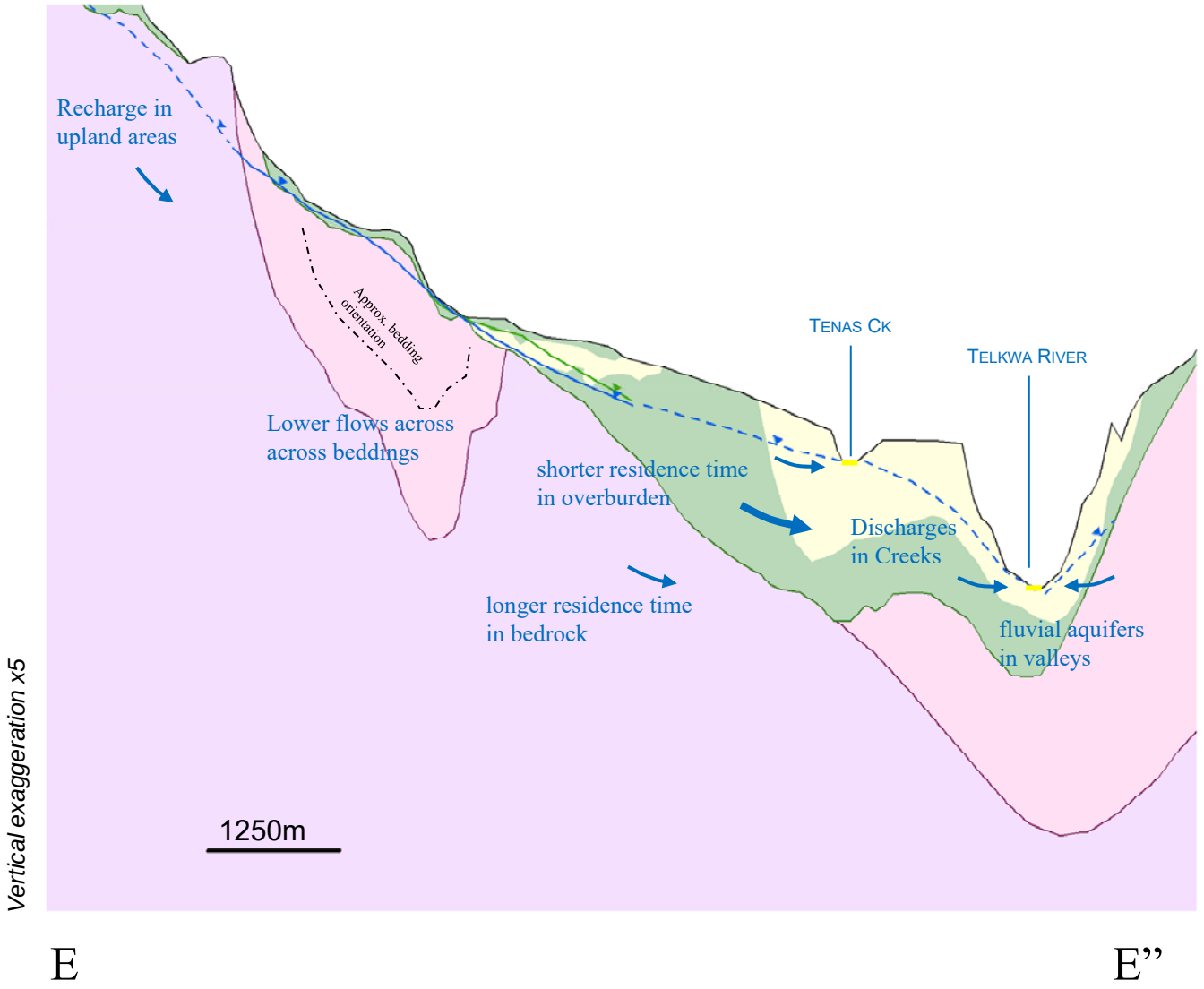
Approved: GF

Figure: **45**




**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

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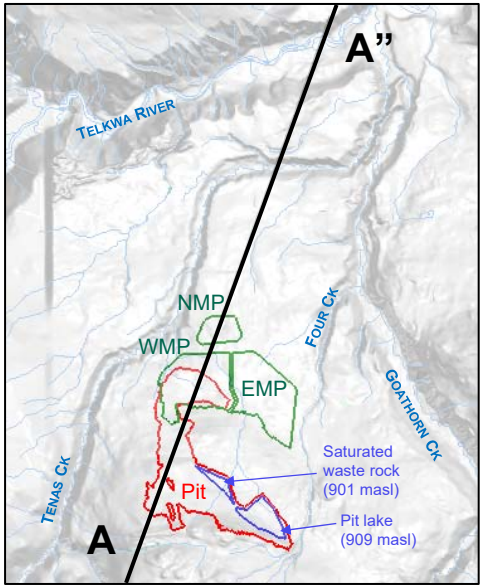
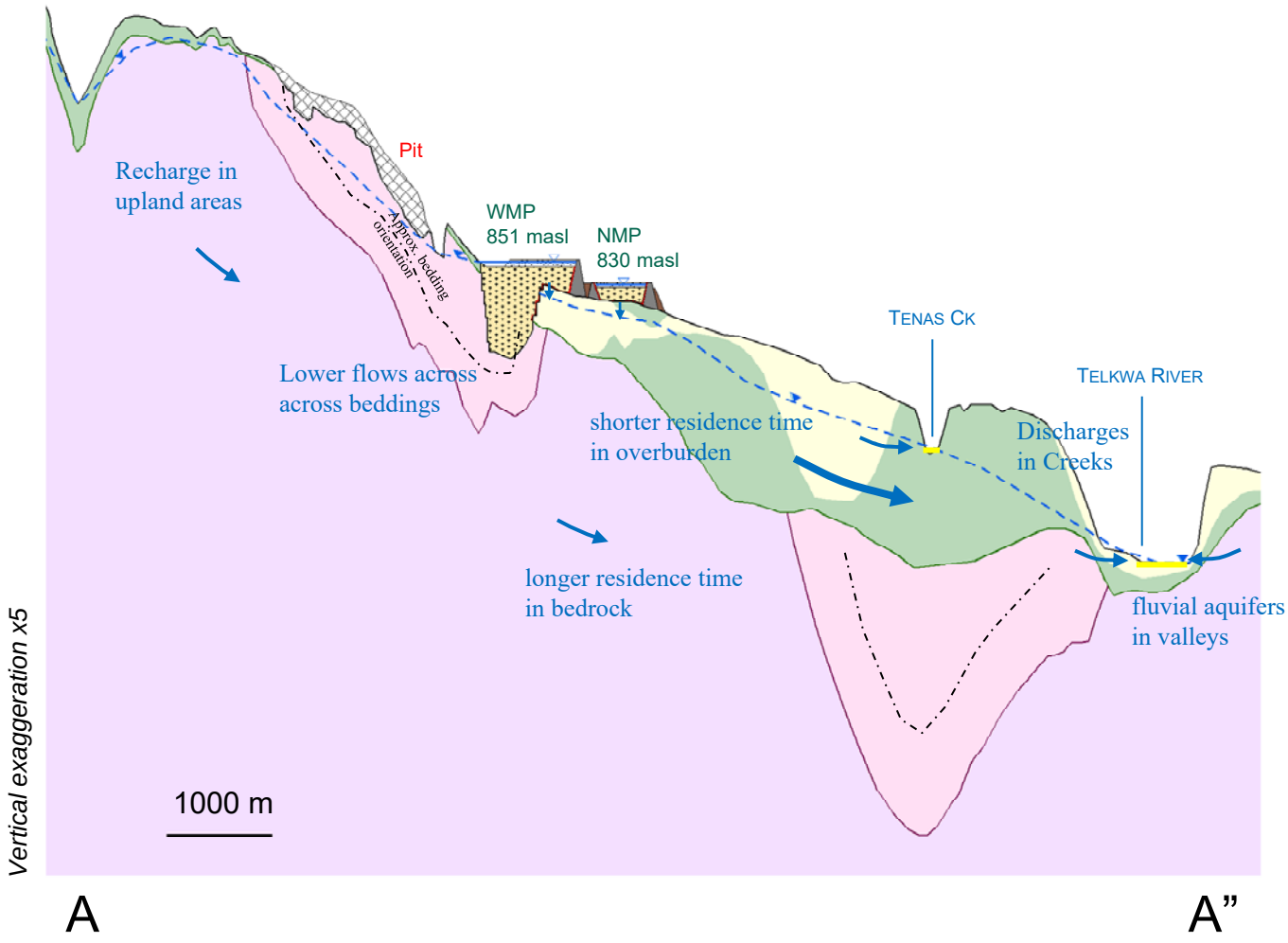
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section EE” Baseline**<br>Date: Dec.2020 · Approved: GF · Figure: **46** |




## Legend

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

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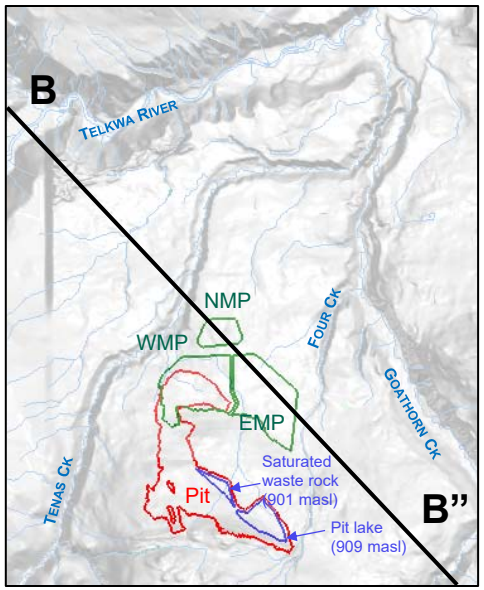
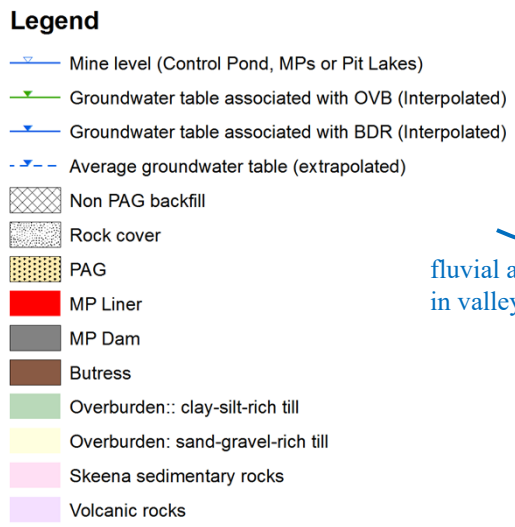
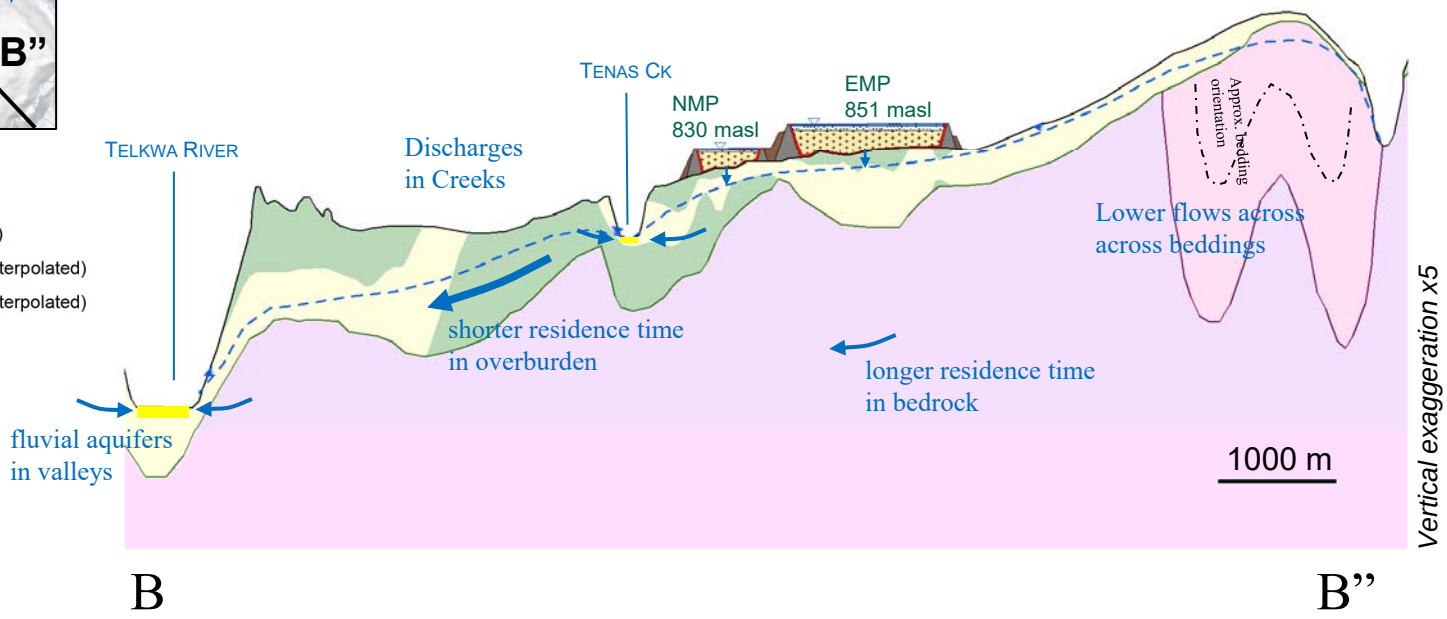
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section AA” Post closure** |
| | | Date: Dec.2020 / Approved: GF / Figure: **47** |

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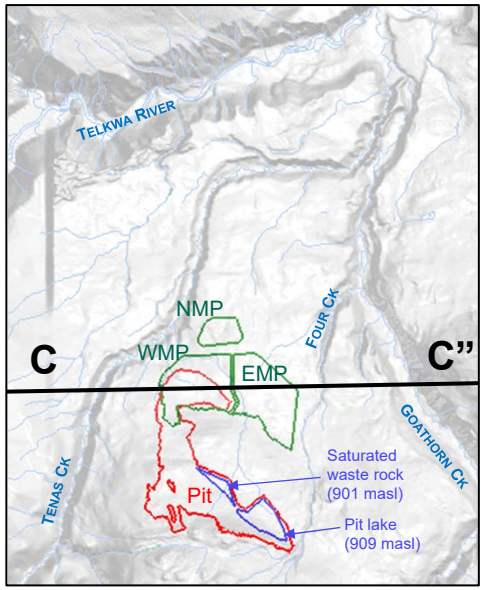
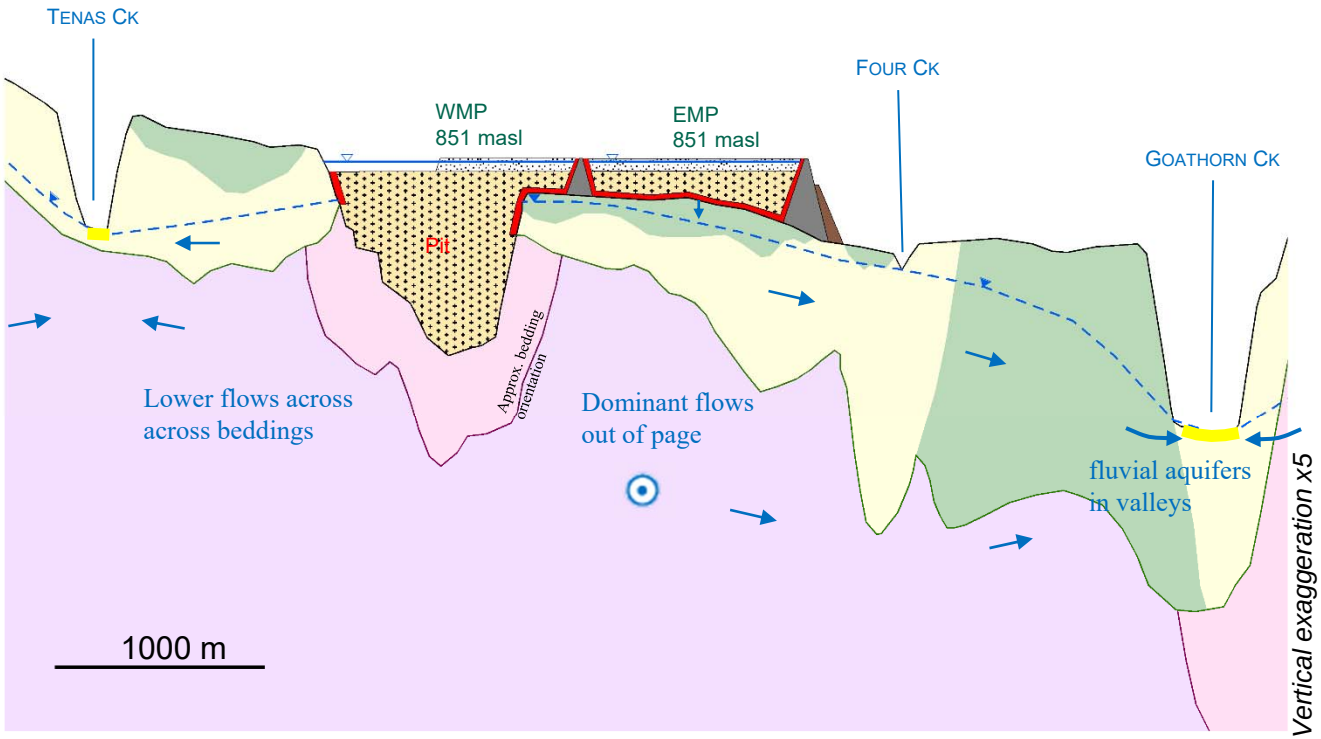
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section BB”<br>Post closure** |
| | | Date: Dec.2020 / Approved: GF / Figure: **48** |




**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

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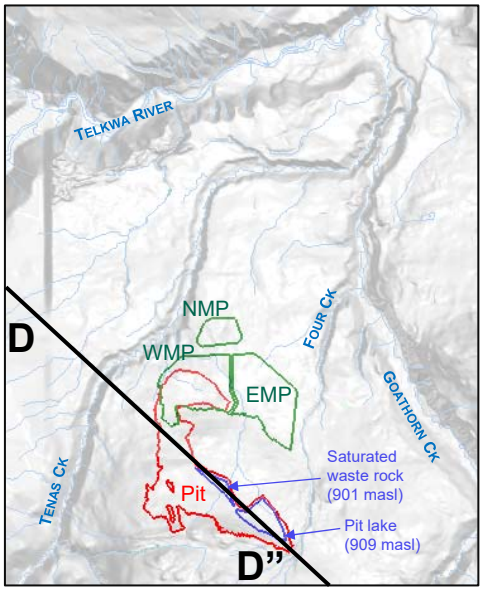
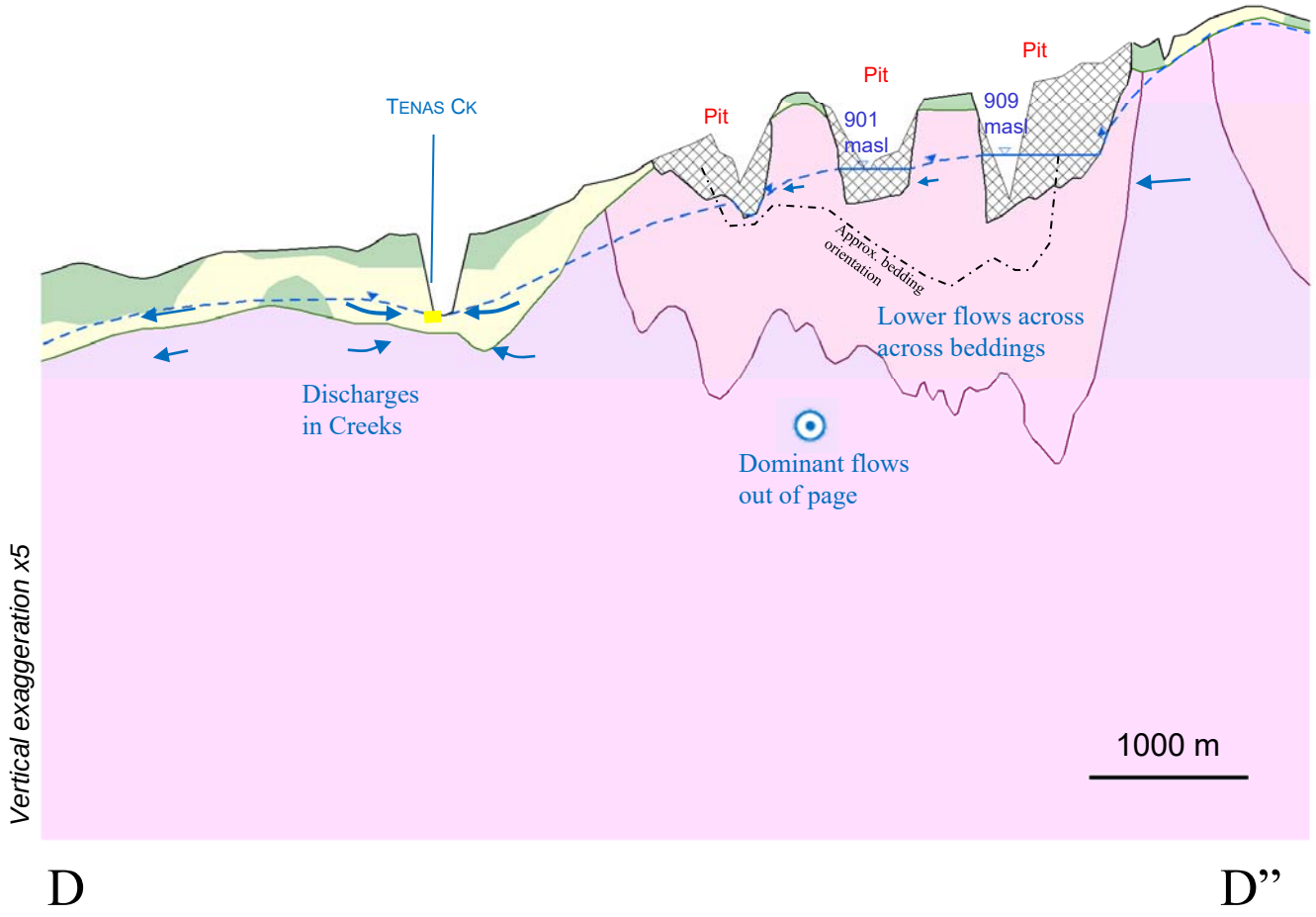
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section CC” Post closure** |
| | | Date: Dec.2020 / Approved: GF / Figure: **49** |




## Legend

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

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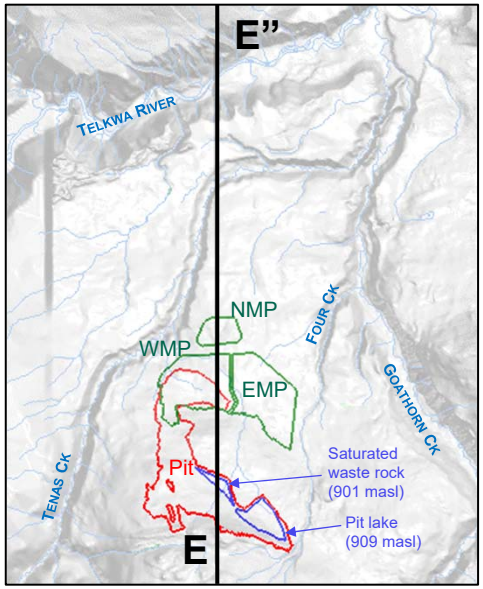
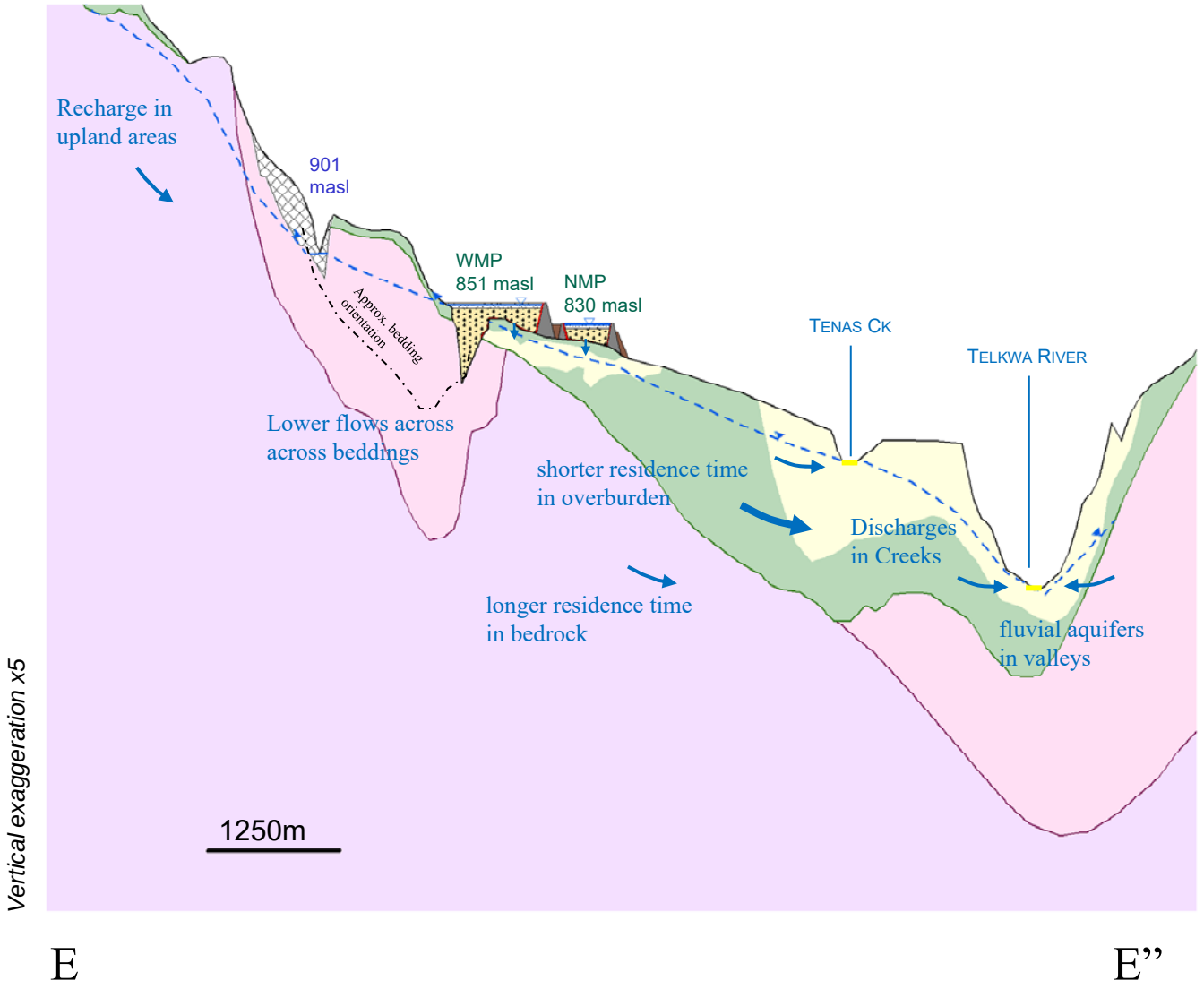
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section DD” Post closure** |
| | | Date: Dec.2020 / Approved: GF / Figure: **50** |




## Legend

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

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**Conceptual Cross Section EE”**
**Post closure**

Job No: 1CT027.004
Filename: Fig42to51_ConceptualCrossX.pptx

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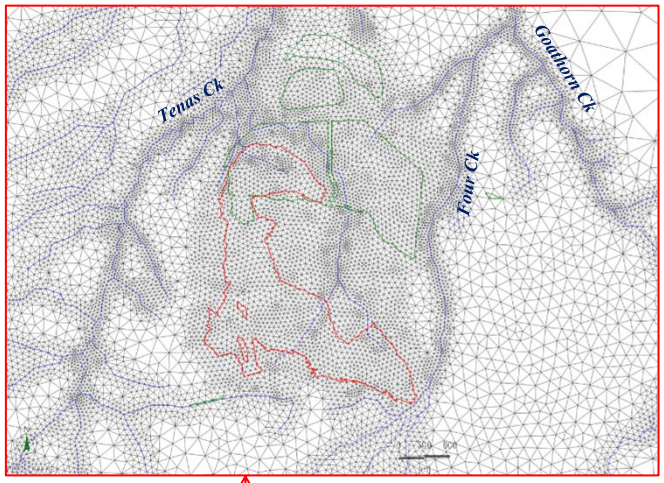
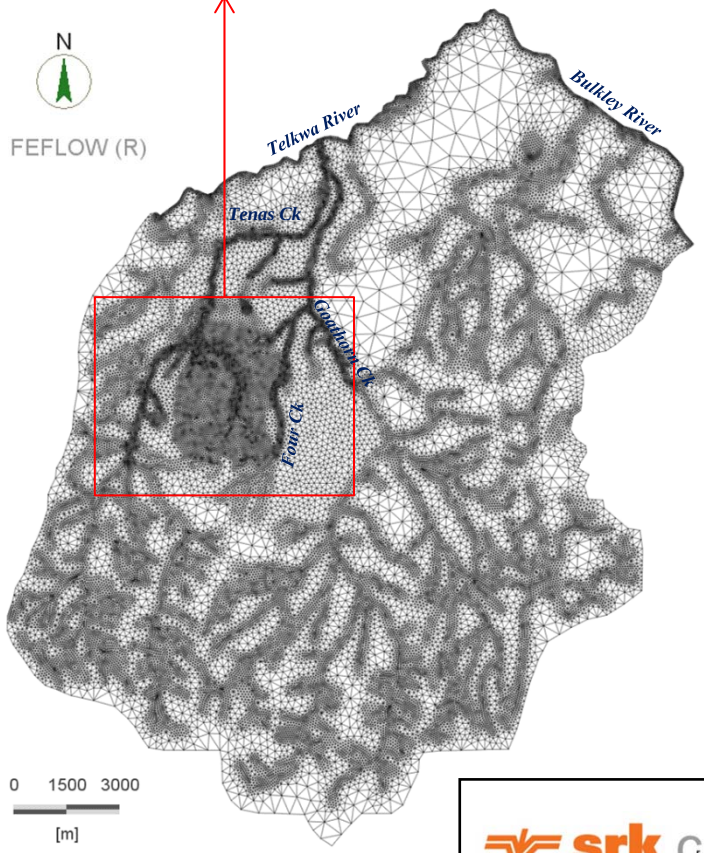
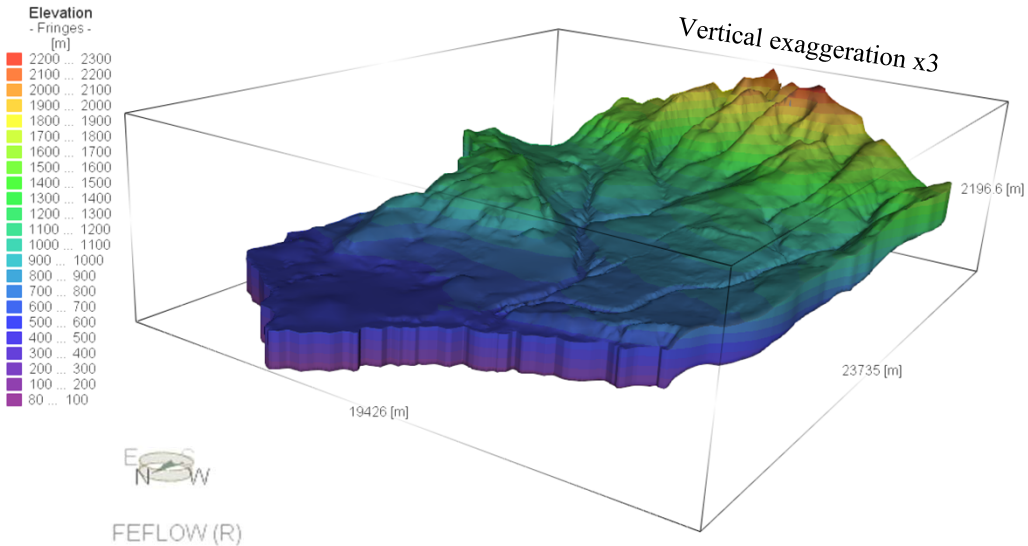
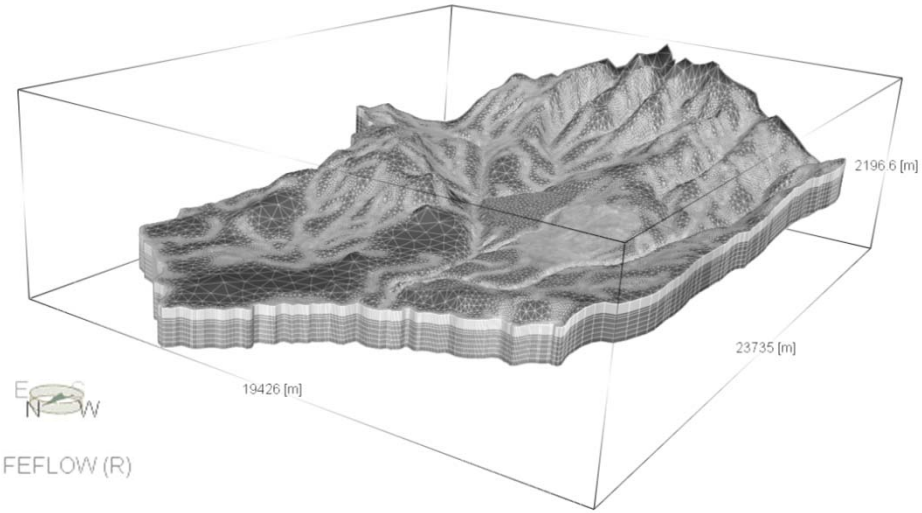
| Date: | Approved: | Figure: |
|---|---|---|
| Dec.2020 | GF | 51 |

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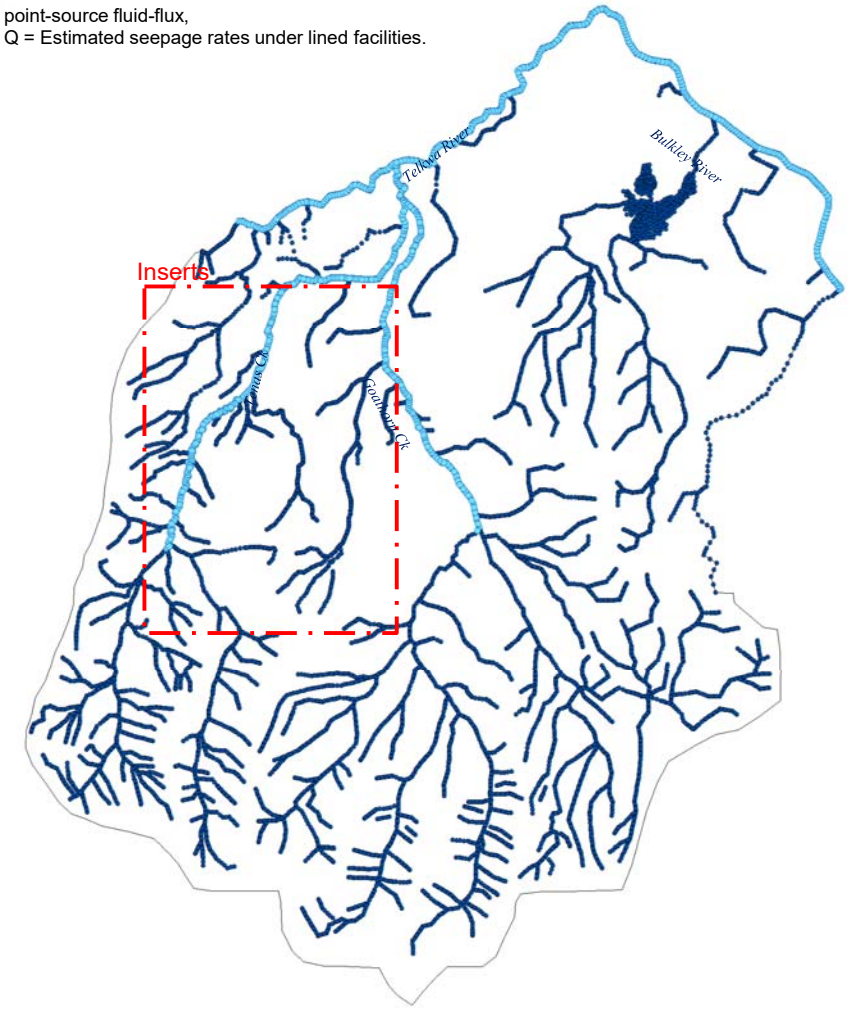
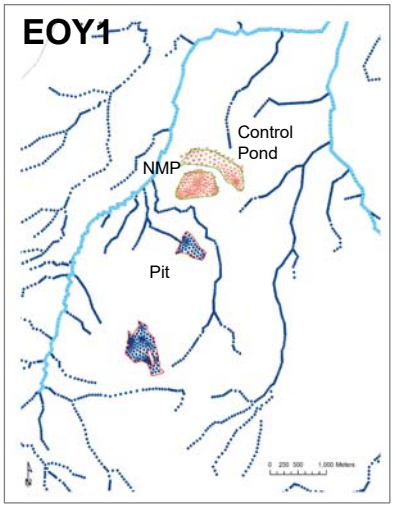
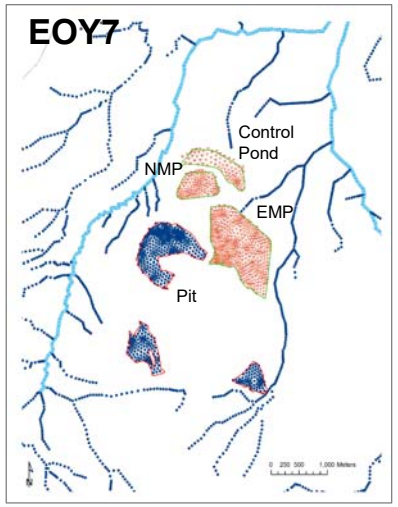
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig52_Domain and mesh.pptx | Tenas Project | **Domain and mesh of the 3D numerical model** |
| | | Date: Nov 2020 / Approved: GF / Figure: **52** |

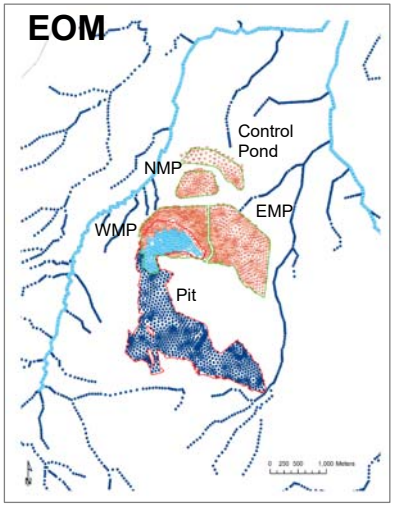
## Legend

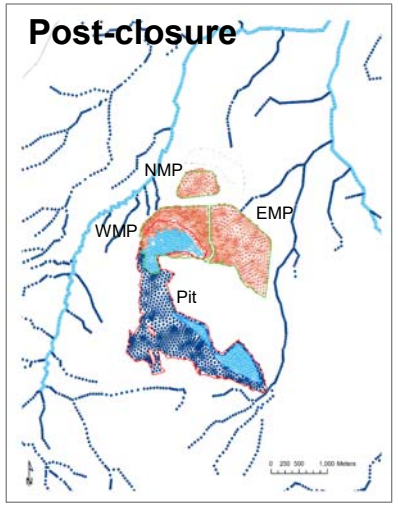
- Dirichlet (constant head),
  H = topo elevation, or water levels at unlined WMP, in-pit saturated waste rock / lake.
- Dirichlet (constant head) with flux constraint (seepage),
  H = Topo elevation, or pit elevation (ie., pit walls).
- point-source fluid-flux,
  Q = Estimated seepage rates under lined facilities.

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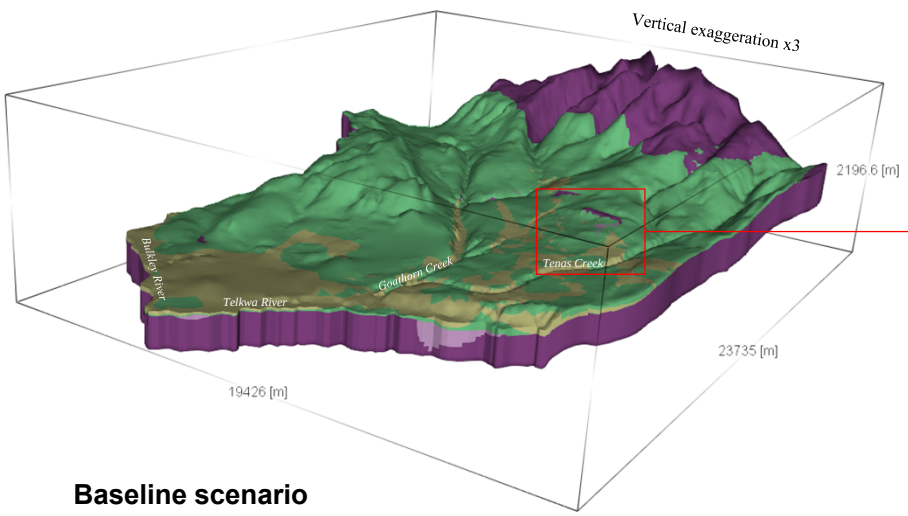
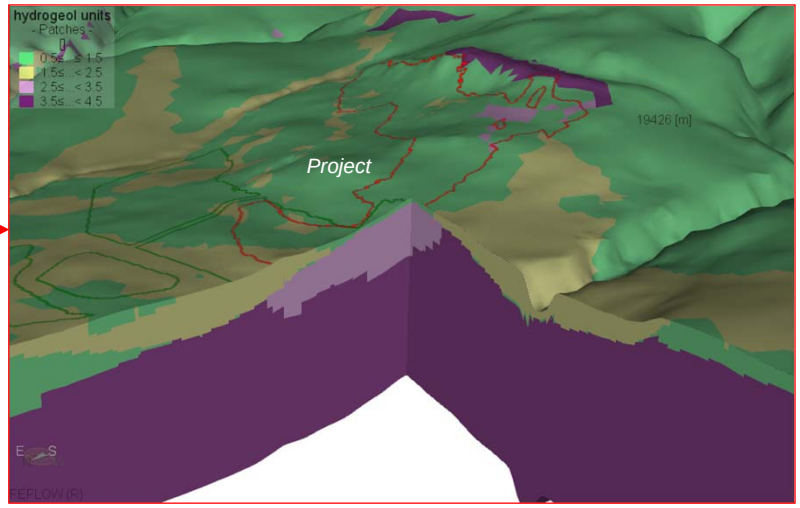
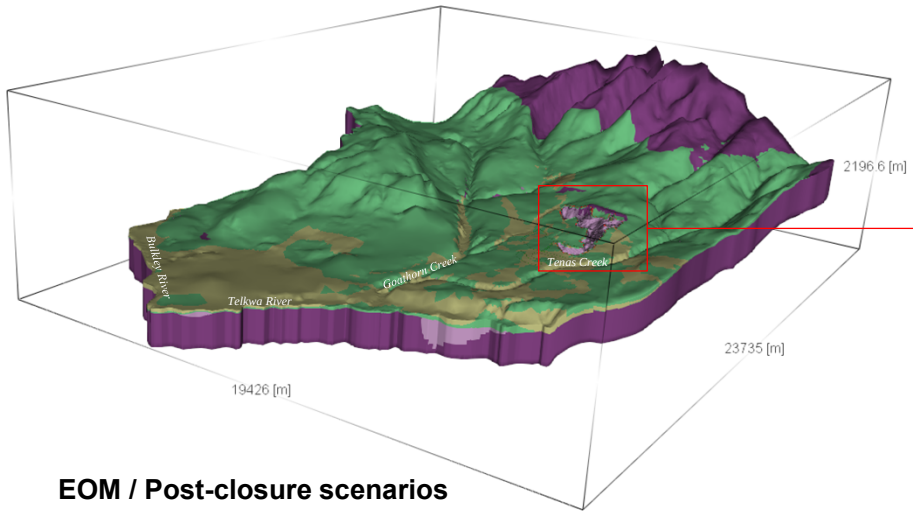
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Boundary conditions** |
| Job No: 1CT027.004<br>Filename: Fig53_Boundary conditions.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **53** |

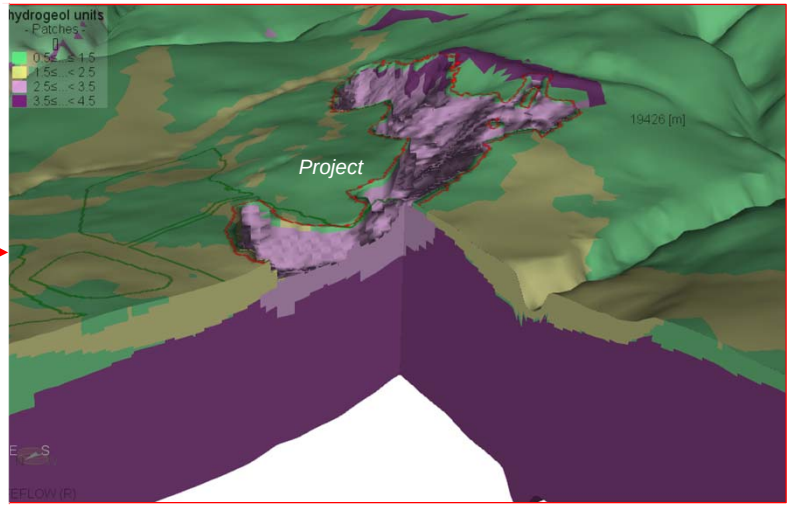



**Baseline scenario**




**EOM / Post-closure scenarios**




Silt-clay-rich till
Sand-gravel-rich till
Sedimentary rocks
Volcanic rocks

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Job No: 1CT027.004
Filename: Fig54_3D view HydrostatGwModel.pptx

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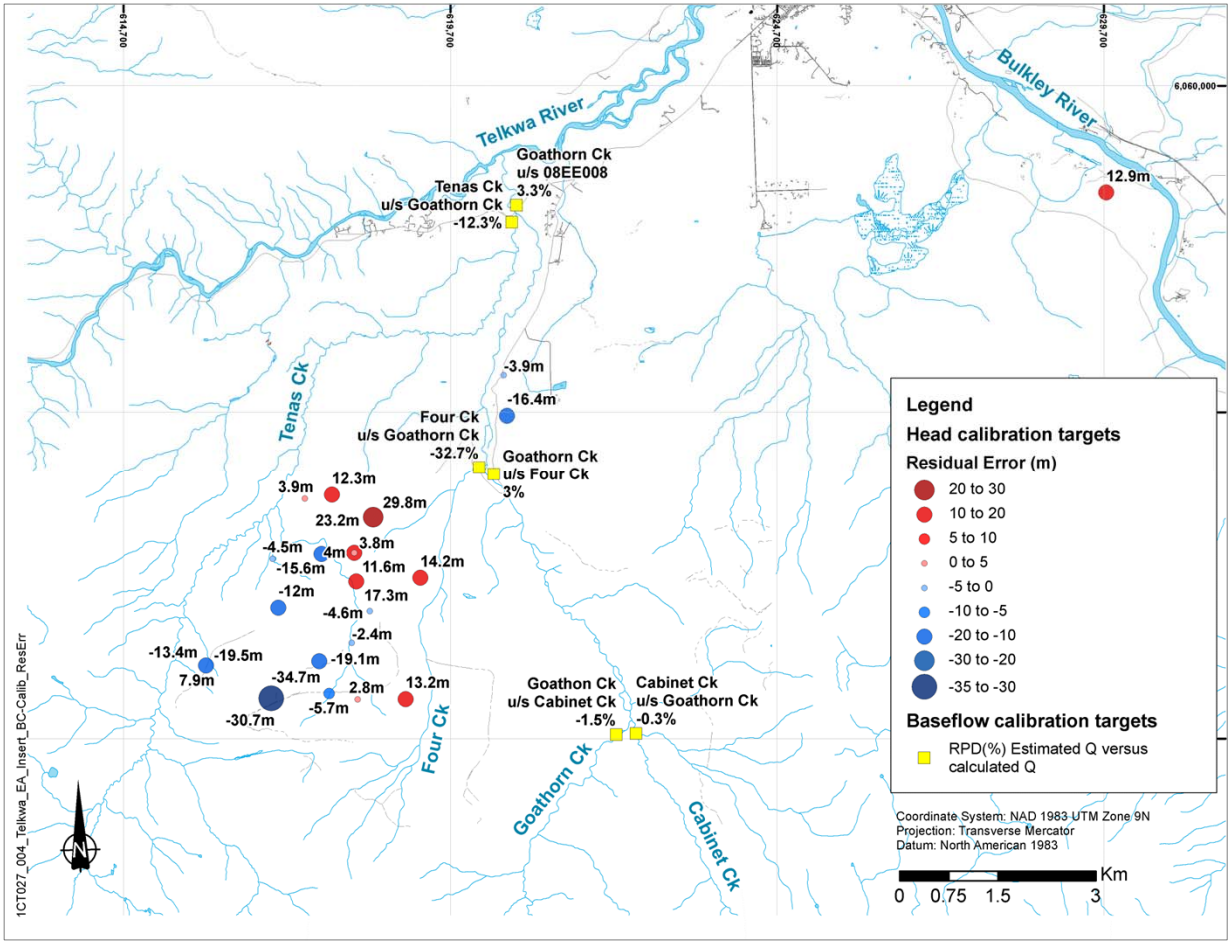
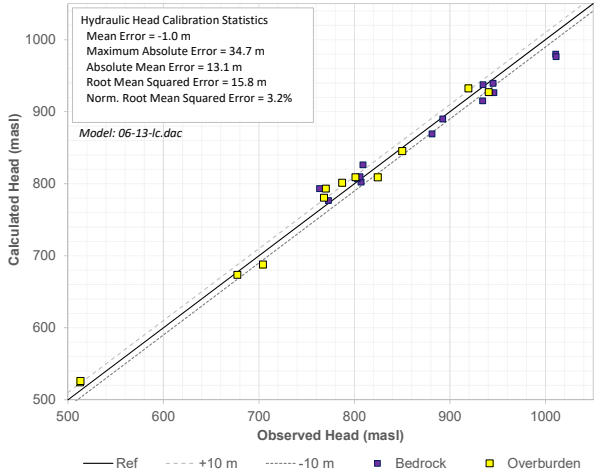
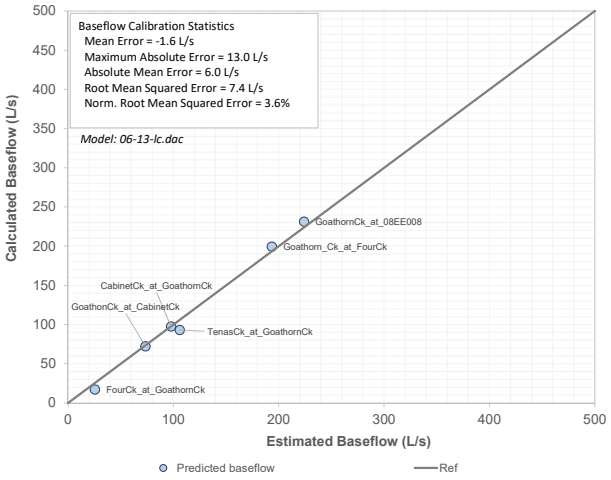
**3D view of the numerical model**

| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 54 |

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|---|---|---|
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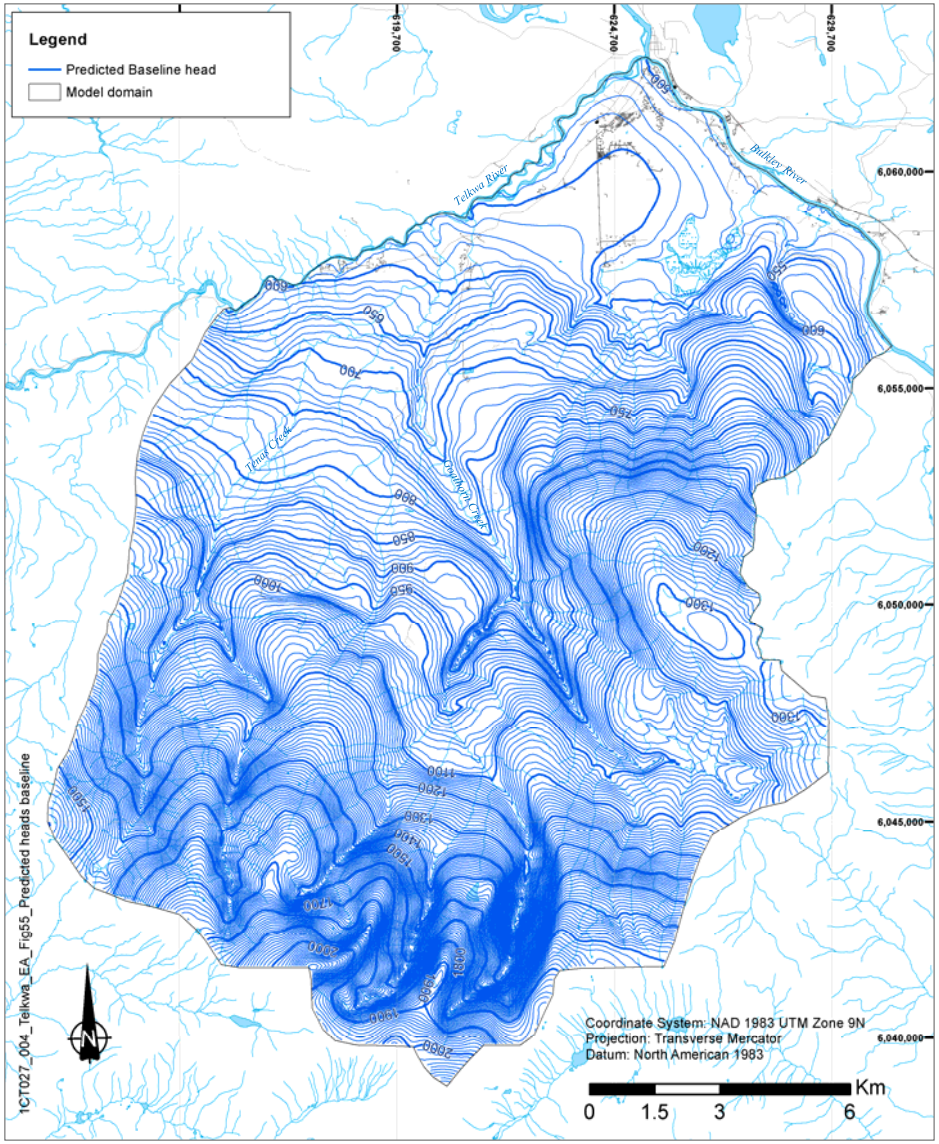
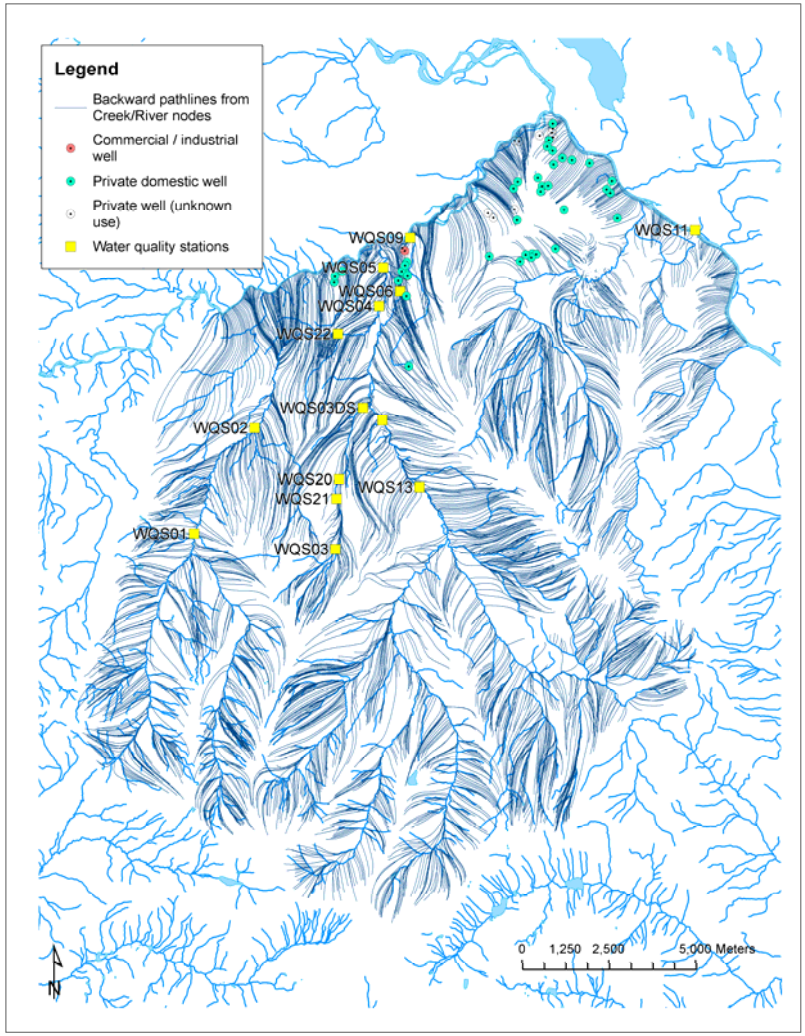
| | | **Base case calibration** |
| Job No: 1CT027.004<br>Filename: Fig55_BC_Calibration.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **55** |

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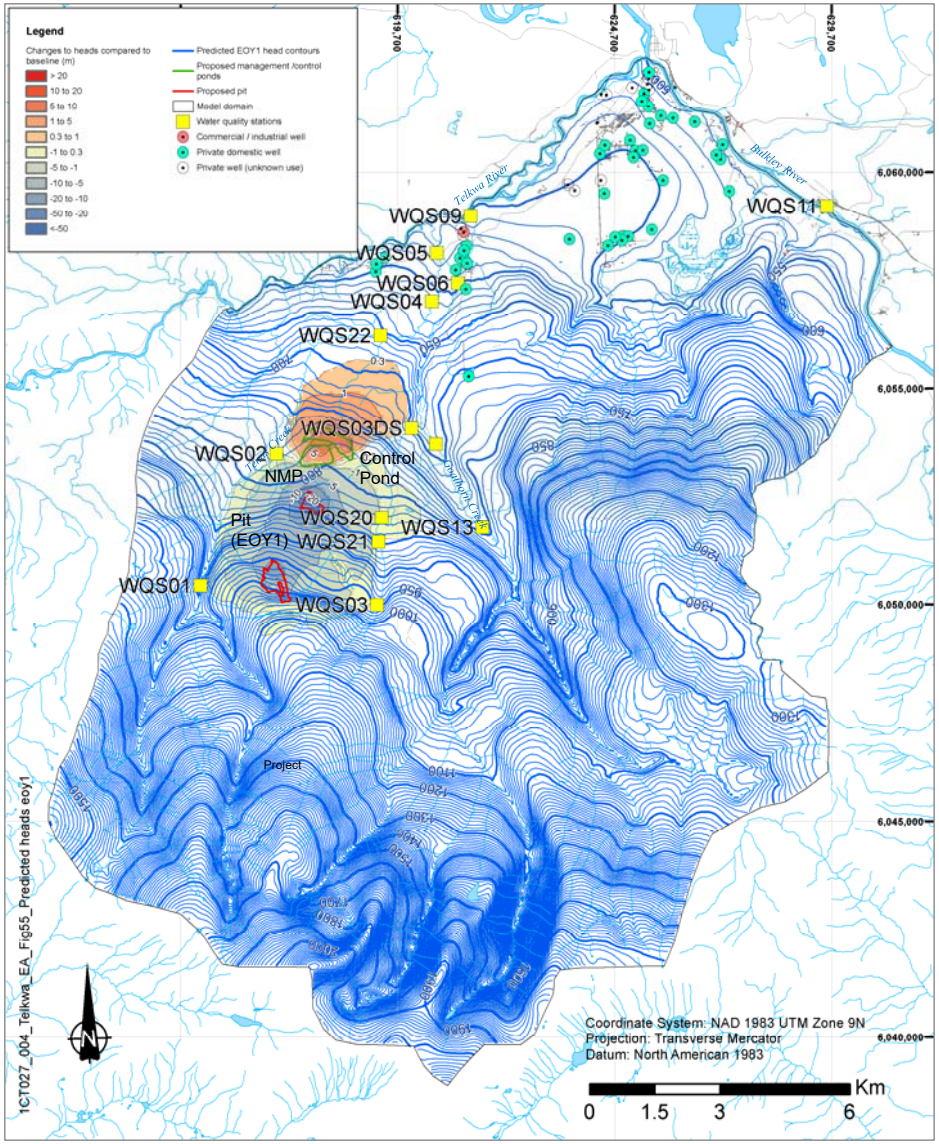
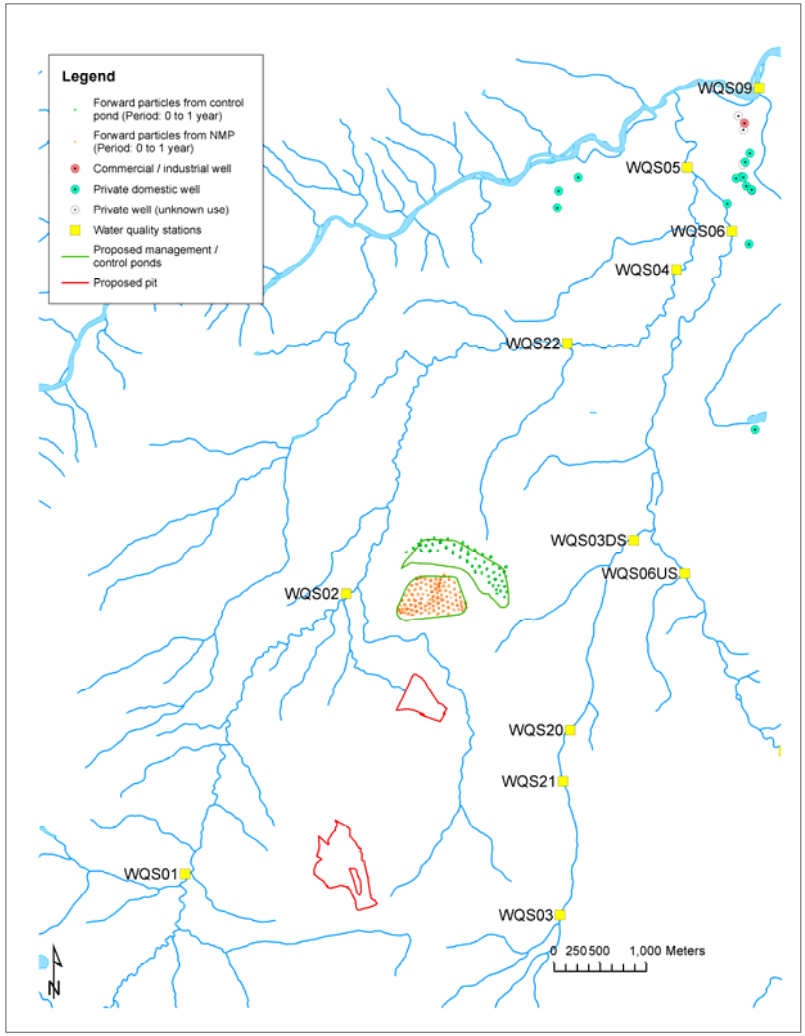
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Base case heads and backward paths for baseline conditions** |
| Job No: 1CT027.002<br>Filename: Fig56_Base case heads&paths bsln.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **56** |

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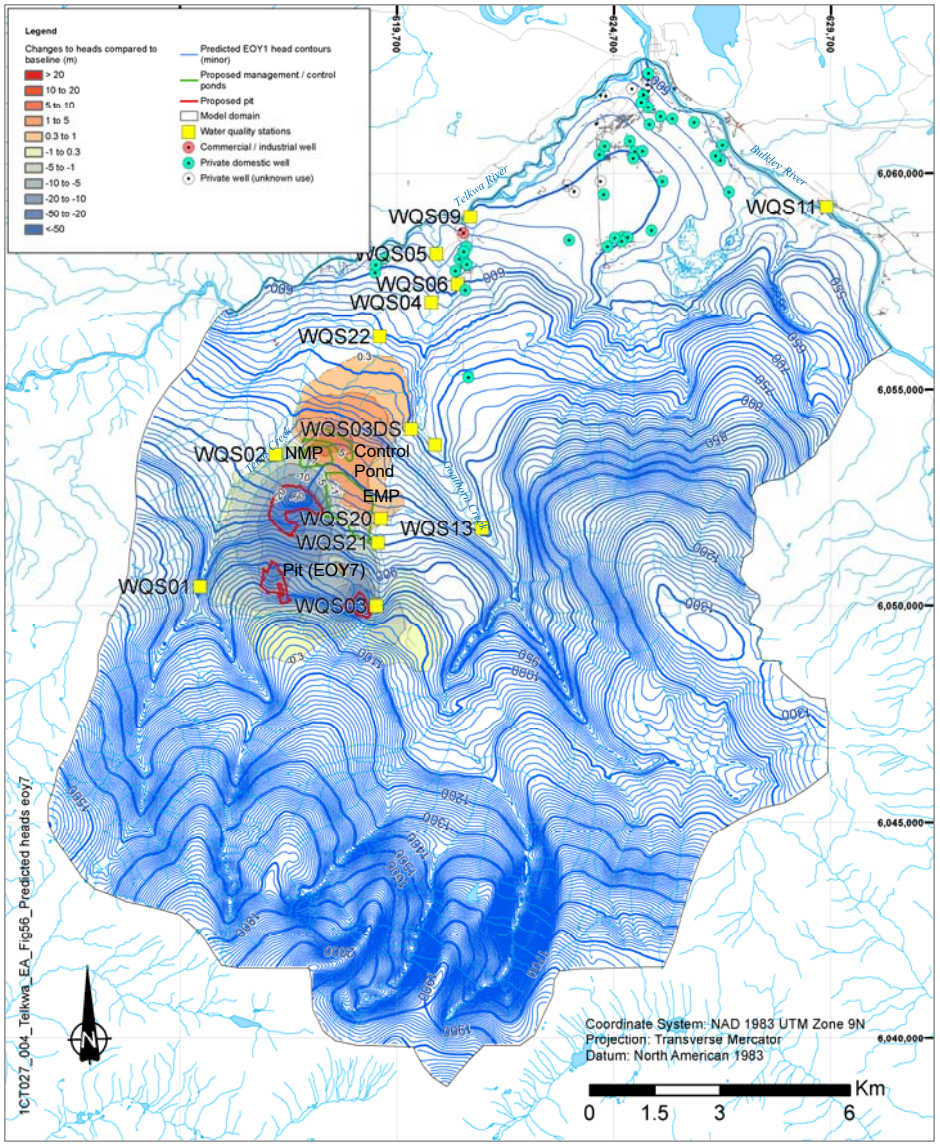
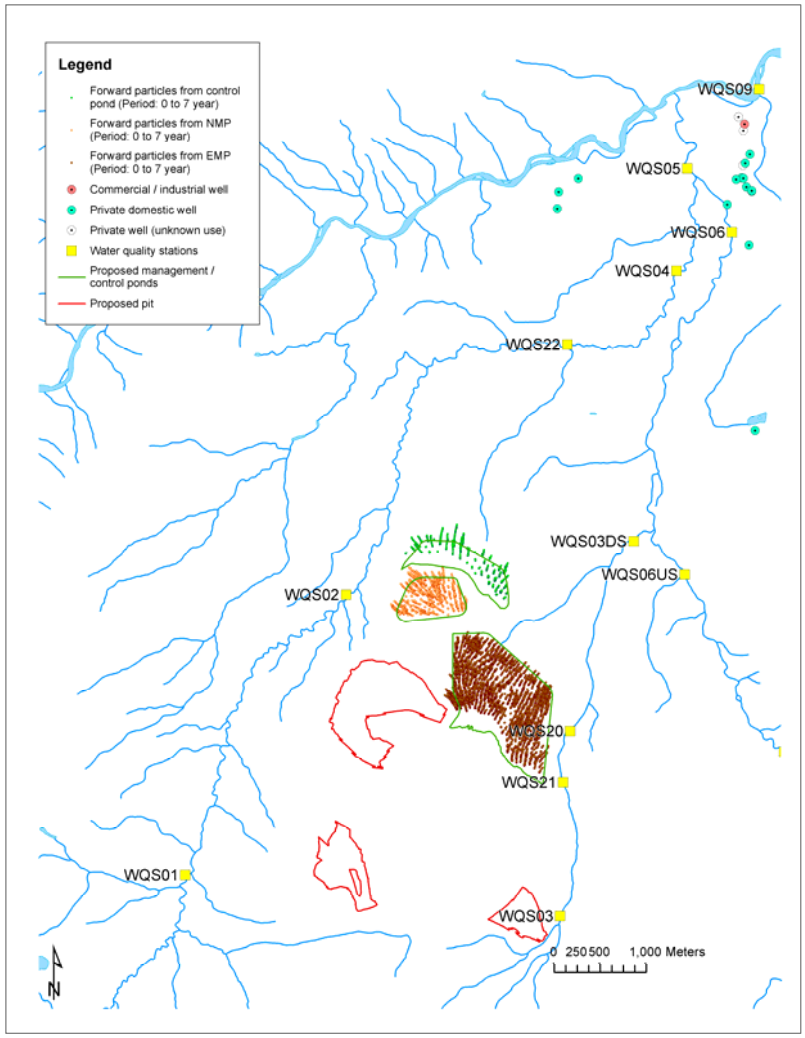
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads and forward paths for EoY1 conditions** |
| Job No: 1CT027.002<br>Filename: Fig57_Base case heads&paths eoy1.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **57** |

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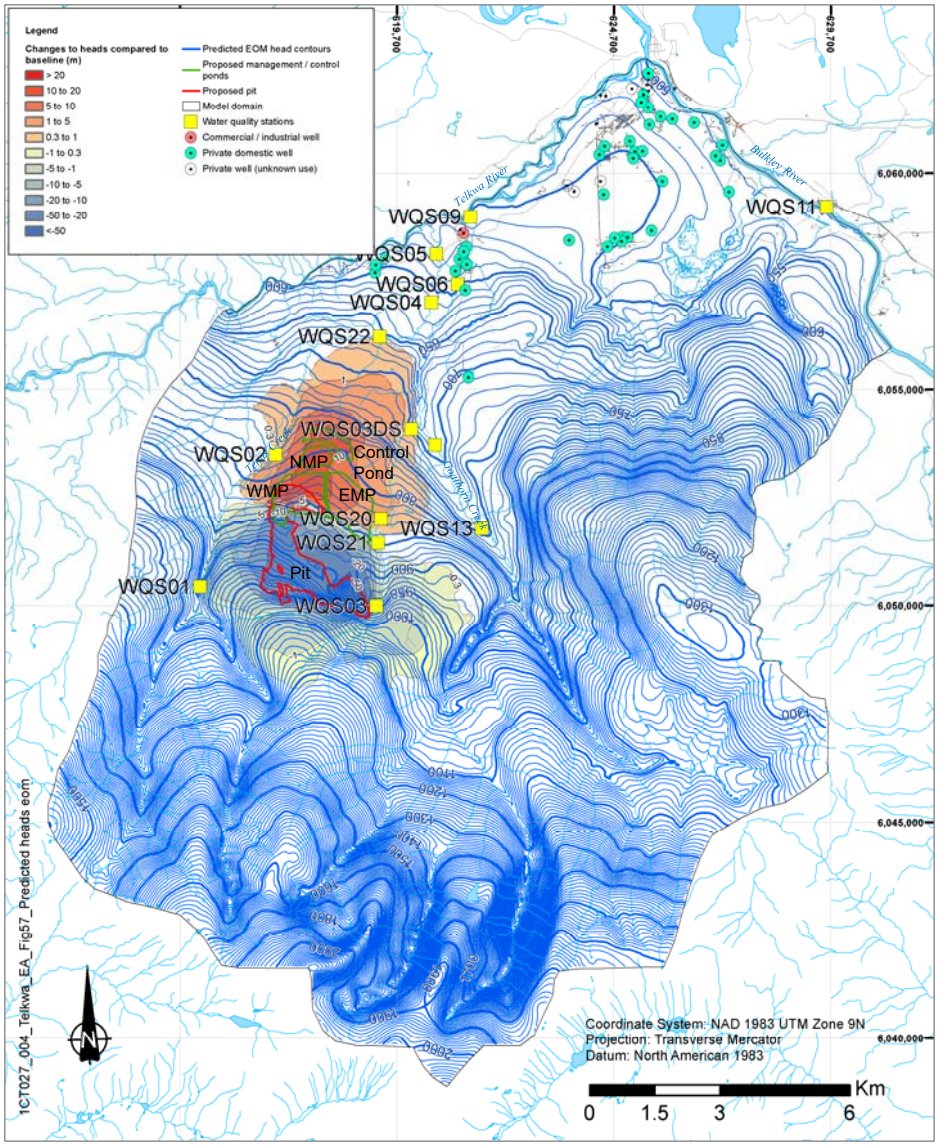
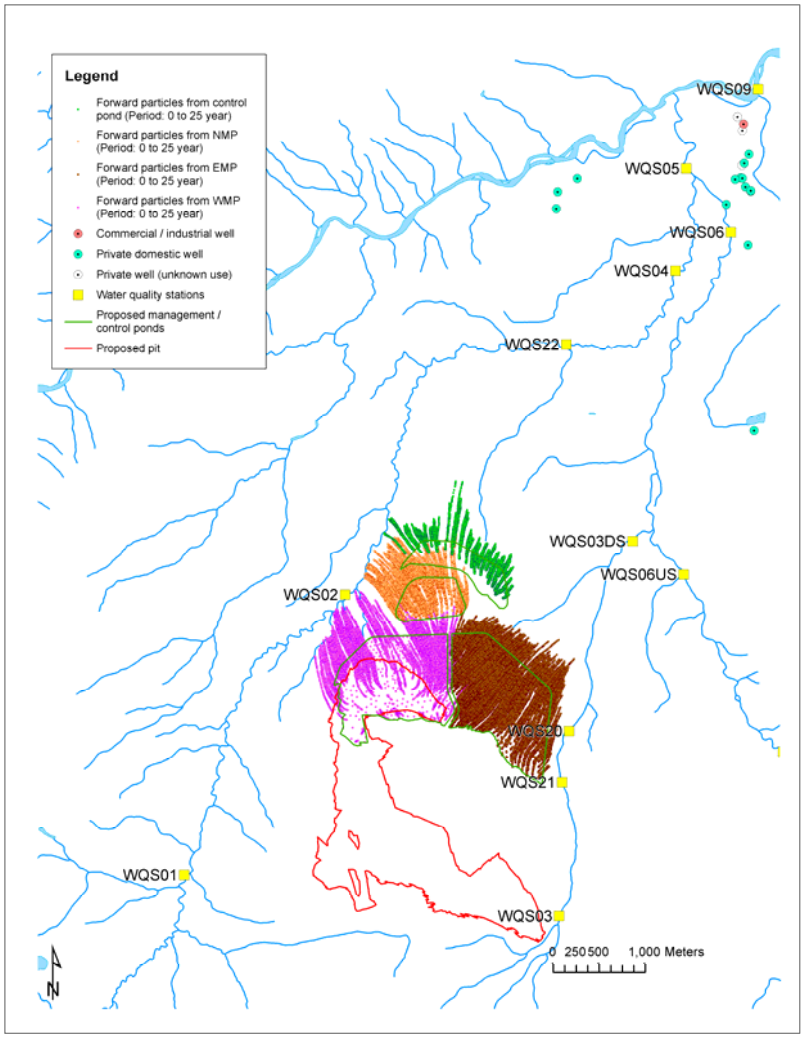
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads and forward paths for EoY7 conditions** |
| Job No: 1CT027.002<br>Filename: Fig58_Base case heads&paths eoy7.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **58** |

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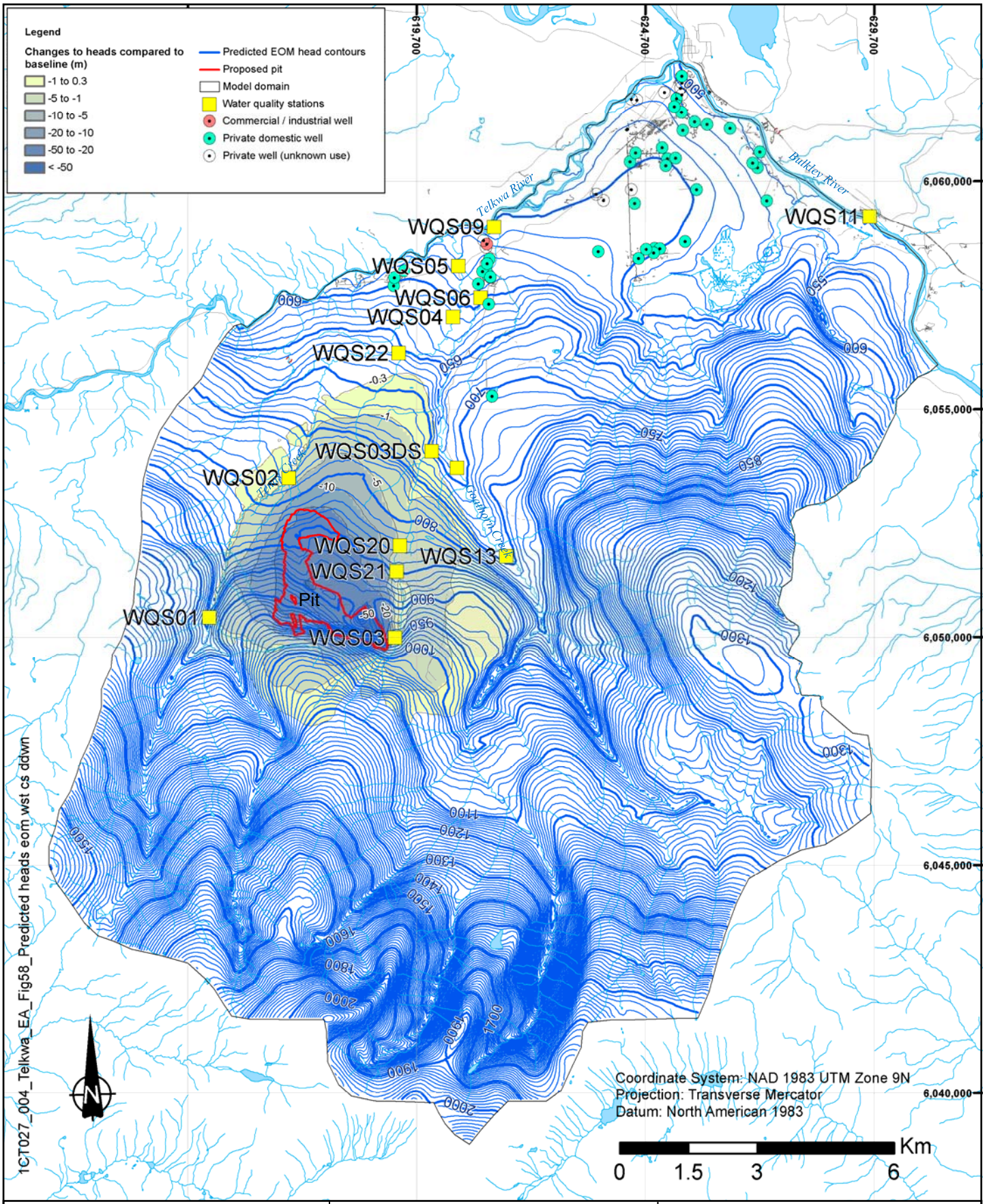
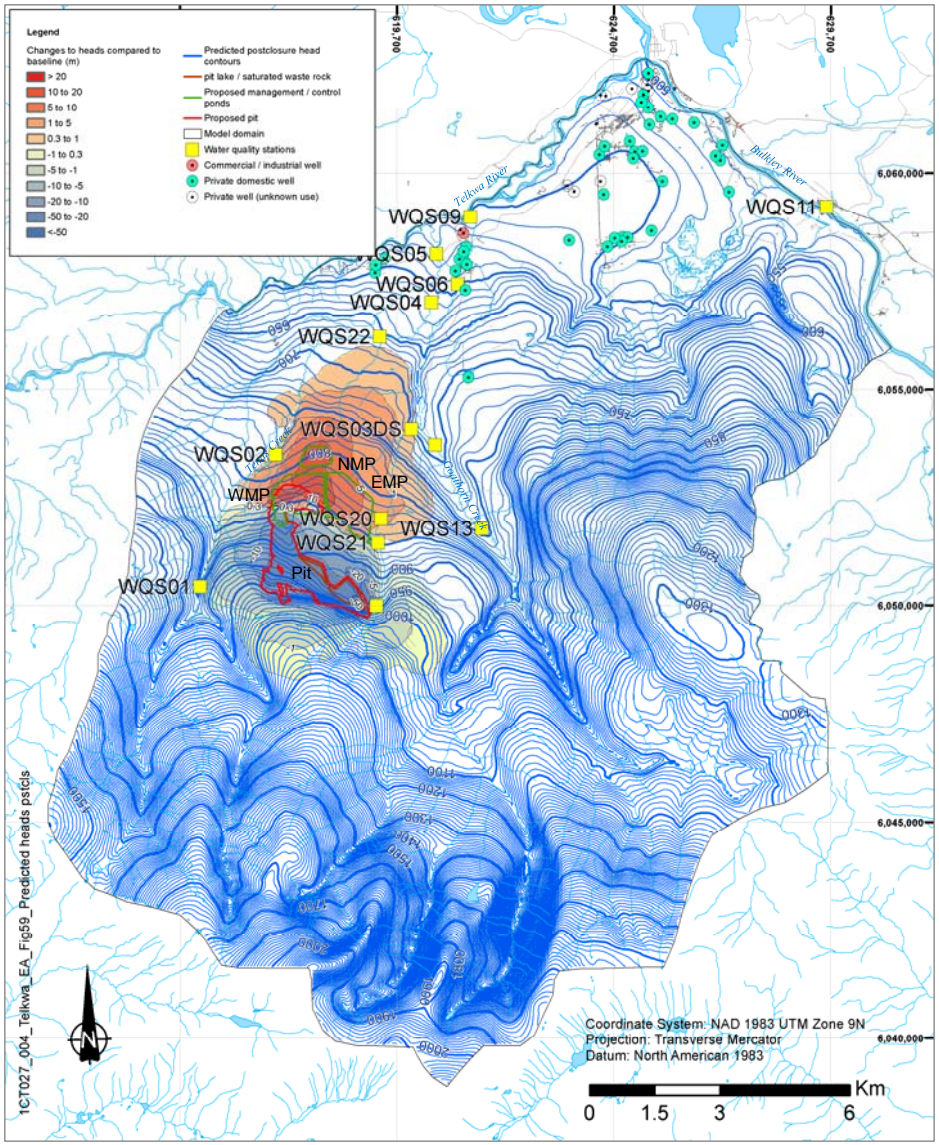
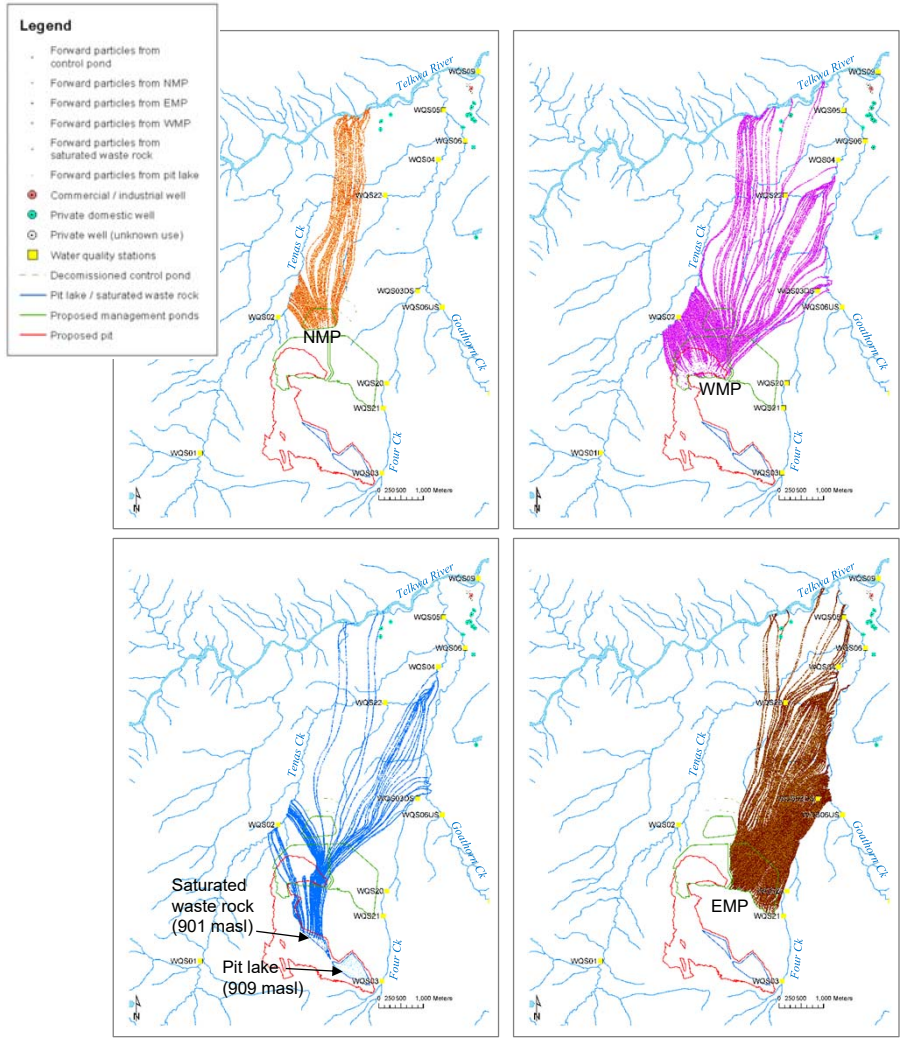
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads and forward paths for EOM conditions** |
| Job No: 1CT027.002<br>Filename: Fig59_Base case heads&paths eom.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **59** |




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads for EOM pit conditions and no management ponds (worst case drawdown)** |
| Job No: 1CT027.004<br>Filename: Fig60_Base case heads eom wstddwn.pptx | Tenas Project | Date: Dec 2020 \| Approved: GF \| Figure: **60** |

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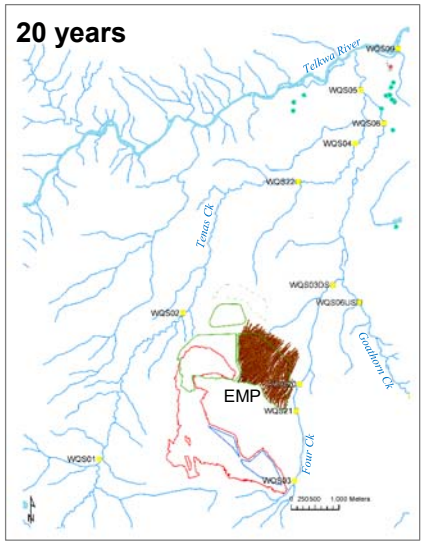
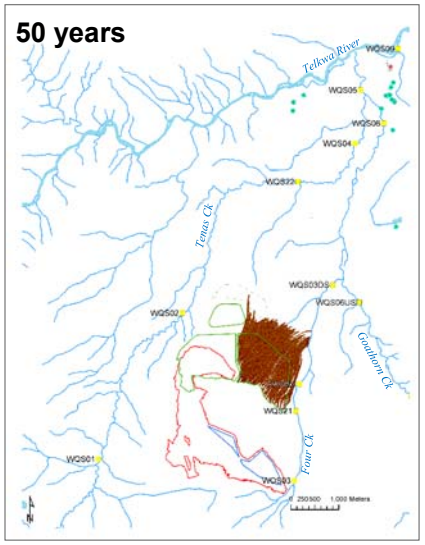
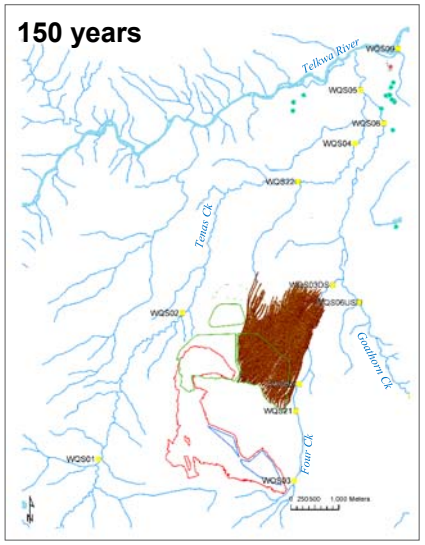
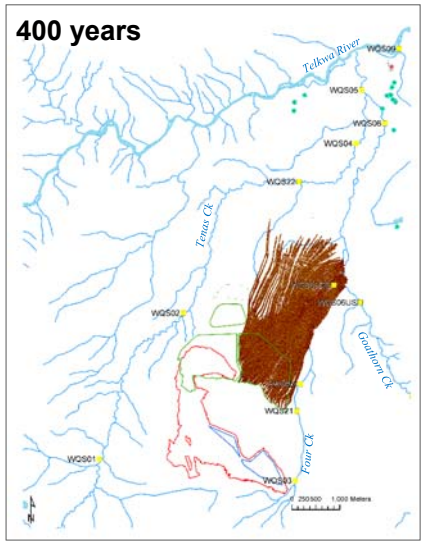
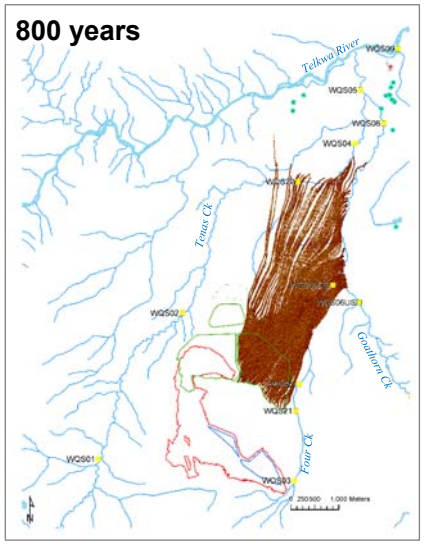
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads and forward paths for post-closure conditions** |
| Job No: 1CT027.002<br>Filename: Fig61_Base case heads&paths pstcls.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **61** |

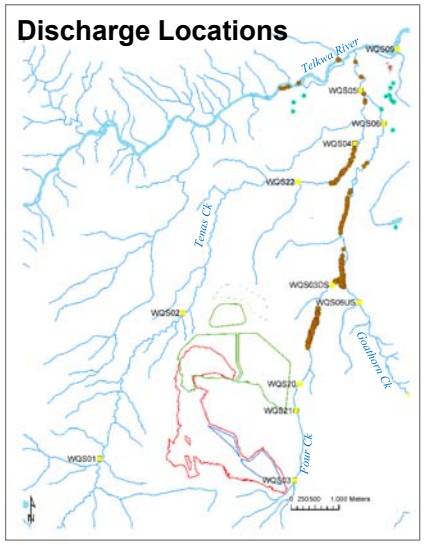



## Legend

- Forward particles from EMP
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

srk consulting

TELKWA COAL LIMITED

Tenas Project

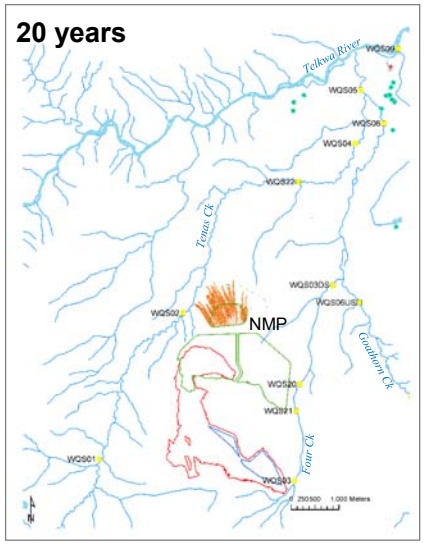
Job No: 1CT027.004

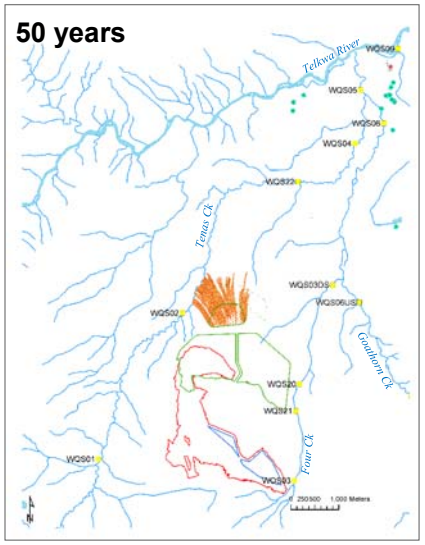
Filename: Fig62_BC_Particles_timesteps_EMP.pptx

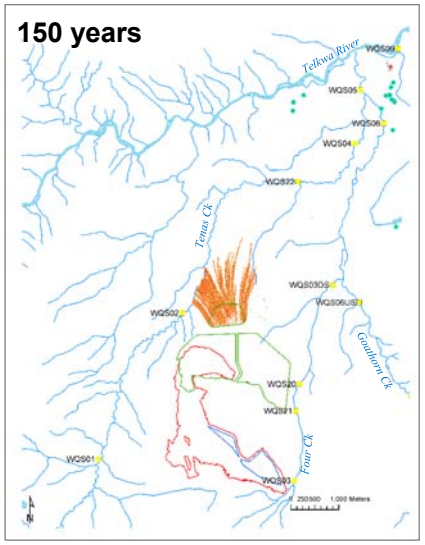
Groundwater Technical Report

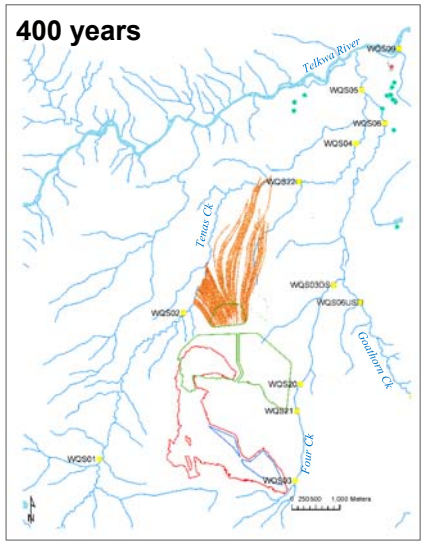
**Modelled forward particle paths from the EMP**

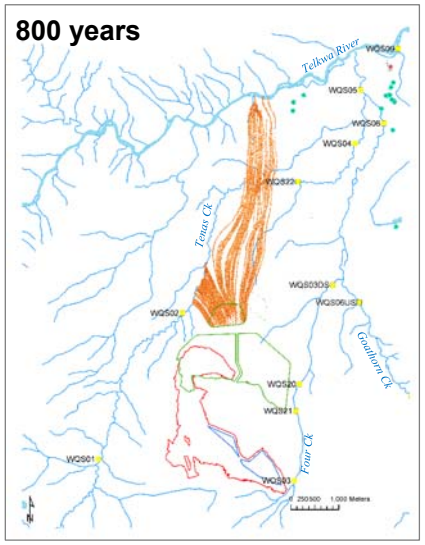
| Date: | Approved: | Figure: |
|---|---|---|
| Dec 2020 | GF | 62 |

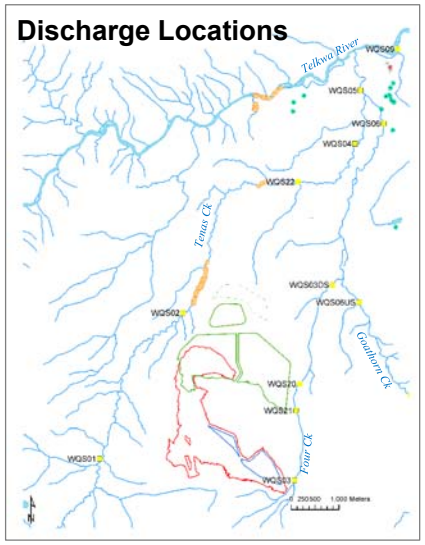



## Legend

- Forward particles from NMP
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

srk consulting

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Groundwater Technical Report

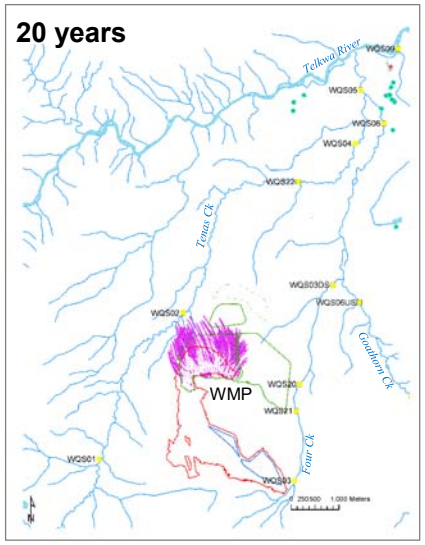
**Modelled forward particle paths from the NMP**

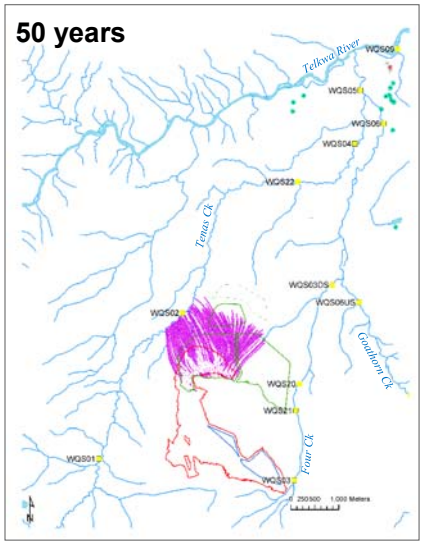
Job No: 1CT027.004

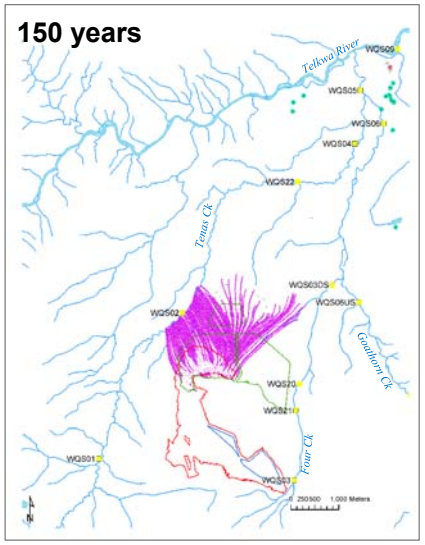
Filename: Fig63_BC_Particles_timesteps_NMP.pptx

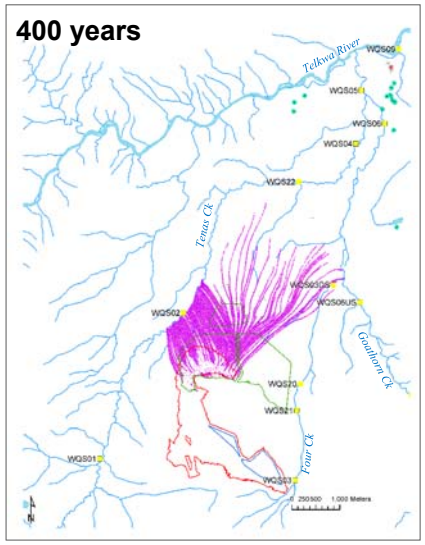
Tenas Project

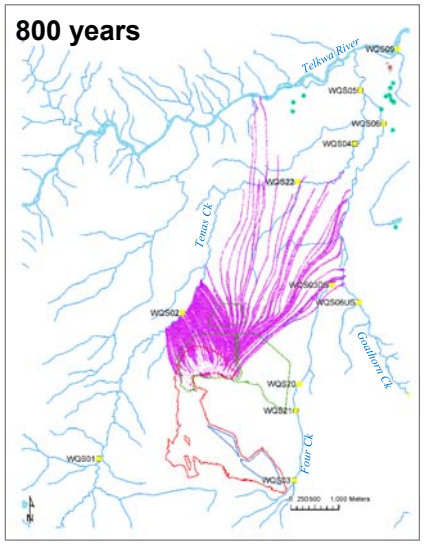
| Date: | Approved: | Figure: |
|---|---|---|
| Dec 2020 | GF | 63 |

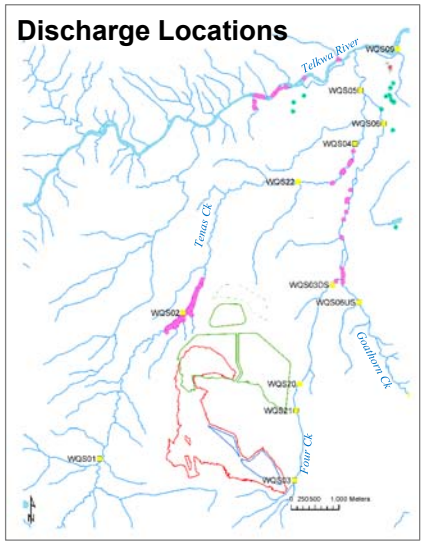


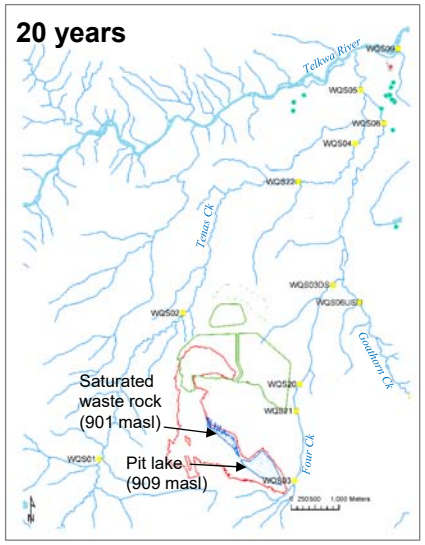



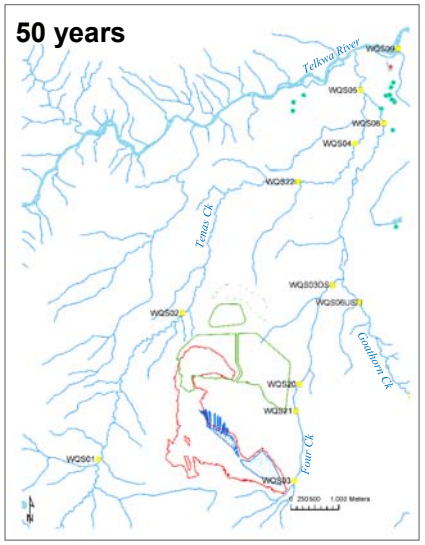



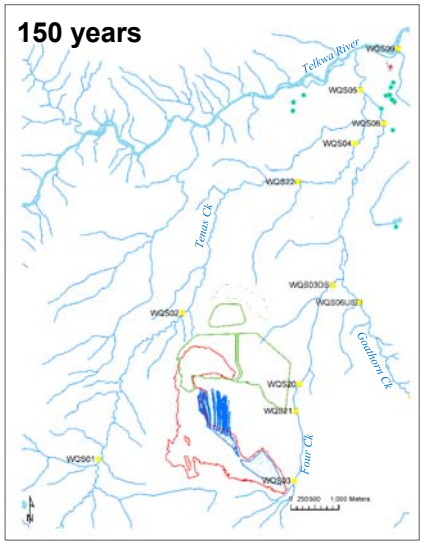

## Legend

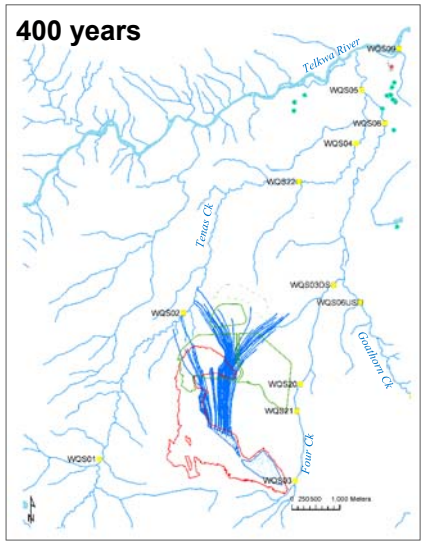
- Forward particles from WMP
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

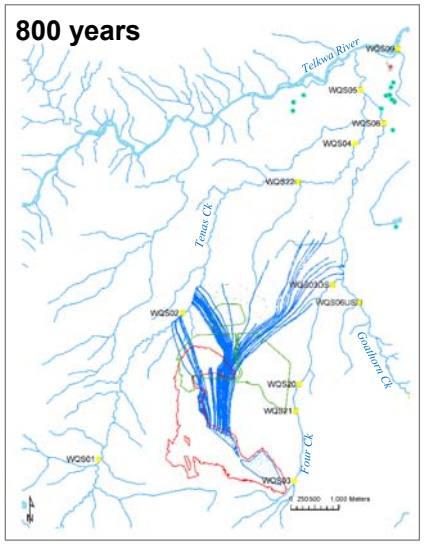
| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled forward particle paths from the WMP** |
| Job No: 1CT027.004<br>Filename: Fig64_BC_Particles_timesteps_WMP.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: 64 |

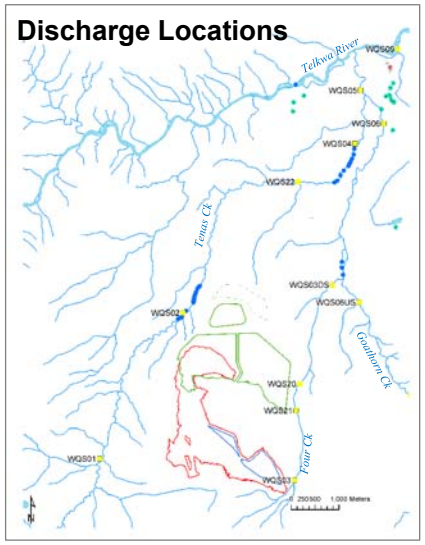



## Legend

- Forward particles from saturated waste rock
- Forward particles from pit lake
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

srk consulting

TELKWA COAL LIMITED

Tenas Project

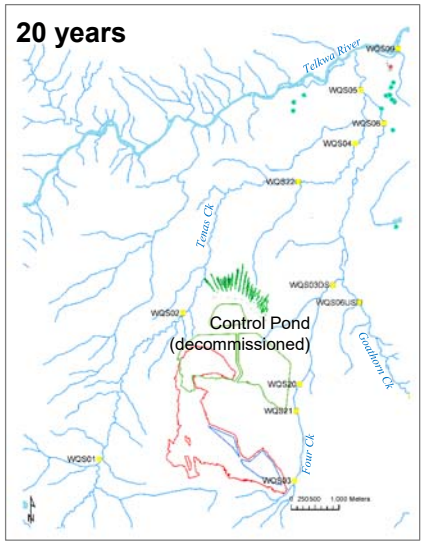
Job No: 1CT027.004

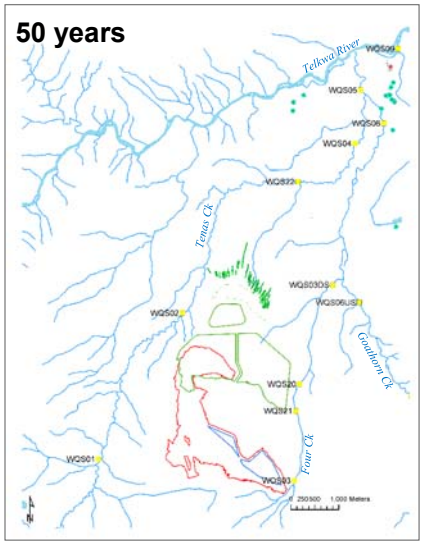
Filename: Fig65_BC_Particles_timesteps_PL_SWr.pptx

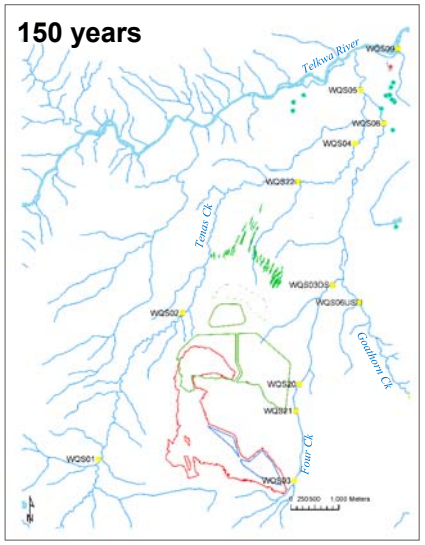
Groundwater Technical Report

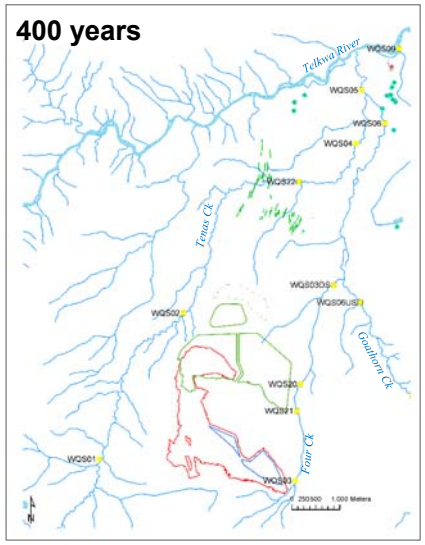
**Modelled forward particle paths from the pit lake / saturated waste rock**

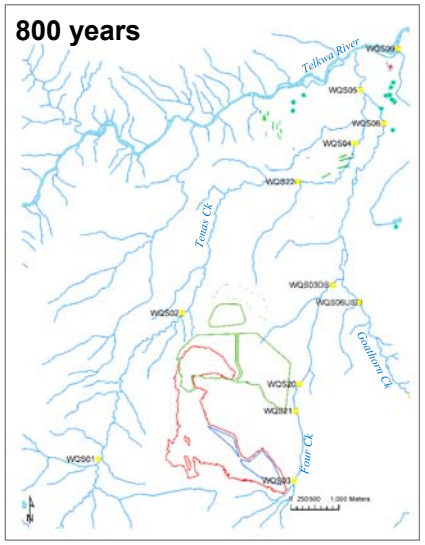
| Date: | Approved: | Figure: |
|---|---|---|
| Dec 2020 | GF | 65 |

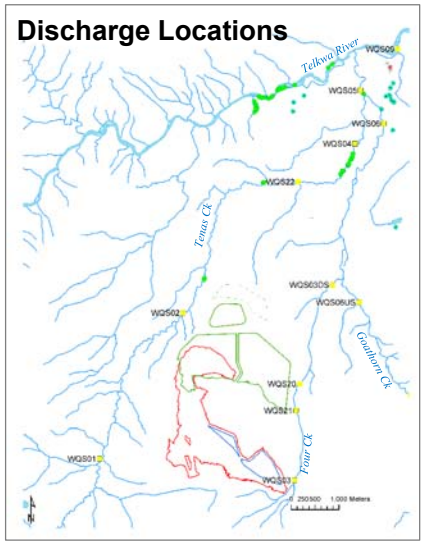


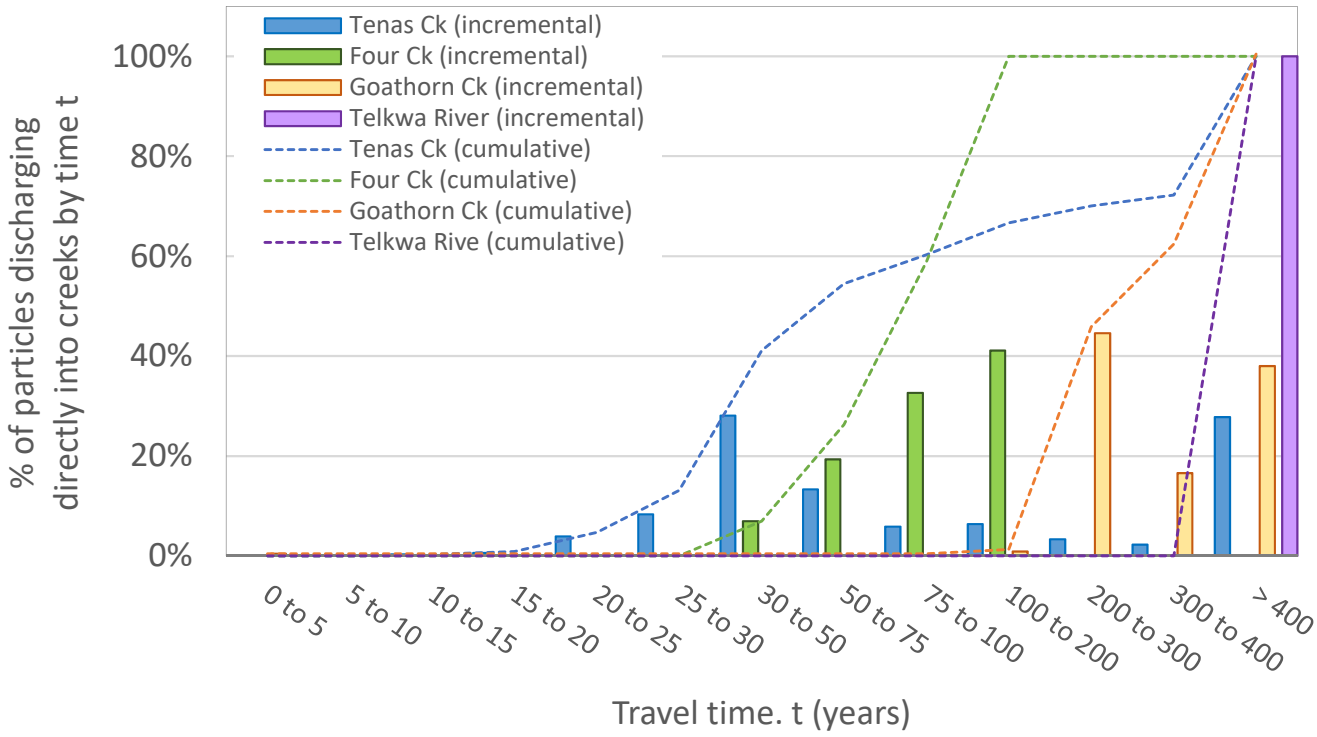




## Legend

- Forward particles from control pond (25 year pulse)
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig66_BC_Particles_timesteps_CP.pptx | Tenas Project | **Modelled forward particle paths from the control pond** |
| | | Date: Dec 2020 / Approved: GF / Figure: **66** |




| | | | | |
|---|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | | |
| | | **Plots of predicted particle travel times to creeks** | | |
| Job No: 1CT027.004<br>Filename: Fig67_plots_travel_times.pptx | Tenas Project | Date: Dec.2020 | Approved: GF | Figure: **67** |

# Appendix A – Monitoring Well Installation and Monitoring Details

| ID | Area | Installation type | Geol. along Screen | Data availability and usage in EA baseline study | | | Damaged | Dry | Easting | Northing | Collar Elev. | Stick-up | Total depth | Diam. | Screen Top | Screen Bottom | Source | Inspected | Last date of inspection | Comment Last Inspection |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | | - | - | *Hydraulic test* | *Level* | *Sampling* | (yes/no) | (yes/no) | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *mags* | *mbgs* | *inch* | *mgbs* | *mbgs* | - | | **dd/mm/yy** | |
| T18-01D (ARD02) | Tenas | Single well | BDR | yes | yes | No | No | No | 6050689 | 617841 | 956.50 | 0.99 | 78.6 | 3.0 | 69.8 | 72.9 | SRK 2018 | Yes | 6-Sep-18 | - |
| T18-02S (GEO11) | Tenas | Single well | OVB | No | dry | No | No | No | 6051995 | 618921 | 835.22 | 0.50 | 19.5 | 2.0 | 11.0 | 14.0 | SRK 2018 | Yes | 8-Sep-18 | - |
| T18-03D (ARD01) | Tenas | None | OVB+BDR | yes | No | No | n/a | n/a | 6051772 | 617080 | 904.32 | n/a | 102.6 | n/a | n/a | n/a | SRK 2018 | Yes | Feb 18 | - |
| T18-04D (W1D) | Tenas | Nested well | BDR | yes | yes | yes | No | No | 6051115 | 615955 | 938.09 | 1.00 | 70.0 | 2.0 | 56.4 | 59.5 | SRK 2018 | Yes | 13-Sep-18 | - |
| T18-04S (W1S) | Tenas | Nested well | OVB | yes | yes | yes | No | No | 6051115 | 615955 | 938.18 | 0.80 | 70.0 | 2.0 | 10.1 | 13.1 | SRK 2018 | Yes | 6-Sep-18 | - |
| T18-06D (W2) | Tenas | Single well | OVB | yes | yes | Yes | No | No | 6052647 | 616245 | 851.60 | 0.80 | 131.3 | 2.0 | 114.8 | 117.8 | SRK 2018 | Yes | 10-Sep-18 | - |
| T18-07D (ARD06) | Tenas | None | OVB+BDR | yes | No | No | n/a | n/a | 6052051 | 617318 | 864.16 | n/a | 213.7 | n/a | n/a | n/a | SRK 2018 | Yes | Feb 18 | - |
| T18-08D (W3D) | Tenas | Nested well | BDR | yes | yes | Yes | No | No | 6053379 | 618515 | 803.52 | 1.00 | 53.2 | 2.0 | 44.7 | 47.8 | SRK 2018 | Yes | 8-Sep-18 | - |
| T18-08S (W3S) | Tenas | Nested well | OVB | yes | yes | yes | No | No | 6053379 | 618515 | 803.52 | 1.00 | 53.2 | 1.5 | 40.0 | 43.1 | SRK 2018 | Yes | 8-Sep-18 | - |
| T18-09S | Tenas | Single well | OVB | No | No | No | No | No | 6051117 | 615957 | 938.26 | | 13.5 | 2.0 | 10.1 | 13.1 | SRK 2018 | Yes | 10-Feb-18 | |
| T18-11S (GEO22) | Tenas | Single well | OVB | No | dry | No | No | Yes | 6054253 | 617697 | 790.23 | 0.75 | 19.5 | 2.0 | 7.5 | 10.5 | SRK 2018 | Yes | 8-Sep-18 | - |
| T18-13S (GEO13) | Tenas | Single well | OVB | No | dry | No | No | Yes | 6053408 | 617809 | 814.36 | 0.87 | 18.4 | 2.0 | 14.9 | 17.9 | SRK 2018 | Yes | 8-Sep-18 | - |
| T19-18S | Tenas | Single well | OVB | yes | yes | Yes*** | No | No | 6052454 | 619237 | 822.00 | 1.00 | 47.2 | 2.0 | 34.1 | 35.6 | SRK 2019 | Yes | 16-Jan-19 | Bedrock intercepted at 43.4 m. Hole Terminated at 47.2 m |
| T19-19S | Tenas | Single well | OVB+BDR | No | dry | No | No | Yes | 6052171 | 618775 | 839.97 | 2.20 | 47.2 | 2.0 | 43.5 | 45.0 | SRK 2019 | Yes | 19-Jan-19 | Bedrock intercepted at 44.9 m. Hole Terminated at 47.2 m |
| T19-20S | Tenas | Single well | OVB | No | dry | No | No | Yes | 6052440 | 616824 | 858.78 | 1.70 | 44.2 | 2.0 | 28.7 | 30.2 | SRK 2019 | Yes | 21-Jan-19 | Bedrock intercepted at 43.0 m. Hole Terminated at 44.2 m |
| T19-21S | Tenas | Single well | BDR | yes | yes | Yes*** | No | No | 6052746 | 616976 | 833.45 | 1.80 | 59.4 | 2.0 | 56.7 | 58.2 | SRK 2019 | Yes | 27-Jan-19 | Bedrock intercepted at 56.1 m. Hole Terminated at 59.4 m |
| T19-22S | Tenas | Single well | BDR | yes | yes | Yes*** | No | No | 6052847 | 617705 | 825.81 | 2.80 | 29.7 | 2.0 | 27.8 | 29.3 | SRK 2019 | Yes | 29-Jan-19 | Bedrock intercepted at 28.0 m. Hole Terminated at 29.7 m |
| T19-26S | Tenas | Single well | OVB | yes | yes | Yes*** | No | No | 6053665 | 617469 | 814.00 | 1.90 | 67.1 | 2.0 | 50.8 | 52.3 | SRK 2019 | Yes | 6-Feb-19 | No bedrock intercepted. Hole terminated at 67.1 m |
| T19-27S | Tenas | Single well | OVB | yes | yes | Yes*** | No | No | 6053726 | 617883 | 815.07 | 1.90 | 67.1 | 2.0 | 43.0 | 44.5 | SRK 2019 | Yes | 15-Feb-19 | No bedrock intercepted. Hole terminated at 67.1 m |
| T19-34S | Tenas | Single well | BDR | yes | yes | Yes*** | No | No | 6052399 | 618256 | 836.51 | 1.50 | 38.1 | 2.0 | 35.1 | 36.6 | SRK 2019 | Yes | 26-Feb-19 | Bedrock intercepted at 33.5 m. Hole Terminated at 38.1 m |
| T19-35S | Tenas | Single well | BDR | yes | yes | Yes*** | No | No | 6052834 | 618228 | 827.98 | 2.20 | 30.5 | 2.0 | 28.3 | 29.8 | SRK 2019 | Yes | 27-Feb-19 | |
| T95R-15C | Tenas | Single well | BDR | yes | yes | yes | No | No | 6051998 | 617062 | 888.36 | 1.66 | 66.0 | 2.0 | 48.0 | 63.0 | Piteau 98, Stantec 2016 | Yes | 9-Nov-18 | There is a crack in the upper part of the well but it is functional. There is no cap and no protective steel lid. Water level is above the ground surface. |
| T95R-39C | Tenas | Single well | BDR | yes | No* | No* | Yes | n/a | 6050869 | 617336 | 981.03 | 0.80 | 80.0 | 2.0 | 51.2 | 58.4 | Piteau 98, Stantec 2016 | Yes | 25-Jul-18 | Upper part of the well and casing are destroyed. |
| T95R-40 | Tenas | Single well | BDR | yes | yes | yes | No | No | 6051461 | 618188 | 900.18 | 0.26 | n/a | 2.0 | 42.0 | 53.0 | Piteau 98 | Yes | 15-Sep-18 | The dedicated bailer fell down into the well. |
| T95R-64 | Tenas | Single well | BDR | yes | yes | yes | No | No | 6050597 | 618278 | 949.50 | 1.23 | 128.9 | 2.0 | 85.0 | 94.0 | Piteau 98, Stantec 2016 | Yes | 31-Mar-18 | - |
| T96R-16-19 | Tenas | Nested well | BDR | yes | yes | No | No | No | 6050613 | 616954 | 1012.90 | 0.75 | 78.8 | 2.0 | 13.1 | 19.1 | Piteau 98, Stantec 2016 | Yes | 6-Sep-18 | - |
| T96R-16-28 | Tenas | Nested well | BDR | yes | yes | No | No | No | 6050613 | 616954 | 1012.90 | 0.82 | n/a | 2.0 | 24.5 | 27.5 | Piteau 98 | Yes | 6-Sep-18 | - |
| T96R-34-67 | Tenas | Nested well | BDR | yes | No* | No* | Yes | No | 6051180 | 617691 | 934.02 | 0.94 | n/a | 2.0 | 66.2 | 67.5 | Piteau 98 | Yes | 25-Jul-18 | inside casing of T96R-34-67 was found to be damaged during the August 2017 sampling event |
| T96R-34-87 | Tenas | Nested well | BDR | yes | yes | yes | No | No | 6051180 | 617691 | 934.02 | 0.97 | 97.6 | 2.0 | 80.6 | 86.6 | Piteau 98, Stantec 2016 | Yes | 12-Sep-18 | - |
| T96R-56C-83 | Tenas | Single well | BDR | yes | No* | No | Yes | No | 6050370 | 618588 | 944.08 | 1.18 | 93.1 | 2.0 | 74.9 | 82.6 | Piteau 98, Stantec 2016 | Yes | 25-Jul-18 | Suspected damage. Depth to bottom is much shallower than the provided well details. The well casing looks disturbed and tilted. |
| T96TP-01-10 | Tenas | Single well | BDR | yes | No* | No | Yes | No | 6050718 | 617276 | 995.70 | 1.24 | n/a | 3.0 | 8.5 | 10.0 | Piteau 98 | Yes | 25-Jul-18 | The coordinates were off by about 26 meters. Could not find another well in the area. 3" well in some type of testing area. Well is surrounded by a fence. Depth to bottom off by 5 meters from the original depth (screened section is filled with fines?). |
| T96TP-02-07 | Tenas | Single well | BDR | yes | No* | No | No | No | 6050655 | 617201 | 1001.60 | 1.31 | n/a | 3.0 | 2.0 | 7.0 | Piteau 98 | Yes | 25-Jul-18 | 3" diameter well surrounded by a fence. Soft bottom and shallower than original depth. |
| T97R-108C-70 | Tenas | Single well | BDR | yes | No* | No | Yes | No | 6052532 | 617380 | 834.48 | 0.42 | 81.0 | 2.0 | 61.0 | 70.0 | Piteau 98, Stantec 2016 | Yes | 26-Jul-18 | Well is damaged. Casing is bent and the ground around the well is depressed. Depth to bottom is very shallow. |
| TOB96-01-05 | Tenas | Single well | OVB | yes | yes | yes | No | No | 6050602 | 619014 | 922.87 | 0.75 | 10.5 | 2.0 | 1.6 | 4.6 | Piteau 98, Stantec 2016 | Yes | 13-Sep-18 | - |
| TOB96-02-06 | Tenas | Nested well | OVB | yes | yes | yes | No | No | 6051947 | 618466 | 853.41 | 0.38 | 33.5 | 2.0 | 3.0 | 6.0 | Piteau 98, Stantec 2016 | Yes | 10-Sep-18 | - |
| TOB96-02-20 | Tenas | Nested well | OVB | yes | dry | yes | No | n/a | 6051947 | 618466 | 853.41 | 0.34 | n/a | 2.0 | 17.0 | 20.0 | Piteau 98 | Yes | 26-Jul-18 | Observed dry 8 times out 11 sampling events. |
| TOB96-11-04 | Tenas | Nested well | OVB | yes | yes | yes | No | No | 6052818 | 617724 | 827.36 | 0.87 | 20.2 | 2.0 | 1.5 | 4.5 | Piteau 98, Stantec 2016 | Yes | 6-Sep-18 | - |
| TOB96-11-19 | Tenas | Nested well | OVB | No | dry | No | No | Yes | 6052818 | 617724 | 827.36 | 0.31 | 20.2 | 2.0 | 18.7 | 20.2 | Piteau 98, Stantec 2016 | Yes | 6-Sep-18 | Upper part of the PVC casing is cracked and broken (cap on the ground). Well is still useable. Steel protective casing looks good. Water level tape easily can get down the well. |
| TOB96-12-04 | Tenas | Single well | OVB | yes | No* | No* | Yes | n/a | 6051377 | 616082 | 926.02 | 0.42 | 37.0 | 2.0 | 1.0 | 4.0 | Piteau 98, Stantec 2016 | Yes | 26-Jul-18 | Well is damaged. Casing is bent over and the depth to bottom is shallower than the original depth. |
| TOB97-06-21 | Tenas | Single well | OVB | No | dry | No | No | Yes | 6052496 | 616652 | 854.58 | 0.74 | 21.0 | 2.0 | 18.0 | 21.0 | Piteau 98, Stantec 2016 | Yes | 10-Sep-18 | - |
| TOB97-07-24 | Tenas | Single well | OVB | No | dry | No | No | Yes | 6053579 | 617887 | 811.05 | 0.90 | 24.0 | 2.0 | 21.0 | 24.0 | Piteau 98, Stantec 2016 | Yes | 8-Sep-18 | - |
| T18-14S | Access Road | Single well | OVB | No | yes | No | No | No | 6055570 | 620514 | 683.00 | n/a | | 2.0 | 6.7 | 8.2 | Westrek, 2020 | Yes | date install. | Road Geotech |
| T18-15S | Access Road | Single well | OVB | No | yes | No | No | No | 6054948 | 620563 | 716.70 | n/a | | 2.0 | 11.3 | 14.3 | Westrek, 2020 | Yes | date install. | Road Geotech |
| T19-36S | Rail Loadout | Single well | OVB | yes | yes | yes | No | No | 6058365 | 629737 | 515.35 | 0.88 | 5.2 | 2.0 | 3.7 | 5.2 | Cassiar 2020 | Yes | 12-Mar-19 | Rail loadout well |
| T19-37S | Rail Loadout | Single well | OVB | yes | yes | yes | No | No | 6058215 | 629955 | 516.39 | 0.87 | 5.0 | 2.0 | 3.4 | 5.0 | Cassiar 2020 | Yes | 12-Mar-19 | Rail loadout well |
| T19-28S | Access Road | VWP | OVB | No | yes | No | No | No | 6054651 | 620005 | 710.20 | | | n/a | 9.1 | - | Westrek, 2020 | Yes | date install. | Road Geotech |
| T19-30S | Access Road | VWP | OVB | No | yes | No | No | No | 6054456 | 620050 | 706.70 | | | n/a | 14.9 | - | Westrek, 2020 | Yes | date install. | Road Geotech |
| T19-31S | Access Road | VWP | OVB | No | dry | No | No | Yes | 6054334 | 620048 | 704.90 | | | n/a | 7.6 | - | Westrek, 2020 | Yes | date install. | Road Geotech |
| T96R-113-43 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6054134 | 621254 | 771.74 | 0.35** | n/a | 2.0 | 36.5 | 42.5 | Piteau 98 | No | n/a | - |
| T96R-113-79 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6054134 | 621254 | 771.74 | 0.35** | 94.0 | 2.0 | 75.5 | 78.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T96R-40-117 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6053367 | 621431 | 833.50 | 0.78** | n/a | 2.0 | 108.4 | 117.4 | Piteau 98, Stantec 2016 | No | n/a | - |
| T96R-40-87 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6053367 | 621431 | 833.55 | 0.8** | 156.2 | 2.0 | 81.0 | 87.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T96R-44-54 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6054247 | 620908 | 764.94 | 0.62** | 86.0 | 2.0 | 50.5 | 53.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T974-21-87 | Goathorn | Single well | BDR | yes | No* | No | - | - | 6055301 | 620886 | 690.64 | n/a | n/a | 2.0 | 81.7 | 87.7 | Piteau 98 | No | - | - |
| T97R-12-75 | Goathorn | Single well | BDR | No | No* | No* | n/a | n/a | 6053804 | 621297 | 792.54 | 0.65** | 97.0 | 2.0 | 68.0 | 74.8 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-15-29 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6054655 | 621062 | 739.81 | 2.15** | 79.3 | 2.0 | 26.0 | 29.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-15-52 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6054655 | 621062 | 739.81 | 0.60** | n/a | 2.0 | 47.0 | 51.6 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-17-104 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6052878 | 621462 | 846.30 | 0.55** | 116.0 | 2.0 | 98.5 | 104.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-17-79 | Goathorn | Nested well | BDR | No | No* | No* | n/a | n/a | 6052878 | 621462 | 846.30 | 0.52** | n/a | 2.0 | 69.7 | 78.7 | Piteau 98, Stantec 2016 | No | n/a | - |

| ID | Area | Installation type | Geol. along Screen | Data availability and usage in EA baseline study | | | Damaged | Dry | Easting | Northing | Collar Elev. | Stick-up | Total depth | Diam. | Screen Top | Screen Bottom | Source | Inspected | Last date of inspection | Comment Last Inspection |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | | - | - | *Hydraulic test* | *Level* | *Sampling* | (yes/no) | (yes/no) | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *mags* | *mbgs* | *inch* | *mgbs* | *mbgs* | - | | **dd/mm/yy** | |
| T97R-20-131 | Goathorn | Single well | BDR | yes | No* | No | n/a | n/a | 6055114 | 621360 | 713.61 | 0.89** | n/a | 2.0 | 127.0 | 131.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-20-40 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6055114 | 621360 | 713.61 | 0.82** | 163.8 | 2.0 | 35.2 | 39.7 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-20-83 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6055114 | 621360 | 713.46 | 0.97** | n/a | 2.0 | 77.2 | 83.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-21-41 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6055301 | 620886 | 690.64 | 0.87** | 140.0 | 2.0 | 37.7 | 49.7 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-23-69 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6055588 | 620717 | 679.72 | 0.60** | 104.8 | 2.0 | 61.5 | 68.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-33-20 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6054236 | 621053 | 767.66 | 0.60** | 125.4 | 2.0 | 12.5 | 15.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-33-55 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6054236 | 621053 | 767.66 | 0.80** | 125.4 | 2.0 | 50.7 | 53.7 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-33-78 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6054236 | 621053 | 767.66 | 0.92** | 125.4 | 2.0 | 75.1 | 78.1 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-36-140 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6055272 | 621430 | 710.28 | 0.86** | n/a | 2.0 | 137.0 | 140.0 | Piteau 98 | No | n/a | - |
| T97R-36W | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6055272 | 621430 | 710.71 | 0.45** | n/a | n/a | 11.5 | 132.5 | Piteau 98 | No | n/a | - |
| T97R-49-63 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6055515 | 621377 | 701.94 | 0.60** | 116.4 | 2.0 | 60.0 | 63.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97RP-01-04 | Goathorn | Nested well | OVB | yes | No* | No | n/a | n/a | 6054364 | 620705 | 744.49 | 0.66** | 16.0 | n/a | 1.3 | 4.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97RP-01-13 | Goathorn | Nested well | OVB | yes | No* | No | n/a | n/a | 6054364 | 620705 | 744.49 | 0.66** | 16.0 | n/a | 11.5 | 13.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97RP-02-12 | Goathorn | Single well | OVB | yes | No* | No | n/a | n/a | 6054362 | 620887 | 758.56 | 0.60** | 21.0 | n/a | 10.8 | 12.3 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97RP-03-08 | Goathorn | Single well | OVB | yes | No* | No | n/a | n/a | 6054325 | 621236 | 764.04 | 0.70** | 12.0 | n/a | 5.5 | 8.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| TOB97-04-07 | Goathorn | Single well | OVB | yes | No* | No | n/a | n/a | 6055616 | 622328 | 684.25 | 0.54** | 9.0 | n/a | 4.5 | 7.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| TOB97-05-06 | Goathorn | Single well | OVB | yes | No* | No | n/a | n/a | 6054474 | 621931 | 759.37 | 0.83** | 8.0 | n/a | 2.8 | 5.9 | Piteau 98, Stantec 2016 | No | n/a | - |
| T93R-28A | North | Nested well | BDR | yes | No* | No* | n/a | n/a | 6059121 | 617859 | 789.74 | 0.95** | n/a | 2.0 | 51.0 | 55.3 | Piteau 98 | No | n/a | - |
| T93R-28B | North | Nested well | BDR | yes | No* | No* | n/a | n/a | 6059121 | 617859 | 790.32 | 0.52** | n/a | 2.0 | 72.5 | 78.1 | Piteau 98 | No | n/a | - |
| T93R-29B | North | Nested well | BDR | No | No* | No* | n/a | n/a | 6059169 | 617057 | 849.69 | 0.7** | n/a | 2.0 | 109.1 | 114.3 | Piteau 98 | No | n/a | - |
| T93R-30 | North | Single well | BDR | yes | No* | No* | n/a | n/a | 6059771 | 616666 | 902.16 | 0.48** | 134.1 | 2.0 | 100.6 | 106.7 | Piteau 98, Stantec 2016 | No | n/a | - |
| T93R-32 | North | Single well | BDR | yes | No | No | n/a | n/a | 6060062 | 617474 | 925.66 | 0.79** | 110.6 | 2.0 | 98.7 | 104.8 | Piteau, 98; Stantec 2016 | No | n/a | - |
| TW604A | North | Single well | BDR | yes | No* | No* | n/a | n/a | 6060143 | 618631 | 812.64 | 0.68** | n/a | n/a | 24.8 | 32.6 | Piteau 98 | No | n/a | - |
| TW905A | North | Single well | BDR | No | No* | No | n/a | n/a | 6059908 | 618552 | 803.15 | 0.225** | n/a | n/a | 17.8 | 26.0 | Piteau 98 | No | n/a | - |
| TW905B | North | Single well | BDR | yes | No | No | n/a | n/a | 6059908 | 618552 | 803.15 | 0.28** | n/a | *n/a* | 48.9 | 58.3 | Piteau 98 | No | n/a | - |
| TW906A | North | Single well | BDR | yes | No | No | n/a | n/a | 6060028 | 618624 | 805.85 | 0.65** | n/a | *n/a* | 55.2 | 67.6 | Piteau 98 | No | n/a | - |
| TW913 | North | Single well | BDR | yes | No | No | n/a | n/a | 6059992 | 617070 | 922.86 | 0.77** | n/a | *n/a* | 24.9 | 32.5 | Piteau 98 | No | n/a | - |
| T93R-29A | North | Nested well | OVB | No | No* | No | n/a | n/a | 6059169 | 617057 | 849.69 | 0.76** | n/a | 2.0 | 26.5 | 33.5 | Piteau 98 | No | n/a | - |

*n/a, not applicable or not available*
*OVB, Overburden*
*BDR, Bedrock*



[1] *Stickup value measurements from the latest inspection unless indicated. Note stickups were raised that a couple of wells after the initial installation. These details are reported with the groundwater level data.*

*, there is no recent (>2017) level data or groundwater samples, but there are level data from between 1989 and 1993, and groundwater sample from between 1993 and 1997.

**, information collected from reports and not verified in the field.

***, well sampled duing one event only, following installation. Groundwater quality not included in the baseline dataset

# Appendix B – Hydraulic Conductivity Measurements

| TEST ID | Hole ID | Area | Test Type | K | Log_K | Ground surf. elev. | Screen/packer/PSD Sample | | Main geological type | Geological Unit | Geology Details | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Top | Bottom | | | | |
| - | - | - | - | *m/s* | *m/s* | *masl* | *mgbs* | *mbgs* | - | - | - | |
| T95R-15C | T95R-15C | Tenas | Slug test | 6.0E-06 | -5.2 | 889.4 | 48.0 | 63.0 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T95R-39C | T95R-39C | Tenas | Slug test | 9.6E-07 | -6.0 | 981.0 | 51.2 | 58.4 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T95R-40 | T95R-40 | Tenas | Slug test | 1.4E-06 | -5.9 | 900.2 | 42.0 | 53.0 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T95R-64 | T95R-64 | Tenas | Slug test | 5.5E-07 | -6.3 | 949.5 | 85.0 | 94.0 | BDR | I | Coal seam #1 (1/1U?) | Piteau, 1988 |
| T96R-16-19 | T96R-16-19 | Tenas | Slug test | 1.6E-07 | -6.8 | 1012.9 | 13.1 | 19.1 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T96R-16-28 | T96R-16-28 | Tenas | Slug test | 3.2E-08 | -7.5 | 1012.9 | 24.5 | 27.5 | BDR | *n/a* | Un-named lower coal | Piteau, 1988 |
| T96R-34-67 | T96R-34-67 | Tenas | Slug test | 2.1E-08 | -7.7 | 934.0 | 66.2 | 67.5 | BDR | *n/a* | Coal (upper ) | Piteau, 1988 |
| T96R-34-87 | T96R-34-87 | Tenas | Slug test | 1.2E-07 | -6.9 | 934.0 | 80.6 | 86.6 | BDR | I | Coal seam #1 (1/1U?) | Piteau, 1988 |
| T96R-56C-83 | T96R-56C-83 | Tenas | Slug test | 2.2E-06 | -5.7 | 944.1 | 74.9 | 82.6 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T97R-108C-70 | T97R-108C-70 | Tenas | Slug test | >1E-6 | -6.0 | 834.5 | 61.0 | 70.0 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T96TP-01-10 | T96TP-01-10 | Tenas | Slug test | >1E-6 | -6.0 | 995.7 | 8.5 | 10.0 | BDR | *n/a* | Coal seam C | Piteau, 1988 |
| T96TP-02-07 | T96TP-02-07 | Tenas | Slug test | >1E-6 | -6.0 | 1001.6 | 2.0 | 7.0 | BDR | I | Coal seam #1 | Piteau, 1988 |
| TOB96-01-05 | TOB96-01-05 | Tenas | Slug test | 7.2E-07 | -6.1 | 922.9 | 1.6 | 4.6 | OVB | *n/a* | Till | Piteau, 1988 |
| TOB96-02-06 | TOB96-02-06 | Tenas | Slug test | 1.4E-07 | -6.9 | 853.4 | 3.0 | 6.0 | OVB | *n/a* | Till | Piteau, 1988 |
| TOB96-02-20 | TOB96-02-20 | Tenas | Slug test | 1.3E-06 | -5.9 | 853.4 | 17.0 | 20.0 | OVB | *n/a* | SAND and GRAVEL | Piteau, 1988 |
| TOB96-11-04 | TOB96-11-04 | Tenas | Slug test | 1.4E-10 | -9.9 | 827.4 | 1.5 | 4.5 | OVB | *n/a* | CLAY | Piteau, 1988 |
| TOB96-12-04 | TOB96-12-04 | Tenas | Slug test | 2.8E-09 | -8.6 | 926.0 | 1.0 | 4.0 | OVB | *n/a* | Till | Piteau, 1988 |
| T18-04D#1 (W1) | T18-04D | Tenas | Packer Injection Test | 4.6E-08 | -7.3 | 938.8 | 63.2 | 68.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-04D#2 (W1) | T18-04D | Tenas | Packer Injection Test | 7.6E-08 | -7.1 | 938.8 | 54.2 | 59.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-04D#3 (W1) | T18-04D | Tenas | Packer Injection Test | 1.0E-07 | -7.0 | 938.8 | 45.2 | 50.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-04D#4 (W1) | T18-04D | Tenas | Packer Injection Test | 8.9E-07 | -6.1 | 938.8 | 33.2 | 38.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-04D#5 (W1) | T18-04D | Tenas | Packer Injection Test | 5.4E-07 | -6.3 | 938.8 | 21.2 | 26.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-03D#1 (ARD01) | T18-03D | Tenas | Packer Injection Test | 8.0E-09 | -8.1 | 904.3 | 90.2 | 97.0 | BDR | *n/a* | Mudstone/Siltstone | SRK, 2018 |
| T18-03D#2 (ARD01) | T18-03D | Tenas | Packer Injection Test | 6.5E-09 | -8.2 | 904.3 | 81.2 | 88.0 | BDR | *n/a* | Conglomerate | SRK, 2018 |
| T18-03D#3 (ARD01) | T18-03D | Tenas | Packer Injection Test | 1.2E-08 | -7.9 | 904.3 | 63.2 | 71.5 | BDR | *n/a* | Siltstone | SRK, 2018 |
| T18-03D#4 (ARD01) | T18-03D | Tenas | Packer Injection Test | 1.7E-08 | -7.8 | 904.3 | 42.2 | 48.5 | BDR | *n/a* | Mudstone | SRK, 2018 |
| T18-07D#1 (ARD06) | T18-07D | Tenas | Packer Injection Test | 6.4E-08 | -7.2 | 864.2 | 200.2 | 207.0 | BDR | *n/a* | Conglomerate | SRK, 2018 |
| T18-07D#2 (ARD06) | T18-07D | Tenas | Packer Injection Test | 9.7E-08 | -7.0 | 864.2 | 176.2 | 183.0 | BDR | *n/a* | Siltstone | SRK, 2018 |
| T18-07D#3 (ARD06) | T18-07D | Tenas | Packer Injection Test | 3.7E-08 | -7.4 | 864.2 | 170.2 | 174.0 | BDR | *n/a* | Sandstone | SRK, 2018 |
| T18-07D#4 (ARD06) | T18-07D | Tenas | Packer Injection Test | 2.2E-07 | -6.7 | 864.2 | 149.2 | 156.0 | BDR | *n/a* | Siltstone | SRK, 2018 |
| T18-01S | T18-01S | Tenas | Grain Size | 8.9E-09 | -8.1 | 862.8 | 6.1 | 6.4 | OVB | *n/a* | Gravely CLAY with Trace Cobbles | SRK, 2018 |
| T18-02S | T18-02S | Tenas | Grain Size | 4.9E-08 | -7.3 | 835.7 | 11.8 | 12.1 | OVB | *n/a* | Clayey SILT with some Sand | SRK, 2018 |
| T18-02S | T18-02S | Tenas | Grain Size | 5.0E-08 | -7.3 | 835.7 | 12.6 | 12.9 | OVB | *n/a* | Silty SAND with trace clay and trace cobbles | SRK, 2018 |
| T18-02TP | T18-02TP | Tenas | Grain Size | 8.6E-09 | -8.1 | 1050.0 | 0.9 | 1.2 | OVB | *n/a* | Gravely CLAY with Trace Sand | SRK, 2018 |
| T18-03S | T18-03S | Tenas | Grain Size | 1.1E-05 | -4.9 | 851.9 | 9.0 | 9.3 | OVB | *n/a* | Gravely SAND with trace Silt | SRK, 2018 |
| T18-03TP | T18-03TP | Tenas | Grain Size | 7.3E-09 | -8.1 | 1050.0 | 2.7 | 3.0 | OVB | *n/a* | Clayey GRAVEL with Some Cobbles | SRK, 2018 |
| T18-04S | T18-04S | Tenas | Grain Size | 4.5E-08 | -7.3 | 834.3 | 8.6 | 8.9 | OVB | *n/a* | Sandy SILT with Some Clay | SRK, 2018 |
| T18-05S | T18-05S | Tenas | Grain Size | 1.0E-09 | -9.0 | 852.4 | 10.2 | 10.5 | OVB | *n/a* | Gravely CLAY with Trace Cobbles | SRK, 2018 |
| T18-07S | T18-07S | Tenas | Grain Size | 5.6E-08 | -7.3 | 908.4 | 18.1 | 18.4 | OVB | *n/a* | Gravely SAND with some Cobbles | SRK, 2018 |
| T18-07TP | T18-07TP | Tenas | Grain Size | 1.0E-07 | -7.0 | 1050.0 | 1.9 | 2.2 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-08S | T18-08S | Tenas | Grain Size | 6.3E-09 | -8.2 | 885.4 | 9.1 | 9.4 | OVB | *n/a* | Gravely CLAY with Trace Cobbles | SRK, 2018 |
| T18-08TP | T18-08TP | Tenas | Grain Size | 1.0E-08 | -8.0 | 1050.0 | 1.9 | 2.2 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-09TP | T18-09TP | Tenas | Grain Size | 2.0E-09 | -8.7 | 1050.0 | 2.9 | 3.2 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-10S | T18-10S | Tenas | Grain Size | 3.8E-09 | -8.4 | 837.8 | 3.7 | 4.0 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-11S | T18-11S | Tenas | Grain Size | 6.7E-07 | -6.2 | 791.0 | 0.1 | 0.4 | OVB | *n/a* | Sandy CLAY with Trace Cobbles | SRK, 2018 |
| T18-12S | T18-12S | Tenas | Grain Size | 1.2E-06 | -5.9 | 800.8 | 24.1 | 24.4 | OVB | *n/a* | Clayey SAND with Some Gravel | SRK, 2018 |
| T18-13S | T18-13S | Tenas | Grain Size | 2.7E-09 | -8.6 | 815.2 | 1.6 | 1.9 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-13S | T18-13S | Tenas | Grain Size | 6.8E-11 | -10.2 | 815.2 | 12.6 | 12.9 | OVB | *n/a* | Gravely CLAY with Trace Cobbles | SRK, 2018 |
| T18-08S | T18-08S | Tenas | Grain Size | 1.2E-06 | -5.9 | 885.4 | 24.4 | 24.7 | OVB | *n/a* | silty SAND | SRK, 2018 |
| T18-06D (W2) | T18-06D | Tenas | Slug test | 3.0E-06 | -5.5 | 852.5 | 113.3 | 117.8 | OVB | *n/a* | COBBLES | Cassiar, 2018 |
| T18-01D (ARD02) | T18-01D | Tenas | Slug test | 5.2E-07 | -6.3 | 957.5 | 69.8 | 72.9 | BDR | *n/a* | Sandstone | Cassiar, 2020 |
| T18-04S (W1S) | T18-04D | Tenas | Slug test | 5.0E-07 | -6.3 | 938.8 | 10.1 | 13.1 | BDR | *n/a* | Gravelly Fat Clay (Till) and Volcanics | Cassiar, 2018 |
| T18-08S (W3S) | T18-08D | Tenas | Slug test | 5.0E-07 | -6.3 | 804.5 | 40.0 | 43.1 | OVB | *n/a* | SAND lense in Till | Cassiar, 2018 |
| T18-08D (W3D) | T18-08D | Tenas | Slug test | 3.0E-09 | -8.5 | 804.5 | 44.7 | 47.8 | BDR | *n/a* | Volcanics | Cassiar, 2018 |
| T18-01D (ARD02) | T18-08D | Tenas | Pump Test | 2.2E-07 | -6.7 | 957.5 | 69.8 | 72.9 | BDR | *n/a* | Sandstone | Cassiar, 2020 |
| T19-18S | T19-18S | Tenas | Slug Test | 5.9E-07 | -6.2 | 822.0 | 34.1 | 35.6 | OVB | *n/a* | Clayey Sand | Cassiar, 2020 |
| T19-21S | T19-21S | Tenas | Slug Test | 3.0E-08 | -7.5 | 833.5 | 56.7 | 58.2 | BDR | *n/a* | Weathered Siltstone | Cassiar, 2020 |
| T19-22S | T19-22S | Tenas | Slug Test | 6.6E-08 | -7.2 | 825.8 | 27.8 | 29.3 | BDR | *n/a* | Weathered Siltstone | Cassiar, 2020 |
| T19-26S | T19-26S | Tenas | Slug Test | 3.3E-06 | -5.5 | 814.0 | 50.8 | 52.3 | OVB | *n/a* | Clayey Sand | Cassiar, 2020 |
| T19-27S | T19-27S | Tenas | Slug Test | 5.1E-05 | -4.3 | 815.1 | 43.0 | 44.5 | OVB | *n/a* | Silty Sand with Gravel | Cassiar, 2020 |
| T19-34S | T19-34S | Tenas | Slug Test | 1.4E-07 | -6.9 | 836.5 | 35.1 | 36.6 | BDR | *n/a* | Weathered Siltstone | Cassiar, 2020 |
| T19-35S | T19-35S | Tenas | Slug Test | 5.3E-06 | -5.3 | 828.0 | 28.3 | 29.8 | BDR | *n/a* | Weathered Siltstone | Cassiar, 2020 |
| T19-36S | T19-36S | Rail loadout | Slug Test | 7.5E-04 | -3.1 | 515.4 | 3.3 | 5.3 | OVB | *n/a* | fluvial well-graded sand and gravel | Cassiar, 2020 |
| T19-37S | T19-37S | Rail loadout | Slug Test | 7.2E-06 | -5.1 | 516.4 | 3.0 | 5.0 | OVB | *n/a* | fluvial well-graded sand and gravel | Cassiar, 2020 |
| T96R-40-87 | T96R-40-87 | Goathorn | Slug Test | 3.7E-06 | -5.43 | 833.6 | 81.0 | 87.0 | BDR | III | Coal seam #4 (5?) | Piteau, 1988 |
| T96R-40-117 | T96R-40-117 | Goathorn | Slug Test | 4.3E-10 | -9.37 | 833.5 | 108.4 | 117.4 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T96R-44-54 | T96R-44-54 | Goathorn | Slug Test | 3.7E-08 | -7.43 | 764.9 | 50.5 | 53.5 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T96R-113-43 | T96R-113-43 | Goathorn | Slug Test | 8.5E-07 | -6.07 | 771.7 | 36.5 | 42.5 | BDR | III | Coal seam #4-5 | Piteau, 1988 |
| T96R-113-79 | T96R-113-79 | Goathorn | Slug Test | 9.2E-10 | -9.04 | 771.7 | 75.5 | 78.5 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T97R-15-29 | T97R-15-29 | Goathorn | Slug Test | 4.7E-08 | -7.33 | 739.8 | 26.0 | 29.0 | BDR | III | Coal seam #4-5 | Piteau, 1988 |
| T97R-15-52 | T97R-15-52 | Goathorn | Slug Test | 2.0E-07 | -6.70 | 739.8 | 47.0 | 51.6 | BDR | III | Coal seam #3 | Piteau, 1988 |
| T97R-17-104 | T97R-17-104 | Goathorn | Slug Test | 2.6E-07 | -6.59 | 846.3 | 98.5 | 104.0 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T97R-20-40 | T97R-20-40 | Goathorn | Slug Test | 1.6E-09 | -8.80 | 713.6 | 35.2 | 39.7 | BDR | III | Coal seam #8 | Piteau, 1988 |
| T97R-20-83 | T97R-20-83 | Goathorn | Slug Test | 1.0E-09 | -9.00 | 713.5 | 77.2 | 83.5 | BDR | III | Coal seam #4-5 | Piteau, 1988 |
| T97R-20-131 | T97R-20-131 | Goathorn | Slug Test | 3.2E-09 | -8.49 | 713.6 | 127.0 | 131.0 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T97R-21-41 | T97R-21-41 | Goathorn | Slug Test | 4.0E-07 | -6.40 | 690.6 | 37.7 | 49.7 | BDR | I | Coal seam (#?) | Piteau, 1988 |
| T974-21-87 | T974-21-87 | Goathorn | Slug Test | 1.4E-08 | -7.85 | 690.6 | 81.7 | 87.7 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T97R-23-69 | T97R-23-69 | Goathorn | Slug Test | 1.3E-07 | -6.89 | 679.7 | 61.5 | 68.5 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T97R-33-20 | T97R-33-20 | Goathorn | Slug Test | >1E-6 | -6.00 | 767.7 | 12.5 | 15.5 | BDR | III | Upper Sandstone | Piteau, 1988 |
| T97R-33-55 | T97R-33-55 | Goathorn | Slug Test | 1.5E-10 | -9.82 | 767.7 | 50.7 | 53.7 | BDR | III | Sandstone, Coal seam #3 | Piteau, 1988 |
| T97R-33-78 | T97R-33-78 | Goathorn | Slug Test | 2.9E-09 | -8.54 | 767.7 | 75.1 | 78.1 | BDR | III | Lower Mudstone | Piteau, 1988 |
| T97R-36W | T97R-36W | Goathorn | Pump Test | 2.1E-09 | -8.68 | 710.7 | 11.5 | 132.5 | BDR | *n/a* | Various | Piteau, 1988 |
| T97R-36-140 | T97R-36-140 | Goathorn | Slug Test | 7.7E-12 | -11.11 | 710.3 | 137.0 | 140.0 | BDR | *n/a* | Lower Mudstone | Piteau, 1988 |
| T97R-49-63 | T97R-49-63 | Goathorn | Slug Test | 1.1E-09 | -8.96 | 701.9 | 60.0 | 63.0 | BDR | III | Sandstone, Coal seam #3 | Piteau, 1988 |
| TOB97-04-07 | TOB97-04-07 | Goathorn | Slug Test | 8.1E-09 | -8.09 | 684.3 | 4.5 | 7.5 | OVB | *n/a* | SILT (Till) | Piteau, 1988 |
| TOB97-05-06 | TOB97-05-06 | Goathorn | Slug Test | 1.2E-08 | -7.92 | 759.4 | 2.8 | 5.9 | OVB | *n/a* | Till | Piteau, 1988 |
| T93R-28A | T93R-28A | North | Slug Test | 2.7E-09 | -8.57 | 789.7 | 51.0 | 55.3 | BDR | *n/a* | Coal seam #6 | Piteau, 1988 |
| T93R-28B | T93R-28B | North | Slug Test | 1.0E-08 | -8.00 | 790.3 | 72.5 | 78.1 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T93R-30 | T93R-30 | North | Slug Test | 5.4E-09 | -8.27 | 902.2 | 100.6 | 106.7 | BDR | I | Coal seam #1 | Piteau, 1988 |
| TW604A | TW604A | North | Slug Test | 2.4E-07 | -6.62 | 812.6 | 24.8 | 32.6 | BDR | *n/a* | Coal seam #6, Mudstone | Piteau, 1988 |
| TW905B | TW905B | North | Slug Test | 3.5E-07 | -6.46 | 803.2 | 48.9 | 58.3 | BDR | III | Sandstone, Mudstone, Coal seam #2 | Piteau, 1988 |
| TW906A | TW906A | North | Slug Test | 2.2E-07 | -6.66 | 805.9 | 55.2 | 67.6 | BDR | III | Mudstone, Coal seam #2 | Piteau, 1988 |
| TW913 | TW913 | North | Slug Test | 1.3E-07 | -6.89 | 922.9 | 24.9 | 32.5 | BDR | III | Mudstone, Coal seam #2 | Piteau, 1988 |
| T93R-32 | T93R-32 | North | Slug Test | 7.3E-09 | -8.14 | 925.7 | 98.7 | 104.8 | BDR | III | Coal seam #2 | Piteau, 1988 |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T18-01D | 0 | 12.7 | 12.7 | Overburden | Telkwa_Geotech.csv |
| T18-01D | 12.7 | 14.5 | 1.8 | MDST | Telkwa_Geotech.csv |
| T18-01D | 14.5 | 15.7 | 1.2 | COAL | Telkwa_Geotech.csv |
| T18-01D | 15.7 | 21.7 | 6 | MDST | Telkwa_Geotech.csv |
| T18-01D | 21.7 | 23.2 | 1.5 | COAL | Telkwa_Geotech.csv |
| T18-01D | 23.2 | 30 | 6.8 | MDST | Telkwa_Geotech.csv |
| T18-01D | 30 | 36.42 | 6.42 | SLTS | Telkwa_Geotech.csv |
| T18-01D | 36.42 | 38.5 | 2.08 | COAL | Telkwa_Geotech.csv |
| T18-01D | 38.5 | 39.1 | 0.6 | MDST | Telkwa_Geotech.csv |
| T18-01D | 39.1 | 40.7 | 1.6 | COAL | Telkwa_Geotech.csv |
| T18-01D | 40.7 | 44.5 | 3.8 | MDST | Telkwa_Geotech.csv |
| T18-01D | 44.5 | 44.9 | 0.4 | COAL | Telkwa_Geotech.csv |
| T18-01D | 44.9 | 45.7 | 0.8 | MDST | Telkwa_Geotech.csv |
| T18-01S | 0 | 0.4 | 0.4 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-01TP | 0 | 8 | 8 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-02D | 8 | 8.4 | 0.4 | Overburden | Telkwa_Geotech.csv |
| T18-02D | 8.4 | 36.66 | 28.26 | MDST | Telkwa_Geotech.csv |
| T18-02D | 36.66 | 36.9 | 0.24 | COAL | Telkwa_Geotech.csv |
| T18-02D | 36.9 | 40.8 | 3.9 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 40.8 | 41.45 | 0.65 | COAL | Telkwa_Geotech.csv |
| T18-02D | 41.45 | 48.6 | 7.15 | MDST | Telkwa_Geotech.csv |
| T18-02D | 48.6 | 50.3 | 1.7 | COAL | Telkwa_Geotech.csv |
| T18-02D | 50.3 | 58.1 | 7.8 | MDST | Telkwa_Geotech.csv |
| T18-02D | 58.1 | 58.58 | 0.48 | COAL | Telkwa_Geotech.csv |
| T18-02D | 58.58 | 68.36 | 9.78 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 68.36 | 75.54 | 7.18 | COAL | Telkwa_Geotech.csv |
| T18-02D | 75.54 | 78.63 | 3.09 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 78.63 | 79.8 | 1.17 | COAL | Telkwa_Geotech.csv |
| T18-02D | 79.8 | 80.38 | 0.58 | MDST | Telkwa_Geotech.csv |
| T18-02D | 80.38 | 81.3 | 0.92 | COAL | Telkwa_Geotech.csv |
| T18-02D | 81.3 | 91.8 | 10.5 | MDST | Telkwa_Geotech.csv |
| T18-02D | 91.8 | 92.6 | 0.8 | COAL | Telkwa_Geotech.csv |
| T18-02D | 92.6 | 105.3 | 12.7 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 105.3 | 106.8 | 1.5 | SST | Telkwa_Geotech.csv |
| T18-02D | 106.8 | 108.3 | 1.5 | n/a | Telkwa_Geotech.csv |
| T18-02D | 108.3 | 109.8 | 1.5 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 109.8 | 120.3 | 10.5 | SST | Telkwa_Geotech.csv |
| T18-02D | 120.3 | 121.8 | 1.5 | SLTS | Telkwa_Geotech.csv |
| T18-02S | 0 | 0.7 | 0.7 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-02TP | 0 | 0.3 | 0.3 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-03S | 0 | 0.4 | 0.4 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-03TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-04S | 0 | 0.1 | 0.1 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-04TP | 0 | 0.3 | 0.3 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-05D | 0 | 13.5 | 13.5 | Overburden | Telkwa_Geotech.csv |
| T18-05D | 13.5 | 90 | 76.5 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 90 | 93.62 | 3.62 | MDST | Telkwa_Geotech.csv |
| T18-05D | 93.62 | 94.1 | 0.48 | COAL | Telkwa_Geotech.csv |
| T18-05D | 94.1 | 97.5 | 3.4 | MDST | Telkwa_Geotech.csv |
| T18-05D | 97.5 | 99.4 | 1.9 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 99.4 | 101.6 | 2.2 | COAL | Telkwa_Geotech.csv |
| T18-05D | 101.6 | 111 | 9.4 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 111 | 111.37 | 0.37 | MDST | Telkwa_Geotech.csv |
| T18-05D | 111.37 | 111.67 | 0.3 | COAL | Telkwa_Geotech.csv |
| T18-05D | 111.67 | 118.95 | 7.28 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 118.95 | 126.2 | 7.25 | COAL | Telkwa_Geotech.csv |
| T18-05D | 126.2 | 131.14 | 4.94 | MDST | Telkwa_Geotech.csv |
| T18-05D | 131.14 | 132.14 | 1 | COAL | Telkwa_Geotech.csv |
| T18-05D | 132.14 | 132.4 | 0.26 | MDST | Telkwa_Geotech.csv |
| T18-05D | 132.4 | 133.2 | 0.8 | COAL | Telkwa_Geotech.csv |
| T18-05D | 133.2 | 134.52 | 1.32 | MDST | Telkwa_Geotech.csv |
| T18-05D | 134.52 | 135.47 | 0.95 | COAL | Telkwa_Geotech.csv |
| T18-05D | 135.47 | 139.32 | 3.85 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 139.32 | 140.46 | 1.14 | COAL | Telkwa_Geotech.csv |
| T18-05D | 140.46 | 141 | 0.54 | MDST | Telkwa_Geotech.csv |
| T18-05D | 141 | 142.1 | 1.1 | COAL | Telkwa_Geotech.csv |
| T18-05D | 142.1 | 156 | 13.9 | MDST | Telkwa_Geotech.csv |
| T18-05D | 156 | 175.5 | 19.5 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 175.5 | 177 | 1.5 | MDST | Telkwa_Geotech.csv |
| T18-05S | 0 | 0.4 | 0.4 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-05TP | 0 | 0.3 | 0.3 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-06TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-07S | 0 | 26.2 | 26.2 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-07S | 26.2 | 27.9 | 1.7 | ? | Sonic_Logs_Combined_20180511.csv |
| T18-07TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-08S | 0 | 0.3 | 0.3 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-08TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-09S | 0 | 12.9 | 12.9 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-09S | 12.9 | 13.5 | 0.6 | ? | Sonic_Logs_Combined_20180511.csv |
| T18-09TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-10S | 0 | 0.2 | 0.2 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-10TP | 0 | 0.3 | 0.3 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-11S | 0 | 0.5 | 0.5 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-11TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-12S | 0 | 0.4 | 0.4 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-12TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-13S | 0 | 11.7 | 11.7 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T81R-108 | 0 | 25.7 | 25.7 | Overburden | Tenas_Lithology.csv |
| T81R-108 | 25.7 | 38.1 | 12.4 | MDST | Tenas_Lithology.csv |
| T81R-108 | 38.1 | 52.7 | 14.6 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 52.7 | 71.9 | 19.2 | VOLC | Tenas_Lithology.csv |
| T81R-108 | 71.9 | 73.8 | 1.9 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 73.8 | 76.2 | 2.4 | SST | Tenas_Lithology.csv |
| T81R-108 | 76.2 | 77.1 | 0.9 | MDST | Tenas_Lithology.csv |
| T81R-108 | 77.1 | 87.7 | 10.6 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 87.7 | 90.25 | 2.55 | SST | Tenas_Lithology.csv |
| T81R-108 | 90.25 | 95.6 | 5.35 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 95.6 | 100.8 | 5.2 | SST | Tenas_Lithology.csv |
| T81R-108 | 100.8 | 108.5 | 7.7 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 108.5 | 115.6 | 7.1 | MDST | Tenas_Lithology.csv |
| T81R-108 | 115.6 | 126.8 | 11.2 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 126.8 | 129 | 2.2 | CGL | Tenas_Lithology.csv |
| T81R-108 | 129 | 130 | 1 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T81R-108 | 130 | 156.8 | 26.8 | VOLC | Tenas_Lithology.csv |
| T81R-108 | 156.8 | 157.9 | 1.1 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 157.9 | 160.2 | 2.3 | MDST | Tenas_Lithology.csv |
| T81R-108 | 160.2 | 169.8 | 9.6 | VOLC | Tenas_Lithology.csv |
| T92R-39C | 0 | 2.3 | 2.3 | Overburden | Tenas_Lithology.csv |
| T92R-39C | 2.3 | 2.47 | 0.17 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 2.47 | 4.21 | 1.74 | COAL | Tenas_Lithology.csv |
| T92R-39C | 4.21 | 6.68 | 2.47 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 6.68 | 11.03 | 4.35 | COAL | Tenas_Lithology.csv |
| T92R-39C | 11.03 | 11.48 | 0.45 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 11.48 | 11.76 | 0.28 | COAL | Tenas_Lithology.csv |
| T92R-39C | 11.76 | 15.9 | 4.14 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 15.9 | 19.03 | 3.13 | MDST | Tenas_Lithology.csv |
| T92R-39C | 19.03 | 19.1 | 0.07 | COAL | Tenas_Lithology.csv |
| T92R-39C | 19.1 | 19.63 | 0.53 | MDST | Tenas_Lithology.csv |
| T92R-39C | 19.63 | 19.75 | 0.12 | COAL | Tenas_Lithology.csv |
| T92R-39C | 19.75 | 21.2 | 1.45 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 21.2 | 21.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T92R-39C | 21.4 | 23.88 | 2.48 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 23.88 | 24.1 | 0.22 | COAL | Tenas_Lithology.csv |
| T92R-39C | 24.1 | 27.2 | 3.1 | SST | Tenas_Lithology.csv |
| T92R-39C | 27.2 | 27.46 | 0.26 | COAL | Tenas_Lithology.csv |
| T92R-39C | 27.46 | 29.42 | 1.96 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 29.42 | 29.62 | 0.2 | COAL | Tenas_Lithology.csv |
| T92R-39C | 29.62 | 35.2 | 5.58 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 35.2 | 62.5 | 27.3 | SST | Tenas_Lithology.csv |
| T92R-42 | 0 | 7.26 | 7.26 | Overburden | Tenas_Lithology.csv |
| T92R-42 | 7.26 | 10.7 | 3.44 | MDST | Tenas_Lithology.csv |
| T92R-42 | 10.7 | 15.05 | 4.35 | SLTS | Tenas_Lithology.csv |
| T92R-42 | 15.05 | 20 | 4.95 | SST | Tenas_Lithology.csv |
| T92R-42 | 20 | 22.45 | 2.45 | MDST | Tenas_Lithology.csv |
| T92R-42 | 22.45 | 25.5 | 3.05 | SST | Tenas_Lithology.csv |
| T92R-42 | 25.5 | 28.1 | 2.6 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 0 | 6.71 | 6.71 | Overburden | Tenas_Lithology.csv |
| T92R-43 | 6.71 | 26.81 | 20.1 | MDST | Tenas_Lithology.csv |
| T92R-43 | 26.81 | 27.22 | 0.41 | COAL | Tenas_Lithology.csv |
| T92R-43 | 27.22 | 30.1 | 2.88 | MDST | Tenas_Lithology.csv |
| T92R-43 | 30.1 | 30.61 | 0.51 | COAL | Tenas_Lithology.csv |
| T92R-43 | 30.61 | 33.59 | 2.98 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 33.59 | 34.06 | 0.47 | COAL | Tenas_Lithology.csv |
| T92R-43 | 34.06 | 38.79 | 4.73 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 38.79 | 39.22 | 0.43 | COAL | Tenas_Lithology.csv |
| T92R-43 | 39.22 | 42.89 | 3.67 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 42.89 | 48.69 | 5.8 | COAL | Tenas_Lithology.csv |
| T92R-43 | 48.69 | 50.87 | 2.18 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 50.87 | 51.31 | 0.44 | COAL | Tenas_Lithology.csv |
| T92R-43 | 51.31 | 55 | 3.69 | MDST | Tenas_Lithology.csv |
| T92R-43 | 55 | 56.6 | 1.6 | SST | Tenas_Lithology.csv |
| T92R-43 | 56.6 | 57.42 | 0.82 | MDST | Tenas_Lithology.csv |
| T92R-43 | 57.42 | 57.98 | 0.56 | COAL | Tenas_Lithology.csv |
| T92R-43 | 57.98 | 61.86 | 3.88 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 61.86 | 62.45 | 0.59 | COAL | Tenas_Lithology.csv |
| T92R-43 | 62.45 | 62.85 | 0.4 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 62.85 | 63.2 | 0.35 | COAL | Tenas_Lithology.csv |
| T92R-43 | 63.2 | 67.57 | 4.37 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 67.57 | 67.98 | 0.41 | COAL | Tenas_Lithology.csv |
| T92R-43 | 67.98 | 85.3 | 17.32 | SST | Tenas_Lithology.csv |
| T93D-45 | 0 | 39.5 | 39.5 | Overburden | Tenas_Lithology.csv |
| T93D-45 | 39.5 | 40.03 | 0.53 | COAL | Tenas_Lithology.csv |
| T93D-45 | 40.03 | 44.08 | 4.05 | MDST | Tenas_Lithology.csv |
| T93D-45 | 44.08 | 44.57 | 0.49 | COAL | Tenas_Lithology.csv |
| T93D-45 | 44.57 | 44.76 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93D-45 | 44.76 | 46.13 | 1.37 | COAL | Tenas_Lithology.csv |
| T93D-45 | 46.13 | 58.17 | 12.04 | MDST | Tenas_Lithology.csv |
| T93D-45 | 58.17 | 60 | 1.83 | COAL | Tenas_Lithology.csv |
| T93D-45 | 60 | 61.5 | 1.5 | MDST | Tenas_Lithology.csv |
| T93D-45 | 61.5 | 62.3 | 0.8 | COAL | Tenas_Lithology.csv |
| T93D-45 | 62.3 | 65.6 | 3.3 | SLTS | Tenas_Lithology.csv |
| T93D-45 | 65.6 | 66.2 | 0.6 | COAL | Tenas_Lithology.csv |
| T93D-45 | 66.2 | 67.6 | 1.4 | SLTS | Tenas_Lithology.csv |
| T93D-45 | 67.6 | 68.2 | 0.6 | COAL | Tenas_Lithology.csv |
| T93D-45 | 68.2 | 76.4 | 8.2 | SLTS | Tenas_Lithology.csv |
| T93D-45 | 76.4 | 107.5 | 31.1 | SST | Tenas_Lithology.csv |
| T93D-45 | 107.5 | 115.6 | 8.1 | SLTS | Tenas_Lithology.csv |
| T93D-45 | 115.6 | 128.75 | 13.15 | SST | Tenas_Lithology.csv |
| T93D-45 | 128.75 | 129.23 | 0.48 | COAL | Tenas_Lithology.csv |
| T93D-45 | 129.23 | 131.3 | 2.07 | MDST | Tenas_Lithology.csv |
| T93D-45 | 131.3 | 134.7 | 3.4 | SST | Tenas_Lithology.csv |
| T93D-45 | 134.7 | 142.8 | 8.1 | CGL | Tenas_Lithology.csv |
| T93D-47 | 0 | 12.21 | 12.21 | Overburden | Tenas_Lithology.csv |
| T93D-47 | 12.21 | 38.6 | 26.39 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 38.6 | 52.4 | 13.8 | SST | Tenas_Lithology.csv |
| T93D-47 | 52.4 | 92 | 39.6 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 92 | 100 | 8 | SST | Tenas_Lithology.csv |
| T93D-47 | 100 | 110 | 10 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 110 | 116.7 | 6.7 | SST | Tenas_Lithology.csv |
| T93D-47 | 116.7 | 141 | 24.3 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 141 | 166.81 | 25.81 | SST | Tenas_Lithology.csv |
| T93D-47 | 166.81 | 167.17 | 0.36 | COAL | Tenas_Lithology.csv |
| T93D-47 | 167.17 | 168.03 | 0.86 | MDST | Tenas_Lithology.csv |
| T93D-47 | 168.03 | 168.95 | 0.92 | COAL | Tenas_Lithology.csv |
| T93D-47 | 168.95 | 170.02 | 1.07 | MDST | Tenas_Lithology.csv |
| T93D-47 | 170.02 | 171.13 | 1.11 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 171.13 | 173 | 1.87 | CGL | Tenas_Lithology.csv |
| T93D-47 | 173 | 178.9 | 5.9 | SST | Tenas_Lithology.csv |
| T93D-53 | 0 | 7.52 | 7.52 | Overburden | Tenas_Lithology.csv |
| T93D-53 | 7.52 | 9.56 | 2.04 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 9.56 | 14.86 | 5.3 | SST | Tenas_Lithology.csv |
| T93D-53 | 14.86 | 33.43 | 18.57 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 33.43 | 35.83 | 2.4 | SST | Tenas_Lithology.csv |
| T93D-53 | 35.83 | 36.42 | 0.59 | MDST | Tenas_Lithology.csv |
| T93D-53 | 36.42 | 36.47 | 0.05 | COAL | Tenas_Lithology.csv |
| T93D-53 | 36.47 | 39.73 | 3.26 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T93D-53 | 39.73 | 39.89 | 0.16 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 39.89 | 39.97 | 0.08 | MDST | Tenas_Lithology.csv |
| T93D-53 | 39.97 | 40.12 | 0.15 | COAL | Tenas_Lithology.csv |
| T93D-53 | 40.12 | 40.96 | 0.84 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 40.96 | 41.29 | 0.33 | COAL | Tenas_Lithology.csv |
| T93D-53 | 41.29 | 41.39 | 0.1 | MDST | Tenas_Lithology.csv |
| T93D-53 | 41.39 | 43.61 | 2.22 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 43.61 | 43.79 | 0.18 | COAL | Tenas_Lithology.csv |
| T93D-53 | 43.79 | 43.82 | 0.03 | MDST | Tenas_Lithology.csv |
| T93D-53 | 43.82 | 46.45 | 2.63 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 46.45 | 46.48 | 0.03 | MDST | Tenas_Lithology.csv |
| T93D-53 | 46.48 | 48.18 | 1.7 | COAL | Tenas_Lithology.csv |
| T93D-53 | 48.18 | 50.02 | 1.84 | MDST | Tenas_Lithology.csv |
| T93D-53 | 50.02 | 50.41 | 0.39 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 50.41 | 51.32 | 0.91 | MDST | Tenas_Lithology.csv |
| T93D-53 | 51.32 | 56.19 | 4.87 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 56.19 | 58.65 | 2.46 | COAL | Tenas_Lithology.csv |
| T93D-53 | 58.65 | 58.69 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93D-53 | 58.69 | 62.96 | 4.27 | COAL | Tenas_Lithology.csv |
| T93D-53 | 62.96 | 63.07 | 0.11 | MDST | Tenas_Lithology.csv |
| T93D-53 | 63.07 | 67.35 | 4.28 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 67.35 | 67.72 | 0.37 | COAL | Tenas_Lithology.csv |
| T93D-53 | 67.72 | 67.93 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93D-53 | 67.93 | 68.23 | 0.3 | COAL | Tenas_Lithology.csv |
| T93D-53 | 68.23 | 70.88 | 2.65 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 70.88 | 71.23 | 0.35 | MDST | Tenas_Lithology.csv |
| T93D-53 | 71.23 | 71.57 | 0.34 | COAL | Tenas_Lithology.csv |
| T93D-53 | 71.57 | 73.39 | 1.82 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 73.39 | 74.4 | 1.01 | MDST | Tenas_Lithology.csv |
| T93D-53 | 74.4 | 75.15 | 0.75 | COAL | Tenas_Lithology.csv |
| T93D-53 | 75.15 | 75.31 | 0.16 | MDST | Tenas_Lithology.csv |
| T93D-53 | 75.31 | 75.93 | 0.62 | SST | Tenas_Lithology.csv |
| T93D-53 | 75.93 | 76.64 | 0.71 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 76.64 | 77.44 | 0.8 | COAL | Tenas_Lithology.csv |
| T93D-53 | 77.44 | 78.32 | 0.88 | SST | Tenas_Lithology.csv |
| T93D-53 | 78.32 | 78.42 | 0.1 | COAL | Tenas_Lithology.csv |
| T93D-53 | 78.42 | 79.06 | 0.64 | MDST | Tenas_Lithology.csv |
| T93D-53 | 79.06 | 81.02 | 1.96 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 81.02 | 81.59 | 0.57 | SST | Tenas_Lithology.csv |
| T93D-53 | 81.59 | 84.96 | 3.37 | MDST | Tenas_Lithology.csv |
| T93D-53 | 84.96 | 85.34 | 0.38 | COAL | Tenas_Lithology.csv |
| T93D-53 | 85.34 | 91.4 | 6.06 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 0 | 1.66 | 1.66 | Overburden | Tenas_Lithology.csv |
| T93R-02 | 1.66 | 3.35 | 1.69 | COAL | Tenas_Lithology.csv |
| T93R-02 | 3.35 | 3.74 | 0.39 | MDST | Tenas_Lithology.csv |
| T93R-02 | 3.74 | 7.18 | 3.44 | COAL | Tenas_Lithology.csv |
| T93R-02 | 7.18 | 8.55 | 1.37 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 8.55 | 9.28 | 0.73 | COAL | Tenas_Lithology.csv |
| T93R-02 | 9.28 | 10 | 0.72 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 10 | 14.62 | 4.62 | SST | Tenas_Lithology.csv |
| T93R-02 | 14.62 | 14.84 | 0.22 | COAL | Tenas_Lithology.csv |
| T93R-02 | 14.84 | 15.59 | 0.75 | MDST | Tenas_Lithology.csv |
| T93R-02 | 15.59 | 15.72 | 0.13 | COAL | Tenas_Lithology.csv |
| T93R-02 | 15.72 | 20.4 | 4.68 | MDST | Tenas_Lithology.csv |
| T93R-02 | 20.4 | 21.01 | 0.61 | COAL | Tenas_Lithology.csv |
| T93R-02 | 21.01 | 21.39 | 0.38 | MDST | Tenas_Lithology.csv |
| T93R-02 | 21.39 | 21.98 | 0.59 | COAL | Tenas_Lithology.csv |
| T93R-02 | 21.98 | 24 | 2.02 | MDST | Tenas_Lithology.csv |
| T93R-02 | 24 | 28.84 | 4.84 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 28.84 | 29.25 | 0.41 | COAL | Tenas_Lithology.csv |
| T93R-02 | 29.25 | 31.4 | 2.15 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 31.4 | 34.75 | 3.35 | SST | Tenas_Lithology.csv |
| T93R-02 | 34.75 | 39 | 4.25 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 39 | 53.34 | 14.34 | SST | Tenas_Lithology.csv |
| T93R-02 | 53.34 | 57.9 | 4.56 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 57.9 | 63.1 | 5.2 | MDST | Tenas_Lithology.csv |
| T93R-02 | 63.1 | 68.6 | 5.5 | SST | Tenas_Lithology.csv |
| T93R-02 | 68.6 | 80.6 | 12 | MDST | Tenas_Lithology.csv |
| T93R-03 | 0 | 4.43 | 4.43 | Overburden | Tenas_Lithology.csv |
| T93R-03 | 4.43 | 6.7 | 2.27 | MDST | Tenas_Lithology.csv |
| T93R-03 | 6.7 | 58.52 | 51.82 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 58.52 | 67.07 | 8.55 | MDST | Tenas_Lithology.csv |
| T93R-03 | 67.07 | 67.41 | 0.34 | COAL | Tenas_Lithology.csv |
| T93R-03 | 67.41 | 67.73 | 0.32 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-03 | 67.73 | 68.14 | 0.41 | COAL | Tenas_Lithology.csv |
| T93R-03 | 68.14 | 71.95 | 3.81 | MDST | Tenas_Lithology.csv |
| T93R-03 | 71.95 | 72.26 | 0.31 | COAL | Tenas_Lithology.csv |
| T93R-03 | 72.26 | 75.71 | 3.45 | MDST | Tenas_Lithology.csv |
| T93R-03 | 75.71 | 76.04 | 0.33 | COAL | Tenas_Lithology.csv |
| T93R-03 | 76.04 | 76.97 | 0.93 | MDST | Tenas_Lithology.csv |
| T93R-03 | 76.97 | 78.25 | 1.28 | COAL | Tenas_Lithology.csv |
| T93R-03 | 78.25 | 78.38 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-03 | 78.38 | 78.65 | 0.27 | COAL | Tenas_Lithology.csv |
| T93R-03 | 78.65 | 78.94 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-03 | 78.94 | 79.3 | 0.36 | COAL | Tenas_Lithology.csv |
| T93R-03 | 79.3 | 79.4 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-03 | 79.4 | 81.52 | 2.12 | COAL | Tenas_Lithology.csv |
| T93R-03 | 81.52 | 82.78 | 1.26 | MDST | Tenas_Lithology.csv |
| T93R-03 | 82.78 | 83.2 | 0.42 | COAL | Tenas_Lithology.csv |
| T93R-03 | 83.2 | 84.12 | 0.92 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 84.12 | 85.16 | 1.04 | COAL | Tenas_Lithology.csv |
| T93R-03 | 85.16 | 88.9 | 3.74 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 88.9 | 89.12 | 0.22 | COAL | Tenas_Lithology.csv |
| T93R-03 | 89.12 | 91.79 | 2.67 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 91.79 | 92.77 | 0.98 | COAL | Tenas_Lithology.csv |
| T93R-03 | 92.77 | 93.6 | 0.83 | MDST | Tenas_Lithology.csv |
| T93R-03 | 93.6 | 94.47 | 0.87 | COAL | Tenas_Lithology.csv |
| T93R-03 | 94.47 | 96 | 1.53 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 96 | 100.8 | 4.8 | SST | Tenas_Lithology.csv |
| T93R-04 | 0 | 2.14 | 2.14 | Overburden | Tenas_Lithology.csv |
| T93R-04 | 2.14 | 14.32 | 12.18 | SST | Tenas_Lithology.csv |
| T93R-04 | 14.32 | 19.51 | 5.19 | MDST | Tenas_Lithology.csv |
| T93R-04 | 19.51 | 23.16 | 3.65 | SST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T93R-04 | 23.16 | 25.3 | 2.14 | MDST | Tenas_Lithology.csv |
| T93R-04 | 25.3 | 29.87 | 4.57 | SST | Tenas_Lithology.csv |
| T93R-04 | 29.87 | 57.91 | 28.04 | MDST | Tenas_Lithology.csv |
| T93R-04 | 57.91 | 60.65 | 2.74 | SST | Tenas_Lithology.csv |
| T93R-04 | 60.65 | 68.9 | 8.25 | MDST | Tenas_Lithology.csv |
| T93R-04 | 68.9 | 89 | 20.1 | VOLC | Tenas_Lithology.csv |
| T93R-05 | 0 | 3.67 | 3.67 | Overburden | Tenas_Lithology.csv |
| T93R-05 | 3.67 | 11.28 | 7.61 | MDST | Tenas_Lithology.csv |
| T93R-05 | 11.28 | 18.9 | 7.62 | SLTS | Tenas_Lithology.csv |
| T93R-05 | 18.9 | 24.38 | 5.48 | MDST | Tenas_Lithology.csv |
| T93R-05 | 24.38 | 25.6 | 1.22 | SST | Tenas_Lithology.csv |
| T93R-05 | 25.6 | 38.69 | 13.09 | MDST | Tenas_Lithology.csv |
| T93R-05 | 38.69 | 39.15 | 0.46 | COAL | Tenas_Lithology.csv |
| T93R-05 | 39.15 | 41.17 | 2.02 | MDST | Tenas_Lithology.csv |
| T93R-05 | 41.17 | 41.68 | 0.51 | COAL | Tenas_Lithology.csv |
| T93R-05 | 41.68 | 44.17 | 2.49 | MDST | Tenas_Lithology.csv |
| T93R-05 | 44.17 | 44.4 | 0.23 | COAL | Tenas_Lithology.csv |
| T93R-05 | 44.4 | 44.84 | 0.44 | MDST | Tenas_Lithology.csv |
| T93R-05 | 44.84 | 46.34 | 1.5 | COAL | Tenas_Lithology.csv |
| T93R-05 | 46.34 | 54.24 | 7.9 | MDST | Tenas_Lithology.csv |
| T93R-05 | 54.24 | 54.62 | 0.38 | COAL | Tenas_Lithology.csv |
| T93R-05 | 54.62 | 58.79 | 4.17 | MDST | Tenas_Lithology.csv |
| T93R-05 | 58.79 | 64.5 | 5.71 | COAL | Tenas_Lithology.csv |
| T93R-05 | 64.5 | 65.48 | 0.98 | MDST | Tenas_Lithology.csv |
| T93R-05 | 65.48 | 65.82 | 0.34 | COAL | Tenas_Lithology.csv |
| T93R-05 | 65.82 | 66.25 | 0.43 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-05 | 66.25 | 66.8 | 0.55 | COAL | Tenas_Lithology.csv |
| T93R-05 | 66.8 | 68.27 | 1.47 | MDST | Tenas_Lithology.csv |
| T93R-05 | 68.27 | 71.02 | 2.75 | SST | Tenas_Lithology.csv |
| T93R-05 | 71.02 | 77.8 | 6.78 | MDST | Tenas_Lithology.csv |
| T93R-05 | 77.8 | 78.03 | 0.23 | COAL | Tenas_Lithology.csv |
| T93R-05 | 78.03 | 79.39 | 1.36 | MDST | Tenas_Lithology.csv |
| T93R-05 | 79.39 | 80.08 | 0.69 | COAL | Tenas_Lithology.csv |
| T93R-05 | 80.08 | 81.05 | 0.97 | SLTS | Tenas_Lithology.csv |
| T93R-05 | 81.05 | 81.3 | 0.25 | COAL | Tenas_Lithology.csv |
| T93R-05 | 81.3 | 83.14 | 1.84 | SLTS | Tenas_Lithology.csv |
| T93R-05 | 83.14 | 83.5 | 0.36 | COAL | Tenas_Lithology.csv |
| T93R-05 | 83.5 | 85.32 | 1.82 | SLTS | Tenas_Lithology.csv |
| T93R-05 | 85.32 | 85.59 | 0.27 | COAL | Tenas_Lithology.csv |
| T93R-05 | 85.59 | 92.4 | 6.81 | SLTS | Tenas_Lithology.csv |
| T93R-06C | 0 | 1.23 | 1.23 | Overburden | Tenas_Lithology.csv |
| T93R-06C | 1.23 | 4.84 | 3.61 | MDST | Tenas_Lithology.csv |
| T93R-06C | 4.84 | 5.38 | 0.54 | COAL | Tenas_Lithology.csv |
| T93R-06C | 5.38 | 8.58 | 3.2 | MDST | Tenas_Lithology.csv |
| T93R-06C | 8.58 | 8.79 | 0.21 | COAL | Tenas_Lithology.csv |
| T93R-06C | 8.79 | 10.28 | 1.49 | MDST | Tenas_Lithology.csv |
| T93R-06C | 10.28 | 11.88 | 1.6 | COAL | Tenas_Lithology.csv |
| T93R-06C | 11.88 | 18.55 | 6.67 | MDST | Tenas_Lithology.csv |
| T93R-06C | 18.55 | 18.83 | 0.28 | COAL | Tenas_Lithology.csv |
| T93R-06C | 18.83 | 21.01 | 2.18 | MDST | Tenas_Lithology.csv |
| T93R-06C | 21.01 | 22.88 | 1.87 | COAL | Tenas_Lithology.csv |
| T93R-06C | 22.88 | 23.9 | 1.02 | MDST | Tenas_Lithology.csv |
| T93R-06C | 23.9 | 27.07 | 3.17 | COAL | Tenas_Lithology.csv |
| T93R-06C | 27.07 | 27.43 | 0.36 | MDST | Tenas_Lithology.csv |
| T93R-06C | 27.43 | 27.93 | 0.5 | COAL | Tenas_Lithology.csv |
| T93R-06C | 27.93 | 29.07 | 1.14 | MDST | Tenas_Lithology.csv |
| T93R-06C | 29.07 | 29.47 | 0.4 | COAL | Tenas_Lithology.csv |
| T93R-06C | 29.47 | 36.75 | 7.28 | MDST | Tenas_Lithology.csv |
| T93R-06C | 36.75 | 37.18 | 0.43 | COAL | Tenas_Lithology.csv |
| T93R-06C | 37.18 | 44 | 6.82 | MDST | Tenas_Lithology.csv |
| T93R-06C | 44 | 44.28 | 0.28 | COAL | Tenas_Lithology.csv |
| T93R-06C | 44.28 | 50.3 | 6.02 | MDST | Tenas_Lithology.csv |
| T93R-06C | 50.3 | 51.21 | 0.91 | SLTS | Tenas_Lithology.csv |
| T93R-06C | 51.21 | 55.8 | 4.59 | SST | Tenas_Lithology.csv |
| T93R-08C | 0 | 1.84 | 1.84 | Overburden | Tenas_Lithology.csv |
| T93R-08C | 1.84 | 3.13 | 1.29 | MDST | Tenas_Lithology.csv |
| T93R-08C | 3.13 | 4.63 | 1.5 | COAL | Tenas_Lithology.csv |
| T93R-08C | 4.63 | 8.56 | 3.93 | SLTS | Tenas_Lithology.csv |
| T93R-08C | 8.56 | 10.62 | 2.06 | COAL | Tenas_Lithology.csv |
| T93R-08C | 10.62 | 11.42 | 0.8 | MDST | Tenas_Lithology.csv |
| T93R-08C | 11.42 | 12.43 | 1.01 | COAL | Tenas_Lithology.csv |
| T93R-08C | 12.43 | 14.15 | 1.72 | MDST | Tenas_Lithology.csv |
| T93R-08C | 14.15 | 14.9 | 0.75 | COAL | Tenas_Lithology.csv |
| T93R-08C | 14.9 | 16.57 | 1.67 | SLTS | Tenas_Lithology.csv |
| T93R-08C | 16.57 | 17.16 | 0.59 | COAL | Tenas_Lithology.csv |
| T93R-08C | 17.16 | 18.64 | 1.48 | MDST | Tenas_Lithology.csv |
| T93R-08C | 18.64 | 18.95 | 0.31 | COAL | Tenas_Lithology.csv |
| T93R-08C | 18.95 | 26.46 | 7.51 | SLTS | Tenas_Lithology.csv |
| T93R-08C | 26.46 | 27.01 | 0.55 | COAL | Tenas_Lithology.csv |
| T93R-08C | 27.01 | 27.72 | 0.71 | SST | Tenas_Lithology.csv |
| T93R-08C | 27.72 | 28.27 | 0.55 | COAL | Tenas_Lithology.csv |
| T93R-08C | 28.27 | 43 | 14.73 | SST | Tenas_Lithology.csv |
| T93R-09 | 0 | 1.23 | 1.23 | Overburden | Tenas_Lithology.csv |
| T93R-09 | 1.23 | 4.27 | 3.04 | MDST | Tenas_Lithology.csv |
| T93R-09 | 4.27 | 7.01 | 2.74 | SST | Tenas_Lithology.csv |
| T93R-09 | 7.01 | 15.54 | 8.53 | MDST | Tenas_Lithology.csv |
| T93R-09 | 15.54 | 21.03 | 5.49 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 21.03 | 23.77 | 2.74 | MDST | Tenas_Lithology.csv |
| T93R-09 | 23.77 | 26.52 | 2.75 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 26.52 | 42.37 | 15.85 | MDST | Tenas_Lithology.csv |
| T93R-09 | 42.37 | 50.29 | 7.92 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 50.29 | 60.65 | 10.36 | MDST | Tenas_Lithology.csv |
| T93R-09 | 60.65 | 63.4 | 2.75 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 63.4 | 67.66 | 4.26 | SST | Tenas_Lithology.csv |
| T93R-09 | 67.66 | 71.63 | 3.97 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 71.63 | 75.9 | 4.27 | MDST | Tenas_Lithology.csv |
| T93R-09 | 75.9 | 77.72 | 1.82 | SST | Tenas_Lithology.csv |
| T93R-09 | 77.72 | 83.21 | 5.49 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 83.21 | 88.7 | 5.49 | MDST | Tenas_Lithology.csv |
| T93R-09 | 88.7 | 92.05 | 3.35 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 92.05 | 94.18 | 2.13 | MDST | Tenas_Lithology.csv |
| T93R-09 | 94.18 | 106.37 | 12.19 | SST | Tenas_Lithology.csv |
| T93R-09 | 106.37 | 111.56 | 5.19 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T93R-09 | 111.56 | 126.65 | 15.09 | MDST | Tenas_Lithology.csv |
| T93R-09 | 126.65 | 127.46 | 0.81 | COAL | Tenas_Lithology.csv |
| T93R-09 | 127.46 | 132.13 | 4.67 | MDST | Tenas_Lithology.csv |
| T93R-09 | 132.13 | 132.56 | 0.43 | COAL | Tenas_Lithology.csv |
| T93R-09 | 132.56 | 137.77 | 5.21 | MDST | Tenas_Lithology.csv |
| T93R-09 | 137.77 | 140.21 | 2.44 | SST | Tenas_Lithology.csv |
| T93R-09 | 140.21 | 141.43 | 1.22 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 141.43 | 147.22 | 5.79 | SST | Tenas_Lithology.csv |
| T93R-09 | 147.22 | 148.13 | 0.91 | MDST | Tenas_Lithology.csv |
| T93R-09 | 148.13 | 157.58 | 9.45 | SST | Tenas_Lithology.csv |
| T93R-09 | 157.58 | 164.59 | 7.01 | MDST | Tenas_Lithology.csv |
| T93R-09 | 164.59 | 171.3 | 6.71 | SST | Tenas_Lithology.csv |
| T93R-10 | 0 | 3.36 | 3.36 | Overburden | Tenas_Lithology.csv |
| T93R-10 | 3.36 | 28.78 | 25.42 | SST | Tenas_Lithology.csv |
| T93R-10 | 28.78 | 29.65 | 0.87 | COAL | Tenas_Lithology.csv |
| T93R-10 | 29.65 | 32.58 | 2.93 | SLTS | Tenas_Lithology.csv |
| T93R-10 | 32.58 | 33.22 | 0.64 | COAL | Tenas_Lithology.csv |
| T93R-10 | 33.22 | 35.4 | 2.18 | MDST | Tenas_Lithology.csv |
| T93R-10 | 35.4 | 36.1 | 0.7 | COAL | Tenas_Lithology.csv |
| T93R-10 | 36.1 | 53.34 | 17.24 | SLTS | Tenas_Lithology.csv |
| T93R-10 | 53.34 | 61 | 7.66 | VOLC | Tenas_Lithology.csv |
| T93R-12 | 0 | 15.56 | 15.56 | Overburden | Tenas_Lithology.csv |
| T93R-12 | 15.56 | 24.08 | 8.52 | MDST | Tenas_Lithology.csv |
| T93R-12 | 24.08 | 29.26 | 5.18 | SLTS | Tenas_Lithology.csv |
| T93R-12 | 29.26 | 32.61 | 3.35 | MDST | Tenas_Lithology.csv |
| T93R-12 | 32.61 | 35.97 | 3.36 | SLTS | Tenas_Lithology.csv |
| T93R-12 | 35.97 | 65.53 | 29.56 | MDST | Tenas_Lithology.csv |
| T93R-12 | 65.53 | 67.38 | 1.85 | SLTS | Tenas_Lithology.csv |
| T93R-12 | 67.38 | 68.12 | 0.74 | COAL | Tenas_Lithology.csv |
| T93R-12 | 68.12 | 72.85 | 4.73 | MDST | Tenas_Lithology.csv |
| T93R-12 | 72.85 | 73.65 | 0.8 | COAL | Tenas_Lithology.csv |
| T93R-12 | 73.65 | 76.02 | 2.37 | MDST | Tenas_Lithology.csv |
| T93R-12 | 76.02 | 76.25 | 0.23 | COAL | Tenas_Lithology.csv |
| T93R-12 | 76.25 | 78.77 | 2.52 | MDST | Tenas_Lithology.csv |
| T93R-12 | 78.77 | 80.8 | 2.03 | COAL | Tenas_Lithology.csv |
| T93R-12 | 80.8 | 89.61 | 8.81 | MDST | Tenas_Lithology.csv |
| T93R-12 | 89.61 | 91.44 | 1.83 | SST | Tenas_Lithology.csv |
| T93R-12 | 91.44 | 92.7 | 1.26 | MDST | Tenas_Lithology.csv |
| T93R-12 | 92.7 | 93.05 | 0.35 | COAL | Tenas_Lithology.csv |
| T93R-12 | 93.05 | 100.31 | 7.26 | SLTS | Tenas_Lithology.csv |
| T93R-12 | 100.31 | 108.29 | 7.98 | COAL | Tenas_Lithology.csv |
| T93R-12 | 108.29 | 113 | 4.71 | MDST | Tenas_Lithology.csv |
| T93R-12 | 113 | 113.52 | 0.52 | COAL | Tenas_Lithology.csv |
| T93R-12 | 113.52 | 113.97 | 0.45 | MDST | Tenas_Lithology.csv |
| T93R-12 | 113.97 | 114.7 | 0.73 | COAL | Tenas_Lithology.csv |
| T93R-12 | 114.7 | 116.2 | 1.5 | MDST | Tenas_Lithology.csv |
| T93R-12 | 116.2 | 116.85 | 0.65 | COAL | Tenas_Lithology.csv |
| T93R-12 | 116.85 | 120.85 | 4 | MDST | Tenas_Lithology.csv |
| T93R-12 | 120.85 | 121.9 | 1.05 | COAL | Tenas_Lithology.csv |
| T93R-12 | 121.9 | 121.96 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-12 | 121.96 | 122.77 | 0.81 | COAL | Tenas_Lithology.csv |
| T93R-12 | 122.77 | 122.87 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-12 | 122.87 | 123.57 | 0.7 | COAL | Tenas_Lithology.csv |
| T93R-12 | 123.57 | 128.9 | 5.33 | MDST | Tenas_Lithology.csv |
| T93R-13 | 0 | 23.81 | 23.81 | Overburden | Tenas_Lithology.csv |
| T93R-13 | 23.81 | 28.04 | 4.23 | MDST | Tenas_Lithology.csv |
| T93R-13 | 28.04 | 36.58 | 8.54 | SLTS | Tenas_Lithology.csv |
| T93R-13 | 36.58 | 59.13 | 22.55 | MDST | Tenas_Lithology.csv |
| T93R-13 | 59.13 | 60.05 | 0.92 | SLTS | Tenas_Lithology.csv |
| T93R-13 | 60.05 | 64 | 3.95 | MDST | Tenas_Lithology.csv |
| T93R-13 | 64 | 140.8 | 76.8 | VOLC | Tenas_Lithology.csv |
| T93R-14 | 0 | 3.67 | 3.67 | Overburden | Tenas_Lithology.csv |
| T93R-14 | 3.67 | 13.41 | 9.74 | VOLC | Tenas_Lithology.csv |
| T93R-14 | 13.41 | 39.62 | 26.21 | SLTS | Tenas_Lithology.csv |
| T93R-14 | 39.62 | 49.68 | 10.06 | SST | Tenas_Lithology.csv |
| T93R-14 | 49.68 | 54.25 | 4.57 | VOLC | Tenas_Lithology.csv |
| T93R-14 | 54.25 | 57.91 | 3.66 | SST | Tenas_Lithology.csv |
| T93R-14 | 57.91 | 71.63 | 13.72 | VOLC | Tenas_Lithology.csv |
| T93R-14 | 71.63 | 79.86 | 8.23 | SST | Tenas_Lithology.csv |
| T93R-14 | 79.86 | 110 | 30.14 | VOLC | Tenas_Lithology.csv |
| T93R-15 | 0 | 0.13 | 0.13 | Overburden | Tenas_Lithology.csv |
| T93R-16 | 0 | 11.1 | 11.1 | Overburden | Tenas_Lithology.csv |
| T93R-17 | 0 | 3.97 | 3.97 | Overburden | Tenas_Lithology.csv |
| T93R-17 | 3.97 | 26.21 | 22.24 | MDST | Tenas_Lithology.csv |
| T93R-17 | 26.21 | 27.43 | 1.22 | SST | Tenas_Lithology.csv |
| T93R-17 | 27.43 | 43.89 | 16.46 | MDST | Tenas_Lithology.csv |
| T93R-17 | 43.89 | 49.07 | 5.18 | SLTS | Tenas_Lithology.csv |
| T93R-17 | 49.07 | 51.51 | 2.44 | MDST | Tenas_Lithology.csv |
| T93R-17 | 51.51 | 56.08 | 4.57 | SLTS | Tenas_Lithology.csv |
| T93R-17 | 56.08 | 63.7 | 7.62 | SST | Tenas_Lithology.csv |
| T93R-17 | 63.7 | 68.88 | 5.18 | SLTS | Tenas_Lithology.csv |
| T93R-17 | 68.88 | 75.9 | 7.02 | MDST | Tenas_Lithology.csv |
| T93R-17 | 75.9 | 77.41 | 1.51 | SST | Tenas_Lithology.csv |
| T93R-17 | 77.41 | 77.95 | 0.54 | MDST | Tenas_Lithology.csv |
| T93R-17 | 77.95 | 80.41 | 2.46 | COAL | Tenas_Lithology.csv |
| T93R-17 | 80.41 | 81.66 | 1.25 | MDST | Tenas_Lithology.csv |
| T93R-17 | 81.66 | 82.44 | 0.78 | COAL | Tenas_Lithology.csv |
| T93R-17 | 82.44 | 82.7 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-17 | 82.7 | 85.9 | 3.2 | COAL | Tenas_Lithology.csv |
| T93R-17 | 85.9 | 88.88 | 2.98 | MDST | Tenas_Lithology.csv |
| T93R-17 | 88.88 | 89 | 0.12 | COAL | Tenas_Lithology.csv |
| T93R-17 | 89 | 89.2 | 0.2 | MDST | Tenas_Lithology.csv |
| T93R-17 | 89.2 | 89.54 | 0.34 | COAL | Tenas_Lithology.csv |
| T93R-17 | 89.54 | 89.72 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-17 | 89.72 | 90.82 | 1.1 | COAL | Tenas_Lithology.csv |
| T93R-17 | 90.82 | 101.43 | 10.61 | SLTS | Tenas_Lithology.csv |
| T93R-17 | 101.43 | 102.27 | 0.84 | COAL | Tenas_Lithology.csv |
| T93R-17 | 102.27 | 103.14 | 0.87 | MDST | Tenas_Lithology.csv |
| T93R-17 | 103.14 | 103.61 | 0.47 | COAL | Tenas_Lithology.csv |
| T93R-17 | 103.61 | 107.01 | 3.4 | MDST | Tenas_Lithology.csv |
| T93R-17 | 107.01 | 107.3 | 0.29 | COAL | Tenas_Lithology.csv |
| T93R-17 | 107.3 | 123.75 | 16.45 | MDST | Tenas_Lithology.csv |
| T93R-17 | 123.75 | 128.9 | 5.15 | SST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T93R-18 | 0 | 25.08 | 25.08 | Overburden | Tenas_Lithology.csv |
| T93R-18 | 25.08 | 27.1 | 2.02 | n/a | Tenas_Lithology.csv |
| T93R-18 | 27.1 | 40.55 | 13.45 | MDST | Tenas_Lithology.csv |
| T93R-19 | 0 | 10.37 | 10.37 | Overburden | Tenas_Lithology.csv |
| T93R-19 | 10.37 | 122 | 111.63 | VOLC | Tenas_Lithology.csv |
| T93R-51 | 0 | 3.67 | 3.67 | Overburden | Tenas_Lithology.csv |
| T93R-51 | 3.67 | 13.5 | 9.83 | SLTS | Tenas_Lithology.csv |
| T93R-51 | 13.5 | 18.2 | 4.7 | SST | Tenas_Lithology.csv |
| T93R-51 | 18.2 | 19.3 | 1.1 | MDST | Tenas_Lithology.csv |
| T93R-51 | 19.3 | 21 | 1.7 | SST | Tenas_Lithology.csv |
| T93R-51 | 21 | 29.5 | 8.5 | MDST | Tenas_Lithology.csv |
| T93R-51 | 29.5 | 33.53 | 4.03 | SST | Tenas_Lithology.csv |
| T93R-51 | 33.53 | 36.6 | 3.07 | MDST | Tenas_Lithology.csv |
| T93R-51 | 36.6 | 40.5 | 3.9 | SLTS | Tenas_Lithology.csv |
| T93R-51 | 40.5 | 44.5 | 4 | MDST | Tenas_Lithology.csv |
| T93R-51 | 44.5 | 51.52 | 7.02 | SLTS | Tenas_Lithology.csv |
| T93R-51 | 51.52 | 71.3 | 19.78 | MDST | Tenas_Lithology.csv |
| T94R-01 | 0 | 3.06 | 3.06 | Overburden | Tenas_Lithology.csv |
| T94R-01 | 3.06 | 8.2 | 5.14 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 8.2 | 10.48 | 2.28 | MDST | Tenas_Lithology.csv |
| T94R-01 | 10.48 | 12.53 | 2.05 | COAL | Tenas_Lithology.csv |
| T94R-01 | 12.53 | 15.65 | 3.12 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 15.65 | 17.98 | 2.33 | COAL | Tenas_Lithology.csv |
| T94R-01 | 17.98 | 18.34 | 0.36 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-01 | 18.34 | 18.61 | 0.27 | COAL | Tenas_Lithology.csv |
| T94R-01 | 18.61 | 18.83 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-01 | 18.83 | 19.11 | 0.28 | COAL | Tenas_Lithology.csv |
| T94R-01 | 19.11 | 21 | 1.89 | MDST | Tenas_Lithology.csv |
| T94R-01 | 21 | 22.62 | 1.62 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 22.62 | 23.19 | 0.57 | COAL | Tenas_Lithology.csv |
| T94R-01 | 23.19 | 24.1 | 0.91 | MDST | Tenas_Lithology.csv |
| T94R-01 | 24.1 | 24.59 | 0.49 | COAL | Tenas_Lithology.csv |
| T94R-01 | 24.59 | 25.6 | 1.01 | MDST | Tenas_Lithology.csv |
| T94R-01 | 25.6 | 31.2 | 5.6 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 31.2 | 31.56 | 0.36 | COAL | Tenas_Lithology.csv |
| T94R-01 | 31.56 | 33.12 | 1.56 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 33.12 | 33.46 | 0.34 | COAL | Tenas_Lithology.csv |
| T94R-01 | 33.46 | 39.11 | 5.65 | SST | Tenas_Lithology.csv |
| T94R-01 | 39.11 | 39.59 | 0.48 | COAL | Tenas_Lithology.csv |
| T94R-01 | 39.59 | 40.44 | 0.85 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 40.44 | 41.97 | 1.53 | MDST | Tenas_Lithology.csv |
| T94R-01 | 41.97 | 72 | 30.03 | SST | Tenas_Lithology.csv |
| T94R-01 | 72 | 74.25 | 2.25 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 74.25 | 74.66 | 0.41 | COAL | Tenas_Lithology.csv |
| T94R-01 | 74.66 | 75.76 | 1.1 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 75.76 | 76.2 | 0.44 | COAL | Tenas_Lithology.csv |
| T94R-01 | 76.2 | 76.4 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-01 | 76.4 | 76.98 | 0.58 | COAL | Tenas_Lithology.csv |
| T94R-01 | 76.98 | 77.51 | 0.53 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-01 | 77.51 | 77.96 | 0.45 | COAL | Tenas_Lithology.csv |
| T94R-01 | 77.96 | 83.8 | 5.84 | SLTS | Tenas_Lithology.csv |
| T94R-02 | 0 | 0.71 | 0.71 | Overburden | Tenas_Lithology.csv |
| T94R-02 | 0.71 | 37 | 36.29 | VOLC | Tenas_Lithology.csv |
| T94R-03 | 0 | 0.61 | 0.61 | Overburden | Tenas_Lithology.csv |
| T94R-03 | 0.61 | 1.5 | 0.89 | COAL | Tenas_Lithology.csv |
| T94R-03 | 1.5 | 4.15 | 2.65 | MDST | Tenas_Lithology.csv |
| T94R-03 | 4.15 | 8.61 | 4.46 | SST | Tenas_Lithology.csv |
| T94R-03 | 8.61 | 9.04 | 0.43 | COAL | Tenas_Lithology.csv |
| T94R-03 | 9.04 | 14.09 | 5.05 | SLTS | Tenas_Lithology.csv |
| T94R-03 | 14.09 | 19.41 | 5.32 | COAL | Tenas_Lithology.csv |
| T94R-03 | 19.41 | 20.4 | 0.99 | MDST | Tenas_Lithology.csv |
| T94R-03 | 20.4 | 20.75 | 0.35 | COAL | Tenas_Lithology.csv |
| T94R-03 | 20.75 | 21.12 | 0.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-03 | 21.12 | 21.87 | 0.75 | COAL | Tenas_Lithology.csv |
| T94R-03 | 21.87 | 23.2 | 1.33 | MDST | Tenas_Lithology.csv |
| T94R-03 | 23.2 | 23.59 | 0.39 | COAL | Tenas_Lithology.csv |
| T94R-03 | 23.59 | 25.8 | 2.21 | MDST | Tenas_Lithology.csv |
| T94R-03 | 25.8 | 28.84 | 3.04 | SLTS | Tenas_Lithology.csv |
| T94R-03 | 28.84 | 29.11 | 0.27 | COAL | Tenas_Lithology.csv |
| T94R-03 | 29.11 | 30.81 | 1.7 | SLTS | Tenas_Lithology.csv |
| T94R-03 | 30.81 | 31.19 | 0.38 | COAL | Tenas_Lithology.csv |
| T94R-03 | 31.19 | 38.5 | 7.31 | SST | Tenas_Lithology.csv |
| T94R-03 | 38.5 | 38.78 | 0.28 | COAL | Tenas_Lithology.csv |
| T94R-03 | 38.78 | 59.8 | 21.02 | SST | Tenas_Lithology.csv |
| T94R-03 | 59.8 | 71 | 11.2 | SLTS | Tenas_Lithology.csv |
| T94R-03 | 71 | 84.8 | 13.8 | SST | Tenas_Lithology.csv |
| T94R-04C | 0 | 9.91 | 9.91 | Overburden | Tenas_Lithology.csv |
| T94R-04C | 9.91 | 10.97 | 1.06 | MDST | Tenas_Lithology.csv |
| T94R-04C | 10.97 | 13.77 | 2.8 | SST | Tenas_Lithology.csv |
| T94R-04C | 13.77 | 15.2 | 1.43 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 15.2 | 17.77 | 2.57 | MDST | Tenas_Lithology.csv |
| T94R-04C | 17.77 | 24.2 | 6.43 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 24.2 | 30.85 | 6.65 | SST | Tenas_Lithology.csv |
| T94R-04C | 30.85 | 32.2 | 1.35 | MDST | Tenas_Lithology.csv |
| T94R-04C | 32.2 | 33.09 | 0.89 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 33.09 | 33.33 | 0.24 | COAL | Tenas_Lithology.csv |
| T94R-04C | 33.33 | 36.1 | 2.77 | MDST | Tenas_Lithology.csv |
| T94R-04C | 36.1 | 36.12 | 0.02 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 36.12 | 37.5 | 1.38 | MDST | Tenas_Lithology.csv |
| T94R-04C | 37.5 | 37.79 | 0.29 | COAL | Tenas_Lithology.csv |
| T94R-04C | 37.79 | 40.44 | 2.65 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 40.44 | 42.38 | 1.94 | COAL | Tenas_Lithology.csv |
| T94R-04C | 42.38 | 43.28 | 0.9 | MDST | Tenas_Lithology.csv |
| T94R-04C | 43.28 | 49.4 | 6.12 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 49.4 | 49.76 | 0.36 | COAL | Tenas_Lithology.csv |
| T94R-04C | 49.76 | 53.95 | 4.19 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 53.95 | 55.8 | 1.85 | COAL | Tenas_Lithology.csv |
| T94R-04C | 55.8 | 56.36 | 0.56 | MDST | Tenas_Lithology.csv |
| T94R-04C | 56.36 | 60.17 | 3.81 | COAL | Tenas_Lithology.csv |
| T94R-04C | 60.17 | 62.16 | 1.99 | MDST | Tenas_Lithology.csv |
| T94R-04C | 62.16 | 62.64 | 0.48 | COAL | Tenas_Lithology.csv |
| T94R-04C | 62.64 | 62.85 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-04C | 62.85 | 63.05 | 0.2 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T94R-04C | 63.05 | 65.5 | 2.45 | MDST | Tenas_Lithology.csv |
| T94R-04C | 65.5 | 69 | 3.5 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 69 | 69.25 | 0.25 | COAL | Tenas_Lithology.csv |
| T94R-04C | 69.25 | 70.63 | 1.38 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 70.63 | 70.8 | 0.17 | COAL | Tenas_Lithology.csv |
| T94R-04C | 70.8 | 73.65 | 2.85 | SST | Tenas_Lithology.csv |
| T94R-04C | 73.65 | 73.82 | 0.17 | COAL | Tenas_Lithology.csv |
| T94R-04C | 73.82 | 74.7 | 0.88 | SST | Tenas_Lithology.csv |
| T94R-05 | 0 | 3.97 | 3.97 | Overburden | Tenas_Lithology.csv |
| T94R-05 | 3.97 | 8.5 | 4.53 | MDST | Tenas_Lithology.csv |
| T94R-05 | 8.5 | 14 | 5.5 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 14 | 38.4 | 24.4 | SST | Tenas_Lithology.csv |
| T94R-05 | 38.4 | 49.5 | 11.1 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 49.5 | 58.68 | 9.18 | SST | Tenas_Lithology.csv |
| T94R-05 | 58.68 | 59.03 | 0.35 | COAL | Tenas_Lithology.csv |
| T94R-05 | 59.03 | 64.2 | 5.17 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 64.2 | 70.56 | 6.36 | SST | Tenas_Lithology.csv |
| T94R-05 | 70.56 | 71.62 | 1.06 | COAL | Tenas_Lithology.csv |
| T94R-05 | 71.62 | 79.31 | 7.69 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 79.31 | 79.57 | 0.26 | COAL | Tenas_Lithology.csv |
| T94R-05 | 79.57 | 82.35 | 2.78 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 82.35 | 82.79 | 0.44 | COAL | Tenas_Lithology.csv |
| T94R-05 | 82.79 | 84.85 | 2.06 | MDST | Tenas_Lithology.csv |
| T94R-05 | 84.85 | 85.52 | 0.67 | COAL | Tenas_Lithology.csv |
| T94R-05 | 85.52 | 86.46 | 0.94 | MDST | Tenas_Lithology.csv |
| T94R-05 | 86.46 | 86.86 | 0.4 | COAL | Tenas_Lithology.csv |
| T94R-05 | 86.86 | 88.26 | 1.4 | SST | Tenas_Lithology.csv |
| T94R-05 | 88.26 | 88.91 | 0.65 | COAL | Tenas_Lithology.csv |
| T94R-05 | 88.91 | 90.5 | 1.59 | SST | Tenas_Lithology.csv |
| T94R-05 | 90.5 | 91.33 | 0.83 | COAL | Tenas_Lithology.csv |
| T94R-05 | 91.33 | 92.3 | 0.97 | CGL | Tenas_Lithology.csv |
| T94R-05 | 92.3 | 93.53 | 1.23 | SST | Tenas_Lithology.csv |
| T94R-05 | 93.53 | 94.21 | 0.68 | COAL | Tenas_Lithology.csv |
| T94R-05 | 94.21 | 97 | 2.79 | SST | Tenas_Lithology.csv |
| T94R-05 | 97 | 108 | 11 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 108 | 113.4 | 5.4 | SST | Tenas_Lithology.csv |
| T94R-05 | 113.4 | 114.6 | 1.2 | CGL | Tenas_Lithology.csv |
| T94R-05 | 114.6 | 116.46 | 1.86 | MDST | Tenas_Lithology.csv |
| T94R-05 | 116.46 | 121.6 | 5.14 | SST | Tenas_Lithology.csv |
| T94R-06 | 0 | 1.51 | 1.51 | Overburden | Tenas_Lithology.csv |
| T94R-06 | 1.51 | 69 | 67.49 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 69 | 70.6 | 1.6 | SST | Tenas_Lithology.csv |
| T94R-06 | 70.6 | 75.7 | 5.1 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 75.7 | 80.1 | 4.4 | MDST | Tenas_Lithology.csv |
| T94R-06 | 80.1 | 81.3 | 1.2 | SST | Tenas_Lithology.csv |
| T94R-06 | 81.3 | 84.5 | 3.2 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 84.5 | 92.5 | 8 | MDST | Tenas_Lithology.csv |
| T94R-06 | 92.5 | 96.2 | 3.7 | SST | Tenas_Lithology.csv |
| T94R-06 | 96.2 | 102.6 | 6.4 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 102.6 | 105 | 2.4 | MDST | Tenas_Lithology.csv |
| T94R-06 | 105 | 128.3 | 23.3 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 128.3 | 133.5 | 5.2 | SST | Tenas_Lithology.csv |
| T94R-06 | 133.5 | 135 | 1.5 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 135 | 135.14 | 0.14 | COAL | Tenas_Lithology.csv |
| T94R-06 | 135.14 | 137.8 | 2.66 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 137.8 | 140 | 2.2 | SST | Tenas_Lithology.csv |
| T94R-06 | 140 | 141.74 | 1.74 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 141.74 | 142.13 | 0.39 | COAL | Tenas_Lithology.csv |
| T94R-06 | 142.13 | 144.12 | 1.99 | MDST | Tenas_Lithology.csv |
| T94R-06 | 144.12 | 144.58 | 0.46 | COAL | Tenas_Lithology.csv |
| T94R-06 | 144.58 | 145.61 | 1.03 | MDST | Tenas_Lithology.csv |
| T94R-06 | 145.61 | 145.9 | 0.29 | COAL | Tenas_Lithology.csv |
| T94R-06 | 145.9 | 147.06 | 1.16 | MDST | Tenas_Lithology.csv |
| T94R-06 | 147.06 | 147.32 | 0.26 | COAL | Tenas_Lithology.csv |
| T94R-06 | 147.32 | 150.56 | 3.24 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 150.56 | 150.88 | 0.32 | COAL | Tenas_Lithology.csv |
| T94R-06 | 150.88 | 151.94 | 1.06 | SST | Tenas_Lithology.csv |
| T94R-06 | 151.94 | 152.21 | 0.27 | COAL | Tenas_Lithology.csv |
| T94R-06 | 152.21 | 152.22 | 0.01 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 0 | 6.11 | 6.11 | Overburden | Tenas_Lithology.csv |
| T94R-07 | 6.11 | 54.5 | 48.39 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 54.5 | 62.5 | 8 | SST | Tenas_Lithology.csv |
| T94R-07 | 62.5 | 63.1 | 0.6 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 63.1 | 63.22 | 0.12 | COAL | Tenas_Lithology.csv |
| T94R-07 | 63.22 | 64.56 | 1.34 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 64.56 | 64.68 | 0.12 | COAL | Tenas_Lithology.csv |
| T94R-07 | 64.68 | 66.5 | 1.82 | MDST | Tenas_Lithology.csv |
| T94R-07 | 66.5 | 79.28 | 12.78 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 79.28 | 80.52 | 1.24 | COAL | Tenas_Lithology.csv |
| T94R-07 | 80.52 | 89.65 | 9.13 | MDST | Tenas_Lithology.csv |
| T94R-07 | 89.65 | 90.01 | 0.36 | COAL | Tenas_Lithology.csv |
| T94R-07 | 90.01 | 96.37 | 6.36 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 96.37 | 102.27 | 5.9 | COAL | Tenas_Lithology.csv |
| T94R-07 | 102.27 | 107.23 | 4.96 | MDST | Tenas_Lithology.csv |
| T94R-07 | 107.23 | 108.36 | 1.13 | COAL | Tenas_Lithology.csv |
| T94R-07 | 108.36 | 109.7 | 1.34 | MDST | Tenas_Lithology.csv |
| T94R-07 | 109.7 | 110.27 | 0.57 | COAL | Tenas_Lithology.csv |
| T94R-07 | 110.27 | 114.86 | 4.59 | MDST | Tenas_Lithology.csv |
| T94R-07 | 114.86 | 115.43 | 0.57 | COAL | Tenas_Lithology.csv |
| T94R-07 | 115.43 | 116.52 | 1.09 | MDST | Tenas_Lithology.csv |
| T94R-07 | 116.52 | 117.11 | 0.59 | COAL | Tenas_Lithology.csv |
| T94R-07 | 117.11 | 117.72 | 0.61 | MDST | Tenas_Lithology.csv |
| T94R-07 | 117.72 | 118 | 0.28 | COAL | Tenas_Lithology.csv |
| T94R-07 | 118 | 119.69 | 1.69 | MDST | Tenas_Lithology.csv |
| T94R-07 | 119.69 | 120.19 | 0.5 | COAL | Tenas_Lithology.csv |
| T94R-07 | 120.19 | 120.9 | 0.71 | SLTS | Tenas_Lithology.csv |
| T94R-08 | 0 | 17.68 | 17.68 | Overburden | Tenas_Lithology.csv |
| T94R-08 | 17.68 | 21.7 | 4.02 | SST | Tenas_Lithology.csv |
| T94R-08 | 21.7 | 54.5 | 32.8 | MDST | Tenas_Lithology.csv |
| T94R-08 | 54.5 | 106.4 | 51.9 | SLTS | Tenas_Lithology.csv |
| T94R-08 | 106.4 | 113.14 | 6.74 | MDST | Tenas_Lithology.csv |
| T94R-08 | 113.14 | 113.79 | 0.65 | COAL | Tenas_Lithology.csv |
| T94R-08 | 113.79 | 123.8 | 10.01 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T94R-08 | 123.8 | 124.17 | 0.37 | COAL | Tenas_Lithology.csv |
| T94R-08 | 124.17 | 132.4 | 8.23 | MDST | Tenas_Lithology.csv |
| T94R-08 | 132.4 | 138.3 | 5.9 | SLTS | Tenas_Lithology.csv |
| T94R-08 | 138.3 | 144.5 | 6.2 | SST | Tenas_Lithology.csv |
| T94R-09 | 0 | 56.39 | 56.39 | Overburden | Tenas_Lithology.csv |
| T94R-09 | 56.39 | 92.29 | 35.9 | CGL | Tenas_Lithology.csv |
| T94R-09 | 92.29 | 146.66 | 54.37 | VOLC | Tenas_Lithology.csv |
| T94R-10C | 0 | 6.11 | 6.11 | Overburden | Tenas_Lithology.csv |
| T94R-10C | 6.11 | 42.9 | 36.79 | MDST | Tenas_Lithology.csv |
| T94R-10C | 42.9 | 45.73 | 2.83 | SLTS | Tenas_Lithology.csv |
| T94R-10C | 45.73 | 46.34 | 0.61 | COAL | Tenas_Lithology.csv |
| T94R-10C | 46.34 | 49.33 | 2.99 | MDST | Tenas_Lithology.csv |
| T94R-10C | 49.33 | 49.96 | 0.63 | COAL | Tenas_Lithology.csv |
| T94R-10C | 49.96 | 54.53 | 4.57 | MDST | Tenas_Lithology.csv |
| T94R-10C | 54.53 | 56.36 | 1.83 | COAL | Tenas_Lithology.csv |
| T94R-10C | 56.36 | 71.15 | 14.79 | MDST | Tenas_Lithology.csv |
| T94R-10C | 71.15 | 73.66 | 2.51 | COAL | Tenas_Lithology.csv |
| T94R-10C | 73.66 | 74.94 | 1.28 | MDST | Tenas_Lithology.csv |
| T94R-10C | 74.94 | 79.05 | 4.11 | COAL | Tenas_Lithology.csv |
| T94R-10C | 79.05 | 81.51 | 2.46 | MDST | Tenas_Lithology.csv |
| T94R-10C | 81.51 | 82.6 | 1.09 | COAL | Tenas_Lithology.csv |
| T94R-10C | 82.6 | 84.08 | 1.48 | MDST | Tenas_Lithology.csv |
| T94R-10C | 84.08 | 84.52 | 0.44 | COAL | Tenas_Lithology.csv |
| T94R-10C | 84.52 | 89.6 | 5.08 | MDST | Tenas_Lithology.csv |
| T94R-11 | 0 | 67 | 67 | Overburden | Tenas_Lithology.csv |
| T94R-11 | 67 | 71.48 | 4.48 | VOLC | Tenas_Lithology.csv |
| T94R-12 | 0 | 19.51 | 19.51 | Overburden | Tenas_Lithology.csv |
| T94R-12 | 19.51 | 38.05 | 18.54 | MDST | Tenas_Lithology.csv |
| T94R-12 | 38.05 | 38.42 | 0.37 | COAL | Tenas_Lithology.csv |
| T94R-12 | 38.42 | 40.74 | 2.32 | MDST | Tenas_Lithology.csv |
| T94R-12 | 40.74 | 42.81 | 2.07 | COAL | Tenas_Lithology.csv |
| T94R-12 | 42.81 | 53.48 | 10.67 | MDST | Tenas_Lithology.csv |
| T94R-12 | 53.48 | 54.02 | 0.54 | COAL | Tenas_Lithology.csv |
| T94R-12 | 54.02 | 56.09 | 2.07 | MDST | Tenas_Lithology.csv |
| T94R-12 | 56.09 | 56.21 | 0.12 | COAL | Tenas_Lithology.csv |
| T94R-12 | 56.21 | 69.7 | 13.49 | MDST | Tenas_Lithology.csv |
| T94R-12 | 69.7 | 73.2 | 3.5 | SST | Tenas_Lithology.csv |
| T94R-12 | 73.2 | 94.8 | 21.6 | VOLC | Tenas_Lithology.csv |
| T94R-13 | 0 | 2.14 | 2.14 | Overburden | Tenas_Lithology.csv |
| T94R-13 | 2.14 | 41.9 | 39.76 | VOLC | Tenas_Lithology.csv |
| T95R-06 | 0 | 92.9 | 92.9 | Overburden | Tenas_Lithology.csv |
| T95R-06 | 92.9 | 116 | 23.1 | VOLC | Tenas_Lithology.csv |
| T95R-07C | 0 | 6.4 | 6.4 | Overburden | Tenas_Lithology.csv |
| T95R-07C | 6.4 | 6.95 | 0.55 | MDST | Tenas_Lithology.csv |
| T95R-07C | 6.95 | 7.57 | 0.62 | COAL | Tenas_Lithology.csv |
| T95R-07C | 7.57 | 10.94 | 3.37 | MDST | Tenas_Lithology.csv |
| T95R-07C | 10.94 | 13.01 | 2.07 | COAL | Tenas_Lithology.csv |
| T95R-07C | 13.01 | 19.5 | 6.49 | MDST | Tenas_Lithology.csv |
| T95R-07C | 19.5 | 19.85 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-07C | 19.85 | 23.59 | 3.74 | MDST | Tenas_Lithology.csv |
| T95R-07C | 23.59 | 28.94 | 5.35 | COAL | Tenas_Lithology.csv |
| T95R-07C | 28.94 | 30.22 | 1.28 | MDST | Tenas_Lithology.csv |
| T95R-07C | 30.22 | 30.7 | 0.48 | COAL | Tenas_Lithology.csv |
| T95R-07C | 30.7 | 30.83 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-07C | 30.83 | 31.14 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-07C | 31.14 | 32.12 | 0.98 | MDST | Tenas_Lithology.csv |
| T95R-07C | 32.12 | 32.59 | 0.47 | COAL | Tenas_Lithology.csv |
| T95R-07C | 32.59 | 33.69 | 1.1 | MDST | Tenas_Lithology.csv |
| T95R-07C | 33.69 | 34.11 | 0.42 | COAL | Tenas_Lithology.csv |
| T95R-07C | 34.11 | 34.62 | 0.51 | MDST | Tenas_Lithology.csv |
| T95R-07C | 34.62 | 34.8 | 0.18 | COAL | Tenas_Lithology.csv |
| T95R-07C | 34.8 | 37.83 | 3.03 | MDST | Tenas_Lithology.csv |
| T95R-07C | 37.83 | 38.39 | 0.56 | COAL | Tenas_Lithology.csv |
| T95R-07C | 38.39 | 39.2 | 0.81 | MDST | Tenas_Lithology.csv |
| T95R-07C | 39.2 | 39.91 | 0.71 | COAL | Tenas_Lithology.csv |
| T95R-07C | 39.91 | 47.88 | 7.97 | MDST | Tenas_Lithology.csv |
| T95R-07C | 47.88 | 48.23 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-07C | 48.23 | 56 | 7.77 | MDST | Tenas_Lithology.csv |
| T95R-09 | 0 | 151.5 | 151.5 | Overburden | Tenas_Lithology.csv |
| T95R-09 | 151.5 | 153 | 1.5 | MDST | Tenas_Lithology.csv |
| T95R-09 | 153 | 156 | 3 | Overburden | Tenas_Lithology.csv |
| T95R-10 | 0 | 22.36 | 22.36 | Overburden | Tenas_Lithology.csv |
| T95R-10 | 22.36 | 24.4 | 2.04 | COAL | Tenas_Lithology.csv |
| T95R-10 | 24.4 | 26.7 | 2.3 | MDST | Tenas_Lithology.csv |
| T95R-10 | 26.7 | 27.15 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-10 | 27.15 | 27.89 | 0.74 | MDST | Tenas_Lithology.csv |
| T95R-10 | 27.89 | 28.33 | 0.44 | COAL | Tenas_Lithology.csv |
| T95R-10 | 28.33 | 36.05 | 7.72 | MDST | Tenas_Lithology.csv |
| T95R-10 | 36.05 | 37.9 | 1.85 | COAL | Tenas_Lithology.csv |
| T95R-10 | 37.9 | 38.66 | 0.76 | MDST | Tenas_Lithology.csv |
| T95R-10 | 38.66 | 38.98 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-10 | 38.98 | 51.31 | 12.33 | MDST | Tenas_Lithology.csv |
| T95R-10 | 51.31 | 51.7 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-10 | 51.7 | 53.85 | 2.15 | MDST | Tenas_Lithology.csv |
| T95R-10 | 53.85 | 54.2 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-10 | 54.2 | 63 | 8.8 | SLTS | Tenas_Lithology.csv |
| T95R-10 | 63 | 110.3 | 47.3 | SST | Tenas_Lithology.csv |
| T95R-10 | 110.3 | 138 | 27.7 | VOLC | Tenas_Lithology.csv |
| T95R-11 | 0 | 4.51 | 4.51 | Overburden | Tenas_Lithology.csv |
| T95R-11 | 4.51 | 22.95 | 18.44 | SLTS | Tenas_Lithology.csv |
| T95R-11 | 22.95 | 23.6 | 0.65 | COAL | Tenas_Lithology.csv |
| T95R-11 | 23.6 | 25.4 | 1.8 | MDST | Tenas_Lithology.csv |
| T95R-11 | 25.4 | 25.6 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-11 | 25.6 | 26.09 | 0.49 | MDST | Tenas_Lithology.csv |
| T95R-11 | 26.09 | 26.8 | 0.71 | COAL | Tenas_Lithology.csv |
| T95R-11 | 26.8 | 27.57 | 0.77 | MDST | Tenas_Lithology.csv |
| T95R-11 | 27.57 | 28.4 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-11 | 28.4 | 35.9 | 7.5 | MDST | Tenas_Lithology.csv |
| T95R-11 | 35.9 | 36 | 0.1 | COAL | Tenas_Lithology.csv |
| T95R-11 | 36 | 36.58 | 0.58 | MDST | Tenas_Lithology.csv |
| T95R-11 | 36.58 | 36.86 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-11 | 36.86 | 41.2 | 4.34 | SST | Tenas_Lithology.csv |
| T95R-11 | 41.2 | 41.63 | 0.43 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-11 | 41.63 | 43.42 | 1.79 | MDST | Tenas_Lithology.csv |
| T95R-11 | 43.42 | 43.66 | 0.24 | COAL | Tenas_Lithology.csv |
| T95R-11 | 43.66 | 55 | 11.34 | SLTS | Tenas_Lithology.csv |
| T95R-13 | 0 | 6.01 | 6.01 | Overburden | Tenas_Lithology.csv |
| T95R-13 | 6.01 | 30.3 | 24.29 | SLTS | Tenas_Lithology.csv |
| T95R-13 | 30.3 | 41.59 | 11.29 | MDST | Tenas_Lithology.csv |
| T95R-13 | 41.59 | 42.16 | 0.57 | COAL | Tenas_Lithology.csv |
| T95R-13 | 42.16 | 45 | 2.84 | MDST | Tenas_Lithology.csv |
| T95R-13 | 45 | 56.6 | 11.6 | SLTS | Tenas_Lithology.csv |
| T95R-13 | 56.6 | 56.9 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-13 | 56.9 | 60.65 | 3.75 | MDST | Tenas_Lithology.csv |
| T95R-13 | 60.65 | 62.64 | 1.99 | COAL | Tenas_Lithology.csv |
| T95R-13 | 62.64 | 63.6 | 0.96 | MDST | Tenas_Lithology.csv |
| T95R-13 | 63.6 | 67.32 | 3.72 | COAL | Tenas_Lithology.csv |
| T95R-13 | 67.32 | 69.7 | 2.38 | MDST | Tenas_Lithology.csv |
| T95R-13 | 69.7 | 71.3 | 1.6 | COAL | Tenas_Lithology.csv |
| T95R-13 | 71.3 | 73.3 | 2 | MDST | Tenas_Lithology.csv |
| T95R-13 | 73.3 | 73.6 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-13 | 73.6 | 78.65 | 5.05 | MDST | Tenas_Lithology.csv |
| T95R-13 | 78.65 | 79.4 | 0.75 | COAL | Tenas_Lithology.csv |
| T95R-13 | 79.4 | 81.82 | 2.42 | MDST | Tenas_Lithology.csv |
| T95R-13 | 81.82 | 82.36 | 0.54 | COAL | Tenas_Lithology.csv |
| T95R-13 | 82.36 | 85.12 | 2.76 | MDST | Tenas_Lithology.csv |
| T95R-13 | 85.12 | 85.33 | 0.21 | COAL | Tenas_Lithology.csv |
| T95R-13 | 85.33 | 91.1 | 5.77 | SLTS | Tenas_Lithology.csv |
| T95R-13 | 91.1 | 96 | 4.9 | SST | Tenas_Lithology.csv |
| T95R-13 | 96 | 105.3 | 9.3 | CGL | Tenas_Lithology.csv |
| T95R-14 | 0 | 9.01 | 9.01 | Overburden | Tenas_Lithology.csv |
| T95R-14 | 9.01 | 30 | 20.99 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 30 | 54.3 | 24.3 | MDST | Tenas_Lithology.csv |
| T95R-14 | 54.3 | 97.5 | 43.2 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 97.5 | 100.7 | 3.2 | SST | Tenas_Lithology.csv |
| T95R-14 | 100.7 | 105.6 | 4.9 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 105.6 | 109.7 | 4.1 | SST | Tenas_Lithology.csv |
| T95R-14 | 109.7 | 114.67 | 4.97 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 114.67 | 115.45 | 0.78 | COAL | Tenas_Lithology.csv |
| T95R-14 | 115.45 | 119.17 | 3.72 | MDST | Tenas_Lithology.csv |
| T95R-14 | 119.17 | 120.9 | 1.73 | COAL | Tenas_Lithology.csv |
| T95R-14 | 120.9 | 133.9 | 13 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 133.9 | 135.95 | 2.05 | COAL | Tenas_Lithology.csv |
| T95R-14 | 135.95 | 142.15 | 6.2 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 142.15 | 143.27 | 1.12 | COAL | Tenas_Lithology.csv |
| T95R-14 | 143.27 | 143.48 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-14 | 143.48 | 144.68 | 1.2 | COAL | Tenas_Lithology.csv |
| T95R-14 | 144.68 | 152.34 | 7.66 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 152.34 | 153.18 | 0.84 | COAL | Tenas_Lithology.csv |
| T95R-14 | 153.18 | 155.2 | 2.02 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 155.2 | 162.6 | 7.4 | CGL | Tenas_Lithology.csv |
| T95R-14 | 162.6 | 167 | 4.4 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 167 | 178 | 11 | SST | Tenas_Lithology.csv |
| T95R-15C | 0 | 6.51 | 6.51 | Overburden | Tenas_Lithology.csv |
| T95R-15C | 6.51 | 19.57 | 13.06 | SLTS | Tenas_Lithology.csv |
| T95R-15C | 19.57 | 27.84 | 8.27 | MDST | Tenas_Lithology.csv |
| T95R-15C | 27.84 | 29.91 | 2.07 | SLTS | Tenas_Lithology.csv |
| T95R-15C | 29.91 | 31.2 | 1.29 | MDST | Tenas_Lithology.csv |
| T95R-15C | 31.2 | 31.5 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-15C | 31.5 | 36.3 | 4.8 | MDST | Tenas_Lithology.csv |
| T95R-15C | 36.3 | 36.7 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-15C | 36.7 | 39.02 | 2.32 | MDST | Tenas_Lithology.csv |
| T95R-15C | 39.02 | 41.2 | 2.18 | COAL | Tenas_Lithology.csv |
| T95R-15C | 41.2 | 47.63 | 6.43 | MDST | Tenas_Lithology.csv |
| T95R-15C | 47.63 | 47.92 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-15C | 47.92 | 51.18 | 3.26 | MDST | Tenas_Lithology.csv |
| T95R-15C | 51.18 | 53.47 | 2.29 | COAL | Tenas_Lithology.csv |
| T95R-15C | 53.47 | 56.9 | 3.43 | MDST | Tenas_Lithology.csv |
| T95R-15C | 56.9 | 61.22 | 4.32 | COAL | Tenas_Lithology.csv |
| T95R-15C | 61.22 | 63.84 | 2.62 | MDST | Tenas_Lithology.csv |
| T95R-15C | 63.84 | 71.4 | 7.56 | SST | Tenas_Lithology.csv |
| T95R-15C | 71.4 | 75.35 | 3.95 | MDST | Tenas_Lithology.csv |
| T95R-15C | 75.35 | 75.62 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-15C | 75.62 | 77.1 | 1.48 | MDST | Tenas_Lithology.csv |
| T95R-15C | 77.1 | 77.42 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-15C | 77.42 | 80.2 | 2.78 | MDST | Tenas_Lithology.csv |
| T95R-15C | 80.2 | 80.65 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-15C | 80.65 | 81.95 | 1.3 | MDST | Tenas_Lithology.csv |
| T95R-15C | 81.95 | 82.21 | 0.26 | COAL | Tenas_Lithology.csv |
| T95R-15C | 82.21 | 100 | 17.79 | SLTS | Tenas_Lithology.csv |
| T95R-17 | 0 | 5.51 | 5.51 | Overburden | Tenas_Lithology.csv |
| T95R-17 | 5.51 | 40.7 | 35.19 | SST | Tenas_Lithology.csv |
| T95R-17 | 40.7 | 46.8 | 6.1 | SLTS | Tenas_Lithology.csv |
| T95R-17 | 46.8 | 50.3 | 3.5 | SST | Tenas_Lithology.csv |
| T95R-17 | 50.3 | 118.5 | 68.2 | MDST | Tenas_Lithology.csv |
| T95R-17 | 118.5 | 121 | 2.5 | SST | Tenas_Lithology.csv |
| T95R-17 | 121 | 125.15 | 4.15 | MDST | Tenas_Lithology.csv |
| T95R-17 | 125.15 | 125.57 | 0.42 | COAL | Tenas_Lithology.csv |
| T95R-17 | 125.57 | 127.61 | 2.04 | MDST | Tenas_Lithology.csv |
| T95R-17 | 127.61 | 128.31 | 0.7 | COAL | Tenas_Lithology.csv |
| T95R-17 | 128.31 | 129.83 | 1.52 | MDST | Tenas_Lithology.csv |
| T95R-17 | 129.83 | 130 | 0.17 | COAL | Tenas_Lithology.csv |
| T95R-17 | 130 | 130.25 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-17 | 130.25 | 130.5 | 0.25 | COAL | Tenas_Lithology.csv |
| T95R-17 | 130.5 | 131.9 | 1.4 | MDST | Tenas_Lithology.csv |
| T95R-17 | 131.9 | 132.1 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-17 | 132.1 | 133.8 | 1.7 | MDST | Tenas_Lithology.csv |
| T95R-17 | 133.8 | 134.3 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-17 | 134.3 | 135.1 | 0.8 | MDST | Tenas_Lithology.csv |
| T95R-17 | 135.1 | 135.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-17 | 135.4 | 142.4 | 7 | MDST | Tenas_Lithology.csv |
| T95R-17 | 142.4 | 158.5 | 16.1 | SLTS | Tenas_Lithology.csv |
| T95R-17 | 158.5 | 178 | 19.5 | SST | Tenas_Lithology.csv |
| T95R-19C | 0 | 7.01 | 7.01 | Overburden | Tenas_Lithology.csv |
| T95R-19C | 7.01 | 33.83 | 26.82 | MDST | Tenas_Lithology.csv |
| T95R-19C | 33.83 | 34.3 | 0.47 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-19C | 34.3 | 37.8 | 3.5 | MDST | Tenas_Lithology.csv |
| T95R-19C | 37.8 | 38.15 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-19C | 38.15 | 40.11 | 1.96 | MDST | Tenas_Lithology.csv |
| T95R-19C | 40.11 | 40.27 | 0.16 | COAL | Tenas_Lithology.csv |
| T95R-19C | 40.27 | 43.27 | 3 | MDST | Tenas_Lithology.csv |
| T95R-19C | 43.27 | 43.47 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-19C | 43.47 | 44.46 | 0.99 | MDST | Tenas_Lithology.csv |
| T95R-19C | 44.46 | 46.37 | 1.91 | COAL | Tenas_Lithology.csv |
| T95R-19C | 46.37 | 53.34 | 6.97 | MDST | Tenas_Lithology.csv |
| T95R-19C | 53.34 | 53.78 | 0.44 | COAL | Tenas_Lithology.csv |
| T95R-19C | 53.78 | 59.76 | 5.98 | MDST | Tenas_Lithology.csv |
| T95R-19C | 59.76 | 61.85 | 2.09 | COAL | Tenas_Lithology.csv |
| T95R-19C | 61.85 | 61.9 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-19C | 61.9 | 66.21 | 4.31 | COAL | Tenas_Lithology.csv |
| T95R-19C | 66.21 | 69.64 | 3.43 | MDST | Tenas_Lithology.csv |
| T95R-19C | 69.64 | 69.97 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-19C | 69.97 | 70.06 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-19C | 70.06 | 71.19 | 1.13 | COAL | Tenas_Lithology.csv |
| T95R-19C | 71.19 | 71.68 | 0.49 | MDST | Tenas_Lithology.csv |
| T95R-19C | 71.68 | 72.43 | 0.75 | COAL | Tenas_Lithology.csv |
| T95R-19C | 72.43 | 77.32 | 4.89 | MDST | Tenas_Lithology.csv |
| T95R-19C | 77.32 | 77.63 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-19C | 77.63 | 77.9 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-19C | 77.9 | 78.08 | 0.18 | COAL | Tenas_Lithology.csv |
| T95R-19C | 78.08 | 78.73 | 0.65 | MDST | Tenas_Lithology.csv |
| T95R-19C | 78.73 | 79.48 | 0.75 | COAL | Tenas_Lithology.csv |
| T95R-19C | 79.48 | 79.89 | 0.41 | MDST | Tenas_Lithology.csv |
| T95R-19C | 79.89 | 80.63 | 0.74 | COAL | Tenas_Lithology.csv |
| T95R-19C | 80.63 | 82.81 | 2.18 | MDST | Tenas_Lithology.csv |
| T95R-19C | 82.81 | 83.93 | 1.12 | COAL | Tenas_Lithology.csv |
| T95R-19C | 83.93 | 84.95 | 1.02 | MDST | Tenas_Lithology.csv |
| T95R-19C | 84.95 | 85.11 | 0.16 | COAL | Tenas_Lithology.csv |
| T95R-19C | 85.11 | 85.9 | 0.79 | MDST | Tenas_Lithology.csv |
| T95R-20 | 0 | 12 | 12 | Overburden | Tenas_Lithology.csv |
| T95R-21 | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T95R-21 | 6 | 13.78 | 7.78 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 13.78 | 13.98 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-21 | 13.98 | 17.92 | 3.94 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 17.92 | 18.26 | 0.34 | COAL | Tenas_Lithology.csv |
| T95R-21 | 18.26 | 21.18 | 2.92 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 21.18 | 21.85 | 0.67 | COAL | Tenas_Lithology.csv |
| T95R-21 | 21.85 | 25.93 | 4.08 | MDST | Tenas_Lithology.csv |
| T95R-21 | 25.93 | 26.17 | 0.24 | COAL | Tenas_Lithology.csv |
| T95R-21 | 26.17 | 26.58 | 0.41 | MDST | Tenas_Lithology.csv |
| T95R-21 | 26.58 | 28.4 | 1.82 | COAL | Tenas_Lithology.csv |
| T95R-21 | 28.4 | 35.15 | 6.75 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 35.15 | 35.47 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-21 | 35.47 | 40.47 | 5 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 40.47 | 46.35 | 5.88 | COAL | Tenas_Lithology.csv |
| T95R-21 | 46.35 | 47.78 | 1.43 | MDST | Tenas_Lithology.csv |
| T95R-21 | 47.78 | 48.28 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-21 | 48.28 | 48.55 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-21 | 48.55 | 48.88 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-21 | 48.88 | 61.76 | 12.88 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 61.76 | 62.4 | 0.64 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-21 | 62.4 | 63.85 | 1.45 | MDST | Tenas_Lithology.csv |
| T95R-21 | 63.85 | 64.38 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-21 | 64.38 | 67.59 | 3.21 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 67.59 | 68.01 | 0.42 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-21 | 68.01 | 69.76 | 1.75 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 69.76 | 70.13 | 0.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-21 | 70.13 | 73 | 2.87 | SLTS | Tenas_Lithology.csv |
| T95R-22C | 0 | 12.51 | 12.51 | Overburden | Tenas_Lithology.csv |
| T95R-22C | 12.51 | 12.8 | 0.29 | MDST | Tenas_Lithology.csv |
| T95R-22C | 12.8 | 15.25 | 2.45 | COAL | Tenas_Lithology.csv |
| T95R-22C | 15.25 | 15.65 | 0.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-22C | 15.65 | 18.2 | 2.55 | COAL | Tenas_Lithology.csv |
| T95R-22C | 18.2 | 19.85 | 1.65 | MDST | Tenas_Lithology.csv |
| T95R-22C | 19.85 | 21.72 | 1.87 | COAL | Tenas_Lithology.csv |
| T95R-22C | 21.72 | 22.53 | 0.81 | MDST | Tenas_Lithology.csv |
| T95R-22C | 22.53 | 22.91 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-22C | 22.91 | 24.18 | 1.27 | MDST | Tenas_Lithology.csv |
| T95R-22C | 24.18 | 24.85 | 0.67 | COAL | Tenas_Lithology.csv |
| T95R-22C | 24.85 | 25.4 | 0.55 | MDST | Tenas_Lithology.csv |
| T95R-22C | 25.4 | 28.6 | 3.2 | COAL | Tenas_Lithology.csv |
| T95R-22C | 28.6 | 33.6 | 5 | MDST | Tenas_Lithology.csv |
| T95R-22C | 33.6 | 34.29 | 0.69 | COAL | Tenas_Lithology.csv |
| T95R-22C | 34.29 | 36.39 | 2.1 | MDST | Tenas_Lithology.csv |
| T95R-22C | 36.39 | 37.23 | 0.84 | COAL | Tenas_Lithology.csv |
| T95R-22C | 37.23 | 38.26 | 1.03 | MDST | Tenas_Lithology.csv |
| T95R-22C | 38.26 | 38.53 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-22C | 38.53 | 51.9 | 13.37 | MDST | Tenas_Lithology.csv |
| T95R-22C | 51.9 | 52.6 | 0.7 | COAL | Tenas_Lithology.csv |
| T95R-22C | 52.6 | 52.9 | 0.3 | MDST | Tenas_Lithology.csv |
| T95R-22C | 52.9 | 53 | 0.1 | COAL | Tenas_Lithology.csv |
| T95R-22C | 53 | 53.15 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-22C | 53.15 | 54.13 | 0.98 | COAL | Tenas_Lithology.csv |
| T95R-22C | 54.13 | 62.34 | 8.21 | MDST | Tenas_Lithology.csv |
| T95R-22C | 62.34 | 63.12 | 0.78 | COAL | Tenas_Lithology.csv |
| T95R-22C | 63.12 | 96.5 | 33.38 | MDST | Tenas_Lithology.csv |
| T95R-22C | 96.5 | 97.4 | 0.9 | SST | Tenas_Lithology.csv |
| T95R-22C | 97.4 | 114.9 | 17.5 | CGL | Tenas_Lithology.csv |
| T95R-24 | 0 | 5.31 | 5.31 | Overburden | Tenas_Lithology.csv |
| T95R-24 | 5.31 | 14.5 | 9.19 | MDST | Tenas_Lithology.csv |
| T95R-24 | 14.5 | 16.04 | 1.54 | SST | Tenas_Lithology.csv |
| T95R-24 | 16.04 | 16.21 | 0.17 | MDST | Tenas_Lithology.csv |
| T95R-24 | 16.21 | 16.54 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-24 | 16.54 | 18.81 | 2.27 | MDST | Tenas_Lithology.csv |
| T95R-24 | 18.81 | 19.37 | 0.56 | COAL | Tenas_Lithology.csv |
| T95R-24 | 19.37 | 25.28 | 5.91 | SLTS | Tenas_Lithology.csv |
| T95R-24 | 25.28 | 26.23 | 0.95 | COAL | Tenas_Lithology.csv |
| T95R-24 | 26.23 | 37.38 | 11.15 | SLTS | Tenas_Lithology.csv |
| T95R-24 | 37.38 | 39.22 | 1.84 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-24 | 39.22 | 40.75 | 1.53 | MDST | Tenas_Lithology.csv |
| T95R-24 | 40.75 | 44.19 | 3.44 | COAL | Tenas_Lithology.csv |
| T95R-24 | 44.19 | 44.69 | 0.5 | MDST | Tenas_Lithology.csv |
| T95R-24 | 44.69 | 45.22 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-24 | 45.22 | 45.37 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-24 | 45.37 | 45.77 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-24 | 45.77 | 49 | 3.23 | SST | Tenas_Lithology.csv |
| T95R-24 | 49 | 57.65 | 8.65 | MDST | Tenas_Lithology.csv |
| T95R-24 | 57.65 | 58.08 | 0.43 | COAL | Tenas_Lithology.csv |
| T95R-24 | 58.08 | 59.8 | 1.72 | MDST | Tenas_Lithology.csv |
| T95R-24 | 59.8 | 60.3 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-24 | 60.3 | 63.84 | 3.54 | MDST | Tenas_Lithology.csv |
| T95R-24 | 63.84 | 64.27 | 0.43 | COAL | Tenas_Lithology.csv |
| T95R-24 | 64.27 | 66.72 | 2.45 | MDST | Tenas_Lithology.csv |
| T95R-24 | 66.72 | 67.03 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-24 | 67.03 | 67.9 | 0.87 | MDST | Tenas_Lithology.csv |
| T95R-25 | 0 | 5.21 | 5.21 | Overburden | Tenas_Lithology.csv |
| T95R-25 | 5.21 | 5.5 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-25 | 5.5 | 7.1 | 1.6 | MDST | Tenas_Lithology.csv |
| T95R-25 | 7.1 | 7.37 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-25 | 7.37 | 8.8 | 1.43 | SLTS | Tenas_Lithology.csv |
| T95R-25 | 8.8 | 9 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-25 | 9 | 15 | 6 | SST | Tenas_Lithology.csv |
| T95R-25 | 15 | 15.27 | 0.27 | MDST | Tenas_Lithology.csv |
| T95R-25 | 15.27 | 15.72 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-25 | 15.72 | 15.9 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-25 | 15.9 | 16.52 | 0.62 | COAL | Tenas_Lithology.csv |
| T95R-25 | 16.52 | 18.58 | 2.06 | MDST | Tenas_Lithology.csv |
| T95R-25 | 18.58 | 26.85 | 8.27 | SST | Tenas_Lithology.csv |
| T95R-25 | 26.85 | 27.44 | 0.59 | COAL | Tenas_Lithology.csv |
| T95R-25 | 27.44 | 31.7 | 4.26 | SLTS | Tenas_Lithology.csv |
| T95R-25 | 31.7 | 37 | 5.3 | SST | Tenas_Lithology.csv |
| T95R-25 | 37 | 43 | 6 | CGL | Tenas_Lithology.csv |
| T95R-26 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T95R-26 | 7 | 11 | 4 | CGL | Tenas_Lithology.csv |
| T95R-26 | 11 | 15 | 4 | MDST | Tenas_Lithology.csv |
| T95R-26 | 15 | 16 | 1 | CGL | Tenas_Lithology.csv |
| T95R-26 | 16 | 19 | 3 | MDST | Tenas_Lithology.csv |
| T95R-26 | 19 | 23 | 4 | CGL | Tenas_Lithology.csv |
| T95R-26 | 23 | 26 | 3 | MDST | Tenas_Lithology.csv |
| T95R-26 | 26 | 32 | 6 | CGL | Tenas_Lithology.csv |
| T95R-26 | 32 | 57 | 25 | MDST | Tenas_Lithology.csv |
| T95R-26 | 57 | 80 | 23 | VOLC | Tenas_Lithology.csv |
| T95R-28C | 0 | 5.81 | 5.81 | Overburden | Tenas_Lithology.csv |
| T95R-28C | 5.81 | 15.6 | 9.79 | SLTS | Tenas_Lithology.csv |
| T95R-28C | 15.6 | 30.56 | 14.96 | MDST | Tenas_Lithology.csv |
| T95R-28C | 30.56 | 33.76 | 3.2 | SLTS | Tenas_Lithology.csv |
| T95R-28C | 33.76 | 34.41 | 0.65 | MDST | Tenas_Lithology.csv |
| T95R-28C | 34.41 | 34.95 | 0.54 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 34.95 | 40.3 | 5.35 | MDST | Tenas_Lithology.csv |
| T95R-28C | 40.3 | 40.67 | 0.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 40.67 | 46.76 | 6.09 | MDST | Tenas_Lithology.csv |
| T95R-28C | 46.76 | 48.62 | 1.86 | COAL | Tenas_Lithology.csv |
| T95R-28C | 48.62 | 55.57 | 6.95 | MDST | Tenas_Lithology.csv |
| T95R-28C | 55.57 | 55.72 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 55.72 | 59.5 | 3.78 | MDST | Tenas_Lithology.csv |
| T95R-28C | 59.5 | 61.29 | 1.79 | COAL | Tenas_Lithology.csv |
| T95R-28C | 61.29 | 62.39 | 1.1 | MDST | Tenas_Lithology.csv |
| T95R-28C | 62.39 | 63.7 | 1.31 | COAL | Tenas_Lithology.csv |
| T95R-28C | 63.7 | 64.99 | 1.29 | MDST | Tenas_Lithology.csv |
| T95R-28C | 64.99 | 67.37 | 2.38 | COAL | Tenas_Lithology.csv |
| T95R-28C | 67.37 | 67.6 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 67.6 | 67.85 | 0.25 | COAL | Tenas_Lithology.csv |
| T95R-28C | 67.85 | 76.22 | 8.37 | MDST | Tenas_Lithology.csv |
| T95R-28C | 76.22 | 77.01 | 0.79 | COAL | Tenas_Lithology.csv |
| T95R-28C | 77.01 | 77.97 | 0.96 | MDST | Tenas_Lithology.csv |
| T95R-28C | 77.97 | 78.38 | 0.41 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 78.38 | 86.43 | 8.05 | MDST | Tenas_Lithology.csv |
| T95R-28C | 86.43 | 86.78 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-28C | 86.78 | 87.28 | 0.5 | MDST | Tenas_Lithology.csv |
| T95R-28C | 87.28 | 88.14 | 0.86 | COAL | Tenas_Lithology.csv |
| T95R-28C | 88.14 | 89.17 | 1.03 | MDST | Tenas_Lithology.csv |
| T95R-28C | 89.17 | 89.42 | 0.25 | COAL | Tenas_Lithology.csv |
| T95R-28C | 89.42 | 89.76 | 0.34 | MDST | Tenas_Lithology.csv |
| T95R-28C | 89.76 | 90 | 0.24 | COAL | Tenas_Lithology.csv |
| T95R-28C | 90 | 91.25 | 1.25 | MDST | Tenas_Lithology.csv |
| T95R-28C | 91.25 | 91.91 | 0.66 | COAL | Tenas_Lithology.csv |
| T95R-28C | 91.91 | 99.7 | 7.79 | MDST | Tenas_Lithology.csv |
| T95R-28C | 99.7 | 115.9 | 16.2 | SLTS | Tenas_Lithology.csv |
| T95R-30 | 0 | 12.01 | 12.01 | Overburden | Tenas_Lithology.csv |
| T95R-30 | 12.01 | 53.3 | 41.29 | VOLC | Tenas_Lithology.csv |
| T95R-31 | 0 | 9.01 | 9.01 | Overburden | Tenas_Lithology.csv |
| T95R-31 | 9.01 | 25.3 | 16.29 | SST | Tenas_Lithology.csv |
| T95R-31 | 25.3 | 34.2 | 8.9 | MDST | Tenas_Lithology.csv |
| T95R-31 | 34.2 | 47.92 | 13.72 | SLTS | Tenas_Lithology.csv |
| T95R-31 | 47.92 | 49.45 | 1.53 | COAL | Tenas_Lithology.csv |
| T95R-31 | 49.45 | 56.55 | 7.1 | SLTS | Tenas_Lithology.csv |
| T95R-31 | 56.55 | 56.88 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-31 | 56.88 | 58.9 | 2.02 | MDST | Tenas_Lithology.csv |
| T95R-31 | 58.9 | 61.5 | 2.6 | SST | Tenas_Lithology.csv |
| T95R-31 | 61.5 | 64.02 | 2.52 | MDST | Tenas_Lithology.csv |
| T95R-31 | 64.02 | 65.45 | 1.43 | COAL | Tenas_Lithology.csv |
| T95R-31 | 65.45 | 65.75 | 0.3 | MDST | Tenas_Lithology.csv |
| T95R-31 | 65.75 | 67.07 | 1.32 | COAL | Tenas_Lithology.csv |
| T95R-31 | 67.07 | 67.75 | 0.68 | MDST | Tenas_Lithology.csv |
| T95R-31 | 67.75 | 67.97 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-31 | 67.97 | 69.44 | 1.47 | MDST | Tenas_Lithology.csv |
| T95R-31 | 69.44 | 70.2 | 0.76 | COAL | Tenas_Lithology.csv |
| T95R-31 | 70.2 | 70.35 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-31 | 70.35 | 71.4 | 1.05 | COAL | Tenas_Lithology.csv |
| T95R-31 | 71.4 | 72.42 | 1.02 | MDST | Tenas_Lithology.csv |
| T95R-31 | 72.42 | 73.03 | 0.61 | COAL | Tenas_Lithology.csv |
| T95R-31 | 73.03 | 74.85 | 1.82 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-31 | 74.85 | 75.65 | 0.8 | COAL | Tenas_Lithology.csv |
| T95R-31 | 75.65 | 85.05 | 9.4 | MDST | Tenas_Lithology.csv |
| T95R-31 | 85.05 | 85.45 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-31 | 85.45 | 86.2 | 0.75 | MDST | Tenas_Lithology.csv |
| T95R-31 | 86.2 | 87.93 | 1.73 | COAL | Tenas_Lithology.csv |
| T95R-31 | 87.93 | 95.17 | 7.24 | MDST | Tenas_Lithology.csv |
| T95R-31 | 95.17 | 95.7 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-31 | 95.7 | 108.3 | 12.6 | SLTS | Tenas_Lithology.csv |
| T95R-31 | 108.3 | 146 | 37.7 | SST | Tenas_Lithology.csv |
| T95R-32 | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T95R-32 | 6 | 41.54 | 35.54 | SLTS | Tenas_Lithology.csv |
| T95R-32 | 41.54 | 42.11 | 0.57 | COAL | Tenas_Lithology.csv |
| T95R-32 | 42.11 | 43.49 | 1.38 | MDST | Tenas_Lithology.csv |
| T95R-32 | 43.49 | 43.82 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-32 | 43.82 | 44.66 | 0.84 | MDST | Tenas_Lithology.csv |
| T95R-32 | 44.66 | 45.28 | 0.62 | COAL | Tenas_Lithology.csv |
| T95R-32 | 45.28 | 47 | 1.72 | MDST | Tenas_Lithology.csv |
| T95R-32 | 47 | 47.2 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-32 | 47.2 | 49.5 | 2.3 | MDST | Tenas_Lithology.csv |
| T95R-32 | 49.5 | 50.48 | 0.98 | CGL | Tenas_Lithology.csv |
| T95R-32 | 50.48 | 50.61 | 0.13 | COAL | Tenas_Lithology.csv |
| T95R-32 | 50.61 | 52.3 | 1.69 | CGL | Tenas_Lithology.csv |
| T95R-32 | 52.3 | 58.3 | 6 | SLTS | Tenas_Lithology.csv |
| T95R-32 | 58.3 | 58.7 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-32 | 58.7 | 71.3 | 12.6 | SLTS | Tenas_Lithology.csv |
| T95R-32 | 71.3 | 75.6 | 4.3 | SST | Tenas_Lithology.csv |
| T95R-32 | 75.6 | 80.2 | 4.6 | CGL | Tenas_Lithology.csv |
| T95R-32 | 80.2 | 89.1 | 8.9 | SST | Tenas_Lithology.csv |
| T95R-32 | 89.1 | 95.6 | 6.5 | MDST | Tenas_Lithology.csv |
| T95R-32 | 95.6 | 105.2 | 9.6 | SST | Tenas_Lithology.csv |
| T95R-32 | 105.2 | 117.4 | 12.2 | CGL | Tenas_Lithology.csv |
| T95R-32 | 117.4 | 142.05 | 24.65 | MDST | Tenas_Lithology.csv |
| T95R-32 | 142.05 | 147 | 4.95 | VOLC | Tenas_Lithology.csv |
| T95R-34 | 0 | 5.01 | 5.01 | Overburden | Tenas_Lithology.csv |
| T95R-34 | 5.01 | 46.25 | 41.24 | MDST | Tenas_Lithology.csv |
| T95R-34 | 46.25 | 48.2 | 1.95 | COAL | Tenas_Lithology.csv |
| T95R-34 | 48.2 | 55.89 | 7.69 | MDST | Tenas_Lithology.csv |
| T95R-34 | 55.89 | 56.28 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-34 | 56.28 | 63.08 | 6.8 | MDST | Tenas_Lithology.csv |
| T95R-34 | 63.08 | 64.23 | 1.15 | COAL | Tenas_Lithology.csv |
| T95R-34 | 64.23 | 64.6 | 0.37 | MDST | Tenas_Lithology.csv |
| T95R-34 | 64.6 | 65.01 | 0.41 | COAL | Tenas_Lithology.csv |
| T95R-34 | 65.01 | 65.17 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-34 | 65.17 | 66.13 | 0.96 | COAL | Tenas_Lithology.csv |
| T95R-34 | 66.13 | 66.41 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-34 | 66.41 | 69.88 | 3.47 | COAL | Tenas_Lithology.csv |
| T95R-34 | 69.88 | 73.22 | 3.34 | MDST | Tenas_Lithology.csv |
| T95R-34 | 73.22 | 73.68 | 0.46 | COAL | Tenas_Lithology.csv |
| T95R-34 | 73.68 | 75.3 | 1.62 | MDST | Tenas_Lithology.csv |
| T95R-34 | 75.3 | 75.99 | 0.69 | COAL | Tenas_Lithology.csv |
| T95R-34 | 75.99 | 76.52 | 0.53 | MDST | Tenas_Lithology.csv |
| T95R-34 | 76.52 | 76.75 | 0.23 | COAL | Tenas_Lithology.csv |
| T95R-34 | 76.75 | 77.3 | 0.55 | MDST | Tenas_Lithology.csv |
| T95R-34 | 77.3 | 77.7 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-34 | 77.7 | 81.89 | 4.19 | SLTS | Tenas_Lithology.csv |
| T95R-34 | 81.89 | 82.73 | 0.84 | COAL | Tenas_Lithology.csv |
| T95R-34 | 82.73 | 84.15 | 1.42 | MDST | Tenas_Lithology.csv |
| T95R-34 | 84.15 | 84.73 | 0.58 | COAL | Tenas_Lithology.csv |
| T95R-34 | 84.73 | 88.2 | 3.47 | SST | Tenas_Lithology.csv |
| T95R-34 | 88.2 | 91.8 | 3.6 | SLTS | Tenas_Lithology.csv |
| T95R-34 | 91.8 | 92.4 | 0.6 | COAL | Tenas_Lithology.csv |
| T95R-34 | 92.4 | 113 | 20.6 | SLTS | Tenas_Lithology.csv |
| T95R-34 | 113 | 116 | 3 | SST | Tenas_Lithology.csv |
| T95R-35C | 0 | 10.61 | 10.61 | Overburden | Tenas_Lithology.csv |
| T95R-35C | 10.61 | 20.5 | 9.89 | MDST | Tenas_Lithology.csv |
| T95R-35C | 20.5 | 23.9 | 3.4 | SST | Tenas_Lithology.csv |
| T95R-35C | 23.9 | 31.4 | 7.5 | SLTS | Tenas_Lithology.csv |
| T95R-35C | 31.4 | 50 | 18.6 | SST | Tenas_Lithology.csv |
| T95R-35C | 50 | 62.4 | 12.4 | MDST | Tenas_Lithology.csv |
| T95R-35C | 62.4 | 67.6 | 5.2 | SST | Tenas_Lithology.csv |
| T95R-35C | 67.6 | 75.36 | 7.76 | MDST | Tenas_Lithology.csv |
| T95R-35C | 75.36 | 75.5 | 0.14 | COAL | Tenas_Lithology.csv |
| T95R-35C | 75.5 | 77.02 | 1.52 | MDST | Tenas_Lithology.csv |
| T95R-35C | 77.02 | 79.37 | 2.35 | COAL | Tenas_Lithology.csv |
| T95R-35C | 79.37 | 84.05 | 4.68 | SLTS | Tenas_Lithology.csv |
| T95R-35C | 84.05 | 84.23 | 0.18 | MDST | Tenas_Lithology.csv |
| T95R-35C | 84.23 | 84.54 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-35C | 84.54 | 89.1 | 4.56 | MDST | Tenas_Lithology.csv |
| T95R-35C | 89.1 | 89.2 | 0.1 | COAL | Tenas_Lithology.csv |
| T95R-35C | 89.2 | 98.99 | 9.79 | SLTS | Tenas_Lithology.csv |
| T95R-35C | 98.99 | 100.08 | 1.09 | SST | Tenas_Lithology.csv |
| T95R-35C | 100.08 | 102.14 | 2.06 | SLTS | Tenas_Lithology.csv |
| T95R-35C | 102.14 | 130 | 27.86 | SST | Tenas_Lithology.csv |
| T95R-36 | 0 | 4.01 | 4.01 | Overburden | Tenas_Lithology.csv |
| T95R-36 | 4.01 | 5.61 | 1.6 | MDST | Tenas_Lithology.csv |
| T95R-36 | 5.61 | 5.82 | 0.21 | COAL | Tenas_Lithology.csv |
| T95R-36 | 5.82 | 7.43 | 1.61 | MDST | Tenas_Lithology.csv |
| T95R-36 | 7.43 | 7.71 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-36 | 7.71 | 11.98 | 4.27 | SLTS | Tenas_Lithology.csv |
| T95R-36 | 11.98 | 12.27 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-36 | 12.27 | 12.6 | 0.33 | SLTS | Tenas_Lithology.csv |
| T95R-36 | 12.6 | 14.71 | 2.11 | SST | Tenas_Lithology.csv |
| T95R-36 | 14.71 | 15.1 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-36 | 15.1 | 17.4 | 2.3 | SST | Tenas_Lithology.csv |
| T95R-36 | 17.4 | 19.65 | 2.25 | SLTS | Tenas_Lithology.csv |
| T95R-36 | 19.65 | 19.93 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-36 | 19.93 | 20.72 | 0.79 | MDST | Tenas_Lithology.csv |
| T95R-36 | 20.72 | 21.09 | 0.37 | COAL | Tenas_Lithology.csv |
| T95R-36 | 21.09 | 40.1 | 19.01 | SST | Tenas_Lithology.csv |
| T95R-36 | 40.1 | 55 | 14.9 | MDST | Tenas_Lithology.csv |
| T95R-38C | 0 | 7.01 | 7.01 | Overburden | Tenas_Lithology.csv |
| T95R-38C | 7.01 | 17.48 | 10.47 | MDST | Tenas_Lithology.csv |
| T95R-38C | 17.48 | 18.29 | 0.81 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-38C | 18.29 | 28.25 | 9.96 | MDST | Tenas_Lithology.csv |
| T95R-38C | 28.25 | 38.66 | 10.41 | COAL | Tenas_Lithology.csv |
| T95R-38C | 38.66 | 44.62 | 5.96 | MDST | Tenas_Lithology.csv |
| T95R-38C | 44.62 | 45.47 | 0.85 | COAL | Tenas_Lithology.csv |
| T95R-38C | 45.47 | 45.62 | 0.15 | MDST | Tenas_Lithology.csv |
| T95R-38C | 45.62 | 45.77 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-38C | 45.77 | 47.83 | 2.06 | MDST | Tenas_Lithology.csv |
| T95R-38C | 47.83 | 48.89 | 1.06 | COAL | Tenas_Lithology.csv |
| T95R-38C | 48.89 | 51.83 | 2.94 | MDST | Tenas_Lithology.csv |
| T95R-38C | 51.83 | 52.52 | 0.69 | COAL | Tenas_Lithology.csv |
| T95R-38C | 52.52 | 57 | 4.48 | MDST | Tenas_Lithology.csv |
| T95R-38C | 57 | 57.17 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-38C | 57.17 | 59.62 | 2.45 | MDST | Tenas_Lithology.csv |
| T95R-38C | 59.62 | 60.25 | 0.63 | COAL | Tenas_Lithology.csv |
| T95R-38C | 60.25 | 61.96 | 1.71 | MDST | Tenas_Lithology.csv |
| T95R-38C | 61.96 | 62.55 | 0.59 | COAL | Tenas_Lithology.csv |
| T95R-38C | 62.55 | 70.1 | 7.55 | MDST | Tenas_Lithology.csv |
| T95R-38C | 70.1 | 83.05 | 12.95 | SST | Tenas_Lithology.csv |
| T95R-38C | 83.05 | 104.7 | 21.65 | CGL | Tenas_Lithology.csv |
| T95R-39C | 0 | 3.01 | 3.01 | Overburden | Tenas_Lithology.csv |
| T95R-39C | 3.01 | 17.49 | 14.48 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 17.49 | 30.24 | 12.75 | MDST | Tenas_Lithology.csv |
| T95R-39C | 30.24 | 31.83 | 1.59 | SST | Tenas_Lithology.csv |
| T95R-39C | 31.83 | 32.08 | 0.25 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 32.08 | 32.35 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-39C | 32.35 | 35.81 | 3.46 | MDST | Tenas_Lithology.csv |
| T95R-39C | 35.81 | 36.15 | 0.34 | COAL | Tenas_Lithology.csv |
| T95R-39C | 36.15 | 38.78 | 2.63 | MDST | Tenas_Lithology.csv |
| T95R-39C | 38.78 | 38.94 | 0.16 | COAL | Tenas_Lithology.csv |
| T95R-39C | 38.94 | 39.78 | 0.84 | MDST | Tenas_Lithology.csv |
| T95R-39C | 39.78 | 41.43 | 1.65 | COAL | Tenas_Lithology.csv |
| T95R-39C | 41.43 | 50.29 | 8.86 | MDST | Tenas_Lithology.csv |
| T95R-39C | 50.29 | 50.61 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-39C | 50.61 | 53.9 | 3.29 | MDST | Tenas_Lithology.csv |
| T95R-39C | 53.9 | 55.98 | 2.08 | COAL | Tenas_Lithology.csv |
| T95R-39C | 55.98 | 56.44 | 0.46 | MDST | Tenas_Lithology.csv |
| T95R-39C | 56.44 | 57.11 | 0.67 | COAL | Tenas_Lithology.csv |
| T95R-39C | 57.11 | 64.53 | 7.42 | MDST | Tenas_Lithology.csv |
| T95R-39C | 64.53 | 64.83 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-39C | 64.83 | 65.87 | 1.04 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 65.87 | 66.74 | 0.87 | COAL | Tenas_Lithology.csv |
| T95R-39C | 66.74 | 70.1 | 3.36 | MDST | Tenas_Lithology.csv |
| T95R-39C | 70.1 | 71.22 | 1.12 | SST | Tenas_Lithology.csv |
| T95R-39C | 71.22 | 71.42 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-39C | 71.42 | 75.45 | 4.03 | MDST | Tenas_Lithology.csv |
| T95R-39C | 75.45 | 76.24 | 0.79 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 76.24 | 76.66 | 0.42 | SST | Tenas_Lithology.csv |
| T95R-39C | 76.66 | 77.82 | 1.16 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 77.82 | 80 | 2.18 | SST | Tenas_Lithology.csv |
| T95R-40 | 0 | 38 | 38 | Overburden | Tenas_Lithology.csv |
| T95R-40 | 38 | 43 | 5 | MDST | Tenas_Lithology.csv |
| T95R-40 | 43 | 52.7 | 9.7 | COAL | Tenas_Lithology.csv |
| T95R-40 | 52.7 | 57.52 | 4.82 | MDST | Tenas_Lithology.csv |
| T95R-40 | 57.52 | 58.25 | 0.73 | COAL | Tenas_Lithology.csv |
| T95R-40 | 58.25 | 60.33 | 2.08 | MDST | Tenas_Lithology.csv |
| T95R-40 | 60.33 | 61 | 0.67 | COAL | Tenas_Lithology.csv |
| T95R-40 | 61 | 63.1 | 2.1 | MDST | Tenas_Lithology.csv |
| T95R-40 | 63.1 | 63.57 | 0.47 | COAL | Tenas_Lithology.csv |
| T95R-40 | 63.57 | 64.05 | 0.48 | MDST | Tenas_Lithology.csv |
| T95R-40 | 64.05 | 64.3 | 0.25 | COAL | Tenas_Lithology.csv |
| T95R-40 | 64.3 | 70.29 | 5.99 | MDST | Tenas_Lithology.csv |
| T95R-40 | 70.29 | 70.6 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-40 | 70.6 | 70.9 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-40 | 70.9 | 72.22 | 1.32 | COAL | Tenas_Lithology.csv |
| T95R-40 | 72.22 | 75.45 | 3.23 | MDST | Tenas_Lithology.csv |
| T95R-40 | 75.45 | 75.72 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-40 | 75.72 | 80 | 4.28 | MDST | Tenas_Lithology.csv |
| T95R-43 | 0 | 22.5 | 22.5 | Overburden | Tenas_Lithology.csv |
| T95R-43 | 22.5 | 52.35 | 29.85 | SST | Tenas_Lithology.csv |
| T95R-43 | 52.35 | 53.12 | 0.77 | COAL | Tenas_Lithology.csv |
| T95R-43 | 53.12 | 53.45 | 0.33 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-43 | 53.45 | 55.28 | 1.83 | COAL | Tenas_Lithology.csv |
| T95R-43 | 55.28 | 56.7 | 1.42 | MDST | Tenas_Lithology.csv |
| T95R-43 | 56.7 | 60.7 | 4 | SLTS | Tenas_Lithology.csv |
| T95R-43 | 60.7 | 85.3 | 24.6 | CGL | Tenas_Lithology.csv |
| T95R-43 | 85.3 | 86 | 0.7 | MDST | Tenas_Lithology.csv |
| T95R-43 | 86 | 88.6 | 2.6 | SST | Tenas_Lithology.csv |
| T95R-43 | 88.6 | 98.5 | 9.9 | CGL | Tenas_Lithology.csv |
| T95R-44 | 0 | 136 | 136 | Overburden | Tenas_Lithology.csv |
| T95R-44 | 136 | 138 | 2 | VOLC | Tenas_Lithology.csv |
| T95R-45 | 0 | 1.01 | 1.01 | Overburden | Tenas_Lithology.csv |
| T95R-45 | 1.01 | 56 | 54.99 | VOLC | Tenas_Lithology.csv |
| T95R-46 | 0 | 3.01 | 3.01 | Overburden | Tenas_Lithology.csv |
| T95R-46 | 3.01 | 28.28 | 25.27 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 28.28 | 28.67 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-46 | 28.67 | 33.36 | 4.69 | MDST | Tenas_Lithology.csv |
| T95R-46 | 33.36 | 33.55 | 0.19 | COAL | Tenas_Lithology.csv |
| T95R-46 | 33.55 | 36.09 | 2.54 | MDST | Tenas_Lithology.csv |
| T95R-46 | 36.09 | 37.75 | 1.66 | COAL | Tenas_Lithology.csv |
| T95R-46 | 37.75 | 44.93 | 7.18 | MDST | Tenas_Lithology.csv |
| T95R-46 | 44.93 | 45.24 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-46 | 45.24 | 48.8 | 3.56 | MDST | Tenas_Lithology.csv |
| T95R-46 | 48.8 | 50.72 | 1.92 | COAL | Tenas_Lithology.csv |
| T95R-46 | 50.72 | 51.08 | 0.36 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-46 | 51.08 | 54.4 | 3.32 | COAL | Tenas_Lithology.csv |
| T95R-46 | 54.4 | 55.22 | 0.82 | MDST | Tenas_Lithology.csv |
| T95R-46 | 55.22 | 56.17 | 0.95 | COAL | Tenas_Lithology.csv |
| T95R-46 | 56.17 | 65 | 8.83 | SST | Tenas_Lithology.csv |
| T95R-46 | 65 | 66 | 1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-46 | 66 | 71.61 | 5.61 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 71.61 | 72.13 | 0.52 | COAL | Tenas_Lithology.csv |
| T95R-46 | 72.13 | 74.1 | 1.97 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 74.1 | 75.15 | 1.05 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-46 | 75.15 | 77.23 | 2.08 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 77.23 | 77.65 | 0.42 | COAL | Tenas_Lithology.csv |
| T95R-46 | 77.65 | 79.55 | 1.9 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 79.55 | 79.86 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-46 | 79.86 | 82.06 | 2.2 | MDST | Tenas_Lithology.csv |
| T95R-46 | 82.06 | 82.54 | 0.48 | COAL | Tenas_Lithology.csv |
| T95R-46 | 82.54 | 97.5 | 14.96 | SST | Tenas_Lithology.csv |
| T95R-50C | 0 | 6.15 | 6.15 | Overburden | Tenas_Lithology.csv |
| T95R-50C | 6.15 | 6.34 | 0.19 | MDST | Tenas_Lithology.csv |
| T95R-50C | 6.34 | 6.87 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-50C | 6.87 | 8.87 | 2 | MDST | Tenas_Lithology.csv |
| T95R-50C | 8.87 | 8.98 | 0.11 | COAL | Tenas_Lithology.csv |
| T95R-50C | 8.98 | 9.25 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-50C | 9.25 | 9.75 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-50C | 9.75 | 20.91 | 11.16 | MDST | Tenas_Lithology.csv |
| T95R-50C | 20.91 | 23.2 | 2.29 | COAL | Tenas_Lithology.csv |
| T95R-50C | 23.2 | 23.92 | 0.72 | MDST | Tenas_Lithology.csv |
| T95R-50C | 23.92 | 29.82 | 5.9 | COAL | Tenas_Lithology.csv |
| T95R-50C | 29.82 | 33.2 | 3.38 | SLTS | Tenas_Lithology.csv |
| T95R-50C | 33.2 | 33.7 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-50C | 33.7 | 35.39 | 1.69 | MDST | Tenas_Lithology.csv |
| T95R-50C | 35.39 | 35.61 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-50C | 35.61 | 83.8 | 48.19 | SST | Tenas_Lithology.csv |
| T95R-60 | 0 | 7.01 | 7.01 | Overburden | Tenas_Lithology.csv |
| T95R-60 | 7.01 | 13.13 | 6.12 | MDST | Tenas_Lithology.csv |
| T95R-60 | 13.13 | 13.48 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-60 | 13.48 | 18.94 | 5.46 | MDST | Tenas_Lithology.csv |
| T95R-60 | 18.94 | 19.28 | 0.34 | COAL | Tenas_Lithology.csv |
| T95R-60 | 19.28 | 19.7 | 0.42 | MDST | Tenas_Lithology.csv |
| T95R-60 | 19.7 | 20.29 | 0.59 | COAL | Tenas_Lithology.csv |
| T95R-60 | 20.29 | 31.23 | 10.94 | SLTS | Tenas_Lithology.csv |
| T95R-60 | 31.23 | 33.81 | 2.58 | COAL | Tenas_Lithology.csv |
| T95R-60 | 33.81 | 45.66 | 11.85 | SLTS | Tenas_Lithology.csv |
| T95R-60 | 45.66 | 46.15 | 0.49 | COAL | Tenas_Lithology.csv |
| T95R-60 | 46.15 | 57.87 | 11.72 | SLTS | Tenas_Lithology.csv |
| T95R-60 | 57.87 | 66.64 | 8.77 | COAL | Tenas_Lithology.csv |
| T95R-60 | 66.64 | 71.05 | 4.41 | MDST | Tenas_Lithology.csv |
| T95R-60 | 71.05 | 71.85 | 0.8 | COAL | Tenas_Lithology.csv |
| T95R-60 | 71.85 | 73.85 | 2 | MDST | Tenas_Lithology.csv |
| T95R-60 | 73.85 | 74.95 | 1.1 | COAL | Tenas_Lithology.csv |
| T95R-60 | 74.95 | 77.24 | 2.29 | MDST | Tenas_Lithology.csv |
| T95R-60 | 77.24 | 77.6 | 0.36 | COAL | Tenas_Lithology.csv |
| T95R-60 | 77.6 | 77.9 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-60 | 77.9 | 78.37 | 0.47 | COAL | Tenas_Lithology.csv |
| T95R-60 | 78.37 | 83.43 | 5.06 | MDST | Tenas_Lithology.csv |
| T95R-60 | 83.43 | 84.21 | 0.78 | COAL | Tenas_Lithology.csv |
| T95R-60 | 84.21 | 85.43 | 1.22 | MDST | Tenas_Lithology.csv |
| T95R-60 | 85.43 | 86.26 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-60 | 86.26 | 96.06 | 9.8 | SLTS | Tenas_Lithology.csv |
| T95R-60 | 96.06 | 96.89 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-60 | 96.89 | 101.2 | 4.31 | MDST | Tenas_Lithology.csv |
| T95R-60 | 101.2 | 115.7 | 14.5 | SST | Tenas_Lithology.csv |
| T95R-61 | 0 | 13.41 | 13.41 | Overburden | Tenas_Lithology.csv |
| T95R-61 | 13.41 | 20.6 | 7.19 | SST | Tenas_Lithology.csv |
| T95R-61 | 20.6 | 31.9 | 11.3 | SLTS | Tenas_Lithology.csv |
| T95R-61 | 31.9 | 51.23 | 19.33 | SST | Tenas_Lithology.csv |
| T95R-61 | 51.23 | 52.31 | 1.08 | COAL | Tenas_Lithology.csv |
| T95R-61 | 52.31 | 59.42 | 7.11 | SLTS | Tenas_Lithology.csv |
| T95R-61 | 59.42 | 59.8 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-61 | 59.8 | 66.6 | 6.8 | SLTS | Tenas_Lithology.csv |
| T95R-61 | 66.6 | 69.05 | 2.45 | COAL | Tenas_Lithology.csv |
| T95R-61 | 69.05 | 69.6 | 0.55 | MDST | Tenas_Lithology.csv |
| T95R-61 | 69.6 | 69.93 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-61 | 69.93 | 71.55 | 1.62 | MDST | Tenas_Lithology.csv |
| T95R-61 | 71.55 | 73.67 | 2.12 | COAL | Tenas_Lithology.csv |
| T95R-61 | 73.67 | 75.05 | 1.38 | MDST | Tenas_Lithology.csv |
| T95R-61 | 75.05 | 75.64 | 0.59 | COAL | Tenas_Lithology.csv |
| T95R-61 | 75.64 | 76.77 | 1.13 | MDST | Tenas_Lithology.csv |
| T95R-61 | 76.77 | 77.75 | 0.98 | COAL | Tenas_Lithology.csv |
| T95R-61 | 77.75 | 79.02 | 1.27 | MDST | Tenas_Lithology.csv |
| T95R-61 | 79.02 | 79.48 | 0.46 | COAL | Tenas_Lithology.csv |
| T95R-61 | 79.48 | 84.6 | 5.12 | SLTS | Tenas_Lithology.csv |
| T95R-61 | 84.6 | 84.91 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-61 | 84.91 | 86.6 | 1.69 | MDST | Tenas_Lithology.csv |
| T95R-61 | 86.6 | 87.37 | 0.77 | COAL | Tenas_Lithology.csv |
| T95R-61 | 87.37 | 93.06 | 5.69 | MDST | Tenas_Lithology.csv |
| T95R-61 | 93.06 | 93.47 | 0.41 | COAL | Tenas_Lithology.csv |
| T95R-61 | 93.47 | 104.7 | 11.23 | SST | Tenas_Lithology.csv |
| T95R-62 | 0 | 5.01 | 5.01 | Overburden | Tenas_Lithology.csv |
| T95R-62 | 5.01 | 34.25 | 29.24 | SLTS | Tenas_Lithology.csv |
| T95R-62 | 34.25 | 34.65 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-62 | 34.65 | 37.42 | 2.77 | SST | Tenas_Lithology.csv |
| T95R-62 | 37.42 | 37.88 | 0.46 | COAL | Tenas_Lithology.csv |
| T95R-62 | 37.88 | 42.36 | 4.48 | SLTS | Tenas_Lithology.csv |
| T95R-62 | 42.36 | 43.77 | 1.41 | COAL | Tenas_Lithology.csv |
| T95R-62 | 43.77 | 57.32 | 13.55 | SLTS | Tenas_Lithology.csv |
| T95R-62 | 57.32 | 58.55 | 1.23 | COAL | Tenas_Lithology.csv |
| T95R-62 | 58.55 | 60.2 | 1.65 | MDST | Tenas_Lithology.csv |
| T95R-62 | 60.2 | 61.03 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-62 | 61.03 | 66.27 | 5.24 | SLTS | Tenas_Lithology.csv |
| T95R-62 | 66.27 | 66.64 | 0.37 | COAL | Tenas_Lithology.csv |
| T95R-62 | 66.64 | 68.8 | 2.16 | SST | Tenas_Lithology.csv |
| T95R-62 | 68.8 | 81.3 | 12.5 | CGL | Tenas_Lithology.csv |
| T95R-62 | 81.3 | 90.7 | 9.4 | SST | Tenas_Lithology.csv |
| T95R-63 | 0 | 19 | 19 | Overburden | Tenas_Lithology.csv |
| T95R-63 | 19 | 20.51 | 1.51 | MDST | Tenas_Lithology.csv |
| T95R-63 | 20.51 | 21.13 | 0.62 | COAL | Tenas_Lithology.csv |
| T95R-63 | 21.13 | 24.89 | 3.76 | MDST | Tenas_Lithology.csv |
| T95R-63 | 24.89 | 25 | 0.11 | COAL | Tenas_Lithology.csv |
| T95R-63 | 25 | 25.83 | 0.83 | MDST | Tenas_Lithology.csv |
| T95R-63 | 25.83 | 26.81 | 0.98 | COAL | Tenas_Lithology.csv |
| T95R-63 | 26.81 | 30.2 | 3.39 | MDST | Tenas_Lithology.csv |
| T95R-63 | 30.2 | 34.65 | 4.45 | SST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-63 | 34.65 | 34.91 | 0.26 | COAL | Tenas_Lithology.csv |
| T95R-63 | 34.91 | 39.29 | 4.38 | MDST | Tenas_Lithology.csv |
| T95R-63 | 39.29 | 41.01 | 1.72 | COAL | Tenas_Lithology.csv |
| T95R-63 | 41.01 | 41.14 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-63 | 41.14 | 44.94 | 3.8 | COAL | Tenas_Lithology.csv |
| T95R-63 | 44.94 | 47.3 | 2.36 | MDST | Tenas_Lithology.csv |
| T95R-63 | 47.3 | 48.2 | 0.9 | COAL | Tenas_Lithology.csv |
| T95R-63 | 48.2 | 48.9 | 0.7 | MDST | Tenas_Lithology.csv |
| T95R-63 | 48.9 | 49.63 | 0.73 | COAL | Tenas_Lithology.csv |
| T95R-63 | 49.63 | 50.78 | 1.15 | MDST | Tenas_Lithology.csv |
| T95R-63 | 50.78 | 51.28 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-63 | 51.28 | 55.01 | 3.73 | SLTS | Tenas_Lithology.csv |
| T95R-63 | 55.01 | 55.4 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-63 | 55.4 | 57.5 | 2.1 | SST | Tenas_Lithology.csv |
| T95R-63 | 57.5 | 58.15 | 0.65 | COAL | Tenas_Lithology.csv |
| T95R-63 | 58.15 | 65.48 | 7.33 | MDST | Tenas_Lithology.csv |
| T95R-63 | 65.48 | 65.78 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-63 | 65.78 | 78.7 | 12.92 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 0 | 10.01 | 10.01 | Overburden | Tenas_Lithology.csv |
| T95R-64 | 10.01 | 54.05 | 44.04 | SST | Tenas_Lithology.csv |
| T95R-64 | 54.05 | 64.55 | 10.5 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 64.55 | 64.95 | 0.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 64.95 | 69.54 | 4.59 | MDST | Tenas_Lithology.csv |
| T95R-64 | 69.54 | 69.9 | 0.36 | COAL | Tenas_Lithology.csv |
| T95R-64 | 69.9 | 70.75 | 0.85 | MDST | Tenas_Lithology.csv |
| T95R-64 | 70.75 | 71.08 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-64 | 71.08 | 75.35 | 4.27 | MDST | Tenas_Lithology.csv |
| T95R-64 | 75.35 | 76.14 | 0.79 | COAL | Tenas_Lithology.csv |
| T95R-64 | 76.14 | 76.32 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 76.32 | 77.1 | 0.78 | COAL | Tenas_Lithology.csv |
| T95R-64 | 77.1 | 82.25 | 5.15 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 82.25 | 82.49 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 82.49 | 86.13 | 3.64 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 86.13 | 89 | 2.87 | COAL | Tenas_Lithology.csv |
| T95R-64 | 89 | 89.35 | 0.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 89.35 | 89.51 | 0.16 | COAL | Tenas_Lithology.csv |
| T95R-64 | 89.51 | 89.75 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 89.75 | 92.3 | 2.55 | COAL | Tenas_Lithology.csv |
| T95R-64 | 92.3 | 94.65 | 2.35 | MDST | Tenas_Lithology.csv |
| T95R-64 | 94.65 | 95.05 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-64 | 95.05 | 96.6 | 1.55 | MDST | Tenas_Lithology.csv |
| T95R-64 | 96.6 | 97.43 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-64 | 97.43 | 105.58 | 8.15 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 105.58 | 105.84 | 0.26 | COAL | Tenas_Lithology.csv |
| T95R-64 | 105.84 | 107.3 | 1.46 | MDST | Tenas_Lithology.csv |
| T95R-64 | 107.3 | 108.17 | 0.87 | COAL | Tenas_Lithology.csv |
| T95R-64 | 108.17 | 116.47 | 8.3 | SST | Tenas_Lithology.csv |
| T95R-64 | 116.47 | 116.87 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-64 | 116.87 | 128.9 | 12.03 | SST | Tenas_Lithology.csv |
| T95R-65 | 0 | 14 | 14 | Overburden | Tenas_Lithology.csv |
| T95R-65 | 14 | 78.6 | 64.6 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 78.6 | 82.5 | 3.9 | MDST | Tenas_Lithology.csv |
| T95R-65 | 82.5 | 98.12 | 15.62 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 98.12 | 99.19 | 1.07 | COAL | Tenas_Lithology.csv |
| T95R-65 | 99.19 | 109.55 | 10.36 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 109.55 | 110.05 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-65 | 110.05 | 117.67 | 7.62 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 117.67 | 120.15 | 2.48 | COAL | Tenas_Lithology.csv |
| T95R-65 | 120.15 | 120.31 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-65 | 120.31 | 123.44 | 3.13 | COAL | Tenas_Lithology.csv |
| T95R-65 | 123.44 | 125.45 | 2.01 | MDST | Tenas_Lithology.csv |
| T95R-65 | 125.45 | 125.89 | 0.44 | COAL | Tenas_Lithology.csv |
| T95R-65 | 125.89 | 127.22 | 1.33 | MDST | Tenas_Lithology.csv |
| T95R-65 | 127.22 | 128.28 | 1.06 | COAL | Tenas_Lithology.csv |
| T95R-65 | 128.28 | 128.45 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-65 | 128.45 | 129 | 0.55 | COAL | Tenas_Lithology.csv |
| T95R-65 | 129 | 133.18 | 4.18 | MDST | Tenas_Lithology.csv |
| T95R-65 | 133.18 | 133.55 | 0.37 | COAL | Tenas_Lithology.csv |
| T95R-65 | 133.55 | 137.1 | 3.55 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 137.1 | 137.5 | 0.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-65 | 137.5 | 140.66 | 3.16 | MDST | Tenas_Lithology.csv |
| T95R-65 | 140.66 | 141.05 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-65 | 141.05 | 141.31 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-65 | 141.31 | 142.3 | 0.99 | COAL | Tenas_Lithology.csv |
| T95R-65 | 142.3 | 144.94 | 2.64 | SST | Tenas_Lithology.csv |
| T95R-65 | 144.94 | 145.67 | 0.73 | COAL | Tenas_Lithology.csv |
| T95R-65 | 145.67 | 148.9 | 3.23 | MDST | Tenas_Lithology.csv |
| T95R-65 | 148.9 | 159.2 | 10.3 | SST | Tenas_Lithology.csv |
| T95R-66 | 0 | 15.01 | 15.01 | Overburden | Tenas_Lithology.csv |
| T95R-66 | 15.01 | 21.1 | 6.09 | MDST | Tenas_Lithology.csv |
| T95R-66 | 21.1 | 66.52 | 45.42 | SST | Tenas_Lithology.csv |
| T95R-66 | 66.52 | 75.92 | 9.4 | SLTS | Tenas_Lithology.csv |
| T95R-66 | 75.92 | 76.31 | 0.39 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-66 | 76.31 | 76.92 | 0.61 | MDST | Tenas_Lithology.csv |
| T95R-66 | 76.92 | 77.23 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-66 | 77.23 | 80.9 | 3.67 | MDST | Tenas_Lithology.csv |
| T95R-66 | 80.9 | 81.33 | 0.43 | COAL | Tenas_Lithology.csv |
| T95R-66 | 81.33 | 90.47 | 9.14 | MDST | Tenas_Lithology.csv |
| T95R-66 | 90.47 | 90.92 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-66 | 90.92 | 97.1 | 6.18 | MDST | Tenas_Lithology.csv |
| T95R-66 | 97.1 | 97.2 | 0.1 | COAL | Tenas_Lithology.csv |
| T95R-66 | 97.2 | 99.36 | 2.16 | MDST | Tenas_Lithology.csv |
| T95R-66 | 99.36 | 100.87 | 1.51 | COAL | Tenas_Lithology.csv |
| T95R-66 | 100.87 | 102.15 | 1.28 | MDST | Tenas_Lithology.csv |
| T95R-66 | 102.15 | 102.75 | 0.6 | COAL | Tenas_Lithology.csv |
| T95R-66 | 102.75 | 108.1 | 5.35 | MDST | Tenas_Lithology.csv |
| T95R-66 | 108.1 | 108.25 | 0.15 | COAL | Tenas_Lithology.csv |
| T95R-66 | 108.25 | 109.25 | 1 | MDST | Tenas_Lithology.csv |
| T95R-66 | 109.25 | 109.7 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-66 | 109.7 | 117.7 | 8 | MDST | Tenas_Lithology.csv |
| T95R-66 | 117.7 | 151 | 33.3 | SST | Tenas_Lithology.csv |
| T95R-67 | 0 | 2.01 | 2.01 | Overburden | Tenas_Lithology.csv |
| T95R-67 | 2.01 | 5.35 | 3.34 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-67 | 5.35 | 6.88 | 1.53 | COAL | Tenas_Lithology.csv |
| T95R-67 | 6.88 | 12.85 | 5.97 | MDST | Tenas_Lithology.csv |
| T95R-67 | 12.85 | 13.15 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-67 | 13.15 | 15.32 | 2.17 | MDST | Tenas_Lithology.csv |
| T95R-67 | 15.32 | 17.17 | 1.85 | COAL | Tenas_Lithology.csv |
| T95R-67 | 17.17 | 18.25 | 1.08 | MDST | Tenas_Lithology.csv |
| T95R-67 | 18.25 | 22.08 | 3.83 | COAL | Tenas_Lithology.csv |
| T95R-67 | 22.08 | 23.37 | 1.29 | MDST | Tenas_Lithology.csv |
| T95R-67 | 23.37 | 23.67 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-67 | 23.67 | 33.11 | 9.44 | SLTS | Tenas_Lithology.csv |
| T95R-67 | 33.11 | 33.54 | 0.43 | COAL | Tenas_Lithology.csv |
| T95R-67 | 33.54 | 38.02 | 4.48 | SLTS | Tenas_Lithology.csv |
| T95R-67 | 38.02 | 39.61 | 1.59 | MDST | Tenas_Lithology.csv |
| T95R-67 | 39.61 | 39.92 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-67 | 39.92 | 55 | 15.08 | SST | Tenas_Lithology.csv |
| T95R-68 | 0 | 4.51 | 4.51 | Overburden | Tenas_Lithology.csv |
| T95R-68 | 4.51 | 17.65 | 13.14 | MDST | Tenas_Lithology.csv |
| T95R-68 | 17.65 | 23.1 | 5.45 | SLTS | Tenas_Lithology.csv |
| T95R-68 | 23.1 | 24.9 | 1.8 | SST | Tenas_Lithology.csv |
| T95R-68 | 24.9 | 26.64 | 1.74 | MDST | Tenas_Lithology.csv |
| T95R-68 | 26.64 | 27.02 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-68 | 27.02 | 30.11 | 3.09 | MDST | Tenas_Lithology.csv |
| T95R-68 | 30.11 | 30.33 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-68 | 30.33 | 30.8 | 0.47 | MDST | Tenas_Lithology.csv |
| T95R-68 | 30.8 | 31.02 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-68 | 31.02 | 32.9 | 1.88 | MDST | Tenas_Lithology.csv |
| T95R-68 | 32.9 | 33.16 | 0.26 | COAL | Tenas_Lithology.csv |
| T95R-68 | 33.16 | 34.75 | 1.59 | MDST | Tenas_Lithology.csv |
| T95R-68 | 34.75 | 36.34 | 1.59 | COAL | Tenas_Lithology.csv |
| T95R-68 | 36.34 | 43.48 | 7.14 | MDST | Tenas_Lithology.csv |
| T95R-68 | 43.48 | 43.7 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-68 | 43.7 | 50.31 | 6.61 | MDST | Tenas_Lithology.csv |
| T95R-68 | 50.31 | 51.95 | 1.64 | COAL | Tenas_Lithology.csv |
| T95R-68 | 51.95 | 52.15 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-68 | 52.15 | 56.25 | 4.1 | COAL | Tenas_Lithology.csv |
| T95R-68 | 56.25 | 60.24 | 3.99 | SLTS | Tenas_Lithology.csv |
| T95R-68 | 60.24 | 60.52 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-68 | 60.52 | 60.67 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-68 | 60.67 | 60.82 | 0.15 | COAL | Tenas_Lithology.csv |
| T95R-68 | 60.82 | 61.02 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-68 | 61.02 | 61.86 | 0.84 | COAL | Tenas_Lithology.csv |
| T95R-68 | 61.86 | 62.5 | 0.64 | MDST | Tenas_Lithology.csv |
| T95R-68 | 62.5 | 63.27 | 0.77 | COAL | Tenas_Lithology.csv |
| T95R-68 | 63.27 | 64 | 0.73 | MDST | Tenas_Lithology.csv |
| T95R-68 | 64 | 64.22 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-68 | 64.22 | 67.38 | 3.16 | MDST | Tenas_Lithology.csv |
| T95R-68 | 67.38 | 67.9 | 0.52 | COAL | Tenas_Lithology.csv |
| T95R-68 | 67.9 | 73.69 | 5.79 | MDST | Tenas_Lithology.csv |
| T95R-68 | 73.69 | 73.97 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-68 | 73.97 | 96.6 | 22.63 | SST | Tenas_Lithology.csv |
| T95R-68 | 96.6 | 107.57 | 10.97 | SLTS | Tenas_Lithology.csv |
| T95R-68 | 107.57 | 120 | 12.43 | SST | Tenas_Lithology.csv |
| T95R-69 | 0 | 6.3 | 6.3 | Overburden | Tenas_Lithology.csv |
| T95R-69 | 6.3 | 15.15 | 8.85 | MDST | Tenas_Lithology.csv |
| T95R-69 | 15.15 | 15.45 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-69 | 15.45 | 19.58 | 4.13 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 19.58 | 20.11 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-69 | 20.11 | 23.27 | 3.16 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 23.27 | 25.05 | 1.78 | COAL | Tenas_Lithology.csv |
| T95R-69 | 25.05 | 32.25 | 7.2 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 32.25 | 32.55 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-69 | 32.55 | 35.4 | 2.85 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 35.4 | 37.3 | 1.9 | COAL | Tenas_Lithology.csv |
| T95R-69 | 37.3 | 38.25 | 0.95 | MDST | Tenas_Lithology.csv |
| T95R-69 | 38.25 | 41.78 | 3.53 | COAL | Tenas_Lithology.csv |
| T95R-69 | 41.78 | 42.13 | 0.35 | MDST | Tenas_Lithology.csv |
| T95R-69 | 42.13 | 42.65 | 0.52 | COAL | Tenas_Lithology.csv |
| T95R-69 | 42.65 | 43.69 | 1.04 | MDST | Tenas_Lithology.csv |
| T95R-69 | 43.69 | 44.05 | 0.36 | COAL | Tenas_Lithology.csv |
| T95R-69 | 44.05 | 53.2 | 9.15 | SST | Tenas_Lithology.csv |
| T95R-69 | 53.2 | 55.38 | 2.18 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 55.38 | 56.03 | 0.65 | COAL | Tenas_Lithology.csv |
| T95R-69 | 56.03 | 60.41 | 4.38 | SST | Tenas_Lithology.csv |
| T95R-69 | 60.41 | 63.1 | 2.69 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 63.1 | 63.43 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-69 | 63.43 | 80 | 16.57 | SST | Tenas_Lithology.csv |
| T95R-70 | 0 | 9.01 | 9.01 | Overburden | Tenas_Lithology.csv |
| T95R-70 | 9.01 | 16.7 | 7.69 | SLTS | Tenas_Lithology.csv |
| T95R-70 | 16.7 | 20.53 | 3.83 | SST | Tenas_Lithology.csv |
| T95R-70 | 20.53 | 28.49 | 7.96 | CGL | Tenas_Lithology.csv |
| T95R-70 | 28.49 | 80.8 | 52.31 | SST | Tenas_Lithology.csv |
| T95R-70 | 80.8 | 105 | 24.2 | CGL | Tenas_Lithology.csv |
| T95R-71 | 0 | 12.01 | 12.01 | Overburden | Tenas_Lithology.csv |
| T95R-71 | 12.01 | 20.51 | 8.5 | SLTS | Tenas_Lithology.csv |
| T95R-71 | 20.51 | 24.5 | 3.99 | MDST | Tenas_Lithology.csv |
| T95R-71 | 24.5 | 26 | 1.5 | SST | Tenas_Lithology.csv |
| T95R-71 | 26 | 30.15 | 4.15 | SLTS | Tenas_Lithology.csv |
| T95R-71 | 30.15 | 30.44 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-71 | 30.44 | 34.65 | 4.21 | SST | Tenas_Lithology.csv |
| T95R-71 | 34.65 | 35.31 | 0.66 | COAL | Tenas_Lithology.csv |
| T95R-71 | 35.31 | 36.24 | 0.93 | MDST | Tenas_Lithology.csv |
| T95R-71 | 36.24 | 38.35 | 2.11 | COAL | Tenas_Lithology.csv |
| T95R-71 | 38.35 | 54.46 | 16.11 | SST | Tenas_Lithology.csv |
| T95R-71 | 54.46 | 57.52 | 3.06 | COAL | Tenas_Lithology.csv |
| T95R-71 | 57.52 | 57.66 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-71 | 57.66 | 60.56 | 2.9 | COAL | Tenas_Lithology.csv |
| T95R-71 | 60.56 | 62.3 | 1.74 | MDST | Tenas_Lithology.csv |
| T95R-71 | 62.3 | 62.85 | 0.55 | COAL | Tenas_Lithology.csv |
| T95R-71 | 62.85 | 64.64 | 1.79 | MDST | Tenas_Lithology.csv |
| T95R-71 | 64.64 | 65.29 | 0.65 | COAL | Tenas_Lithology.csv |
| T95R-71 | 65.29 | 66.09 | 0.8 | MDST | Tenas_Lithology.csv |
| T95R-71 | 66.09 | 66.84 | 0.75 | COAL | Tenas_Lithology.csv |
| T95R-71 | 66.84 | 67.54 | 0.7 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-71 | 67.54 | 67.92 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-71 | 67.92 | 75.11 | 7.19 | MDST | Tenas_Lithology.csv |
| T95R-71 | 75.11 | 75.9 | 0.79 | COAL | Tenas_Lithology.csv |
| T95R-71 | 75.9 | 80 | 4.1 | SLTS | Tenas_Lithology.csv |
| T95R-71 | 80 | 80.19 | 0.19 | MDST | Tenas_Lithology.csv |
| T95R-71 | 80.19 | 82.57 | 2.38 | SST | Tenas_Lithology.csv |
| T95R-71 | 82.57 | 82.78 | 0.21 | COAL | Tenas_Lithology.csv |
| T95R-71 | 82.78 | 97.5 | 14.72 | SST | Tenas_Lithology.csv |
| T95R-74 | 0 | 4.01 | 4.01 | Overburden | Tenas_Lithology.csv |
| T95R-74 | 4.01 | 9.12 | 5.11 | MDST | Tenas_Lithology.csv |
| T95R-74 | 9.12 | 14.4 | 5.28 | COAL | Tenas_Lithology.csv |
| T95R-74 | 14.4 | 17.86 | 3.46 | MDST | Tenas_Lithology.csv |
| T95R-74 | 17.86 | 18.15 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-74 | 18.15 | 18.74 | 0.59 | MDST | Tenas_Lithology.csv |
| T95R-74 | 18.74 | 19.29 | 0.55 | COAL | Tenas_Lithology.csv |
| T95R-74 | 19.29 | 22.45 | 3.16 | MDST | Tenas_Lithology.csv |
| T95R-74 | 22.45 | 22.74 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-74 | 22.74 | 24.13 | 1.39 | MDST | Tenas_Lithology.csv |
| T95R-74 | 24.13 | 24.76 | 0.63 | COAL | Tenas_Lithology.csv |
| T95R-74 | 24.76 | 27.42 | 2.66 | SST | Tenas_Lithology.csv |
| T95R-74 | 27.42 | 27.8 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-74 | 27.8 | 34.29 | 6.49 | SST | Tenas_Lithology.csv |
| T95R-74 | 34.29 | 34.65 | 0.36 | COAL | Tenas_Lithology.csv |
| T95R-74 | 34.65 | 61.5 | 26.85 | SST | Tenas_Lithology.csv |
| T95R-76 | 0 | 3.01 | 3.01 | Overburden | Tenas_Lithology.csv |
| T95R-76 | 3.01 | 8.7 | 5.69 | MDST | Tenas_Lithology.csv |
| T95R-76 | 8.7 | 10.73 | 2.03 | COAL | Tenas_Lithology.csv |
| T95R-76 | 10.73 | 13.68 | 2.95 | MDST | Tenas_Lithology.csv |
| T95R-76 | 13.68 | 16 | 2.32 | COAL | Tenas_Lithology.csv |
| T95R-76 | 16 | 16.18 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-76 | 16.18 | 18.4 | 2.22 | COAL | Tenas_Lithology.csv |
| T95R-76 | 18.4 | 18.98 | 0.58 | MDST | Tenas_Lithology.csv |
| T95R-76 | 18.98 | 19.48 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-76 | 19.48 | 19.91 | 0.43 | MDST | Tenas_Lithology.csv |
| T95R-76 | 19.91 | 20.52 | 0.61 | COAL | Tenas_Lithology.csv |
| T95R-76 | 20.52 | 26.6 | 6.08 | MDST | Tenas_Lithology.csv |
| T95R-76 | 26.6 | 30.7 | 4.1 | SST | Tenas_Lithology.csv |
| T95R-76 | 30.7 | 31.15 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-76 | 31.15 | 32.46 | 1.31 | MDST | Tenas_Lithology.csv |
| T95R-76 | 32.46 | 32.59 | 0.13 | COAL | Tenas_Lithology.csv |
| T95R-76 | 32.59 | 35.24 | 2.65 | SST | Tenas_Lithology.csv |
| T95R-76 | 35.24 | 35.42 | 0.18 | COAL | Tenas_Lithology.csv |
| T95R-76 | 35.42 | 39.43 | 4.01 | MDST | Tenas_Lithology.csv |
| T95R-76 | 39.43 | 39.74 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-76 | 39.74 | 45.2 | 5.46 | SST | Tenas_Lithology.csv |
| T95R-76 | 45.2 | 54.4 | 9.2 | MDST | Tenas_Lithology.csv |
| T95R-76 | 54.4 | 62.05 | 7.65 | CGL | Tenas_Lithology.csv |
| T95R-76 | 62.05 | 73 | 10.95 | SST | Tenas_Lithology.csv |
| T95R-77 | 0 | 9.11 | 9.11 | Overburden | Tenas_Lithology.csv |
| T95R-77 | 9.11 | 23.8 | 14.69 | SLTS | Tenas_Lithology.csv |
| T95R-77 | 23.8 | 33.5 | 9.7 | MDST | Tenas_Lithology.csv |
| T95R-77 | 33.5 | 34.1 | 0.6 | SST | Tenas_Lithology.csv |
| T95R-77 | 34.1 | 39.3 | 5.2 | MDST | Tenas_Lithology.csv |
| T95R-77 | 39.3 | 40.8 | 1.5 | SST | Tenas_Lithology.csv |
| T95R-77 | 40.8 | 44.7 | 3.9 | MDST | Tenas_Lithology.csv |
| T95R-77 | 44.7 | 46 | 1.3 | SST | Tenas_Lithology.csv |
| T95R-77 | 46 | 55.3 | 9.3 | CGL | Tenas_Lithology.csv |
| T95R-77 | 55.3 | 70 | 14.7 | VOLC | Tenas_Lithology.csv |
| T95R-78 | 0 | 2.01 | 2.01 | Overburden | Tenas_Lithology.csv |
| T95R-78 | 2.01 | 11.29 | 9.28 | SLTS | Tenas_Lithology.csv |
| T95R-78 | 11.29 | 11.61 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-78 | 11.61 | 12.78 | 1.17 | MDST | Tenas_Lithology.csv |
| T95R-78 | 12.78 | 13.12 | 0.34 | COAL | Tenas_Lithology.csv |
| T95R-78 | 13.12 | 17.59 | 4.47 | MDST | Tenas_Lithology.csv |
| T95R-78 | 17.59 | 17.89 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-78 | 17.89 | 20.45 | 2.56 | SST | Tenas_Lithology.csv |
| T95R-78 | 20.45 | 22.75 | 2.3 | MDST | Tenas_Lithology.csv |
| T95R-78 | 22.75 | 55 | 32.25 | SST | Tenas_Lithology.csv |
| T95R-78 | 55 | 56.95 | 1.95 | CGL | Tenas_Lithology.csv |
| T95R-78 | 56.95 | 74 | 17.05 | SST | Tenas_Lithology.csv |
| T95R-79 | 0 | 13.7 | 13.7 | Overburden | Tenas_Lithology.csv |
| T95R-79 | 13.7 | 14.45 | 0.75 | MDST | Tenas_Lithology.csv |
| T95R-79 | 14.45 | 14.72 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-79 | 14.72 | 16.34 | 1.62 | MDST | Tenas_Lithology.csv |
| T95R-79 | 16.34 | 18.6 | 2.26 | COAL | Tenas_Lithology.csv |
| T95R-79 | 18.6 | 28.79 | 10.19 | MDST | Tenas_Lithology.csv |
| T95R-79 | 28.79 | 29.08 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-79 | 29.08 | 29.89 | 0.81 | MDST | Tenas_Lithology.csv |
| T95R-79 | 29.89 | 30.36 | 0.47 | COAL | Tenas_Lithology.csv |
| T95R-79 | 30.36 | 31.2 | 0.84 | MDST | Tenas_Lithology.csv |
| T95R-79 | 31.2 | 31.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-79 | 31.4 | 33.33 | 1.93 | MDST | Tenas_Lithology.csv |
| T95R-79 | 33.33 | 33.73 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-79 | 33.73 | 36.5 | 2.77 | MDST | Tenas_Lithology.csv |
| T95R-79 | 36.5 | 40.51 | 4.01 | SLTS | Tenas_Lithology.csv |
| T95R-79 | 40.51 | 48.9 | 8.39 | SST | Tenas_Lithology.csv |
| T95R-79 | 48.9 | 52 | 3.1 | CGL | Tenas_Lithology.csv |
| T95R-79 | 52 | 53 | 1 | SLTS | Tenas_Lithology.csv |
| T95R-79 | 53 | 55 | 2 | SST | Tenas_Lithology.csv |
| T95R-80 | 0 | 5.01 | 5.01 | Overburden | Tenas_Lithology.csv |
| T95R-80 | 5.01 | 6.25 | 1.24 | MDST | Tenas_Lithology.csv |
| T95R-80 | 6.25 | 9.89 | 3.64 | COAL | Tenas_Lithology.csv |
| T95R-80 | 9.89 | 10.26 | 0.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-80 | 10.26 | 10.8 | 0.54 | COAL | Tenas_Lithology.csv |
| T95R-80 | 10.8 | 22.57 | 11.77 | SLTS | Tenas_Lithology.csv |
| T95R-80 | 22.57 | 23.05 | 0.48 | COAL | Tenas_Lithology.csv |
| T95R-80 | 23.05 | 23.55 | 0.5 | MDST | Tenas_Lithology.csv |
| T95R-80 | 23.55 | 24.54 | 0.99 | COAL | Tenas_Lithology.csv |
| T95R-80 | 24.54 | 28.85 | 4.31 | SLTS | Tenas_Lithology.csv |
| T95R-80 | 28.85 | 29.13 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-80 | 29.13 | 31.54 | 2.41 | SLTS | Tenas_Lithology.csv |
| T95R-80 | 31.54 | 31.87 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-80 | 31.87 | 46.75 | 14.88 | SST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-80 | 46.75 | 51 | 4.25 | CGL | Tenas_Lithology.csv |
| T95R-80 | 51 | 62 | 11 | SST | Tenas_Lithology.csv |
| T95R-81 | 0 | 9 | 9 | Overburden | Tenas_Lithology.csv |
| T95R-81 | 9 | 20.4 | 11.4 | MDST | Tenas_Lithology.csv |
| T95R-81 | 20.4 | 22.2 | 1.8 | SLTS | Tenas_Lithology.csv |
| T95R-81 | 22.2 | 24.76 | 2.56 | MDST | Tenas_Lithology.csv |
| T95R-81 | 24.76 | 24.98 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-81 | 24.98 | 28.05 | 3.07 | SLTS | Tenas_Lithology.csv |
| T95R-81 | 28.05 | 28.74 | 0.69 | COAL | Tenas_Lithology.csv |
| T95R-81 | 28.74 | 35.49 | 6.75 | SLTS | Tenas_Lithology.csv |
| T95R-81 | 35.49 | 37.26 | 1.77 | COAL | Tenas_Lithology.csv |
| T95R-81 | 37.26 | 37.5 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-81 | 37.5 | 38.49 | 0.99 | COAL | Tenas_Lithology.csv |
| T95R-81 | 38.49 | 41 | 2.51 | MDST | Tenas_Lithology.csv |
| T95R-81 | 41 | 41.2 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-81 | 41.2 | 44.25 | 3.05 | MDST | Tenas_Lithology.csv |
| T95R-81 | 44.25 | 44.49 | 0.24 | COAL | Tenas_Lithology.csv |
| T95R-81 | 44.49 | 45.1 | 0.61 | MDST | Tenas_Lithology.csv |
| T95R-81 | 45.1 | 45.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-81 | 45.4 | 48.42 | 3.02 | CGL | Tenas_Lithology.csv |
| T95R-81 | 48.42 | 48.79 | 0.37 | COAL | Tenas_Lithology.csv |
| T95R-81 | 48.79 | 52.33 | 3.54 | MDST | Tenas_Lithology.csv |
| T95R-81 | 52.33 | 52.75 | 0.42 | COAL | Tenas_Lithology.csv |
| T95R-81 | 52.75 | 53.56 | 0.81 | MDST | Tenas_Lithology.csv |
| T95R-81 | 53.56 | 53.85 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-81 | 53.85 | 57.8 | 3.95 | MDST | Tenas_Lithology.csv |
| T95R-81 | 57.8 | 60.2 | 2.4 | SST | Tenas_Lithology.csv |
| T95R-81 | 60.2 | 67.85 | 7.65 | CGL | Tenas_Lithology.csv |
| T95R-81 | 67.85 | 80 | 12.15 | SST | Tenas_Lithology.csv |
| T96R-01 | 0 | 6.27 | 6.27 | Overburden | Tenas_Lithology.csv |
| T96R-01 | 6.27 | 11 | 4.73 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 11 | 13.5 | 2.5 | MDST | Tenas_Lithology.csv |
| T96R-01 | 13.5 | 16 | 2.5 | SST | Tenas_Lithology.csv |
| T96R-01 | 16 | 26 | 10 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 26 | 34.6 | 8.6 | MDST | Tenas_Lithology.csv |
| T96R-01 | 34.6 | 38 | 3.4 | SST | Tenas_Lithology.csv |
| T96R-01 | 38 | 58 | 20 | MDST | Tenas_Lithology.csv |
| T96R-01 | 58 | 67 | 9 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 67 | 70.2 | 3.2 | SST | Tenas_Lithology.csv |
| T96R-01 | 70.2 | 85.95 | 15.75 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 85.95 | 86.97 | 1.02 | COAL | Tenas_Lithology.csv |
| T96R-01 | 86.97 | 91.7 | 4.73 | SST | Tenas_Lithology.csv |
| T96R-01 | 91.7 | 95.5 | 3.8 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 95.5 | 95.7 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-01 | 95.7 | 103.33 | 7.63 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 103.33 | 105.37 | 2.04 | COAL | Tenas_Lithology.csv |
| T96R-01 | 105.37 | 105.47 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-01 | 105.47 | 109.53 | 4.06 | COAL | Tenas_Lithology.csv |
| T96R-01 | 109.53 | 114.15 | 4.62 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 114.15 | 114.7 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-01 | 114.7 | 115.87 | 1.17 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 115.87 | 117.02 | 1.15 | COAL | Tenas_Lithology.csv |
| T96R-01 | 117.02 | 119.58 | 2.56 | SST | Tenas_Lithology.csv |
| T96R-01 | 119.58 | 120.02 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-01 | 120.02 | 120.89 | 0.87 | MDST | Tenas_Lithology.csv |
| T96R-01 | 120.89 | 121.1 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-01 | 121.1 | 130.64 | 9.54 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 130.64 | 130.87 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-01 | 130.87 | 131.17 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-01 | 131.17 | 132.25 | 1.08 | COAL | Tenas_Lithology.csv |
| T96R-01 | 132.25 | 133.15 | 0.9 | MDST | Tenas_Lithology.csv |
| T96R-01 | 133.15 | 133.31 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-01 | 133.31 | 133.57 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-01 | 133.57 | 134.93 | 1.36 | COAL | Tenas_Lithology.csv |
| T96R-01 | 134.93 | 137.71 | 2.78 | SST | Tenas_Lithology.csv |
| T96R-01 | 137.71 | 138.23 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-01 | 138.23 | 148.6 | 10.37 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 148.6 | 153.3 | 4.7 | SST | Tenas_Lithology.csv |
| T96R-01 | 153.3 | 153.8 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-01 | 153.8 | 168.8 | 15 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 168.8 | 195.2 | 26.4 | SST | Tenas_Lithology.csv |
| T96R-02 | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T96R-02 | 6 | 32 | 26 | SLTS | Tenas_Lithology.csv |
| T96R-02 | 32 | 35 | 3 | SST | Tenas_Lithology.csv |
| T96R-02 | 35 | 66.03 | 31.03 | MDST | Tenas_Lithology.csv |
| T96R-02 | 66.03 | 66.36 | 0.33 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-02 | 66.36 | 67.79 | 1.43 | MDST | Tenas_Lithology.csv |
| T96R-02 | 67.79 | 69.06 | 1.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-02 | 69.06 | 70.5 | 1.44 | SLTS | Tenas_Lithology.csv |
| T96R-02 | 70.5 | 71.5 | 1 | SST | Tenas_Lithology.csv |
| T96R-02 | 71.5 | 77 | 5.5 | CGL | Tenas_Lithology.csv |
| T96R-02 | 77 | 90.7 | 13.7 | VOLC | Tenas_Lithology.csv |
| T96R-03 | 0 | 13.71 | 13.71 | Overburden | Tenas_Lithology.csv |
| T96R-03 | 13.71 | 55.8 | 42.09 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 55.8 | 64.9 | 9.1 | SST | Tenas_Lithology.csv |
| T96R-03 | 64.9 | 65.19 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-03 | 65.19 | 69.88 | 4.69 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 69.88 | 70.02 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-03 | 70.02 | 72.65 | 2.63 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 72.65 | 72.79 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-03 | 72.79 | 78 | 5.21 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 78 | 80.98 | 2.98 | MDST | Tenas_Lithology.csv |
| T96R-03 | 80.98 | 82.52 | 1.54 | COAL | Tenas_Lithology.csv |
| T96R-03 | 82.52 | 83.14 | 0.62 | MDST | Tenas_Lithology.csv |
| T96R-03 | 83.14 | 83.34 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-03 | 83.34 | 84.8 | 1.46 | MDST | Tenas_Lithology.csv |
| T96R-03 | 84.8 | 84.95 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-03 | 84.95 | 85.31 | 0.36 | MDST | Tenas_Lithology.csv |
| T96R-03 | 85.31 | 87.74 | 2.43 | COAL | Tenas_Lithology.csv |
| T96R-03 | 87.74 | 90.08 | 2.34 | MDST | Tenas_Lithology.csv |
| T96R-03 | 90.08 | 90.41 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-03 | 90.41 | 91.3 | 0.89 | MDST | Tenas_Lithology.csv |
| T96R-03 | 91.3 | 92.03 | 0.73 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-03 | 92.03 | 92.57 | 0.54 | MDST | Tenas_Lithology.csv |
| T96R-03 | 92.57 | 93.28 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-03 | 93.28 | 95.45 | 2.17 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 95.45 | 97.1 | 1.65 | SST | Tenas_Lithology.csv |
| T96R-03 | 97.1 | 97.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-03 | 97.4 | 102 | 4.6 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 102 | 106.5 | 4.5 | SST | Tenas_Lithology.csv |
| T96R-03 | 106.5 | 106.8 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-03 | 106.8 | 114.3 | 7.5 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 114.3 | 135.1 | 20.8 | SST | Tenas_Lithology.csv |
| T96R-04C | 0 | 3.05 | 3.05 | Overburden | Tenas_Lithology.csv |
| T96R-04C | 3.05 | 6 | 2.95 | MDST | Tenas_Lithology.csv |
| T96R-04C | 6 | 14.38 | 8.38 | SST | Tenas_Lithology.csv |
| T96R-04C | 14.38 | 14.63 | 0.25 | SLTS | Tenas_Lithology.csv |
| T96R-04C | 14.63 | 15.17 | 0.54 | COAL | Tenas_Lithology.csv |
| T96R-04C | 15.17 | 16.74 | 1.57 | SLTS | Tenas_Lithology.csv |
| T96R-04C | 16.74 | 16.92 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-04C | 16.92 | 17.46 | 0.54 | MDST | Tenas_Lithology.csv |
| T96R-04C | 17.46 | 18.98 | 1.52 | COAL | Tenas_Lithology.csv |
| T96R-04C | 18.98 | 26.14 | 7.16 | MDST | Tenas_Lithology.csv |
| T96R-04C | 26.14 | 26.45 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-04C | 26.45 | 29.11 | 2.66 | MDST | Tenas_Lithology.csv |
| T96R-04C | 29.11 | 30.8 | 1.69 | COAL | Tenas_Lithology.csv |
| T96R-04C | 30.8 | 31.09 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-04C | 31.09 | 34.44 | 3.35 | COAL | Tenas_Lithology.csv |
| T96R-04C | 34.44 | 36.68 | 2.24 | MDST | Tenas_Lithology.csv |
| T96R-04C | 36.68 | 37.06 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-04C | 37.06 | 39 | 1.94 | MDST | Tenas_Lithology.csv |
| T96R-05C | 0 | 9.01 | 9.01 | Overburden | Tenas_Lithology.csv |
| T96R-05C | 9.01 | 12.88 | 3.87 | MDST | Tenas_Lithology.csv |
| T96R-05C | 12.88 | 21.8 | 8.92 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 21.8 | 31.61 | 9.81 | MDST | Tenas_Lithology.csv |
| T96R-05C | 31.61 | 32.52 | 0.91 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 32.52 | 33.86 | 1.34 | SST | Tenas_Lithology.csv |
| T96R-05C | 33.86 | 35.41 | 1.55 | MDST | Tenas_Lithology.csv |
| T96R-05C | 35.41 | 35.55 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-05C | 35.55 | 39.51 | 3.96 | MDST | Tenas_Lithology.csv |
| T96R-05C | 39.51 | 41.3 | 1.79 | COAL | Tenas_Lithology.csv |
| T96R-05C | 41.3 | 42.12 | 0.82 | MDST | Tenas_Lithology.csv |
| T96R-05C | 42.12 | 44.4 | 2.28 | COAL | Tenas_Lithology.csv |
| T96R-05C | 44.4 | 44.98 | 0.58 | MDST | Tenas_Lithology.csv |
| T96R-05C | 44.98 | 45.62 | 0.64 | COAL | Tenas_Lithology.csv |
| T96R-05C | 45.62 | 46.68 | 1.06 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 46.68 | 50.84 | 4.16 | COAL | Tenas_Lithology.csv |
| T96R-05C | 50.84 | 55.15 | 4.31 | MDST | Tenas_Lithology.csv |
| T96R-05C | 55.15 | 56.1 | 0.95 | COAL | Tenas_Lithology.csv |
| T96R-05C | 56.1 | 58.06 | 1.96 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 58.06 | 58.52 | 0.46 | MDST | Tenas_Lithology.csv |
| T96R-05C | 58.52 | 59.52 | 1 | COAL | Tenas_Lithology.csv |
| T96R-05C | 59.52 | 63.46 | 3.94 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 63.46 | 64 | 0.54 | MDST | Tenas_Lithology.csv |
| T96R-05C | 64 | 72.2 | 8.2 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 72.2 | 73.27 | 1.07 | MDST | Tenas_Lithology.csv |
| T96R-05C | 73.27 | 73.51 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-05C | 73.51 | 73.58 | 0.07 | MDST | Tenas_Lithology.csv |
| T96R-05C | 73.58 | 75.51 | 1.93 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 75.51 | 76 | 0.49 | COAL | Tenas_Lithology.csv |
| T96R-05C | 76 | 76.31 | 0.31 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-05C | 76.31 | 76.55 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-05C | 76.55 | 77.98 | 1.43 | MDST | Tenas_Lithology.csv |
| T96R-05C | 77.98 | 78.81 | 0.83 | COAL | Tenas_Lithology.csv |
| T96R-05C | 78.81 | 85.08 | 6.27 | MDST | Tenas_Lithology.csv |
| T96R-05C | 85.08 | 85.32 | 0.24 | SST | Tenas_Lithology.csv |
| T96R-05C | 85.32 | 85.52 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-05C | 85.52 | 85.78 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-05C | 85.78 | 86.62 | 0.84 | COAL | Tenas_Lithology.csv |
| T96R-05C | 86.62 | 87.62 | 1 | MDST | Tenas_Lithology.csv |
| T96R-06 | 0 | 17 | 17 | Overburden | Tenas_Lithology.csv |
| T96R-06 | 17 | 22 | 5 | SST | Tenas_Lithology.csv |
| T96R-06 | 22 | 35.1 | 13.1 | SLTS | Tenas_Lithology.csv |
| T96R-06 | 35.1 | 51.01 | 15.91 | SST | Tenas_Lithology.csv |
| T96R-06 | 51.01 | 51.1 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-06 | 51.1 | 51.41 | 0.31 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-06 | 51.41 | 51.71 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-06 | 51.71 | 53.65 | 1.94 | MDST | Tenas_Lithology.csv |
| T96R-06 | 53.65 | 53.82 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-06 | 53.82 | 54.08 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-06 | 54.08 | 55.81 | 1.73 | COAL | Tenas_Lithology.csv |
| T96R-06 | 55.81 | 60.5 | 4.69 | MDST | Tenas_Lithology.csv |
| T96R-06 | 60.5 | 63.03 | 2.53 | SLTS | Tenas_Lithology.csv |
| T96R-06 | 63.03 | 63.4 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-06 | 63.4 | 66.69 | 3.29 | SLTS | Tenas_Lithology.csv |
| T96R-06 | 66.69 | 70.97 | 4.28 | MDST | Tenas_Lithology.csv |
| T96R-06 | 70.97 | 72.85 | 1.88 | COAL | Tenas_Lithology.csv |
| T96R-06 | 72.85 | 72.91 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-06 | 72.91 | 73.8 | 0.89 | COAL | Tenas_Lithology.csv |
| T96R-06 | 73.8 | 74.14 | 0.34 | MDST | Tenas_Lithology.csv |
| T96R-06 | 74.14 | 76.88 | 2.74 | COAL | Tenas_Lithology.csv |
| T96R-06 | 76.88 | 77.92 | 1.04 | MDST | Tenas_Lithology.csv |
| T96R-06 | 77.92 | 78 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-06 | 78 | 78.15 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-06 | 78.15 | 78.47 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-06 | 78.47 | 79.59 | 1.12 | MDST | Tenas_Lithology.csv |
| T96R-06 | 79.59 | 80.29 | 0.7 | COAL | Tenas_Lithology.csv |
| T96R-06 | 80.29 | 80.89 | 0.6 | MDST | Tenas_Lithology.csv |
| T96R-06 | 80.89 | 81.45 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-06 | 81.45 | 82.26 | 0.81 | MDST | Tenas_Lithology.csv |
| T96R-06 | 82.26 | 82.5 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-06 | 82.5 | 85 | 2.5 | MDST | Tenas_Lithology.csv |
| T96R-06 | 85 | 89.19 | 4.19 | SST | Tenas_Lithology.csv |
| T96R-06 | 89.19 | 89.8 | 0.61 | COAL | Tenas_Lithology.csv |
| T96R-06 | 89.8 | 96.12 | 6.32 | SLTS | Tenas_Lithology.csv |
| T96R-06 | 96.12 | 96.54 | 0.42 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-06 | 96.54 | 110.1 | 13.56 | SST | Tenas_Lithology.csv |
| T96R-07C | 0 | 1.52 | 1.52 | Overburden | Tenas_Lithology.csv |
| T96R-07C | 1.52 | 3.92 | 2.4 | MDST | Tenas_Lithology.csv |
| T96R-07C | 3.92 | 5.41 | 1.49 | COAL | Tenas_Lithology.csv |
| T96R-07C | 5.41 | 10.9 | 5.49 | MDST | Tenas_Lithology.csv |
| T96R-07C | 10.9 | 12.32 | 1.42 | SLTS | Tenas_Lithology.csv |
| T96R-07C | 12.32 | 12.61 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-07C | 12.61 | 13.9 | 1.29 | MDST | Tenas_Lithology.csv |
| T96R-07C | 13.9 | 15.35 | 1.45 | SLTS | Tenas_Lithology.csv |
| T96R-07C | 15.35 | 17.04 | 1.69 | COAL | Tenas_Lithology.csv |
| T96R-07C | 17.04 | 17.44 | 0.4 | MDST | Tenas_Lithology.csv |
| T96R-07C | 17.44 | 20.89 | 3.45 | COAL | Tenas_Lithology.csv |
| T96R-07C | 20.89 | 22.81 | 1.92 | MDST | Tenas_Lithology.csv |
| T96R-07C | 22.81 | 23.13 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-07C | 23.13 | 23.2 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-07C | 23.2 | 23.5 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-07C | 23.5 | 25.6 | 2.1 | MDST | Tenas_Lithology.csv |
| T96R-08 | 0 | 3.5 | 3.5 | Overburden | Tenas_Lithology.csv |
| T96R-08 | 3.5 | 6.13 | 2.63 | MDST | Tenas_Lithology.csv |
| T96R-08 | 6.13 | 7.05 | 0.92 | COAL | Tenas_Lithology.csv |
| T96R-08 | 7.05 | 7.22 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-08 | 7.22 | 7.39 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-08 | 7.39 | 7.73 | 0.34 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-08 | 7.73 | 8.32 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-08 | 8.32 | 13.17 | 4.85 | MDST | Tenas_Lithology.csv |
| T96R-08 | 13.17 | 13.32 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-08 | 13.32 | 15.38 | 2.06 | MDST | Tenas_Lithology.csv |
| T96R-08 | 15.38 | 15.61 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-08 | 15.61 | 20.82 | 5.21 | SLTS | Tenas_Lithology.csv |
| T96R-08 | 20.82 | 20.91 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-08 | 20.91 | 22.21 | 1.3 | SLTS | Tenas_Lithology.csv |
| T96R-08 | 22.21 | 22.38 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-08 | 22.38 | 27.3 | 4.92 | MDST | Tenas_Lithology.csv |
| T96R-08 | 27.3 | 37 | 9.7 | SST | Tenas_Lithology.csv |
| T96R-08 | 37 | 47 | 10 | CGL | Tenas_Lithology.csv |
| T96R-08 | 47 | 58 | 11 | SST | Tenas_Lithology.csv |
| T96R-08 | 58 | 67.7 | 9.7 | CGL | Tenas_Lithology.csv |
| T96R-10 | 0 | 5 | 5 | Overburden | Tenas_Lithology.csv |
| T96R-10 | 5 | 7 | 2 | SLTS | Tenas_Lithology.csv |
| T96R-10 | 7 | 11.64 | 4.64 | SST | Tenas_Lithology.csv |
| T96R-10 | 11.64 | 12.04 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-10 | 12.04 | 15.83 | 3.79 | MDST | Tenas_Lithology.csv |
| T96R-10 | 15.83 | 16.51 | 0.68 | COAL | Tenas_Lithology.csv |
| T96R-10 | 16.51 | 18.18 | 1.67 | MDST | Tenas_Lithology.csv |
| T96R-10 | 18.18 | 18.57 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-10 | 18.57 | 18.85 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-10 | 18.85 | 20.82 | 1.97 | COAL | Tenas_Lithology.csv |
| T96R-10 | 20.82 | 26.71 | 5.89 | SLTS | Tenas_Lithology.csv |
| T96R-10 | 26.71 | 27.55 | 0.84 | COAL | Tenas_Lithology.csv |
| T96R-10 | 27.55 | 27.64 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-10 | 27.64 | 30.45 | 2.81 | COAL | Tenas_Lithology.csv |
| T96R-10 | 30.45 | 32.14 | 1.69 | SST | Tenas_Lithology.csv |
| T96R-10 | 32.14 | 32.54 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-10 | 32.54 | 32.76 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-10 | 32.76 | 33 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-10 | 33 | 37 | 4 | SST | Tenas_Lithology.csv |
| T96R-10 | 37 | 41 | 4 | CGL | Tenas_Lithology.csv |
| T96R-10 | 41 | 44.9 | 3.9 | SST | Tenas_Lithology.csv |
| T96R-10 | 44.9 | 45.1 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-10 | 45.1 | 46.31 | 1.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-10 | 46.31 | 46.71 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-10 | 46.71 | 62 | 15.29 | SST | Tenas_Lithology.csv |
| T96R-10 | 62 | 67.1 | 5.1 | CGL | Tenas_Lithology.csv |
| T96R-105 | 0 | 53 | 53 | Overburden | Tenas_Lithology.csv |
| T96R-105 | 53 | 54.5 | 1.5 | SLTS | Tenas_Lithology.csv |
| T96R-105 | 54.5 | 95.5 | 41 | SST | Tenas_Lithology.csv |
| T96R-105 | 95.5 | 100 | 4.5 | CGL | Tenas_Lithology.csv |
| T96R-105 | 100 | 102.7 | 2.7 | SST | Tenas_Lithology.csv |
| T96R-11 | 0 | 2 | 2 | Overburden | Tenas_Lithology.csv |
| T96R-11 | 2 | 2.24 | 0.24 | MDST | Tenas_Lithology.csv |
| T96R-11 | 2.24 | 4 | 1.76 | COAL | Tenas_Lithology.csv |
| T96R-11 | 4 | 11.24 | 7.24 | MDST | Tenas_Lithology.csv |
| T96R-11 | 11.24 | 11.47 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-11 | 11.47 | 14.39 | 2.92 | MDST | Tenas_Lithology.csv |
| T96R-11 | 14.39 | 14.81 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-11 | 14.81 | 16.25 | 1.44 | SLTS | Tenas_Lithology.csv |
| T96R-11 | 16.25 | 16.84 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-11 | 16.84 | 23.88 | 7.04 | SLTS | Tenas_Lithology.csv |
| T96R-11 | 23.88 | 24.09 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-11 | 24.09 | 25.62 | 1.53 | MDST | Tenas_Lithology.csv |
| T96R-11 | 25.62 | 25.9 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-11 | 25.9 | 26.8 | 0.9 | MDST | Tenas_Lithology.csv |
| T96R-11 | 26.8 | 27.15 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-11 | 27.15 | 34.57 | 7.42 | MDST | Tenas_Lithology.csv |
| T96R-11 | 34.57 | 34.8 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-11 | 34.8 | 42 | 7.2 | SST | Tenas_Lithology.csv |
| T96R-11 | 42 | 45 | 3 | SLTS | Tenas_Lithology.csv |
| T96R-11 | 45 | 58.5 | 13.5 | CGL | Tenas_Lithology.csv |
| T96R-11 | 58.5 | 93.55 | 35.05 | SST | Tenas_Lithology.csv |
| T96R-11 | 93.55 | 94.3 | 0.75 | COAL | Tenas_Lithology.csv |
| T96R-11 | 94.3 | 96.7 | 2.4 | SST | Tenas_Lithology.csv |
| T96R-11 | 96.7 | 97.2 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-11 | 97.2 | 101.4 | 4.2 | SLTS | Tenas_Lithology.csv |
| T96R-11 | 101.4 | 125.7 | 24.3 | VOLC | Tenas_Lithology.csv |
| T96R-110 | 0 | 37.5 | 37.5 | Overburden | Tenas_Lithology.csv |
| T96R-110 | 37.5 | 38.18 | 0.68 | SLTS | Tenas_Lithology.csv |
| T96R-110 | 38.18 | 42.3 | 4.12 | COAL | Tenas_Lithology.csv |
| T96R-110 | 42.3 | 46 | 3.7 | MDST | Tenas_Lithology.csv |
| T96R-110 | 46 | 47 | 1 | COAL | Tenas_Lithology.csv |
| T96R-110 | 47 | 47.4 | 0.4 | MDST | Tenas_Lithology.csv |
| T96R-110 | 47.4 | 47.65 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-110 | 47.65 | 56.01 | 8.36 | SLTS | Tenas_Lithology.csv |
| T96R-110 | 56.01 | 56.38 | 0.37 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-110 | 56.38 | 66.3 | 9.92 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 0 | 4 | 4 | Overburden | Tenas_Lithology.csv |
| T96R-119 | 4 | 15 | 11 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 15 | 21 | 6 | SST | Tenas_Lithology.csv |
| T96R-119 | 21 | 26 | 5 | MDST | Tenas_Lithology.csv |
| T96R-119 | 26 | 53.96 | 27.96 | SST | Tenas_Lithology.csv |
| T96R-119 | 53.96 | 54.44 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-119 | 54.44 | 54.96 | 0.52 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 54.96 | 55.81 | 0.85 | COAL | Tenas_Lithology.csv |
| T96R-119 | 55.81 | 59.52 | 3.71 | MDST | Tenas_Lithology.csv |
| T96R-119 | 59.52 | 59.78 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-119 | 59.78 | 59.85 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-119 | 59.85 | 60.03 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-119 | 60.03 | 61.13 | 1.1 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 61.13 | 61.33 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-119 | 61.33 | 72.89 | 11.56 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 72.89 | 73.46 | 0.57 | COAL | Tenas_Lithology.csv |
| T96R-119 | 73.46 | 75.1 | 1.64 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 75.1 | 75.45 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-119 | 75.45 | 80.7 | 5.25 | MDST | Tenas_Lithology.csv |
| T96R-119 | 80.7 | 84 | 3.3 | SST | Tenas_Lithology.csv |
| T96R-120 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-120 | 7 | 19.1 | 12.1 | MDST | Tenas_Lithology.csv |
| T96R-120 | 19.1 | 25.32 | 6.22 | SST | Tenas_Lithology.csv |
| T96R-120 | 25.32 | 25.49 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-120 | 25.49 | 28.01 | 2.52 | MDST | Tenas_Lithology.csv |
| T96R-120 | 28.01 | 28.6 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-120 | 28.6 | 32.04 | 3.44 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 32.04 | 33.74 | 1.7 | COAL | Tenas_Lithology.csv |
| T96R-120 | 33.74 | 33.84 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-120 | 33.84 | 34.84 | 1 | COAL | Tenas_Lithology.csv |
| T96R-120 | 34.84 | 44.38 | 9.54 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 44.38 | 44.91 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-120 | 44.91 | 47.9 | 2.99 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 47.9 | 48.42 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-120 | 48.42 | 51.11 | 2.69 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 51.11 | 51.52 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-120 | 51.52 | 60.04 | 8.52 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 60.04 | 60.56 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-120 | 60.56 | 63 | 2.44 | SST | Tenas_Lithology.csv |
| T96R-120 | 63 | 65 | 2 | CGL | Tenas_Lithology.csv |
| T96R-120 | 65 | 73.7 | 8.7 | SST | Tenas_Lithology.csv |
| T96R-121 | 0 | 7.3 | 7.3 | Overburden | Tenas_Lithology.csv |
| T96R-121 | 7.3 | 41.18 | 33.88 | SST | Tenas_Lithology.csv |
| T96R-121 | 41.18 | 41.43 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-121 | 41.43 | 44.08 | 2.65 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 44.08 | 44.63 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-121 | 44.63 | 47.81 | 3.18 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 47.81 | 49.72 | 1.91 | COAL | Tenas_Lithology.csv |
| T96R-121 | 49.72 | 59.33 | 9.61 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 59.33 | 59.64 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-121 | 59.64 | 62.93 | 3.29 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 62.93 | 65.01 | 2.08 | COAL | Tenas_Lithology.csv |
| T96R-121 | 65.01 | 66.57 | 1.56 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 66.57 | 67.29 | 0.72 | COAL | Tenas_Lithology.csv |
| T96R-121 | 67.29 | 67.62 | 0.33 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-121 | 67.62 | 70.47 | 2.85 | COAL | Tenas_Lithology.csv |
| T96R-121 | 70.47 | 74.18 | 3.71 | MDST | Tenas_Lithology.csv |
| T96R-121 | 74.18 | 75.32 | 1.14 | COAL | Tenas_Lithology.csv |
| T96R-121 | 75.32 | 76.16 | 0.84 | MDST | Tenas_Lithology.csv |
| T96R-121 | 76.16 | 76.29 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-121 | 76.29 | 82.53 | 6.24 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 82.53 | 83.49 | 0.96 | COAL | Tenas_Lithology.csv |
| T96R-121 | 83.49 | 85.91 | 2.42 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 85.91 | 86.37 | 0.46 | COAL | Tenas_Lithology.csv |
| T96R-121 | 86.37 | 90.02 | 3.65 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 90.02 | 90.2 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-121 | 90.2 | 91.86 | 1.66 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 91.86 | 92.2 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-121 | 92.2 | 97 | 4.8 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 97 | 109.4 | 12.4 | SST | Tenas_Lithology.csv |
| T96R-124 | 0 | 21.47 | 21.47 | Overburden | Tenas_Lithology.csv |
| T96R-124 | 21.47 | 39.21 | 17.74 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 39.21 | 39.58 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-124 | 39.58 | 42.73 | 3.15 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 42.73 | 43.4 | 0.67 | COAL | Tenas_Lithology.csv |
| T96R-124 | 43.4 | 46.05 | 2.65 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 46.05 | 48.1 | 2.05 | COAL | Tenas_Lithology.csv |
| T96R-124 | 48.1 | 56.49 | 8.39 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 56.49 | 56.88 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-124 | 56.88 | 60.05 | 3.17 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 60.05 | 62.15 | 2.1 | COAL | Tenas_Lithology.csv |
| T96R-124 | 62.15 | 62.98 | 0.83 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 62.98 | 67.04 | 4.06 | COAL | Tenas_Lithology.csv |
| T96R-124 | 67.04 | 70.22 | 3.18 | MDST | Tenas_Lithology.csv |
| T96R-124 | 70.22 | 71.17 | 0.95 | COAL | Tenas_Lithology.csv |
| T96R-124 | 71.17 | 71.81 | 0.64 | MDST | Tenas_Lithology.csv |
| T96R-124 | 71.81 | 71.87 | 0.06 | COAL | Tenas_Lithology.csv |
| T96R-124 | 71.87 | 73 | 1.13 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 73 | 78.5 | 5.5 | CGL | Tenas_Lithology.csv |
| T96R-124 | 78.5 | 78.89 | 0.39 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 78.89 | 79.67 | 0.78 | COAL | Tenas_Lithology.csv |
| T96R-124 | 79.67 | 79.94 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-124 | 79.94 | 80.6 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-124 | 80.6 | 85.61 | 5.01 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 85.61 | 85.72 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-124 | 85.72 | 87.09 | 1.37 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 87.09 | 87.15 | 0.06 | COAL | Tenas_Lithology.csv |
| T96R-124 | 87.15 | 91.7 | 4.55 | SST | Tenas_Lithology.csv |
| T96R-125 | 0 | 6.35 | 6.35 | Overburden | Tenas_Lithology.csv |
| T96R-125 | 6.35 | 7 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-125 | 7 | 8.54 | 1.54 | MDST | Tenas_Lithology.csv |
| T96R-125 | 8.54 | 8.83 | 0.29 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-125 | 8.83 | 9.1 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-125 | 9.1 | 10.72 | 1.62 | COAL | Tenas_Lithology.csv |
| T96R-125 | 10.72 | 16.72 | 6 | SST | Tenas_Lithology.csv |
| T96R-125 | 16.72 | 17.07 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-125 | 17.07 | 20.79 | 3.72 | MDST | Tenas_Lithology.csv |
| T96R-125 | 20.79 | 26 | 5.21 | COAL | Tenas_Lithology.csv |
| T96R-125 | 26 | 27.44 | 1.44 | MDST | Tenas_Lithology.csv |
| T96R-125 | 27.44 | 27.65 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-125 | 27.65 | 28.13 | 0.48 | SLTS | Tenas_Lithology.csv |
| T96R-125 | 28.13 | 28.33 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-125 | 28.33 | 29.03 | 0.7 | MDST | Tenas_Lithology.csv |
| T96R-125 | 29.03 | 29.45 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-125 | 29.45 | 30.1 | 0.65 | MDST | Tenas_Lithology.csv |
| T96R-125 | 30.1 | 30.53 | 0.43 | COAL | Tenas_Lithology.csv |
| T96R-125 | 30.53 | 34.81 | 4.28 | SLTS | Tenas_Lithology.csv |
| T96R-125 | 34.81 | 35.03 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-125 | 35.03 | 36.38 | 1.35 | SST | Tenas_Lithology.csv |
| T96R-125 | 36.38 | 37.02 | 0.64 | COAL | Tenas_Lithology.csv |
| T96R-125 | 37.02 | 43.98 | 6.96 | SST | Tenas_Lithology.csv |
| T96R-125 | 43.98 | 44.3 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-125 | 44.3 | 49.3 | 5 | SST | Tenas_Lithology.csv |
| T96R-126 | 0 | 18.55 | 18.55 | Overburden | Tenas_Lithology.csv |
| T96R-126 | 18.55 | 23 | 4.45 | MDST | Tenas_Lithology.csv |
| T96R-126 | 23 | 26.27 | 3.27 | COAL | Tenas_Lithology.csv |
| T96R-126 | 26.27 | 28.41 | 2.14 | MDST | Tenas_Lithology.csv |
| T96R-126 | 28.41 | 29 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-126 | 29 | 29.61 | 0.61 | MDST | Tenas_Lithology.csv |
| T96R-126 | 29.61 | 30.06 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-126 | 30.06 | 32 | 1.94 | SLTS | Tenas_Lithology.csv |
| T96R-126 | 32 | 32.1 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-126 | 32.1 | 32.8 | 0.7 | MDST | Tenas_Lithology.csv |
| T96R-126 | 32.8 | 32.9 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-126 | 32.9 | 35.8 | 2.9 | MDST | Tenas_Lithology.csv |
| T96R-126 | 35.8 | 36 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-126 | 36 | 36.58 | 0.58 | MDST | Tenas_Lithology.csv |
| T96R-126 | 36.58 | 37.04 | 0.46 | COAL | Tenas_Lithology.csv |
| T96R-126 | 37.04 | 44.93 | 7.89 | SST | Tenas_Lithology.csv |
| T96R-126 | 44.93 | 45.3 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-126 | 45.3 | 55.3 | 10 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 0 | 26.5 | 26.5 | Overburden | Tenas_Lithology.csv |
| T96R-127 | 26.5 | 27.17 | 0.67 | COAL | Tenas_Lithology.csv |
| T96R-127 | 27.17 | 30.49 | 3.32 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 30.49 | 30.6 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-127 | 30.6 | 33.91 | 3.31 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 33.91 | 35.93 | 2.02 | COAL | Tenas_Lithology.csv |
| T96R-127 | 35.93 | 37.43 | 1.5 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 37.43 | 38.09 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-127 | 38.09 | 38.27 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-127 | 38.27 | 41.13 | 2.86 | COAL | Tenas_Lithology.csv |
| T96R-127 | 41.13 | 43.19 | 2.06 | MDST | Tenas_Lithology.csv |
| T96R-127 | 43.19 | 43.44 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-127 | 43.44 | 43.67 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-127 | 43.67 | 44.57 | 0.9 | COAL | Tenas_Lithology.csv |
| T96R-127 | 44.57 | 45.53 | 0.96 | MDST | Tenas_Lithology.csv |
| T96R-127 | 45.53 | 45.8 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-127 | 45.8 | 46.14 | 0.34 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-127 | 46.14 | 46.26 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-127 | 46.26 | 51.21 | 4.95 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 51.21 | 51.48 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-127 | 51.48 | 53.31 | 1.83 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 53.31 | 53.93 | 0.62 | COAL | Tenas_Lithology.csv |
| T96R-127 | 53.93 | 59.36 | 5.43 | SST | Tenas_Lithology.csv |
| T96R-127 | 59.36 | 59.54 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-127 | 59.54 | 61.06 | 1.52 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 61.06 | 61.28 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-127 | 61.28 | 72.6 | 11.32 | SST | Tenas_Lithology.csv |
| T96R-128 | 0 | 3.6 | 3.6 | Overburden | Tenas_Lithology.csv |
| T96R-128 | 3.6 | 10.74 | 7.14 | MDST | Tenas_Lithology.csv |
| T96R-128 | 10.74 | 10.9 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-128 | 10.9 | 15.3 | 4.4 | MDST | Tenas_Lithology.csv |
| T96R-128 | 15.3 | 43.3 | 28 | SLTS | Tenas_Lithology.csv |
| T96R-128 | 43.3 | 45.1 | 1.8 | CGL | Tenas_Lithology.csv |
| T96R-128 | 45.1 | 47.2 | 2.1 | SLTS | Tenas_Lithology.csv |
| T96R-128 | 47.2 | 51.8 | 4.6 | MDST | Tenas_Lithology.csv |
| T96R-128 | 51.8 | 53.5 | 1.7 | SST | Tenas_Lithology.csv |
| T96R-129 | 0 | 7.2 | 7.2 | Overburden | Tenas_Lithology.csv |
| T96R-129 | 7.2 | 11 | 3.8 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 11 | 14.2 | 3.2 | MDST | Tenas_Lithology.csv |
| T96R-129 | 14.2 | 21.2 | 7 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 21.2 | 23 | 1.8 | MDST | Tenas_Lithology.csv |
| T96R-129 | 23 | 23.3 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-129 | 23.3 | 23.6 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-129 | 23.6 | 24.3 | 0.7 | COAL | Tenas_Lithology.csv |
| T96R-129 | 24.3 | 32.52 | 8.22 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 32.52 | 32.7 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-129 | 32.7 | 36.52 | 3.82 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 36.52 | 41.45 | 4.93 | COAL | Tenas_Lithology.csv |
| T96R-129 | 41.45 | 45.01 | 3.56 | MDST | Tenas_Lithology.csv |
| T96R-129 | 45.01 | 45.56 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-129 | 45.56 | 45.86 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-129 | 45.86 | 46.6 | 0.74 | COAL | Tenas_Lithology.csv |
| T96R-129 | 46.6 | 47.05 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-129 | 47.05 | 47.47 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-129 | 47.47 | 48.3 | 0.83 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 48.3 | 48.5 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-129 | 48.5 | 52.17 | 3.67 | MDST | Tenas_Lithology.csv |
| T96R-129 | 52.17 | 52.76 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-129 | 52.76 | 54.3 | 1.54 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 54.3 | 54.5 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-129 | 54.5 | 65.5 | 11 | n/a | Tenas_Lithology.csv |
| T96R-12C | 0 | 0.76 | 0.76 | Overburden | Tenas_Lithology.csv |
| T96R-12C | 0.76 | 2.29 | 1.53 | COAL | Tenas_Lithology.csv |
| T96R-12C | 2.29 | 3.4 | 1.11 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-12C | 3.4 | 7.81 | 4.41 | SLTS | Tenas_Lithology.csv |
| T96R-12C | 7.81 | 9.07 | 1.26 | MDST | Tenas_Lithology.csv |
| T96R-12C | 9.07 | 9.37 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-12C | 9.37 | 12.35 | 2.98 | MDST | Tenas_Lithology.csv |
| T96R-12C | 12.35 | 14.06 | 1.71 | COAL | Tenas_Lithology.csv |
| T96R-12C | 14.06 | 14.48 | 0.42 | MDST | Tenas_Lithology.csv |
| T96R-12C | 14.48 | 17.75 | 3.27 | COAL | Tenas_Lithology.csv |
| T96R-12C | 17.75 | 19.44 | 1.69 | MDST | Tenas_Lithology.csv |
| T96R-12C | 19.44 | 19.84 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-12C | 19.84 | 19.95 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-12C | 19.95 | 20.22 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-12C | 20.22 | 22.8 | 2.58 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T96R-130 | 15 | 31 | 16 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 31 | 48 | 17 | MDST | Tenas_Lithology.csv |
| T96R-130 | 48 | 53 | 5 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 53 | 76 | 23 | SST | Tenas_Lithology.csv |
| T96R-130 | 76 | 79 | 3 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 79 | 92.54 | 13.54 | MDST | Tenas_Lithology.csv |
| T96R-130 | 92.54 | 94.4 | 1.86 | COAL | Tenas_Lithology.csv |
| T96R-130 | 94.4 | 96.17 | 1.77 | MDST | Tenas_Lithology.csv |
| T96R-130 | 96.17 | 98.4 | 2.23 | COAL | Tenas_Lithology.csv |
| T96R-130 | 98.4 | 111 | 12.6 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 111 | 112.08 | 1.08 | COAL | Tenas_Lithology.csv |
| T96R-130 | 112.08 | 115 | 2.92 | SST | Tenas_Lithology.csv |
| T96R-130 | 115 | 116 | 1 | CGL | Tenas_Lithology.csv |
| T96R-130 | 116 | 118 | 2 | SST | Tenas_Lithology.csv |
| T96R-130 | 118 | 139.1 | 21.1 | CGL | Tenas_Lithology.csv |
| T96R-131 | 0 | 8.81 | 8.81 | Overburden | Tenas_Lithology.csv |
| T96R-131 | 8.81 | 19 | 10.19 | MDST | Tenas_Lithology.csv |
| T96R-131 | 19 | 22.3 | 3.3 | SST | Tenas_Lithology.csv |
| T96R-131 | 22.3 | 49.2 | 26.9 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 49.2 | 57.7 | 8.5 | SST | Tenas_Lithology.csv |
| T96R-131 | 57.7 | 58 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-131 | 58 | 59.87 | 1.87 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 59.87 | 60.3 | 0.43 | COAL | Tenas_Lithology.csv |
| T96R-131 | 60.3 | 62.24 | 1.94 | MDST | Tenas_Lithology.csv |
| T96R-131 | 62.24 | 62.42 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-131 | 62.42 | 63.09 | 0.67 | MDST | Tenas_Lithology.csv |
| T96R-131 | 63.09 | 65.01 | 1.92 | COAL | Tenas_Lithology.csv |
| T96R-131 | 65.01 | 73.43 | 8.42 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 73.43 | 76.91 | 3.48 | COAL | Tenas_Lithology.csv |
| T96R-131 | 76.91 | 77.01 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-131 | 77.01 | 77.29 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-131 | 77.29 | 77.41 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-131 | 77.41 | 80.83 | 3.42 | COAL | Tenas_Lithology.csv |
| T96R-131 | 80.83 | 83.25 | 2.42 | MDST | Tenas_Lithology.csv |
| T96R-131 | 83.25 | 83.8 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-131 | 83.8 | 84.45 | 0.65 | MDST | Tenas_Lithology.csv |
| T96R-131 | 84.45 | 85.29 | 0.84 | COAL | Tenas_Lithology.csv |
| T96R-131 | 85.29 | 87.3 | 2.01 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 87.3 | 87.6 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-131 | 87.6 | 88.15 | 0.55 | MDST | Tenas_Lithology.csv |
| T96R-131 | 88.15 | 88.37 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-131 | 88.37 | 90.7 | 2.33 | MDST | Tenas_Lithology.csv |
| T96R-131 | 90.7 | 90.9 | 0.2 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 90.9 | 91.2 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-131 | 91.2 | 91.8 | 0.6 | MDST | Tenas_Lithology.csv |
| T96R-131 | 91.8 | 92 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-131 | 92 | 93.9 | 1.9 | MDST | Tenas_Lithology.csv |
| T96R-131 | 93.9 | 94 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-131 | 94 | 103.8 | 9.8 | MDST | Tenas_Lithology.csv |
| T96R-137 | 0 | 2.1 | 2.1 | Overburden | Tenas_Lithology.csv |
| T96R-137 | 2.1 | 8.42 | 6.32 | MDST | Tenas_Lithology.csv |
| T96R-137 | 8.42 | 10.16 | 1.74 | COAL | Tenas_Lithology.csv |
| T96R-137 | 10.16 | 10.49 | 0.33 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-137 | 10.49 | 10.63 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-137 | 10.63 | 10.98 | 0.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-137 | 10.98 | 11.85 | 0.87 | COAL | Tenas_Lithology.csv |
| T96R-137 | 11.85 | 12.53 | 0.68 | MDST | Tenas_Lithology.csv |
| T96R-137 | 12.53 | 12.71 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-137 | 12.71 | 12.92 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-137 | 12.92 | 13.16 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-137 | 13.16 | 15.13 | 1.97 | MDST | Tenas_Lithology.csv |
| T96R-137 | 15.13 | 15.25 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-137 | 15.25 | 16.78 | 1.53 | SLTS | Tenas_Lithology.csv |
| T96R-137 | 16.78 | 17.04 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-137 | 17.04 | 18.03 | 0.99 | SLTS | Tenas_Lithology.csv |
| T96R-137 | 18.03 | 18.39 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-137 | 18.39 | 26.2 | 7.81 | SLTS | Tenas_Lithology.csv |
| T96R-137 | 26.2 | 26.36 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-137 | 26.36 | 27.4 | 1.04 | MDST | Tenas_Lithology.csv |
| T96R-137 | 27.4 | 34.1 | 6.7 | SLTS | Tenas_Lithology.csv |
| T96R-137 | 34.1 | 42.7 | 8.6 | CGL | Tenas_Lithology.csv |
| T96R-13C | 0 | 0.8 | 0.8 | Overburden | Tenas_Lithology.csv |
| T96R-13C | 0.8 | 2.05 | 1.25 | SLTS | Tenas_Lithology.csv |
| T96R-13C | 2.05 | 6.48 | 4.43 | MDST | Tenas_Lithology.csv |
| T96R-13C | 6.48 | 6.81 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-13C | 6.81 | 9.5 | 2.69 | MDST | Tenas_Lithology.csv |
| T96R-13C | 9.5 | 11 | 1.5 | COAL | Tenas_Lithology.csv |
| T96R-13C | 11 | 11.59 | 0.59 | SLTS | Tenas_Lithology.csv |
| T96R-13C | 11.59 | 14.73 | 3.14 | COAL | Tenas_Lithology.csv |
| T96R-13C | 14.73 | 16.2 | 1.47 | MDST | Tenas_Lithology.csv |
| T96R-13C | 16.2 | 16.99 | 0.79 | COAL | Tenas_Lithology.csv |
| T96R-13C | 16.99 | 20 | 3.01 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 0 | 9 | 9 | Overburden | Tenas_Lithology.csv |
| T96R-14 | 9 | 14 | 5 | MDST | Tenas_Lithology.csv |
| T96R-14 | 14 | 21.5 | 7.5 | SST | Tenas_Lithology.csv |
| T96R-14 | 21.5 | 33.5 | 12 | MDST | Tenas_Lithology.csv |
| T96R-14 | 33.5 | 45.5 | 12 | SST | Tenas_Lithology.csv |
| T96R-14 | 45.5 | 57.93 | 12.43 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 57.93 | 59.46 | 1.53 | COAL | Tenas_Lithology.csv |
| T96R-14 | 59.46 | 66.76 | 7.3 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-14 | 66.76 | 67.02 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-14 | 67.02 | 72.6 | 5.58 | MDST | Tenas_Lithology.csv |
| T96R-14 | 72.6 | 74.11 | 1.51 | COAL | Tenas_Lithology.csv |
| T96R-14 | 74.11 | 74.47 | 0.36 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 74.47 | 75.79 | 1.32 | COAL | Tenas_Lithology.csv |
| T96R-14 | 75.79 | 76.16 | 0.37 | MDST | Tenas_Lithology.csv |
| T96R-14 | 76.16 | 76.42 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-14 | 76.42 | 76.69 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 76.69 | 77.48 | 0.79 | COAL | Tenas_Lithology.csv |
| T96R-14 | 77.48 | 77.71 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 77.71 | 78.31 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-14 | 78.31 | 78.53 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 78.53 | 79.54 | 1.01 | COAL | Tenas_Lithology.csv |
| T96R-14 | 79.54 | 81.86 | 2.32 | MDST | Tenas_Lithology.csv |
| T96R-14 | 81.86 | 82.38 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-14 | 82.38 | 83.77 | 1.39 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 83.77 | 83.98 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-14 | 83.98 | 84.22 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 84.22 | 84.87 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-14 | 84.87 | 88 | 3.13 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 88 | 91.6 | 3.6 | MDST | Tenas_Lithology.csv |
| T96R-14 | 91.6 | 96.1 | 4.5 | SST | Tenas_Lithology.csv |
| T96R-14 | 96.1 | 96.24 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 96.24 | 96.52 | 0.28 | MDST | Tenas_Lithology.csv |
| T96R-14 | 96.52 | 97.2 | 0.68 | COAL | Tenas_Lithology.csv |
| T96R-14 | 97.2 | 100 | 2.8 | MDST | Tenas_Lithology.csv |
| T96R-14 | 100 | 103.34 | 3.34 | SST | Tenas_Lithology.csv |
| T96R-14 | 103.34 | 103.7 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-14 | 103.7 | 123 | 19.3 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 0 | 11.5 | 11.5 | Overburden | Tenas_Lithology.csv |
| T96R-15 | 11.5 | 29 | 17.5 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 29 | 36 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-15 | 36 | 39.4 | 3.4 | SST | Tenas_Lithology.csv |
| T96R-15 | 39.4 | 39.71 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-15 | 39.71 | 47 | 7.29 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 47 | 52.59 | 5.59 | SST | Tenas_Lithology.csv |
| T96R-15 | 52.59 | 53.57 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-15 | 53.57 | 61.69 | 8.12 | SST | Tenas_Lithology.csv |
| T96R-15 | 61.69 | 62.01 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-15 | 62.01 | 65.99 | 3.98 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 65.99 | 67.6 | 1.61 | COAL | Tenas_Lithology.csv |
| T96R-15 | 67.6 | 68.59 | 0.99 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 68.59 | 69.85 | 1.26 | COAL | Tenas_Lithology.csv |
| T96R-15 | 69.85 | 70.11 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-15 | 70.11 | 72.89 | 2.78 | COAL | Tenas_Lithology.csv |
| T96R-15 | 72.89 | 77.47 | 4.58 | MDST | Tenas_Lithology.csv |
| T96R-15 | 77.47 | 77.89 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-15 | 77.89 | 79.5 | 1.61 | MDST | Tenas_Lithology.csv |
| T96R-15 | 79.5 | 80.14 | 0.64 | COAL | Tenas_Lithology.csv |
| T96R-15 | 80.14 | 80.91 | 0.77 | MDST | Tenas_Lithology.csv |
| T96R-15 | 80.91 | 81.15 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-15 | 81.15 | 81.57 | 0.42 | MDST | Tenas_Lithology.csv |
| T96R-15 | 81.57 | 81.91 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-15 | 81.91 | 83.35 | 1.44 | MDST | Tenas_Lithology.csv |
| T96R-15 | 83.35 | 83.53 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-15 | 83.53 | 87.64 | 4.11 | MDST | Tenas_Lithology.csv |
| T96R-15 | 87.64 | 88.1 | 0.46 | COAL | Tenas_Lithology.csv |
| T96R-15 | 88.1 | 88.18 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-15 | 88.18 | 88.33 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-15 | 88.33 | 89.32 | 0.99 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 89.32 | 90.04 | 0.72 | COAL | Tenas_Lithology.csv |
| T96R-15 | 90.04 | 96.14 | 6.1 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 96.14 | 96.65 | 0.51 | COAL | Tenas_Lithology.csv |
| T96R-15 | 96.65 | 112.5 | 15.85 | SST | Tenas_Lithology.csv |
| T96R-15 | 112.5 | 119.5 | 7 | CGL | Tenas_Lithology.csv |
| T96R-15 | 119.5 | 128.2 | 8.7 | SST | Tenas_Lithology.csv |
| T96R-16 | 0 | 0.25 | 0.25 | Overburden | Tenas_Lithology.csv |
| T96R-16 | 0.25 | 1.2 | 0.95 | COAL | Tenas_Lithology.csv |
| T96R-16 | 1.2 | 1.65 | 0.45 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 1.65 | 2.24 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-16 | 2.24 | 6 | 3.76 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 6 | 7.47 | 1.47 | MDST | Tenas_Lithology.csv |
| T96R-16 | 7.47 | 7.62 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-16 | 7.62 | 9.56 | 1.94 | MDST | Tenas_Lithology.csv |
| T96R-16 | 9.56 | 11.45 | 1.89 | COAL | Tenas_Lithology.csv |
| T96R-16 | 11.45 | 14.32 | 2.87 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 14.32 | 16.3 | 1.98 | COAL | Tenas_Lithology.csv |
| T96R-16 | 16.3 | 16.46 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-16 | 16.46 | 16.6 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-16 | 16.6 | 16.95 | 0.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-16 | 16.95 | 17.8 | 0.85 | COAL | Tenas_Lithology.csv |
| T96R-16 | 17.8 | 18.36 | 0.56 | MDST | Tenas_Lithology.csv |
| T96R-16 | 18.36 | 18.6 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-16 | 18.6 | 18.83 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-16 | 18.83 | 18.96 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-16 | 18.96 | 25.15 | 6.19 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 25.15 | 25.3 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-16 | 25.3 | 25.4 | 0.1 | MDST | Tenas_Lithology.csv |
| T96R-16 | 25.4 | 25.52 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-16 | 25.52 | 26.32 | 0.8 | MDST | Tenas_Lithology.csv |
| T96R-16 | 26.32 | 26.62 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-16 | 26.62 | 31.6 | 4.98 | MDST | Tenas_Lithology.csv |
| T96R-16 | 31.6 | 31.7 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-16 | 31.7 | 35.52 | 3.82 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 35.52 | 35.81 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-16 | 35.81 | 44.5 | 8.69 | SST | Tenas_Lithology.csv |
| T96R-16 | 44.5 | 45.9 | 1.4 | CGL | Tenas_Lithology.csv |
| T96R-16 | 45.9 | 59 | 13.1 | SST | Tenas_Lithology.csv |
| T96R-16 | 59 | 72 | 13 | CGL | Tenas_Lithology.csv |
| T96R-16 | 72 | 78.8 | 6.8 | SST | Tenas_Lithology.csv |
| T96R-17C | 0 | 0.91 | 0.91 | Overburden | Tenas_Lithology.csv |
| T96R-17C | 0.91 | 3.47 | 2.56 | MDST | Tenas_Lithology.csv |
| T96R-17C | 3.47 | 3.75 | 0.28 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-17C | 3.75 | 6.71 | 2.96 | MDST | Tenas_Lithology.csv |
| T96R-17C | 6.71 | 8.36 | 1.65 | COAL | Tenas_Lithology.csv |
| T96R-17C | 8.36 | 8.81 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-17C | 8.81 | 12.07 | 3.26 | COAL | Tenas_Lithology.csv |
| T96R-17C | 12.07 | 13.39 | 1.32 | MDST | Tenas_Lithology.csv |
| T96R-17C | 13.39 | 13.8 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-17C | 13.8 | 13.9 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-17C | 13.9 | 14.31 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-17C | 14.31 | 17 | 2.69 | MDST | Tenas_Lithology.csv |
| T96R-18C | 0 | 0.91 | 0.91 | Overburden | Tenas_Lithology.csv |
| T96R-18C | 0.91 | 1.89 | 0.98 | MDST | Tenas_Lithology.csv |
| T96R-18C | 1.89 | 3.97 | 2.08 | SLTS | Tenas_Lithology.csv |
| T96R-18C | 3.97 | 5.59 | 1.62 | COAL | Tenas_Lithology.csv |
| T96R-18C | 5.59 | 6.05 | 0.46 | MDST | Tenas_Lithology.csv |
| T96R-18C | 6.05 | 9.38 | 3.33 | COAL | Tenas_Lithology.csv |
| T96R-18C | 9.38 | 10.78 | 1.4 | SLTS | Tenas_Lithology.csv |
| T96R-18C | 10.78 | 11.16 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-18C | 11.16 | 11.26 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-18C | 11.26 | 11.58 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-18C | 11.58 | 13.5 | 1.92 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 0 | 2.3 | 2.3 | Overburden | Tenas_Lithology.csv |
| T96R-19 | 2.3 | 5.2 | 2.9 | MDST | Tenas_Lithology.csv |
| T96R-19 | 5.2 | 14.88 | 9.68 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 14.88 | 15.25 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-19 | 15.25 | 19.13 | 3.88 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 19.13 | 19.58 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-19 | 19.58 | 21.62 | 2.04 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 21.62 | 21.76 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-19 | 21.76 | 22.64 | 0.88 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 22.64 | 24.07 | 1.43 | COAL | Tenas_Lithology.csv |
| T96R-19 | 24.07 | 30.83 | 6.76 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 30.83 | 31.03 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-19 | 31.03 | 33.62 | 2.59 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 33.62 | 35.23 | 1.61 | COAL | Tenas_Lithology.csv |
| T96R-19 | 35.23 | 36.39 | 1.16 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 36.39 | 39.73 | 3.34 | COAL | Tenas_Lithology.csv |
| T96R-19 | 39.73 | 40.7 | 0.97 | MDST | Tenas_Lithology.csv |
| T96R-19 | 40.7 | 40.81 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-19 | 40.81 | 41 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-19 | 41 | 41.17 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-19 | 41.17 | 44.54 | 3.37 | SST | Tenas_Lithology.csv |
| T96R-19 | 44.54 | 44.61 | 0.07 | COAL | Tenas_Lithology.csv |
| T96R-19 | 44.61 | 44.88 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-19 | 44.88 | 44.94 | 0.06 | COAL | Tenas_Lithology.csv |
| T96R-19 | 44.94 | 45.38 | 0.44 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 45.38 | 45.47 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-19 | 45.47 | 46.33 | 0.86 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 46.33 | 46.6 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-19 | 46.6 | 50.01 | 3.41 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 50.01 | 50.1 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-19 | 50.1 | 65.5 | 15.4 | SST | Tenas_Lithology.csv |
| T96R-19 | 65.5 | 70 | 4.5 | CGL | Tenas_Lithology.csv |
| T96R-19 | 70 | 79.6 | 9.6 | SST | Tenas_Lithology.csv |
| T96R-20C | 0 | 3.04 | 3.04 | Overburden | Tenas_Lithology.csv |
| T96R-20C | 3.04 | 5.27 | 2.23 | MDST | Tenas_Lithology.csv |
| T96R-20C | 5.27 | 5.98 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-20C | 5.98 | 7.96 | 1.98 | MDST | Tenas_Lithology.csv |
| T96R-20C | 7.96 | 8.04 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-20C | 8.04 | 8.58 | 0.54 | MDST | Tenas_Lithology.csv |
| T96R-20C | 8.58 | 9.97 | 1.39 | COAL | Tenas_Lithology.csv |
| T96R-20C | 9.97 | 9.98 | 0.01 | MDST | Tenas_Lithology.csv |
| T96R-21 | 0 | 11 | 11 | Overburden | Tenas_Lithology.csv |
| T96R-21 | 11 | 29 | 18 | SST | Tenas_Lithology.csv |
| T96R-21 | 29 | 44.31 | 15.31 | SLTS | Tenas_Lithology.csv |
| T96R-21 | 44.31 | 44.5 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-21 | 44.5 | 49.82 | 5.32 | MDST | Tenas_Lithology.csv |
| T96R-21 | 49.82 | 50.06 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-21 | 50.06 | 50.16 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-21 | 50.16 | 55.49 | 5.33 | COAL | Tenas_Lithology.csv |
| T96R-21 | 55.49 | 58.9 | 3.41 | MDST | Tenas_Lithology.csv |
| T96R-21 | 58.9 | 59.3 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-21 | 59.3 | 59.8 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-21 | 59.8 | 60.66 | 0.86 | COAL | Tenas_Lithology.csv |
| T96R-21 | 60.66 | 62.58 | 1.92 | MDST | Tenas_Lithology.csv |
| T96R-21 | 62.58 | 62.87 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-21 | 62.87 | 63.32 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-21 | 63.32 | 63.53 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-21 | 63.53 | 69.6 | 6.07 | SST | Tenas_Lithology.csv |
| T96R-21 | 69.6 | 70.2 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-21 | 70.2 | 71.77 | 1.57 | SLTS | Tenas_Lithology.csv |
| T96R-21 | 71.77 | 71.91 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-21 | 71.91 | 77.54 | 5.63 | SST | Tenas_Lithology.csv |
| T96R-21 | 77.54 | 77.93 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-21 | 77.93 | 85.6 | 7.67 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 0 | 9.5 | 9.5 | Overburden | Tenas_Lithology.csv |
| T96R-22 | 9.5 | 30.05 | 20.55 | MDST | Tenas_Lithology.csv |
| T96R-22 | 30.05 | 30.58 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-22 | 30.58 | 34.51 | 3.93 | MDST | Tenas_Lithology.csv |
| T96R-22 | 34.51 | 36.08 | 1.57 | COAL | Tenas_Lithology.csv |
| T96R-22 | 36.08 | 36.35 | 0.27 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 36.35 | 36.48 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 36.48 | 37.04 | 0.56 | MDST | Tenas_Lithology.csv |
| T96R-22 | 37.04 | 39.18 | 2.14 | COAL | Tenas_Lithology.csv |
| T96R-22 | 39.18 | 39.71 | 0.53 | MDST | Tenas_Lithology.csv |
| T96R-22 | 39.71 | 40.08 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-22 | 40.08 | 40.27 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 40.27 | 40.44 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-22 | 40.44 | 41.47 | 1.03 | MDST | Tenas_Lithology.csv |
| T96R-22 | 41.47 | 42.4 | 0.93 | COAL | Tenas_Lithology.csv |
| T96R-22 | 42.4 | 42.7 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-22 | 42.7 | 44.91 | 2.21 | COAL | Tenas_Lithology.csv |
| T96R-22 | 44.91 | 47.12 | 2.21 | MDST | Tenas_Lithology.csv |
| T96R-22 | 47.12 | 47.67 | 0.55 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-22 | 47.67 | 50.1 | 2.43 | MDST | Tenas_Lithology.csv |
| T96R-22 | 50.1 | 50.32 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-22 | 50.32 | 50.65 | 0.33 | MDST | Tenas_Lithology.csv |
| T96R-22 | 50.65 | 51.25 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-22 | 51.25 | 53.63 | 2.38 | MDST | Tenas_Lithology.csv |
| T96R-22 | 53.63 | 54.61 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-22 | 54.61 | 55.73 | 1.12 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 55.73 | 56.03 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 56.03 | 58.93 | 2.9 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 58.93 | 59.33 | 0.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 59.33 | 59.96 | 0.63 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 59.96 | 60.23 | 0.27 | MDST | Tenas_Lithology.csv |
| T96R-22 | 60.23 | 61.13 | 0.9 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 61.13 | 61.52 | 0.39 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 61.52 | 67.6 | 6.08 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 67.6 | 68.65 | 1.05 | COAL | Tenas_Lithology.csv |
| T96R-22 | 68.65 | 68.87 | 0.22 | MDST | Tenas_Lithology.csv |
| T96R-22 | 68.87 | 70.1 | 1.23 | COAL | Tenas_Lithology.csv |
| T96R-22 | 70.1 | 72.59 | 2.49 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 72.59 | 72.7 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 72.7 | 75.38 | 2.68 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 75.38 | 75.69 | 0.31 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 75.69 | 76.48 | 0.79 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 76.48 | 77.39 | 0.91 | COAL | Tenas_Lithology.csv |
| T96R-22 | 77.39 | 95 | 17.61 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 95 | 106.5 | 11.5 | SST | Tenas_Lithology.csv |
| T96R-22 | 106.5 | 110 | 3.5 | CGL | Tenas_Lithology.csv |
| T96R-22 | 110 | 128.5 | 18.5 | SST | Tenas_Lithology.csv |
| T96R-23C | 0 | 11.3 | 11.3 | Overburden | Tenas_Lithology.csv |
| T96R-23C | 11.3 | 14.62 | 3.32 | MDST | Tenas_Lithology.csv |
| T96R-23C | 14.62 | 18.1 | 3.48 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 18.1 | 18.83 | 0.73 | SST | Tenas_Lithology.csv |
| T96R-23C | 18.83 | 24.9 | 6.07 | MDST | Tenas_Lithology.csv |
| T96R-23C | 24.9 | 25.4 | 0.5 | SST | Tenas_Lithology.csv |
| T96R-23C | 25.4 | 44.89 | 19.49 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 44.89 | 47.97 | 3.08 | MDST | Tenas_Lithology.csv |
| T96R-23C | 47.97 | 56.94 | 8.97 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 56.94 | 64.56 | 7.62 | MDST | Tenas_Lithology.csv |
| T96R-23C | 64.56 | 68.3 | 3.74 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 68.3 | 72.15 | 3.85 | MDST | Tenas_Lithology.csv |
| T96R-23C | 72.15 | 80.93 | 8.78 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 80.93 | 83.45 | 2.52 | MDST | Tenas_Lithology.csv |
| T96R-23C | 83.45 | 83.71 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-23C | 83.71 | 84.44 | 0.73 | MDST | Tenas_Lithology.csv |
| T96R-23C | 84.44 | 85.46 | 1.02 | COAL | Tenas_Lithology.csv |
| T96R-23C | 85.46 | 89.05 | 3.59 | MDST | Tenas_Lithology.csv |
| T96R-23C | 89.05 | 90 | 0.95 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 90 | 104.57 | 14.57 | MDST | Tenas_Lithology.csv |
| T96R-23C | 104.57 | 107.74 | 3.17 | COAL | Tenas_Lithology.csv |
| T96R-23C | 107.74 | 108.03 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-23C | 108.03 | 108.15 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-23C | 108.15 | 108.49 | 0.34 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-23C | 108.49 | 111.03 | 2.54 | COAL | Tenas_Lithology.csv |
| T96R-23C | 111.03 | 116.07 | 5.04 | MDST | Tenas_Lithology.csv |
| T96R-23C | 116.07 | 116.37 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-23C | 116.37 | 116.7 | 0.33 | MDST | Tenas_Lithology.csv |
| T96R-24 | 0 | 2.8 | 2.8 | Overburden | Tenas_Lithology.csv |
| T96R-24 | 2.8 | 22.37 | 19.57 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 22.37 | 22.69 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-24 | 22.69 | 27.58 | 4.89 | MDST | Tenas_Lithology.csv |
| T96R-24 | 27.58 | 27.82 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-24 | 27.82 | 28.66 | 0.84 | MDST | Tenas_Lithology.csv |
| T96R-24 | 28.66 | 29.26 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-24 | 29.26 | 38.92 | 9.66 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 38.92 | 40.15 | 1.23 | COAL | Tenas_Lithology.csv |
| T96R-24 | 40.15 | 40.3 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 40.3 | 41.9 | 1.6 | COAL | Tenas_Lithology.csv |
| T96R-24 | 41.9 | 46.66 | 4.76 | MDST | Tenas_Lithology.csv |
| T96R-24 | 46.66 | 47.27 | 0.61 | COAL | Tenas_Lithology.csv |
| T96R-24 | 47.27 | 58.37 | 11.1 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 58.37 | 60.61 | 2.24 | COAL | Tenas_Lithology.csv |
| T96R-24 | 60.61 | 60.72 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 60.72 | 63.8 | 3.08 | COAL | Tenas_Lithology.csv |
| T96R-24 | 63.8 | 64 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 64 | 65.65 | 1.65 | COAL | Tenas_Lithology.csv |
| T96R-24 | 65.65 | 65.82 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 65.82 | 67.11 | 1.29 | COAL | Tenas_Lithology.csv |
| T96R-24 | 67.11 | 69.41 | 2.3 | MDST | Tenas_Lithology.csv |
| T96R-24 | 69.41 | 70.53 | 1.12 | COAL | Tenas_Lithology.csv |
| T96R-24 | 70.53 | 72.05 | 1.52 | MDST | Tenas_Lithology.csv |
| T96R-24 | 72.05 | 72.26 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-24 | 72.26 | 72.43 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 72.43 | 72.72 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-24 | 72.72 | 73.82 | 1.1 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 73.82 | 74.7 | 0.88 | COAL | Tenas_Lithology.csv |
| T96R-24 | 74.7 | 80.07 | 5.37 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 80.07 | 80.4 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-24 | 80.4 | 80.53 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 80.53 | 81.33 | 0.8 | COAL | Tenas_Lithology.csv |
| T96R-24 | 81.33 | 81.97 | 0.64 | MDST | Tenas_Lithology.csv |
| T96R-24 | 81.97 | 82.18 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-24 | 82.18 | 82.25 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 82.25 | 83.11 | 0.86 | COAL | Tenas_Lithology.csv |
| T96R-24 | 83.11 | 92.88 | 9.77 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 92.88 | 93.64 | 0.76 | COAL | Tenas_Lithology.csv |
| T96R-24 | 93.64 | 128.5 | 34.86 | SST | Tenas_Lithology.csv |
| T96R-25 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-25 | 7 | 24.6 | 17.6 | MDST | Tenas_Lithology.csv |
| T96R-25 | 24.6 | 31 | 6.4 | SLTS | Tenas_Lithology.csv |
| T96R-25 | 31 | 37.5 | 6.5 | MDST | Tenas_Lithology.csv |
| T96R-25 | 37.5 | 38.1 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-25 | 38.1 | 39.8 | 1.7 | MDST | Tenas_Lithology.csv |
| T96R-25 | 39.8 | 40 | 0.2 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-25 | 40 | 40.8 | 0.8 | MDST | Tenas_Lithology.csv |
| T96R-25 | 40.8 | 42.5 | 1.7 | COAL | Tenas_Lithology.csv |
| T96R-25 | 42.5 | 47.3 | 4.8 | SLTS | Tenas_Lithology.csv |
| T96R-25 | 47.3 | 47.5 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-25 | 47.5 | 52.8 | 5.3 | MDST | Tenas_Lithology.csv |
| T96R-25 | 52.8 | 58.4 | 5.6 | COAL | Tenas_Lithology.csv |
| T96R-25 | 58.4 | 61.2 | 2.8 | MDST | Tenas_Lithology.csv |
| T96R-25 | 61.2 | 61.5 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-25 | 61.5 | 61.65 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-25 | 61.65 | 62.8 | 1.15 | COAL | Tenas_Lithology.csv |
| T96R-25 | 62.8 | 63.9 | 1.1 | MDST | Tenas_Lithology.csv |
| T96R-25 | 63.9 | 64.5 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-25 | 64.5 | 64.8 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-25 | 64.8 | 65 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-25 | 65 | 68.1 | 3.1 | SLTS | Tenas_Lithology.csv |
| T96R-25 | 68.1 | 68.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-25 | 68.4 | 68.5 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-25 | 68.5 | 68.75 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-25 | 68.75 | 70.4 | 1.65 | MDST | Tenas_Lithology.csv |
| T96R-25 | 70.4 | 71 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-25 | 71 | 71.5 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-25 | 71.5 | 71.7 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-25 | 71.7 | 78.5 | 6.8 | MDST | Tenas_Lithology.csv |
| T96R-26 | 0 | 13.9 | 13.9 | Overburden | Tenas_Lithology.csv |
| T96R-26 | 13.9 | 33.2 | 19.3 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 33.2 | 44.21 | 11.01 | SST | Tenas_Lithology.csv |
| T96R-26 | 44.21 | 44.71 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-26 | 44.71 | 49.09 | 4.38 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 49.09 | 49.42 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-26 | 49.42 | 49.54 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 49.54 | 50.08 | 0.54 | COAL | Tenas_Lithology.csv |
| T96R-26 | 50.08 | 56.86 | 6.78 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 56.86 | 58.17 | 1.31 | COAL | Tenas_Lithology.csv |
| T96R-26 | 58.17 | 67.42 | 9.25 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 67.42 | 68.32 | 0.9 | COAL | Tenas_Lithology.csv |
| T96R-26 | 68.32 | 68.7 | 0.38 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 68.7 | 69.36 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-26 | 69.36 | 70.2 | 0.84 | MDST | Tenas_Lithology.csv |
| T96R-26 | 70.2 | 70.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-26 | 70.4 | 73.56 | 3.16 | MDST | Tenas_Lithology.csv |
| T96R-26 | 73.56 | 74.54 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-26 | 74.54 | 75.95 | 1.41 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 75.95 | 76.2 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 76.2 | 81.45 | 5.25 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 81.45 | 89.65 | 8.2 | MDST | Tenas_Lithology.csv |
| T96R-26 | 89.65 | 90.18 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-26 | 90.18 | 90.33 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 90.33 | 90.6 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-26 | 90.6 | 91.08 | 0.48 | MDST | Tenas_Lithology.csv |
| T96R-26 | 91.08 | 91.26 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-26 | 91.26 | 91.35 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 91.35 | 92.06 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-26 | 92.06 | 93.9 | 1.84 | SST | Tenas_Lithology.csv |
| T96R-26 | 93.9 | 94 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-26 | 94 | 106.2 | 12.2 | SST | Tenas_Lithology.csv |
| T96R-27 | 0 | 1.23 | 1.23 | Overburden | Tenas_Lithology.csv |
| T96R-27 | 1.23 | 1.68 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-27 | 1.68 | 2.11 | 0.43 | MDST | Tenas_Lithology.csv |
| T96R-27 | 2.11 | 3.93 | 1.82 | SLTS | Tenas_Lithology.csv |
| T96R-27 | 3.93 | 4.5 | 0.57 | COAL | Tenas_Lithology.csv |
| T96R-27 | 4.5 | 5.8 | 1.3 | MDST | Tenas_Lithology.csv |
| T96R-27 | 5.8 | 7.55 | 1.75 | COAL | Tenas_Lithology.csv |
| T96R-27 | 7.55 | 10.2 | 2.65 | MDST | Tenas_Lithology.csv |
| T96R-27 | 10.2 | 10.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-27 | 10.4 | 12.6 | 2.2 | MDST | Tenas_Lithology.csv |
| T96R-27 | 12.6 | 13.52 | 0.92 | COAL | Tenas_Lithology.csv |
| T96R-27 | 13.52 | 14.4 | 0.88 | MDST | Tenas_Lithology.csv |
| T96R-27 | 14.4 | 14.75 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-27 | 14.75 | 16.2 | 1.45 | MDST | Tenas_Lithology.csv |
| T96R-27 | 16.2 | 16.68 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-27 | 16.68 | 18.4 | 1.72 | MDST | Tenas_Lithology.csv |
| T96R-27 | 18.4 | 18.61 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-27 | 18.61 | 24.67 | 6.06 | SLTS | Tenas_Lithology.csv |
| T96R-27 | 24.67 | 25.03 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-27 | 25.03 | 33.33 | 8.3 | SLTS | Tenas_Lithology.csv |
| T96R-27 | 33.33 | 33.58 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-27 | 33.58 | 42 | 8.42 | SST | Tenas_Lithology.csv |
| T96R-27 | 42 | 58 | 16 | CGL | Tenas_Lithology.csv |
| T96R-27 | 58 | 62 | 4 | SLTS | Tenas_Lithology.csv |
| T96R-27 | 62 | 71 | 9 | SST | Tenas_Lithology.csv |
| T96R-27 | 71 | 73.5 | 2.5 | CGL | Tenas_Lithology.csv |
| T96R-28C | 0 | 10.68 | 10.68 | Overburden | Tenas_Lithology.csv |
| T96R-28C | 10.68 | 14.68 | 4 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 14.68 | 15.08 | 0.4 | SST | Tenas_Lithology.csv |
| T96R-28C | 15.08 | 17.07 | 1.99 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 17.07 | 17.73 | 0.66 | MDST | Tenas_Lithology.csv |
| T96R-28C | 17.73 | 55.72 | 37.99 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 55.72 | 69.93 | 14.21 | MDST | Tenas_Lithology.csv |
| T96R-28C | 69.93 | 72.08 | 2.15 | SST | Tenas_Lithology.csv |
| T96R-28C | 72.08 | 73.19 | 1.11 | MDST | Tenas_Lithology.csv |
| T96R-28C | 73.19 | 73.61 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-28C | 73.61 | 81.9 | 8.29 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 81.9 | 88.42 | 6.52 | MDST | Tenas_Lithology.csv |
| T96R-28C | 88.42 | 89 | 0.58 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 89 | 89.13 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-28C | 89.13 | 89.97 | 0.84 | MDST | Tenas_Lithology.csv |
| T96R-28C | 89.97 | 91.21 | 1.24 | COAL | Tenas_Lithology.csv |
| T96R-28C | 91.21 | 99.03 | 7.82 | MDST | Tenas_Lithology.csv |
| T96R-28C | 99.03 | 99.44 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-28C | 99.44 | 104.76 | 5.32 | MDST | Tenas_Lithology.csv |
| T96R-28C | 104.76 | 106.95 | 2.19 | COAL | Tenas_Lithology.csv |
| T96R-28C | 106.95 | 107.01 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-28C | 107.01 | 111.31 | 4.3 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-28C | 111.31 | 115.46 | 4.15 | MDST | Tenas_Lithology.csv |
| T96R-28C | 115.46 | 115.81 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-28C | 115.81 | 115.96 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-28C | 115.96 | 117.18 | 1.22 | COAL | Tenas_Lithology.csv |
| T96R-28C | 117.18 | 117.88 | 0.7 | MDST | Tenas_Lithology.csv |
| T96R-28C | 117.88 | 118.5 | 0.62 | COAL | Tenas_Lithology.csv |
| T96R-28C | 118.5 | 119.12 | 0.62 | MDST | Tenas_Lithology.csv |
| T96R-28C | 119.12 | 119.27 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-28C | 119.27 | 120.7 | 1.43 | MDST | Tenas_Lithology.csv |
| T96R-29 | 0 | 4.5 | 4.5 | Overburden | Tenas_Lithology.csv |
| T96R-29 | 4.5 | 7 | 2.5 | SST | Tenas_Lithology.csv |
| T96R-29 | 7 | 27.55 | 20.55 | SLTS | Tenas_Lithology.csv |
| T96R-29 | 27.55 | 27.81 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-29 | 27.81 | 31.23 | 3.42 | SLTS | Tenas_Lithology.csv |
| T96R-29 | 31.23 | 31.29 | 0.06 | COAL | Tenas_Lithology.csv |
| T96R-29 | 31.29 | 32.26 | 0.97 | MDST | Tenas_Lithology.csv |
| T96R-29 | 32.26 | 32.57 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-29 | 32.57 | 37.66 | 5.09 | SLTS | Tenas_Lithology.csv |
| T96R-29 | 37.66 | 38.93 | 1.27 | COAL | Tenas_Lithology.csv |
| T96R-29 | 38.93 | 50.5 | 11.57 | SST | Tenas_Lithology.csv |
| T96R-29 | 50.5 | 50.63 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-29 | 50.63 | 56.14 | 5.51 | SLTS | Tenas_Lithology.csv |
| T96R-29 | 56.14 | 61.35 | 5.21 | COAL | Tenas_Lithology.csv |
| T96R-29 | 61.35 | 65.31 | 3.96 | MDST | Tenas_Lithology.csv |
| T96R-29 | 65.31 | 65.57 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-29 | 65.57 | 65.76 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-29 | 65.76 | 65.93 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-29 | 65.93 | 66.25 | 0.32 | MDST | Tenas_Lithology.csv |
| T96R-29 | 66.25 | 66.35 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-29 | 66.35 | 67.44 | 1.09 | MDST | Tenas_Lithology.csv |
| T96R-29 | 67.44 | 68.07 | 0.63 | COAL | Tenas_Lithology.csv |
| T96R-29 | 68.07 | 68.92 | 0.85 | MDST | Tenas_Lithology.csv |
| T96R-29 | 68.92 | 69.36 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-29 | 69.36 | 77.41 | 8.05 | SST | Tenas_Lithology.csv |
| T96R-29 | 77.41 | 77.68 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-29 | 77.68 | 79 | 1.32 | SST | Tenas_Lithology.csv |
| T96R-30 | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T96R-30 | 6 | 19 | 13 | SST | Tenas_Lithology.csv |
| T96R-30 | 19 | 31 | 12 | MDST | Tenas_Lithology.csv |
| T96R-30 | 31 | 35.09 | 4.09 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 35.09 | 35.5 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-30 | 35.5 | 40.94 | 5.44 | MDST | Tenas_Lithology.csv |
| T96R-30 | 40.94 | 41.26 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-30 | 41.26 | 41.52 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 41.52 | 42.19 | 0.67 | COAL | Tenas_Lithology.csv |
| T96R-30 | 42.19 | 51.08 | 8.89 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 51.08 | 53.31 | 2.23 | COAL | Tenas_Lithology.csv |
| T96R-30 | 53.31 | 65.79 | 12.48 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 65.79 | 66.2 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-30 | 66.2 | 77.15 | 10.95 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 77.15 | 79.01 | 1.86 | COAL | Tenas_Lithology.csv |
| T96R-30 | 79.01 | 79.46 | 0.45 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 79.46 | 79.88 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-30 | 79.88 | 79.97 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 79.97 | 81.21 | 1.24 | COAL | Tenas_Lithology.csv |
| T96R-30 | 81.21 | 81.42 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 81.42 | 82.72 | 1.3 | COAL | Tenas_Lithology.csv |
| T96R-30 | 82.72 | 82.85 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 82.85 | 85.16 | 2.31 | COAL | Tenas_Lithology.csv |
| T96R-30 | 85.16 | 87.54 | 2.38 | MDST | Tenas_Lithology.csv |
| T96R-30 | 87.54 | 88.16 | 0.62 | COAL | Tenas_Lithology.csv |
| T96R-30 | 88.16 | 91.14 | 2.98 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 91.14 | 92.41 | 1.27 | COAL | Tenas_Lithology.csv |
| T96R-30 | 92.41 | 94.23 | 1.82 | MDST | Tenas_Lithology.csv |
| T96R-30 | 94.23 | 94.42 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-30 | 94.42 | 94.82 | 0.4 | MDST | Tenas_Lithology.csv |
| T96R-30 | 94.82 | 95.29 | 0.47 | COAL | Tenas_Lithology.csv |
| T96R-30 | 95.29 | 96.29 | 1 | MDST | Tenas_Lithology.csv |
| T96R-30 | 96.29 | 96.49 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-30 | 96.49 | 99.56 | 3.07 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 99.56 | 99.92 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-30 | 99.92 | 100.02 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 100.02 | 100.5 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-30 | 100.5 | 105.81 | 5.31 | SST | Tenas_Lithology.csv |
| T96R-30 | 105.81 | 106.46 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-30 | 106.46 | 109 | 2.54 | MDST | Tenas_Lithology.csv |
| T96R-30 | 109 | 128.2 | 19.2 | SST | Tenas_Lithology.csv |
| T96R-31 | 0 | 0.96 | 0.96 | Overburden | Tenas_Lithology.csv |
| T96R-31 | 0.96 | 5.72 | 4.76 | MDST | Tenas_Lithology.csv |
| T96R-31 | 5.72 | 6.13 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-31 | 6.13 | 9.88 | 3.75 | SLTS | Tenas_Lithology.csv |
| T96R-31 | 9.88 | 10.48 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-31 | 10.48 | 10.95 | 0.47 | MDST | Tenas_Lithology.csv |
| T96R-31 | 10.95 | 12.88 | 1.93 | COAL | Tenas_Lithology.csv |
| T96R-31 | 12.88 | 13.06 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-31 | 13.06 | 13.3 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-31 | 13.3 | 16.92 | 3.62 | SST | Tenas_Lithology.csv |
| T96R-31 | 16.92 | 18.8 | 1.88 | COAL | Tenas_Lithology.csv |
| T96R-31 | 18.8 | 19.1 | 0.3 | SLTS | Tenas_Lithology.csv |
| T96R-31 | 19.1 | 19.96 | 0.86 | COAL | Tenas_Lithology.csv |
| T96R-31 | 19.96 | 20.22 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-31 | 20.22 | 20.59 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-31 | 20.59 | 21.46 | 0.87 | MDST | Tenas_Lithology.csv |
| T96R-31 | 21.46 | 21.7 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-31 | 21.7 | 22.15 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-31 | 22.15 | 22.88 | 0.73 | COAL | Tenas_Lithology.csv |
| T96R-31 | 22.88 | 27 | 4.12 | SLTS | Tenas_Lithology.csv |
| T96R-31 | 27 | 31.08 | 4.08 | SST | Tenas_Lithology.csv |
| T96R-31 | 31.08 | 31.3 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-31 | 31.3 | 32.11 | 0.81 | SLTS | Tenas_Lithology.csv |
| T96R-31 | 32.11 | 32.64 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-31 | 32.64 | 37.5 | 4.86 | SST | Tenas_Lithology.csv |
| T96R-31 | 37.5 | 37.66 | 0.16 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-31 | 37.66 | 41.11 | 3.45 | SST | Tenas_Lithology.csv |
| T96R-31 | 41.11 | 41.41 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-31 | 41.41 | 46 | 4.59 | MDST | Tenas_Lithology.csv |
| T96R-31 | 46 | 63 | 17 | CGL | Tenas_Lithology.csv |
| T96R-31 | 63 | 66 | 3 | SST | Tenas_Lithology.csv |
| T96R-32 | 0 | 16.2 | 16.2 | Overburden | Tenas_Lithology.csv |
| T96R-32 | 16.2 | 18.81 | 2.61 | MDST | Tenas_Lithology.csv |
| T96R-32 | 18.81 | 19.28 | 0.47 | COAL | Tenas_Lithology.csv |
| T96R-32 | 19.28 | 19.34 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-32 | 19.34 | 23.38 | 4.04 | COAL | Tenas_Lithology.csv |
| T96R-32 | 23.38 | 27.19 | 3.81 | MDST | Tenas_Lithology.csv |
| T96R-32 | 27.19 | 27.45 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-32 | 27.45 | 28.18 | 0.73 | MDST | Tenas_Lithology.csv |
| T96R-32 | 28.18 | 28.76 | 0.58 | COAL | Tenas_Lithology.csv |
| T96R-32 | 28.76 | 30.12 | 1.36 | SLTS | Tenas_Lithology.csv |
| T96R-32 | 30.12 | 30.68 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-32 | 30.68 | 31.2 | 0.52 | MDST | Tenas_Lithology.csv |
| T96R-32 | 31.2 | 31.36 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-32 | 31.36 | 35.92 | 4.56 | SST | Tenas_Lithology.csv |
| T96R-32 | 35.92 | 36.23 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-32 | 36.23 | 36.46 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-32 | 36.46 | 36.55 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-32 | 36.55 | 43.2 | 6.65 | SLTS | Tenas_Lithology.csv |
| T96R-32 | 43.2 | 43.51 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-32 | 43.51 | 49 | 5.49 | SLTS | Tenas_Lithology.csv |
| T96R-32 | 49 | 57 | 8 | SST | Tenas_Lithology.csv |
| T96R-32 | 57 | 64 | 7 | CGL | Tenas_Lithology.csv |
| T96R-32 | 64 | 67.6 | 3.6 | SST | Tenas_Lithology.csv |
| T96R-33 | 0 | 0.31 | 0.31 | Overburden | Tenas_Lithology.csv |
| T96R-33 | 0.31 | 1 | 0.69 | COAL | Tenas_Lithology.csv |
| T96R-33 | 1 | 3.28 | 2.28 | MDST | Tenas_Lithology.csv |
| T96R-33 | 3.28 | 5.66 | 2.38 | COAL | Tenas_Lithology.csv |
| T96R-33 | 5.66 | 6.6 | 0.94 | MDST | Tenas_Lithology.csv |
| T96R-33 | 6.6 | 7.52 | 0.92 | COAL | Tenas_Lithology.csv |
| T96R-33 | 7.52 | 9.22 | 1.7 | MDST | Tenas_Lithology.csv |
| T96R-33 | 9.22 | 9.45 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-33 | 9.45 | 10.74 | 1.29 | MDST | Tenas_Lithology.csv |
| T96R-33 | 10.74 | 10.85 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-33 | 10.85 | 11.83 | 0.98 | MDST | Tenas_Lithology.csv |
| T96R-33 | 11.83 | 11.92 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-33 | 11.92 | 21.1 | 9.18 | MDST | Tenas_Lithology.csv |
| T96R-33 | 21.1 | 21.81 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-33 | 21.81 | 22.3 | 0.49 | MDST | Tenas_Lithology.csv |
| T96R-33 | 22.3 | 22.64 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-33 | 22.64 | 31.74 | 9.1 | MDST | Tenas_Lithology.csv |
| T96R-33 | 31.74 | 32.13 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-33 | 32.13 | 40 | 7.87 | SST | Tenas_Lithology.csv |
| T96R-33 | 40 | 48.8 | 8.8 | CGL | Tenas_Lithology.csv |
| T96R-34 | 0 | 12 | 12 | Overburden | Tenas_Lithology.csv |
| T96R-34 | 12 | 34 | 22 | SST | Tenas_Lithology.csv |
| T96R-34 | 34 | 48 | 14 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 48 | 57.83 | 9.83 | SST | Tenas_Lithology.csv |
| T96R-34 | 57.83 | 58.17 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-34 | 58.17 | 61.04 | 2.87 | MDST | Tenas_Lithology.csv |
| T96R-34 | 61.04 | 61.2 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-34 | 61.2 | 61.69 | 0.49 | MDST | Tenas_Lithology.csv |
| T96R-34 | 61.69 | 61.96 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-34 | 61.96 | 65.81 | 3.85 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 65.81 | 66.4 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-34 | 66.4 | 66.46 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-34 | 66.46 | 67.27 | 0.81 | COAL | Tenas_Lithology.csv |
| T96R-34 | 67.27 | 75.34 | 8.07 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 75.34 | 75.64 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-34 | 75.64 | 81.09 | 5.45 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 81.09 | 86.36 | 5.27 | COAL | Tenas_Lithology.csv |
| T96R-34 | 86.36 | 88.59 | 2.23 | MDST | Tenas_Lithology.csv |
| T96R-34 | 88.59 | 88.93 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-34 | 88.93 | 89.33 | 0.4 | MDST | Tenas_Lithology.csv |
| T96R-34 | 89.33 | 89.67 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-34 | 89.67 | 96.2 | 6.53 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 96.2 | 96.51 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-34 | 96.51 | 97.6 | 1.09 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 0 | 1.6 | 1.6 | Overburden | Tenas_Lithology.csv |
| T96R-35 | 1.6 | 3.7 | 2.1 | MDST | Tenas_Lithology.csv |
| T96R-35 | 3.7 | 3.97 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-35 | 3.97 | 5.45 | 1.48 | MDST | Tenas_Lithology.csv |
| T96R-35 | 5.45 | 5.61 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-35 | 5.61 | 6.11 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-35 | 6.11 | 6.27 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-35 | 6.27 | 6.58 | 0.31 | MDST | Tenas_Lithology.csv |
| T96R-35 | 6.58 | 6.91 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-35 | 6.91 | 13.47 | 6.56 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 13.47 | 13.81 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-35 | 13.81 | 23 | 9.19 | MDST | Tenas_Lithology.csv |
| T96R-35 | 23 | 36 | 13 | CGL | Tenas_Lithology.csv |
| T96R-35 | 36 | 39 | 3 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 39 | 46 | 7 | SST | Tenas_Lithology.csv |
| T96R-35 | 46 | 59 | 13 | CGL | Tenas_Lithology.csv |
| T96R-35 | 59 | 63.15 | 4.15 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 63.15 | 63.34 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-35 | 63.34 | 64.02 | 0.68 | MDST | Tenas_Lithology.csv |
| T96R-35 | 64.02 | 64.2 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-35 | 64.2 | 65 | 0.8 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 65 | 73.6 | 8.6 | VOLC | Tenas_Lithology.csv |
| T96R-37 | 0 | 2.5 | 2.5 | Overburden | Tenas_Lithology.csv |
| T96R-37 | 2.5 | 8.6 | 6.1 | MDST | Tenas_Lithology.csv |
| T96R-37 | 8.6 | 8.9 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-37 | 8.9 | 11.72 | 2.82 | MDST | Tenas_Lithology.csv |
| T96R-37 | 11.72 | 11.97 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-37 | 11.97 | 15.7 | 3.73 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 15.7 | 15.89 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-37 | 15.89 | 17.13 | 1.24 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 17.13 | 18.29 | 1.16 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-37 | 18.29 | 26.5 | 8.21 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 26.5 | 26.6 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-37 | 26.6 | 30.74 | 4.14 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 30.74 | 35.67 | 4.93 | COAL | Tenas_Lithology.csv |
| T96R-37 | 35.67 | 37.6 | 1.93 | MDST | Tenas_Lithology.csv |
| T96R-37 | 37.6 | 38.3 | 0.7 | COAL | Tenas_Lithology.csv |
| T96R-37 | 38.3 | 41.04 | 2.74 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 41.04 | 41.45 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-37 | 41.45 | 43.1 | 1.65 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 43.1 | 43.3 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-37 | 43.3 | 46.6 | 3.3 | MDST | Tenas_Lithology.csv |
| T96R-37 | 46.6 | 46.9 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-37 | 46.9 | 48.2 | 1.3 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 48.2 | 48.8 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-37 | 48.8 | 55.16 | 6.36 | SST | Tenas_Lithology.csv |
| T96R-37 | 55.16 | 55.54 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-37 | 55.54 | 61.6 | 6.06 | SST | Tenas_Lithology.csv |
| T96R-38 | 0 | 5.1 | 5.1 | Overburden | Tenas_Lithology.csv |
| T96R-38 | 5.1 | 11.91 | 6.81 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 11.91 | 12.41 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-38 | 12.41 | 19.49 | 7.08 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 19.49 | 19.92 | 0.43 | COAL | Tenas_Lithology.csv |
| T96R-38 | 19.92 | 22.79 | 2.87 | MDST | Tenas_Lithology.csv |
| T96R-38 | 22.79 | 22.98 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-38 | 22.98 | 24.16 | 1.18 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 24.16 | 24.33 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-38 | 24.33 | 24.46 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-38 | 24.46 | 24.63 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-38 | 24.63 | 24.87 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-38 | 24.87 | 25.42 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-38 | 25.42 | 29.45 | 4.03 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 29.45 | 29.94 | 0.49 | COAL | Tenas_Lithology.csv |
| T96R-38 | 29.94 | 34.43 | 4.49 | SST | Tenas_Lithology.csv |
| T96R-38 | 34.43 | 34.78 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-38 | 34.78 | 47 | 12.22 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 47 | 53 | 6 | CGL | Tenas_Lithology.csv |
| T96R-38 | 53 | 68 | 15 | SST | Tenas_Lithology.csv |
| T96R-38 | 68 | 69 | 1 | CGL | Tenas_Lithology.csv |
| T96R-38 | 69 | 76.1 | 7.1 | SST | Tenas_Lithology.csv |
| T96R-39 | 0 | 2.83 | 2.83 | Overburden | Tenas_Lithology.csv |
| T96R-39 | 2.83 | 10.87 | 8.04 | SLTS | Tenas_Lithology.csv |
| T96R-39 | 10.87 | 11.07 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-39 | 11.07 | 18 | 6.93 | SLTS | Tenas_Lithology.csv |
| T96R-39 | 18 | 18.12 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-39 | 18.12 | 19.99 | 1.87 | MDST | Tenas_Lithology.csv |
| T96R-39 | 19.99 | 20.07 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-39 | 20.07 | 25.76 | 5.69 | SLTS | Tenas_Lithology.csv |
| T96R-39 | 25.76 | 26.29 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-39 | 26.29 | 31 | 4.71 | MDST | Tenas_Lithology.csv |
| T96R-39 | 31 | 61.5 | 30.5 | SST | Tenas_Lithology.csv |
| T96R-41 | 0 | 23 | 23 | Overburden | Tenas_Lithology.csv |
| T96R-41 | 23 | 34 | 11 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 34 | 49.1 | 15.1 | SST | Tenas_Lithology.csv |
| T96R-41 | 49.1 | 49.37 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-41 | 49.37 | 51.05 | 1.68 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 51.05 | 51.3 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-41 | 51.3 | 51.54 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-41 | 51.54 | 51.68 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-41 | 51.68 | 52.54 | 0.86 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 52.54 | 53.07 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-41 | 53.07 | 57.85 | 4.78 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 57.85 | 59.03 | 1.18 | COAL | Tenas_Lithology.csv |
| T96R-41 | 59.03 | 59.13 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-41 | 59.13 | 60.06 | 0.93 | COAL | Tenas_Lithology.csv |
| T96R-41 | 60.06 | 70.48 | 10.42 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 70.48 | 71.81 | 1.33 | COAL | Tenas_Lithology.csv |
| T96R-41 | 71.81 | 76.38 | 4.57 | MDST | Tenas_Lithology.csv |
| T96R-41 | 76.38 | 76.6 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-41 | 76.6 | 77.86 | 1.26 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 77.86 | 78.47 | 0.61 | COAL | Tenas_Lithology.csv |
| T96R-41 | 78.47 | 79 | 0.53 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 79 | 85 | 6 | SST | Tenas_Lithology.csv |
| T96R-41 | 85 | 105 | 20 | CGL | Tenas_Lithology.csv |
| T96R-41 | 105 | 121.4 | 16.4 | SST | Tenas_Lithology.csv |
| T96R-42C | 0 | 6.4 | 6.4 | Overburden | Tenas_Lithology.csv |
| T96R-42C | 6.4 | 12.5 | 6.1 | MDST | Tenas_Lithology.csv |
| T96R-42C | 12.5 | 14.26 | 1.76 | SST | Tenas_Lithology.csv |
| T96R-42C | 14.26 | 18.86 | 4.6 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 18.86 | 31.53 | 12.67 | MDST | Tenas_Lithology.csv |
| T96R-42C | 31.53 | 36.04 | 4.51 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 36.04 | 37.18 | 1.14 | SST | Tenas_Lithology.csv |
| T96R-42C | 37.18 | 39.46 | 2.28 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 39.46 | 41.34 | 1.88 | MDST | Tenas_Lithology.csv |
| T96R-42C | 41.34 | 82.28 | 40.94 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 82.28 | 90.76 | 8.48 | MDST | Tenas_Lithology.csv |
| T96R-42C | 90.76 | 91.56 | 0.8 | SST | Tenas_Lithology.csv |
| T96R-42C | 91.56 | 96.63 | 5.07 | MDST | Tenas_Lithology.csv |
| T96R-42C | 96.63 | 102 | 5.37 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 102 | 103.24 | 1.24 | MDST | Tenas_Lithology.csv |
| T96R-42C | 103.24 | 105.99 | 2.75 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 105.99 | 107.75 | 1.76 | MDST | Tenas_Lithology.csv |
| T96R-42C | 107.75 | 108.12 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-42C | 108.12 | 110.16 | 2.04 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 110.16 | 110.81 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-42C | 110.81 | 115 | 4.19 | MDST | Tenas_Lithology.csv |
| T96R-42C | 115 | 116.69 | 1.69 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 116.69 | 116.77 | 0.08 | MDST | Tenas_Lithology.csv |
| T96R-42C | 116.77 | 117.3 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-42C | 117.3 | 118.04 | 0.74 | MDST | Tenas_Lithology.csv |
| T96R-42C | 118.04 | 118.6 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-42C | 118.6 | 121.3 | 2.7 | MDST | Tenas_Lithology.csv |
| T96R-42C | 121.3 | 123.12 | 1.82 | SST | Tenas_Lithology.csv |
| T96R-42C | 123.12 | 126.45 | 3.33 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-42C | 126.45 | 127.1 | 0.65 | MDST | Tenas_Lithology.csv |
| T96R-42C | 127.1 | 128 | 0.9 | COAL | Tenas_Lithology.csv |
| T96R-42C | 128 | 133.9 | 5.9 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 133.9 | 135.21 | 1.31 | MDST | Tenas_Lithology.csv |
| T96R-42C | 135.21 | 135.57 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-42C | 135.57 | 141.78 | 6.21 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 141.78 | 145.87 | 4.09 | MDST | Tenas_Lithology.csv |
| T96R-42C | 145.87 | 147.83 | 1.96 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 147.83 | 150.1 | 2.27 | SST | Tenas_Lithology.csv |
| T96R-43 | 0 | 15.5 | 15.5 | Overburden | Tenas_Lithology.csv |
| T96R-43 | 15.5 | 27.75 | 12.25 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 27.75 | 29.36 | 1.61 | COAL | Tenas_Lithology.csv |
| T96R-43 | 29.36 | 37.32 | 7.96 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 37.32 | 37.63 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-43 | 37.63 | 45.74 | 8.11 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 45.74 | 52.76 | 7.02 | COAL | Tenas_Lithology.csv |
| T96R-43 | 52.76 | 54.5 | 1.74 | MDST | Tenas_Lithology.csv |
| T96R-43 | 54.5 | 55.15 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-43 | 55.15 | 57.18 | 2.03 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 57.18 | 58.17 | 0.99 | COAL | Tenas_Lithology.csv |
| T96R-43 | 58.17 | 63.5 | 5.33 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 63.5 | 68.06 | 4.56 | MDST | Tenas_Lithology.csv |
| T96R-43 | 68.06 | 70.48 | 2.42 | COAL | Tenas_Lithology.csv |
| T96R-43 | 70.48 | 70.64 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-43 | 70.64 | 72.69 | 2.05 | COAL | Tenas_Lithology.csv |
| T96R-43 | 72.69 | 82.75 | 10.06 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 82.75 | 83.4 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-43 | 83.4 | 91.2 | 7.8 | SLTS | Tenas_Lithology.csv |
| T96R-45 | 0 | 22.9 | 22.9 | Overburden | Tenas_Lithology.csv |
| T96R-45 | 22.9 | 44.5 | 21.6 | SLTS | Tenas_Lithology.csv |
| T96R-45 | 44.5 | 49 | 4.5 | CGL | Tenas_Lithology.csv |
| T96R-45 | 49 | 51.5 | 2.5 | MDST | Tenas_Lithology.csv |
| T96R-45 | 51.5 | 54 | 2.5 | SST | Tenas_Lithology.csv |
| T96R-45 | 54 | 68 | 14 | CGL | Tenas_Lithology.csv |
| T96R-45 | 68 | 75.8 | 7.8 | SLTS | Tenas_Lithology.csv |
| T96R-45 | 75.8 | 78 | 2.2 | CGL | Tenas_Lithology.csv |
| T96R-45 | 78 | 79.6 | 1.6 | VOLC | Tenas_Lithology.csv |
| T96R-46 | 0 | 3.8 | 3.8 | Overburden | Tenas_Lithology.csv |
| T96R-46 | 3.8 | 50 | 46.2 | SLTS | Tenas_Lithology.csv |
| T96R-46 | 50 | 83.6 | 33.6 | SST | Tenas_Lithology.csv |
| T96R-46 | 83.6 | 86.28 | 2.68 | SLTS | Tenas_Lithology.csv |
| T96R-46 | 86.28 | 87.46 | 1.18 | COAL | Tenas_Lithology.csv |
| T96R-46 | 87.46 | 100.03 | 12.57 | SLTS | Tenas_Lithology.csv |
| T96R-46 | 100.03 | 104.17 | 4.14 | COAL | Tenas_Lithology.csv |
| T96R-46 | 104.17 | 107.16 | 2.99 | MDST | Tenas_Lithology.csv |
| T96R-46 | 107.16 | 108.29 | 1.13 | COAL | Tenas_Lithology.csv |
| T96R-46 | 108.29 | 115.38 | 7.09 | SLTS | Tenas_Lithology.csv |
| T96R-46 | 115.38 | 115.86 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-46 | 115.86 | 118.48 | 2.62 | SST | Tenas_Lithology.csv |
| T96R-46 | 118.48 | 118.98 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-46 | 118.98 | 121.91 | 2.93 | SST | Tenas_Lithology.csv |
| T96R-46 | 121.91 | 122.16 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-46 | 122.16 | 123.8 | 1.64 | SST | Tenas_Lithology.csv |
| T96R-46 | 123.8 | 124 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-46 | 124 | 140.4 | 16.4 | SST | Tenas_Lithology.csv |
| T96R-47 | 0 | 11.5 | 11.5 | Overburden | Tenas_Lithology.csv |
| T96R-47 | 11.5 | 55 | 43.5 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 55 | 101.41 | 46.41 | SST | Tenas_Lithology.csv |
| T96R-47 | 101.41 | 101.53 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-47 | 101.53 | 102.47 | 0.94 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 102.47 | 102.74 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-47 | 102.74 | 107.11 | 4.37 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 107.11 | 107.77 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-47 | 107.77 | 110.83 | 3.06 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 110.83 | 111.03 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-47 | 111.03 | 124.66 | 13.63 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 124.66 | 127.24 | 2.58 | COAL | Tenas_Lithology.csv |
| T96R-47 | 127.24 | 127.29 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-47 | 127.29 | 128.55 | 1.26 | COAL | Tenas_Lithology.csv |
| T96R-47 | 128.55 | 128.66 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-47 | 128.66 | 128.94 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-47 | 128.94 | 129.36 | 0.42 | MDST | Tenas_Lithology.csv |
| T96R-47 | 129.36 | 132.44 | 3.08 | COAL | Tenas_Lithology.csv |
| T96R-47 | 132.44 | 137.98 | 5.54 | MDST | Tenas_Lithology.csv |
| T96R-47 | 137.98 | 139.34 | 1.36 | COAL | Tenas_Lithology.csv |
| T96R-47 | 139.34 | 141.26 | 1.92 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 141.26 | 141.8 | 0.54 | COAL | Tenas_Lithology.csv |
| T96R-47 | 141.8 | 144.91 | 3.11 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 144.91 | 145.04 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-47 | 145.04 | 145.98 | 0.94 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 145.98 | 147.19 | 1.21 | COAL | Tenas_Lithology.csv |
| T96R-47 | 147.19 | 149.5 | 2.31 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 149.5 | 152.1 | 2.6 | SST | Tenas_Lithology.csv |
| T96R-49 | 0 | 10.97 | 10.97 | Overburden | Tenas_Lithology.csv |
| T96R-49 | 10.97 | 17.98 | 7.01 | SST | Tenas_Lithology.csv |
| T96R-49 | 17.98 | 28.95 | 10.97 | MDST | Tenas_Lithology.csv |
| T96R-49 | 28.95 | 32 | 3.05 | SST | Tenas_Lithology.csv |
| T96R-49 | 32 | 70.51 | 38.51 | MDST | Tenas_Lithology.csv |
| T96R-49 | 70.51 | 70.83 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-49 | 70.83 | 85.43 | 14.6 | MDST | Tenas_Lithology.csv |
| T96R-49 | 85.43 | 85.63 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-49 | 85.63 | 91.49 | 5.86 | SLTS | Tenas_Lithology.csv |
| T96R-49 | 91.49 | 91.63 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-49 | 91.63 | 108.2 | 16.57 | SST | Tenas_Lithology.csv |
| T96R-49 | 108.2 | 109.6 | 1.4 | VOLC | Tenas_Lithology.csv |
| T96R-50 | 0 | 7.8 | 7.8 | Overburden | Tenas_Lithology.csv |
| T96R-50 | 7.8 | 13.33 | 5.53 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 13.33 | 13.91 | 0.58 | COAL | Tenas_Lithology.csv |
| T96R-50 | 13.91 | 13.99 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-50 | 13.99 | 17.16 | 3.17 | COAL | Tenas_Lithology.csv |
| T96R-50 | 17.16 | 19.21 | 2.05 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 19.21 | 20.08 | 0.87 | COAL | Tenas_Lithology.csv |
| T96R-50 | 20.08 | 20.26 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-50 | 20.26 | 22.71 | 2.45 | COAL | Tenas_Lithology.csv |
| T96R-50 | 22.71 | 24.2 | 1.49 | MDST | Tenas_Lithology.csv |
| T96R-50 | 24.2 | 24.86 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-50 | 24.86 | 27.01 | 2.15 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 27.01 | 27.81 | 0.8 | COAL | Tenas_Lithology.csv |
| T96R-50 | 27.81 | 28.1 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-50 | 28.1 | 31.87 | 3.77 | COAL | Tenas_Lithology.csv |
| T96R-50 | 31.87 | 32.21 | 0.34 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-50 | 32.21 | 33.24 | 1.03 | COAL | Tenas_Lithology.csv |
| T96R-50 | 33.24 | 39.28 | 6.04 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 39.28 | 40.38 | 1.1 | COAL | Tenas_Lithology.csv |
| T96R-50 | 40.38 | 42.8 | 2.42 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 42.8 | 43 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-50 | 43 | 44.28 | 1.28 | MDST | Tenas_Lithology.csv |
| T96R-50 | 44.28 | 45.26 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-50 | 45.26 | 63.56 | 18.3 | SST | Tenas_Lithology.csv |
| T96R-50 | 63.56 | 63.95 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-50 | 63.95 | 64.16 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-50 | 64.16 | 64.37 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-50 | 64.37 | 64.67 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-50 | 64.67 | 65.47 | 0.8 | COAL | Tenas_Lithology.csv |
| T96R-50 | 65.47 | 67 | 1.53 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 67 | 73.5 | 6.5 | SST | Tenas_Lithology.csv |
| T96R-51 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-51 | 7 | 16.7 | 9.7 | MDST | Tenas_Lithology.csv |
| T96R-51 | 16.7 | 20.7 | 4 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 20.7 | 36.6 | 15.9 | SST | Tenas_Lithology.csv |
| T96R-51 | 36.6 | 71.52 | 34.92 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 71.52 | 71.68 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-51 | 71.68 | 75.67 | 3.99 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 75.67 | 75.88 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-51 | 75.88 | 76.07 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-51 | 76.07 | 76.55 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-51 | 76.55 | 83.68 | 7.13 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 83.68 | 85.61 | 1.93 | COAL | Tenas_Lithology.csv |
| T96R-51 | 85.61 | 99.89 | 14.28 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 99.89 | 100.71 | 0.82 | COAL | Tenas_Lithology.csv |
| T96R-51 | 100.71 | 101.72 | 1.01 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 101.72 | 101.96 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-51 | 101.96 | 102.35 | 0.39 | MDST | Tenas_Lithology.csv |
| T96R-51 | 102.35 | 102.72 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-51 | 102.72 | 103.5 | 0.78 | MDST | Tenas_Lithology.csv |
| T96R-51 | 103.5 | 103.65 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-51 | 103.65 | 105.92 | 2.27 | MDST | Tenas_Lithology.csv |
| T96R-51 | 105.92 | 106.2 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-51 | 106.2 | 106.34 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-51 | 106.34 | 106.78 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-51 | 106.78 | 108.2 | 1.42 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 108.2 | 112.8 | 4.6 | SST | Tenas_Lithology.csv |
| T96R-51 | 112.8 | 116 | 3.2 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 116 | 127.9 | 11.9 | SST | Tenas_Lithology.csv |
| T96R-52 | 0 | 22.2 | 22.2 | Overburden | Tenas_Lithology.csv |
| T96R-52 | 22.2 | 24 | 1.8 | MDST | Tenas_Lithology.csv |
| T96R-52 | 24 | 59.75 | 35.75 | SST | Tenas_Lithology.csv |
| T96R-52 | 59.75 | 64.53 | 4.78 | MDST | Tenas_Lithology.csv |
| T96R-52 | 64.53 | 64.61 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-52 | 64.61 | 71.88 | 7.27 | SLTS | Tenas_Lithology.csv |
| T96R-52 | 71.88 | 72.11 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-52 | 72.11 | 78.65 | 6.54 | SLTS | Tenas_Lithology.csv |
| T96R-52 | 78.65 | 80.35 | 1.7 | COAL | Tenas_Lithology.csv |
| T96R-52 | 80.35 | 100.74 | 20.39 | SLTS | Tenas_Lithology.csv |
| T96R-52 | 100.74 | 107.84 | 7.1 | COAL | Tenas_Lithology.csv |
| T96R-52 | 107.84 | 113.92 | 6.08 | MDST | Tenas_Lithology.csv |
| T96R-52 | 113.92 | 115.19 | 1.27 | COAL | Tenas_Lithology.csv |
| T96R-52 | 115.19 | 117.31 | 2.12 | SLTS | Tenas_Lithology.csv |
| T96R-52 | 117.31 | 117.75 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-52 | 117.75 | 121.95 | 4.2 | MDST | Tenas_Lithology.csv |
| T96R-52 | 121.95 | 123.05 | 1.1 | COAL | Tenas_Lithology.csv |
| T96R-52 | 123.05 | 123.76 | 0.71 | MDST | Tenas_Lithology.csv |
| T96R-52 | 123.76 | 124.48 | 0.72 | COAL | Tenas_Lithology.csv |
| T96R-52 | 124.48 | 127.2 | 2.72 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 0 | 11.3 | 11.3 | Overburden | Tenas_Lithology.csv |
| T96R-56C | 11.3 | 12.5 | 1.2 | SST | Tenas_Lithology.csv |
| T96R-56C | 12.5 | 19.47 | 6.97 | MDST | Tenas_Lithology.csv |
| T96R-56C | 19.47 | 19.83 | 0.36 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 19.83 | 23.47 | 3.64 | MDST | Tenas_Lithology.csv |
| T96R-56C | 23.47 | 24.56 | 1.09 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 24.56 | 24.86 | 0.3 | SST | Tenas_Lithology.csv |
| T96R-56C | 24.86 | 27.8 | 2.94 | MDST | Tenas_Lithology.csv |
| T96R-56C | 27.8 | 29.44 | 1.64 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 29.44 | 36.42 | 6.98 | MDST | Tenas_Lithology.csv |
| T96R-56C | 36.42 | 38.65 | 2.23 | SST | Tenas_Lithology.csv |
| T96R-56C | 38.65 | 60.34 | 21.69 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 60.34 | 65.71 | 5.37 | MDST | Tenas_Lithology.csv |
| T96R-56C | 65.71 | 66.22 | 0.51 | SST | Tenas_Lithology.csv |
| T96R-56C | 66.22 | 69.09 | 2.87 | MDST | Tenas_Lithology.csv |
| T96R-56C | 69.09 | 69.23 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-56C | 69.23 | 74.94 | 5.71 | MDST | Tenas_Lithology.csv |
| T96R-56C | 74.94 | 76.71 | 1.77 | COAL | Tenas_Lithology.csv |
| T96R-56C | 76.71 | 77.27 | 0.56 | MDST | Tenas_Lithology.csv |
| T96R-56C | 77.27 | 78.89 | 1.62 | COAL | Tenas_Lithology.csv |
| T96R-56C | 78.89 | 79.18 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-56C | 79.18 | 82.63 | 3.45 | COAL | Tenas_Lithology.csv |
| T96R-56C | 82.63 | 85.52 | 2.89 | MDST | Tenas_Lithology.csv |
| T96R-56C | 85.52 | 85.67 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-56C | 85.67 | 85.77 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-56C | 85.77 | 86.18 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-56C | 86.18 | 87.68 | 1.5 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 87.68 | 88.13 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-56C | 88.13 | 88.98 | 0.85 | MDST | Tenas_Lithology.csv |
| T96R-56C | 88.98 | 89.23 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-56C | 89.23 | 90.31 | 1.08 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 90.31 | 90.68 | 0.37 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-56C | 90.68 | 93.1 | 2.42 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 0 | 2 | 2 | Overburden | Tenas_Lithology.csv |
| T96R-58 | 2 | 17.3 | 15.3 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 17.3 | 20.2 | 2.9 | MDST | Tenas_Lithology.csv |
| T96R-58 | 20.2 | 29.6 | 9.4 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 29.6 | 29.8 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-58 | 29.8 | 32.02 | 2.22 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 32.02 | 32.47 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-58 | 32.47 | 35.25 | 2.78 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 35.25 | 35.4 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-58 | 35.4 | 35.93 | 0.53 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 35.93 | 37.41 | 1.48 | COAL | Tenas_Lithology.csv |
| T96R-58 | 37.41 | 40 | 2.59 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 40 | 51.26 | 11.26 | SST | Tenas_Lithology.csv |
| T96R-58 | 51.26 | 56.45 | 5.19 | COAL | Tenas_Lithology.csv |
| T96R-58 | 56.45 | 58.36 | 1.91 | MDST | Tenas_Lithology.csv |
| T96R-58 | 58.36 | 58.71 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-58 | 58.71 | 58.85 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-58 | 58.85 | 59.19 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-58 | 59.19 | 65.71 | 6.52 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 65.71 | 65.96 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-58 | 65.96 | 70.23 | 4.27 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 70.23 | 70.49 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-58 | 70.49 | 73.62 | 3.13 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 73.62 | 74.1 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-58 | 74.1 | 77.5 | 3.4 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 77.5 | 77.8 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-58 | 77.8 | 79.03 | 1.23 | MDST | Tenas_Lithology.csv |
| T96R-58 | 79.03 | 79.3 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-58 | 79.3 | 79.9 | 0.6 | SLTS | Tenas_Lithology.csv |
| T96R-59 | 0 | 21 | 21 | Overburden | Tenas_Lithology.csv |
| T96R-59 | 21 | 26.57 | 5.57 | MDST | Tenas_Lithology.csv |
| T96R-59 | 26.57 | 27.68 | 1.11 | COAL | Tenas_Lithology.csv |
| T96R-59 | 27.68 | 29.24 | 1.56 | MDST | Tenas_Lithology.csv |
| T96R-59 | 29.24 | 29.81 | 0.57 | COAL | Tenas_Lithology.csv |
| T96R-59 | 29.81 | 36.28 | 6.47 | SLTS | Tenas_Lithology.csv |
| T96R-59 | 36.28 | 36.92 | 0.64 | COAL | Tenas_Lithology.csv |
| T96R-59 | 36.92 | 54.5 | 17.58 | SST | Tenas_Lithology.csv |
| T96R-59 | 54.5 | 59 | 4.5 | CGL | Tenas_Lithology.csv |
| T96R-59 | 59 | 61 | 2 | SST | Tenas_Lithology.csv |
| T96R-59 | 61 | 62.7 | 1.7 | MDST | Tenas_Lithology.csv |
| T96R-59 | 62.7 | 64.5 | 1.8 | CGL | Tenas_Lithology.csv |
| T96R-59 | 64.5 | 73.6 | 9.1 | SST | Tenas_Lithology.csv |
| T96R-60 | 0 | 0.9 | 0.9 | Overburden | Tenas_Lithology.csv |
| T96R-60 | 0.9 | 7 | 6.1 | SLTS | Tenas_Lithology.csv |
| T96R-60 | 7 | 7.23 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-60 | 7.23 | 7.66 | 0.43 | MDST | Tenas_Lithology.csv |
| T96R-60 | 7.66 | 13.18 | 5.52 | COAL | Tenas_Lithology.csv |
| T96R-60 | 13.18 | 14.07 | 0.89 | MDST | Tenas_Lithology.csv |
| T96R-60 | 14.07 | 14.78 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-60 | 14.78 | 15.64 | 0.86 | MDST | Tenas_Lithology.csv |
| T96R-60 | 15.64 | 16.11 | 0.47 | COAL | Tenas_Lithology.csv |
| T96R-60 | 16.11 | 17.4 | 1.29 | SLTS | Tenas_Lithology.csv |
| T96R-60 | 17.4 | 17.6 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-60 | 17.6 | 18.1 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-60 | 18.1 | 18.3 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-60 | 18.3 | 22.28 | 3.98 | MDST | Tenas_Lithology.csv |
| T96R-60 | 22.28 | 22.55 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-60 | 22.55 | 22.81 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-60 | 22.81 | 23 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-60 | 23 | 23.95 | 0.95 | MDST | Tenas_Lithology.csv |
| T96R-60 | 23.95 | 24.36 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-60 | 24.36 | 30.68 | 6.32 | SLTS | Tenas_Lithology.csv |
| T96R-60 | 30.68 | 30.93 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-60 | 30.93 | 34 | 3.07 | MDST | Tenas_Lithology.csv |
| T96R-60 | 34 | 49.2 | 15.2 | SST | Tenas_Lithology.csv |
| T96R-61 | 0 | 6.5 | 6.5 | Overburden | Tenas_Lithology.csv |
| T96R-61 | 6.5 | 42.5 | 36 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 42.5 | 53.65 | 11.15 | SST | Tenas_Lithology.csv |
| T96R-61 | 53.65 | 53.93 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-61 | 53.93 | 57.19 | 3.26 | SST | Tenas_Lithology.csv |
| T96R-61 | 57.19 | 57.29 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-61 | 57.29 | 58.07 | 0.78 | MDST | Tenas_Lithology.csv |
| T96R-61 | 58.07 | 58.36 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-61 | 58.36 | 63.94 | 5.58 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 63.94 | 65.41 | 1.47 | COAL | Tenas_Lithology.csv |
| T96R-61 | 65.41 | 73.3 | 7.89 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 73.3 | 73.61 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-61 | 73.61 | 80.34 | 6.73 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 80.34 | 83.99 | 3.65 | COAL | Tenas_Lithology.csv |
| T96R-61 | 83.99 | 84.05 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-61 | 84.05 | 86.03 | 1.98 | COAL | Tenas_Lithology.csv |
| T96R-61 | 86.03 | 88.71 | 2.68 | MDST | Tenas_Lithology.csv |
| T96R-61 | 88.71 | 88.95 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-61 | 88.95 | 89.28 | 0.33 | MDST | Tenas_Lithology.csv |
| T96R-61 | 89.28 | 90.26 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-61 | 90.26 | 90.68 | 0.42 | MDST | Tenas_Lithology.csv |
| T96R-61 | 90.68 | 91.16 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-61 | 91.16 | 95.18 | 4.02 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 95.18 | 95.48 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-61 | 95.48 | 96.82 | 1.34 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 96.82 | 97.35 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-61 | 97.35 | 101.3 | 3.95 | SST | Tenas_Lithology.csv |
| T96R-61 | 101.3 | 106.38 | 5.08 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 106.38 | 106.65 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-61 | 106.65 | 109.7 | 3.05 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T96R-63 | 3 | 24.71 | 21.71 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 24.71 | 24.96 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-63 | 24.96 | 30.81 | 5.85 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 30.81 | 31 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-63 | 31 | 34.61 | 3.61 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 34.61 | 35.92 | 1.31 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-63 | 35.92 | 42.9 | 6.98 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 42.9 | 43.1 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-63 | 43.1 | 46.14 | 3.04 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 46.14 | 47.77 | 1.63 | COAL | Tenas_Lithology.csv |
| T96R-63 | 47.77 | 48.04 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-63 | 48.04 | 51.36 | 3.32 | COAL | Tenas_Lithology.csv |
| T96R-63 | 51.36 | 51.96 | 0.6 | MDST | Tenas_Lithology.csv |
| T96R-63 | 51.96 | 52.2 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-63 | 52.2 | 52.36 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-63 | 52.36 | 52.68 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-63 | 52.68 | 55.31 | 2.63 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 55.31 | 55.5 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-63 | 55.5 | 59.31 | 3.81 | SST | Tenas_Lithology.csv |
| T96R-63 | 59.31 | 59.53 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-63 | 59.53 | 65.42 | 5.89 | SST | Tenas_Lithology.csv |
| T96R-63 | 65.42 | 65.81 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-63 | 65.81 | 79.6 | 13.79 | SST | Tenas_Lithology.csv |
| T96R-64 | 0 | 22.43 | 22.43 | Overburden | Tenas_Lithology.csv |
| T96R-64 | 22.43 | 81.13 | 58.7 | SST | Tenas_Lithology.csv |
| T96R-64 | 81.13 | 82.67 | 1.54 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 82.67 | 82.97 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-64 | 82.97 | 87.16 | 4.19 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 87.16 | 87.9 | 0.74 | COAL | Tenas_Lithology.csv |
| T96R-64 | 87.9 | 92.58 | 4.68 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 92.58 | 92.8 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-64 | 92.8 | 95.32 | 2.52 | MDST | Tenas_Lithology.csv |
| T96R-64 | 95.32 | 96.76 | 1.44 | COAL | Tenas_Lithology.csv |
| T96R-64 | 96.76 | 104.89 | 8.13 | SST | Tenas_Lithology.csv |
| T96R-64 | 104.89 | 105.15 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-64 | 105.15 | 111.15 | 6 | SST | Tenas_Lithology.csv |
| T96R-64 | 111.15 | 118.69 | 7.54 | COAL | Tenas_Lithology.csv |
| T96R-64 | 118.69 | 119.2 | 0.51 | MDST | Tenas_Lithology.csv |
| T96R-64 | 119.2 | 119.6 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-64 | 119.6 | 121.42 | 1.82 | MDST | Tenas_Lithology.csv |
| T96R-64 | 121.42 | 122.2 | 0.78 | COAL | Tenas_Lithology.csv |
| T96R-64 | 122.2 | 122.32 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-64 | 122.32 | 122.53 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-64 | 122.53 | 123.28 | 0.75 | MDST | Tenas_Lithology.csv |
| T96R-64 | 123.28 | 123.48 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-64 | 123.48 | 128.2 | 4.72 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 128.2 | 128.82 | 0.62 | COAL | Tenas_Lithology.csv |
| T96R-64 | 128.82 | 130.54 | 1.72 | MDST | Tenas_Lithology.csv |
| T96R-64 | 130.54 | 130.7 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-64 | 130.7 | 130.82 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-64 | 130.82 | 131.1 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-64 | 131.1 | 134.73 | 3.63 | MDST | Tenas_Lithology.csv |
| T96R-64 | 134.73 | 134.81 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-64 | 134.81 | 138 | 3.19 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 138 | 138.36 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-64 | 138.36 | 140.4 | 2.04 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 0 | 18.3 | 18.3 | Overburden | Tenas_Lithology.csv |
| T96R-65C | 18.3 | 21.12 | 2.82 | MDST | Tenas_Lithology.csv |
| T96R-65C | 21.12 | 44.16 | 23.04 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 44.16 | 53.2 | 9.04 | MDST | Tenas_Lithology.csv |
| T96R-65C | 53.2 | 55.96 | 2.76 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 55.96 | 56.46 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-65C | 56.46 | 56.56 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 56.56 | 61.98 | 5.42 | MDST | Tenas_Lithology.csv |
| T96R-65C | 61.98 | 64.09 | 2.11 | COAL | Tenas_Lithology.csv |
| T96R-65C | 64.09 | 65.72 | 1.63 | MDST | Tenas_Lithology.csv |
| T96R-65C | 65.72 | 83.38 | 17.66 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 83.38 | 86.32 | 2.94 | COAL | Tenas_Lithology.csv |
| T96R-65C | 86.32 | 86.48 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 86.48 | 92.34 | 5.86 | COAL | Tenas_Lithology.csv |
| T96R-65C | 92.34 | 98.86 | 6.52 | MDST | Tenas_Lithology.csv |
| T96R-65C | 98.86 | 100.16 | 1.3 | SST | Tenas_Lithology.csv |
| T96R-65C | 100.16 | 100.46 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-65C | 100.46 | 101.17 | 0.71 | MDST | Tenas_Lithology.csv |
| T96R-65C | 101.17 | 102.51 | 1.34 | COAL | Tenas_Lithology.csv |
| T96R-65C | 102.51 | 105.3 | 2.79 | MDST | Tenas_Lithology.csv |
| T96R-65C | 105.3 | 105.48 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-65C | 105.48 | 109.9 | 4.42 | MDST | Tenas_Lithology.csv |
| T96R-65C | 109.9 | 110.27 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-65C | 110.27 | 110.4 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 110.4 | 110.86 | 0.46 | COAL | Tenas_Lithology.csv |
| T96R-65C | 110.86 | 111.1 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 111.1 | 111.43 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-65C | 111.43 | 112.65 | 1.22 | MDST | Tenas_Lithology.csv |
| T96R-65C | 112.65 | 113.03 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-65C | 113.03 | 113.33 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 113.33 | 113.69 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-65C | 113.69 | 121.6 | 7.91 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 121.6 | 122.18 | 0.58 | MDST | Tenas_Lithology.csv |
| T96R-67 | 0 | 1.2 | 1.2 | Overburden | Tenas_Lithology.csv |
| T96R-67 | 1.2 | 21.5 | 20.3 | SLTS | Tenas_Lithology.csv |
| T96R-67 | 21.5 | 81.7 | 60.2 | SST | Tenas_Lithology.csv |
| T96R-67 | 81.7 | 83.24 | 1.54 | COAL | Tenas_Lithology.csv |
| T96R-67 | 83.24 | 102.51 | 19.27 | SLTS | Tenas_Lithology.csv |
| T96R-67 | 102.51 | 108.66 | 6.15 | COAL | Tenas_Lithology.csv |
| T96R-67 | 108.66 | 111.73 | 3.07 | MDST | Tenas_Lithology.csv |
| T96R-67 | 111.73 | 112.04 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-67 | 112.04 | 112.17 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-67 | 112.17 | 112.54 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-67 | 112.54 | 112.72 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-67 | 112.72 | 113.4 | 0.68 | COAL | Tenas_Lithology.csv |
| T96R-67 | 113.4 | 114.9 | 1.5 | MDST | Tenas_Lithology.csv |
| T96R-67 | 114.9 | 115.27 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-67 | 115.27 | 119.99 | 4.72 | SLTS | Tenas_Lithology.csv |
| T96R-67 | 119.99 | 120.08 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-67 | 120.08 | 121.61 | 1.53 | MDST | Tenas_Lithology.csv |
| T96R-67 | 121.61 | 122.2 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-67 | 122.2 | 126.84 | 4.64 | SLTS | Tenas_Lithology.csv |
| T96R-67 | 126.84 | 127.14 | 0.3 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-67 | 127.14 | 129.16 | 2.02 | SST | Tenas_Lithology.csv |
| T96R-67 | 129.16 | 129.45 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-67 | 129.45 | 134.5 | 5.05 | SST | Tenas_Lithology.csv |
| T96R-69 | 0 | 2.5 | 2.5 | Overburden | Tenas_Lithology.csv |
| T96R-69 | 2.5 | 34.6 | 32.1 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 34.6 | 44.3 | 9.7 | SST | Tenas_Lithology.csv |
| T96R-69 | 44.3 | 53 | 8.7 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 53 | 59.5 | 6.5 | SST | Tenas_Lithology.csv |
| T96R-69 | 59.5 | 74.8 | 15.3 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 74.8 | 75 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-69 | 75 | 78.05 | 3.05 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 78.05 | 80 | 1.95 | COAL | Tenas_Lithology.csv |
| T96R-69 | 80 | 80.3 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-69 | 80.3 | 83.76 | 3.46 | COAL | Tenas_Lithology.csv |
| T96R-69 | 83.76 | 86.2 | 2.44 | MDST | Tenas_Lithology.csv |
| T96R-69 | 86.2 | 86.48 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-69 | 86.48 | 90.85 | 4.37 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 90.85 | 91 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-69 | 91 | 100.81 | 9.81 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 100.81 | 100.94 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-69 | 100.94 | 103.44 | 2.5 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 103.44 | 103.57 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-69 | 103.57 | 114.35 | 10.78 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 114.35 | 114.45 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-69 | 114.45 | 115.6 | 1.15 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T96R-70 | 15 | 44.5 | 29.5 | SST | Tenas_Lithology.csv |
| T96R-70 | 44.5 | 48 | 3.5 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 48 | 75 | 27 | SST | Tenas_Lithology.csv |
| T96R-70 | 75 | 81.89 | 6.89 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 81.89 | 82.23 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-70 | 82.23 | 85.63 | 3.4 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 85.63 | 86.38 | 0.75 | COAL | Tenas_Lithology.csv |
| T96R-70 | 86.38 | 93.26 | 6.88 | SST | Tenas_Lithology.csv |
| T96R-70 | 93.26 | 94.95 | 1.69 | COAL | Tenas_Lithology.csv |
| T96R-70 | 94.95 | 113.22 | 18.27 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 113.22 | 117.27 | 4.05 | COAL | Tenas_Lithology.csv |
| T96R-70 | 117.27 | 117.33 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-70 | 117.33 | 121.01 | 3.68 | COAL | Tenas_Lithology.csv |
| T96R-70 | 121.01 | 123.31 | 2.3 | MDST | Tenas_Lithology.csv |
| T96R-70 | 123.31 | 123.5 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-70 | 123.5 | 129.87 | 6.37 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 129.87 | 130.07 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-70 | 130.07 | 130.18 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-70 | 130.18 | 130.93 | 0.75 | COAL | Tenas_Lithology.csv |
| T96R-70 | 130.93 | 133.2 | 2.27 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 133.2 | 133.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-70 | 133.4 | 133.6 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-70 | 133.6 | 133.9 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-70 | 133.9 | 134.7 | 0.8 | MDST | Tenas_Lithology.csv |
| T96R-70 | 134.7 | 135 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-70 | 135 | 136.8 | 1.8 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 136.8 | 137 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-70 | 137 | 141.1 | 4.1 | MDST | Tenas_Lithology.csv |
| T96R-70 | 141.1 | 141.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-70 | 141.4 | 146.6 | 5.2 | SST | Tenas_Lithology.csv |
| T96R-72 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-72 | 7 | 31 | 24 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 31 | 48 | 17 | MDST | Tenas_Lithology.csv |
| T96R-72 | 48 | 59 | 11 | SST | Tenas_Lithology.csv |
| T96R-72 | 59 | 100 | 41 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 100 | 138 | 38 | SST | Tenas_Lithology.csv |
| T96R-72 | 138 | 145.77 | 7.77 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 145.77 | 146.01 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-72 | 146.01 | 148.36 | 2.35 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 148.36 | 157 | 8.64 | MDST | Tenas_Lithology.csv |
| T96R-72 | 157 | 168 | 11 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 168 | 178 | 10 | SST | Tenas_Lithology.csv |
| T96R-72 | 178 | 182.8 | 4.8 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 0 | 7.8 | 7.8 | Overburden | Tenas_Lithology.csv |
| T96R-73 | 7.8 | 15 | 7.2 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 15 | 20.6 | 5.6 | SST | Tenas_Lithology.csv |
| T96R-73 | 20.6 | 33 | 12.4 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 33 | 105.83 | 72.83 | SST | Tenas_Lithology.csv |
| T96R-73 | 105.83 | 106.36 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-73 | 106.36 | 106.43 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-73 | 106.43 | 109.83 | 3.4 | COAL | Tenas_Lithology.csv |
| T96R-73 | 109.83 | 110.2 | 0.37 | MDST | Tenas_Lithology.csv |
| T96R-73 | 110.2 | 113.06 | 2.86 | COAL | Tenas_Lithology.csv |
| T96R-73 | 113.06 | 114.5 | 1.44 | MDST | Tenas_Lithology.csv |
| T96R-73 | 114.5 | 115.6 | 1.1 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 115.6 | 119.29 | 3.69 | MDST | Tenas_Lithology.csv |
| T96R-73 | 119.29 | 119.6 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-73 | 119.6 | 119.91 | 0.31 | MDST | Tenas_Lithology.csv |
| T96R-73 | 119.91 | 120.27 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-73 | 120.27 | 121.02 | 0.75 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 121.02 | 121.76 | 0.74 | COAL | Tenas_Lithology.csv |
| T96R-73 | 121.76 | 125.79 | 4.03 | MDST | Tenas_Lithology.csv |
| T96R-73 | 125.79 | 126.03 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-73 | 126.03 | 126.62 | 0.59 | MDST | Tenas_Lithology.csv |
| T96R-73 | 126.62 | 127.18 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-73 | 127.18 | 133.57 | 6.39 | SST | Tenas_Lithology.csv |
| T96R-73 | 133.57 | 133.77 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-73 | 133.77 | 134.5 | 0.73 | SST | Tenas_Lithology.csv |
| T96R-75 | 0 | 14.5 | 14.5 | Overburden | Tenas_Lithology.csv |
| T96R-75 | 14.5 | 30.16 | 15.66 | SST | Tenas_Lithology.csv |
| T96R-75 | 30.16 | 36.28 | 6.12 | COAL | Tenas_Lithology.csv |
| T96R-75 | 36.28 | 39.47 | 3.19 | MDST | Tenas_Lithology.csv |
| T96R-75 | 39.47 | 40.4 | 0.93 | COAL | Tenas_Lithology.csv |
| T96R-75 | 40.4 | 40.68 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-75 | 40.68 | 41.61 | 0.93 | COAL | Tenas_Lithology.csv |
| T96R-75 | 41.61 | 51.77 | 10.16 | SLTS | Tenas_Lithology.csv |
| T96R-75 | 51.77 | 53.23 | 1.46 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-75 | 53.23 | 58.16 | 4.93 | SLTS | Tenas_Lithology.csv |
| T96R-75 | 58.16 | 58.84 | 0.68 | COAL | Tenas_Lithology.csv |
| T96R-75 | 58.84 | 63.05 | 4.21 | SLTS | Tenas_Lithology.csv |
| T96R-75 | 63.05 | 63.68 | 0.63 | COAL | Tenas_Lithology.csv |
| T96R-75 | 63.68 | 67.6 | 3.92 | SST | Tenas_Lithology.csv |
| T96R-76 | 0 | 0.02 | 0.02 | Overburden | Tenas_Lithology.csv |
| T96R-76 | 0.02 | 1.23 | 1.21 | SLTS | Tenas_Lithology.csv |
| T96R-76 | 1.23 | 2.85 | 1.62 | COAL | Tenas_Lithology.csv |
| T96R-76 | 2.85 | 3.26 | 0.41 | MDST | Tenas_Lithology.csv |
| T96R-76 | 3.26 | 6.75 | 3.49 | COAL | Tenas_Lithology.csv |
| T96R-76 | 6.75 | 8.24 | 1.49 | SLTS | Tenas_Lithology.csv |
| T96R-76 | 8.24 | 8.76 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-76 | 8.76 | 17.9 | 9.14 | SLTS | Tenas_Lithology.csv |
| T96R-77 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-77 | 7 | 43 | 36 | SLTS | Tenas_Lithology.csv |
| T96R-77 | 43 | 50 | 7 | MDST | Tenas_Lithology.csv |
| T96R-77 | 50 | 54.5 | 4.5 | SST | Tenas_Lithology.csv |
| T96R-77 | 54.5 | 60 | 5.5 | MDST | Tenas_Lithology.csv |
| T96R-77 | 60 | 127.29 | 67.29 | SST | Tenas_Lithology.csv |
| T96R-77 | 127.29 | 127.51 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-77 | 127.51 | 131.4 | 3.89 | SLTS | Tenas_Lithology.csv |
| T96R-77 | 131.4 | 133.26 | 1.86 | COAL | Tenas_Lithology.csv |
| T96R-77 | 133.26 | 133.93 | 0.67 | MDST | Tenas_Lithology.csv |
| T96R-77 | 133.93 | 134.03 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-77 | 134.03 | 134.24 | 0.21 | MDST | Tenas_Lithology.csv |
| T96R-77 | 134.24 | 137.93 | 3.69 | COAL | Tenas_Lithology.csv |
| T96R-77 | 137.93 | 140.25 | 2.32 | MDST | Tenas_Lithology.csv |
| T96R-77 | 140.25 | 140.6 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-77 | 140.6 | 164.7 | 24.1 | SST | Tenas_Lithology.csv |
| T96R-78 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T96R-78 | 3 | 6.4 | 3.4 | SST | Tenas_Lithology.csv |
| T96R-78 | 6.4 | 33.25 | 26.85 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 33.25 | 36.3 | 3.05 | SST | Tenas_Lithology.csv |
| T96R-78 | 36.3 | 38.1 | 1.8 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 38.1 | 41.4 | 3.3 | MDST | Tenas_Lithology.csv |
| T96R-78 | 41.4 | 43.6 | 2.2 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 43.6 | 44.9 | 1.3 | MDST | Tenas_Lithology.csv |
| T96R-78 | 44.9 | 45.08 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-78 | 45.08 | 49.56 | 4.48 | MDST | Tenas_Lithology.csv |
| T96R-78 | 49.56 | 49.8 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-78 | 49.8 | 49.94 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-78 | 49.94 | 50.28 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-78 | 50.28 | 53.26 | 2.98 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 53.26 | 54.45 | 1.19 | COAL | Tenas_Lithology.csv |
| T96R-78 | 54.45 | 54.57 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-78 | 54.57 | 55.26 | 0.69 | COAL | Tenas_Lithology.csv |
| T96R-78 | 55.26 | 67.43 | 12.17 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 67.43 | 69.51 | 2.08 | COAL | Tenas_Lithology.csv |
| T96R-78 | 69.51 | 73.1 | 3.59 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 73.1 | 75.42 | 2.32 | COAL | Tenas_Lithology.csv |
| T96R-78 | 75.42 | 76.47 | 1.05 | MDST | Tenas_Lithology.csv |
| T96R-78 | 76.47 | 76.66 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-78 | 76.66 | 76.8 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-78 | 76.8 | 77.1 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-78 | 77.1 | 77.4 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-78 | 77.4 | 77.66 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-78 | 77.66 | 78.02 | 0.36 | MDST | Tenas_Lithology.csv |
| T96R-78 | 78.02 | 78.07 | 0.05 | COAL | Tenas_Lithology.csv |
| T96R-78 | 78.07 | 80.17 | 2.1 | MDST | Tenas_Lithology.csv |
| T96R-78 | 80.17 | 80.42 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-78 | 80.42 | 83.22 | 2.8 | MDST | Tenas_Lithology.csv |
| T96R-78 | 83.22 | 83.29 | 0.07 | COAL | Tenas_Lithology.csv |
| T96R-78 | 83.29 | 84.77 | 1.48 | MDST | Tenas_Lithology.csv |
| T96R-78 | 84.77 | 84.93 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-78 | 84.93 | 87.8 | 2.87 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 87.8 | 96.6 | 8.8 | SST | Tenas_Lithology.csv |
| T96R-78 | 96.6 | 103.1 | 6.5 | VOLC | Tenas_Lithology.csv |
| T96R-79 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T96R-79 | 15 | 29.52 | 14.52 | SST | Tenas_Lithology.csv |
| T96R-79 | 29.52 | 29.83 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-79 | 29.83 | 32.79 | 2.96 | SLTS | Tenas_Lithology.csv |
| T96R-79 | 32.79 | 33 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-79 | 33 | 43.84 | 10.84 | SLTS | Tenas_Lithology.csv |
| T96R-79 | 43.84 | 44.71 | 0.87 | COAL | Tenas_Lithology.csv |
| T96R-79 | 44.71 | 47 | 2.29 | SLTS | Tenas_Lithology.csv |
| T96R-79 | 47 | 73.5 | 26.5 | SST | Tenas_Lithology.csv |
| T96R-82 | 0 | 10 | 10 | Overburden | Tenas_Lithology.csv |
| T96R-82 | 10 | 23 | 13 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 23 | 34 | 11 | SST | Tenas_Lithology.csv |
| T96R-82 | 34 | 37.04 | 3.04 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 37.04 | 37.36 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-82 | 37.36 | 43.23 | 5.87 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 43.23 | 43.6 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-82 | 43.6 | 49.21 | 5.61 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 49.21 | 50.94 | 1.73 | COAL | Tenas_Lithology.csv |
| T96R-82 | 50.94 | 61.7 | 10.76 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 61.7 | 62 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-82 | 62 | 68.47 | 6.47 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 68.47 | 71.03 | 2.56 | COAL | Tenas_Lithology.csv |
| T96R-82 | 71.03 | 72.37 | 1.34 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 72.37 | 76.96 | 4.59 | COAL | Tenas_Lithology.csv |
| T96R-82 | 76.96 | 82.21 | 5.25 | MDST | Tenas_Lithology.csv |
| T96R-82 | 82.21 | 82.31 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-82 | 82.31 | 82.74 | 0.43 | MDST | Tenas_Lithology.csv |
| T96R-82 | 82.74 | 84.02 | 1.28 | COAL | Tenas_Lithology.csv |
| T96R-82 | 84.02 | 85.83 | 1.81 | MDST | Tenas_Lithology.csv |
| T96R-82 | 85.83 | 86.06 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-82 | 86.06 | 93.12 | 7.06 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 93.12 | 93.6 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-82 | 93.6 | 95.26 | 1.66 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 95.26 | 95.7 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-82 | 95.7 | 102.49 | 6.79 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 102.49 | 102.8 | 0.31 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-82 | 102.8 | 104.2 | 1.4 | SLTS | Tenas_Lithology.csv |
| T96R-83 | 0 | 12.92 | 12.92 | Overburden | Tenas_Lithology.csv |
| T96R-83 | 12.92 | 25 | 12.08 | n/a | Tenas_Lithology.csv |
| T96R-84 | 0 | 26.5 | 26.5 | Overburden | Tenas_Lithology.csv |
| T96R-84 | 26.5 | 38.43 | 11.93 | SST | Tenas_Lithology.csv |
| T96R-84 | 38.43 | 38.75 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-84 | 38.75 | 39.3 | 0.55 | MDST | Tenas_Lithology.csv |
| T96R-84 | 39.3 | 39.69 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-84 | 39.69 | 40.54 | 0.85 | MDST | Tenas_Lithology.csv |
| T96R-84 | 40.54 | 41.26 | 0.72 | COAL | Tenas_Lithology.csv |
| T96R-84 | 41.26 | 49 | 7.74 | SLTS | Tenas_Lithology.csv |
| T96R-84 | 49 | 52.2 | 3.2 | VOLC | Tenas_Lithology.csv |
| T96R-86 | 0 | 17 | 17 | Overburden | Tenas_Lithology.csv |
| T96R-86 | 17 | 22.53 | 5.53 | MDST | Tenas_Lithology.csv |
| T96R-86 | 22.53 | 23.3 | 0.77 | COAL | Tenas_Lithology.csv |
| T96R-86 | 23.3 | 26.78 | 3.48 | SLTS | Tenas_Lithology.csv |
| T96R-86 | 26.78 | 28.77 | 1.99 | COAL | Tenas_Lithology.csv |
| T96R-86 | 28.77 | 31.62 | 2.85 | SLTS | Tenas_Lithology.csv |
| T96R-86 | 31.62 | 32.27 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-86 | 32.27 | 32.43 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-86 | 32.43 | 35.66 | 3.23 | COAL | Tenas_Lithology.csv |
| T96R-86 | 35.66 | 35.95 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-86 | 35.95 | 36.24 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-86 | 36.24 | 36.45 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-86 | 36.45 | 36.74 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-86 | 36.74 | 37.19 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-86 | 37.19 | 37.75 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-86 | 37.75 | 40.8 | 3.05 | MDST | Tenas_Lithology.csv |
| T96R-86 | 40.8 | 43 | 2.2 | SST | Tenas_Lithology.csv |
| T96R-86 | 43 | 46.23 | 3.23 | MDST | Tenas_Lithology.csv |
| T96R-86 | 46.23 | 46.42 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-86 | 46.42 | 46.59 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-86 | 46.59 | 46.78 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-86 | 46.78 | 48.02 | 1.24 | MDST | Tenas_Lithology.csv |
| T96R-86 | 48.02 | 48.54 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-86 | 48.54 | 51.54 | 3 | MDST | Tenas_Lithology.csv |
| T96R-86 | 51.54 | 51.76 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-86 | 51.76 | 53.19 | 1.43 | SLTS | Tenas_Lithology.csv |
| T96R-86 | 53.19 | 53.37 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-86 | 53.37 | 55.5 | 2.13 | MDST | Tenas_Lithology.csv |
| T96R-86 | 55.5 | 60.9 | 5.4 | SST | Tenas_Lithology.csv |
| T96R-87 | 0 | 18 | 18 | Overburden | Tenas_Lithology.csv |
| T96R-87 | 18 | 26.47 | 8.47 | MDST | Tenas_Lithology.csv |
| T96R-87 | 26.47 | 27.1 | 0.63 | COAL | Tenas_Lithology.csv |
| T96R-87 | 27.1 | 27.92 | 0.82 | SLTS | Tenas_Lithology.csv |
| T96R-87 | 27.92 | 31.74 | 3.82 | COAL | Tenas_Lithology.csv |
| T96R-87 | 31.74 | 37.1 | 5.36 | MDST | Tenas_Lithology.csv |
| T96R-87 | 37.1 | 37.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-87 | 37.4 | 38.18 | 0.78 | MDST | Tenas_Lithology.csv |
| T96R-87 | 38.18 | 38.35 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-87 | 38.35 | 47.3 | 8.95 | SLTS | Tenas_Lithology.csv |
| T96R-87 | 47.3 | 71.8 | 24.5 | SST | Tenas_Lithology.csv |
| T96R-91 | 0 | 1.8 | 1.8 | Overburden | Tenas_Lithology.csv |
| T96R-91 | 1.8 | 9.1 | 7.3 | SLTS | Tenas_Lithology.csv |
| T96R-91 | 9.1 | 28.6 | 19.5 | SST | Tenas_Lithology.csv |
| T96R-91 | 28.6 | 35.85 | 7.25 | SLTS | Tenas_Lithology.csv |
| T96R-91 | 35.85 | 36.02 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-91 | 36.02 | 36.99 | 0.97 | MDST | Tenas_Lithology.csv |
| T96R-91 | 36.99 | 37.6 | 0.61 | COAL | Tenas_Lithology.csv |
| T96R-91 | 37.6 | 37.83 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-91 | 37.83 | 38.01 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-91 | 38.01 | 44.2 | 6.19 | SST | Tenas_Lithology.csv |
| T96R-91 | 44.2 | 44.5 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-91 | 44.5 | 46.3 | 1.8 | SST | Tenas_Lithology.csv |
| T96R-91 | 46.3 | 46.41 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-91 | 46.41 | 47.93 | 1.52 | MDST | Tenas_Lithology.csv |
| T96R-91 | 47.93 | 48.04 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-91 | 48.04 | 48.16 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-91 | 48.16 | 48.26 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-91 | 48.26 | 49.48 | 1.22 | SLTS | Tenas_Lithology.csv |
| T96R-91 | 49.48 | 49.81 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-91 | 49.81 | 53.88 | 4.07 | SST | Tenas_Lithology.csv |
| T96R-91 | 53.88 | 54.03 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-91 | 54.03 | 56.23 | 2.2 | SLTS | Tenas_Lithology.csv |
| T96R-91 | 56.23 | 56.4 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-91 | 56.4 | 59.4 | 3 | SST | Tenas_Lithology.csv |
| T96R-91 | 59.4 | 65.5 | 6.1 | MDST | Tenas_Lithology.csv |
| T96R-91 | 65.5 | 76.2 | 10.7 | SST | Tenas_Lithology.csv |
| T96R-92 | 0 | 23.8 | 23.8 | Overburden | Tenas_Lithology.csv |
| T96R-92 | 23.8 | 24.74 | 0.94 | MDST | Tenas_Lithology.csv |
| T96R-92 | 24.74 | 30.3 | 5.56 | COAL | Tenas_Lithology.csv |
| T96R-92 | 30.3 | 34.93 | 4.63 | MDST | Tenas_Lithology.csv |
| T96R-92 | 34.93 | 35.15 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-92 | 35.15 | 35.31 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-92 | 35.31 | 36.9 | 1.59 | COAL | Tenas_Lithology.csv |
| T96R-92 | 36.9 | 38.5 | 1.6 | MDST | Tenas_Lithology.csv |
| T96R-92 | 38.5 | 47.49 | 8.99 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 47.49 | 48.2 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-92 | 48.2 | 48.75 | 0.55 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 48.75 | 49.44 | 0.69 | COAL | Tenas_Lithology.csv |
| T96R-92 | 49.44 | 51.79 | 2.35 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 51.79 | 52.1 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-92 | 52.1 | 54.06 | 1.96 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 54.06 | 54.34 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-92 | 54.34 | 56.76 | 2.42 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 56.76 | 56.85 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-92 | 56.85 | 61.2 | 4.35 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 61.2 | 79.7 | 18.5 | SST | Tenas_Lithology.csv |
| T96R-99 | 0 | 32.92 | 32.92 | Overburden | Tenas_Lithology.csv |
| T96R-99 | 32.92 | 36.3 | 3.38 | COAL | Tenas_Lithology.csv |
| T96R-99 | 36.3 | 39.66 | 3.36 | MDST | Tenas_Lithology.csv |
| T96R-99 | 39.66 | 39.92 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-99 | 39.92 | 40.04 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-99 | 40.04 | 40.42 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-99 | 40.42 | 40.6 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-99 | 40.6 | 41.23 | 0.63 | COAL | Tenas_Lithology.csv |
| T96R-99 | 41.23 | 42.16 | 0.93 | MDST | Tenas_Lithology.csv |
| T96R-99 | 42.16 | 42.44 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-99 | 42.44 | 48.02 | 5.58 | MDST | Tenas_Lithology.csv |
| T96R-99 | 48.02 | 48.2 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-99 | 48.2 | 50.08 | 1.88 | SLTS | Tenas_Lithology.csv |
| T96R-99 | 50.08 | 50.45 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-99 | 50.45 | 54 | 3.55 | SLTS | Tenas_Lithology.csv |
| T96R-99 | 54 | 55.5 | 1.5 | CGL | Tenas_Lithology.csv |
| T96R-99 | 55.5 | 55.52 | 0.02 | SLTS | Tenas_Lithology.csv |
| T96R-99 | 55.52 | 55.67 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-99 | 55.67 | 56.9 | 1.23 | SLTS | Tenas_Lithology.csv |
| T96R-99 | 56.9 | 57.1 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-99 | 57.1 | 79.6 | 22.5 | SST | Tenas_Lithology.csv |
| T97R-100C | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-100C | 3 | 23.42 | 20.42 | SLTS | Tenas_Lithology.csv |
| T97R-100C | 23.42 | 30.85 | 7.43 | MDST | Tenas_Lithology.csv |
| T97R-100C | 30.85 | 31.41 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-100C | 31.41 | 31.59 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-100C | 31.59 | 35.24 | 3.65 | COAL | Tenas_Lithology.csv |
| T97R-100C | 35.24 | 35.71 | 0.47 | MDST | Tenas_Lithology.csv |
| T97R-100C | 35.71 | 36.73 | 1.02 | COAL | Tenas_Lithology.csv |
| T97R-100C | 36.73 | 38.32 | 1.59 | MDST | Tenas_Lithology.csv |
| T97R-100C | 38.32 | 39.1 | 0.78 | SLTS | Tenas_Lithology.csv |
| T97R-100C | 39.1 | 42.68 | 3.58 | SST | Tenas_Lithology.csv |
| T97R-100C | 42.68 | 46 | 3.32 | MDST | Tenas_Lithology.csv |
| T97R-101 | 0 | 10 | 10 | Overburden | Tenas_Lithology.csv |
| T97R-101 | 10 | 12.9 | 2.9 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 12.9 | 13.5 | 0.6 | COAL | Tenas_Lithology.csv |
| T97R-101 | 13.5 | 22.7 | 9.2 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 22.7 | 28.56 | 5.86 | SST | Tenas_Lithology.csv |
| T97R-101 | 28.56 | 29.63 | 1.07 | COAL | Tenas_Lithology.csv |
| T97R-101 | 29.63 | 39.84 | 10.21 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 39.84 | 40.22 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-101 | 40.22 | 40.5 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-101 | 40.5 | 41.06 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-101 | 41.06 | 44.61 | 3.55 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 44.61 | 44.75 | 0.14 | COAL | Tenas_Lithology.csv |
| T97R-101 | 44.75 | 46.05 | 1.3 | MDST | Tenas_Lithology.csv |
| T97R-101 | 46.05 | 46.2 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-101 | 46.2 | 46.45 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-101 | 46.45 | 46.97 | 0.52 | COAL | Tenas_Lithology.csv |
| T97R-101 | 46.97 | 48.72 | 1.75 | MDST | Tenas_Lithology.csv |
| T97R-101 | 48.72 | 48.98 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-101 | 48.98 | 49.06 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-101 | 49.06 | 49.35 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-101 | 49.35 | 50.24 | 0.89 | MDST | Tenas_Lithology.csv |
| T97R-101 | 50.24 | 50.35 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-101 | 50.35 | 52.23 | 1.88 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 52.23 | 52.38 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-101 | 52.38 | 52.44 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-101 | 52.44 | 52.71 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-101 | 52.71 | 54.13 | 1.42 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 54.13 | 54.41 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-101 | 54.41 | 65.2 | 10.79 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 65.2 | 74.4 | 9.2 | SST | Tenas_Lithology.csv |
| T97R-102 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-102 | 3 | 27.3 | 24.3 | SLTS | Tenas_Lithology.csv |
| T97R-102 | 27.3 | 37.7 | 10.4 | SST | Tenas_Lithology.csv |
| T97R-102 | 37.7 | 41.49 | 3.79 | SLTS | Tenas_Lithology.csv |
| T97R-102 | 41.49 | 42.28 | 0.79 | COAL | Tenas_Lithology.csv |
| T97R-102 | 42.28 | 44.52 | 2.24 | SLTS | Tenas_Lithology.csv |
| T97R-102 | 44.52 | 44.81 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-102 | 44.81 | 45.92 | 1.11 | SLTS | Tenas_Lithology.csv |
| T97R-102 | 45.92 | 46.81 | 0.89 | COAL | Tenas_Lithology.csv |
| T97R-102 | 46.81 | 48.04 | 1.23 | MDST | Tenas_Lithology.csv |
| T97R-102 | 48.04 | 51.45 | 3.41 | COAL | Tenas_Lithology.csv |
| T97R-102 | 51.45 | 51.88 | 0.43 | MDST | Tenas_Lithology.csv |
| T97R-102 | 51.88 | 52.48 | 0.6 | COAL | Tenas_Lithology.csv |
| T97R-102 | 52.48 | 52.71 | 0.23 | MDST | Tenas_Lithology.csv |
| T97R-102 | 52.71 | 53.1 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-102 | 53.1 | 61 | 7.9 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 0 | 7.5 | 7.5 | Overburden | Tenas_Lithology.csv |
| T97R-103 | 7.5 | 50.8 | 43.3 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 50.8 | 63.6 | 12.8 | MDST | Tenas_Lithology.csv |
| T97R-103 | 63.6 | 70.5 | 6.9 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 70.5 | 81.6 | 11.1 | MDST | Tenas_Lithology.csv |
| T97R-103 | 81.6 | 110.69 | 29.09 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 110.69 | 113.83 | 3.14 | COAL | Tenas_Lithology.csv |
| T97R-103 | 113.83 | 114.36 | 0.53 | MDST | Tenas_Lithology.csv |
| T97R-103 | 114.36 | 115.67 | 1.31 | COAL | Tenas_Lithology.csv |
| T97R-103 | 115.67 | 115.72 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-103 | 115.72 | 116.07 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-103 | 116.07 | 121.88 | 5.81 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 121.88 | 122.79 | 0.91 | COAL | Tenas_Lithology.csv |
| T97R-103 | 122.79 | 123.74 | 0.95 | MDST | Tenas_Lithology.csv |
| T97R-103 | 123.74 | 124.81 | 1.07 | COAL | Tenas_Lithology.csv |
| T97R-103 | 124.81 | 126.04 | 1.23 | MDST | Tenas_Lithology.csv |
| T97R-103 | 126.04 | 128.66 | 2.62 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 128.66 | 129.43 | 0.77 | COAL | Tenas_Lithology.csv |
| T97R-103 | 129.43 | 129.61 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-103 | 129.61 | 129.72 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-103 | 129.72 | 131.14 | 1.42 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 131.14 | 131.45 | 0.31 | COAL | Tenas_Lithology.csv |
| T97R-103 | 131.45 | 135 | 3.55 | SLTS | Tenas_Lithology.csv |
| T97R-104 | 0 | 5 | 5 | Overburden | Tenas_Lithology.csv |
| T97R-104 | 5 | 9.88 | 4.88 | SLTS | Tenas_Lithology.csv |
| T97R-104 | 9.88 | 10.07 | 0.19 | COAL | Tenas_Lithology.csv |
| T97R-104 | 10.07 | 12.68 | 2.61 | MDST | Tenas_Lithology.csv |
| T97R-104 | 12.68 | 13.3 | 0.62 | COAL | Tenas_Lithology.csv |
| T97R-104 | 13.3 | 18.42 | 5.12 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-104 | 18.42 | 18.82 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-104 | 18.82 | 18.85 | 0.03 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-104 | 18.85 | 19.48 | 0.63 | COAL | Tenas_Lithology.csv |
| T97R-104 | 19.48 | 24.1 | 4.62 | SLTS | Tenas_Lithology.csv |
| T97R-104 | 24.1 | 24.31 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-104 | 24.31 | 27.73 | 3.42 | MDST | Tenas_Lithology.csv |
| T97R-104 | 27.73 | 29.8 | 2.07 | COAL | Tenas_Lithology.csv |
| T97R-104 | 29.8 | 30.5 | 0.7 | MDST | Tenas_Lithology.csv |
| T97R-104 | 30.5 | 31.17 | 0.67 | COAL | Tenas_Lithology.csv |
| T97R-104 | 31.17 | 36.05 | 4.88 | SLTS | Tenas_Lithology.csv |
| T97R-104 | 36.05 | 36.33 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-104 | 36.33 | 37.04 | 0.71 | MDST | Tenas_Lithology.csv |
| T97R-104 | 37.04 | 37.88 | 0.84 | COAL | Tenas_Lithology.csv |
| T97R-104 | 37.88 | 41.8 | 3.92 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 0 | 2 | 2 | Overburden | Tenas_Lithology.csv |
| T97R-105 | 2 | 4.7 | 2.7 | SST | Tenas_Lithology.csv |
| T97R-105 | 4.7 | 5 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-105 | 5 | 6.7 | 1.7 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 6.7 | 8.02 | 1.32 | MDST | Tenas_Lithology.csv |
| T97R-105 | 8.02 | 9.82 | 1.8 | COAL | Tenas_Lithology.csv |
| T97R-105 | 9.82 | 12.88 | 3.06 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 12.88 | 14.97 | 2.09 | COAL | Tenas_Lithology.csv |
| T97R-105 | 14.97 | 15.05 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-105 | 15.05 | 16.8 | 1.75 | COAL | Tenas_Lithology.csv |
| T97R-105 | 16.8 | 20.4 | 3.6 | SST | Tenas_Lithology.csv |
| T97R-105 | 20.4 | 24.5 | 4.1 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 24.5 | 25 | 0.5 | COAL | Tenas_Lithology.csv |
| T97R-105 | 25 | 26.15 | 1.15 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 26.15 | 26.6 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-105 | 26.6 | 31 | 4.4 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 0 | 3.5 | 3.5 | Overburden | Tenas_Lithology.csv |
| T97R-106 | 3.5 | 14.1 | 10.6 | MDST | Tenas_Lithology.csv |
| T97R-106 | 14.1 | 61.4 | 47.3 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 61.4 | 68.4 | 7 | MDST | Tenas_Lithology.csv |
| T97R-106 | 68.4 | 97.4 | 29 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 97.4 | 100.3 | 2.9 | MDST | Tenas_Lithology.csv |
| T97R-106 | 100.3 | 102.8 | 2.5 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 102.8 | 110 | 7.2 | MDST | Tenas_Lithology.csv |
| T97R-106 | 110 | 114.25 | 4.25 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 114.25 | 121.01 | 6.76 | MDST | Tenas_Lithology.csv |
| T97R-106 | 121.01 | 121.25 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-106 | 121.25 | 122.05 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-106 | 122.05 | 122.74 | 0.69 | COAL | Tenas_Lithology.csv |
| T97R-106 | 122.74 | 123.59 | 0.85 | MDST | Tenas_Lithology.csv |
| T97R-106 | 123.59 | 123.79 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-106 | 123.79 | 125.24 | 1.45 | MDST | Tenas_Lithology.csv |
| T97R-106 | 125.24 | 125.44 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-106 | 125.44 | 127.05 | 1.61 | MDST | Tenas_Lithology.csv |
| T97R-106 | 127.05 | 127.77 | 0.72 | COAL | Tenas_Lithology.csv |
| T97R-106 | 127.77 | 129.11 | 1.34 | MDST | Tenas_Lithology.csv |
| T97R-106 | 129.11 | 129.46 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-106 | 129.46 | 138.25 | 8.79 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 138.25 | 152.2 | 13.95 | SST | Tenas_Lithology.csv |
| T97R-107 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T97R-107 | 15 | 22.3 | 7.3 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 22.3 | 22.8 | 0.5 | SST | Tenas_Lithology.csv |
| T97R-107 | 22.8 | 27.3 | 4.5 | MDST | Tenas_Lithology.csv |
| T97R-107 | 27.3 | 34 | 6.7 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 34 | 35.2 | 1.2 | SST | Tenas_Lithology.csv |
| T97R-107 | 35.2 | 40.9 | 5.7 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 40.9 | 41.6 | 0.7 | SST | Tenas_Lithology.csv |
| T97R-107 | 41.6 | 49.1 | 7.5 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 49.1 | 49.6 | 0.5 | SST | Tenas_Lithology.csv |
| T97R-107 | 49.6 | 61.3 | 11.7 | MDST | Tenas_Lithology.csv |
| T97R-107 | 61.3 | 74.7 | 13.4 | SST | Tenas_Lithology.csv |
| T97R-107 | 74.7 | 89.2 | 14.5 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 89.2 | 90.1 | 0.9 | COAL | Tenas_Lithology.csv |
| T97R-107 | 90.1 | 98.68 | 8.58 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 98.68 | 99.09 | 0.41 | COAL | Tenas_Lithology.csv |
| T97R-107 | 99.09 | 102.13 | 3.04 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 102.13 | 103.85 | 1.72 | COAL | Tenas_Lithology.csv |
| T97R-107 | 103.85 | 103.9 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-107 | 103.9 | 105.1 | 1.2 | COAL | Tenas_Lithology.csv |
| T97R-107 | 105.1 | 106.07 | 0.97 | MDST | Tenas_Lithology.csv |
| T97R-107 | 106.07 | 109.16 | 3.09 | COAL | Tenas_Lithology.csv |
| T97R-107 | 109.16 | 112.4 | 3.24 | MDST | Tenas_Lithology.csv |
| T97R-107 | 112.4 | 112.8 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-107 | 112.8 | 113.1 | 0.3 | MDST | Tenas_Lithology.csv |
| T97R-107 | 113.1 | 113.87 | 0.77 | COAL | Tenas_Lithology.csv |
| T97R-107 | 113.87 | 117.34 | 3.47 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 117.34 | 117.56 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-107 | 117.56 | 117.72 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-107 | 117.72 | 118.23 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-107 | 118.23 | 118.48 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-107 | 118.48 | 118.67 | 0.19 | COAL | Tenas_Lithology.csv |
| T97R-107 | 118.67 | 119.42 | 0.75 | MDST | Tenas_Lithology.csv |
| T97R-107 | 119.42 | 120.32 | 0.9 | COAL | Tenas_Lithology.csv |
| T97R-107 | 120.32 | 124.77 | 4.45 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 124.77 | 124.93 | 0.16 | COAL | Tenas_Lithology.csv |
| T97R-107 | 124.93 | 128 | 3.07 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 0 | 28.2 | 28.2 | Overburden | Tenas_Lithology.csv |
| T97R-108C | 28.2 | 45.53 | 17.33 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 45.53 | 46.6 | 1.07 | MDST | Tenas_Lithology.csv |
| T97R-108C | 46.6 | 47.98 | 1.38 | COAL | Tenas_Lithology.csv |
| T97R-108C | 47.98 | 51.38 | 3.4 | MDST | Tenas_Lithology.csv |
| T97R-108C | 51.38 | 56.61 | 5.23 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 56.61 | 56.91 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-108C | 56.91 | 62.05 | 5.14 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 62.05 | 62.46 | 0.41 | COAL | Tenas_Lithology.csv |
| T97R-108C | 62.46 | 62.49 | 0.03 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-108C | 62.49 | 64.35 | 1.86 | COAL | Tenas_Lithology.csv |
| T97R-108C | 64.35 | 64.41 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-108C | 64.41 | 64.57 | 0.16 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-108C | 64.57 | 65.72 | 1.15 | MDST | Tenas_Lithology.csv |
| T97R-108C | 65.72 | 67.86 | 2.14 | COAL | Tenas_Lithology.csv |
| T97R-108C | 67.86 | 67.9 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-108C | 67.9 | 70.2 | 2.3 | COAL | Tenas_Lithology.csv |
| T97R-108C | 70.2 | 70.7 | 0.5 | MDST | Tenas_Lithology.csv |
| T97R-108C | 70.7 | 73.5 | 2.8 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 73.5 | 73.9 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-108C | 73.9 | 74.26 | 0.36 | MDST | Tenas_Lithology.csv |
| T97R-108C | 74.26 | 74.48 | 0.22 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 74.48 | 75.87 | 1.39 | MDST | Tenas_Lithology.csv |
| T97R-108C | 75.87 | 76.4 | 0.53 | COAL | Tenas_Lithology.csv |
| T97R-108C | 76.4 | 76.65 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-108C | 76.65 | 77.1 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-108C | 77.1 | 79.1 | 2 | MDST | Tenas_Lithology.csv |
| T97R-108C | 79.1 | 80.9 | 1.8 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 0 | 8.5 | 8.5 | Overburden | Tenas_Lithology.csv |
| T97R-109 | 8.5 | 16.3 | 7.8 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 16.3 | 27.6 | 11.3 | MDST | Tenas_Lithology.csv |
| T97R-109 | 27.6 | 32.8 | 5.2 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 32.8 | 39.2 | 6.4 | MDST | Tenas_Lithology.csv |
| T97R-109 | 39.2 | 39.8 | 0.6 | SST | Tenas_Lithology.csv |
| T97R-109 | 39.8 | 44.8 | 5 | MDST | Tenas_Lithology.csv |
| T97R-109 | 44.8 | 47.3 | 2.5 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 47.3 | 47.9 | 0.6 | SST | Tenas_Lithology.csv |
| T97R-109 | 47.9 | 62.4 | 14.5 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 62.4 | 63.3 | 0.9 | SST | Tenas_Lithology.csv |
| T97R-109 | 63.3 | 74.2 | 10.9 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 74.2 | 74.6 | 0.4 | SST | Tenas_Lithology.csv |
| T97R-109 | 74.6 | 80.4 | 5.8 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 80.4 | 90.6 | 10.2 | SST | Tenas_Lithology.csv |
| T97R-109 | 90.6 | 92.06 | 1.46 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 92.06 | 92.39 | 0.33 | COAL | Tenas_Lithology.csv |
| T97R-109 | 92.39 | 98.27 | 5.88 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 98.27 | 98.61 | 0.34 | COAL | Tenas_Lithology.csv |
| T97R-109 | 98.61 | 102.19 | 3.58 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 102.19 | 102.42 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-109 | 102.42 | 104.87 | 2.45 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 104.87 | 106.64 | 1.77 | COAL | Tenas_Lithology.csv |
| T97R-109 | 106.64 | 115.61 | 8.97 | SST | Tenas_Lithology.csv |
| T97R-109 | 115.61 | 115.95 | 0.34 | COAL | Tenas_Lithology.csv |
| T97R-109 | 115.95 | 121.81 | 5.86 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 121.81 | 122.21 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-109 | 122.21 | 122.33 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-109 | 122.33 | 125.52 | 3.19 | COAL | Tenas_Lithology.csv |
| T97R-109 | 125.52 | 126 | 0.48 | MDST | Tenas_Lithology.csv |
| T97R-109 | 126 | 126.25 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-109 | 126.25 | 126.67 | 0.42 | MDST | Tenas_Lithology.csv |
| T97R-109 | 126.67 | 129.42 | 2.75 | COAL | Tenas_Lithology.csv |
| T97R-109 | 129.42 | 134.3 | 4.88 | MDST | Tenas_Lithology.csv |
| T97R-109 | 134.3 | 134.67 | 0.37 | COAL | Tenas_Lithology.csv |
| T97R-109 | 134.67 | 134.92 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-109 | 134.92 | 136.27 | 1.35 | COAL | Tenas_Lithology.csv |
| T97R-109 | 136.27 | 142.5 | 6.23 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 0 | 8 | 8 | Overburden | Tenas_Lithology.csv |
| T97R-110 | 8 | 27.63 | 19.63 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 27.63 | 27.93 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-110 | 27.93 | 28.6 | 0.67 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 28.6 | 29.07 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-110 | 29.07 | 29.14 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-110 | 29.14 | 29.29 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-110 | 29.29 | 37.35 | 8.06 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 37.35 | 38.61 | 1.26 | COAL | Tenas_Lithology.csv |
| T97R-110 | 38.61 | 51.06 | 12.45 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 51.06 | 51.83 | 0.77 | COAL | Tenas_Lithology.csv |
| T97R-110 | 51.83 | 56.15 | 4.32 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 56.15 | 64.74 | 8.59 | COAL | Tenas_Lithology.csv |
| T97R-110 | 64.74 | 68.31 | 3.57 | MDST | Tenas_Lithology.csv |
| T97R-110 | 68.31 | 68.45 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-110 | 68.45 | 69.09 | 0.64 | MDST | Tenas_Lithology.csv |
| T97R-110 | 69.09 | 69.65 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-110 | 69.65 | 70.55 | 0.9 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 70.55 | 70.68 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-110 | 70.68 | 70.85 | 0.17 | MDST | Tenas_Lithology.csv |
| T97R-110 | 70.85 | 72.89 | 2.04 | COAL | Tenas_Lithology.csv |
| T97R-110 | 72.89 | 74.59 | 1.7 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 74.59 | 75.84 | 1.25 | COAL | Tenas_Lithology.csv |
| T97R-110 | 75.84 | 78.6 | 2.76 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 0 | 8 | 8 | Overburden | Tenas_Lithology.csv |
| T97R-111 | 8 | 25.1 | 17.1 | MDST | Tenas_Lithology.csv |
| T97R-111 | 25.1 | 36.6 | 11.5 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 36.6 | 51.3 | 14.7 | MDST | Tenas_Lithology.csv |
| T97R-111 | 51.3 | 61.1 | 9.8 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 61.1 | 61.7 | 0.6 | MDST | Tenas_Lithology.csv |
| T97R-111 | 61.7 | 76.15 | 14.45 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 76.15 | 77.33 | 1.18 | COAL | Tenas_Lithology.csv |
| T97R-111 | 77.33 | 87.71 | 10.38 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 87.71 | 88.15 | 0.44 | COAL | Tenas_Lithology.csv |
| T97R-111 | 88.15 | 92.69 | 4.54 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 92.69 | 94.55 | 1.86 | COAL | Tenas_Lithology.csv |
| T97R-111 | 94.55 | 94.6 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-111 | 94.6 | 98.58 | 3.98 | COAL | Tenas_Lithology.csv |
| T97R-111 | 98.58 | 101.48 | 2.9 | MDST | Tenas_Lithology.csv |
| T97R-111 | 101.48 | 101.83 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-111 | 101.83 | 101.98 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-111 | 101.98 | 102.28 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-111 | 102.28 | 104.18 | 1.9 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 104.18 | 104.82 | 0.64 | COAL | Tenas_Lithology.csv |
| T97R-111 | 104.82 | 106.77 | 1.95 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 106.77 | 107.17 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-111 | 107.17 | 108.6 | 1.43 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 108.6 | 109.8 | 1.2 | MDST | Tenas_Lithology.csv |
| T97R-111 | 109.8 | 113.25 | 3.45 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 113.25 | 113.43 | 0.18 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-111 | 113.43 | 113.47 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-111 | 113.47 | 113.83 | 0.36 | COAL | Tenas_Lithology.csv |
| T97R-111 | 113.83 | 115.27 | 1.44 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 115.27 | 116.19 | 0.92 | COAL | Tenas_Lithology.csv |
| T97R-111 | 116.19 | 117.08 | 0.89 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 117.08 | 117.23 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-111 | 117.23 | 118.79 | 1.56 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 118.79 | 119 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-111 | 119 | 119.13 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-111 | 119.13 | 119.47 | 0.34 | COAL | Tenas_Lithology.csv |
| T97R-111 | 119.47 | 121.6 | 2.13 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 0 | 5 | 5 | Overburden | Tenas_Lithology.csv |
| T97R-112 | 5 | 13.4 | 8.4 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 13.4 | 29.8 | 16.4 | MDST | Tenas_Lithology.csv |
| T97R-112 | 29.8 | 30.9 | 1.1 | SST | Tenas_Lithology.csv |
| T97R-112 | 30.9 | 54.6 | 23.7 | MDST | Tenas_Lithology.csv |
| T97R-112 | 54.6 | 60.8 | 6.2 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 60.8 | 73.8 | 13 | MDST | Tenas_Lithology.csv |
| T97R-112 | 73.8 | 74.8 | 1 | SST | Tenas_Lithology.csv |
| T97R-112 | 74.8 | 94.2 | 19.4 | MDST | Tenas_Lithology.csv |
| T97R-112 | 94.2 | 107.1 | 12.9 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 107.1 | 108 | 0.9 | SST | Tenas_Lithology.csv |
| T97R-112 | 108 | 131.75 | 23.75 | MDST | Tenas_Lithology.csv |
| T97R-112 | 131.75 | 144.76 | 13.01 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 144.76 | 145.06 | 0.3 | MDST | Tenas_Lithology.csv |
| T97R-112 | 145.06 | 145.56 | 0.5 | COAL | Tenas_Lithology.csv |
| T97R-112 | 145.56 | 149.95 | 4.39 | MDST | Tenas_Lithology.csv |
| T97R-112 | 149.95 | 150.24 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-112 | 150.24 | 153.19 | 2.95 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 153.19 | 153.45 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-112 | 153.45 | 156.1 | 2.65 | MDST | Tenas_Lithology.csv |
| T97R-112 | 156.1 | 158.05 | 1.95 | COAL | Tenas_Lithology.csv |
| T97R-112 | 158.05 | 162.77 | 4.72 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 162.77 | 163.25 | 0.48 | COAL | Tenas_Lithology.csv |
| T97R-112 | 163.25 | 165.78 | 2.53 | MDST | Tenas_Lithology.csv |
| T97R-112 | 165.78 | 165.98 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-112 | 165.98 | 167.91 | 1.93 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 167.91 | 169.98 | 2.07 | MDST | Tenas_Lithology.csv |
| T97R-112 | 169.98 | 170.34 | 0.36 | COAL | Tenas_Lithology.csv |
| T97R-112 | 170.34 | 171.11 | 0.77 | MDST | Tenas_Lithology.csv |
| T97R-112 | 171.11 | 171.32 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-112 | 171.32 | 174.2 | 2.88 | SST | Tenas_Lithology.csv |
| T97R-112 | 174.2 | 174.67 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-112 | 174.67 | 182.7 | 8.03 | SST | Tenas_Lithology.csv |
| T97R-112 | 182.7 | 183 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-112 | 183 | 184.8 | 1.8 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 184.8 | 185.03 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-112 | 185.03 | 191.75 | 6.72 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 191.75 | 207.3 | 15.55 | SST | Tenas_Lithology.csv |
| T97R-113 | 0 | 4 | 4 | Overburden | Tenas_Lithology.csv |
| T97R-113 | 4 | 71.2 | 67.2 | SLTS | Tenas_Lithology.csv |
| T97R-113 | 71.2 | 75.6 | 4.4 | SST | Tenas_Lithology.csv |
| T97R-113 | 75.6 | 76.4 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-113 | 76.4 | 85 | 8.6 | SLTS | Tenas_Lithology.csv |
| T97R-113 | 85 | 86.98 | 1.98 | COAL | Tenas_Lithology.csv |
| T97R-113 | 86.98 | 89.8 | 2.82 | SLTS | Tenas_Lithology.csv |
| T97R-113 | 89.8 | 95.81 | 6.01 | SST | Tenas_Lithology.csv |
| T97R-113 | 95.81 | 96.08 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-113 | 96.08 | 102.2 | 6.12 | SLTS | Tenas_Lithology.csv |
| T97R-113 | 102.2 | 103.7 | 1.5 | COAL | Tenas_Lithology.csv |
| T97R-113 | 103.7 | 104 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-113 | 104 | 108.13 | 4.13 | COAL | Tenas_Lithology.csv |
| T97R-113 | 108.13 | 110.88 | 2.75 | MDST | Tenas_Lithology.csv |
| T97R-113 | 110.88 | 111.21 | 0.33 | COAL | Tenas_Lithology.csv |
| T97R-113 | 111.21 | 111.34 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-113 | 111.34 | 112.1 | 0.76 | COAL | Tenas_Lithology.csv |
| T97R-113 | 112.1 | 112.4 | 0.3 | MDST | Tenas_Lithology.csv |
| T97R-113 | 112.4 | 113.14 | 0.74 | COAL | Tenas_Lithology.csv |
| T97R-113 | 113.14 | 118.12 | 4.98 | SST | Tenas_Lithology.csv |
| T97R-113 | 118.12 | 122.3 | 4.18 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 0 | 1.8 | 1.8 | Overburden | Tenas_Lithology.csv |
| T97R-114 | 1.8 | 61.8 | 60 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 61.8 | 69.8 | 8 | MDST | Tenas_Lithology.csv |
| T97R-114 | 69.8 | 74.8 | 5 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 74.8 | 81.3 | 6.5 | MDST | Tenas_Lithology.csv |
| T97R-114 | 81.3 | 87.34 | 6.04 | SST | Tenas_Lithology.csv |
| T97R-114 | 87.34 | 87.55 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-114 | 87.55 | 89.9 | 2.35 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 89.9 | 94.7 | 4.8 | MDST | Tenas_Lithology.csv |
| T97R-114 | 94.7 | 95.05 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-114 | 95.05 | 95.33 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-114 | 95.33 | 95.84 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-114 | 95.84 | 103.04 | 7.2 | SST | Tenas_Lithology.csv |
| T97R-114 | 103.04 | 103.2 | 0.16 | COAL | Tenas_Lithology.csv |
| T97R-114 | 103.2 | 105.38 | 2.18 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 105.38 | 105.78 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-114 | 105.78 | 107.13 | 1.35 | MDST | Tenas_Lithology.csv |
| T97R-114 | 107.13 | 109.28 | 2.15 | SST | Tenas_Lithology.csv |
| T97R-114 | 109.28 | 109.38 | 0.1 | COAL | Tenas_Lithology.csv |
| T97R-114 | 109.38 | 109.46 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-114 | 109.46 | 109.71 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-114 | 109.71 | 123 | 13.29 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-115 | 3 | 18.3 | 15.3 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 18.3 | 34.3 | 16 | MDST | Tenas_Lithology.csv |
| T97R-115 | 34.3 | 38.78 | 4.48 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 38.78 | 39.24 | 0.46 | COAL | Tenas_Lithology.csv |
| T97R-115 | 39.24 | 42.13 | 2.89 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 42.13 | 42.82 | 0.69 | COAL | Tenas_Lithology.csv |
| T97R-115 | 42.82 | 46.08 | 3.26 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 46.08 | 47.82 | 1.74 | COAL | Tenas_Lithology.csv |
| T97R-115 | 47.82 | 54.84 | 7.02 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 54.84 | 55.15 | 0.31 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-115 | 55.15 | 58.66 | 3.51 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 58.66 | 60.35 | 1.69 | COAL | Tenas_Lithology.csv |
| T97R-115 | 60.35 | 61.08 | 0.73 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 61.08 | 64.86 | 3.78 | COAL | Tenas_Lithology.csv |
| T97R-115 | 64.86 | 66.64 | 1.78 | MDST | Tenas_Lithology.csv |
| T97R-115 | 66.64 | 67.11 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-115 | 67.11 | 67.27 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-115 | 67.27 | 67.55 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-115 | 67.55 | 75 | 7.45 | SST | Tenas_Lithology.csv |
| T97R-116 | 0 | 0.8 | 0.8 | Overburden | Tenas_Lithology.csv |
| T97R-116 | 0.8 | 3.5 | 2.7 | MDST | Tenas_Lithology.csv |
| T97R-116 | 3.5 | 80.2 | 76.7 | SLTS | Tenas_Lithology.csv |
| T97R-116 | 80.2 | 87.4 | 7.2 | MDST | Tenas_Lithology.csv |
| T97R-116 | 87.4 | 88.1 | 0.7 | SST | Tenas_Lithology.csv |
| T97R-116 | 88.1 | 100.7 | 12.6 | MDST | Tenas_Lithology.csv |
| T97R-116 | 100.7 | 124.8 | 24.1 | SLTS | Tenas_Lithology.csv |
| T97R-116 | 124.8 | 128.4 | 3.6 | MDST | Tenas_Lithology.csv |
| T97R-116 | 128.4 | 139.25 | 10.85 | SLTS | Tenas_Lithology.csv |
| T97R-116 | 139.25 | 139.5 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-116 | 139.5 | 142.18 | 2.68 | SLTS | Tenas_Lithology.csv |
| T97R-116 | 142.18 | 142.33 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-116 | 142.33 | 151.4 | 9.07 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-117 | 3 | 7 | 4 | SST | Tenas_Lithology.csv |
| T97R-117 | 7 | 48.6 | 41.6 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 48.6 | 69.5 | 20.9 | MDST | Tenas_Lithology.csv |
| T97R-117 | 69.5 | 112.23 | 42.73 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 112.23 | 112.46 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-117 | 112.46 | 115.2 | 2.74 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 115.2 | 115.79 | 0.59 | COAL | Tenas_Lithology.csv |
| T97R-117 | 115.79 | 117.33 | 1.54 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 117.33 | 117.88 | 0.55 | COAL | Tenas_Lithology.csv |
| T97R-117 | 117.88 | 120.43 | 2.55 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 120.43 | 120.96 | 0.53 | COAL | Tenas_Lithology.csv |
| T97R-117 | 120.96 | 133.3 | 12.34 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 133.3 | 141 | 7.7 | SST | Tenas_Lithology.csv |
| T97R-118 | 0 | 29 | 29 | Overburden | Tenas_Lithology.csv |
| T97R-118 | 29 | 37.86 | 8.86 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 37.86 | 39.17 | 1.31 | COAL | Tenas_Lithology.csv |
| T97R-118 | 39.17 | 39.32 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-118 | 39.32 | 40.12 | 0.8 | COAL | Tenas_Lithology.csv |
| T97R-118 | 40.12 | 42.74 | 2.62 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 42.74 | 43.79 | 1.05 | COAL | Tenas_Lithology.csv |
| T97R-118 | 43.79 | 43.89 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-118 | 43.89 | 43.98 | 0.09 | COAL | Tenas_Lithology.csv |
| T97R-118 | 43.98 | 44.07 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-118 | 44.07 | 44.8 | 0.73 | COAL | Tenas_Lithology.csv |
| T97R-118 | 44.8 | 51.48 | 6.68 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 51.48 | 52.04 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-118 | 52.04 | 54.04 | 2 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 54.04 | 54.39 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-118 | 54.39 | 63.8 | 9.41 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 63.8 | 80.8 | 17 | SST | Tenas_Lithology.csv |
| T97R-118 | 80.8 | 91.9 | 11.1 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 0 | 6.3 | 6.3 | Overburden | Tenas_Lithology.csv |
| T97R-119 | 6.3 | 19.1 | 12.8 | MDST | Tenas_Lithology.csv |
| T97R-119 | 19.1 | 23.1 | 4 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 23.1 | 35.3 | 12.2 | MDST | Tenas_Lithology.csv |
| T97R-119 | 35.3 | 42.1 | 6.8 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 42.1 | 58 | 15.9 | MDST | Tenas_Lithology.csv |
| T97R-119 | 58 | 59.2 | 1.2 | SST | Tenas_Lithology.csv |
| T97R-119 | 59.2 | 76.6 | 17.4 | MDST | Tenas_Lithology.csv |
| T97R-119 | 76.6 | 93.8 | 17.2 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 93.8 | 94.6 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-119 | 94.6 | 94.8 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-119 | 94.8 | 100.7 | 5.9 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 100.7 | 102.15 | 1.45 | COAL | Tenas_Lithology.csv |
| T97R-119 | 102.15 | 109.17 | 7.02 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 109.17 | 109.43 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-119 | 109.43 | 112.66 | 3.23 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 112.66 | 114.45 | 1.79 | COAL | Tenas_Lithology.csv |
| T97R-119 | 114.45 | 115.41 | 0.96 | MDST | Tenas_Lithology.csv |
| T97R-119 | 115.41 | 115.52 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-119 | 115.52 | 115.69 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-119 | 115.69 | 119.16 | 3.47 | COAL | Tenas_Lithology.csv |
| T97R-119 | 119.16 | 120.69 | 1.53 | MDST | Tenas_Lithology.csv |
| T97R-119 | 120.69 | 121.07 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-119 | 121.07 | 121.18 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-119 | 121.18 | 121.33 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-119 | 121.33 | 126.9 | 5.57 | SST | Tenas_Lithology.csv |
| T97R-119 | 126.9 | 127.44 | 0.54 | COAL | Tenas_Lithology.csv |
| T97R-119 | 127.44 | 133.6 | 6.16 | SST | Tenas_Lithology.csv |
| T97R-120 | 0 | 1.44 | 1.44 | Overburden | Tenas_Lithology.csv |
| T97R-120 | 1.44 | 2 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-120 | 2 | 3.57 | 1.57 | SLTS | Tenas_Lithology.csv |
| T97R-120 | 3.57 | 5.53 | 1.96 | COAL | Tenas_Lithology.csv |
| T97R-120 | 5.53 | 12.8 | 7.27 | SLTS | Tenas_Lithology.csv |
| T97R-120 | 12.8 | 13.33 | 0.53 | COAL | Tenas_Lithology.csv |
| T97R-120 | 13.33 | 14.13 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-120 | 14.13 | 14.78 | 0.65 | COAL | Tenas_Lithology.csv |
| T97R-120 | 14.78 | 16.54 | 1.76 | SLTS | Tenas_Lithology.csv |
| T97R-120 | 16.54 | 16.81 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-120 | 16.81 | 23.54 | 6.73 | SLTS | Tenas_Lithology.csv |
| T97R-120 | 23.54 | 23.78 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-120 | 23.78 | 24.25 | 0.47 | MDST | Tenas_Lithology.csv |
| T97R-120 | 24.25 | 24.66 | 0.41 | COAL | Tenas_Lithology.csv |
| T97R-120 | 24.66 | 30 | 5.34 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-121 | 3 | 19.8 | 16.8 | MDST | Tenas_Lithology.csv |
| T97R-121 | 19.8 | 30.48 | 10.68 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 30.48 | 30.99 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-121 | 30.99 | 33.83 | 2.84 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 33.83 | 34.04 | 0.21 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-121 | 34.04 | 35.29 | 1.25 | MDST | Tenas_Lithology.csv |
| T97R-121 | 35.29 | 36.48 | 1.19 | COAL | Tenas_Lithology.csv |
| T97R-121 | 36.48 | 44.17 | 7.69 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 44.17 | 46.06 | 1.89 | COAL | Tenas_Lithology.csv |
| T97R-121 | 46.06 | 49.61 | 3.55 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 49.61 | 54.44 | 4.83 | SST | Tenas_Lithology.csv |
| T97R-121 | 54.44 | 54.62 | 0.18 | COAL | Tenas_Lithology.csv |
| T97R-121 | 54.62 | 54.67 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-121 | 54.67 | 55.02 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-121 | 55.02 | 59.35 | 4.33 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 59.35 | 59.8 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-121 | 59.8 | 60.05 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-121 | 60.05 | 60.15 | 0.1 | COAL | Tenas_Lithology.csv |
| T97R-121 | 60.15 | 61.19 | 1.04 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 61.19 | 61.35 | 0.16 | COAL | Tenas_Lithology.csv |
| T97R-121 | 61.35 | 61.41 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-121 | 61.41 | 61.98 | 0.57 | COAL | Tenas_Lithology.csv |
| T97R-121 | 61.98 | 67.55 | 5.57 | SST | Tenas_Lithology.csv |
| T97R-121 | 67.55 | 67.94 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-121 | 67.94 | 78.6 | 10.66 | SLTS | Tenas_Lithology.csv |
| T97R-65 | 0 | 0.85 | 0.85 | Overburden | Tenas_Lithology.csv |
| T97R-65 | 0.85 | 1.49 | 0.64 | COAL | Tenas_Lithology.csv |
| T97R-65 | 1.49 | 4 | 2.51 | SLTS | Tenas_Lithology.csv |
| T97R-65 | 4 | 4.3 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-65 | 4.3 | 7.3 | 3 | MDST | Tenas_Lithology.csv |
| T97R-65 | 7.3 | 11.46 | 4.16 | SST | Tenas_Lithology.csv |
| T97R-65 | 11.46 | 12.04 | 0.58 | COAL | Tenas_Lithology.csv |
| T97R-65 | 12.04 | 12.75 | 0.71 | MDST | Tenas_Lithology.csv |
| T97R-65 | 12.75 | 12.85 | 0.1 | COAL | Tenas_Lithology.csv |
| T97R-65 | 12.85 | 12.97 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-65 | 12.97 | 13.4 | 0.43 | COAL | Tenas_Lithology.csv |
| T97R-65 | 13.4 | 13.66 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-65 | 13.66 | 13.77 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-65 | 13.77 | 14.66 | 0.89 | MDST | Tenas_Lithology.csv |
| T97R-65 | 14.66 | 14.84 | 0.18 | COAL | Tenas_Lithology.csv |
| T97R-65 | 14.84 | 22.38 | 7.54 | SST | Tenas_Lithology.csv |
| T97R-65 | 22.38 | 22.47 | 0.09 | COAL | Tenas_Lithology.csv |
| T97R-65 | 22.47 | 22.6 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-65 | 22.6 | 22.99 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-65 | 22.99 | 29.8 | 6.81 | SST | Tenas_Lithology.csv |
| T97R-66 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-66 | 3 | 5.44 | 2.44 | SLTS | Tenas_Lithology.csv |
| T97R-66 | 5.44 | 5.76 | 0.32 | COAL | Tenas_Lithology.csv |
| T97R-66 | 5.76 | 6.21 | 0.45 | MDST | Tenas_Lithology.csv |
| T97R-66 | 6.21 | 8.1 | 1.89 | COAL | Tenas_Lithology.csv |
| T97R-66 | 8.1 | 8.28 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-66 | 8.28 | 9 | 0.72 | COAL | Tenas_Lithology.csv |
| T97R-66 | 9 | 9.72 | 0.72 | MDST | Tenas_Lithology.csv |
| T97R-66 | 9.72 | 10.15 | 0.43 | COAL | Tenas_Lithology.csv |
| T97R-66 | 10.15 | 24 | 13.85 | MDST | Tenas_Lithology.csv |
| T97R-66 | 24 | 24.5 | 0.5 | COAL | Tenas_Lithology.csv |
| T97R-66 | 24.5 | 25 | 0.5 | MDST | Tenas_Lithology.csv |
| T97R-66 | 25 | 25.85 | 0.85 | COAL | Tenas_Lithology.csv |
| T97R-66 | 25.85 | 33.25 | 7.4 | SLTS | Tenas_Lithology.csv |
| T97R-66 | 33.25 | 33.85 | 0.6 | COAL | Tenas_Lithology.csv |
| T97R-66 | 33.85 | 36.5 | 2.65 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 0 | 5 | 5 | Overburden | Tenas_Lithology.csv |
| T97R-67 | 5 | 8.6 | 3.6 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 8.6 | 14 | 5.4 | SST | Tenas_Lithology.csv |
| T97R-67 | 14 | 14.25 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 14.25 | 17.72 | 3.47 | SST | Tenas_Lithology.csv |
| T97R-67 | 17.72 | 18.17 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-67 | 18.17 | 20.97 | 2.8 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 20.97 | 21.6 | 0.63 | COAL | Tenas_Lithology.csv |
| T97R-67 | 21.6 | 26.57 | 4.97 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 26.57 | 27.44 | 0.87 | COAL | Tenas_Lithology.csv |
| T97R-67 | 27.44 | 27.49 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 27.49 | 28.21 | 0.72 | COAL | Tenas_Lithology.csv |
| T97R-67 | 28.21 | 35.1 | 6.89 | SST | Tenas_Lithology.csv |
| T97R-67 | 35.1 | 35.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-67 | 35.4 | 40.98 | 5.58 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 40.98 | 42.93 | 1.95 | COAL | Tenas_Lithology.csv |
| T97R-67 | 42.93 | 43.03 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 43.03 | 43.88 | 0.85 | COAL | Tenas_Lithology.csv |
| T97R-67 | 43.88 | 43.94 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 43.94 | 45.85 | 1.91 | COAL | Tenas_Lithology.csv |
| T97R-67 | 45.85 | 46.03 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 46.03 | 46.83 | 0.8 | COAL | Tenas_Lithology.csv |
| T97R-67 | 46.83 | 48.62 | 1.79 | MDST | Tenas_Lithology.csv |
| T97R-67 | 48.62 | 49.56 | 0.94 | COAL | Tenas_Lithology.csv |
| T97R-67 | 49.56 | 56 | 6.44 | SST | Tenas_Lithology.csv |
| T97R-67 | 56 | 56.3 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 56.3 | 60.04 | 3.74 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 60.04 | 60.4 | 0.36 | COAL | Tenas_Lithology.csv |
| T97R-67 | 60.4 | 60.86 | 0.46 | MDST | Tenas_Lithology.csv |
| T97R-67 | 60.86 | 61.04 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 61.04 | 62.24 | 1.2 | MDST | Tenas_Lithology.csv |
| T97R-67 | 62.24 | 62.9 | 0.66 | COAL | Tenas_Lithology.csv |
| T97R-67 | 62.9 | 67.2 | 4.3 | MDST | Tenas_Lithology.csv |
| T97R-67 | 67.2 | 67.49 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 67.49 | 68.34 | 0.85 | MDST | Tenas_Lithology.csv |
| T97R-67 | 68.34 | 68.63 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-67 | 68.63 | 79.4 | 10.77 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 0 | 12.75 | 12.75 | Overburden | Tenas_Lithology.csv |
| T97R-69 | 12.75 | 55.6 | 42.85 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 55.6 | 65.53 | 9.93 | SST | Tenas_Lithology.csv |
| T97R-69 | 65.53 | 82.66 | 17.13 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 82.66 | 83.38 | 0.72 | COAL | Tenas_Lithology.csv |
| T97R-69 | 83.38 | 90.45 | 7.07 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 90.45 | 90.7 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-69 | 90.7 | 98.18 | 7.48 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 98.18 | 99.9 | 1.72 | COAL | Tenas_Lithology.csv |
| T97R-69 | 99.9 | 100.2 | 0.3 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-69 | 100.2 | 100.66 | 0.46 | COAL | Tenas_Lithology.csv |
| T97R-69 | 100.66 | 100.72 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-69 | 100.72 | 101.75 | 1.03 | COAL | Tenas_Lithology.csv |
| T97R-69 | 101.75 | 101.88 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-69 | 101.88 | 104.11 | 2.23 | COAL | Tenas_Lithology.csv |
| T97R-69 | 104.11 | 104.18 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-69 | 104.18 | 104.86 | 0.68 | COAL | Tenas_Lithology.csv |
| T97R-69 | 104.86 | 109.52 | 4.66 | MDST | Tenas_Lithology.csv |
| T97R-69 | 109.52 | 109.9 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-69 | 109.9 | 111.71 | 1.81 | MDST | Tenas_Lithology.csv |
| T97R-69 | 111.71 | 111.84 | 0.13 | COAL | Tenas_Lithology.csv |
| T97R-69 | 111.84 | 111.96 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-69 | 111.96 | 112.93 | 0.97 | COAL | Tenas_Lithology.csv |
| T97R-69 | 112.93 | 115.53 | 2.6 | MDST | Tenas_Lithology.csv |
| T97R-69 | 115.53 | 115.82 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-69 | 115.82 | 116.92 | 1.1 | MDST | Tenas_Lithology.csv |
| T97R-69 | 116.92 | 117.55 | 0.63 | COAL | Tenas_Lithology.csv |
| T97R-69 | 117.55 | 119.12 | 1.57 | MDST | Tenas_Lithology.csv |
| T97R-69 | 119.12 | 119.43 | 0.31 | COAL | Tenas_Lithology.csv |
| T97R-69 | 119.43 | 119.76 | 0.33 | MDST | Tenas_Lithology.csv |
| T97R-69 | 119.76 | 120.55 | 0.79 | COAL | Tenas_Lithology.csv |
| T97R-69 | 120.55 | 121.27 | 0.72 | MDST | Tenas_Lithology.csv |
| T97R-69 | 121.27 | 122.14 | 0.87 | COAL | Tenas_Lithology.csv |
| T97R-69 | 122.14 | 128 | 5.86 | MDST | Tenas_Lithology.csv |
| T97R-70 | 0 | 11 | 11 | Overburden | Tenas_Lithology.csv |
| T97R-70 | 11 | 14.38 | 3.38 | SLTS | Tenas_Lithology.csv |
| T97R-70 | 14.38 | 14.6 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-70 | 14.6 | 18.57 | 3.97 | SLTS | Tenas_Lithology.csv |
| T97R-70 | 18.57 | 21.31 | 2.74 | COAL | Tenas_Lithology.csv |
| T97R-70 | 21.31 | 22.88 | 1.57 | SLTS | Tenas_Lithology.csv |
| T97R-70 | 22.88 | 25.36 | 2.48 | COAL | Tenas_Lithology.csv |
| T97R-70 | 25.36 | 25.96 | 0.6 | MDST | Tenas_Lithology.csv |
| T97R-70 | 25.96 | 26.63 | 0.67 | COAL | Tenas_Lithology.csv |
| T97R-70 | 26.63 | 27.74 | 1.11 | MDST | Tenas_Lithology.csv |
| T97R-70 | 27.74 | 32.75 | 5.01 | COAL | Tenas_Lithology.csv |
| T97R-70 | 32.75 | 38.41 | 5.66 | MDST | Tenas_Lithology.csv |
| T97R-70 | 38.41 | 39.32 | 0.91 | COAL | Tenas_Lithology.csv |
| T97R-70 | 39.32 | 39.66 | 0.34 | MDST | Tenas_Lithology.csv |
| T97R-70 | 39.66 | 39.75 | 0.09 | COAL | Tenas_Lithology.csv |
| T97R-70 | 39.75 | 42.15 | 2.4 | SLTS | Tenas_Lithology.csv |
| T97R-70 | 42.15 | 42.5 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-70 | 42.5 | 42.7 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-70 | 42.7 | 42.95 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-70 | 42.95 | 43.2 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-70 | 43.2 | 43.5 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-70 | 43.5 | 43.85 | 0.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-70 | 43.85 | 44.1 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-70 | 44.1 | 61 | 16.9 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 0 | 14 | 14 | Overburden | Tenas_Lithology.csv |
| T97R-71 | 14 | 39.6 | 25.6 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 39.6 | 48.28 | 8.68 | SST | Tenas_Lithology.csv |
| T97R-71 | 48.28 | 48.75 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-71 | 48.75 | 52.98 | 4.23 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 52.98 | 54.07 | 1.09 | COAL | Tenas_Lithology.csv |
| T97R-71 | 54.07 | 60.14 | 6.07 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 60.14 | 60.36 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-71 | 60.36 | 60.42 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 60.42 | 61.99 | 1.57 | COAL | Tenas_Lithology.csv |
| T97R-71 | 61.99 | 67.8 | 5.81 | SST | Tenas_Lithology.csv |
| T97R-71 | 67.8 | 70.6 | 2.8 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 70.6 | 71 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-71 | 71 | 75.59 | 4.59 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 75.59 | 77.53 | 1.94 | COAL | Tenas_Lithology.csv |
| T97R-71 | 77.53 | 78.49 | 0.96 | MDST | Tenas_Lithology.csv |
| T97R-71 | 78.49 | 78.89 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-71 | 78.89 | 78.94 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 78.94 | 79.96 | 1.02 | COAL | Tenas_Lithology.csv |
| T97R-71 | 79.96 | 80.44 | 0.48 | MDST | Tenas_Lithology.csv |
| T97R-71 | 80.44 | 80.85 | 0.41 | COAL | Tenas_Lithology.csv |
| T97R-71 | 80.85 | 81.52 | 0.67 | MDST | Tenas_Lithology.csv |
| T97R-71 | 81.52 | 82.27 | 0.75 | COAL | Tenas_Lithology.csv |
| T97R-71 | 82.27 | 82.43 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 82.43 | 84.06 | 1.63 | COAL | Tenas_Lithology.csv |
| T97R-71 | 84.06 | 84.55 | 0.49 | MDST | Tenas_Lithology.csv |
| T97R-71 | 84.55 | 85 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-71 | 85 | 87.12 | 2.12 | MDST | Tenas_Lithology.csv |
| T97R-71 | 87.12 | 87.71 | 0.59 | COAL | Tenas_Lithology.csv |
| T97R-71 | 87.71 | 89.67 | 1.96 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 89.67 | 90.51 | 0.84 | COAL | Tenas_Lithology.csv |
| T97R-71 | 90.51 | 91.26 | 0.75 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 91.26 | 91.51 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 91.51 | 92.31 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-71 | 92.31 | 92.69 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-71 | 92.69 | 93.62 | 0.93 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 93.62 | 93.84 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 93.84 | 94.74 | 0.9 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 94.74 | 94.83 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 94.83 | 99.5 | 4.67 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 99.5 | 100.36 | 0.86 | COAL | Tenas_Lithology.csv |
| T97R-71 | 100.36 | 100.72 | 0.36 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 100.72 | 101.56 | 0.84 | COAL | Tenas_Lithology.csv |
| T97R-71 | 101.56 | 103.7 | 2.14 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T97R-75 | 15 | 35.4 | 20.4 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 35.4 | 40.4 | 5 | SST | Tenas_Lithology.csv |
| T97R-75 | 40.4 | 55.3 | 14.9 | MDST | Tenas_Lithology.csv |
| T97R-75 | 55.3 | 94.33 | 39.03 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 94.33 | 96.02 | 1.69 | COAL | Tenas_Lithology.csv |
| T97R-75 | 96.02 | 100.8 | 4.78 | SST | Tenas_Lithology.csv |
| T97R-75 | 100.8 | 104.3 | 3.5 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 104.3 | 104.55 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-75 | 104.55 | 110.01 | 5.46 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 110.01 | 111.75 | 1.74 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-75 | 111.75 | 112.56 | 0.81 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 112.56 | 112.98 | 0.42 | COAL | Tenas_Lithology.csv |
| T97R-75 | 112.98 | 113.05 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-75 | 113.05 | 114.15 | 1.1 | COAL | Tenas_Lithology.csv |
| T97R-75 | 114.15 | 114.28 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-75 | 114.28 | 117.45 | 3.17 | COAL | Tenas_Lithology.csv |
| T97R-75 | 117.45 | 120.01 | 2.56 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 120.01 | 121.72 | 1.71 | SST | Tenas_Lithology.csv |
| T97R-75 | 121.72 | 123.43 | 1.71 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 123.43 | 124.37 | 0.94 | COAL | Tenas_Lithology.csv |
| T97R-75 | 124.37 | 127.9 | 3.53 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 127.9 | 128.37 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-75 | 128.37 | 128.68 | 0.31 | MDST | Tenas_Lithology.csv |
| T97R-75 | 128.68 | 128.91 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-75 | 128.91 | 129.64 | 0.73 | MDST | Tenas_Lithology.csv |
| T97R-75 | 129.64 | 129.96 | 0.32 | COAL | Tenas_Lithology.csv |
| T97R-75 | 129.96 | 130.72 | 0.76 | MDST | Tenas_Lithology.csv |
| T97R-75 | 130.72 | 132.87 | 2.15 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 132.87 | 133.13 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-75 | 133.13 | 135.1 | 1.97 | SST | Tenas_Lithology.csv |
| T97R-78 | 0 | 9.5 | 9.5 | Overburden | Tenas_Lithology.csv |
| T97R-78 | 9.5 | 21.5 | 12 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 21.5 | 31.11 | 9.61 | SST | Tenas_Lithology.csv |
| T97R-78 | 31.11 | 45.5 | 14.39 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 45.5 | 47.24 | 1.74 | COAL | Tenas_Lithology.csv |
| T97R-78 | 47.24 | 55.01 | 7.77 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 55.01 | 55.4 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-78 | 55.4 | 58.66 | 3.26 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 58.66 | 60.28 | 1.62 | COAL | Tenas_Lithology.csv |
| T97R-78 | 60.28 | 61.3 | 1.02 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 61.3 | 62.63 | 1.33 | COAL | Tenas_Lithology.csv |
| T97R-78 | 62.63 | 62.92 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 62.92 | 63.19 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-78 | 63.19 | 63.41 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 63.41 | 63.72 | 0.31 | COAL | Tenas_Lithology.csv |
| T97R-78 | 63.72 | 63.9 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 63.9 | 66.19 | 2.29 | COAL | Tenas_Lithology.csv |
| T97R-78 | 66.19 | 70.75 | 4.56 | MDST | Tenas_Lithology.csv |
| T97R-78 | 70.75 | 71.07 | 0.32 | COAL | Tenas_Lithology.csv |
| T97R-78 | 71.07 | 72.41 | 1.34 | MDST | Tenas_Lithology.csv |
| T97R-78 | 72.41 | 72.49 | 0.08 | COAL | Tenas_Lithology.csv |
| T97R-78 | 72.49 | 72.64 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 72.64 | 73.44 | 0.8 | COAL | Tenas_Lithology.csv |
| T97R-78 | 73.44 | 76.41 | 2.97 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 76.41 | 76.57 | 0.16 | COAL | Tenas_Lithology.csv |
| T97R-78 | 76.57 | 81.91 | 5.34 | MDST | Tenas_Lithology.csv |
| T97R-78 | 81.91 | 82.54 | 0.63 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 82.54 | 82.72 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 82.72 | 83.18 | 0.46 | MDST | Tenas_Lithology.csv |
| T97R-78 | 83.18 | 83.67 | 0.49 | COAL | Tenas_Lithology.csv |
| T97R-78 | 83.67 | 84.6 | 0.93 | MDST | Tenas_Lithology.csv |
| T97R-78 | 84.6 | 85.8 | 1.2 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 0 | 10.5 | 10.5 | Overburden | Tenas_Lithology.csv |
| T97R-80 | 10.5 | 29.8 | 19.3 | MDST | Tenas_Lithology.csv |
| T97R-80 | 29.8 | 48.15 | 18.35 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 48.15 | 51.2 | 3.05 | SST | Tenas_Lithology.csv |
| T97R-80 | 51.2 | 55 | 3.8 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 55 | 55.85 | 0.85 | MDST | Tenas_Lithology.csv |
| T97R-80 | 55.85 | 57.36 | 1.51 | COAL | Tenas_Lithology.csv |
| T97R-80 | 57.36 | 57.97 | 0.61 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 57.97 | 58.37 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-80 | 58.37 | 58.43 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 58.43 | 59.35 | 0.92 | COAL | Tenas_Lithology.csv |
| T97R-80 | 59.35 | 59.44 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 59.44 | 59.72 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-80 | 59.72 | 59.79 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 59.79 | 62.45 | 2.66 | COAL | Tenas_Lithology.csv |
| T97R-80 | 62.45 | 66.91 | 4.46 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 66.91 | 67.18 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-80 | 67.18 | 69.19 | 2.01 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 69.19 | 70.07 | 0.88 | COAL | Tenas_Lithology.csv |
| T97R-80 | 70.07 | 74.84 | 4.77 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 74.84 | 75.22 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-80 | 75.22 | 78.87 | 3.65 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 78.87 | 79.54 | 0.67 | COAL | Tenas_Lithology.csv |
| T97R-80 | 79.54 | 79.61 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 79.61 | 79.78 | 0.17 | COAL | Tenas_Lithology.csv |
| T97R-80 | 79.78 | 80.68 | 0.9 | MDST | Tenas_Lithology.csv |
| T97R-80 | 80.68 | 80.79 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-80 | 80.79 | 80.85 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 80.85 | 81.73 | 0.88 | COAL | Tenas_Lithology.csv |
| T97R-80 | 81.73 | 87.65 | 5.92 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 87.65 | 88.17 | 0.52 | COAL | Tenas_Lithology.csv |
| T97R-80 | 88.17 | 91.3 | 3.13 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 0 | 13.5 | 13.5 | Overburden | Tenas_Lithology.csv |
| T97R-84 | 13.5 | 29.7 | 16.2 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 29.7 | 37.43 | 7.73 | SST | Tenas_Lithology.csv |
| T97R-84 | 37.43 | 40.3 | 2.87 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 40.3 | 41.54 | 1.24 | MDST | Tenas_Lithology.csv |
| T97R-84 | 41.54 | 42.15 | 0.61 | COAL | Tenas_Lithology.csv |
| T97R-84 | 42.15 | 44.31 | 2.16 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 44.31 | 44.56 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-84 | 44.56 | 44.87 | 0.31 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-84 | 44.87 | 46.59 | 1.72 | COAL | Tenas_Lithology.csv |
| T97R-84 | 46.59 | 54.88 | 8.29 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 54.88 | 55.28 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-84 | 55.28 | 60.88 | 5.6 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 60.88 | 62.74 | 1.86 | COAL | Tenas_Lithology.csv |
| T97R-84 | 62.74 | 62.86 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-84 | 62.86 | 63.8 | 0.94 | COAL | Tenas_Lithology.csv |
| T97R-84 | 63.8 | 63.91 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-84 | 63.91 | 64.88 | 0.97 | COAL | Tenas_Lithology.csv |
| T97R-84 | 64.88 | 65.01 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-84 | 65.01 | 66.75 | 1.74 | COAL | Tenas_Lithology.csv |
| T97R-84 | 66.75 | 68.73 | 1.98 | MDST | Tenas_Lithology.csv |
| T97R-84 | 68.73 | 69.24 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-84 | 69.24 | 70.43 | 1.19 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 70.43 | 71.29 | 0.86 | COAL | Tenas_Lithology.csv |
| T97R-84 | 71.29 | 71.52 | 0.23 | MDST | Tenas_Lithology.csv |
| T97R-84 | 71.52 | 72.09 | 0.57 | COAL | Tenas_Lithology.csv |
| T97R-84 | 72.09 | 72.84 | 0.75 | MDST | Tenas_Lithology.csv |
| T97R-84 | 72.84 | 73.14 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-84 | 73.14 | 76 | 2.86 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 76 | 76.29 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-84 | 76.29 | 78.4 | 2.11 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 78.4 | 79.11 | 0.71 | COAL | Tenas_Lithology.csv |
| T97R-84 | 79.11 | 86.12 | 7.01 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 86.12 | 86.54 | 0.42 | COAL | Tenas_Lithology.csv |
| T97R-84 | 86.54 | 90 | 3.46 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 0 | 9.5 | 9.5 | Overburden | Tenas_Lithology.csv |
| T97R-87 | 9.5 | 18.4 | 8.9 | MDST | Tenas_Lithology.csv |
| T97R-87 | 18.4 | 41.9 | 23.5 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 41.9 | 48.2 | 6.3 | MDST | Tenas_Lithology.csv |
| T97R-87 | 48.2 | 62.56 | 14.36 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 62.56 | 62.69 | 0.13 | COAL | Tenas_Lithology.csv |
| T97R-87 | 62.69 | 63.6 | 0.91 | MDST | Tenas_Lithology.csv |
| T97R-87 | 63.6 | 63.98 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-87 | 63.98 | 72.26 | 8.28 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 72.26 | 73.74 | 1.48 | COAL | Tenas_Lithology.csv |
| T97R-87 | 73.74 | 90.28 | 16.54 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 90.28 | 92.4 | 2.12 | COAL | Tenas_Lithology.csv |
| T97R-87 | 92.4 | 92.48 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 92.48 | 93.55 | 1.07 | COAL | Tenas_Lithology.csv |
| T97R-87 | 93.55 | 93.68 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 93.68 | 93.98 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-87 | 93.98 | 94.05 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 94.05 | 96.54 | 2.49 | COAL | Tenas_Lithology.csv |
| T97R-87 | 96.54 | 100.14 | 3.6 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 100.14 | 100.26 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 100.26 | 100.76 | 0.5 | MDST | Tenas_Lithology.csv |
| T97R-87 | 100.76 | 101.8 | 1.04 | COAL | Tenas_Lithology.csv |
| T97R-87 | 101.8 | 105.76 | 3.96 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 105.76 | 106.13 | 0.37 | COAL | Tenas_Lithology.csv |
| T97R-87 | 106.13 | 108.15 | 2.02 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 108.15 | 108.36 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-87 | 108.36 | 108.54 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 108.54 | 109 | 0.46 | COAL | Tenas_Lithology.csv |
| T97R-87 | 109 | 109.1 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 109.1 | 109.39 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-87 | 109.39 | 110.47 | 1.08 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 110.47 | 111.23 | 0.76 | COAL | Tenas_Lithology.csv |
| T97R-87 | 111.23 | 116.8 | 5.57 | SLTS | Tenas_Lithology.csv |
| T97R-88 | 0 | 16 | 16 | Overburden | Tenas_Lithology.csv |
| T97R-88 | 16 | 20 | 4 | MDST | Tenas_Lithology.csv |
| T97R-88 | 20 | 20.3 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-88 | 20.3 | 22.7 | 2.4 | MDST | Tenas_Lithology.csv |
| T97R-88 | 22.7 | 33.95 | 11.25 | SLTS | Tenas_Lithology.csv |
| T97R-88 | 33.95 | 34.58 | 0.63 | COAL | Tenas_Lithology.csv |
| T97R-88 | 34.58 | 34.64 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-88 | 34.64 | 35.43 | 0.79 | COAL | Tenas_Lithology.csv |
| T97R-88 | 35.43 | 41.57 | 6.14 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 0 | 21 | 21 | Overburden | Tenas_Lithology.csv |
| T97R-90 | 21 | 26.95 | 5.95 | MDST | Tenas_Lithology.csv |
| T97R-90 | 26.95 | 27.38 | 0.43 | COAL | Tenas_Lithology.csv |
| T97R-90 | 27.38 | 33.8 | 6.42 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 33.8 | 34.25 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-90 | 34.25 | 37.89 | 3.64 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 37.89 | 38.12 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-90 | 38.12 | 40.72 | 2.6 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 40.72 | 41.75 | 1.03 | COAL | Tenas_Lithology.csv |
| T97R-90 | 41.75 | 41.85 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 41.85 | 42.82 | 0.97 | COAL | Tenas_Lithology.csv |
| T97R-90 | 42.82 | 55.44 | 12.62 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 55.44 | 55.61 | 0.17 | COAL | Tenas_Lithology.csv |
| T97R-90 | 55.61 | 60.4 | 4.79 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 60.4 | 60.48 | 0.08 | COAL | Tenas_Lithology.csv |
| T97R-90 | 60.48 | 60.64 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 60.64 | 63.38 | 2.74 | COAL | Tenas_Lithology.csv |
| T97R-90 | 63.38 | 63.52 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 63.52 | 63.78 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-90 | 63.78 | 64.97 | 1.19 | MDST | Tenas_Lithology.csv |
| T97R-90 | 64.97 | 68.9 | 3.93 | COAL | Tenas_Lithology.csv |
| T97R-90 | 68.9 | 68.94 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 68.94 | 69.94 | 1 | COAL | Tenas_Lithology.csv |
| T97R-90 | 69.94 | 73.8 | 3.86 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 73.8 | 74.15 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-90 | 74.15 | 74.29 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 74.29 | 75.79 | 1.5 | COAL | Tenas_Lithology.csv |
| T97R-90 | 75.79 | 83.2 | 7.41 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 83.2 | 85.4 | 2.2 | SST | Tenas_Lithology.csv |
| T97R-90 | 85.4 | 88 | 2.6 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 88 | 88.2 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-90 | 88.2 | 98.5 | 10.3 | SST | Tenas_Lithology.csv |
| T97R-91 | 0 | 9 | 9 | Overburden | Tenas_Lithology.csv |
| T97R-91 | 9 | 12.4 | 3.4 | SLTS | Tenas_Lithology.csv |
| T97R-91 | 12.4 | 19.01 | 6.61 | SST | Tenas_Lithology.csv |
| T97R-91 | 19.01 | 19.5 | 0.49 | COAL | Tenas_Lithology.csv |
| T97R-91 | 19.5 | 22.48 | 2.98 | SLTS | Tenas_Lithology.csv |
| T97R-91 | 22.48 | 22.68 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-91 | 22.68 | 23.45 | 0.77 | MDST | Tenas_Lithology.csv |
| T97R-91 | 23.45 | 23.76 | 0.31 | COAL | Tenas_Lithology.csv |
| T97R-91 | 23.76 | 29.7 | 5.94 | SLTS | Tenas_Lithology.csv |
| T97R-91 | 29.7 | 31.34 | 1.64 | COAL | Tenas_Lithology.csv |
| T97R-91 | 31.34 | 38.58 | 7.24 | SLTS | Tenas_Lithology.csv |
| T97R-91 | 38.58 | 38.97 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-91 | 38.97 | 44.23 | 5.26 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-91 | 44.23 | 46.43 | 2.2 | COAL | Tenas_Lithology.csv |
| T97R-91 | 46.43 | 46.48 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-91 | 46.48 | 47.41 | 0.93 | COAL | Tenas_Lithology.csv |
| T97R-91 | 47.41 | 47.49 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-91 | 47.49 | 51.05 | 3.56 | COAL | Tenas_Lithology.csv |
| T97R-91 | 51.05 | 54.14 | 3.09 | MDST | Tenas_Lithology.csv |
| T97R-91 | 54.14 | 54.56 | 0.42 | COAL | Tenas_Lithology.csv |
| T97R-91 | 54.56 | 54.8 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-91 | 54.8 | 55.04 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-91 | 55.04 | 55.63 | 0.59 | MDST | Tenas_Lithology.csv |
| T97R-91 | 55.63 | 56.14 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-91 | 56.14 | 56.87 | 0.73 | MDST | Tenas_Lithology.csv |
| T97R-91 | 56.87 | 57.3 | 0.43 | COAL | Tenas_Lithology.csv |
| T97R-91 | 57.3 | 59.1 | 1.8 | MDST | Tenas_Lithology.csv |
| T97R-91 | 59.1 | 67.5 | 8.4 | SLTS | Tenas_Lithology.csv |
| T97R-94 | 0 | 1 | 1 | Overburden | Tenas_Lithology.csv |
| T97R-94 | 1 | 3 | 2 | COAL | Tenas_Lithology.csv |
| T97R-94 | 3 | 9.21 | 6.21 | SLTS | Tenas_Lithology.csv |
| T97R-94 | 9.21 | 9.49 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-94 | 9.49 | 11.82 | 2.33 | SLTS | Tenas_Lithology.csv |
| T97R-94 | 11.82 | 13.71 | 1.89 | COAL | Tenas_Lithology.csv |
| T97R-94 | 13.71 | 14.57 | 0.86 | MDST | Tenas_Lithology.csv |
| T97R-94 | 14.57 | 16.05 | 1.48 | COAL | Tenas_Lithology.csv |
| T97R-94 | 16.05 | 16.14 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 16.14 | 16.65 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-94 | 16.65 | 16.7 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 16.7 | 16.94 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-94 | 16.94 | 17.04 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 17.04 | 17.91 | 0.87 | COAL | Tenas_Lithology.csv |
| T97R-94 | 17.91 | 19.42 | 1.51 | MDST | Tenas_Lithology.csv |
| T97R-94 | 19.42 | 19.87 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-94 | 19.87 | 19.95 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 19.95 | 20.19 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-94 | 20.19 | 26.14 | 5.95 | SST | Tenas_Lithology.csv |
| T97R-94 | 26.14 | 26.43 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-94 | 26.43 | 26.64 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 26.64 | 26.89 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-94 | 26.89 | 27.79 | 0.9 | MDST | Tenas_Lithology.csv |
| T97R-94 | 27.79 | 27.88 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 27.88 | 30 | 2.12 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 0 | 1 | 1 | Overburden | Tenas_Lithology.csv |
| T97R-95C | 1 | 2.03 | 1.03 | MDST | Tenas_Lithology.csv |
| T97R-95C | 2.03 | 2.81 | 0.78 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 2.81 | 3.9 | 1.09 | MDST | Tenas_Lithology.csv |
| T97R-95C | 3.9 | 4.17 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-95C | 4.17 | 6.48 | 2.31 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 6.48 | 8.05 | 1.57 | COAL | Tenas_Lithology.csv |
| T97R-95C | 8.05 | 8.18 | 0.13 | MDST | Tenas_Lithology.csv |
| T97R-95C | 8.18 | 8.93 | 0.75 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 8.93 | 9.69 | 0.76 | MDST | Tenas_Lithology.csv |
| T97R-95C | 9.69 | 11.2 | 1.51 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 11.2 | 11.42 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-95C | 11.42 | 12.1 | 0.68 | MDST | Tenas_Lithology.csv |
| T97R-95C | 12.1 | 13.27 | 1.17 | COAL | Tenas_Lithology.csv |
| T97R-95C | 13.27 | 13.54 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-95C | 13.54 | 13.72 | 0.18 | COAL | Tenas_Lithology.csv |
| T97R-95C | 13.72 | 14.23 | 0.51 | MDST | Tenas_Lithology.csv |
| T97R-95C | 14.23 | 15.35 | 1.12 | COAL | Tenas_Lithology.csv |
| T97R-95C | 15.35 | 16.14 | 0.79 | MDST | Tenas_Lithology.csv |
| T97R-95C | 16.14 | 16.4 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-95C | 16.4 | 17.11 | 0.71 | MDST | Tenas_Lithology.csv |
| T97R-95C | 17.11 | 17.67 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-95C | 17.67 | 18.51 | 0.84 | MDST | Tenas_Lithology.csv |
| T97R-95C | 18.51 | 18.73 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-95C | 18.73 | 19.36 | 0.63 | MDST | Tenas_Lithology.csv |
| T97R-95C | 19.36 | 19.66 | 0.3 | SST | Tenas_Lithology.csv |
| T97R-95C | 19.66 | 21.33 | 1.67 | MDST | Tenas_Lithology.csv |
| T97R-95C | 21.33 | 23.7 | 2.37 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 23.7 | 26.5 | 2.8 | SST | Tenas_Lithology.csv |
| T97R-95C | 26.5 | 26.97 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-95C | 26.97 | 29.31 | 2.34 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 29.31 | 29.52 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-95C | 29.52 | 36 | 6.48 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 0 | 14 | 14 | Overburden | Tenas_Lithology.csv |
| T97R-96 | 14 | 23.1 | 9.1 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 23.1 | 38.8 | 15.7 | MDST | Tenas_Lithology.csv |
| T97R-96 | 38.8 | 42.4 | 3.6 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 42.4 | 55.7 | 13.3 | MDST | Tenas_Lithology.csv |
| T97R-96 | 55.7 | 60.1 | 4.4 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 60.1 | 62.1 | 2 | MDST | Tenas_Lithology.csv |
| T97R-96 | 62.1 | 81.04 | 18.94 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 81.04 | 81.39 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-96 | 81.39 | 82.96 | 1.57 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 82.96 | 83.51 | 0.55 | COAL | Tenas_Lithology.csv |
| T97R-96 | 83.51 | 86.18 | 2.67 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 86.18 | 87.46 | 1.28 | COAL | Tenas_Lithology.csv |
| T97R-96 | 87.46 | 91.78 | 4.32 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 91.78 | 92.18 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-96 | 92.18 | 93.7 | 1.52 | MDST | Tenas_Lithology.csv |
| T97R-96 | 93.7 | 94.32 | 0.62 | COAL | Tenas_Lithology.csv |
| T97R-96 | 94.32 | 101.6 | 7.28 | SST | Tenas_Lithology.csv |
| T97R-96 | 101.6 | 101.94 | 0.34 | COAL | Tenas_Lithology.csv |
| T97R-96 | 101.94 | 104.06 | 2.12 | SST | Tenas_Lithology.csv |
| T97R-96 | 104.06 | 104.43 | 0.37 | COAL | Tenas_Lithology.csv |
| T97R-96 | 104.43 | 124 | 19.57 | SLTS | Tenas_Lithology.csv |
| T97R-97 | 0 | 11.6 | 11.6 | Overburden | Tenas_Lithology.csv |
| T97R-97 | 11.6 | 12.6 | 1 | MDST | Tenas_Lithology.csv |
| T97R-97 | 12.6 | 16.6 | 4 | COAL | Tenas_Lithology.csv |
| T97R-97 | 16.6 | 17.75 | 1.15 | MDST | Tenas_Lithology.csv |
| T97R-97 | 17.75 | 18.14 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-97 | 18.14 | 18.9 | 0.76 | MDST | Tenas_Lithology.csv |
| T97R-97 | 18.9 | 19.61 | 0.71 | COAL | Tenas_Lithology.csv |
| T97R-97 | 19.61 | 23.8 | 4.19 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-99 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T97R-99 | 7 | 19.9 | 12.9 | MDST | Tenas_Lithology.csv |
| T97R-99 | 19.9 | 31.4 | 11.5 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 31.4 | 31.63 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-99 | 31.63 | 42.61 | 10.98 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 42.61 | 44.76 | 2.15 | COAL | Tenas_Lithology.csv |
| T97R-99 | 44.76 | 53.14 | 8.38 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 53.14 | 53.44 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-99 | 53.44 | 56.02 | 2.58 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 56.02 | 57.7 | 1.68 | COAL | Tenas_Lithology.csv |
| T97R-99 | 57.7 | 60.18 | 2.48 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 60.18 | 63.79 | 3.61 | COAL | Tenas_Lithology.csv |
| T97R-99 | 63.79 | 65.38 | 1.59 | MDST | Tenas_Lithology.csv |
| T97R-99 | 65.38 | 65.53 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-99 | 65.53 | 66.35 | 0.82 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 66.35 | 68.04 | 1.69 | COAL | Tenas_Lithology.csv |
| T97R-99 | 68.04 | 70.69 | 2.65 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 70.69 | 70.83 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-99 | 70.83 | 80 | 9.17 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T98R-03C | 6 | 8.35 | 2.35 | MDST | Tenas_Lithology.csv |
| T98R-03C | 8.35 | 8.45 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-03C | 8.45 | 9.75 | 1.3 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 9.75 | 11.4 | 1.65 | COAL | Tenas_Lithology.csv |
| T98R-03C | 11.4 | 11.96 | 0.56 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 11.96 | 18.1 | 6.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-03C | 18.1 | 18.35 | 0.25 | COAL | Tenas_Lithology.csv |
| T98R-03C | 18.35 | 19.9 | 1.55 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-03C | 19.9 | 20.6 | 0.7 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 20.6 | 22.7 | 2.1 | COAL | Tenas_Lithology.csv |
| T98R-03C | 22.7 | 23.55 | 0.85 | MDST | Tenas_Lithology.csv |
| T98R-03C | 23.55 | 26.8 | 3.25 | COAL | Tenas_Lithology.csv |
| T98R-03C | 26.8 | 27.1 | 0.3 | MDST | Tenas_Lithology.csv |
| T98R-03C | 27.1 | 27.65 | 0.55 | COAL | Tenas_Lithology.csv |
| T98R-03C | 27.65 | 28.1 | 0.45 | MDST | Tenas_Lithology.csv |
| T98R-03C | 28.1 | 28.28 | 0.18 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 28.28 | 28.63 | 0.35 | MDST | Tenas_Lithology.csv |
| T98R-03C | 28.63 | 28.88 | 0.25 | COAL | Tenas_Lithology.csv |
| T98R-03C | 28.88 | 28.96 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-07C | 0 | 19 | 19 | Overburden | Tenas_Lithology.csv |
| T98R-07C | 19 | 61.04 | 42.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-07C | 61.04 | 61.13 | 0.09 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 61.13 | 61.32 | 0.19 | SST | Tenas_Lithology.csv |
| T98R-07C | 61.32 | 61.45 | 0.13 | MDST | Tenas_Lithology.csv |
| T98R-07C | 61.45 | 61.73 | 0.28 | SST | Tenas_Lithology.csv |
| T98R-07C | 61.73 | 62.03 | 0.3 | MDST | Tenas_Lithology.csv |
| T98R-07C | 62.03 | 62.57 | 0.54 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 62.57 | 63.07 | 0.5 | MDST | Tenas_Lithology.csv |
| T98R-07C | 63.07 | 63.94 | 0.87 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 63.94 | 64.02 | 0.08 | MDST | Tenas_Lithology.csv |
| T98R-07C | 64.02 | 66.12 | 2.1 | COAL | Tenas_Lithology.csv |
| T98R-07C | 66.12 | 67.1 | 0.98 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 67.1 | 83.5 | 16.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-07C | 83.5 | 84.87 | 1.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-07C | 84.87 | 91.86 | 6.99 | COAL | Tenas_Lithology.csv |
| T98R-07C | 91.86 | 92 | 0.14 | MDST | Tenas_Lithology.csv |
| T98R-07C | 92 | 92.87 | 0.87 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 92.87 | 97.5 | 4.63 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-09C | 0 | 15.06 | 15.06 | Overburden | Tenas_Lithology.csv |
| T98R-09C | 15.06 | 18.28 | 3.22 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 18.28 | 18.74 | 0.46 | SST | Tenas_Lithology.csv |
| T98R-09C | 18.74 | 32.75 | 14.01 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 32.75 | 44.81 | 12.06 | MDST | Tenas_Lithology.csv |
| T98R-09C | 44.81 | 45.83 | 1.02 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 45.83 | 46.26 | 0.43 | COAL | Tenas_Lithology.csv |
| T98R-09C | 46.26 | 48.86 | 2.6 | MDST | Tenas_Lithology.csv |
| T98R-09C | 48.86 | 49.09 | 0.23 | COAL | Tenas_Lithology.csv |
| T98R-09C | 49.09 | 49.31 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-09C | 49.31 | 49.61 | 0.3 | COAL | Tenas_Lithology.csv |
| T98R-09C | 49.61 | 50.21 | 0.6 | MDST | Tenas_Lithology.csv |
| T98R-09C | 50.21 | 52.52 | 2.31 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 52.52 | 52.82 | 0.3 | COAL | Tenas_Lithology.csv |
| T98R-09C | 52.82 | 52.92 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-09C | 52.92 | 54.53 | 1.61 | COAL | Tenas_Lithology.csv |
| T98R-09C | 54.53 | 56.71 | 2.18 | MDST | Tenas_Lithology.csv |
| T98R-09C | 56.71 | 58.89 | 2.18 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 58.89 | 61.1 | 2.21 | MDST | Tenas_Lithology.csv |
| T98R-09C | 61.1 | 61.29 | 0.19 | COAL | Tenas_Lithology.csv |
| T98R-09C | 61.29 | 62.97 | 1.68 | MDST | Tenas_Lithology.csv |
| T98R-09C | 62.97 | 68.87 | 5.9 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 68.87 | 74.42 | 5.55 | COAL | Tenas_Lithology.csv |
| T98R-09C | 74.42 | 75.12 | 0.7 | MDST | Tenas_Lithology.csv |
| T98R-09C | 75.12 | 77.18 | 2.06 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 77.18 | 77.63 | 0.45 | COAL | Tenas_Lithology.csv |
| T98R-09C | 77.63 | 77.75 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-09C | 77.75 | 78.2 | 0.45 | COAL | Tenas_Lithology.csv |
| T98R-13C | 0 | 12 | 12 | Overburden | Tenas_Lithology.csv |
| T98R-13C | 12 | 72.93 | 60.93 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-13C | 72.93 | 75.04 | 2.11 | MDST | Tenas_Lithology.csv |
| T98R-13C | 75.04 | 76 | 0.96 | COAL | Tenas_Lithology.csv |
| T98R-13C | 76 | 76.06 | 0.06 | MDST | Tenas_Lithology.csv |
| T98R-13C | 76.06 | 76.83 | 0.77 | SLTS | Tenas_Lithology.csv |
| T98R-13C | 76.83 | 85.74 | 8.91 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-13C | 85.74 | 86.05 | 0.31 | COAL | Tenas_Lithology.csv |
| T98R-13C | 86.05 | 88.6 | 2.55 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-13C | 88.6 | 89.65 | 1.05 | SLTS | Tenas_Lithology.csv |
| T98R-13C | 89.65 | 89.95 | 0.3 | SST | Tenas_Lithology.csv |
| T98R-13C | 89.95 | 91.28 | 1.33 | SLTS | Tenas_Lithology.csv |
| T98R-13C | 91.28 | 91.35 | 0.07 | MDST | Tenas_Lithology.csv |
| T98R-13C | 91.35 | 91.63 | 0.28 | SLTS | Tenas_Lithology.csv |
| T98R-13C | 91.63 | 97.58 | 5.95 | COAL | Tenas_Lithology.csv |
| T98R-13C | 97.58 | 97.73 | 0.15 | MDST | Tenas_Lithology.csv |
| T98R-13C | 97.73 | 97.89 | 0.16 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T98R-13C | 97.89 | 103.6 | 5.71 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-14 | 0 | 3.8 | 3.8 | Overburden | Tenas_Lithology.csv |
| T98R-14 | 3.8 | 11.25 | 7.45 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 11.25 | 16.5 | 5.25 | MDST | Tenas_Lithology.csv |
| T98R-14 | 16.5 | 18.25 | 1.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 18.25 | 21 | 2.75 | MDST | Tenas_Lithology.csv |
| T98R-14 | 21 | 24 | 3 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 24 | 26.75 | 2.75 | MDST | Tenas_Lithology.csv |
| T98R-14 | 26.75 | 30.25 | 3.5 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 30.25 | 30.75 | 0.5 | MDST | Tenas_Lithology.csv |
| T98R-14 | 30.75 | 35.5 | 4.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 35.5 | 38 | 2.5 | MDST | Tenas_Lithology.csv |
| T98R-14 | 38 | 41 | 3 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 41 | 46.25 | 5.25 | MDST | Tenas_Lithology.csv |
| T98R-14 | 46.25 | 48 | 1.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 48 | 49.5 | 1.5 | MDST | Tenas_Lithology.csv |
| T98R-14 | 49.5 | 60 | 10.5 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 60 | 61.25 | 1.25 | MDST | Tenas_Lithology.csv |
| T98R-14 | 61.25 | 63 | 1.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 63 | 63.25 | 0.25 | MDST | Tenas_Lithology.csv |
| T98R-14 | 63.25 | 78 | 14.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 78 | 84.4 | 6.4 | MDST | Tenas_Lithology.csv |
| T98R-16 | 0 | 22 | 22 | Overburden | Tenas_Lithology.csv |
| T98R-16 | 22 | 25.16 | 3.16 | MDST | Tenas_Lithology.csv |
| T98R-16 | 25.16 | 26.98 | 1.82 | COAL | Tenas_Lithology.csv |
| T98R-16 | 26.98 | 35.2 | 8.22 | SST | Tenas_Lithology.csv |
| T98R-16 | 35.2 | 35.57 | 0.37 | COAL | Tenas_Lithology.csv |
| T98R-16 | 35.57 | 47.12 | 11.55 | MDST | Tenas_Lithology.csv |
| T98R-16 | 47.12 | 49.75 | 2.63 | COAL | Tenas_Lithology.csv |
| T98R-16 | 49.75 | 49.86 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-16 | 49.86 | 55.3 | 5.44 | COAL | Tenas_Lithology.csv |
| T98R-16 | 55.3 | 56.55 | 1.25 | MDST | Tenas_Lithology.csv |
| T98R-16 | 56.55 | 57.34 | 0.79 | COAL | Tenas_Lithology.csv |
| T98R-16 | 57.34 | 65.5 | 8.16 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T98R-18 | 3 | 3.29 | 0.29 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 3.29 | 3.83 | 0.54 | COAL | Tenas_Lithology.csv |
| T98R-18 | 3.83 | 6.6 | 2.77 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 6.6 | 7.23 | 0.63 | MDST | Tenas_Lithology.csv |
| T98R-18 | 7.23 | 7.34 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-18 | 7.34 | 8.11 | 0.77 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 8.11 | 9.52 | 1.41 | COAL | Tenas_Lithology.csv |
| T98R-18 | 9.52 | 15.9 | 6.38 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 15.9 | 16.45 | 0.55 | COAL | Tenas_Lithology.csv |
| T98R-18 | 16.45 | 19.5 | 3.05 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 19.5 | 20.39 | 0.89 | MDST | Tenas_Lithology.csv |
| T98R-18 | 20.39 | 22.09 | 1.7 | COAL | Tenas_Lithology.csv |
| T98R-18 | 22.09 | 22.21 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-18 | 22.21 | 23.8 | 1.59 | COAL | Tenas_Lithology.csv |
| T98R-18 | 23.8 | 23.91 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-18 | 23.91 | 25.75 | 1.84 | COAL | Tenas_Lithology.csv |
| T98R-18 | 25.75 | 27.85 | 2.1 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 27.85 | 28.69 | 0.84 | COAL | Tenas_Lithology.csv |
| T98R-18 | 28.69 | 29.82 | 1.13 | MDST | Tenas_Lithology.csv |
| T98R-18 | 29.82 | 30.15 | 0.33 | COAL | Tenas_Lithology.csv |
| T98R-18 | 30.15 | 30.83 | 0.68 | MDST | Tenas_Lithology.csv |
| T98R-18 | 30.83 | 31.29 | 0.46 | COAL | Tenas_Lithology.csv |
| T98R-18 | 31.29 | 34.7 | 3.41 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T98R-20 | 3 | 4.55 | 1.55 | MDST | Tenas_Lithology.csv |
| T98R-20 | 4.55 | 6.33 | 1.78 | COAL | Tenas_Lithology.csv |
| T98R-20 | 6.33 | 7.59 | 1.26 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 7.59 | 10.92 | 3.33 | COAL | Tenas_Lithology.csv |
| T98R-20 | 10.92 | 11.5 | 0.58 | MDST | Tenas_Lithology.csv |
| T98R-20 | 11.5 | 12.1 | 0.6 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 12.1 | 12.84 | 0.74 | COAL | Tenas_Lithology.csv |
| T98R-20 | 12.84 | 13 | 0.16 | MDST | Tenas_Lithology.csv |
| T98R-20 | 13 | 14.8 | 1.8 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 14.8 | 15.18 | 0.38 | COAL | Tenas_Lithology.csv |
| T98R-20 | 15.18 | 16 | 0.82 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 16 | 16.28 | 0.28 | COAL | Tenas_Lithology.csv |
| T98R-20 | 16.28 | 21.3 | 5.02 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 21.3 | 22.1 | 0.8 | COAL | Tenas_Lithology.csv |
| T98R-20 | 22.1 | 23.3 | 1.2 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 23.3 | 23.7 | 0.4 | COAL | Tenas_Lithology.csv |
| T98R-20 | 23.7 | 26.5 | 2.8 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 26.5 | 42.5 | 16 | MDST | Tenas_Lithology.csv |
| T98R-21C | 0 | 12 | 12 | Overburden | Tenas_Lithology.csv |
| T98R-21C | 12 | 59.32 | 47.32 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 59.32 | 59.37 | 0.05 | COAL | Tenas_Lithology.csv |
| T98R-21C | 59.37 | 61.02 | 1.65 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 61.02 | 61.12 | 0.1 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 61.12 | 61.25 | 0.13 | MDST | Tenas_Lithology.csv |
| T98R-21C | 61.25 | 61.75 | 0.5 | COAL | Tenas_Lithology.csv |
| T98R-21C | 61.75 | 62.31 | 0.56 | MDST | Tenas_Lithology.csv |
| T98R-21C | 62.31 | 63.26 | 0.95 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 63.26 | 63.34 | 0.08 | MDST | Tenas_Lithology.csv |
| T98R-21C | 63.34 | 63.59 | 0.25 | COAL | Tenas_Lithology.csv |
| T98R-21C | 63.59 | 63.63 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 63.63 | 63.72 | 0.09 | COAL | Tenas_Lithology.csv |
| T98R-21C | 63.72 | 63.9 | 0.18 | MDST | Tenas_Lithology.csv |
| T98R-21C | 63.9 | 64.29 | 0.39 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 64.29 | 64.35 | 0.06 | MDST | Tenas_Lithology.csv |
| T98R-21C | 64.35 | 66.23 | 1.88 | COAL | Tenas_Lithology.csv |
| T98R-21C | 66.23 | 66.31 | 0.08 | MDST | Tenas_Lithology.csv |
| T98R-21C | 66.31 | 66.85 | 0.54 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 66.85 | 73.54 | 6.69 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 73.54 | 75.08 | 1.54 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 75.08 | 75.15 | 0.07 | MDST | Tenas_Lithology.csv |
| T98R-21C | 75.15 | 77.34 | 2.19 | COAL | Tenas_Lithology.csv |
| T98R-21C | 77.34 | 77.4 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 77.4 | 78.92 | 1.52 | COAL | Tenas_Lithology.csv |
| T98R-21C | 78.92 | 79.07 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T98R-21C | 79.07 | 79.32 | 0.25 | COAL | Tenas_Lithology.csv |
| T98R-21C | 79.32 | 79.51 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 79.51 | 82.72 | 3.21 | COAL | Tenas_Lithology.csv |
| T98R-21C | 82.72 | 82.86 | 0.14 | MDST | Tenas_Lithology.csv |
| T98R-21C | 82.86 | 83.26 | 0.4 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 83.26 | 84.94 | 1.68 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 84.94 | 85.86 | 0.92 | COAL | Tenas_Lithology.csv |
| T98R-21C | 85.86 | 86.09 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 86.09 | 87.15 | 1.06 | COAL | Tenas_Lithology.csv |
| T98R-21C | 87.15 | 89.28 | 2.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 89.28 | 89.45 | 0.17 | COAL | Tenas_Lithology.csv |
| T98R-21C | 89.45 | 91.8 | 2.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-23 | 0 | 1.6 | 1.6 | Overburden | Tenas_Lithology.csv |
| T98R-23 | 1.6 | 2.87 | 1.27 | COAL | Tenas_Lithology.csv |
| T98R-23 | 2.87 | 4.76 | 1.89 | MDST | Tenas_Lithology.csv |
| T98R-23 | 4.76 | 5.8 | 1.04 | COAL | Tenas_Lithology.csv |
| T98R-23 | 5.8 | 7 | 1.2 | MDST | Tenas_Lithology.csv |
| T98R-23 | 7 | 7.55 | 0.55 | SLTS | Tenas_Lithology.csv |
| T98R-23 | 7.55 | 7.85 | 0.3 | COAL | Tenas_Lithology.csv |
| T98R-23 | 7.85 | 8.31 | 0.46 | MDST | Tenas_Lithology.csv |
| T98R-23 | 8.31 | 8.88 | 0.57 | COAL | Tenas_Lithology.csv |
| T98R-23 | 8.88 | 15 | 6.12 | SLTS | Tenas_Lithology.csv |
| T98R-23 | 15 | 16.5 | 1.5 | MDST | Tenas_Lithology.csv |
| T98R-23 | 16.5 | 24.8 | 8.3 | SLTS | Tenas_Lithology.csv |
| T98R-24 | 0 | 1.8 | 1.8 | Overburden | Tenas_Lithology.csv |
| T98R-24 | 1.8 | 2.53 | 0.73 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-24 | 2.53 | 3.3 | 0.77 | COAL | Tenas_Lithology.csv |
| T98R-24 | 3.3 | 4.7 | 1.4 | MDST | Tenas_Lithology.csv |
| T98R-24 | 4.7 | 6.3 | 1.6 | COAL | Tenas_Lithology.csv |
| T98R-24 | 6.3 | 9.16 | 2.86 | MDST | Tenas_Lithology.csv |
| T98R-24 | 9.16 | 9.33 | 0.17 | COAL | Tenas_Lithology.csv |
| T98R-24 | 9.33 | 10.63 | 1.3 | MDST | Tenas_Lithology.csv |
| T98R-24 | 10.63 | 12.63 | 2 | COAL | Tenas_Lithology.csv |
| T98R-24 | 12.63 | 15.04 | 2.41 | SLTS | Tenas_Lithology.csv |
| T98R-24 | 15.04 | 17.71 | 2.67 | COAL | Tenas_Lithology.csv |
| T98R-24 | 17.71 | 18.14 | 0.43 | MDST | Tenas_Lithology.csv |
| T98R-24 | 18.14 | 18.34 | 0.2 | COAL | Tenas_Lithology.csv |
| T98R-24 | 18.34 | 18.66 | 0.32 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-24 | 18.66 | 18.74 | 0.08 | COAL | Tenas_Lithology.csv |
| T98R-24 | 18.74 | 19.8 | 1.06 | MDST | Tenas_Lithology.csv |
| T98R-24 | 19.8 | 20.28 | 0.48 | COAL | Tenas_Lithology.csv |
| T98R-24 | 20.28 | 20.43 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-24 | 20.43 | 21.51 | 1.08 | COAL | Tenas_Lithology.csv |
| T98R-24 | 21.51 | 30.5 | 8.99 | MDST | Tenas_Lithology.csv |
| T98R-25 | 0 | 4.34 | 4.34 | Overburden | Tenas_Lithology.csv |
| T98R-25 | 4.34 | 5.51 | 1.17 | COAL | Tenas_Lithology.csv |
| T98R-25 | 5.51 | 6.53 | 1.02 | MDST | Tenas_Lithology.csv |
| T98R-25 | 6.53 | 9.92 | 3.39 | COAL | Tenas_Lithology.csv |
| T98R-25 | 9.92 | 10.41 | 0.49 | MDST | Tenas_Lithology.csv |
| T98R-25 | 10.41 | 11.05 | 0.64 | COAL | Tenas_Lithology.csv |
| T98R-25 | 11.05 | 11.17 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-25 | 11.17 | 11.63 | 0.46 | COAL | Tenas_Lithology.csv |
| T98R-25 | 11.63 | 18.5 | 6.87 | MDST | Tenas_Lithology.csv |
| T98R-31C | 0 | 6.7 | 6.7 | Overburden | Tenas_Lithology.csv |
| T98R-31C | 6.7 | 16.82 | 10.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 16.82 | 17.22 | 0.4 | COAL | Tenas_Lithology.csv |
| T98R-31C | 17.22 | 19.62 | 2.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 19.62 | 20.2 | 0.58 | COAL | Tenas_Lithology.csv |
| T98R-31C | 20.2 | 24.55 | 4.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 24.55 | 26.2 | 1.65 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 26.2 | 26.3 | 0.1 | MDST | Tenas_Lithology.csv |
| T98R-31C | 26.3 | 27.2 | 0.9 | COAL | Tenas_Lithology.csv |
| T98R-31C | 27.2 | 27.26 | 0.06 | MDST | Tenas_Lithology.csv |
| T98R-31C | 27.26 | 27.71 | 0.45 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 27.71 | 36.77 | 9.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 36.77 | 38.05 | 1.28 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 38.05 | 38.1 | 0.05 | MDST | Tenas_Lithology.csv |
| T98R-31C | 38.1 | 40.09 | 1.99 | COAL | Tenas_Lithology.csv |
| T98R-31C | 40.09 | 40.47 | 0.38 | MDST | Tenas_Lithology.csv |
| T98R-31C | 40.47 | 41.26 | 0.79 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 41.26 | 41.36 | 0.1 | MDST | Tenas_Lithology.csv |
| T98R-31C | 41.36 | 45.05 | 3.69 | COAL | Tenas_Lithology.csv |
| T98R-31C | 45.05 | 45.09 | 0.04 | MDST | Tenas_Lithology.csv |
| T98R-31C | 45.09 | 45.7 | 0.61 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 45.7 | 45.77 | 0.07 | MDST | Tenas_Lithology.csv |
| T98R-31C | 45.77 | 46.34 | 0.57 | COAL | Tenas_Lithology.csv |
| T98R-31C | 46.34 | 46.44 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 46.44 | 46.71 | 0.27 | COAL | Tenas_Lithology.csv |
| T98R-31C | 46.71 | 47.08 | 0.37 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 47.08 | 51.2 | 4.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| TOB96-01-05 | 0 | 4.6 | 4.6 | Overburden | Tenas_Lithology.csv |
| TOB96-01-05 | 4.6 | 10.55 | 5.95 | MDST | Tenas_Lithology.csv |
| TOB96-02-06 | 0 | 32.7 | 32.7 | Overburden | Tenas_Lithology.csv |
| TOB96-02-06 | 32.7 | 33.7 | 1 | MDST | Tenas_Lithology.csv |
| TOB96-04 | 0 | 117.5 | 117.5 | Overburden | Tenas_Lithology.csv |
| TOB96-04 | 117.5 | 123 | 5.5 | VOLC | Tenas_Lithology.csv |
| TOB96-11-04 | 0 | 4.92 | 4.92 | Overburden | Tenas_Lithology.csv |
| TOB96-12-04 | 0 | 3.64 | 3.64 | Overburden | Tenas_Lithology.csv |
| TOB96-12-04 | 3.64 | 7 | 3.36 | VOLC | Tenas_Lithology.csv |
| TOB96-13 | 0 | 13.15 | 13.15 | Overburden | Tenas_Lithology.csv |
| TOB96-13 | 13.15 | 20 | 6.85 | VOLC | Tenas_Lithology.csv |
| TOB96-18 | 0 | 18.2 | 18.2 | Overburden | Tenas_Lithology.csv |
| TOB96-18 | 18.2 | 20.25 | 2.05 | MDST | Tenas_Lithology.csv |
| TOB97-07-24 | 0 | 10.2 | 10.2 | Overburden | Tenas_Lithology.csv |
| W01 | 0 | 11.5 | 11.5 | Overburden | Tenas_Lithology.csv |
| W01 | 11.5 | 70 | 58.5 | VOLC | Tenas_Lithology.csv |
| W02 | 0 | 117.8 | 117.8 | Overburden | Tenas_Lithology.csv |
| W02 | 117.8 | 120.65 | 2.85 | VOLC | Tenas_Lithology.csv |
| W03 | 0 | 44.2 | 44.2 | Overburden | Tenas_Lithology.csv |
| W03 | 44.2 | 53.2 | 9 | VOLC | Tenas_Lithology.csv |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T18-01D | 6.8 | 5E-07 | 3.39E-06 | 1.36E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 6.4 | 3E-08 | 1.93E-07 | 2.14E+08 | 19.8 | 3E-08 | 5.94E-07 | 6.60E+08 |
| T18-01S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-01TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-02D | 13.1 | 5E-07 | 6.57E-06 | 2.63E+07 | 12.0 | 3E-07 | 3.60E-06 | 4.00E+07 | 32.5 | 3E-08 | 9.74E-07 | 1.08E+09 | 54.3 | 3E-08 | 1.63E-06 | 1.81E+09 |
| T18-02S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-02TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-03S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-03TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-04S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-04TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-05D | 15.2 | 5E-07 | 7.61E-06 | 3.04E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 118.4 | 3E-08 | 3.55E-06 | 3.95E+09 | 29.9 | 3E-08 | 8.96E-07 | 9.95E+08 |
| T18-05S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-05TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-06TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-07S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-07TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-08S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-08TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-09S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-09TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-10S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-10TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-11S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-11TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-12S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-12TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-13S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T81R-108 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 10.2 | 3E-07 | 3.05E-06 | 3.38E+07 | 53.5 | 3E-08 | 1.60E-06 | 1.78E+09 | 22.7 | 3E-08 | 6.81E-07 | 7.57E+08 |
| T92R-39C | 7.4 | 5E-07 | 3.72E-06 | 1.49E+07 | 30.4 | 3E-07 | 9.12E-06 | 1.01E+08 | 18.7 | 3E-08 | 5.61E-07 | 6.23E+08 | 3.7 | 3E-08 | 1.10E-07 | 1.22E+08 |
| T92R-42 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 8.0 | 3E-07 | 2.40E-06 | 2.67E+07 | 7.0 | 3E-08 | 2.09E-07 | 2.32E+08 | 5.9 | 3E-08 | 1.77E-07 | 1.96E+08 |
| T92R-43 | 10.0 | 5E-07 | 4.99E-06 | 1.99E+07 | 18.9 | 3E-07 | 5.68E-06 | 6.31E+07 | 22.2 | 3E-08 | 6.66E-07 | 7.40E+08 | 27.5 | 3E-08 | 8.25E-07 | 9.16E+08 |
| T93D-45 | 6.7 | 5E-07 | 3.35E-06 | 1.34E+07 | 47.7 | 3E-07 | 1.43E-05 | 1.59E+08 | 21.0 | 3E-08 | 6.30E-07 | 7.00E+08 | 19.7 | 3E-08 | 5.90E-07 | 6.55E+08 |
| T93D-47 | 1.3 | 5E-07 | 6.40E-07 | 2.56E+06 | 60.2 | 3E-07 | 1.81E-05 | 2.01E+08 | 101.4 | 3E-08 | 3.04E-06 | 3.38E+09 | 1.9 | 3E-08 | 5.79E-08 | 6.43E+07 |
| T93D-53 | 12.2 | 5E-07 | 6.09E-06 | 2.44E+07 | 9.8 | 3E-07 | 2.93E-06 | 3.26E+07 | 49.2 | 3E-08 | 1.48E-06 | 1.64E+09 | 12.5 | 3E-08 | 3.74E-07 | 4.16E+08 |
| T93R-02 | 7.8 | 5E-07 | 3.91E-06 | 1.56E+07 | 27.8 | 3E-07 | 8.34E-06 | 9.27E+07 | 17.9 | 3E-08 | 5.37E-07 | 5.96E+08 | 25.4 | 3E-08 | 7.63E-07 | 8.47E+08 |
| T93R-03 | 9.0 | 5E-07 | 4.48E-06 | 1.79E+07 | 4.8 | 3E-07 | 1.44E-06 | 1.60E+07 | 60.7 | 3E-08 | 1.82E-06 | 2.02E+09 | 21.1 | 3E-08 | 6.33E-07 | 7.03E+08 |
| T93R-04 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 23.1 | 3E-07 | 6.94E-06 | 7.71E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 43.6 | 3E-08 | 1.31E-06 | 1.45E+09 |
| T93R-05 | 11.5 | 5E-07 | 5.74E-06 | 2.30E+07 | 4.0 | 3E-07 | 1.19E-06 | 1.32E+07 | 19.1 | 3E-08 | 5.72E-07 | 6.35E+08 | 53.8 | 3E-08 | 1.61E-06 | 1.79E+09 |
| T93R-06C | 9.3 | 5E-07 | 4.64E-06 | 1.86E+07 | 4.6 | 3E-07 | 1.38E-06 | 1.53E+07 | 0.9 | 3E-08 | 2.73E-08 | 3.03E+07 | 39.8 | 3E-08 | 1.19E-06 | 1.33E+09 |
| T93R-08C | 7.3 | 5E-07 | 3.66E-06 | 1.46E+07 | 15.4 | 3E-07 | 4.63E-06 | 5.15E+07 | 13.1 | 3E-08 | 3.93E-07 | 4.37E+08 | 5.3 | 3E-08 | 1.59E-07 | 1.76E+08 |
| T93R-09 | 1.2 | 5E-07 | 6.20E-07 | 2.48E+06 | 45.4 | 3E-07 | 1.36E-05 | 1.51E+08 | 38.1 | 3E-08 | 1.14E-06 | 1.27E+09 | 85.3 | 3E-08 | 2.56E-06 | 2.84E+09 |
| T93R-10 | 2.2 | 5E-07 | 1.11E-06 | 4.42E+06 | 25.4 | 3E-07 | 7.63E-06 | 8.47E+07 | 20.2 | 3E-08 | 6.05E-07 | 6.72E+08 | 2.2 | 3E-08 | 6.54E-08 | 7.27E+07 |
| T93R-12 | 16.6 | 5E-07 | 8.30E-06 | 3.32E+07 | 1.8 | 3E-07 | 5.49E-07 | 6.10E+06 | 17.7 | 3E-08 | 5.30E-07 | 5.88E+08 | 77.1 | 3E-08 | 2.31E-06 | 2.57E+09 |
| T93R-13 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 9.5 | 3E-08 | 2.84E-07 | 3.15E+08 | 30.7 | 3E-08 | 9.22E-07 | 1.02E+09 |
| T93R-14 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 22.0 | 3E-07 | 6.59E-06 | 7.32E+07 | 26.2 | 3E-08 | 7.86E-07 | 8.74E+08 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T93R-15 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T93R-16 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T93R-17 | 9.6 | 5E-07 | 4.80E-06 | 1.92E+07 | 15.5 | 3E-07 | 4.65E-06 | 5.17E+07 | 25.5 | 3E-08 | 7.66E-07 | 8.51E+08 | 73.9 | 3E-08 | 2.22E-06 | 2.46E+09 |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T93R-18 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 13.5 | 3E-08 | 4.04E-07 | 4.48E+08 |
| T93R-19 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T93R-51 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 10.4 | 3E-07 | 3.13E-06 | 3.48E+07 | 20.8 | 3E-08 | 6.23E-07 | 6.92E+08 | 36.5 | 3E-08 | 1.09E-06 | 1.22E+09 |
| T94R-01 | 9.0 | 5E-07 | 4.52E-06 | 1.81E+07 | 35.7 | 3E-07 | 1.07E-05 | 1.19E+08 | 27.1 | 3E-08 | 8.12E-07 | 9.03E+08 | 7.6 | 3E-08 | 2.29E-07 | 2.54E+08 |
| T94R-02 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T94R-03 | 9.1 | 5E-07 | 4.53E-06 | 1.81E+07 | 46.6 | 3E-07 | 1.40E-05 | 1.55E+08 | 21.0 | 3E-08 | 6.30E-07 | 7.00E+08 | 7.2 | 3E-08 | 2.15E-07 | 2.39E+08 |
| T94R-04C | 9.8 | 5E-07 | 4.88E-06 | 1.95E+07 | 13.2 | 3E-07 | 3.95E-06 | 4.39E+07 | 26.6 | 3E-08 | 7.98E-07 | 8.87E+08 | 15.0 | 3E-08 | 4.51E-07 | 5.01E+08 |
| T94R-05 | 5.3 | 5E-07 | 2.67E-06 | 1.07E+07 | 57.5 | 3E-07 | 1.72E-05 | 1.92E+08 | 43.2 | 3E-08 | 1.30E-06 | 1.44E+09 | 9.4 | 3E-08 | 2.82E-07 | 3.13E+08 |
| T94R-06 | 2.1 | 5E-07 | 1.06E-06 | 4.26E+06 | 15.0 | 3E-07 | 4.49E-06 | 4.99E+07 | 114.6 | 3E-08 | 3.44E-06 | 3.82E+09 | 19.0 | 3E-08 | 5.69E-07 | 6.33E+08 |
| T94R-07 | 11.4 | 5E-07 | 5.69E-06 | 2.28E+07 | 8.0 | 3E-07 | 2.40E-06 | 2.67E+07 | 70.2 | 3E-08 | 2.11E-06 | 2.34E+09 | 25.2 | 3E-08 | 7.57E-07 | 8.41E+08 |
| T94R-08 | 1.0 | 5E-07 | 5.10E-07 | 2.04E+06 | 10.2 | 3E-07 | 3.07E-06 | 3.41E+07 | 57.8 | 3E-08 | 1.73E-06 | 1.93E+09 | 57.8 | 3E-08 | 1.73E-06 | 1.93E+09 |
| T94R-09 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T94R-10C | 11.2 | 5E-07 | 5.61E-06 | 2.24E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 2.8 | 3E-08 | 8.49E-08 | 9.43E+07 | 69.4 | 3E-08 | 2.08E-06 | 2.31E+09 |
| T94R-11 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T94R-12 | 3.1 | 5E-07 | 1.55E-06 | 6.20E+06 | 3.5 | 3E-07 | 1.05E-06 | 1.17E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 47.1 | 3E-08 | 1.41E-06 | 1.57E+09 |
| T94R-13 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-06 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-07C | 11.9 | 5E-07 | 5.94E-06 | 2.37E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 37.6 | 3E-08 | 1.13E-06 | 1.25E+09 |
| T95R-09 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 1.5 | 3E-08 | 4.50E-08 | 5.00E+07 |
| T95R-10 | 5.8 | 5E-07 | 2.92E-06 | 1.17E+07 | 47.3 | 3E-07 | 1.42E-05 | 1.58E+08 | 8.8 | 3E-08 | 2.64E-07 | 2.93E+08 | 26.0 | 3E-08 | 7.80E-07 | 8.67E+08 |
| T95R-11 | 3.4 | 5E-07 | 1.72E-06 | 6.88E+06 | 4.3 | 3E-07 | 1.30E-06 | 1.45E+07 | 29.8 | 3E-08 | 8.93E-07 | 9.93E+08 | 12.9 | 3E-08 | 3.88E-07 | 4.31E+08 |
| T95R-13 | 10.0 | 5E-07 | 4.99E-06 | 2.00E+07 | 4.9 | 3E-07 | 1.47E-06 | 1.63E+07 | 41.7 | 3E-08 | 1.25E-06 | 1.39E+09 | 33.5 | 3E-08 | 1.00E-06 | 1.12E+09 |
| T95R-14 | 7.7 | 5E-07 | 3.86E-06 | 1.54E+07 | 18.3 | 3E-07 | 5.49E-06 | 6.10E+07 | 107.3 | 3E-08 | 3.22E-06 | 3.58E+09 | 28.0 | 3E-08 | 8.41E-07 | 9.34E+08 |
| T95R-15C | 11.1 | 5E-07 | 5.54E-06 | 2.22E+07 | 7.6 | 3E-07 | 2.27E-06 | 2.52E+07 | 32.9 | 3E-08 | 9.88E-07 | 1.10E+09 | 41.9 | 3E-08 | 1.26E-06 | 1.40E+09 |
| T95R-17 | 2.5 | 5E-07 | 1.27E-06 | 5.08E+06 | 60.7 | 3E-07 | 1.82E-05 | 2.02E+08 | 22.2 | 3E-08 | 6.66E-07 | 7.40E+08 | 86.8 | 3E-08 | 2.60E-06 | 2.89E+09 |
| T95R-19C | 15.4 | 5E-07 | 7.70E-06 | 3.08E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 63.1 | 3E-08 | 1.89E-06 | 2.10E+09 |
| T95R-20 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-21 | 10.8 | 5E-07 | 5.42E-06 | 2.17E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 47.1 | 3E-08 | 1.41E-06 | 1.57E+09 | 7.4 | 3E-08 | 2.21E-07 | 2.46E+08 |
| T95R-22C | 15.5 | 5E-07 | 7.74E-06 | 3.10E+07 | 0.9 | 3E-07 | 2.70E-07 | 3.00E+06 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 68.0 | 3E-08 | 2.04E-06 | 2.27E+09 |
| T95R-24 | 9.7 | 5E-07 | 4.86E-06 | 1.94E+07 | 4.8 | 3E-07 | 1.43E-06 | 1.59E+07 | 17.1 | 3E-08 | 5.12E-07 | 5.69E+08 | 30.9 | 3E-08 | 9.27E-07 | 1.03E+09 |
| T95R-25 | 2.2 | 5E-07 | 1.11E-06 | 4.44E+06 | 19.6 | 3E-07 | 5.87E-06 | 6.52E+07 | 5.7 | 3E-08 | 1.71E-07 | 1.90E+08 | 3.9 | 3E-08 | 1.18E-07 | 1.31E+08 |
| T95R-26 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 35.0 | 3E-08 | 1.05E-06 | 1.17E+09 |
| T95R-28C | 10.7 | 5E-07 | 5.37E-06 | 2.15E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 29.2 | 3E-08 | 8.76E-07 | 9.73E+08 | 68.5 | 3E-08 | 2.05E-06 | 2.28E+09 |
| T95R-30 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-31 | 10.7 | 5E-07 | 5.36E-06 | 2.14E+07 | 56.6 | 3E-07 | 1.70E-05 | 1.89E+08 | 33.4 | 3E-08 | 1.00E-06 | 1.11E+09 | 36.1 | 3E-08 | 1.08E-06 | 1.20E+09 |
| T95R-32 | 2.3 | 5E-07 | 1.13E-06 | 4.50E+06 | 22.8 | 3E-07 | 6.84E-06 | 7.60E+07 | 54.1 | 3E-08 | 1.62E-06 | 1.80E+09 | 37.4 | 3E-08 | 1.12E-06 | 1.25E+09 |
| T95R-34 | 12.1 | 5E-07 | 6.07E-06 | 2.43E+07 | 6.5 | 3E-07 | 1.94E-06 | 2.16E+07 | 28.4 | 3E-08 | 8.52E-07 | 9.46E+08 | 63.6 | 3E-08 | 1.91E-06 | 2.12E+09 |
| T95R-35C | 2.9 | 5E-07 | 1.45E-06 | 5.80E+06 | 56.2 | 3E-07 | 1.68E-05 | 1.87E+08 | 24.0 | 3E-08 | 7.21E-07 | 8.01E+08 | 36.3 | 3E-08 | 1.09E-06 | 1.21E+09 |
| T95R-36 | 1.8 | 5E-07 | 9.10E-07 | 3.64E+06 | 23.4 | 3E-07 | 7.03E-06 | 7.81E+07 | 6.9 | 3E-08 | 2.06E-07 | 2.28E+08 | 18.9 | 3E-08 | 5.67E-07 | 6.30E+08 |
| T95R-38C | 15.0 | 5E-07 | 7.52E-06 | 3.01E+07 | 13.0 | 3E-07 | 3.89E-06 | 4.32E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 47.7 | 3E-08 | 1.43E-06 | 1.59E+09 |
| T95R-39C | 6.9 | 5E-07 | 3.43E-06 | 1.37E+07 | 5.3 | 3E-07 | 1.59E-06 | 1.77E+07 | 17.7 | 3E-08 | 5.32E-07 | 5.91E+08 | 47.1 | 3E-08 | 1.41E-06 | 1.57E+09 |
| T95R-40 | 13.7 | 5E-07 | 6.86E-06 | 2.74E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 28.0 | 3E-08 | 8.39E-07 | 9.33E+08 |
| T95R-43 | 2.6 | 5E-07 | 1.30E-06 | 5.20E+06 | 32.5 | 3E-07 | 9.74E-06 | 1.08E+08 | 4.0 | 3E-08 | 1.20E-07 | 1.33E+08 | 2.1 | 3E-08 | 6.36E-08 | 7.07E+07 |
| T95R-44 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T95R-45 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-46 | 11.5 | 5E-07 | 5.76E-06 | 2.30E+07 | 23.8 | 3E-07 | 7.14E-06 | 7.93E+07 | 36.8 | 3E-08 | 1.10E-06 | 1.23E+09 | 21.0 | 3E-08 | 6.30E-07 | 7.00E+08 |
| T95R-50C | 10.1 | 5E-07 | 5.03E-06 | 2.01E+07 | 48.2 | 3E-07 | 1.45E-05 | 1.61E+08 | 3.4 | 3E-08 | 1.01E-07 | 1.13E+08 | 15.8 | 3E-08 | 4.73E-07 | 5.25E+08 |
| T95R-60 | 18.3 | 5E-07 | 9.15E-06 | 3.66E+07 | 14.5 | 3E-07 | 4.35E-06 | 4.83E+07 | 44.3 | 3E-08 | 1.33E-06 | 1.48E+09 | 31.3 | 3E-08 | 9.39E-07 | 1.04E+09 |
| T95R-61 | 9.9 | 5E-07 | 4.94E-06 | 1.98E+07 | 37.8 | 3E-07 | 1.13E-05 | 1.26E+08 | 30.3 | 3E-08 | 9.10E-07 | 1.01E+09 | 13.3 | 3E-08 | 4.00E-07 | 4.44E+08 |
| T95R-62 | 4.7 | 5E-07 | 2.35E-06 | 9.40E+06 | 14.3 | 3E-07 | 4.30E-06 | 4.78E+07 | 52.5 | 3E-08 | 1.58E-06 | 1.75E+09 | 1.7 | 3E-08 | 4.95E-08 | 5.50E+07 |
| T95R-63 | 11.0 | 5E-07 | 5.48E-06 | 2.19E+07 | 6.6 | 3E-07 | 1.97E-06 | 2.18E+07 | 16.7 | 3E-08 | 5.00E-07 | 5.55E+08 | 25.4 | 3E-08 | 7.62E-07 | 8.47E+08 |
| T95R-64 | 10.6 | 5E-07 | 5.30E-06 | 2.12E+07 | 64.4 | 3E-07 | 1.93E-05 | 2.15E+08 | 27.4 | 3E-08 | 8.23E-07 | 9.15E+08 | 15.1 | 3E-08 | 4.52E-07 | 5.02E+08 |
| T95R-65 | 11.7 | 5E-07 | 5.86E-06 | 2.34E+07 | 12.9 | 3E-07 | 3.88E-06 | 4.31E+07 | 101.8 | 3E-08 | 3.05E-06 | 3.39E+09 | 17.8 | 3E-08 | 5.34E-07 | 5.94E+08 |
| T95R-66 | 4.0 | 5E-07 | 2.00E-06 | 8.00E+06 | 78.7 | 3E-07 | 2.36E-05 | 2.62E+08 | 9.4 | 3E-08 | 2.82E-07 | 3.13E+08 | 43.5 | 3E-08 | 1.30E-06 | 1.45E+09 |
| T95R-67 | 8.6 | 5E-07 | 4.28E-06 | 1.71E+07 | 15.1 | 3E-07 | 4.52E-06 | 5.03E+07 | 13.9 | 3E-08 | 4.18E-07 | 4.64E+08 | 15.4 | 3E-08 | 4.63E-07 | 5.15E+08 |
| T95R-68 | 11.7 | 5E-07 | 5.85E-06 | 2.34E+07 | 36.9 | 3E-07 | 1.11E-05 | 1.23E+08 | 20.4 | 3E-08 | 6.12E-07 | 6.80E+08 | 46.0 | 3E-08 | 1.38E-06 | 1.53E+09 |
| T95R-69 | 10.2 | 5E-07 | 5.10E-06 | 2.04E+07 | 30.1 | 3E-07 | 9.03E-06 | 1.00E+08 | 22.2 | 3E-08 | 6.66E-07 | 7.40E+08 | 11.2 | 3E-08 | 3.36E-07 | 3.73E+08 |
| T95R-70 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 56.1 | 3E-07 | 1.68E-05 | 1.87E+08 | 7.7 | 3E-08 | 2.31E-07 | 2.56E+08 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-71 | 12.4 | 5E-07 | 6.18E-06 | 2.47E+07 | 38.9 | 3E-07 | 1.17E-05 | 1.30E+08 | 16.8 | 3E-08 | 5.03E-07 | 5.58E+08 | 17.3 | 3E-08 | 5.20E-07 | 5.78E+08 |
| T95R-74 | 7.8 | 5E-07 | 3.89E-06 | 1.56E+07 | 36.0 | 3E-07 | 1.08E-05 | 1.20E+08 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 13.7 | 3E-08 | 4.11E-07 | 4.57E+08 |
| T95R-76 | 8.8 | 5E-07 | 4.38E-06 | 1.75E+07 | 23.2 | 3E-07 | 6.95E-06 | 7.72E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 30.3 | 3E-08 | 9.08E-07 | 1.01E+09 |
| T95R-77 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 3.4 | 3E-07 | 1.02E-06 | 1.13E+07 | 14.7 | 3E-08 | 4.41E-07 | 4.90E+08 | 18.8 | 3E-08 | 5.64E-07 | 6.27E+08 |
| T95R-78 | 1.0 | 5E-07 | 4.80E-07 | 1.92E+06 | 51.9 | 3E-07 | 1.56E-05 | 1.73E+08 | 9.3 | 3E-08 | 2.78E-07 | 3.09E+08 | 7.9 | 3E-08 | 2.38E-07 | 2.65E+08 |
| T95R-79 | 3.9 | 5E-07 | 1.95E-06 | 7.78E+06 | 10.4 | 3E-07 | 3.12E-06 | 3.46E+07 | 5.0 | 3E-08 | 1.50E-07 | 1.67E+08 | 18.9 | 3E-08 | 5.67E-07 | 6.30E+08 |
| T95R-80 | 6.3 | 5E-07 | 3.13E-06 | 1.25E+07 | 25.9 | 3E-07 | 7.76E-06 | 8.63E+07 | 18.5 | 3E-08 | 5.55E-07 | 6.16E+08 | 1.7 | 3E-08 | 5.22E-08 | 5.80E+07 |
| T95R-81 | 5.5 | 5E-07 | 2.75E-06 | 1.10E+07 | 14.6 | 3E-07 | 4.37E-06 | 4.85E+07 | 11.6 | 3E-08 | 3.49E-07 | 3.87E+08 | 28.4 | 3E-08 | 8.53E-07 | 9.48E+08 |
| T96R-01 | 13.5 | 5E-07 | 6.76E-06 | 2.70E+07 | 50.3 | 3E-07 | 1.51E-05 | 1.68E+08 | 91.6 | 3E-08 | 2.75E-06 | 3.05E+09 | 32.9 | 3E-08 | 9.86E-07 | 1.10E+09 |
| T96R-02 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 4.0 | 3E-07 | 1.20E-06 | 1.33E+07 | 27.4 | 3E-08 | 8.23E-07 | 9.15E+08 | 32.5 | 3E-08 | 9.74E-07 | 1.08E+09 |
| T96R-03 | 7.3 | 5E-07 | 3.63E-06 | 1.45E+07 | 36.1 | 3E-07 | 1.08E-05 | 1.20E+08 | 68.9 | 3E-08 | 2.07E-06 | 2.30E+09 | 9.2 | 3E-08 | 2.76E-07 | 3.06E+08 |
| T96R-04C | 8.0 | 5E-07 | 3.99E-06 | 1.59E+07 | 8.4 | 3E-07 | 2.51E-06 | 2.79E+07 | 1.8 | 3E-08 | 5.46E-08 | 6.07E+07 | 17.5 | 3E-08 | 5.25E-07 | 5.83E+08 |
| T96R-05C | 13.8 | 5E-07 | 6.90E-06 | 2.76E+07 | 1.6 | 3E-07 | 4.74E-07 | 5.27E+06 | 26.9 | 3E-08 | 8.08E-07 | 8.97E+08 | 35.7 | 3E-08 | 1.07E-06 | 1.19E+09 |
| T96R-06 | 11.1 | 5E-07 | 5.55E-06 | 2.22E+07 | 38.7 | 3E-07 | 1.16E-05 | 1.29E+08 | 25.2 | 3E-08 | 7.57E-07 | 8.41E+08 | 17.3 | 3E-08 | 5.20E-07 | 5.77E+08 |
| T96R-07C | 7.5 | 5E-07 | 3.77E-06 | 1.51E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 2.9 | 3E-08 | 8.61E-08 | 9.57E+07 | 13.6 | 3E-08 | 4.08E-07 | 4.53E+08 |
| T96R-08 | 2.3 | 5E-07 | 1.16E-06 | 4.64E+06 | 20.7 | 3E-07 | 6.21E-06 | 6.90E+07 | 6.5 | 3E-08 | 1.95E-07 | 2.17E+08 | 14.5 | 3E-08 | 4.34E-07 | 4.82E+08 |
| T96R-10 | 8.3 | 5E-07 | 4.17E-06 | 1.67E+07 | 29.5 | 3E-07 | 8.86E-06 | 9.84E+07 | 7.9 | 3E-08 | 2.37E-07 | 2.63E+08 | 5.5 | 3E-08 | 1.64E-07 | 1.82E+08 |
| T96R-105 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 43.7 | 3E-07 | 1.31E-05 | 1.46E+08 | 1.5 | 3E-08 | 4.50E-08 | 5.00E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T96R-11 | 5.3 | 5E-07 | 2.66E-06 | 1.06E+07 | 44.7 | 3E-07 | 1.34E-05 | 1.49E+08 | 15.7 | 3E-08 | 4.70E-07 | 5.23E+08 | 20.3 | 3E-08 | 6.08E-07 | 6.75E+08 |
| T96R-110 | 5.7 | 5E-07 | 2.87E-06 | 1.15E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 19.0 | 3E-08 | 5.69E-07 | 6.32E+08 | 4.1 | 3E-08 | 1.23E-07 | 1.37E+08 |
| T96R-119 | 2.9 | 5E-07 | 1.45E-06 | 5.78E+06 | 37.3 | 3E-07 | 1.12E-05 | 1.24E+08 | 25.8 | 3E-08 | 7.75E-07 | 8.61E+08 | 14.0 | 3E-08 | 4.19E-07 | 4.65E+08 |
| T96R-120 | 5.4 | 5E-07 | 2.72E-06 | 1.09E+07 | 17.4 | 3E-07 | 5.21E-06 | 5.79E+07 | 27.2 | 3E-08 | 8.15E-07 | 9.06E+08 | 14.6 | 3E-08 | 4.39E-07 | 4.87E+08 |
| T96R-121 | 11.9 | 5E-07 | 5.94E-06 | 2.38E+07 | 46.3 | 3E-07 | 1.39E-05 | 1.54E+08 | 39.1 | 3E-08 | 1.17E-06 | 1.30E+09 | 4.6 | 3E-08 | 1.37E-07 | 1.52E+08 |
| T96R-124 | 12.3 | 5E-07 | 6.13E-06 | 2.45E+07 | 4.6 | 3E-07 | 1.37E-06 | 1.52E+07 | 43.8 | 3E-08 | 1.31E-06 | 1.46E+09 | 3.8 | 3E-08 | 1.15E-07 | 1.27E+08 |
| T96R-125 | 10.6 | 5E-07 | 5.28E-06 | 2.11E+07 | 19.3 | 3E-07 | 5.79E-06 | 6.44E+07 | 4.8 | 3E-08 | 1.43E-07 | 1.59E+08 | 8.1 | 3E-08 | 2.42E-07 | 2.68E+08 |
| T96R-126 | 5.5 | 5E-07 | 2.77E-06 | 1.11E+07 | 7.9 | 3E-07 | 2.37E-06 | 2.63E+07 | 11.9 | 3E-08 | 3.58E-07 | 3.98E+08 | 11.4 | 3E-08 | 3.41E-07 | 3.79E+08 |
| T96R-127 | 9.2 | 5E-07 | 4.58E-06 | 1.83E+07 | 16.8 | 3E-07 | 5.03E-06 | 5.58E+07 | 16.4 | 3E-08 | 4.93E-07 | 5.48E+08 | 3.0 | 3E-08 | 9.06E-08 | 1.01E+08 |
| T96R-128 | 0.2 | 5E-07 | 8.00E-08 | 3.20E+05 | 1.7 | 3E-07 | 5.10E-07 | 5.67E+06 | 30.1 | 3E-08 | 9.03E-07 | 1.00E+09 | 16.1 | 3E-08 | 4.84E-07 | 5.38E+08 |
| T96R-129 | 8.8 | 5E-07 | 4.41E-06 | 1.76E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 25.2 | 3E-08 | 7.56E-07 | 8.40E+08 | 13.0 | 3E-08 | 3.89E-07 | 4.33E+08 |
| T96R-12C | 7.5 | 5E-07 | 3.74E-06 | 1.50E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 7.0 | 3E-08 | 2.10E-07 | 2.33E+08 | 7.5 | 3E-08 | 2.24E-07 | 2.49E+08 |
| T96R-130 | 5.2 | 5E-07 | 2.59E-06 | 1.03E+07 | 27.9 | 3E-07 | 8.38E-06 | 9.31E+07 | 36.6 | 3E-08 | 1.10E-06 | 1.22E+09 | 32.3 | 3E-08 | 9.69E-07 | 1.08E+09 |
| T96R-131 | 12.3 | 5E-07 | 6.16E-06 | 2.46E+07 | 11.8 | 3E-07 | 3.54E-06 | 3.93E+07 | 39.4 | 3E-08 | 1.18E-06 | 1.31E+09 | 31.1 | 3E-08 | 9.32E-07 | 1.04E+09 |
| T96R-137 | 4.1 | 5E-07 | 2.04E-06 | 8.14E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 17.0 | 3E-08 | 5.11E-07 | 5.68E+08 | 10.0 | 3E-08 | 3.00E-07 | 3.34E+08 |
| T96R-13C | 5.8 | 5E-07 | 2.88E-06 | 1.15E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 4.9 | 3E-08 | 1.46E-07 | 1.62E+08 | 8.6 | 3E-08 | 2.58E-07 | 2.86E+08 |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T96R-14 | 9.7 | 5E-07 | 4.85E-06 | 1.94E+07 | 27.3 | 3E-07 | 8.20E-06 | 9.11E+07 | 43.9 | 3E-08 | 1.32E-06 | 1.46E+09 | 32.0 | 3E-08 | 9.58E-07 | 1.07E+09 |
| T96R-15 | 10.7 | 5E-07 | 5.34E-06 | 2.14E+07 | 41.7 | 3E-07 | 1.25E-05 | 1.39E+08 | 36.9 | 3E-08 | 1.11E-06 | 1.23E+09 | 12.9 | 3E-08 | 3.88E-07 | 4.31E+08 |
| T96R-16 | 7.9 | 5E-07 | 3.94E-06 | 1.58E+07 | 28.6 | 3E-07 | 8.58E-06 | 9.53E+07 | 17.1 | 3E-08 | 5.13E-07 | 5.70E+08 | 9.9 | 3E-08 | 2.96E-07 | 3.28E+08 |
| T96R-17C | 6.0 | 5E-07 | 3.01E-06 | 1.20E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 10.0 | 3E-08 | 2.99E-07 | 3.33E+08 |
| T96R-18C | 5.7 | 5E-07 | 2.83E-06 | 1.13E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 5.4 | 3E-08 | 1.62E-07 | 1.80E+08 | 1.4 | 3E-08 | 4.32E-08 | 4.80E+07 |
| T96R-19 | 8.4 | 5E-07 | 4.20E-06 | 1.68E+07 | 28.4 | 3E-07 | 8.51E-06 | 9.46E+07 | 31.7 | 3E-08 | 9.51E-07 | 1.06E+09 | 3.9 | 3E-08 | 1.16E-07 | 1.29E+08 |
| T96R-20C | 2.2 | 5E-07 | 1.09E-06 | 4.36E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 4.8 | 3E-08 | 1.43E-07 | 1.59E+08 |
| T96R-21 | 8.7 | 5E-07 | 4.33E-06 | 1.73E+07 | 29.7 | 3E-07 | 8.91E-06 | 9.90E+07 | 24.6 | 3E-08 | 7.36E-07 | 8.18E+08 | 11.6 | 3E-08 | 3.48E-07 | 3.87E+08 |
| T96R-22 | 13.5 | 5E-07 | 6.73E-06 | 2.69E+07 | 30.0 | 3E-07 | 9.00E-06 | 1.00E+08 | 35.5 | 3E-08 | 1.06E-06 | 1.18E+09 | 34.7 | 3E-08 | 1.04E-06 | 1.16E+09 |
| T96R-23C | 7.4 | 5E-07 | 3.71E-06 | 1.48E+07 | 1.2 | 3E-07 | 3.69E-07 | 4.10E+06 | 45.4 | 3E-08 | 1.36E-06 | 1.51E+09 | 50.7 | 3E-08 | 1.52E-06 | 1.69E+09 |
| T96R-24 | 18.3 | 5E-07 | 9.16E-06 | 3.66E+07 | 34.9 | 3E-07 | 1.05E-05 | 1.16E+08 | 56.6 | 3E-08 | 1.70E-06 | 1.89E+09 | 15.0 | 3E-08 | 4.49E-07 | 4.98E+08 |
| T96R-25 | 11.7 | 5E-07 | 5.85E-06 | 2.34E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 14.3 | 3E-08 | 4.29E-07 | 4.77E+08 | 45.1 | 3E-08 | 1.35E-06 | 1.50E+09 |
| T96R-26 | 7.2 | 5E-07 | 3.61E-06 | 1.44E+07 | 25.1 | 3E-07 | 7.52E-06 | 8.35E+07 | 45.3 | 3E-08 | 1.36E-06 | 1.51E+09 | 12.7 | 3E-08 | 3.80E-07 | 4.23E+08 |
| T96R-27 | 5.5 | 5E-07 | 2.77E-06 | 1.11E+07 | 17.4 | 3E-07 | 5.23E-06 | 5.81E+07 | 20.2 | 3E-08 | 6.05E-07 | 6.73E+08 | 10.6 | 3E-08 | 3.19E-07 | 3.54E+08 |
| T96R-28C | 11.0 | 5E-07 | 5.52E-06 | 2.21E+07 | 2.5 | 3E-07 | 7.65E-07 | 8.50E+06 | 52.9 | 3E-08 | 1.59E-06 | 1.76E+09 | 43.4 | 3E-08 | 1.30E-06 | 1.45E+09 |
| T96R-29 | 9.0 | 5E-07 | 4.51E-06 | 1.80E+07 | 23.4 | 3E-07 | 7.03E-06 | 7.81E+07 | 34.6 | 3E-08 | 1.04E-06 | 1.15E+09 | 7.2 | 3E-08 | 2.16E-07 | 2.40E+08 |
| T96R-30 | 15.4 | 5E-07 | 7.70E-06 | 3.08E+07 | 37.5 | 3E-07 | 1.13E-05 | 1.25E+08 | 42.5 | 3E-08 | 1.27E-06 | 1.42E+09 | 25.6 | 3E-08 | 7.67E-07 | 8.53E+08 |
| T96R-31 | 8.5 | 5E-07 | 4.24E-06 | 1.69E+07 | 19.0 | 3E-07 | 5.70E-06 | 6.34E+07 | 9.0 | 3E-08 | 2.69E-07 | 2.99E+08 | 11.1 | 3E-08 | 3.34E-07 | 3.71E+08 |
| T96R-32 | 6.8 | 5E-07 | 3.39E-06 | 1.36E+07 | 16.2 | 3E-07 | 4.85E-06 | 5.39E+07 | 13.5 | 3E-08 | 4.05E-07 | 4.50E+08 | 7.7 | 3E-08 | 2.30E-07 | 2.56E+08 |
| T96R-33 | 5.9 | 5E-07 | 2.93E-06 | 1.17E+07 | 7.9 | 3E-07 | 2.36E-06 | 2.62E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 26.0 | 3E-08 | 7.79E-07 | 8.65E+08 |
| T96R-34 | 8.7 | 5E-07 | 4.37E-06 | 1.75E+07 | 31.8 | 3E-07 | 9.55E-06 | 1.06E+08 | 39.0 | 3E-08 | 1.17E-06 | 1.30E+09 | 6.0 | 3E-08 | 1.80E-07 | 2.00E+08 |
| T96R-35 | 1.6 | 5E-07 | 8.15E-07 | 3.26E+06 | 7.0 | 3E-07 | 2.10E-06 | 2.33E+07 | 14.5 | 3E-08 | 4.35E-07 | 4.84E+08 | 14.3 | 3E-08 | 4.28E-07 | 4.75E+08 |
| T96R-37 | 9.5 | 5E-07 | 4.76E-06 | 1.90E+07 | 12.4 | 3E-07 | 3.73E-06 | 4.14E+07 | 23.0 | 3E-08 | 6.90E-07 | 7.67E+08 | 14.2 | 3E-08 | 4.25E-07 | 4.72E+08 |
| T96R-38 | 2.9 | 5E-07 | 1.43E-06 | 5.70E+06 | 26.6 | 3E-07 | 7.98E-06 | 8.86E+07 | 31.3 | 3E-08 | 9.40E-07 | 1.04E+09 | 2.9 | 3E-08 | 8.61E-08 | 9.57E+07 |
| T96R-39 | 0.9 | 5E-07 | 4.65E-07 | 1.86E+06 | 30.5 | 3E-07 | 9.15E-06 | 1.02E+08 | 20.7 | 3E-08 | 6.20E-07 | 6.89E+08 | 6.6 | 3E-08 | 1.97E-07 | 2.19E+08 |
| T96R-41 | 5.5 | 5E-07 | 2.73E-06 | 1.09E+07 | 37.5 | 3E-07 | 1.13E-05 | 1.25E+08 | 30.5 | 3E-08 | 9.16E-07 | 1.02E+09 | 4.6 | 3E-08 | 1.37E-07 | 1.52E+08 |
| T96R-42C | 3.4 | 5E-07 | 1.69E-06 | 6.74E+06 | 7.8 | 3E-07 | 2.34E-06 | 2.60E+07 | 81.6 | 3E-08 | 2.45E-06 | 2.72E+09 | 51.0 | 3E-08 | 1.53E-06 | 1.70E+09 |
| T96R-43 | 15.7 | 5E-07 | 7.85E-06 | 3.14E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 53.5 | 3E-08 | 1.61E-06 | 1.78E+09 | 6.3 | 3E-08 | 1.89E-07 | 2.10E+08 |
| T96R-45 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 2.5 | 3E-07 | 7.50E-07 | 8.33E+06 | 29.4 | 3E-08 | 8.82E-07 | 9.80E+08 | 2.5 | 3E-08 | 7.50E-08 | 8.33E+07 |
| T96R-46 | 7.7 | 5E-07 | 3.84E-06 | 1.54E+07 | 57.2 | 3E-07 | 1.72E-05 | 1.91E+08 | 68.5 | 3E-08 | 2.06E-06 | 2.28E+09 | 3.0 | 3E-08 | 8.97E-08 | 9.97E+07 |
| T96R-47 | 11.7 | 5E-07 | 5.85E-06 | 2.34E+07 | 49.0 | 3E-07 | 1.47E-05 | 1.63E+08 | 73.8 | 3E-08 | 2.21E-06 | 2.46E+09 | 6.0 | 3E-08 | 1.79E-07 | 1.99E+08 |
| T96R-49 | 0.7 | 5E-07 | 3.30E-07 | 1.32E+06 | 26.6 | 3E-07 | 7.99E-06 | 8.88E+07 | 5.9 | 3E-08 | 1.76E-07 | 1.95E+08 | 64.1 | 3E-08 | 1.92E-06 | 2.14E+09 |
| T96R-50 | 17.0 | 5E-07 | 8.51E-06 | 3.40E+07 | 24.8 | 3E-07 | 7.44E-06 | 8.27E+07 | 19.7 | 3E-08 | 5.92E-07 | 6.57E+08 | 3.1 | 3E-08 | 9.21E-08 | 1.02E+08 |
| T96R-51 | 5.1 | 5E-07 | 2.54E-06 | 1.02E+07 | 32.4 | 3E-07 | 9.72E-06 | 1.08E+08 | 70.0 | 3E-08 | 2.10E-06 | 2.33E+09 | 13.1 | 3E-08 | 3.94E-07 | 4.38E+08 |
| T96R-52 | 12.6 | 5E-07 | 6.32E-06 | 2.53E+07 | 35.8 | 3E-07 | 1.07E-05 | 1.19E+08 | 39.0 | 3E-08 | 1.17E-06 | 1.30E+09 | 17.6 | 3E-08 | 5.27E-07 | 5.86E+08 |
| T96R-56C | 8.6 | 5E-07 | 4.31E-06 | 1.72E+07 | 4.2 | 3E-07 | 1.27E-06 | 1.41E+07 | 29.8 | 3E-08 | 8.93E-07 | 9.93E+08 | 38.8 | 3E-08 | 1.16E-06 | 1.29E+09 |
| T96R-58 | 9.7 | 5E-07 | 4.86E-06 | 1.94E+07 | 11.3 | 3E-07 | 3.38E-06 | 3.75E+07 | 50.7 | 3E-08 | 1.52E-06 | 1.69E+09 | 6.0 | 3E-08 | 1.81E-07 | 2.01E+08 |
| T96R-59 | 2.3 | 5E-07 | 1.16E-06 | 4.64E+06 | 28.7 | 3E-07 | 8.60E-06 | 9.56E+07 | 6.5 | 3E-08 | 1.94E-07 | 2.16E+08 | 8.8 | 3E-08 | 2.65E-07 | 2.94E+08 |
| T96R-60 | 8.5 | 5E-07 | 4.23E-06 | 1.69E+07 | 15.2 | 3E-07 | 4.56E-06 | 5.07E+07 | 13.7 | 3E-08 | 4.11E-07 | 4.57E+08 | 10.7 | 3E-08 | 3.20E-07 | 3.56E+08 |
| T96R-61 | 10.9 | 5E-07 | 5.44E-06 | 2.18E+07 | 18.4 | 3E-07 | 5.51E-06 | 6.12E+07 | 69.7 | 3E-08 | 2.09E-06 | 2.32E+09 | 4.2 | 3E-08 | 1.26E-07 | 1.40E+08 |
| T96R-63 | 8.3 | 5E-07 | 4.13E-06 | 1.65E+07 | 23.5 | 3E-07 | 7.05E-06 | 7.83E+07 | 43.8 | 3E-08 | 1.31E-06 | 1.46E+09 | 0.6 | 3E-08 | 1.80E-08 | 2.00E+07 |
| T96R-64 | 13.6 | 5E-07 | 6.80E-06 | 2.72E+07 | 72.8 | 3E-07 | 2.18E-05 | 2.43E+08 | 20.4 | 3E-08 | 6.11E-07 | 6.79E+08 | 11.0 | 3E-08 | 3.29E-07 | 3.65E+08 |
| T96R-65C | 14.6 | 5E-07 | 7.32E-06 | 2.93E+07 | 1.3 | 3E-07 | 3.90E-07 | 4.33E+06 | 51.4 | 3E-08 | 1.54E-06 | 1.71E+09 | 35.7 | 3E-08 | 1.07E-06 | 1.19E+09 |
| T96R-67 | 10.7 | 5E-07 | 5.34E-06 | 2.14E+07 | 67.3 | 3E-07 | 2.02E-05 | 2.24E+08 | 48.9 | 3E-08 | 1.47E-06 | 1.63E+09 | 6.1 | 3E-08 | 1.83E-07 | 2.03E+08 |
| T96R-69 | 6.4 | 5E-07 | 3.20E-06 | 1.28E+07 | 16.2 | 3E-07 | 4.86E-06 | 5.40E+07 | 87.8 | 3E-08 | 2.63E-06 | 2.93E+09 | 2.7 | 3E-08 | 8.22E-08 | 9.13E+07 |
| T96R-70 | 13.0 | 5E-07 | 6.48E-06 | 2.59E+07 | 68.6 | 3E-07 | 2.06E-05 | 2.29E+08 | 42.5 | 3E-08 | 1.28E-06 | 1.42E+09 | 7.2 | 3E-08 | 2.16E-07 | 2.40E+08 |
| T96R-72 | 0.2 | 5E-07 | 1.20E-07 | 4.80E+05 | 59.0 | 3E-07 | 1.77E-05 | 1.97E+08 | 90.9 | 3E-08 | 2.73E-06 | 3.03E+09 | 25.6 | 3E-08 | 7.69E-07 | 8.55E+08 |
| T96R-73 | 9.2 | 5E-07 | 4.60E-06 | 1.84E+07 | 85.6 | 3E-07 | 2.57E-05 | 2.85E+08 | 21.5 | 3E-08 | 6.44E-07 | 7.15E+08 | 10.4 | 3E-08 | 3.13E-07 | 3.48E+08 |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T96R-75 | 10.8 | 5E-07 | 5.38E-06 | 2.15E+07 | 19.6 | 3E-07 | 5.87E-06 | 6.53E+07 | 19.3 | 3E-08 | 5.79E-07 | 6.43E+08 | 3.2 | 3E-08 | 9.57E-08 | 1.06E+08 |
| T96R-76 | 5.6 | 5E-07 | 2.82E-06 | 1.13E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 11.8 | 3E-08 | 3.55E-07 | 3.95E+08 | 0.4 | 3E-08 | 1.23E-08 | 1.37E+07 |
| T96R-77 | 6.2 | 5E-07 | 3.11E-06 | 1.24E+07 | 95.9 | 3E-07 | 2.88E-05 | 3.20E+08 | 39.9 | 3E-08 | 1.20E-06 | 1.33E+09 | 15.7 | 3E-08 | 4.71E-07 | 5.23E+08 |
| T96R-78 | 8.3 | 5E-07 | 4.16E-06 | 1.66E+07 | 15.3 | 3E-07 | 4.58E-06 | 5.08E+07 | 52.5 | 3E-08 | 1.57E-06 | 1.75E+09 | 17.2 | 3E-08 | 5.15E-07 | 5.72E+08 |
| T96R-79 | 1.4 | 5E-07 | 6.95E-07 | 2.78E+06 | 41.0 | 3E-07 | 1.23E-05 | 1.37E+08 | 16.1 | 3E-08 | 4.83E-07 | 5.36E+08 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T96R-82 | 12.7 | 5E-07 | 6.36E-06 | 2.54E+07 | 11.0 | 3E-07 | 3.30E-06 | 3.67E+07 | 63.0 | 3E-08 | 1.89E-06 | 2.10E+09 | 7.5 | 3E-08 | 2.25E-07 | 2.50E+08 |
| T96R-83 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T96R-84 | 1.4 | 5E-07 | 7.15E-07 | 2.86E+06 | 11.9 | 3E-07 | 3.58E-06 | 3.98E+07 | 7.7 | 3E-08 | 2.32E-07 | 2.58E+08 | 1.4 | 3E-08 | 4.20E-08 | 4.67E+07 |
| T96R-86 | 9.1 | 5E-07 | 4.54E-06 | 1.82E+07 | 7.6 | 3E-07 | 2.28E-06 | 2.53E+07 | 7.8 | 3E-08 | 2.33E-07 | 2.59E+08 | 18.6 | 3E-08 | 5.59E-07 | 6.21E+08 |
| T96R-87 | 4.9 | 5E-07 | 2.46E-06 | 9.84E+06 | 24.5 | 3E-07 | 7.35E-06 | 8.17E+07 | 9.8 | 3E-08 | 2.93E-07 | 3.26E+08 | 14.6 | 3E-08 | 4.38E-07 | 4.87E+08 |
| T96R-91 | 1.9 | 5E-07 | 9.65E-07 | 3.86E+06 | 45.3 | 3E-07 | 1.36E-05 | 1.51E+08 | 18.0 | 3E-08 | 5.39E-07 | 5.99E+08 | 8.9 | 3E-08 | 2.67E-07 | 2.96E+08 |
| T96R-92 | 9.5 | 5E-07 | 4.73E-06 | 1.89E+07 | 18.5 | 3E-07 | 5.55E-06 | 6.17E+07 | 20.6 | 3E-08 | 6.19E-07 | 6.87E+08 | 7.2 | 3E-08 | 2.15E-07 | 2.39E+08 |
| T96R-99 | 5.8 | 5E-07 | 2.92E-06 | 1.17E+07 | 22.5 | 3E-07 | 6.75E-06 | 7.50E+07 | 6.7 | 3E-08 | 2.00E-07 | 2.23E+08 | 9.9 | 3E-08 | 2.96E-07 | 3.29E+08 |
| T97R-100C | 5.2 | 5E-07 | 2.62E-06 | 1.05E+07 | 3.6 | 3E-07 | 1.07E-06 | 1.19E+07 | 21.2 | 3E-08 | 6.36E-07 | 7.07E+08 | 12.8 | 3E-08 | 3.84E-07 | 4.27E+08 |
| T97R-101 | 4.8 | 5E-07 | 2.39E-06 | 9.56E+06 | 15.1 | 3E-07 | 4.52E-06 | 5.02E+07 | 40.0 | 3E-08 | 1.20E-06 | 1.33E+09 | 3.9 | 3E-08 | 1.18E-07 | 1.31E+08 |
| T97R-102 | 6.4 | 5E-07 | 3.19E-06 | 1.27E+07 | 10.4 | 3E-07 | 3.12E-06 | 3.47E+07 | 39.3 | 3E-08 | 1.18E-06 | 1.31E+09 | 1.9 | 3E-08 | 5.67E-08 | 6.30E+07 |
| T97R-103 | 8.0 | 5E-07 | 3.99E-06 | 1.59E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 92.7 | 3E-08 | 2.78E-06 | 3.09E+09 | 26.6 | 3E-08 | 7.98E-07 | 8.87E+08 |
| T97R-104 | 5.9 | 5E-07 | 2.96E-06 | 1.18E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 23.4 | 3E-08 | 7.03E-07 | 7.81E+08 | 7.4 | 3E-08 | 2.23E-07 | 2.48E+08 |
| T97R-105 | 6.9 | 5E-07 | 3.45E-06 | 1.38E+07 | 6.3 | 3E-07 | 1.89E-06 | 2.10E+07 | 14.4 | 3E-08 | 4.32E-07 | 4.80E+08 | 1.3 | 3E-08 | 3.96E-08 | 4.40E+07 |
| T97R-106 | 2.4 | 5E-07 | 1.20E-06 | 4.80E+06 | 14.0 | 3E-07 | 4.19E-06 | 4.65E+07 | 91.8 | 3E-08 | 2.76E-06 | 3.06E+09 | 40.5 | 3E-08 | 1.22E-06 | 1.35E+09 |
| T97R-107 | 10.5 | 5E-07 | 5.23E-06 | 2.09E+07 | 16.3 | 3E-07 | 4.89E-06 | 5.43E+07 | 64.3 | 3E-08 | 1.93E-06 | 2.14E+09 | 21.5 | 3E-08 | 6.44E-07 | 7.15E+08 |
| T97R-108C | 9.9 | 5E-07 | 4.96E-06 | 1.99E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 32.5 | 3E-08 | 9.76E-07 | 1.08E+09 | 9.9 | 3E-08 | 2.96E-07 | 3.29E+08 |
| T97R-109 | 11.1 | 5E-07 | 5.53E-06 | 2.21E+07 | 21.7 | 3E-07 | 6.50E-06 | 7.22E+07 | 72.2 | 3E-08 | 2.16E-06 | 2.41E+09 | 28.5 | 3E-08 | 8.54E-07 | 9.49E+08 |
| T97R-110 | 15.4 | 5E-07 | 7.70E-06 | 3.08E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 50.5 | 3E-08 | 1.51E-06 | 1.68E+09 | 4.4 | 3E-08 | 1.31E-07 | 1.46E+08 |
| T97R-111 | 11.3 | 5E-07 | 5.66E-06 | 2.26E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 65.4 | 3E-08 | 1.96E-06 | 2.18E+09 | 36.5 | 3E-08 | 1.10E-06 | 1.22E+09 |
| T97R-112 | 5.3 | 5E-07 | 2.63E-06 | 1.05E+07 | 29.5 | 3E-07 | 8.84E-06 | 9.82E+07 | 58.6 | 3E-08 | 1.76E-06 | 1.95E+09 | 109.0 | 3E-08 | 3.27E-06 | 3.63E+09 |
| T97R-113 | 9.7 | 5E-07 | 4.85E-06 | 1.94E+07 | 15.4 | 3E-07 | 4.62E-06 | 5.13E+07 | 88.9 | 3E-08 | 2.67E-06 | 2.96E+09 | 3.9 | 3E-08 | 1.16E-07 | 1.28E+08 |
| T97R-114 | 2.0 | 5E-07 | 9.90E-07 | 3.96E+06 | 15.4 | 3E-07 | 4.62E-06 | 5.13E+07 | 82.8 | 3E-08 | 2.48E-06 | 2.76E+09 | 20.7 | 3E-08 | 6.20E-07 | 6.88E+08 |
| T97R-115 | 9.4 | 5E-07 | 4.71E-06 | 1.88E+07 | 7.5 | 3E-07 | 2.24E-06 | 2.48E+07 | 37.2 | 3E-08 | 1.12E-06 | 1.24E+09 | 17.8 | 3E-08 | 5.33E-07 | 5.93E+08 |
| T97R-116 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.7 | 3E-07 | 2.10E-07 | 2.33E+06 | 123.4 | 3E-08 | 3.70E-06 | 4.11E+09 | 26.1 | 3E-08 | 7.83E-07 | 8.70E+08 |
| T97R-117 | 1.9 | 5E-07 | 9.50E-07 | 3.80E+06 | 11.7 | 3E-07 | 3.51E-06 | 3.90E+07 | 103.5 | 3E-08 | 3.11E-06 | 3.45E+09 | 20.9 | 3E-08 | 6.27E-07 | 6.97E+08 |
| T97R-118 | 4.9 | 5E-07 | 2.45E-06 | 9.78E+06 | 17.0 | 3E-07 | 5.10E-06 | 5.67E+07 | 40.7 | 3E-08 | 1.22E-06 | 1.36E+09 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T97R-119 | 8.3 | 5E-07 | 4.18E-06 | 1.67E+07 | 12.9 | 3E-07 | 3.88E-06 | 4.31E+07 | 44.2 | 3E-08 | 1.32E-06 | 1.47E+09 | 61.6 | 3E-08 | 1.85E-06 | 2.05E+09 |
| T97R-120 | 4.6 | 5E-07 | 2.31E-06 | 9.24E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 22.7 | 3E-08 | 6.80E-07 | 7.56E+08 | 1.3 | 3E-08 | 3.81E-08 | 4.23E+07 |
| T97R-121 | 6.0 | 5E-07 | 3.00E-06 | 1.20E+07 | 10.4 | 3E-07 | 3.12E-06 | 3.47E+07 | 40.8 | 3E-08 | 1.22E-06 | 1.36E+09 | 18.1 | 3E-08 | 5.42E-07 | 6.02E+08 |
| T97R-65 | 2.8 | 5E-07 | 1.41E-06 | 5.64E+06 | 18.5 | 3E-07 | 5.55E-06 | 6.17E+07 | 2.5 | 3E-08 | 7.53E-08 | 8.37E+07 | 4.6 | 3E-08 | 1.38E-07 | 1.53E+08 |
| T97R-66 | 5.3 | 5E-07 | 2.66E-06 | 1.06E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 12.5 | 3E-08 | 3.75E-07 | 4.16E+08 | 15.5 | 3E-08 | 4.66E-07 | 5.17E+08 |
| T97R-67 | 10.7 | 5E-07 | 5.37E-06 | 2.15E+07 | 22.2 | 3E-07 | 6.66E-06 | 7.40E+07 | 31.5 | 3E-08 | 9.44E-07 | 1.05E+09 | 8.6 | 3E-08 | 2.58E-07 | 2.87E+08 |
| T97R-69 | 11.5 | 5E-07 | 5.73E-06 | 2.29E+07 | 9.9 | 3E-07 | 2.98E-06 | 3.31E+07 | 74.5 | 3E-08 | 2.24E-06 | 2.48E+09 | 19.0 | 3E-08 | 5.69E-07 | 6.32E+08 |
| T97R-70 | 13.3 | 5E-07 | 6.64E-06 | 2.65E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 28.2 | 3E-08 | 8.47E-07 | 9.41E+08 | 7.7 | 3E-08 | 2.31E-07 | 2.57E+08 |
| T97R-71 | 13.9 | 5E-07 | 6.93E-06 | 2.77E+07 | 14.5 | 3E-07 | 4.35E-06 | 4.83E+07 | 55.0 | 3E-08 | 1.65E-06 | 1.83E+09 | 5.5 | 3E-08 | 1.66E-07 | 1.84E+08 |
| T97R-75 | 10.6 | 5E-07 | 5.30E-06 | 2.12E+07 | 13.5 | 3E-07 | 4.04E-06 | 4.49E+07 | 79.2 | 3E-08 | 2.37E-06 | 2.64E+09 | 16.7 | 3E-08 | 5.01E-07 | 5.57E+08 |
| T97R-78 | 9.8 | 5E-07 | 4.90E-06 | 1.96E+07 | 9.6 | 3E-07 | 2.88E-06 | 3.20E+07 | 43.2 | 3E-08 | 1.30E-06 | 1.44E+09 | 12.6 | 3E-08 | 3.79E-07 | 4.21E+08 |
| T97R-80 | 9.7 | 5E-07 | 4.83E-06 | 1.93E+07 | 3.1 | 3E-07 | 9.15E-07 | 1.02E+07 | 46.7 | 3E-08 | 1.40E-06 | 1.56E+09 | 21.1 | 3E-08 | 6.32E-07 | 7.02E+08 |
| T97R-84 | 12.2 | 5E-07 | 6.08E-06 | 2.43E+07 | 7.7 | 3E-07 | 2.32E-06 | 2.58E+07 | 51.8 | 3E-08 | 1.55E-06 | 1.73E+09 | 4.2 | 3E-08 | 1.26E-07 | 1.40E+08 |
| T97R-87 | 11.1 | 5E-07 | 5.55E-06 | 2.22E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 78.9 | 3E-08 | 2.37E-06 | 2.63E+09 | 16.6 | 3E-08 | 4.98E-07 | 5.54E+08 |
| T97R-88 | 1.7 | 5E-07 | 8.60E-07 | 3.44E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 17.4 | 3E-08 | 5.22E-07 | 5.80E+08 | 6.4 | 3E-08 | 1.92E-07 | 2.13E+08 |
| T97R-90 | 13.3 | 5E-07 | 6.67E-06 | 2.67E+07 | 12.5 | 3E-07 | 3.75E-06 | 4.17E+07 | 43.9 | 3E-08 | 1.32E-06 | 1.46E+09 | 7.1 | 3E-08 | 2.14E-07 | 2.38E+08 |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T97R-91 | 11.3 | 5E-07 | 5.66E-06 | 2.26E+07 | 6.6 | 3E-07 | 1.98E-06 | 2.20E+07 | 33.2 | 3E-08 | 9.97E-07 | 1.11E+09 | 7.0 | 3E-08 | 2.09E-07 | 2.33E+08 |
| T97R-94 | 8.5 | 5E-07 | 4.25E-06 | 1.70E+07 | 6.0 | 3E-07 | 1.79E-06 | 1.98E+07 | 10.7 | 3E-08 | 3.20E-07 | 3.55E+08 | 3.3 | 3E-08 | 9.81E-08 | 1.09E+08 |
| T97R-95C | 6.3 | 5E-07 | 3.13E-06 | 1.25E+07 | 3.1 | 3E-07 | 9.30E-07 | 1.03E+07 | 16.5 | 3E-08 | 4.96E-07 | 5.51E+08 | 8.8 | 3E-08 | 2.65E-07 | 2.95E+08 |
| T97R-96 | 3.9 | 5E-07 | 1.96E-06 | 7.82E+06 | 9.4 | 3E-07 | 2.82E-06 | 3.13E+07 | 64.2 | 3E-08 | 1.93E-06 | 2.14E+09 | 32.5 | 3E-08 | 9.76E-07 | 1.08E+09 |
| T97R-97 | 5.1 | 5E-07 | 2.55E-06 | 1.02E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 4.2 | 3E-08 | 1.26E-07 | 1.40E+08 | 2.9 | 3E-08 | 8.73E-08 | 9.70E+07 |
| T97R-99 | 9.7 | 5E-07 | 4.83E-06 | 1.93E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 48.6 | 3E-08 | 1.46E-06 | 1.62E+09 | 14.5 | 3E-08 | 4.35E-07 | 4.83E+08 |
| T98R-03C | 8.1 | 5E-07 | 4.03E-06 | 1.61E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 2.7 | 3E-08 | 8.22E-08 | 9.13E+07 | 4.3 | 3E-08 | 1.29E-07 | 1.43E+08 |
| T98R-07C | 9.1 | 5E-07 | 4.55E-06 | 1.82E+07 | 0.5 | 3E-07 | 1.41E-07 | 1.57E+06 | 3.3 | 3E-08 | 1.01E-07 | 1.12E+08 | 1.2 | 3E-08 | 3.45E-08 | 3.83E+07 |
| T98R-09C | 9.5 | 5E-07 | 4.75E-06 | 1.90E+07 | 0.5 | 3E-07 | 1.38E-07 | 1.53E+06 | 30.7 | 3E-08 | 9.21E-07 | 1.02E+09 | 22.0 | 3E-08 | 6.61E-07 | 7.34E+08 |
| T98R-13C | 7.2 | 5E-07 | 3.61E-06 | 1.44E+07 | 0.3 | 3E-07 | 9.00E-08 | 1.00E+06 | 3.6 | 3E-08 | 1.08E-07 | 1.20E+08 | 2.4 | 3E-08 | 7.17E-08 | 7.97E+07 |
| T98R-14 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 52.2 | 3E-08 | 1.57E-06 | 1.74E+09 | 28.4 | 3E-08 | 8.52E-07 | 9.47E+08 |
| T98R-16 | 11.1 | 5E-07 | 5.53E-06 | 2.21E+07 | 8.2 | 3E-07 | 2.47E-06 | 2.74E+07 | 8.2 | 3E-08 | 2.45E-07 | 2.72E+08 | 16.0 | 3E-08 | 4.79E-07 | 5.32E+08 |
| T98R-18 | 9.3 | 5E-07 | 4.63E-06 | 1.85E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 18.8 | 3E-08 | 5.63E-07 | 6.26E+08 | 3.3 | 3E-08 | 9.99E-08 | 1.11E+08 |
| T98R-20 | 7.7 | 5E-07 | 3.86E-06 | 1.54E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 13.5 | 3E-08 | 4.05E-07 | 4.50E+08 | 18.3 | 3E-08 | 5.49E-07 | 6.10E+08 |
| T98R-21C | 12.1 | 5E-07 | 6.05E-06 | 2.42E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 3.9 | 3E-08 | 1.18E-07 | 1.31E+08 | 1.3 | 3E-08 | 3.90E-08 | 4.33E+07 |
| T98R-23 | 3.2 | 5E-07 | 1.59E-06 | 6.36E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 15.0 | 3E-08 | 4.49E-07 | 4.99E+08 | 5.1 | 3E-08 | 1.52E-07 | 1.68E+08 |
| T98R-24 | 9.1 | 5E-07 | 4.53E-06 | 1.81E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 2.4 | 3E-08 | 7.23E-08 | 8.03E+07 | 16.0 | 3E-08 | 4.81E-07 | 5.35E+08 |
| T98R-25 | 5.7 | 5E-07 | 2.83E-06 | 1.13E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 8.4 | 3E-08 | 2.51E-07 | 2.79E+08 |
| T98R-31C | 8.4 | 5E-07 | 4.20E-06 | 1.68E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 5.1 | 3E-08 | 1.55E-07 | 1.72E+08 | 0.8 | 3E-08 | 2.40E-08 | 2.67E+07 |
| TOB96-01-05 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 6.0 | 3E-08 | 1.79E-07 | 1.98E+08 |
| TOB96-02-06 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 1.0 | 3E-08 | 3.00E-08 | 3.33E+07 |
| TOB96-04 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| TOB96-11-04 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| TOB96-12-04 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| TOB96-13 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| TOB96-18 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 2.1 | 3E-08 | 6.15E-08 | 6.83E+07 |
| TOB97-07-24 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| W01 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| W02 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| W03 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |

| Hole ID | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| | sum(Bn*Kn)/Bt | Bt/sum(Bn/Kn) | |
| T18-01D | 1.3E-07 | 3.7E-08 | 3.4 |
| T18-01S | n/a | n/a | n/a |
| T18-01TP | n/a | n/a | n/a |
| T18-02D | 1.1E-07 | 3.8E-08 | 3.0 |
| T18-02S | n/a | n/a | n/a |
| T18-02TP | n/a | n/a | n/a |
| T18-03S | n/a | n/a | n/a |
| T18-03TP | n/a | n/a | n/a |
| T18-04S | n/a | n/a | n/a |
| T18-04TP | n/a | n/a | n/a |
| T18-05D | 7.4E-08 | 3.3E-08 | 2.2 |
| T18-05S | n/a | n/a | n/a |
| T18-05TP | n/a | n/a | n/a |
| T18-06TP | n/a | n/a | n/a |
| T18-07S | n/a | n/a | n/a |
| T18-07TP | n/a | n/a | n/a |
| T18-08S | n/a | n/a | n/a |
| T18-08TP | n/a | n/a | n/a |
| T18-09S | n/a | n/a | n/a |
| T18-09TP | n/a | n/a | n/a |
| T18-10S | n/a | n/a | n/a |
| T18-10TP | n/a | n/a | n/a |
| T18-11S | n/a | n/a | n/a |
| T18-11TP | n/a | n/a | n/a |
| T18-12S | n/a | n/a | n/a |
| T18-12TP | n/a | n/a | n/a |
| T18-13S | n/a | n/a | n/a |
| T81R-108 | 6.2E-08 | 3.4E-08 | 1.8 |
| T92R-39C | 2.2E-07 | 7.0E-08 | 3.2 |
| T92R-42 | 1.3E-07 | 4.6E-08 | 2.9 |
| T92R-43 | 1.5E-07 | 4.5E-08 | 3.4 |
| T93D-45 | 2.0E-07 | 6.2E-08 | 3.2 |
| T93D-47 | 1.3E-07 | 4.5E-08 | 2.9 |
| T93D-53 | 1.3E-07 | 4.0E-08 | 3.3 |
| T93R-02 | 1.7E-07 | 5.1E-08 | 3.4 |
| T93R-03 | 8.8E-08 | 3.5E-08 | 2.5 |
| T93R-04 | 1.2E-07 | 4.4E-08 | 2.8 |
| T93R-05 | 1.0E-07 | 3.6E-08 | 2.9 |
| T93R-06C | 1.3E-07 | 3.9E-08 | 3.4 |
| T93R-08C | 2.1E-07 | 6.1E-08 | 3.5 |
| T93R-09 | 1.1E-07 | 4.0E-08 | 2.6 |
| T93R-10 | 1.9E-07 | 6.0E-08 | 3.1 |
| T93R-12 | 1.0E-07 | 3.5E-08 | 2.9 |
| T93R-13 | 3.0E-08 | 3.0E-08 | 1.0 |
| T93R-14 | 1.5E-07 | 5.1E-08 | 3.0 |
| T93R-15 | n/a | n/a | n/a |
| T93R-16 | n/a | n/a | n/a |
| T93R-17 | 1.0E-07 | 3.7E-08 | 2.7 |
| T93R-18 | 3.0E-08 | 3.0E-08 | 1.0 |
| T93R-19 | n/a | n/a | n/a |
| T93R-51 | 7.2E-08 | 3.5E-08 | 2.1 |
| T94R-01 | 2.0E-07 | 6.1E-08 | 3.3 |
| T94R-02 | n/a | n/a | n/a |
| T94R-03 | 2.3E-07 | 7.5E-08 | 3.1 |
| T94R-04C | 1.6E-07 | 4.4E-08 | 3.5 |
| T94R-05 | 1.9E-07 | 5.9E-08 | 3.2 |
| T94R-06 | 6.3E-08 | 3.3E-08 | 1.9 |
| T94R-07 | 9.5E-08 | 3.6E-08 | 2.7 |
| T94R-08 | 5.6E-08 | 3.3E-08 | 1.7 |
| T94R-09 | n/a | n/a | n/a |
| T94R-10C | 9.3E-08 | 3.4E-08 | 2.7 |
| T94R-11 | n/a | n/a | n/a |
| T94R-12 | 7.5E-08 | 3.4E-08 | 2.2 |
| T94R-13 | n/a | n/a | n/a |
| T95R-06 | n/a | n/a | n/a |
| T95R-07C | 1.4E-07 | 3.9E-08 | 3.7 |
| T95R-09 | 3.0E-08 | 3.0E-08 | 1.0 |
| T95R-10 | 2.1E-07 | 6.6E-08 | 3.1 |

**ENTER K VALUES FOR EACH LITHO FOR CALCULATIONS.**

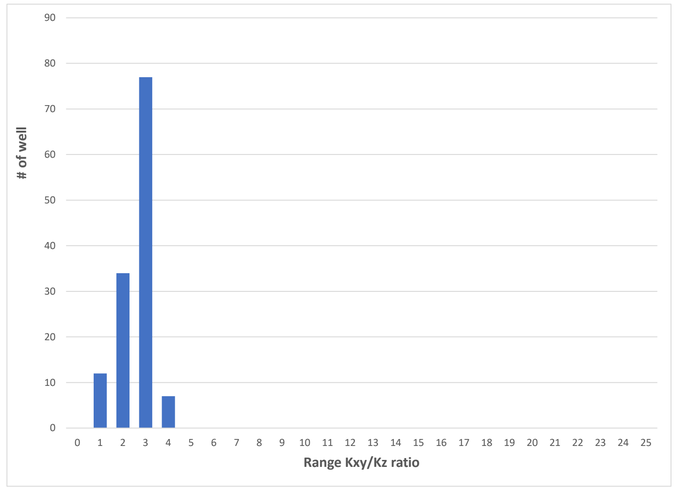
(if Kn set to 0, interval n is excluded)

| List | K assumptions |
|---|---|
| COAL | 5.0E-07 |
| SDST | 3.0E-07 |
| SLTS | 3.00E-08 |
| MDST | 3.0E-08 |

| | | |
|---|---|---|
| **Option1** | coal arythm mean | 1.00E-06 |
| | sst arythm mean | 2.00E-06 |
| | SLTS harm mean | 2.00E-08 |
| | SST harm mean | 2.00E-08 |
| **Option2** | coal geomean | 5.00E-07 |
| | sst geomean | 3.00E-07 |
| | SLTS geomean | 3.00E-08 |
| | SST geomean | 3.00E-08 |

| Stats | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| Count | 221 | 221 | 221 |
| min | 3.0E-08 | 3.0E-08 | 1.00 |
| max | 3.6E-07 | 2.3E-07 | 4.67 |
| average | 1.5E-07 | 4.9E-08 | 3.02 |
| median | 1.4E-07 | 4.3E-08 | 3.15 |
| harmean | 1.1E-07 | 4.4E-08 | 2.73 |
| geomean | 1.3E-07 | 4.6E-08 | 2.90 |

| Bin | Kxy/Kv |
|---|---|
| 0 | 0 |
| 1 | 12 |
| 2 | 34 |
| 3 | 77 |
| 4 | 7 |
| 5 | 0 |
| 6 | 0 |
| 7 | 0 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |
| 11 | 0 |
| 12 | 0 |
| 13 | 0 |
| 14 | 0 |
| 15 | 0 |
| 16 | 0 |
| 17 | 0 |
| 18 | 0 |
| 19 | 0 |
| 20 | 0 |
| 21 | 0 |
| 22 | 0 |
| 23 | 0 |
| 24 | 0 |
| 25 | 0 |



Kyxz per well

| Hole ID | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| | sum(Bn*Kn)/Bt | Bt/sum(Bn/Kn) | |
| T95R-11 | 8.5E-08 | 3.5E-08 | 2.4 |
| T95R-13 | 9.7E-08 | 3.5E-08 | 2.7 |
| T95R-14 | 8.3E-08 | 3.5E-08 | 2.4 |
| T95R-15C | 1.1E-07 | 3.7E-08 | 2.9 |
| T95R-17 | 1.3E-07 | 4.5E-08 | 2.9 |
| T95R-19C | 1.2E-07 | 3.7E-08 | 3.3 |
| T95R-20 | n/a | n/a | n/a |
| T95R-21 | 1.1E-07 | 3.6E-08 | 3.0 |
| T95R-22C | 1.2E-07 | 3.7E-08 | 3.2 |
| T95R-24 | 1.2E-07 | 3.8E-08 | 3.2 |
| T95R-25 | 2.3E-07 | 8.0E-08 | 2.9 |
| T95R-26 | 3.0E-08 | 3.0E-08 | 1.0 |
| T95R-28C | 7.7E-08 | 3.3E-08 | 2.3 |
| T95R-30 | n/a | n/a | n/a |
| T95R-31 | 1.8E-07 | 5.4E-08 | 3.3 |
| T95R-32 | 9.2E-08 | 3.7E-08 | 2.5 |
| T95R-34 | 9.7E-08 | 3.6E-08 | 2.7 |
| T95R-35C | 1.7E-07 | 5.4E-08 | 3.1 |
| T95R-36 | 1.7E-07 | 5.4E-08 | 3.1 |
| T95R-38C | 1.7E-07 | 4.5E-08 | 3.7 |
| T95R-39C | 9.1E-08 | 3.5E-08 | 2.6 |
| T95R-40 | 1.8E-07 | 4.3E-08 | 4.3 |
| T95R-43 | 2.7E-07 | 1.3E-07 | 2.1 |
| T95R-44 | n/a | n/a | n/a |
| T95R-45 | n/a | n/a | n/a |
| T95R-46 | 1.6E-07 | 4.6E-08 | 3.4 |
| T95R-50C | 2.6E-07 | 9.5E-08 | 2.7 |
| T95R-60 | 1.5E-07 | 4.2E-08 | 3.5 |
| T95R-61 | 1.9E-07 | 5.7E-08 | 3.4 |
| T95R-62 | 1.1E-07 | 3.9E-08 | 2.9 |
| T95R-63 | 1.5E-07 | 4.1E-08 | 3.5 |
| T95R-64 | 2.2E-07 | 7.1E-08 | 3.1 |
| T95R-65 | 9.2E-08 | 3.6E-08 | 2.6 |
| T95R-66 | 2.0E-07 | 6.7E-08 | 3.0 |
| T95R-67 | 1.8E-07 | 5.1E-08 | 3.6 |
| T95R-68 | 1.6E-07 | 4.9E-08 | 3.4 |
| T95R-69 | 2.1E-07 | 6.0E-08 | 3.4 |
| T95R-70 | 2.7E-07 | 1.4E-07 | 1.9 |
| T95R-71 | 2.2E-07 | 6.6E-08 | 3.3 |
| T95R-74 | 2.6E-07 | 9.7E-08 | 2.7 |
| T95R-76 | 2.0E-07 | 5.6E-08 | 3.5 |
| T95R-77 | 5.5E-08 | 3.3E-08 | 1.7 |
| T95R-78 | 2.4E-07 | 9.4E-08 | 2.5 |
| T95R-79 | 1.5E-07 | 4.5E-08 | 3.3 |
| T95R-80 | 2.2E-07 | 6.8E-08 | 3.2 |
| T95R-81 | 1.4E-07 | 4.3E-08 | 3.2 |
| T96R-01 | 1.4E-07 | 4.3E-08 | 3.1 |
| T96R-02 | 4.7E-08 | 3.2E-08 | 1.5 |
| T96R-03 | 1.4E-07 | 4.4E-08 | 3.1 |
| T96R-04C | 2.0E-07 | 5.2E-08 | 3.8 |
| T96R-05C | 1.2E-07 | 3.7E-08 | 3.2 |
| T96R-06 | 2.0E-07 | 5.9E-08 | 3.4 |
| T96R-07C | 1.8E-07 | 4.3E-08 | 4.2 |
| T96R-08 | 1.8E-07 | 5.7E-08 | 3.2 |
| T96R-10 | 2.6E-07 | 9.1E-08 | 2.9 |
| T96R-105 | 2.9E-07 | 2.3E-07 | 1.3 |
| T96R-11 | 2.0E-07 | 6.3E-08 | 3.2 |
| T96R-110 | 1.2E-07 | 3.7E-08 | 3.4 |
| T96R-119 | 1.7E-07 | 5.5E-08 | 3.1 |
| T96R-120 | 1.4E-07 | 4.4E-08 | 3.2 |
| T96R-121 | 2.1E-07 | 6.2E-08 | 3.3 |
| T96R-124 | 1.4E-07 | 4.0E-08 | 3.5 |
| T96R-125 | 2.7E-07 | 8.3E-08 | 3.2 |
| T96R-126 | 1.6E-07 | 4.5E-08 | 3.5 |
| T96R-127 | 2.2E-07 | 6.3E-08 | 3.6 |
| T96R-128 | 4.1E-08 | 3.1E-08 | 1.3 |
| T96R-129 | 1.2E-07 | 3.6E-08 | 3.2 |
| T96R-12C | 1.9E-07 | 4.4E-08 | 4.3 |
| T96R-130 | 1.3E-07 | 4.2E-08 | 3.0 |
| T96R-131 | 1.2E-07 | 3.9E-08 | 3.2 |
| T96R-137 | 9.1E-08 | 3.4E-08 | 2.7 |

Kyxz per well

| Hole ID | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| | sum(Bn*Kn)/Bt | Bt/sum(Bn/Kn) | |
| T96R-13C | 1.7E-07 | 4.2E-08 | 4.1 |
| T96R-14 | 1.4E-07 | 4.3E-08 | 3.2 |
| T96R-15 | 1.9E-07 | 5.6E-08 | 3.4 |
| T96R-16 | 2.1E-07 | 6.3E-08 | 3.3 |
| T96R-17C | 2.1E-07 | 4.6E-08 | 4.5 |
| T96R-18C | 2.4E-07 | 5.2E-08 | 4.6 |
| T96R-19 | 1.9E-07 | 5.6E-08 | 3.4 |
| T96R-20C | 1.8E-07 | 4.3E-08 | 4.2 |
| T96R-21 | 1.9E-07 | 5.6E-08 | 3.4 |
| T96R-22 | 1.6E-07 | 4.6E-08 | 3.4 |
| T96R-23C | 6.6E-08 | 3.3E-08 | 2.0 |
| T96R-24 | 1.7E-07 | 4.9E-08 | 3.6 |
| T96R-25 | 1.1E-07 | 3.5E-08 | 3.0 |
| T96R-26 | 1.4E-07 | 4.4E-08 | 3.2 |
| T96R-27 | 1.7E-07 | 4.9E-08 | 3.4 |
| T96R-28C | 8.3E-08 | 3.4E-08 | 2.5 |
| T96R-29 | 1.7E-07 | 5.0E-08 | 3.5 |
| T96R-30 | 1.7E-07 | 5.0E-08 | 3.5 |
| T96R-31 | 2.2E-07 | 6.3E-08 | 3.5 |
| T96R-32 | 2.0E-07 | 5.7E-08 | 3.5 |
| T96R-33 | 1.5E-07 | 4.4E-08 | 3.5 |
| T96R-34 | 1.8E-07 | 5.3E-08 | 3.4 |
| T96R-35 | 1.0E-07 | 3.8E-08 | 2.7 |
| T96R-37 | 1.6E-07 | 4.5E-08 | 3.6 |
| T96R-38 | 1.6E-07 | 5.2E-08 | 3.2 |
| T96R-39 | 1.8E-07 | 5.8E-08 | 3.1 |
| T96R-41 | 1.9E-07 | 6.0E-08 | 3.2 |
| T96R-42C | 5.6E-08 | 3.2E-08 | 1.7 |
| T96R-43 | 1.3E-07 | 3.7E-08 | 3.4 |
| T96R-45 | 5.0E-08 | 3.2E-08 | 1.5 |
| T96R-46 | 1.7E-07 | 5.3E-08 | 3.2 |
| T96R-47 | 1.6E-07 | 4.9E-08 | 3.3 |
| T96R-49 | 1.1E-07 | 4.0E-08 | 2.7 |
| T96R-50 | 2.6E-07 | 7.4E-08 | 3.5 |
| T96R-51 | 1.2E-07 | 4.2E-08 | 2.9 |
| T96R-52 | 1.8E-07 | 5.2E-08 | 3.5 |
| T96R-56C | 9.4E-08 | 3.5E-08 | 2.7 |
| T96R-58 | 1.3E-07 | 4.0E-08 | 3.2 |
| T96R-59 | 2.2E-07 | 7.6E-08 | 2.9 |
| T96R-60 | 2.0E-07 | 5.5E-08 | 3.6 |
| T96R-61 | 1.3E-07 | 4.1E-08 | 3.2 |
| T96R-63 | 1.6E-07 | 4.8E-08 | 3.4 |
| T96R-64 | 2.5E-07 | 9.0E-08 | 2.8 |
| T96R-65C | 1.0E-07 | 3.5E-08 | 2.9 |
| T96R-67 | 2.0E-07 | 6.4E-08 | 3.2 |
| T96R-69 | 9.5E-08 | 3.7E-08 | 2.6 |
| T96R-70 | 2.2E-07 | 6.9E-08 | 3.2 |
| T96R-72 | 1.2E-07 | 4.3E-08 | 2.8 |
| T96R-73 | 2.5E-07 | 9.3E-08 | 2.7 |
| T96R-75 | 2.3E-07 | 6.3E-08 | 3.6 |
| T96R-76 | 1.8E-07 | 4.3E-08 | 4.2 |
| T96R-77 | 2.1E-07 | 7.2E-08 | 2.9 |
| T96R-78 | 1.2E-07 | 3.9E-08 | 3.0 |
| T96R-79 | 2.3E-07 | 8.7E-08 | 2.7 |
| T96R-82 | 1.2E-07 | 3.9E-08 | 3.2 |
| T96R-83 | n/a | n/a | n/a |
| T96R-84 | 2.0E-07 | 6.5E-08 | 3.1 |
| T96R-86 | 1.8E-07 | 4.7E-08 | 3.8 |
| T96R-87 | 2.0E-07 | 6.0E-08 | 3.3 |
| T96R-91 | 2.1E-07 | 7.1E-08 | 2.9 |
| T96R-92 | 2.0E-07 | 5.5E-08 | 3.6 |
| T96R-99 | 2.3E-07 | 7.0E-08 | 3.2 |
| T97R-100C | 1.1E-07 | 3.7E-08 | 3.0 |
| T97R-101 | 1.3E-07 | 4.2E-08 | 3.1 |
| T97R-102 | 1.3E-07 | 4.1E-08 | 3.2 |
| T97R-103 | 5.9E-08 | 3.2E-08 | 1.9 |
| T97R-104 | 1.1E-07 | 3.5E-08 | 3.0 |
| T97R-105 | 2.0E-07 | 5.2E-08 | 3.9 |
| T97R-106 | 6.3E-08 | 3.3E-08 | 1.9 |
| T97R-107 | 1.1E-07 | 3.8E-08 | 2.9 |
| T97R-108C | 1.2E-07 | 3.7E-08 | 3.3 |
| T97R-109 | 1.1E-07 | 3.9E-08 | 2.9 |
| T97R-110 | 1.3E-07 | 3.8E-08 | 3.5 |
| T97R-111 | 7.7E-08 | 3.3E-08 | 2.3 |
| T97R-112 | 8.2E-08 | 3.6E-08 | 2.3 |
| T97R-113 | 1.0E-07 | 3.7E-08 | 2.8 |
| T97R-114 | 7.2E-08 | 3.4E-08 | 2.1 |
| T97R-115 | 1.2E-07 | 3.8E-08 | 3.1 |
| T97R-116 | 3.1E-08 | 3.0E-08 | 1.0 |

Kyxz per well

| Hole ID | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| | sum(Bn*Kn)/Bt | Bt/sum(Bn/Kn) | |
| T97R-117 | 5.9E-08 | 3.3E-08 | 1.8 |
| T97R-118 | 1.4E-07 | 4.4E-08 | 3.2 |
| T97R-119 | 8.8E-08 | 3.5E-08 | 2.5 |
| T97R-120 | 1.1E-07 | 3.5E-08 | 3.0 |
| T97R-121 | 1.0E-07 | 3.7E-08 | 2.8 |
| T97R-65 | 2.5E-07 | 9.3E-08 | 2.7 |
| T97R-66 | 1.0E-07 | 3.5E-08 | 3.0 |
| T97R-67 | 1.8E-07 | 5.1E-08 | 3.6 |
| T97R-69 | 1.0E-07 | 3.6E-08 | 2.8 |
| T97R-70 | 1.6E-07 | 4.0E-08 | 3.9 |
| T97R-71 | 1.5E-07 | 4.2E-08 | 3.5 |
| T97R-75 | 1.0E-07 | 3.7E-08 | 2.8 |
| T97R-78 | 1.3E-07 | 3.9E-08 | 3.2 |
| T97R-80 | 9.7E-08 | 3.5E-08 | 2.7 |
| T97R-84 | 1.3E-07 | 4.0E-08 | 3.4 |
| T97R-87 | 7.9E-08 | 3.3E-08 | 2.4 |
| T97R-88 | 6.2E-08 | 3.2E-08 | 1.9 |
| T97R-90 | 1.6E-07 | 4.3E-08 | 3.6 |
| T97R-91 | 1.5E-07 | 4.2E-08 | 3.6 |
| T97R-94 | 2.3E-07 | 5.7E-08 | 4.0 |
| T97R-95C | 1.4E-07 | 4.0E-08 | 3.5 |
| T97R-96 | 7.0E-08 | 3.4E-08 | 2.1 |
| T97R-97 | 2.3E-07 | 4.9E-08 | 4.6 |
| T97R-99 | 9.2E-08 | 3.4E-08 | 2.7 |
| T98R-03C | 2.8E-07 | 6.0E-08 | 4.7 |
| T98R-07C | 3.4E-07 | 8.3E-08 | 4.1 |
| T98R-09C | 1.0E-07 | 3.5E-08 | 2.9 |
| T98R-13C | 2.9E-07 | 6.3E-08 | 4.6 |
| T98R-14 | 3.0E-08 | 3.0E-08 | 1.0 |
| T98R-16 | 2.0E-07 | 5.1E-08 | 4.0 |
| T98R-18 | 1.7E-07 | 4.2E-08 | 4.1 |
| T98R-20 | 1.2E-07 | 3.7E-08 | 3.3 |
| T98R-21C | 3.6E-07 | 8.7E-08 | 4.1 |
| T98R-23 | 9.4E-08 | 3.4E-08 | 2.7 |
| T98R-24 | 1.8E-07 | 4.3E-08 | 4.3 |
| T98R-25 | 2.2E-07 | 4.8E-08 | 4.5 |
| T98R-31C | 3.1E-07 | 6.7E-08 | 4.6 |
| TOB96-01-05 | 3.0E-08 | 3.0E-08 | 1.0 |
| TOB96-02-06 | 3.0E-08 | 3.0E-08 | 1.0 |
| TOB96-04 | n/a | n/a | n/a |
| TOB96-11-04 | n/a | n/a | n/a |
| TOB96-12-04 | n/a | n/a | n/a |
| TOB96-13 | n/a | n/a | n/a |
| TOB96-18 | 3.0E-08 | 3.0E-08 | 1.0 |
| TOB97-07-24 | n/a | n/a | n/a |
| W01 | n/a | n/a | n/a |
| W02 | n/a | n/a | n/a |
| W03 | n/a | n/a | n/a |

# Appendix C – Groundwater Levels Measurements

# # of observations per events (including dry/artesian obs)

| Event | OVB | | | | | BDR | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tenas | Goathorn | North | Access Road | Rail Loadout | Tenas | Goathorn | North | Access Rd | Rail Loadout |
| Nov-1989 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| Aug/Sep 1993 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| Aug-1994 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Oct-1995 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Sep/Oct 1996 | 6 | 0 | 0 | 0 | 0 | 7 | 5 | 0 | 0 | 0 |
| Aug/Sep 1997 | 8 | 6 | 1 | 0 | 0 | 10 | 23 | 8 | 0 | 0 |
| Jul-2017 | 6 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Aug-2017 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Sep-2017 | 5 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Jan-2018 | 6 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Mar/Apr 2018 | 13 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 |
| Jun-2018 | 12 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| Sep-2018 | 14 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| Nov-2018 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec-2018 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jan-2019 | 17 | 0 | 0 | 2 | 0 | 10 | 0 | 0 | 0 | 0 |
| Feb-2019 | 17 | 0 | 0 | 2 | 0 | 9 | 0 | 0 | 0 | 0 |
| Mar/Apr 2019 | 24 | 0 | 0 | 4 | 4 | 26 | 0 | 0 | 0 | 0 |
| May/Jun 2019 | 18 | 0 | 0 | 2 | 2 | 13 | 0 | 0 | 0 | 0 |
| Aug-2019 | 18 | 0 | 0 | 2 | 0 | 13 | 0 | 0 | 0 | 0 |
| Sep-2019 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-2019 | 4 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 0 |
| **TOTAL** | **168** | **6** | **2** | **19** | **6** | **145** | **28** | **22** | **0** | **0** |

# # of observations per events (excluding dry/artesian obs "no-depth value")

| Event | OVB | | | | | BDR | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tenas | Goathorn | North | Access Road | Rail Loadout | Tenas | Goathorn | North | Access Rd | Rail Loadout |
| Nov-1989 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| Aug/Sep 1993 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| Aug-1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oct-1995 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Sep/Oct 1996 | 4 | 0 | 0 | 0 | 0 | 3 | 5 | 0 | 0 | 0 |
| Aug/Sep 1997 | 5 | 6 | 0 | 0 | 0 | 10 | 21 | 8 | 0 | 0 |
| Jul-2017 | 3 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Aug-2017 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Sep-2017 | 3 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Jan-2018 | 3 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| Mar/Apr 2018 | 8 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 |
| Jun-2018 | 7 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| Sep-2018 | 7 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 |
| Nov-2018 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec-2018 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jan-2019 | 9 | 0 | 0 | 2 | 0 | 7 | 0 | 0 | 0 | 0 |
| Feb-2019 | 15 | 0 | 0 | 2 | 0 | 9 | 0 | 0 | 0 | 0 |
| Mar/Apr 2019 | 13 | 0 | 0 | 4 | 4 | 25 | 0 | 0 | 0 | 0 |
| May/Jun 2019 | 9 | 0 | 0 | 2 | 2 | 11 | 0 | 0 | 0 | 0 |
| Aug-2019 | 9 | 0 | 0 | 2 | 0 | 12 | 0 | 0 | 0 | 0 |
| Sep-2019 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-2019 | 3 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 0 |
| **TOTAL** | **98** | **6** | **0** | **19** | **6** | **129** | **26** | **22** | **0** | **0** |

## Groundwater Level Statistics

| Area | Lithologies | Hole ID | Period | Comment | # Obs | # Value [(1)] | min | avg | max | stdev |
|---|---|---|---|---|---|---|---|---|---|---|
| Tenas | Overburden | T18-02S (GEO11) | Mar-Aug19 | dry or almost dry | 7 | 2 | 821.24 | 821.25 | 821.26 | 0.01 |
| | | T18-04S (W1S) | Apr-Aug19 | - | 7 | 6 | 939.45 | 940.15 | 940.95 | 0.58 |
| | | T18-06D (W2) | Apr-Aug19 | - | 7 | 7 | 800.79 | 801.25 | 801.60 | 0.31 |
| | | T18-08S (W3S) | Apr-Aug19 | - | 9 | 9 | 769.99 | 770.08 | 770.23 | 0.08 |
| | | T18-11S (GEO22) | Apr-Aug19 | dry | 7 | 0 | - | - | - | - |
| | | T18-13S (GEO13) | Apr-Aug19 | dry | 7 | 0 | - | - | - | - |
| | | TOB96-01-05 | 96 to Aug19 | - | 12 | 12 | 918.50 | 920.57 | 922.27 | 1.51 |
| | | TOB96-02-06 | 96 to Aug19 | - | 15 | 14 | 849.72 | 850.92 | 852.27 | 0.83 |
| | | TOB96-02-20 | 96 to Aug19 | dry or almost dry | 11 | 3 | 833.44 | 834.42 | 835.56 | 1.07 |
| | | TOB96-11-04 | 96 to Aug19 | - | 12 | 11 | 824.13 | 824.84 | 825.75 | 0.56 |
| | | TOB96-11-19 | 96 to Aug19 | dry | 12 | 0 | - | - | - | - |
| | | TOB96-12-04 | 96-97 | - | 2 | 2 | 924.01 | 924.06 | 924.10 | 0.06 |
| | | TOB97-06-21 | 97 to Aug19 | dry | 9 | 0 | - | - | - | - |
| | | TOB97-07-24 | 97 to Aug19 | dry | 9 | 0 | - | - | - | - |
| | | T19-18S | Jan-Nov19 | - | 10 | 5 | 786.74 | 787.04 | 787.60 | 0.33 |
| | | T19-19S | Jan19-Aug19 | dry | 6 | 0 | - | - | - | - |
| | | T19-20S | Jan-Nov19 | dry | 7 | 1 | 845.51 | 845.51 | 845.51 | - |
| | | T19-26S | Feb-Nov19 | - | 13 | 5 | 772.60 | 772.77 | 772.88 | 0.11 |
| | | T19-27S | Feb-Nov19 | - | 7 | 7 | 768.16 | 770.05 | 780.90 | 4.79 |
| | Bedrock | T18-01D (ARD02) | Mar18-Aug19 | - | 9 | 9 | 944.46 | 946.03 | 946.90 | 1.13 |
| | | T18-04D (W1D) | Apr18-Aug9 | artesian | 7 | 6 | 939.58 | 943.18 | 947.22 | 3.18 |
| | | T18-08D (W3D) | Apr18-Aug19 | - | 7 | 7 | 762.13 | 763.01 | 765.04 | 1.05 |
| | | T95R-15C | 96 to Aug19 | occasionally artesian | 15 | 10 | 879.96 | 880.92 | 881.21 | 0.38 |
| | | T95R-39C | 94-95 | artesian, flowing | 2 | 0 | - | - | - | - |
| | | T95R-40 | 95 to Aug19 | - | 13 | 13 | 892.23 | 892.45 | 893.12 | 0.23 |
| | | T95R-64 | 95 to Aug19 | - | 16 | 16 | 933.87 | 934.54 | 934.77 | 0.21 |
| | | T96R-16-19 | 95 to Aug19 | - | 12 | 12 | 1010.24 | 1010.68 | 1011.05 | 0.23 |
| | | T96R-16-28 | 95 to Aug19 | - | 12 | 12 | 1010.67 | 1011.10 | 1011.48 | 0.23 |
| | | T96R-34-67 | 96-97 | artesian | 2 | 1 | 934.33 | 934.33 | 934.33 | - |
| | | T96R-34-87 | 96 to Sep18 | artesian | 13 | 9 | 934.09 | 934.16 | 934.26 | 0.05 |
| | | T96R-56C-83 | 96-97 | occasionally artesian | 2 | 1 | 944.00 | 944.00 | 944.00 | - |
| | | T96TP-01-10 | 96 | - | 1 | 1 | 994.86 | 994.86 | 994.86 | - |
| | | T96TP-02-07 | 97 | - | 1 | 1 | 999.17 | 999.17 | 999.17 | - |
| | | T97R-108C-70 | 97 | - | 1 | 1 | 816.94 | 816.94 | 816.94 | - |
| | | T19-21S | Jan-Nov19 | - | 9 | 6 | 806.79 | 806.90 | 806.98 | 0.07 |
| | | T19-22S | Feb-Nov19 | - | 10 | 7 | 800.50 | 802.42 | 803.13 | 0.92 |
| | | T19-34S | Feb-Nov19 | - | 8 | 6 | 808.96 | 809.03 | 809.10 | 0.06 |
| | | T19-35S | Mar-Nov19 | - | 7 | 6 | 805.66 | 805.87 | 806.15 | 0.21 |
| Access Road | Overburden | T18-14S | Nov18 to Nov19 | - | 10 | 10 | 677.08 | 677.39 | 677.60 | 0.19 |
| | | T18-15S | Nov18 to Nov19 | - | 10 | 10 | 704.06 | 704.14 | 704.29 | 0.08 |
| | | T19-28S | 2019 (dates not available) | - | 2 | 2 | 702.90 | 703.40 | 703.90 | 0.71 |
| | | T18-30S | 2019 (dates not available) | - | 2 | 2 | 693.10 | 694.20 | 695.30 | 1.56 |
| | | T19-31S | 2019 (dates not available) | dry | 1 | 0 | - | - | - | - |
| Rail Loadout | Ovrburden | T19-36 | Mar-May19 | - | 3 | 3 | 512.31 | 512.72 | 512.97 | 0.36 |
| | | T19-37 | Mar-May19 | - | 3 | 3 | 512.92 | 513.13 | 513.28 | 0.19 |
| Goathorn | Overburden | TOB97-05-06 | 97 | - | 1 | 1 | 756.82 | 756.82 | 756.82 | n/a |
| | | TOB97-04-07 | 97 | - | 1 | 1 | 678.95 | 678.95 | 678.95 | n/a |
| | | T97RP-03-08 | 97 | - | 1 | 1 | 759.96 | 759.96 | 759.96 | n/a |
| | | T97RP-02-12 | 97 | - | 1 | 1 | 753.07 | 753.07 | 753.07 | n/a |
| | | T97RP-01-13 | 97 | - | 1 | 1 | 743.63 | 743.63 | 743.63 | n/a |
| | | T97RP-01-04 | 97 | - | 1 | 1 | 744.29 | 744.29 | 744.29 | n/a |
| | Bedrock | T96R-113-43 | 96-97 | - | 2 | 2 | 764.19 | 764.46 | 764.73 | 0.38 |
| | | T96R-113-79 | 96-97 | - | 2 | 2 | 757.59 | 758.87 | 760.15 | 1.81 |
| | | T96R-40-117 | 96-97 | - | 2 | 2 | 795.16 | 795.99 | 796.82 | 1.17 |
| | | T96R-40-87 | 96-97 | - | 2 | 2 | 814.13 | 815.06 | 815.99 | 1.32 |
| | | T96R-44-54 | 96-97 | - | 2 | 2 | 751.08 | 751.10 | 751.12 | 0.03 |
| | | T974-21-87 | 97 | - | 1 | 1 | 658.22 | 658.22 | 658.22 | n/a |
| | | T97R-12-75 | 97 | - | 1 | 1 | 786.42 | 786.42 | 786.42 | n/a |
| | | T97R-15-29 | 97 | artesian | 1 | 0 | n/a | n/a | n/a | n/a |
| | | T97R-15-52 | 97 | - | 1 | 1 | 739.93 | 739.93 | 739.93 | n/a |
| | | T97R-17-104 | 97 | - | 1 | 1 | 824.19 | 824.19 | 824.19 | n/a |
| | | T97R-17-79 | 97 | - | 1 | 1 | 824.14 | 824.14 | 824.14 | n/a |
| | | T97R-20-131 | 97 | - | 1 | 1 | 706.91 | 706.91 | 706.91 | n/a |
| | | T97R-20-40 | 97 | - | 1 | 1 | 707.91 | 707.91 | 707.91 | n/a |
| | | T97R-20-83 | 97 | - | 1 | 1 | 709.14 | 709.14 | 709.14 | n/a |
| | | T97R-21-41 | 97 | - | 1 | 1 | 689.91 | 689.91 | 689.91 | n/a |
| | | T97R-23-69 | 97 | - | 1 | 1 | 640.88 | 640.88 | 640.88 | n/a |
| | | T97R-33-20 | 97 | artesian | 1 | 0 | n/a | n/a | n/a | n/a |
| | | T97R-33-55 | 97 | - | 1 | 1 | 753.50 | 753.50 | 753.50 | n/a |
| | | T97R-33-78 | 97 | - | 1 | 1 | 753.75 | 753.75 | 753.75 | n/a |
| | | T97R-36-140 | 97 | - | 1 | 1 | 684.74 | 684.74 | 684.74 | n/a |
| | | T97R-36W | 97 | - | 1 | 1 | 706.72 | 706.72 | 706.72 | n/a |
| | | T97R-49-63 | 97 | - | 2 | 2 | 675.19 | 680.13 | 685.06 | 6.98 |
| North | Overburden | T93R-29A | 93-97 | dry | 2 | 0 | n/a | n/a | n/a | n/a |
| | Bedrock | T93R-28A | 93-97 | - | 2 | 2 | 765.20 | 771.57 | 777.94 | 9.01 |
| | | T93R-28B | 93-97 | - | 2 | 2 | 766.06 | 770.89 | 775.72 | 6.83 |
| | | T93R-29B | 93-97 | - | 2 | 2 | 750.39 | 762.12 | 773.84 | 16.58 |
| | | T93R-30 | 93-97 | - | 2 | 2 | 843.76 | 843.93 | 844.10 | 0.24 |
| | | TW604A | 89-97 | - | 3 | 3 | 787.39 | 788.59 | 789.87 | 1.24 |
| | | TW905A | 89-93 | - | 2 | 2 | 787.69 | 787.99 | 788.28 | 0.42 |

Note:
Historical measurements in TW905B (North area) were inconsistent therfore removed from the dataset.

| Vertical Gradient | Comment | Holde ID1 (shallow well) | Area | Screen mid | Type | Unit | Details | Date | GW Elev | Holde ID2 (deep well) | Area | Screen mid | Type | Unit | Details | Date | GW Elev |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | | - | - | *masl* | - | - | - | *dd-mm-yy* | *masl* | - | - | *masl* | - | - | - | *dd-mm-yy* | *masl* |
| -0.003 | upward | T18-04S (W1S) | Tenas | 926.58 | OVB | na | Gravelly Fat Clay (Till?) and Volc. | 28-Apr-18 | 939.45 | T18-04D (W1D) | Tenas | 880.14 | BDR | na | Till | 27-Apr-18 | 939.58 |
| -0.017 | 0.003 to 0.1 | | | | | | | 19-Jun-18 | 939.65 | | | | | | | 28-Jun-18 | 940.46 |
| -0.029 | avg 0.06 | | | | | | | 6-Sep-18 | 939.91 | | | | | | | 13-Sep-18 | 941.27 |
| n/a | | | | | | | | 7-Jan-19 | > 938.18 | | | | | | | 7-Jan-19 | > 938.09 |
| -0.121 | | | | | | | | 2-Apr-19 | 940.51 | | | | | | | 2-Apr-19 | 946.14 |
| -0.085 | | | | | | | | 31-May-19 | 940.45 | | | | | | | 8-Jun-19 | 944.40 |
| -0.135 | | | | | | | | 29-Aug-19 | 940.95 | | | | | | | 29-Aug-19 | 947.22 |
| 1.589 | Downward / Perched | T18-08S (W3S) | Tenas | 761.97 | OVB | na | Sand lense in Till | 28-Apr-18 | 770.14 | T18-08D (W3D) | Tenas | 757.27 | BDR | na | Volcanics | 23-Apr-18 | 762.67 |
| 1.581 | Disconnected | | | | | | | 18-Jun-18 | 770.02 | | | | | | | 18-Jun-18 | 762.59 |
| 1.694 | | | | | | | | 8-Sep-18 | 770.13 | | | | | | | 8-Sep-18 | 762.17 |
| 1.609 | | | | | | | | 4-Jan-19 | 770.23 | | | | | | | 4-Jan-19 | 762.67 |
| 1.672 | | | | | | | | 30-Mar-19 | 769.99 | | | | | | | 30-Mar-19 | 762.13 |
| 1.331 | | | | | | | | 31-May-19 | 770.08 | | | | | | | 31-May-19 | 763.83 |
| 1.072 | | | | | | | | 27-Aug-19 | 770.08 | | | | | | | 27-Aug-19 | 765.04 |
| -0.043 | Upward | T96R-16-19 | Tenas | 996.43 | BDR | Ut l | Coal (#1) | 18-Sep-96 | 1010.82 | T96R-16-28 | Tenas | 986.9 | BDR | na | Un-named lower coal | 18-Sep-96 | 1011.23 |
| -0.040 | 0.04 to 0.046 | | | | | | | 22-Sep-97 | 1010.78 | | | | | | | 22-Aug-97 | 1011.16 |
| -0.046 | avg 0.04 | | | | | | | 25-Jul-17 | 1010.59 | | | | | | | 25-Jul-17 | 1011.03 |
| -0.044 | | | | | | | | 27-Sep-17 | 1010.55 | | | | | | | 27-Sep-17 | 1010.96 |
| -0.045 | | | | | | | | 16-Jan-18 | 1010.85 | | | | | | | 16-Jan-18 | 1011.28 |
| -0.043 | | | | | | | | 30-Mar-18 | 1010.81 | | | | | | | 30-Mar-18 | 1011.22 |
| -0.046 | | | | | | | | 27-Jun-18 | 1010.94 | | | | | | | 27-Jun-18 | 1011.38 |
| -0.045 | | | | | | | | 6-Sep-18 | 1010.24 | | | | | | | 6-Sep-18 | 1010.67 |
| -0.044 | | | | | | | | 5-Jan-19 | 1010.50 | | | | | | | 5-Jan-19 | 1010.92 |
| -0.043 | | | | | | | | 3-Apr-19 | 1010.58 | | | | | | | 3-Apr-19 | 1010.99 |
| -0.046 | | | | | | | | 1-Jun-19 | 1011.05 | | | | | | | 1-Jun-19 | 1011.48 |
| -0.045 | | | | | | | | 31-Aug-19 | 1010.50 | | | | | | | 31-Aug-19 | 1010.92 |
| n/a | Slightly upward | T96R-34-67 | Tenas | 867.17 | BDR | na | Coal (upper ) | 18-Sep-96 | > 934.02 | T96R-34-87 | Tenas | 850.42 | BDR | Ut l | Coal (#1), 1/1U? | 18-Sep-96 | > 934.02 |
| 0.004 | | | | | | | | 22-Aug-97 | 934.33 | | | | | | | 22-Aug-97 | 934.26 |
| 1.175 | Downward / Perched | TOB96-02-06 | Tenas | 848.96 | OVB | na | Till | 20-Sep-96 | 852.01 | TOB96-02-20 | Tenas | 834.96 | OVB | na | Sand and gravel | 20-Sep-96 | 835.56 |
| n/a | Disconnected | | | | | | | 28-Sep-17 | 850.23 | | | | | | | 28-Sep-17 | < 833.46 |
| n/a | | | | | | | | 16-Jan-18 | 851.22 | | | | | | | 16-Jan-18 | < 833.46 |
| n/a | | | | | | | | 26-Mar-18 | 851.11 | | | | | | | 26-Mar-18 | < 833.46 |
| 1.314 | | | | | | | | 20-Jun-18 | 851.83 | | | | | | | 20-Jun-18 | 833.44 |
| n/a | | | | | | | | 10-Sep-18 | 850.44 | | | | | | | 10-Sep-18 | < 833.46 |
| n/a | Downward / Perched | TOB96-11-04 | Tenas | 824.36 | OVB | na | Clay | 20-Sep-96 | < 822.86 | TOB96-11-19 | Tenas | 807.91 | OVB | na | Fine sand | 20-Sep-96 | < 807.16 |
| n/a | Disconnected | | | | | | | 23-Aug-97 | 825.31 | | | | | | | 22-Aug-97 | < 807.16 |
| n/a | | | | | | | | 26-Jul-17 | 825.75 | | | | | | | 26-Jul-17 | < 807.16 |
| n/a | | | | | | | | 27-Sep-17 | 825.69 | | | | | | | 27-Sep-17 | < 807.16 |
| n/a | | | | | | | | 15-Jan-18 | 825.03 | | | | | | | 15-Jan-18 | < 807.16 |
| n/a | | | | | | | | 26-Mar-18 | 824.36 | | | | | | | 26-Mar-18 | < 807.16 |
| n/a | | | | | | | | 21-Jun-18 | 824.88 | | | | | | | 21-Jun-18 | < 807.16 |
| n/a | | | | | | | | 6-Sep-18 | 824.48 | | | | | | | 6-Sep-18 | < 807.16 |
| n/a | | | | | | | | 8-Jan-19 | 824.34 | | | | | | | 8-Jan-19 | < 807.16 |
| n/a | | | | | | | | 30-Mar-19 | 824.13 | | | | | | | 30-Mar-19 | < 807.16 |
| n/a | | | | | | | | 30-May-19 | 824.43 | | | | | | | 28-May-19 | < 807.16 |
| n/a | | | | | | | | 28-Aug-19 | 824.80 | | | | | | | 28-Aug-19 | < 807.16 |
| 0.191 | Downward | T96R-113-43 | Goathorn | 732.24 | BDR | Ut lll | Coal (#4-5) | 19-Sep-96 | 764.19 | T96R-113-79 | Goathorn | 697.74 | BDR | Ut lll | Coal (#2) | 19-Sep-96 | 757.59 |
| 0.133 | avg 0.14 | | | | | | | 20-Aug-97 | 764.73 | | | | | | | 20-Aug-97 | 760.15 |
| 0.662 | Downward / Perched? | T96R-40-87 | Goathorn | 749.55 | BDR | Ut lll | Coal ( #4), 5? | 19-Sep-96 | 815.99 | T96R-40-117 | Goathorn | 720.6 | BDR | Ut lll | Coal (#2) | 19-Sep-96 | 796.82 |
| 0.655 | avg 0.74 | | | | | | | 20-Aug-97 | 814.13 | | | | | | | 20-Aug-97 | 795.16 |
| n/a | - | T97R-15-29 | Goathorn | 712.31 | BDR | Ut lll | Coal (#4-5) | 20-Aug-97 | > 739.81 | T97R-15-52 | Goathorn | 690.51 | BDR | Ut lll | Coal (#3) | 20-Aug-97 | 739.93 |
| -0.002 | Slightly upward | T97R-17-79 | Goathorn | 772.1 | BDR | Ut lll | Coal (#4-5) | 20-Aug-97 | 824.14 | T97R-17-104 | Goathorn | 745.05 | BDR | Ut lll | Coal (#2) | 20-Aug-97 | 824.19 |
| -0.029 | Upward | T97R-20-40 | Goathorn | 676.16 | BDR | Ut lll | Coal (#8) | 21-Aug-97 | 707.91 | T97R-20-83 | Goathorn | 633.11 | BDR | Ut lll | Coal (#4-5) | 21-Aug-97 | 709.14 |
| 0.328 | Downward | T97R-36W | Goathorn | 638.71 | BDR | na | Various | 21-Aug-97 | 706.72 | T97R-36-140 | Goathorn | 571.78 | BDR | na | Lower Mdstn | 21-Aug-97 | 684.74 |
| 0.069 | Downward | T97RP-01-04 | Goathorn | 741.59 | OVB | na | Silty clay till fill | 25-Sep-97 | 744.29 | T97RP-01-13 | Goathorn | 732.04 | OVB | na | Silty clay till fill | 25-Sep-97 | 743.63 |
| 0.551 | Two regimes? | T93R-28A | North | 736.59 | BDR | na | Coal (#6) | 23-Aug-93 | 777.94 | T93R-28B | North | 715.02 | BDR | Ut lll | Coal (#2) | 28-Sep-93 | 766.06 |
| -0.488 | Or typo error? | | | | | | | 28-Sep-97 | 765.20 | | | | | | | 23-Aug-97 | 775.72 |
| n/a | - | T93R-29A | North | 819.69 | OVB | na | Till | 28-Sep-93 | < 816.19 | T93R-29B | North | 737.99 | BDR | Ut l | Coal (#1) | 28-Sep-93 | 750.39 |
| n/a | | | | | | | | 23-Aug-97 | < 816.19 | | | | | | | 23-Aug-97 | 773.84 |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 24-Mar-18 | 11.00 | 946.49 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 21-Jun-18 | 10.61 | 946.88 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 6-Sep-18 | 10.76 | 946.73 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 8-Jan-19 | 10.67 | 946.82 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 7-Feb-19 | 10.64 | 946.85 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 10-Feb-19 | 10.60 | 946.90 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 30-Mar-19 | 13.01 | 944.48 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 1-Jun-19 | 12.85 | 944.64 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 31-Aug-19 | 13.04 | 944.46 | Tenas | BDR | na | Sandstone |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 26-Mar-18 | 14.46 | 821.26 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 27-Jun-18 | 14.48 | 821.24 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 8-Sep-18 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 10-Jan-19 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 2-Apr-19 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 6-Jun-19 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 30-Aug-19 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 1.47 | 10.10 | 13.10 | 926.58 | 28-Apr-18 | 0.20 | 939.45 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 1.54 | 10.10 | 13.10 | 926.58 | 19-Jun-18 | 0.07 | 939.65 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 1.91 | 10.10 | 13.10 | 926.58 | 6-Sep-18 | 0.18 | 939.91 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 2.28 | 10.10 | 13.10 | 926.58 | 7-Jan-19 | artesian | > 938.18 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 2.65 | 10.10 | 13.10 | 926.58 | 2-Apr-19 | 0.32 | 940.51 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 3.02 | 10.10 | 13.10 | 926.58 | 31-May-19 | 0.75 | 940.45 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 3.39 | 10.10 | 13.10 | 926.58 | 29-Aug-19 | 0.62 | 940.95 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 1.73 | 56.40 | 59.50 | 880.14 | 27-Apr-18 | 0.24 | 939.58 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 2.46 | 56.40 | 59.50 | 880.14 | 28-Jun-18 | 0.09 | 940.46 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 2.46 | 56.40 | 59.50 | 880.14 | 13-Sep-18 | -0.72 | 941.27 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 2.95 | 56.40 | 59.50 | 880.14 | 7-Jan-19 | artesian | > 938.09 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 3.31 | 56.40 | 59.50 | 880.14 | 2-Apr-19 | -4.74 | 946.14 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 3.68 | 56.40 | 59.50 | 880.14 | 8-Jun-19 | -2.63 | 944.40 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 4.04 | 56.40 | 59.50 | 880.14 | 29-Aug-19 | -5.09 | 947.22 | Tenas | BDR | na | Volcanics |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 24-Apr-18 | 51.30 | 801.10 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 10-Sep-18 | 50.80 | 801.60 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 10-Sep-18 | 50.80 | 801.60 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 5-Jan-19 | 51.23 | 801.18 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 1-Apr-19 | 51.61 | 800.79 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 1-Jun-19 | 51.36 | 801.04 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 28-Aug-19 | 50.94 | 801.46 | Tenas | OVB | na | Cobbles? |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 28-Apr-18 | 34.38 | 770.14 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 18-Jun-18 | 34.50 | 770.02 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 8-Sep-18 | 34.39 | 770.13 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 4-Jan-19 | 34.29 | 770.23 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 7-Feb-19 | 34.51 | 770.01 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 10-Feb-19 | 34.48 | 770.04 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 30-Mar-19 | 34.53 | 769.99 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 31-May-19 | 34.44 | 770.08 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 27-Aug-19 | 34.44 | 770.08 | Tenas | OVB | na | Sand lense in Till |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 23-Apr-18 | 41.85 | 762.67 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 18-Jun-18 | 41.93 | 762.59 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 8-Sep-18 | 42.35 | 762.17 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 4-Jan-19 | 41.85 | 762.67 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 30-Mar-19 | 42.39 | 762.13 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 31-May-19 | 40.70 | 763.83 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 27-Aug-19 | 39.48 | 765.04 | Tenas | BDR | na | Volcanics |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 3-Apr-18 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 25-Jun-18 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 8-Sep-18 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 4-Jan-19 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 1-Apr-19 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 31-May-19 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 31-Aug-19 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 2-Apr-18 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 25-Jun-18 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 8-Sep-18 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 4-Jan-19 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 1-Apr-19 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 30-May-19 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 28-Aug-19 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T93R-28A | 6059121 | 617859 | 789.74 | 0.95 | 51.00 | 55.30 | 736.59 | 23-Aug-93 | 12.75 | 777.94 | North | BDR | na | Coal (#6) |
| T93R-28A | 6059121 | 617859 | 789.74 | 0.95 | 51.00 | 55.30 | 736.59 | 28-Sep-97 | 25.49 | 765.20 | North | BDR | na | Coal (#6) |
| T93R-28B | 6059121 | 617859 | 790.32 | 0.52 | 72.50 | 78.10 | 715.02 | 28-Sep-93 | 24.78 | 766.06 | North | BDR | Ut III | Coal (#2) |
| T93R-28B | 6059121 | 617859 | 790.32 | 0.52 | 72.50 | 78.10 | 715.02 | 23-Aug-97 | 15.12 | 775.72 | North | BDR | Ut III | Coal (#2) |
| T93R-29A | 6059169 | 617057 | 849.69 | 0.76 | 26.50 | 33.50 | 819.69 | 28-Sep-93 | dry | < 816.19 | North | OVB | na | Till |
| T93R-29A | 6059169 | 617057 | 849.69 | 0.76 | 26.50 | 33.50 | 819.69 | 23-Aug-97 | dry | < 816.19 | North | OVB | na | Till |
| T93R-29B | 6059169 | 617057 | 849.69 | 0.70 | 109.10 | 114.30 | 737.99 | 28-Sep-93 | 100.00 | 750.39 | North | BDR | Ut I | Coal (#1) |
| T93R-29B | 6059169 | 617057 | 849.69 | 0.70 | 109.10 | 114.30 | 737.99 | 23-Aug-97 | 76.55 | 773.84 | North | BDR | Ut I | Coal (#1) |
| T93R-30 | 6059770 | 616666 | 902.16 | 0.48 | 100.60 | 106.70 | 798.51 | 28-Sep-93 | 58.88 | 843.76 | North | BDR | Ut I | Coal (#1) |
| T93R-30 | 6059770 | 616666 | 902.16 | 0.48 | 100.60 | 106.70 | 798.51 | 23-Aug-97 | 58.54 | 844.10 | North | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 26-Oct-96 | artesian | > 880.2 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 23-Aug-97 | 1.32 | 879.96 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 26-Jul-17 | 0.45 | 880.83 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 26-Sep-17 | 0.24 | 881.04 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 15-Jan-18 | frozen | n/a | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 28-Mar-18 | 0.24 | 881.04 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 20-Apr-18 | 1.23 | 880.61 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 19-Jun-18 | 0.71 | 881.13 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 11-Sep-18 | frozen | n/a | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 4-Oct-18 | frozen | n/a | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 16-Oct-18 | 0.65 | 881.19 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 9-Jan-19 | artesian | > 880.2 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 5-Apr-19 | 0.63 | 881.21 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 7-Jun-19 | 0.66 | 881.18 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 31-Aug-19 | 0.82 | 881.02 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-39C | 6050869 | 617336 | 981.03 | 0.80 | 51.20 | 58.40 | 926.23 | 22-Aug-94 | artesian | > 981.03 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-39C | 6050869 | 617336 | 981.03 | 0.80 | 51.20 | 58.40 | 926.23 | 27-Oct-95 | artesian | > 981.03 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.35 | 42.00 | 53.00 | 852.68 | 27-Oct-95 | 7.88 | 892.65 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.35 | 42.00 | 53.00 | 852.68 | 23-Aug-97 | 7.41 | 893.12 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 25-Jul-17 | 7.95 | 892.50 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 17-Aug-17 | 8.16 | 892.29 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 29-Sep-17 | 8.03 | 892.41 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 18-Jan-18 | 7.95 | 892.49 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 3-Apr-18 | 7.91 | 892.53 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 27-Jun-18 | 8.11 | 892.33 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 15-Sep-18 | 8.17 | 892.27 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 10-Jan-19 | 8.02 | 892.42 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 2-Apr-19 | 8.08 | 892.36 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 4-Jun-19 | 8.13 | 892.32 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 30-Aug-19 | 8.21 | 892.23 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.20 | 85.00 | 94.00 | 851.24 | 26-Oct-95 | 8.07 | 933.87 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.20 | 85.00 | 94.00 | 851.24 | 22-Aug-97 | 7.56 | 934.38 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 25-Jul-17 | 7.54 | 934.44 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 17-Aug-17 | 7.53 | 934.45 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 26-Sep-17 | 7.35 | 934.63 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 15-Jan-18 | 7.28 | 934.70 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 31-Mar-18 | 7.20 | 934.77 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 21-Jun-18 | 7.43 | 934.54 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 13-Sep-18 | 7.51 | 934.46 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 11-Jan-19 | 7.35 | 934.62 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 7-Feb-19 | 7.36 | 934.62 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 10-Feb-19 | 7.32 | 934.65 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 4-Mar-19 | 7.37 | 934.60 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 6-Apr-19 | 7.32 | 934.65 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 8-Jun-19 | 7.37 | 934.60 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 31-Aug-19 | 7.36 | 934.62 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-113-43 | 6054134 | 621254 | 771.74 | 0.35 | 36.50 | 42.50 | 732.24 | 19-Sep-96 | 7.90 | 764.19 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T96R-113-43 | 6054134 | 621254 | 771.74 | 0.35 | 36.50 | 42.50 | 732.24 | 20-Aug-97 | 7.36 | 764.73 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T96R-113-79 | 6054134 | 621254 | 771.74 | 0.35 | 75.50 | 78.50 | 694.74 | 19-Sep-96 | 14.50 | 757.59 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-113-79 | 6054134 | 621254 | 771.74 | 0.35 | 75.50 | 78.50 | 694.74 | 20-Aug-97 | 11.94 | 760.15 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.65 | 13.10 | 19.10 | 996.43 | 18-Sep-96 | 2.36 | 1010.82 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.65 | 13.10 | 19.10 | 996.43 | 22-Sep-97 | 2.40 | 1010.78 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 25-Jul-17 | 2.69 | 1010.59 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 27-Sep-17 | 2.74 | 1010.55 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 16-Jan-18 | 2.43 | 1010.85 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 30-Mar-18 | 2.47 | 1010.81 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 27-Jun-18 | 2.34 | 1010.94 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 6-Sep-18 | 3.04 | 1010.24 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 5-Jan-19 | 2.79 | 1010.50 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 3-Apr-19 | 2.70 | 1010.58 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 1-Jun-19 | 2.24 | 1011.05 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 31-Aug-19 | 2.79 | 1010.50 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.74 | 24.50 | 27.50 | 986.90 | 18-Sep-96 | 2.41 | 1011.23 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.74 | 24.50 | 27.50 | 986.90 | 22-Aug-97 | 2.48 | 1011.16 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 25-Jul-17 | 2.69 | 1011.03 | Tenas | BDR | na | Un-named lower coal |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 27-Sep-17 | 2.76 | 1010.96 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 16-Jan-18 | 2.45 | 1011.28 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 30-Mar-18 | 2.50 | 1011.22 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 27-Jun-18 | 2.34 | 1011.38 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 6-Sep-18 | 3.05 | 1010.67 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 5-Jan-19 | 2.81 | 1010.92 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 3-Apr-19 | 2.73 | 1010.99 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 1-Jun-19 | 2.24 | 1011.48 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 31-Aug-19 | 2.80 | 1010.92 | Tenas | BDR | na | Un-named lower coal |
| T96R-34-67 | 6051180 | 617691 | 934.02 | 0.94 | 66.20 | 67.50 | 867.17 | 18-Sep-96 | artesian | > 934.02 | Tenas | BDR | na | Coal (upper ) |
| T96R-34-67 | 6051180 | 617691 | 934.02 | 0.94 | 66.20 | 67.50 | 867.17 | 22-Aug-97 | 0.63 | 934.33 | Tenas | BDR | na | Coal (upper ) |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 18-Sep-96 | artesian | > 934.02 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 22-Aug-97 | 0.73 | 934.26 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 25-Jul-17 | 0.85 | 934.15 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 16-Aug-17 | 0.88 | 934.11 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 27-Sep-17 | 0.83 | 934.17 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 17-Jan-18 | frozen | n/a | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 28-Mar-18 | 0.86 | 934.13 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 20-Jun-18 | 0.78 | 934.21 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 12-Sep-18 | 0.81 | 934.18 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 9-Jan-19 | artesian | > 934.02 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 4-Apr-19 | 0.90 | 934.09 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 5-Jun-19 | n/a | n/a | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 30-Aug-19 | 0.87 | 934.13 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-40-117 | 6053367 | 621435 | 833.50 | 0.78 | 108.40 | 117.40 | 720.60 | 19-Sep-96 | 37.46 | 796.82 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-40-117 | 6053367 | 621435 | 833.50 | 0.78 | 108.40 | 117.40 | 720.60 | 20-Aug-97 | 39.12 | 795.16 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-40-87 | 6053367 | 621435 | 833.55 | 0.80 | 81.00 | 87.00 | 749.55 | 19-Sep-96 | 18.36 | 815.99 | Goathorn | BDR | Ut III | Coal ( #4), 5? |
| T96R-40-87 | 6053367 | 621435 | 833.55 | 0.80 | 81.00 | 87.00 | 749.55 | 20-Aug-97 | 20.22 | 814.13 | Goathorn | BDR | Ut III | Coal ( #4), 5? |
| T96R-44-54 | 6054247 | 620908 | 764.94 | 0.62 | 50.50 | 53.50 | 712.94 | 19-Sep-96 | 14.44 | 751.12 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-44-54 | 6054247 | 620908 | 764.94 | 0.62 | 50.50 | 53.50 | 712.94 | 20-Aug-97 | 14.48 | 751.08 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-56C-83 | 6050370 | 618588 | 944.08 | 1.18 | 74.90 | 82.60 | 865.33 | 18-Sep-96 | artesian | > 944.08 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-56C-83 | 6050370 | 618588 | 944.08 | 1.18 | 74.90 | 82.60 | 865.33 | 22-Aug-97 | 1.26 | 944.00 | Tenas | BDR | Ut I | Coal (#1) |
| T96TP-01-10 | 6050718 | 617276 | 995.70 | 0.80 | 8.50 | 10.00 | 986.45 | 19-Sep-96 | 1.64 | 994.86 | Tenas | BDR | na | Coal (C) |
| T96TP-02-07 | 6050655 | 617201 | 1001.60 | 0.80 | 2.00 | 7.00 | 997.10 | 20-Aug-97 | 3.23 | 999.17 | Tenas | BDR | Ut I | Coal (#1) |
| T974-21-87 | 6055299 | 620884 | 690.64 | 0.97 | 81.70 | 87.70 | 605.94 | 21-Aug-97 | 33.39 | 658.22 | Goathorn | BDR | Ut I | Coal (#1) |
| T97R-108C-70 | 6052532 | 617380 | 834.48 | 0.62 | 61.00 | 70.00 | 768.98 | 26-Sep-97 | 18.16 | 816.94 | Tenas | BDR | Ut I | Coal (#1) |
| T97R-12-75 | 6053796 | 621298 | 792.54 | 0.65 | 68.00 | 74.80 | 721.14 | 20-Aug-97 | 6.77 | 786.42 | Goathorn | BDR | Ut III | Coal (#2) |
| T97R-15-29 | 6054655 | 621062 | 739.81 | 2.15 | 26.00 | 29.00 | 712.31 | 20-Aug-97 | artesian | > 739.81 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T97R-15-52 | 6054655 | 621062 | 739.81 | 0.60 | 47.00 | 51.60 | 690.51 | 20-Aug-97 | 0.48 | 739.93 | Goathorn | BDR | Ut III | Coal (#3) |
| T97R-17-104 | 6052878 | 621462 | 846.30 | 0.55 | 98.50 | 104.00 | 745.05 | 20-Aug-97 | 22.66 | 824.19 | Goathorn | BDR | Ut III | Coal (#2) |
| T97R-17-79 | 6052878 | 621462 | 846.30 | 0.52 | 69.70 | 78.70 | 772.10 | 20-Aug-97 | 22.68 | 824.14 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T97R-20-131 | 6055114 | 621360 | 713.61 | 0.89 | 127.00 | 131.00 | 584.61 | 21-Aug-97 | 7.59 | 706.91 | Goathorn | BDR | Ut III | Coal (#2) |
| T97R-20-40 | 6055114 | 621360 | 713.61 | 0.82 | 35.20 | 39.70 | 676.16 | 21-Aug-97 | 6.52 | 707.91 | Goathorn | BDR | Ut III | Coal (#8) |
| T97R-20-83 | 6055114 | 621360 | 713.46 | 0.97 | 77.20 | 83.50 | 633.11 | 21-Aug-97 | 5.29 | 709.14 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T97R-21-41 | 6055299 | 620884 | 690.64 | 0.87 | 37.70 | 49.70 | 646.94 | 21-Aug-97 | 1.60 | 689.91 | Goathorn | BDR | Ut I | Coal (#?) |
| T97R-23-69 | 6055588 | 620717 | 679.72 | 0.60 | 61.50 | 68.50 | 614.72 | 21-Aug-97 | 39.44 | 640.88 | Goathorn | BDR | Ut I | Coal (#1) |
| T97R-33-20 | 6054236 | 621053 | 767.66 | 0.60 | 12.50 | 15.50 | 753.66 | 21-Aug-97 | artesian | > 767.66 | Goathorn | BDR | Ut III | Upper Sndstn |
| T97R-33-55 | 6054236 | 621053 | 767.66 | 0.80 | 50.70 | 53.70 | 715.46 | 21-Aug-97 | 14.96 | 753.50 | Goathorn | BDR | Ut III | Sndstn #3 |
| T97R-33-78 | 6054236 | 621053 | 767.66 | 0.92 | 75.10 | 78.10 | 691.06 | 21-Aug-97 | 14.83 | 753.75 | Goathorn | BDR | Ut III | Lower Mdstn |
| T97R-36-140 | 6055272 | 621430 | 710.28 | 0.86 | 137.00 | 140.00 | 571.78 | 21-Aug-97 | 26.40 | 684.74 | Goathorn | BDR | na | Lower Mdstn |
| T97R-36W | 6055272 | 621430 | 710.71 | 0.45 | 11.50 | 132.50 | 638.71 | 21-Aug-97 | 4.44 | 706.72 | Goathorn | BDR | na | Various |
| T97R-49-63 | 6055515 | 621377 | 701.94 | 0.60 | 60.00 | 63.00 | 640.44 | 21-Aug-97 | 27.35 | 675.19 | Goathorn | BDR | Ut III | Sndstn #3 |
| T97R-49-63 | 6055515 | 621377 | 701.94 | 0.60 | 60.00 | 63.00 | 640.44 | 27-Aug-97 | 17.48 | 685.06 | Goathorn | BDR | Ut III | Sndstn #3 |
| T97RP-01-04 | 6054364 | 620705 | 744.49 | 0.66 | 1.30 | 4.50 | 741.59 | 25-Sep-97 | 0.86 | 744.29 | Goathorn | OVB | na | Silty clay till fill |
| T97RP-01-13 | 6054364 | 620705 | 744.49 | 0.66 | 11.50 | 13.00 | 732.24 | 25-Sep-97 | 1.52 | 743.63 | Goathorn | OVB | na | Silty clay till fill |
| T97RP-02-12 | 6054362 | 620887 | 758.56 | 0.60 | 10.80 | 12.30 | 747.01 | 25-Sep-97 | 6.09 | 753.07 | Goathorn | OVB | na | Silty clay till fill |
| T97RP-03-08 | 6054325 | 621236 | 764.04 | 0.70 | 5.50 | 8.50 | 757.04 | 25-Sep-97 | 4.78 | 759.96 | Goathorn | OVB | na | Silty clay till fill |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.52 | 1.60 | 4.60 | 919.77 | 20-Sep-96 | 1.45 | 921.94 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.52 | 1.60 | 4.60 | 919.77 | 22-Aug-97 | 1.12 | 922.27 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 25-Jul-17 | 2.70 | 920.92 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 28-Sep-17 | 3.68 | 919.95 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 18-Jan-18 | 1.92 | 921.70 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 29-Mar-18 | 1.37 | 922.25 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 21-Jun-18 | 1.96 | 921.66 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 13-Sep-18 | 4.88 | 918.74 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 11-Jan-19 | 5.12 | 918.50 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 3-Apr-19 | 4.70 | 918.92 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 6-Jun-19 | 2.36 | 921.26 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 31-Aug-19 | 4.93 | 918.69 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.57 | 3.00 | 6.00 | 848.96 | 20-Sep-96 | 2.02 | 852.01 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.57 | 3.00 | 6.00 | 848.96 | 23-Aug-97 | 1.76 | 852.27 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 26-Jul-17 | 2.93 | 850.91 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 28-Sep-17 | 3.61 | 850.23 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 16-Jan-18 | 2.63 | 851.22 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 26-Mar-18 | 2.73 | 851.11 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 29-Mar-18 | 2.81 | 851.03 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 20-Jun-18 | 2.01 | 851.83 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 22-Jun-10 | 2.06 | 851.78 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 10-Sep-18 | 3.40 | 850.44 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 8-Jan-19 | 3.96 | 849.88 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 29-Mar-19 | 2.81 | n/a | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 5-Apr-19 | 4.12 | 849.72 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 6-Jun-19 | 3.62 | 850.22 | Tenas | OVB | na | Till |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 30-Aug-19 | 3.62 | 850.22 | Tenas | OVB | na | Till |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.52 | 17.00 | 20.00 | 834.96 | 20-Sep-96 | 18.42 | 835.56 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.52 | 17.00 | 20.00 | 834.96 | 23-Sep-97 | 19.71 | 834.27 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 28-Sep-17 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 16-Jan-18 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 26-Mar-18 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 20-Jun-18 | 20.36 | 833.44 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 10-Sep-18 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 8-Jan-19 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 5-Apr-19 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 6-Jun-19 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 30-Aug-19 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.72 | 1.50 | 4.50 | 824.36 | 20-Sep-96 | dry | < 822.86 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.72 | 1.50 | 4.50 | 824.36 | 23-Aug-97 | 2.77 | 825.31 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 26-Jul-17 | 2.48 | 825.75 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 27-Sep-17 | 2.54 | 825.69 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 15-Jan-18 | 3.20 | 825.03 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 26-Mar-18 | 3.87 | 824.36 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 21-Jun-18 | 3.35 | 824.88 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 6-Sep-18 | 3.75 | 824.48 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 8-Jan-19 | 3.89 | 824.34 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 30-Mar-19 | 4.10 | 824.13 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 30-May-19 | 3.80 | 824.43 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 28-Aug-19 | 3.44 | 824.80 | Tenas | OVB | na | Clay |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.68 | 18.70 | 20.20 | 807.91 | 20-Sep-96 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.68 | 18.70 | 20.20 | 807.91 | 22-Aug-97 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 26-Jul-17 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 27-Sep-17 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 15-Jan-18 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 26-Mar-18 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 21-Jun-18 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 6-Sep-18 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 8-Jan-19 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 30-Mar-19 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 28-May-19 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 28-Aug-19 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-12-04 | 6051377 | 616082 | 926.02 | 0.70 | 1.00 | 4.00 | 923.52 | 30-Sep-96 | 2.71 | 924.01 | Tenas | OVB | na | Till |
| TOB96-12-04 | 6051377 | 616082 | 926.02 | 0.70 | 1.00 | 4.00 | 923.52 | 22-Aug-97 | 2.62 | 924.10 | Tenas | OVB | na | Till |
| TOB97-04-07 | 6055616 | 622328 | 684.25 | 0.54 | 4.50 | 7.50 | 678.25 | 26-Sep-97 | 5.84 | 678.95 | Goathorn | OVB | na | Silt till |
| TOB97-05-06 | 6054474 | 621931 | 759.37 | 0.83 | 2.80 | 5.90 | 755.02 | 26-Sep-97 | 3.38 | 756.82 | Goathorn | OVB | na | Till |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.70 | 18.00 | 21.00 | 835.08 | 22-Aug-97 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 26-Jul-17 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 19-Jan-18 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 22-Jun-18 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 10-Sep-18 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 5-Jan-19 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 1-Apr-19 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 1-Jun-19 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 28-Aug-19 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.60 | 21.00 | 24.00 | 788.55 | 22-Aug-97 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 26-Jul-17 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 26-Mar-18 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 25-Jun-18 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 8-Sep-18 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 4-Jan-19 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 1-Apr-19 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 30-May-19 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 28-Aug-19 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TW604A | 6060134 | 618624 | 812.64 | 0.68 | 24.80 | 32.60 | 783.94 | 12-Nov-89 | 23.45 | 789.87 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW604A | 6060134 | 618624 | 812.64 | 0.68 | 24.80 | 32.60 | 783.94 | 29-Sep-93 | 25.93 | 787.39 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW604A | 6060134 | 618624 | 812.64 | 0.68 | 24.80 | 32.60 | 783.94 | 23-Aug-97 | 24.81 | 788.51 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905A | 6059904 | 618544 | 812.64 | 0.68 | 17.80 | 26.00 | 790.74 | 12-Nov-89 | 25.63 | 787.69 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905A | 6059904 | 618544 | 812.64 | 0.68 | 17.80 | 26.00 | 790.74 | 29-Sep-93 | 25.04 | 788.28 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 12-Nov-89 | 24.40 | 788.92 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 12-Nov-89 | 26.53 | 786.79 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 12-Nov-89 | 14.24 | 799.08 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 28-Sep-93 | 13.94 | 799.38 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 29-Sep-93 | 24.06 | 789.26 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 29-Sep-93 | 25.93 | 787.39 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 23-Aug-97 | 23.42 | 789.90 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 23-Aug-97 | 24.32 | 789.00 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 23-Aug-97 | 14.12 | 799.20 | North | BDR | na | Coal (#6 mid), Mdstn |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 17-Jan-19 | 15.70 | n/a | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 18-Jan-19 | 15.06 | n/a | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 10-Feb-19 | 25.47 | n/a | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 13-Feb-19 | 25.92 | n/a | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 24-Feb-19 | 27.35 | n/a | Tenas | OVB | | Clayey Sand |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 11-Mar-19 | 30.43 | 786.87 | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 3-Apr-19 | 29.69 | 787.60 | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 28-May-19 | 30.25 | 787.04 | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 31-Aug-19 | 30.56 | 786.74 | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 28-Nov-19 | 30.32 | 786.97 | Tenas | OVB | | Clayey Sand |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 22-Jan-19 | 44.40 | n/a | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 10-Feb-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 10-Mar-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 6-Apr-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 27-May-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 31-Aug-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 22-Jan-19 | 14.79 | 845.51 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 10-Feb-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 9-Mar-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 4-Apr-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 27-May-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 31-Aug-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 22-Nov-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 29-Jan-19 | 6.44 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 10-Feb-19 | 19.85 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 24-Feb-19 | 24.94 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 9-Mar-19 | 28.35 | 806.94 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 12-Mar-19 | 28.32 | 806.98 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 3-Apr-19 | 28.34 | 806.96 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 25-May-19 | 28.40 | 806.89 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 31-Aug-19 | 28.50 | 806.79 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 22-Nov-19 | 28.43 | 806.86 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 10-Feb-19 | 12.64 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 24-Feb-19 | 16.69 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 8-Mar-19 | 26.59 | 800.50 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 11-Mar-19 | 24.89 | 802.20 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 12-Mar-19 | 24.83 | 802.26 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 30-Mar-19 | 24.22 | 802.87 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 1-Apr-19 | 24.20 | 802.89 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 23-May-19 | 2.06 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 28-Aug-19 | 24.03 | 803.07 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 28-Nov-19 | 23.96 | 803.13 | Tenas | BDR | | Weathered Siltstone |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 7-Feb-19 | 14.13 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 7-Feb-19 | 14.65 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 10-Feb-19 | 28.28 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 11-Feb-19 | 30.18 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 12-Feb-19 | 31.06 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 13-Feb-19 | 31.94 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 15-Feb-19 | 33.05 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 24-Feb-19 | 35.35 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 11-Mar-19 | 35.52 | 772.83 | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 2-Apr-19 | 35.46 | 772.88 | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 24-May-19 | 35.55 | 772.79 | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 28-Aug-19 | 35.74 | 772.60 | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 23-Nov-19 | 35.61 | 772.73 | Tenas | OVB | | Clayey Sand |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 15-Feb-19 | 28.27 | 780.90 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 24-Feb-19 | 40.99 | 768.18 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 10-Mar-19 | 40.89 | 768.28 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 1-Apr-19 | 41.01 | 768.16 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 24-May-19 | 40.96 | 768.21 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 28-Aug-19 | 40.94 | 768.23 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 23-Nov-19 | 40.78 | 768.39 | Tenas | OVB | | Silty Sand with Gravel |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 28-Feb-19 | 10.70 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 1-Mar-19 | 14.07 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 9-Mar-19 | 28.86 | 809.04 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 11-Mar-19 | 28.80 | 809.10 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 6-Apr-19 | 28.84 | 809.06 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 28-May-19 | 28.94 | 808.96 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 27-Aug-19 | 28.94 | 808.96 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 28-Nov-19 | 28.84 | 809.06 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 1-Mar-19 | 20.26 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 8-Mar-19 | 23.47 | 806.15 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 12-Mar-19 | 23.56 | 806.06 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 5-Apr-19 | 23.72 | 805.90 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 23-May-19 | 23.87 | 805.75 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 27-Aug-19 | 23.95 | 805.67 | Tenas | BDR | | Weathered Siltstone |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 28-Nov-19 | 23.96 | 805.66 | Tenas | BDR | | Weathered Siltstone |
| T19-36 | 6058365 | 629737 | 515.35 | 0.88 | 3.70 | 5.20 | 510.90 | 12-Mar-19 | 3.93 | 512.31 | Rail Loadout | OVB | | Sand and Gravel |
| T19-36 | 6058365 | 629737 | 515.35 | 0.88 | 3.70 | 5.20 | 510.90 | 15-Apr-19 | 3.36 | 512.88 | Rail Loadout | OVB | | Sand and Gravel |
| T19-36 | 6058365 | 629737 | 515.35 | 0.88 | 3.70 | 5.20 | 510.90 | 21-May-19 | 3.27 | 512.97 | Rail Loadout | OVB | | Sand and Gravel |
| T19-37 | 6058215 | 629955 | 516.39 | 0.87 | 3.40 | 5.00 | 512.19 | 12-Mar-19 | 4.34 | 512.92 | Rail Loadout | OVB | | Sand and Gravel |
| T19-37 | 6058215 | 629955 | 516.39 | 0.87 | 3.40 | 5.00 | 512.19 | 15-Apr-19 | 4.07 | 513.19 | Rail Loadout | OVB | | Sand and Gravel |
| T19-37 | 6058215 | 629955 | 516.39 | 0.87 | 3.40 | 5.00 | 512.19 | 21-May-19 | 3.99 | 513.28 | Rail Loadout | OVB | | Sand and Gravel |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 13-Nov-18 | 6.21 | 677.54 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 12-Dec-18 | 6.23 | 677.52 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 16-Jan-19 | 6.28 | 677.47 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 22-Feb-19 | 6.32 | 677.43 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 22-Mar-19 | 6.36 | 677.39 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 18-Apr-19 | 6.15 | 677.60 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 29-May-19 | 6.18 | 677.57 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 23-Aug-19 | 6.52 | 677.23 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 26-Sep-19 | 6.67 | 677.08 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 13-Nov-19 | 6.66 | 677.09 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 13-Nov-18 | 13.44 | 704.11 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 12-Dec-18 | 13.46 | 704.09 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 16-Jan-19 | 13.48 | 704.07 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 22-Feb-19 | 13.49 | 704.06 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 22-Mar-19 | 13.49 | 704.06 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 18-Apr-19 | 13.28 | 704.27 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 29-May-19 | 13.26 | 704.29 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 23-Aug-19 | 13.41 | 704.14 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 26-Sep-19 | 13.44 | 704.11 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 13-Nov-19 | 13.37 | 704.18 | Access Road | OVB | | Sand with Gravel/Till |
| T19-28S | 6054651 | 620005 | 710.20 | | | | | n/a | 6.50 | 703.90 | Access Road | OVB | | Till |
| T19-28S | 6054651 | 620005 | 710.20 | | | | | n/a | 7.50 | 702.90 | Access Road | OVB | | Till |
| T18-30S | 6054456 | 620050 | 706.70 | | | | | n/a | 11.40 | 695.30 | Access Road | OVB | | Clayey Silt (Fill) |
| T18-30S | 6054456 | 620050 | 706.70 | | | | | n/a | 13.60 | 693.10 | Access Road | OVB | | Clayey Silt (Fill) |
| T19-31S | 6054334 | 620048 | 704.90 | | | | | n/a | dry | < 697.3 | Access Road | OVB | | Gravelly Silt (Fill) |

# Appendix D – Groundwater Quality

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | - | - | - | T95R-64-0817 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 |
| | | | | | Geol | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR |
| | | | | | Date Sampled | 27-Oct-1995[4] | 28-Oct-1996 | 22-Aug-1997 | 17-Aug-2017 | 26-Sep-2017 | 15-Jan-2018 | 31-Mar-2018 | 21-Jun-2018 | 13-Sep-2018 | 11-Jan-2019 | 6-Apr-2019 | 6-Jun-2019 |
| | | | | | ALS Sample ID (2017-2018) | - | - | - | L1977808-4 | L2000339-2 | L2047836-7 | L2078247-7 | L2117455-5 | L2164994-3 | L2220048-2 | L2255482-3 | L2288655-1 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | 95-04060-3 | 96-04300-3 | 97-04136-25 | - | - | - | - | - | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | - | - | - | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 1450.00 | 1305.00 | 1342.00 | 1330.00 | 1220.00 | 1270.00 | 1280.00 | 1200.00 | 1330.00 | 1250.00 | 1290.00 | 1250.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 1640.00 | 1304.00 | 1176.00 | 1303.00 | 1322.00 | 1279.00 | 1293.00 | 1312.00 | 1277.00 | 1285.00 | 1332.00 | 1282.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 63.10 | 56.40 | 61.80 | 56.80 | 57.20 | 53.50 | 56.60 | 58.10 | 52.80 | 52.00 | 55.60 | 53.90 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.56 | 7.48 | 7.49 | 8.19 | 8.17 | 8.09 | 8.59 | 8.75 | 8.40 | 7.89 | 8.23 | 8.56 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 7.03 | 7.70 | 7.56 | 7.35 | 7.50 | 7.12 | 7.68 | 7.39 | 7.51 | 7.63 | 7.77 | 7.41 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 84.00 | 1.00 | 8.00 | 5.00 | 3.00 | 3.00 | 3.00 | 7.30 | 3.00 | 3.00 | 3.00 | 3.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 879.00 | 782.00 | 827.00 | 845.00 | 823.00 | 838.00 | 818.00 | 779.00 | 830.00 | 820.00 | 794.00 | 812.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | - | - | - | 4.82 | 4.22 | 1.79 | 0.83 | 3.48 | 2.96 | 1.55 | 0.55 | 3.18 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | - | - | - | 2.90 | 3.10 | - | 1.00 | 1.00 | 1.00 | 5.60 | 1.0 | 1.0 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 975.00 | 920.00 | 973.00 | 739.00 | 716.00 | 756.00 | 697.00 | 653.00 | 741.00 | 729.00 | 750.00 | 675.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 0.50 | 0.50 | 0.50 | 39.40 | 44.60 | 1.00 | 61.20 | 48.80 | 29.40 | 1.00 | 1.00 | 64.40 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | - | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 0.10 | 0.10 | 0.10 | 22.30 | - | - | - | - | - | - | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 800.00 | 755.00 | 798.00 | 778.00 | 761.00 | 756.00 | 759.00 | 702.00 | 770.00 | 729.00 | 750.00 | 739.00 |
| **Anions and Nitrogen** | | | n.g. | n.g. | **Anions and Nitrogen** | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.31 | 0.32 | 0.24 | 0.35 | 0.34 | 0.37 | 0.36 | 0.34 | 0.35 | 0.36 | 0.34 | 0.38 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | - | - | - | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 3.00 | 1.10 | 0.60 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 1.34 | - | - | 1.49 | 1.48 | 1.58 | 1.46 | 1.52 | 1.47 | 1.53 | 1.53 | 1.66 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | - | - | - | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | - | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.15 | 0.01 | - | 0.37 | 0.37 | 0.37 | 0.35 | 0.43 | 0.39 | 0.38 | 0.38 | 0.38 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0010 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.05 | 0.01 | 0.02 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.07 | 0.02 | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 12.40 | 0.40 | 0.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | - | - | - | 0.50 | 0.50 | 0.50 | 0.50 | 0.87 | 0.50 | 0.50 | 0.90 | 0.50 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | - | - | - | 0.50 | 0.50 | 0.50 | 0.50 | 0.79 | 0.58 | 0.50 | 0.54 | 0.50 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 1.86 | 0.23 | 0.18 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.24 | 0.40 | - | 0.45 | 0.41 | 0.43 | 0.37 | 0.40 | 0.42 | 0.40 | 0.48 | 0.40 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.14 | 0.23 | 0.38 | 0.15 | 0.13 | 0.15 | 0.12 | 0.13 | 0.14 | 0.13 | 0.14 | 0.14 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 21.60 | 21.00 | 0.11 | 20.70 | 19.50 | 20.60 | 18.10 | 17.90 | 18.80 | 18.90 | 19.60 | 18.30 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.07 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 21.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 2.43 | 0.73 | 0.00 | 0.65 | 0.47 | 0.42 | 0.36 | 0.47 | 0.39 | 0.37 | 0.39 | 0.36 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | - | 0.06 | 1.01 | 0.06 | 0.06 | 0.07 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 3.10 | 2.11 | 0.01 | 1.98 | 1.85 | 1.94 | 1.72 | 1.83 | 1.79 | 1.89 | 1.87 | 1.78 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.24 | 0.10 | 0.06 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 2.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.01 | 0.00 | 0.05 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 3.80 | 1.59 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 1.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 356.00 | 317.00 | 338.00 | 327.00 | 325.00 | 302.00 | 267.00 | 294.00 | 294.00 | 299.00 | 322.00 | 289.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | - | 0.01 | 0.01 | 0.05 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.03 | 0.02 | 0.08 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Dissolved Metals** | | | n.g. | n.g. | **Dissolved Metals** | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.04 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.40 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.20 | 0.37 | 0.44 | 0.43 | 0.44 | 0.43 | 0.40 | 0.44 | 0.45 | 0.43 | 0.50 | 0.47 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.12 | 0.08 | 0.03 | 0.13 | 0.14 | 0.14 | 0.13 | 0.13 | 0.13 | 0.12 | 0.14 | 0.14 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.003 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 20.800 | 19.500 | 21.200 | 19.600 | 19.800 | 18.300 | 19.600 | 20.000 | 18.100 | 17.900 | 19.200 | 18.500 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.002 | 0.001 | 0.006 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.003 | 0.002 | 0.004 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.001 | 0.000 | 0.003 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.11 | 0.01 | 0.01 | 0.56 | 0.41 | 0.39 | 0.38 | 0.17 | 0.36 | 0.34 | 0.34 | 0.36 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | - | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.05 | 0.06 | 0.06 | 0.06 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 2.70 | 1.86 | 2.14 | 1.92 | 1.91 | 1.89 | 1.89 | 1.98 | 1.83 | 1.78 | 1.83 | 1.88 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.19 | 0.07 | 0.04 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0001 | 0.0001 | 0.0500 | 0.0002 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.003 | 0.000 | 0.003 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.005 | 0.001 | 0.017 | 0.005 | 0.005 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.900 | 1.410 | 1.520 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0002 | 0.0002 | 0.0002 | 0.0010 | 0.0010 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.001 | 4.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 349.00 | 298.00 | 314.00 | 367.00 | 334.00 | 303.00 | 310.00 | 330.00 | 310.00 | 296.00 | 326.00 | 307.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | - | 0.00 | 0.00 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | - | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | - | - | - | - | - | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | - | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | - | - | - | - | - | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T96R-34-87 | T96R-34-87 | T96R-34-87 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | - | - | - | T95R-40-0817 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | - | - | 96R-34-87-081 |
| | | | | | Geol | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR |
| | | | | | Date Sampled | 27-Oct-1995 | 28-Oct-1996 | 23-Aug-1997 | 17-Aug-2017 | 29-Sep-2017 | 18-Jan-2018 | 3-Apr-2018 | 27-Jun-2018 | 15-Sep-2018 | 10-Jan-2019 | 2-Apr-2019 | 4-Jun-2019 | 18-Sep-1996 | 22-Aug-1997 | 16-Aug-2017 |
| | | | | | ALS Sample ID (2017-2018) | - | - | - | L1977808-3 | L2000339-9 | L2047836-2 | L2078247-4 | L2122028-3 | L2166287-3 | L2220047-4 | L2254339-6 | L2287158-2 | - | - | L1977808-2 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | 95-04060-4 | 96-04300-4 | 97-04136-37 | - | - | - | - | - | - | - | - | - | 96-03529-6 | 97-04136-35 | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | - | - | - | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | - | - | 5.00 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 2800.00 | 2836.00 | 2883.00 | 2790.00 | 2600.00 | 2680.00 | 2640.00 | 2780.00 | 2630.00 | 2600.00 | 2580.00 | 2650.00 | 1310.00 | 1400.00 | 1320.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 3385.00 | 2770.00 | 2470.00 | 2840.00 | 2560.00 | 2687.00 | 2726.00 | 2831.00 | 2650.00 | 2710.00 | 2921.00 | 2712.00 | 1290.00 | 1278.00 | 1312.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 131.00 | 110.00 | 116.00 | 113.00 | 102.00 | 103.00 | 103.00 | 92.60 | 95.60 | 99.50 | 108.00 | 97.30 | 46.30 | 43.60 | 44.00 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.48 | 7.37 | 7.48 | 8.08 | 7.81 | 7.67 | 8.44 | 8.36 | 8.42 | 7.58 | 7.98 | 8.46 | 7.55 | 7.39 | 8.15 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 6.99 | 7.20 | 7.29 | 7.18 | 7.30 | 7.11 | 7.67 | 7.33 | 7.22 | 7.42 | 7.60 | 7.16 | 7.46 | 7.50 | 7.33 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 57.00 | 7.00 | 7.00 | 11.60 | 5.30 | 688.00 | 3.00 | 51.30 | 28.40 | 92.70 | 71.80 | 13.00 | 31.00 | 3.00 | 10.40 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 1850.00 | 1769.00 | 1910.00 | 1750.00 | 1680.00 | 1810.00 | 1800.00 | 1790.00 | 1760.00 | 1800.00 | 1890.00 | 1750.00 | 818.00 | 838.00 | 834.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | - | - | - | 4.21 | 3.81 | 489.00 | 3.38 | 47.30 | 8.68 | 23.30 | 22.70 | 5.31 | - | - | 1.55 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | - | - | - | 11.30 | 21.50 | - | 1.00 | 1.00 | 17.20 | 22.00 | 17.20 | 1.0 | - | - | 3.70 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 2140.00 | 2103.00 | 2155.00 | 1660.00 | 1630.00 | 1690.00 | 1610.00 | 1640.00 | 1580.00 | 1570.00 | 1610.00 | 1470.00 | 928.00 | 995.00 | 753.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 0.50 | 0.50 | 0.50 | 1.00 | 67.40 | 1.00 | 78.20 | 1.00 | 42.80 | 1.00 | 1.00 | 162.00 | 0.50 | 0.50 | 1.00 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | - | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 0.10 | 0.10 | 0.10 | 33.70 | - | - | - | - | - | - | - | - | 0.10 | 0.10 | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 1760.00 | 1725.00 | 1768.00 | 1660.00 | 1700.00 | 1690.00 | 1690.00 | 1640.00 | 1630.00 | 1570.00 | 1610.00 | 1630.00 | 761.00 | 816.00 | 753.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.64 | 0.68 | 0.50 | 0.67 | 0.64 | 0.70 | 0.68 | 0.63 | 0.66 | 0.70 | 0.70 | 0.71 | 0.41 | 0.32 | 0.37 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | - | - | - | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - | - | 0.25 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 9.80 | 9.20 | 9.40 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 2.10 | 0.50 | 2.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 0.68 | - | - | 0.43 | 0.49 | 0.59 | 0.51 | 0.55 | 0.52 | 0.59 | 0.51 | 0.55 | - | - | 1.53 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | - | - | - | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | - | - | 0.03 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | - | - | - | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | - | - | 0.01 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.01 | 0.01 | - | 0.80 | 0.76 | 1.04 | 0.71 | 1.15 | 0.72 | 0.70 | 0.75 | 0.72 | - | - | 0.38 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.03 | 0.03 | 0.03 | 0.01 | 0.00 | - | 0.00 | 0.03 | 0.02 | 0.05 | 0.01 | 0.01 | 0.02 | 0.01 | 0.00 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.07 | 0.04 | 0.04 | 0.04 | 0.03 | 0.20 | 0.03 | 0.11 | 0.03 | 0.02 | 0.04 | 0.03 | 0.06 | 0.02 | 0.01 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 7.90 | 0.10 | 0.10 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.80 | 0.10 | 1.50 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | - | - | - | 0.50 | 0.50 | 1.11 | 0.56 | 2.51 | 0.54 | 0.50 | 0.50 | 0.81 | - | - | 0.50 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | - | - | - | 1.06 | 0.50 | 64.80 | 1.10 | 8.48 | 1.10 | 0.81 | 1.49 | 0.75 | - | - | 0.50 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 0.97 | 0.19 | 0.08 | 0.06 | 0.03 | 9.42 | 0.02 | 0.33 | 0.79 | 5.96 | 4.11 | 0.22 | 0.79 | 0.07 | 0.09 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 2.05 | 3.57 | 3.77 | 4.19 | 3.17 | 5.01 | 3.15 | 3.92 | 3.52 | 3.46 | 4.53 | 3.15 | 0.82 | 0.89 | 0.96 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.39 | 0.37 | 0.34 | 0.34 | 0.32 | 0.38 | 0.30 | 0.35 | 0.29 | 0.32 | 0.33 | 0.31 | 0.45 | 0.17 | 0.18 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 40.90 | 35.00 | 35.20 | 35.60 | 31.30 | 40.70 | 30.70 | 33.10 | 27.70 | 32.70 | 35.80 | 29.00 | 15.90 | 14.00 | 19.60 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 1.31 | 0.26 | 1.00 | 0.76 | 0.41 | 8.39 | 0.46 | 1.32 | 0.85 | 2.19 | 2.97 | 0.60 | 1.28 | 0.66 | 0.53 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.050 | n.g. | n.g. | Lithium (Li)-Total | - | 0.11 | 0.11 | 0.11 | 0.10 | 0.12 | 0.09 | 0.11 | 0.10 | 0.11 | 0.11 | 0.10 | 0.05 | 0.05 | 0.05 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 7.60 | 6.84 | 6.69 | 6.70 | 5.96 | 9.75 | 6.07 | 6.93 | 6.19 | 7.54 | 7.47 | 5.51 | 2.45 | 2.08 | 2.15 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.29 | 0.15 | 0.06 | 0.04 | 0.03 | 0.15 | 0.03 | 0.06 | 0.03 | 0.04 | 0.07 | 0.03 | 0.06 | 0.01 | 0.02 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.01 | 0.00 | 0.02 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 5.50 | 3.70 | 3.39 | 3.40 | 2.90 | 4.00 | 3.00 | 3.90 | 2.80 | 3.20 | 3.60 | 2.90 | 1.98 | 1.68 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 733.00 | 701.00 | 778.00 | 776.00 | 746.00 | 698.00 | 615.00 | 771.00 | 663.00 | 738.00 | 754.00 | 649.00 | 326.00 | 342.00 | 331.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | - | 0.02 | 0.01 | 0.05 | 0.05 | 0.04 | 0.01 | 0.01 | 0.01 | 0.04 | 0.02 | 0.02 | 0.01 | 0.01 | 0.05 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.02 | 0.04 | 0.05 | 0.01 | 0.01 | 0.04 | 0.01 | 0.03 | 0.01 | 0.02 | 0.02 | 0.01 | 0.03 | 0.06 | 0.01 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.06 | 0.02 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.06 | 0.32 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.60 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.003 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.010 | 0.006 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 2.02 | 3.50 | 3.63 | 4.06 | 3.02 | 3.69 | 3.18 | 3.32 | 3.19 | 3.50 | 3.71 | 3.62 | 0.80 | 0.88 | 0.91 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.36 | 0.24 | 0.32 | 0.31 | 0.33 | 0.36 | 0.34 | 0.33 | 0.29 | 0.32 | 0.33 | 0.29 | 0.36 | 0.06 | 0.16 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.003 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 40.000 | 32.900 | 35.200 | 35.100 | 30.900 | 30.800 | 31.400 | 27.500 | 28.300 | 29.900 | 31.600 | 29.600 | 15.000 | 14.000 | 14.200 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.003 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 | 0.001 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.001 | 0.001 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.01 | 0.01 | 0.01 | 0.68 | 0.32 | 0.03 | 0.40 | 0.26 | 0.50 | 0.56 | 0.55 | 0.43 | 0.13 | 0.30 | 0.46 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | - | 0.10 | 0.11 | 0.11 | 0.10 | 0.10 | 0.10 | 0.09 | 0.09 | 0.10 | 0.11 | 0.09 | 0.05 | 0.04 | 0.05 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 7.50 | 6.75 | 6.69 | 6.29 | 5.99 | 6.33 | 6.05 | 5.79 | 6.04 | 6.06 | 6.97 | 5.69 | 2.15 | 2.08 | 2.09 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.27 | 0.08 | 0.01 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.04 | 0.00 | 0.01 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0001 | 0.0001 | 0.0500 | 0.0002 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0500 | 0.0002 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.006 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.005 | 0.001 | 0.001 | 0.005 | 0.005 | 0.001 | 0.001 | 0.003 | 0.001 | 0.003 | 0.005 | 0.001 | 0.001 | 0.001 | 0.005 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 4.900 | 3.700 | 3.390 | 3.200 | 3.100 | 3.300 | 3.100 | 3.100 | 2.800 | 2.900 | 3.500 | 3.100 | 1.960 | 1.630 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0020 | 0.0002 | 0.0002 | 0.0010 | 0.0010 | 0.0001 | 0.0001 | 0.0003 | 0.0001 | 0.0003 | 0.0003 | 0.0001 | 0.0002 | 0.0002 | 0.0010 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 708.00 | 665.00 | 778.00 | 795.00 | 731.00 | 703.00 | 709.00 | 691.00 | 657.00 | 684.00 | 769.00 | 668.00 | 326.00 | 323.00 | 371.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | - | 0.00 | 0.00 | 0.05 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.05 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | - | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - | - |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000040 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | - | - | - | - | - | 0.000015 | 0.000041 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - | - | - |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000016 | 0.000010 | - | - | - |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | - | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - | - |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | - | - | - | - | - | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000021 | 0.000020 | - | - | - |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T95R-15C | T95R-15C | T95R-15C | T95R-15C | T95R-15C | T95R-15C | T95R-15C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | - | - | - | | T95R-15C | T95R-15C | T95R-15C |
| | | | | | Geol | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR |
| | | | | | Date Sampled | 27-Sep-2017 | 2-Apr-2018 | 20-Jun-2018 | 12-Sep-2018 | 9-Jan-2019 | 4-Apr-2019 | 5-Jun-2019 | 26-Oct-1995 | 28-Oct-1996 | 23-Aug-1997 | 9-Nov-2016 | 26-Sep-2017 | 20-Apr-2018 | 20-Jun-2018 |
| | | | | | ALS Sample ID (2017-2018) | L2000339-3 | L2078247-8 | L2117455-3 | L2164994-2 | L2220048-3 | L2254339-2 | L2287159-3 | - | - | - | - | L2000339-1 | L2085540-1 | L2117455-2 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | QA4704 | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | 95-04060-1 | 96-04300-2 | 97-04136-41 | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 5.00 | 5.00 | 5.00 | 5.00 | 5.0 | 49.90 | 6.30 | - | - | - | 5.00 | 5.00 | 5.00 | 5.00 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 1280.00 | 1340.00 | 1310.00 | 1470.00 | 1830.00 | 1600.00 | 1690.00 | 1440.00 | 1375.00 | 1414.00 | 1340.00 | 1260.00 | 1300.00 | 1250.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 1414.00 | 1379.00 | 1453.00 | 1415.00 | 1896.00 | 1697.00 | 1744.00 | 1665.00 | 1355.00 | 987.00 | - | 1370.00 | 1602.00 | 1370.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 42.00 | 41.70 | 41.50 | 35.70 | 43.10 | 39.80 | 39.30 | 23.70 | 20.60 | 21.20 | 22.80 | 18.30 | 17.80 | 17.40 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.98 | 8.58 | 8.65 | 8.46 | 7.90 | 8.09 | 8.61 | 8.13 | 8.14 | 8.12 | 8.60 | 8.48 | 8.82 | 8.79 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 7.50 | 7.68 | 7.47 | 7.50 | 7.64 | 7.75 | 7.42 | 7.34 | 8.20 | 8.25 | - | 8.20 | 8.40 | 8.31 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 4.70 | 3.00 | 13.50 | 13.40 | 44.60 | 48.00 | 9.90 | 604.00 | 0.40 | 2.00 | 120.00 | 5.30 | 3.00 | 3.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 862.00 | 871.00 | 838.00 | 869.00 | 1220.00 | 1100.00 | 1090.00 | 853.00 | 821.00 | 858.00 | 820.00 | 867.00 | 837.00 | 803.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 2.45 | 0.98 | 2.94 | 11.90 | 12.90 | 75.10 | 10.60 | - | - | - | 120.00 | 3.11 | 0.50 | 1.80 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 8.80 | 1.00 | 1.00 | 1.00 | 7.00 | 6.60 | 1.00 | - | - | - | 0.50 | 1.00 | - | 1.00 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 759.00 | 740.00 | 762.00 | 803.00 | 1100.00 | 883.00 | 969.00 | 989.00 | 954.00 | 1009.00 | 872.00 | 698.00 | 609.00 | 698.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 44.80 | 72.40 | 43.40 | 37.40 | 1.00 | 7.20 | 75.80 | 0.50 | 0.50 | 0.50 | 26.60 | 63.80 | 60.40 | 58.00 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 22.40 | - | - | - | - | - | - | 0.10 | 0.10 | 0.10 | 22.20 | 31.90 | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 804.00 | 813.00 | 805.00 | 840.00 | 1100.00 | 890.00 | 1050.00 | 811.00 | 783.00 | 828.00 | 759.00 | 762.00 | 670.00 | 756.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.37 | 0.40 | 0.40 | 0.40 | 0.49 | 0.42 | 0.47 | 0.26 | 0.28 | 0.22 | 0.33 | 0.25 | 0.25 | 0.28 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | 0.25 | 0.25 | 0.25 | 0.25 | 0.50 | 0.50 | 0.25 | - | - | - | - | 0.25 | 0.25 | 0.25 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 2.50 | 2.50 | 2.50 | 2.50 | 5.00 | 5.00 | 2.50 | 1.90 | 2.20 | 2.20 | 3.00 | 2.50 | 2.50 | 2.70 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 1.51 | 1.46 | 1.49 | 1.43 | 1.49 | 1.04 | 1.36 | 2.16 | - | - | 2.20 | 2.24 | 2.14 | 2.30 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.03 | 0.03 | 0.03 | 0.03 | 0.05 | 0.05 | 0.03 | - | - | - | 0.02 | 0.03 | 0.03 | 0.03 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | - | - | - | 0.01 | 0.01 | 0.01 | 0.01 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.42 | 0.40 | 0.46 | 0.49 | 0.52 | 0.70 | 0.48 | 0.00 | 0.01 | - | 0.45 | 0.28 | 0.27 | 0.77 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | - | - | - | - | - | - | 0.00 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.02 | 0.01 | 0.04 | 0.04 | 0.04 | - | 0.03 | - | 0.01 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.02 | 0.01 | 0.02 | 0.03 | 0.04 | 0.08 | 0.03 | 0.30 | 0.04 | 0.05 | 0.13 | 0.04 | 0.04 | 0.05 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 1.50 | 1.50 | 1.50 | 1.50 | 8.40 | 3.00 | 1.50 | 2.40 | 0.30 | 0.40 | 1.01 | 1.50 | 1.50 | 1.50 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 0.50 | 0.50 | 0.53 | 1.37 | 0.65 | 7.55 | 1.57 | - | - | - | 0.84 | 0.50 | 0.62 | 1.71 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 0.50 | 0.50 | 0.67 | 1.16 | 1.11 | 10.40 | 2.10 | - | - | - | 0.50 | 0.80 | 0.54 | 2.71 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 0.02 | 0.01 | 0.05 | 0.27 | 0.29 | 2.26 | 0.33 | 9.48 | 0.05 | 0.05 | 1.57 | 0.11 | 0.02 | 0.05 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.85 | 0.78 | 0.94 | 0.95 | 1.04 | 0.95 | 1.00 | 0.53 | 0.33 | 0.30 | 0.38 | 0.29 | 0.29 | 0.30 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.17 | 0.16 | 0.16 | 0.18 | 0.17 | 0.17 | 0.17 | 0.19 | 0.24 | 0.16 | 0.14 | 0.15 | 0.12 | 0.12 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 14.50 | 13.20 | 21.00 | 13.80 | 15.70 | 13.10 | 12.60 | - | 6.99 | 6.54 | 6.63 | 5.59 | 5.12 | 5.10 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 0.59 | 0.45 | 0.81 | 1.43 | 0.77 | 3.69 | 0.85 | 24.70 | 0.05 | 0.09 | 3.01 | 0.17 | 0.07 | 0.15 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.05 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.04 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 2.05 | 1.72 | 1.92 | 2.10 | 2.73 | 2.75 | 2.22 | - | 1.20 | 1.18 | 1.53 | 1.07 | 0.97 | 0.90 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 | 0.17 | 0.04 | 0.79 | 0.00 | 0.00 | 0.08 | 0.01 | 0.00 | 0.00 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | - | 1.26 | 1.29 | 1.20 | 2.00 | 2.00 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 353.00 | 284.00 | 311.00 | 345.00 | 467.00 | 427.00 | 425.00 | - | 361.00 | 372.00 | 356.00 | 372.00 | 305.00 | 287.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.01 | - | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.05 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.01 | - | 0.01 | 0.02 | 0.01 | 0.05 | 0.01 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.03 | 0.00 | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.01 | 0.11 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.09 | 0.11 | 0.70 | 0.03 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.89 | 0.83 | 0.90 | 0.93 | 1.08 | 0.82 | 1.03 | 0.23 | 0.33 | 0.31 | 0.29 | 0.30 | 0.30 | 0.31 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.17 | 0.17 | 0.15 | 0.14 | 0.17 | 0.16 | 0.16 | 0.13 | 0.15 | 0.03 | 0.14 | 0.14 | 0.13 | 0.12 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 13.400 | 13.400 | 13.200 | 11.100 | 13.300 | 12.000 | 12.200 | - | 6.410 | 6.540 | 5.430 | 5.620 | 5.550 | 5.340 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.002 | 0.001 | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.024 | 0.001 | 0.001 | 0.001 | 0.001 | 0.003 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.002 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.42 | 0.38 | 0.37 | 0.39 | 0.50 | 0.71 | 0.61 | 1.03 | 0.01 | 0.01 | 0.08 | 0.06 | 0.07 | 0.06 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.05 | 0.04 | 0.05 | 0.04 | 0.05 | 0.05 | 0.04 | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 2.07 | 2.03 | 2.05 | 1.94 | 2.37 | 2.41 | 2.16 | - | 1.12 | 1.18 | 1.05 | 1.04 | 0.96 | 0.98 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.13 | 0.04 | 0.11 | 0.00 | 0.00 | 1.00 | 0.01 | 0.00 | 0.00 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0500 | 0.0000 | 0.0002 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.004 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.003 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.005 | 0.001 | 0.001 | 0.001 | 0.001 | 0.003 | 0.001 | 0.005 | 0.001 | 0.001 | 0.000 | 0.005 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | - | 1.190 | 1.150 | 1.020 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0010 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0010 | 0.0001 | 0.0001 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 358.00 | 337.00 | 346.00 | 336.00 | 442.00 | 448.00 | 417.00 | - | 332.00 | 342.00 | 333.00 | 357.00 | 321.00 | 313.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.01 | - | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | - | 0.00 | 0.00 | 0.01 | 0.05 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - | - | - | - | 0.000005 | 0.000005 |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - | - | - | - | - | 0.000015 | 0.000015 |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - | - | - | - | 0.000005 | 0.000005 |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - | - | - | 0.000050 | 0.000050 |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - | - | - | 0.000050 | 0.000050 |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - | - | - | 0.000050 | 0.000050 |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | - | - | - | - | - | 0.000020 | 0.000020 |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - | - | - | 0.000050 | 0.000050 |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T95R-15C | T95R-15C | T95R-15C | T95R-15C | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W1 Shallow | W1 Shallow | W1 Shallow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | T95R-15C | T95R-15C | T95R-15C | T95R-15C | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W1 Shallow | W1 Shallow | W1 Shallow |
| | | | | | Geol | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | OVB | OVB | OVB |
| | | | | | Date Sampled | 11-Sep-2018 | 9-Jan-2019 | 5-Apr-2019 | 7-Jun-2019 | 25-Apr-2018 | 25-Jun-2018 | 15-Sep-2018 | 14-Jan-2019 | 5-Apr-2019 | 7-Jun-2019 | 30-Aug-2019 | 23-Nov-2019 | 27-Apr-2018 | 28-Jun-2018 | 11-Sep-2018 |
| | | | | | ALS Sample ID (2017-2018) | L2163047-1 | L2220048-4 | L2255482-7 | L2288653-1 | L2085540-2 | L2120097-2 | L2166287-4 | L2222626-1 | L2255482-8 | L2288653-2 | L2340452-2 | L2387383-6 | L2087343-1 | L2122028-2 | L2163047-3 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 5.00 | 5.00 | 5.00 | 5.00 | 9.50 | 13.30 | 9.90 | 11.10 | 7.70 | 8.30 | 6.30 | 7.80 | 9.30 | 6.60 | 6.20 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 1330.00 | 1280.00 | 1320.00 | 1300.00 | 752.00 | 627.00 | 682.00 | 645.00 | 580.00 | 567.00 | 580.00 | 682.00 | 764.00 | 760.00 | 748.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 1326.00 | 1310.00 | 1366.00 | 1323.00 | 722.00 | 546.00 | 754.00 | 701.00 | 584.00 | 557.00 | 618.00 | 661.00 | 789.00 | 752.00 | 751.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 15.00 | 16.50 | 16.60 | 17.30 | 138.00 | 112.00 | 129.00 | 127.00 | 83.40 | 79.80 | 66.00 | 106.00 | 11.40 | 10.80 | 9.72 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 8.69 | 8.42 | 8.60 | 8.60 | 8.38 | 7.83 | 8.16 | 8.45 | 8.23 | 8.27 | 8.53 | 8.14 | 8.74 | 8.86 | 8.80 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 8.18 | 8.41 | 8.59 | 8.27 | 8.20 | 7.65 | 8.26 | 7.74 | 8.17 | 7.79 | 8.03 | 7.78 | 9.10 | 8.85 | 8.99 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 3.00 | 34.40 | 12.20 | 4.20 | 70.50 | 9.90 | 8.00 | 14.00 | 46.20 | 7.20 | 196.00 | 55.50 | 41.30 | 3.00 | 17.10 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 793.00 | 848.00 | 801.00 | 850.00 | 595.00 | 504.00 | 500.00 | 420.00 | 365.00 | 409.00 | 373.00 | 460.00 | 494.00 | 459.00 | 466.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 0.23 | 53.50 | 9.90 | 4.42 | 8.02 | 5.54 | 2.32 | 5.23 | 29.00 | 3.04 | 22.60 | 31.00 | 173.00 | 4.13 | 6.29 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 1.00 | 1.00 | 1.00 | 1.00 | - | 8.60 | 1.90 | 1.90 | 1.20 | 1.00 | 1.00 | 3.10 | - | 1.00 | 1.00 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 739.00 | 718.00 | 734.00 | 692.00 | 238.00 | 247.00 | 283.00 | 265.00 | 257.00 | 248.00 | 240.00 | 295.00 | 318.00 | 310.00 | 321.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 51.00 | 18.40 | 36.60 | 83.00 | 8.20 | 1.00 | 13.40 | 16.20 | 1.00 | 17.60 | 14.20 | 13.60 | 26.60 | 25.80 | 30.60 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 790.00 | 736.00 | 770.00 | 775.00 | 246.00 | 247.00 | 296.00 | 281.00 | 257.00 | 266.00 | 254.00 | 309.00 | 344.00 | 336.00 | 351.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.01 | 0.26 | 0.23 | 0.25 | 0.47 | 0.40 | 0.36 | 0.30 | 0.12 | 0.04 | 0.08 | 0.09 | 0.06 | 0.05 | 0.06 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | 0.25 | 0.25 | 0.25 | 0.25 | 0.30 | 0.07 | 0.25 | 0.05 | 0.05 | 0.05 | 0.05 | 0.07 | 0.25 | 0.05 | 0.25 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 2.50 | 2.50 | 2.50 | 2.50 | 15.10 | 7.63 | 7.30 | 4.27 | 3.42 | 3.05 | 2.70 | 5.62 | 2.50 | 0.50 | 2.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 2.47 | 2.33 | 2.23 | 2.40 | 0.41 | 0.41 | 0.42 | 0.48 | 0.32 | 0.34 | 0.34 | 0.43 | 0.80 | 0.87 | 0.98 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.01 | 0.03 | 0.03 | 0.53 | 0.89 | 0.59 | 0.05 | 0.03 | 0.01 | 0.03 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.28 | 0.28 | 0.28 | 0.27 | 12.10 | 7.12 | 2.23 | 1.60 | 1.99 | 3.40 | 0.93 | 0.83 | 0.48 | 0.11 | 0.58 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | 0.03 | 0.03 | 0.03 | 0.03 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.01 | 0.01 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.04 | 0.04 | 0.04 | 0.04 | - | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | - | 0.02 | 0.06 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.04 | 0.05 | 0.05 | 0.04 | 0.02 | 0.07 | 0.00 | 0.03 | 0.03 | 0.01 | 0.02 | 0.02 | 0.10 | 0.02 | 0.10 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 1.50 | 1.50 | 1.50 | 1.50 | 141.00 | 76.90 | 84.70 | 59.20 | 51.30 | 53.70 | 51.30 | 75.80 | 62.30 | 62.60 | 66.00 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 1.10 | 0.75 | 0.84 | 0.57 | 38.70 | 27.70 | 23.90 | 11.70 | 7.14 | 10.60 | 12.40 | 18.30 | 2.91 | 2.56 | 3.84 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 0.58 | 1.86 | 1.27 | 0.50 | 47.10 | 31.00 | 15.50 | 7.02 | 6.12 | 9.93 | 3.85 | 21.40 | 6.62 | 2.58 | 5.91 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 0.01 | 1.05 | 0.59 | 0.08 | 0.10 | 0.02 | 0.04 | 0.37 | 0.27 | 0.03 | 0.30 | 0.24 | 5.32 | 0.13 | 0.38 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.31 | 0.33 | 0.36 | 0.29 | 0.05 | 0.02 | 0.03 | 0.03 | 0.05 | 0.03 | 0.07 | 0.07 | 0.10 | 0.03 | 0.03 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.12 | 0.13 | 0.15 | 0.14 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.19 | 0.23 | 0.22 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 4.79 | 5.95 | 5.80 | 5.56 | 42.00 | 28.90 | 32.90 | 25.60 | 29.50 | 19.90 | 18.80 | 32.00 | 4.49 | 3.16 | 3.28 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.02 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 0.06 | 1.18 | 0.40 | 0.14 | 0.17 | 0.09 | 0.12 | 0.54 | 0.37 | 0.08 | 0.22 | 0.27 | 4.36 | 0.11 | 0.34 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.04 | 0.04 | 0.05 | 0.05 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 0.85 | 1.29 | 1.11 | 1.01 | 9.61 | 7.21 | 9.18 | 7.59 | 6.86 | 6.73 | 6.12 | 9.30 | 2.45 | 0.63 | 0.70 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.00 | 0.03 | 0.01 | 0.00 | 0.28 | 0.21 | 0.22 | 0.21 | 0.13 | 0.09 | 0.09 | 0.19 | 0.16 | 0.02 | 0.04 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 2.00 | 2.00 | 2.00 | 2.00 | 3.30 | 2.90 | 2.50 | 2.10 | 2.00 | 2.00 | 2.00 | 2.40 | 2.20 | 2.00 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 294.00 | 325.00 | 340.00 | 325.00 | 115.00 | 112.00 | 132.00 | 117.00 | 118.00 | 101.00 | 107.00 | 113.00 | 177.00 | 194.00 | 187.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.05 | 0.01 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.01 | 0.01 | 0.03 | 0.03 | 0.01 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.01 | 0.02 | 0.01 | 0.02 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.32 | 0.31 | 0.35 | 0.31 | 0.04 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.02 | 0.03 | 0.02 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.11 | 0.12 | 0.13 | 0.14 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.19 | 0.21 | 0.20 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 4.590 | 5.110 | 5.080 | 5.370 | 40.600 | 31.400 | 36.100 | 33.800 | 22.300 | 20.600 | 16.500 | 28.100 | 3.490 | 3.320 | 3.020 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.004 | 0.015 | 0.014 | 0.003 | 0.002 | 0.001 | 0.003 | 0.003 | 0.001 | 0.002 | 0.002 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.06 | 0.07 | 0.06 | 0.07 | 0.04 | 0.05 | 0.06 | 0.16 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.04 | 0.04 | 0.05 | 0.05 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 0.86 | 0.91 | 0.94 | 0.94 | 8.82 | 8.13 | 9.40 | 10.40 | 6.71 | 6.89 | 6.04 | 8.82 | 0.64 | 0.61 | 0.53 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.24 | 0.22 | 0.34 | 0.11 | 0.07 | 0.06 | 0.15 | 0.02 | 0.01 | 0.01 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.009 | 0.007 | 0.006 | 0.007 | 0.011 | 0.010 | 0.012 | 0.007 | 0.009 | 0.008 | 0.008 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.005 | 0.003 | 0.003 | 0.003 | 0.002 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.000 | 2.000 | 2.000 | 2.000 | 3.600 | 3.000 | 2.600 | 2.600 | 2.000 | 2.000 | 2.000 | 2.200 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0003 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 314.00 | 298.00 | 327.00 | 316.00 | 113.00 | 116.00 | 126.00 | 138.00 | 118.00 | 104.00 | 107.00 | 109.00 | 183.00 | 194.00 | 181.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | 0.000054 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | 0.000060 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | 0.000065 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | 0.000094 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | 0.000048 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | 0.000029 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | 0.000085 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | 0.000008 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | 0.000184 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | 0.000048 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | 0.000020 | 0.000022 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | - |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | 0.000237 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000030 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000080 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | W1 Shallow | W1 Shallow | W1 Shallow | W1 Shallow | W1 Shallow | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | T0B96-02-06 | T0B96-02-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | W1 Shallow | W1 Shallow | W1 Shallow | W1 Shallow | W1 Shallow | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | - | T0B96-02-06 |
| | | | | | Geol | OVB | OVB | OVB | OVB | OVB | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | OVB | OVB |
| | | | | | Date Sampled | 10-Jan-2019 | 6-Apr-2019 | 4-Jun-2019 | 29-Aug-2019 | 21-Nov-2019 | 28-Apr-2018 | 28-Jun-2018 | 11-Sep-2018 | 10-Jan-2019 | 6-Apr-2019 | 4-Jun-2019 | 29-Aug-2019 | 24-Nov-2019 | 20-Sep-1996 | 23-Aug-1997 |
| | | | | | ALS Sample ID (2017-2018) | L2220047-3 | L2255482-4 | L2287158-1 | L2339588-1 | L2387383-4 | L2087343-2 | L2122028-1 | L2163047-2 | L2220047-1 | L2255482-5 | L2287159-2 | L2340452-1 | L2387383-2 | - | - |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | - | - | - | - | - | - | 96-03529-14 | 97-04136-38 |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 14.70 | 7.30 | 6.90 | 5.00 | 15.10 | 8.50 | 5.50 | 5.00 | 23.10 | 7.20 | 8.20 | 6.90 | 5.00 | - | - |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 738.00 | 758.00 | 752.00 | 775.00 | 767.00 | 1040.00 | 1070.00 | 1050.00 | 933.00 | 1060.00 | 1040.00 | 1080.00 | 1070.00 | 630.00 | 568.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 770.00 | 787.00 | 756.00 | 798.00 | 745.00 | 1212.00 | 1057.00 | 1045.00 | 966.00 | 1096.00 | 1053.00 | 1111.00 | 1061.00 | 570.00 | 560.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 12.20 | 11.00 | 10.10 | 10.90 | 11.40 | 6.38 | 4.68 | 3.88 | 4.29 | 4.20 | 4.03 | 3.87 | 3.97 | 338.00 | 289.00 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 8.80 | 8.77 | 8.80 | 8.85 | 8.74 | 8.92 | 8.96 | 9.01 | 9.15 | 8.95 | 8.97 | 9.01 | 9.04 | 7.87 | 7.12 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 8.33 | 9.60 | 8.96 | 9.08 | 8.87 | 9.30 | 9.10 | 9.25 | 8.97 | 9.64 | 9.16 | 9.17 | 9.18 | 7.58 | 7.36 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 32.70 | 111.00 | 59.40 | 49.60 | 33.10 | 266.00 | 34.70 | 20.50 | 17.50 | 73.80 | 53.40 | 253.00 | 182.00 | 63.00 | 37.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 574.00 | 462.00 | 529.00 | 545.00 | 491.00 | 901.00 | 697.00 | 651.00 | 621.00 | 628.00 | 673.00 | 834.00 | 711.00 | 340.00 | 311.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 164.00 | 62.50 | 160.00 | 166.00 | 88.70 | 730.00 | 56.20 | 30.90 | 26.20 | 106.00 | 77.30 | 858.00 | 254.00 | - | - |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | - | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | - | - |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 300.00 | 306.00 | 325.00 | 329.00 | 318.00 | 468.00 | 465.00 | 456.00 | 377.00 | 471.00 | 473.00 | 465.00 | 461.00 | 386.00 | 380.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 26.20 | 24.20 | 27.00 | 29.20 | 26.20 | 56.40 | 58.80 | 66.80 | 70.40 | 57.80 | 49.80 | 65.60 | 63.00 | 0.50 | 0.50 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.10 | 0.10 |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 326.00 | 331.00 | 352.00 | 358.00 | 344.00 | 524.00 | 524.00 | 522.00 | 447.00 | 529.00 | 523.00 | 530.00 | 524.00 | 317.00 | 312.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.06 | 0.06 | 0.07 | 0.05 | 0.05 | 0.10 | 0.10 | 0.11 | 0.07 | 0.10 | 0.11 | 0.13 | 0.12 | 0.05 | 0.01 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | - | - |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 0.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 0.90 | 0.91 | 0.85 | 0.85 | 0.89 | 5.06 | 5.12 | 5.55 | 3.85 | 5.40 | 4.72 | 5.12 | 5.32 | - | - |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | - | - |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | - | - |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.18 | 0.34 | 0.24 | 0.11 | 0.18 | 0.19 | 0.16 | 0.15 | 0.25 | 0.23 | 0.44 | 0.35 | 0.20 | - | - |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | - | 0.02 | 0.03 | 0.10 | 0.04 | 0.06 | 0.03 | 0.06 | - | - |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | - | 0.04 | 0.04 | 0.12 | 0.07 | 0.06 | - | 0.07 | 0.01 | 0.00 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.09 | 0.06 | 0.09 | 0.09 | 0.06 | 0.10 | 0.05 | 0.04 | 0.11 | 0.07 | 0.09 | 0.10 | 0.08 | 0.06 | 0.04 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 70.20 | 62.00 | 56.00 | 58.80 | 73.50 | 47.40 | 54.30 | 52.60 | 48.20 | 46.90 | 46.90 | 46.70 | 48.70 | 13.40 | 9.10 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 2.85 | 3.45 | 3.84 | 5.06 | 3.10 | 2.99 | 3.86 | 2.99 | 4.05 | 5.68 | 4.44 | 4.23 | 4.39 | - | - |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 3.70 | 4.91 | 4.06 | 7.03 | 3.35 | 3.58 | 3.88 | 3.00 | 4.17 | 5.77 | 6.19 | 4.93 | 4.10 | - | - |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 4.22 | 0.58 | 4.19 | 3.98 | 2.32 | 9.96 | 1.21 | 0.58 | 0.57 | 1.55 | 1.36 | 6.33 | 3.59 | 1.30 | 0.18 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.07 | 41.30 | 1.30 | 1.72 | 0.13 | 0.15 | 0.03 | 0.03 | 0.02 | 0.04 | 0.07 | 0.12 | 0.08 | 0.16 | 0.14 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.20 | 0.22 | 0.24 | 0.22 | 0.20 | 0.30 | 0.35 | 0.33 | 0.30 | 0.35 | 0.30 | 0.27 | 0.33 | 0.09 | 0.01 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 4.77 | 4.08 | 4.26 | 4.39 | 4.55 | 3.13 | 1.61 | 1.34 | 1.55 | 1.52 | 1.61 | 2.06 | 1.60 | 90.60 | 86.00 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 3.81 | 0.75 | 3.94 | 3.55 | 2.19 | 3.21 | 0.38 | 0.19 | 0.25 | 0.52 | 0.94 | 2.13 | 1.17 | 1.77 | 0.27 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.09 | 0.09 | 0.09 | 0.07 | 0.09 | 0.08 | 0.09 | 0.09 | 0.00 | 0.00 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 2.33 | 0.88 | 2.07 | 2.14 | 1.59 | 2.92 | 0.50 | 0.33 | 0.35 | 0.56 | 0.53 | 1.93 | 1.06 | 27.20 | 23.90 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.14 | 0.05 | 0.14 | 0.13 | 0.08 | 0.13 | 0.02 | 0.02 | 0.02 | 0.03 | 0.04 | 0.10 | 0.05 | 0.12 | 0.05 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.70 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.03 | 0.75 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 190.00 | 205.00 | 190.00 | 191.00 | 181.00 | 259.00 | 279.00 | 255.00 | 246.00 | 256.00 | 247.00 | 234.00 | 240.00 | 11.40 | 8.11 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.04 | 0.02 | 0.07 | 0.05 | 0.03 | 0.02 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 | 0.02 | 0.03 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.02 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.03 | 0.01 | 0.01 | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.28 | 0.01 | 0.00 | 0.00 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.000 | 0.000 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.02 | 0.15 | 0.02 | 0.05 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.03 | 0.03 | 0.14 | 0.14 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.19 | 0.23 | 0.19 | 0.23 | 0.20 | 0.29 | 0.32 | 0.30 | 0.30 | 0.33 | 0.30 | 0.27 | 0.31 | 0.04 | 0.01 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 3.780 | 3.360 | 3.120 | 3.310 | 3.480 | 2.040 | 1.490 | 1.240 | 1.400 | 1.320 | 1.280 | 1.180 | 1.240 | 90.600 | 79.200 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.019 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.005 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.003 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.05 | 0.03 | 0.03 | 0.03 | 0.03 | 0.09 | 0.03 | 0.01 | 0.01 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.09 | 0.09 | 0.08 | 0.07 | 0.10 | 0.07 | 0.08 | 0.09 | 0.00 | 0.00 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 0.66 | 0.63 | 0.57 | 0.65 | 0.65 | 0.31 | 0.23 | 0.19 | 0.19 | 0.22 | 0.20 | 0.22 | 0.21 | 27.20 | 22.10 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.00 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.010 | 0.009 | 0.007 | 0.008 | 0.011 | 0.016 | 0.016 | 0.017 | 0.008 | 0.015 | 0.013 | 0.013 | 0.014 | 0.000 | 0.000 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.027 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 0.860 | 0.650 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0010 | 0.0004 | 0.0001 | 0.0004 | 0.0001 | 0.0002 | 0.0002 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 174.00 | 198.00 | 183.00 | 199.00 | 174.00 | 268.00 | 271.00 | 250.00 | 234.00 | 260.00 | 238.00 | 229.00 | 233.00 | 11.40 | 7.80 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.00 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - | - |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | - | - |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-20 | T0B96-02-20 | T0B96-02-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | - | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-20 | T0B96-02-20 | T0B96-02-20 |
| | | | | | Geol | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB |
| | | | | | Date Sampled | 10-Nov-2016 | 28-Sep-2017 | 16-Jan-2018 | 29-Mar-2018 | 22-Jun-2018 | 12-Sep-2018 | 8-Jan-2019 | 5-Apr-2019 | 6-Jun-2019 | 20-Sep-1996 | 23-Aug-1997 | 22-Jun-2018 |
| | | | | | ALS Sample ID (2017-2018) | - | L2000339-4 | L2047836-5 | L2078247-6 | L2120097-4 | L2164994-1 | L2218463-4 | L2255482-6 | L2288655-2 | - | - | L2120097-3 |
| | | | | | Maxxam Sample ID (2016) | QA4706 | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | - | - | 96-03529-16 | 97-04136-39 | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | - | - | 5.00 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 484.00 | 535.00 | 553.00 | 510.00 | 573.00 | 600.00 | 569.00 | 558.00 | 570.00 | 621.00 | 532.00 | 439.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | - | 557.00 | 555.00 | 559.00 | 587.00 | 587.00 | 565.00 | 595.00 | 586.00 | 560.00 | 500.00 | 395.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 389.00 | 314.00 | 297.00 | 311.00 | 308.00 | 312.00 | 328.00 | 325.00 | 321.00 | 246.00 | 271.00 | 200.00 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 8.05 | 7.79 | 8.04 | 8.22 | 7.99 | 7.72 | 7.78 | 8.10 | 8.08 | 8.14 | 7.67 | 7.97 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | - | 7.50 | 7.20 | 7.73 | 7.42 | 7.72 | 7.66 | 7.74 | 7.31 | 7.90 | 7.93 | 7.53 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 2670.00 | 35.50 | 6.10 | 3.00 | 3.70 | 3.00 | 6.00 | 14.60 | 15.10 | 26640.00 | 8060.00 | 378.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 314.00 | 329.00 | 327.00 | 318.00 | 334.00 | 335.00 | 324.00 | 306.00 | 336.00 | 357.00 | 290.00 | 248.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 1950.00 | 19.90 | 4.83 | 2.00 | 0.74 | 0.57 | 2.42 | 6.07 | 8.33 | | | 229.00 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 0.99 | 10.20 | - | 1.00 | 7.10 | 1.00 | 18.50 | 4.20 | 4.50 | - | - | 5.80 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 320.00 | 301.00 | 321.00 | 267.00 | 317.00 | 338.00 | 321.00 | 304.00 | 277.00 | 395.00 | 351.00 | 234.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 0.50 | 2.00 | - | - | - | - | - | - | 1.0 | 0.10 | 0.10 | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 263.00 | 301.00 | 321.00 | 267.00 | 317.00 | 338.00 | 321.00 | 304.00 | 277.00 | 324.00 | 288.00 | 234.00 |
| **Anions and Nitrogen** | | | n.g. | n.g. | **Anions and Nitrogen** | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.19 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.33 | 0.04 | 0.03 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | - | - | 0.05 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 1.10 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.60 | 0.50 | 0.77 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 0.14 | 0.10 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 | - | - | 0.10 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.02 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 | 0.02 | 0.02 | - | - | 0.07 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.48 | 0.04 | 0.03 | 0.23 | 0.16 | 0.28 | 0.03 | 0.06 | 0.07 | - | - | 0.76 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.0010 | 0.0010 | - | - | 0.00 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | - | 0.00 | - | 0.00 | 0.00 | 0.01 | 0.0020 | 0.0020 | 0.00 | 0.01 | 0.01 | 0.00 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.85 | 0.02 | 0.00 | 0.01 | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 | 13.70 | 6.42 | 1.21 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 10.80 | 9.77 | 10.40 | 9.28 | 9.61 | 9.15 | 11.10 | 9.86 | 11.60 | 19.50 | 9.90 | 9.98 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 1.95 | 1.88 | 1.36 | 3.78 | 2.29 | 2.72 | 1.30 | 3.89 | 1.48 | - | - | 4.21 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 1.92 | 1.25 | 1.18 | 2.21 | 1.85 | 1.43 | 1.05 | 1.42 | 1.32 | - | - | 24.60 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 16.70 | 1.19 | 0.19 | 0.06 | 0.05 | 0.05 | 0.14 | 0.40 | 0.83 | 116.00 | 65.40 | 7.95 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.03 | 0.01 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 1.01 | 0.14 | 0.13 | 0.10 | 0.11 | 0.14 | 0.13 | 0.15 | 0.14 | 4.94 | 1.37 | 0.30 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.05 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.05 | 0.13 | 0.10 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 106.00 | 85.40 | 92.70 | 77.70 | 80.80 | 87.40 | 80.70 | 88.60 | 81.30 | 343.00 | 154.00 | 93.40 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.08 | 0.01 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.13 | 0.01 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.21 | 0.03 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 20.00 | 0.85 | 0.14 | 0.06 | 0.07 | 0.07 | 0.08 | 0.28 | 0.61 | 521.00 | 143.00 | 17.00 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.11 | 0.02 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.02 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.05 | 0.01 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 30.40 | 24.90 | 25.30 | 21.50 | 24.00 | 24.40 | 24.90 | 26.80 | 23.90 | 145.00 | 54.60 | 25.10 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 4.46 | 0.48 | 0.11 | 0.03 | 0.01 | 0.02 | 0.03 | 0.11 | 0.15 | 8.36 | 3.94 | 0.75 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.02 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 3.96 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 22.80 | 8.60 | 2.50 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 13.60 | 7.90 | 7.80 | 6.60 | 7.70 | 7.50 | 8.10 | 8.30 | 7.30 | 63.50 | 11.50 | 8.60 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | 0.01 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.04 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.20 | 0.51 | 0.02 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.16 | 0.02 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.11 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 1.11 | 0.49 | 0.07 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.00 | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 1.00 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.004 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.11 | 0.12 | 0.12 | 0.11 | 0.12 | 0.13 | 0.13 | 0.14 | 0.14 | 0.17 | 1.07 | 0.09 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.05 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.01 | 0.01 | 0.10 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 78.200 | 84.900 | 80.900 | 85.100 | 82.700 | 84.900 | 90.000 | 85.300 | 86.100 | 62.200 | 69.700 | 49.800 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.007 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.006 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.009 | 0.001 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.01 | 0.05 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.01 | 0.01 | 0.03 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.01 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 22.40 | 24.80 | 23.20 | 23.90 | 24.70 | 24.40 | 25.20 | 27.20 | 25.80 | 21.90 | 23.50 | 18.50 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.18 | 0.00 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.001 | 0.005 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.019 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 0.794 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 1.160 | 0.690 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0004 | 0.0010 | 0.0005 | 0.0006 | 0.0008 | 0.0010 | 0.0004 | 0.0005 | 0.0010 | 0.0002 | 0.0002 | 0.0008 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 12.10 | 7.70 | 8.20 | 8.00 | 8.00 | 7.90 | 7.30 | 8.10 | 7.30 | 53.70 | 9.46 | 7.90 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | 0.01 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.01 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.24 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | - | - | 0.000005 | - | - | - | - | 0.000005 | - | - | - |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | - | - | 0.000015 | - | - | - | - | 0.000015 | - | - | - |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | - | - | 0.000005 | - | - | - | - | 0.000005 | - | - | - |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | - | - | 0.000050 | - | - | - | - | 0.000050 | - | - | - |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | - | - | 0.000050 | - | - | - | - | 0.000050 | - | - | - |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | - | - | 0.000050 | - | - | - | - | 0.000050 | - | - | - |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | - | - | 0.000020 | - | - | - | - | 0.000020 | - | - | - |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | - | - | 0.000050 | - | - | - | - | 0.000050 | - | - | - |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | - | - | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | - | - | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 |
| | | | | | Geol | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB |
| | | | | | Date Sampled | 23-Aug-1997 | 10-Nov-2016 | 27-Sep-2017 | 18-Jan-2018 | 5-Apr-2018 | 25-Jun-2018 | 10-Sep-2018 | 11-Jan-2019 | 1-Apr-2019 | 5-Jun-2019 | 20-Sep-1996 | 22-Aug-1997 | 19-Jan-2018 | 31-Mar-2018 | 21-Jun-2018 | 21-Jun-2018 |
| | | | | | ALS Sample ID (2017-2018) | - | - | L2000339-5 | L2047836-6 | L2078247-3 | L2120097-5 | L2163047-4 | L2220048-1 | L2254339-3 | L2287159-4 | - | - | L2047836-8 | L2078247-5 | L2117455-4 | L2117455-4 |
| | | | | | Maxxam Sample ID (2016) | - | QA4705 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | 97-04136-40 | - | - | - | - | - | - | - | - | - | 96-03529-13 | 97-04136-32 | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | - | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | - | - | 6.20 | 13.70 | 6.60 | 6.60 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 760.00 | 729.00 | 695.00 | 650.00 | 647.00 | 697.00 | 668.00 | 666.00 | 639.00 | 587.00 | 373.00 | 403.00 | 392.00 | 225.00 | 365.00 | 365.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 670.00 | - | 781.00 | 709.00 | 638.00 | 737.00 | 672.00 | 661.00 | 665.00 | 645.00 | 430.00 | 413.00 | 472.00 | 518.00 | 430.00 | 430.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 381.00 | 423.00 | 405.00 | 339.00 | 354.00 | 363.00 | 364.00 | 382.00 | 375.00 | 356.00 | 181.00 | 189.00 | 154.00 | 74.20 | 175.00 | 175.00 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.57 | 8.16 | 7.85 | 8.18 | 8.35 | 8.14 | 8.37 | 8.26 | 8.36 | 8.36 | 7.18 | 6.70 | 7.66 | 7.87 | 8.46 | 8.46 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 7.58 | - | 7.70 | 7.68 | 7.88 | 7.70 | 8.20 | 7.37 | 8.47 | 7.91 | 7.08 | 7.23 | 7.20 | 7.02 | 7.00 | 7.00 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 27.00 | 385.00 | 21.90 | 14.10 | 25.80 | 21.70 | 44.10 | 69.00 | 32.20 | 3.50 | 170.00 | 418.00 | 43.50 | 3.00 | 10.90 | 10.90 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 427.00 | 420.00 | 390.00 | 367.00 | 345.00 | 373.00 | 389.00 | 384.00 | 387.00 | 344.00 | 199.00 | 220.00 | 261.00 | 167.00 | 251.00 | 251.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | - | 288.00 | 20.20 | 7.74 | 19.80 | 10.00 | 22.80 | 48.50 | 22.10 | 6.31 | | | 47.10 | 21.00 | 10.20 | 10.20 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | - | 7.87 | 10.80 | - | 1.00 | 4.80 | 1.00 | 1.00 | 1.00 | 1.00 | - | - | - | 2.60 | 1.00 | 1.0 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 492.00 | 492.00 | 407.00 | 380.00 | 340.00 | 369.00 | 372.00 | 377.00 | 347.00 | 314.00 | 232.00 | 263.00 | 220.00 | 127.00 | 208.00 | 208.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 0.50 | 0.50 | 1.00 | 1.00 | 9.40 | 8.80 | 11.80 | 1.00 | 7.20 | 2.60 | 0.50 | 0.50 | 1.00 | 1.00 | 8.60 | 8.60 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 0.10 | 0.50 | 2.00 | - | - | - | - | - | - | - | 0.10 | - | - | - | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 404.00 | 403.00 | 407.00 | 380.00 | 350.00 | 378.00 | 384.00 | 377.00 | 354.00 | 317.00 | 190.00 | 216.00 | 220.00 | 127.00 | 217.00 | 217.00 |
| **Anions and Nitrogen** | | | n.g. | n.g. | **Anions and Nitrogen** | | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.02 | 0.09 | 0.02 | 0.01 | 0.01 | 0.01 | - | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.02 | 0.02 | 0.01 | 0.01 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | - | - | 0.25 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.25 | - | - | - | 0.05 | 0.05 | 0.05 | 0.05 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 0.50 | 1.10 | 2.50 | 0.50 | 0.54 | 0.50 | 0.50 | 0.50 | 2.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | - | 0.10 | 0.10 | 0.11 | 0.10 | 0.11 | 0.11 | 0.11 | 0.10 | 0.11 | - | - | 0.14 | 0.09 | 0.13 | 0.13 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | - | 0.02 | 0.13 | 0.15 | 0.17 | 0.13 | 0.20 | 0.18 | 0.14 | 0.14 | - | - | 0.01 | 0.01 | 0.01 | 0.01 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | - | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | - | 0.28 | 0.74 | 0.32 | 0.57 | 0.50 | - | 0.32 | 0.42 | 0.28 | - | - | 0.68 | 0.37 | 0.26 | 0.26 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | - | - | - | 0.00 | 0.00 | - | - | 0.00 | - | - | - | - | 0.00 | 0.00 | 0.00 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.02 | - | 0.00 | - | 0.01 | 0.02 | - | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | - | 0.01 | 0.00 | 0.00 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.06 | 0.22 | 0.06 | 0.06 | 0.05 | 0.20 | - | 0.05 | 0.03 | 0.02 | 0.09 | 0.40 | 0.11 | 0.03 | 0.02 | 0.02 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 36.80 | 21.70 | 20.80 | 22.40 | 24.10 | 23.10 | 26.50 | 28.20 | 25.90 | 24.80 | 5.80 | 9.30 | 4.27 | 1.37 | 2.20 | 2.20 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | - | 2.42 | 3.25 | 1.71 | 2.47 | 1.92 | - | - | - | - | - | - | 10.40 | 7.42 | 7.91 | 7.91 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | - | 2.16 | 4.63 | 2.87 | 3.51 | 3.93 | - | - | - | 1.88 | - | - | 11.60 | 8.91 | 7.38 | 7.38 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 0.64 | 5.27 | 2.81 | 1.31 | 1.27 | 0.75 | - | 0.46 | 0.43 | 0.41 | 3.82 | 4.41 | 0.84 | 1.05 | 0.96 | 0.96 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.15 | 0.19 | 0.14 | 0.10 | 0.09 | 0.08 | - | 0.10 | 0.25 | 0.08 | 0.34 | 0.50 | 0.26 | 0.07 | 0.24 | 0.24 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.01 | 0.05 | 0.10 | 0.10 | 0.10 | 0.10 | - | 0.10 | 0.10 | 0.10 | 0.09 | 0.01 | 0.10 | 0.10 | 0.10 | 0.10 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 75.00 | 75.10 | 69.80 | 66.50 | 55.30 | 59.00 | - | 59.40 | 64.70 | 53.70 | 52.50 | 60.50 | 45.30 | 18.00 | 42.30 | 42.30 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.01 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 1.18 | 5.89 | 2.39 | 1.00 | 1.13 | 0.80 | - | 0.42 | 0.39 | 0.32 | 5.05 | 19.10 | 0.62 | 1.03 | 0.50 | 0.50 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.01 | 0.01 | 0.05 | 0.01 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 60.60 | 57.30 | 55.50 | 49.70 | 46.10 | 49.50 | - | 56.90 | 51.90 | 46.30 | 14.70 | 19.00 | 11.10 | 4.48 | 11.50 | 11.50 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.13 | 0.24 | 0.07 | 0.04 | 0.06 | 0.05 | - | 0.02 | 0.03 | 0.02 | 0.35 | 0.24 | 1.07 | 0.09 | 0.86 | 0.86 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.05 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 1.91 | 2.04 | 2.80 | 2.00 | 2.00 | 2.00 | - | 2.00 | 2.00 | 2.00 | 0.97 | 1.98 | 2.00 | 2.00 | 2.00 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 25.20 | 19.80 | 19.40 | 16.60 | 16.20 | 17.50 | - | 20.90 | 19.50 | 17.30 | 18.30 | 14.00 | 32.70 | 19.20 | 30.80 | 30.80 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | - | 0.01 | - | 0.00 | 0.00 | 0.00 | - | 0.01 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.02 | 0.07 | 0.06 | 0.02 | 0.03 | 0.02 | - | 0.02 | 0.01 | 0.01 | 0.07 | 0.04 | 0.01 | 0.01 | 0.02 | 0.02 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.04 | 0.03 | 0.02 | 0.01 | 0.01 | 0.01 | - | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Dissolved Metals** | | | n.g. | n.g. | **Dissolved Metals** | | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | - | - | - | 0.01 | 0.00 | 0.01 | 0.02 | 0.02 | 0.01 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | - | - | - | 0.001 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.12 | 0.09 | 0.10 | 0.08 | 0.07 | 0.08 | - | - | - | 0.07 | 0.28 | 0.20 | 0.25 | 0.07 | 0.25 | 0.25 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.01 | 0.05 | 0.10 | 0.10 | 0.10 | 0.10 | - | - | - | 0.10 | 0.01 | 0.01 | 0.10 | 0.10 | 0.10 | 0.10 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | - | - | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 74.500 | 69.400 | 69.800 | 58.800 | 62.500 | 60.600 | 61.700 | - | - | 58.800 | 50.500 | 52.400 | 43.500 | 21.000 | 47.900 | 47.900 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | - | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.004 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | - | - | - | 0.000 | 0.004 | 0.003 | 0.001 | 0.000 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.003 | 0.000 | 0.001 | 0.001 | 0.001 | 0.006 | - | - | - | 0.001 | 0.000 | 0.002 | 0.002 | 0.003 | 0.002 | 0.002 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.01 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | - | - | - | 0.03 | 0.01 | 0.01 | 0.03 | 0.04 | 0.03 | 0.03 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.00 | 0.01 | 0.05 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 47.40 | 54.70 | 56.10 | 46.70 | 48.00 | 51.30 | 50.90 | - | - | 50.80 | 13.20 | 14.00 | 11.00 | 5.26 | 13.60 | 13.60 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.02 | 0.12 | 0.01 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.21 | 0.04 | 0.92 | 0.09 | 0.57 | 0.57 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0001 | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | - | - | - | 0.0000 | 0.0001 | 0.0500 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.000 | 0.002 | 0.001 | 0.004 | 0.002 | 0.002 | - | - | - | 0.002 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.022 | 0.001 | 0.005 | 0.001 | 0.001 | 0.001 | - | - | - | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 1.740 | 1.030 | 2.000 | 2.000 | 2.000 | 2.000 | - | - | - | 2.000 | 0.370 | 0.270 | 2.000 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0002 | 0.0001 | 0.0010 | 0.0004 | 0.0007 | 0.0005 | - | - | - | 0.0008 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 17.00 | 19.40 | 19.20 | 17.10 | 19.20 | 18.80 | - | - | - | 18.10 | 12.50 | 12.40 | 33.90 | 25.20 | 31.90 | 31.90 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | - | 0.01 | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.00 | 0.01 | 0.05 | 0.01 | 0.01 | 0.01 | - | - | - | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | - | - | - | 0.01 | 0.00 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000005 | - | - |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000015 | - | - |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000005 | - | - |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000050 | - | - |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000050 | - | - |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000050 | - | - |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000020 | - | - |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | - | - | - | - | - | - | - | - | - | - | - | 0.000050 | - | - |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T0B96-01-05 | T0B96-01-05 | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W2 | W2 | W2 | W2 | W2 | W2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | T0B96-01-05 | T0B96-01-05 | W3-S | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W2 | W2 | W2 | W2 | W2 | W2 |
| | | | | | Geol | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB |
| | | | | | Date Sampled | 4-Apr-2019 | 7-Jun-2019 | 6-Apr-2018 | 18-Jun-2018 | 8-Sep-2018 | 4-Jan-2019 | 30-Mar-2019 | 31-May-2019 | 27-Aug-2019 | 20-Nov-2019 | 5-Apr-2018 | 22-Jun-2018 | 10-Sep-2018 | 5-Jan-2019 | 1-Apr-2019 | 1-Jun-2019 |
| | | | | | ALS Sample ID (2017-2018) | L2254339-1 | L2288655-3 | L2078247-1 | L2117455-1 | L2163047-6 | L2218463-5 | L2254339-9 | L2284065-2 | L2339589-2 | L2387383-5 | L2078247-2 | L2120097-6 | L2163047-5 | L2218463-2 | L2254339-4 | L2284065-1 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 18.40 | 9.00 | 7.50 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 41.30 | 44.70 | 42.30 | 41.40 | 42.50 | 36.10 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 300.00 | 363.00 | 495.00 | 495.00 | 510.00 | 509.00 | 498.00 | 525.00 | 519.00 | 520.00 | 494.00 | 548.00 | 534.00 | 537.00 | 531.00 | 552.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 375.00 | 367.00 | 535.00 | 535.00 | 516.00 | 506.00 | 516.00 | 518.00 | 521.00 | 512.00 | 523.00 | 535.00 | 535.00 | 533.00 | 563.00 | 540.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 108.00 | 155.00 | 108.00 | 113.00 | 110.00 | 115.00 | 117.00 | 121.00 | 111.00 | 102.00 | 57.90 | 59.90 | 69.20 | 73.40 | 73.60 | 71.60 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.78 | 8.34 | 8.50 | 8.52 | 8.50 | 8.39 | 8.42 | 8.53 | 8.56 | 8.46 | 8.43 | 8.49 | 8.60 | 8.46 | 8.48 | 8.54 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 7.59 | 7.07 | 8.71 | 8.45 | 8.34 | 7.75 | 9.15 | 8.36 | 8.33 | 8.33 | 8.78 | 8.39 | 8.51 | 7.91 | 8.99 | 8.46 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 36.20 | 9.10 | 3.00 | 5.30 | 78.10 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 80.60 | 28.70 | 14.30 | 11.40 | 5.80 | 680.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 275.00 | 243.00 | 356.00 | 388.00 | 402.00 | 356.00 | 408.00 | 332.00 | 336.00 | 330.00 | 381.00 | 366.00 | 365.00 | 343.00 | 358.00 | 361.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 76.30 | 6.53 | 2.02 | 2.00 | 19.10 | 0.93 | 1.49 | 0.20 | 0.30 | 0.32 | 76.30 | 22.80 | 5.74 | 5.19 | 0.60 | 415.00 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 4.00 | 5.10 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 156.00 | 215.00 | 220.00 | 226.00 | 231.00 | 234.00 | 225.00 | 278.00 | 237.00 | 255.00 | 227.00 | 266.00 | 282.00 | 283.00 | 283.00 | 289.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 1.00 | 6.80 | 15.40 | 12.80 | 14.00 | 9.40 | 5.80 | 14.80 | 13.60 | 15.80 | 9.80 | 13.40 | 19.60 | 10.60 | 8.80 | 11.40 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 156.00 | 221.00 | 235.00 | 239.00 | 245.00 | 243.00 | 230.00 | 293.00 | 250.00 | 271.00 | 237.00 | 280.00 | 301.00 | 294.00 | 292.00 | 300.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.01 | 0.01 | 0.21 | 0.19 | 0.17 | 0.17 | 0.16 | 0.18 | 0.17 | 0.26 | 0.01 | 0.45 | 0.59 | 0.65 | 0.62 | 0.63 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.08 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 0.50 | 0.50 | 4.38 | 3.35 | 2.95 | 2.49 | 2.14 | 2.15 | 2.00 | 2.40 | 7.28 | 3.24 | 3.18 | 2.95 | 2.76 | 2.69 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 0.09 | 0.15 | 0.20 | 0.19 | 0.21 | 0.19 | 0.17 | 0.20 | 0.16 | 0.20 | 0.32 | 0.38 | 0.37 | 0.34 | 0.32 | 0.33 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.31 | 0.40 | 9.19 | 2.68 | 2.49 | 6.99 | 5.29 | 3.05 | 1.00 | 1.71 | 5.80 | 1.45 | 0.92 | 0.87 | 0.96 | 0.95 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | 0.00 | 0.0010 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.42 | 0.78 | 0.86 | 0.83 | 0.87 | 0.80 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.01 | 0.00 | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 | 0.72 | 0.76 | 0.93 | 0.91 | 0.88 | 0.79 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.04 | 0.02 | 0.03 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.79 | 0.71 | 0.94 | 0.91 | 0.92 | 0.94 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 8.19 | 6.02 | 45.40 | 41.80 | 43.70 | 41.80 | 38.50 | 40.40 | 38.50 | 41.70 | 41.90 | 13.30 | 9.56 | 9.16 | 6.50 | 12.30 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 9.06 | 8.30 | 15.40 | 9.43 | 22.80 | 20.30 | 5.07 | 6.71 | 2.33 | 5.15 | 20.80 | 14.20 | 9.31 | 8.83 | 9.21 | 8.60 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 9.68 | 8.01 | 26.70 | 10.90 | 9.86 | 23.40 | 4.54 | 9.14 | 11.40 | 13.60 | 17.80 | 11.80 | 8.58 | 8.27 | 8.35 | 11.40 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 7.80 | 1.19 | 0.04 | 0.06 | 0.29 | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | 2.41 | 30.00 | 0.11 | 0.10 | 0.03 | 11.70 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.36 | 0.21 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.32 | 0.04 | 0.04 | 0.07 | 0.20 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 44.10 | 42.40 | 24.90 | 26.00 | 26.90 | 25.80 | 26.50 | 25.50 | 25.70 | 25.90 | 19.30 | 139.00 | 20.20 | 19.90 | 21.00 | 30.50 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 6.31 | 0.52 | 0.09 | 0.11 | 0.19 | 0.06 | 0.08 | 0.05 | 0.05 | 0.06 | 1.44 | 18.20 | 0.18 | 0.18 | 0.12 | 4.24 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 14.10 | 11.00 | 9.08 | 10.70 | 11.30 | 11.30 | 11.10 | 11.50 | 11.80 | 10.90 | 3.38 | 11.30 | 4.37 | 4.45 | 4.38 | 10.80 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.17 | 1.38 | 0.08 | 0.07 | 0.08 | 0.06 | 0.05 | 0.05 | 0.05 | 0.06 | 0.13 | 2.70 | 0.16 | 0.17 | 0.18 | 0.30 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.40 | 2.00 | 2.00 | 2.00 | 2.90 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 30.00 | 19.20 | 70.60 | 82.30 | 83.10 | 85.10 | 83.10 | 83.30 | 85.50 | 80.20 | 86.80 | 112.00 | 105.00 | 111.00 | 111.00 | 116.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.05 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.14 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.05 | 0.00 | 0.00 | 0.00 | 0.01 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.11 | 0.01 | 0.01 | 0.01 | 0.08 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.10 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.005 | 0.007 | 0.006 | 0.007 | 0.008 | 0.007 | 0.007 | 0.006 | 0.008 | 0.008 | 0.010 | 0.010 | 0.012 | 0.010 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.14 | 0.21 | 0.04 | 0.05 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.02 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 29.300 | 42.800 | 26.400 | 27.200 | 26.100 | 27.100 | 27.200 | 28.500 | 25.400 | 24.000 | 18.100 | 18.200 | 20.600 | 22.000 | 22.000 | 20.800 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.003 | 0.005 | 0.003 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.23 | 0.03 | 0.03 | 0.05 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.03 | 0.06 | 0.09 | 0.10 | 0.10 | 0.05 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 8.52 | 11.70 | 10.10 | 10.90 | 10.80 | 11.40 | 11.90 | 12.00 | 11.60 | 10.30 | 3.08 | 3.53 | 4.31 | 4.45 | 4.54 | 4.78 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.01 | 1.37 | 0.08 | 0.07 | 0.06 | 0.06 | 0.05 | 0.05 | 0.05 | 0.05 | 0.09 | 0.14 | 0.16 | 0.17 | 0.17 | 0.14 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.001 | 0.001 | 0.010 | 0.012 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.012 | 0.017 | 0.012 | 0.014 | 0.014 | 0.020 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0004 | 0.0005 | 0.0002 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 27.00 | 19.90 | 87.20 | 84.90 | 83.60 | 77.60 | 85.90 | 102.00 | 85.40 | 77.30 | 111.00 | 111.00 | 112.00 | 102.00 | 113.00 | 132.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | 0.000005 | 0.000005 | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | 0.000005 | 0.000005 |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | 0.000015 | 0.000015 | - | - | - | - | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - | 0.000015 | 0.000015 |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | 0.000011 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | 0.000005 | 0.000005 | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | 0.000005 | 0.000005 |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | 0.000050 | 0.000050 | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | 0.000050 | 0.000050 |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | 0.000050 | 0.000050 | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | 0.000050 | 0.000050 |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | 0.000050 | 0.000050 | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000053 | 0.000050 | 0.000050 | - | 0.000050 | 0.000050 |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | 0.000020 | 0.000020 | - | - | - | - | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | - | 0.000020 | 0.000020 |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | 0.000050 | 0.000050 | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | 0.000050 | 0.000050 |

# Appendix E - Liner Seepage Assessment and Preliminary Cost Estimate for Tenas Management Ponds

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**FINAL**

# Technical Memo

March 3, 2022

| | |
|---|---|
| **To** | Dan Farmer, P.Eng., Allegiance Coal Limited |
| **From** | Kyle Scale, P.Eng., Ph.D.; Calvin Boese, P.Eng., M.Sc. |
| **Subject** | Liner Design and Construction Methodology for Tenas Management Ponds |
| **Client** | Telkwa Coal Ltd. |
| **Project** | 2CT025.008.0300 |

## 1 Introduction

Telkwa Coal Ltd. (TCL) has retained SRK Consulting (Canada) Inc. (SRK) to design and provide a preliminary construction methodology for a liner system that will reduce seepage rates from the Tenas Management Ponds to below allowable thresholds defined in SRK's site water balance (SRK, 2020a). This liner assessment was initially conducted on four liner alternatives in the preliminary seepage assessment (Section 4.4.1); however, based on the performance and estimated costs, one of these liner alternatives was advanced to a focused seepage assessment (Section 4.4.2). The construction methodology for the selected liner alternative is detailed in Section 0 at an early design stage level.

This technical memo is divided into sections describing the Liner Design, Seepage Modeling, Construction Methodology, and Recommendations. The *Liner Design* section provides background on the seepage design criteria from SRK's site water balance, geometry of the PAG management ponds, and details the liner materials and liner system configurations. The *Seepage Modeling* section details the cross sections that serve as a basis for the seepage models, the assumptions and calibration of these models, and presents the results of the seepage assessment and presents a recommended liner option. The *Construction Methodology* section outlines the assumptions, material characteristics, execution of the liner system at an early design stage level, and quality control. The technical memo concludes with the *Recommendations* section, presenting SRK's recommendations for field and laboratory testing, construction methodology, and quality control of the recommended liner system.

# 2 Background

The Tenas Project is in central British Columbia, approximately 15 km south of Smithers and 2 km southwest of Telkwa. The Project site is located south of the Tenas River and the boundaries of the Project encompass the lower reaches of the Telkwa River, Goathorn Creek, and Pine Creek. The Tenas Project's total mine life is anticipated to be 22 years, including one year of pre-stripping and construction followed by 21 years of production. The mine plan was designed and scheduled in a manner that allows potentially-acid generating (PAG) rock to be deposited into management ponds (MP), including the East Management Pond (EMP), West Management Pond (WMP), and North Management Pond (NMP). These MP are above-ground PAG rock storage facilitates. The WMP consists of a portion that is an excavated pit (*Tenas Pit Phase 9*), referred to herein as '*In Pit*', and the remaining portion outside the pit referred to herein as '*Ex Pit*'.

Environmental containment is to be achieved with liner systems that are constructed along the bottom of the ponds and the upstream slopes of the perimeter dams.

# 3 Liner Design Basis

The following subsections describe the seepage design criteria, pond geometry, material properties, and liner configurations.

## 3.1 Seepage Design Criteria

A preliminary water balance provided design targets for the liner seepage analyses that evaluated seepage rates through the bottom of the MP and upstream slopes of the perimeter dams. The maximum allowable seepage through the MP catchments was determined to be 2,800 $m^3$/day from the site wide water balance (SRK, 2020a). This value represents the maximum seepage rate allowed to maintain a positive water balance over the PAG rock (e.g. maintain a minimum 1 m capping of ponded water).

This value is conservatively based on the "*10 Year Dry*" scenario. For the average year scenario, the allowable seepage rate through the management pond catchments increases to 4,260 $m^3$/day. For reference, the water quality target from the Definitive Feasibility Study (DFS) model was 1,700 $m^3$/day.

## 3.2 Pond Geometry and Potential Seepage Areas

Design elevations for the dam crests, freeboard, and areas pertinent to the seepage assessments are included in Table 1. Design revision 1 includes added capacity to account for the reduction in MP storage capacity due to the incorporation of a 1 m thick soil over-liner as the liner protective component (discussed in Section 4.4.2). This revision included raising the dam crests and freeboard elevations for the EMP, NMP, and WMP (Ex-Pit).

**Table 1: Model Geometry for the TCL Management Ponds**

| Design Revision | Management Pond | Area Pond[1] ($m^2$) | Area Upstream Dam Slopes[1] ($m^2$) | Cumulative Area[1] ($m^2$) | Dam Crest Elev. (masl) | Freeboard Elev. (masl) |
|---|---|---|---|---|---|---|
| 0 | EMP | 901,000 | 163,000 | 1,064,000 | 850 | 849 |
| | WMP (Ex Pit) | 371,600 | 122,000 | 493,600 | 850 | 849 |
| | WMP (In Pit) | 440,400 | n/a | 440,400 | n/a | n/a |
| | NMP | 76,900 | 184,500 | 261,400 | 830 | 829 |
| 1 | EMP | 961,939 | 180,136 | 1,142,075 | 852 | 851 |
| | WMP (Ex Pit) | 361,874 | 141,148 | 503,022 | 852 | 851 |
| | WMP (In Pit) | 533,548 | n/a | 533,548 | n/a | n/a |
| | NMP | 210,190 | 83,017 | 293,207 | 831 | 830 |

**Notes:**
(1) MP surfaces areas contributing to seepage through the liner system.
(2) Model geometry for Design Revision 1 provided by Telkwa on November 17, 2020.

## 3.3 Material Properties

Table 2 lists the materials that were modeled in the seepage assessment for the various liner design options. The high case for the native soils represents an increase of the base case hydraulic conductivities by a factor of 2.7 (SRK, 2020b).

**Table 2: Materials Considered for the Liner Seepage Assessment**

| Material | Hydraulic Conductivity, k (m/s) | |
|---|---|---|
| | Base Case | High Case |
| Native soil (EMP)[1] | 3.0E-6 | 8.1E-6 |
| Native soil (NMP)[1] | 1.9E-6 | 5.1E-6 |
| Bentonite[2] | 5.0E-11 | - |
| Soil-bentonite mixture[2] | 1.0E-9 | - |
| Soil-bentonite mixture (optimized)[2] | 1.0E-10 | - |
| Skilhorn clay[3] | 5.9E-9 | - |
| Clay-bentonite mixture[2] | 8.6E-10 | - |
| Skeena Sedimentary Rock[4] | 3.62E-7 | - |

**Notes:**
(1) Values for native soil derived from calibration with the site wide FEFLOW® groundwater model.
(2) Values for bentonite, soil-bentonite mixtures, and clay-bentonite mixtures assumed based on experience with previous projects.
(3) Values for Skilhorn measured in laboratory falling head hydraulic conductivity testing performed with a flexible wall permeameter.
(4) Values for Skeena sedimentary rock (bedrock) obtained from FEFLOW® groundwater model.

A hydraulic conductivity of 1.0E-9 m/s for the soil-bentonite mixture was calculated for a 5% (by volume) soil-bentonite mixture based an assumed hydraulic conductivity for bentonite of 5E-11 m/s. However, recent laboratory testing performed by Golder Associates on available bentonite are showing the hydraulic conductivity to be 3E-12 m/s. The calculated hydraulic conductivity of the soil-bentonite mixture, using the recent lab test value, equates to 6E-11 m/s. Based on the lab data and previous experience with a similar northern project, it is anticipated that a hydraulic conductivity value of 1E-10 m/s can be achieved and was therefore considered in the liner option assessment as an optimized value.

# 4 Seepage Model Development

Two-dimensional liner seepage analyses were carried out with GeoStudio's SEEP/W modeling software (Version 11.0.1.21429). The following subsections detail the cross-sections, model assumptions and calibration, and results of the seepage assessment.

## 4.1 Cross Sections

The cross sections shown in Figure 1 were developed into seepage models for the NMP, EMP, and WMP based on site topography, bedrock elevations, and perimeter dam designs. These cross sections were chosen along alignments that intersect the lowest topography in each pond as well as nearby creeks (*topographic lows*). Section 1 (1'-1') was used to develop the model for the NMP; Section 2 (2'-2') was used to develop the model for the EMP; and Sections 3 (3'-3') and 4 (4'-4') were used to develop models for the WMP.

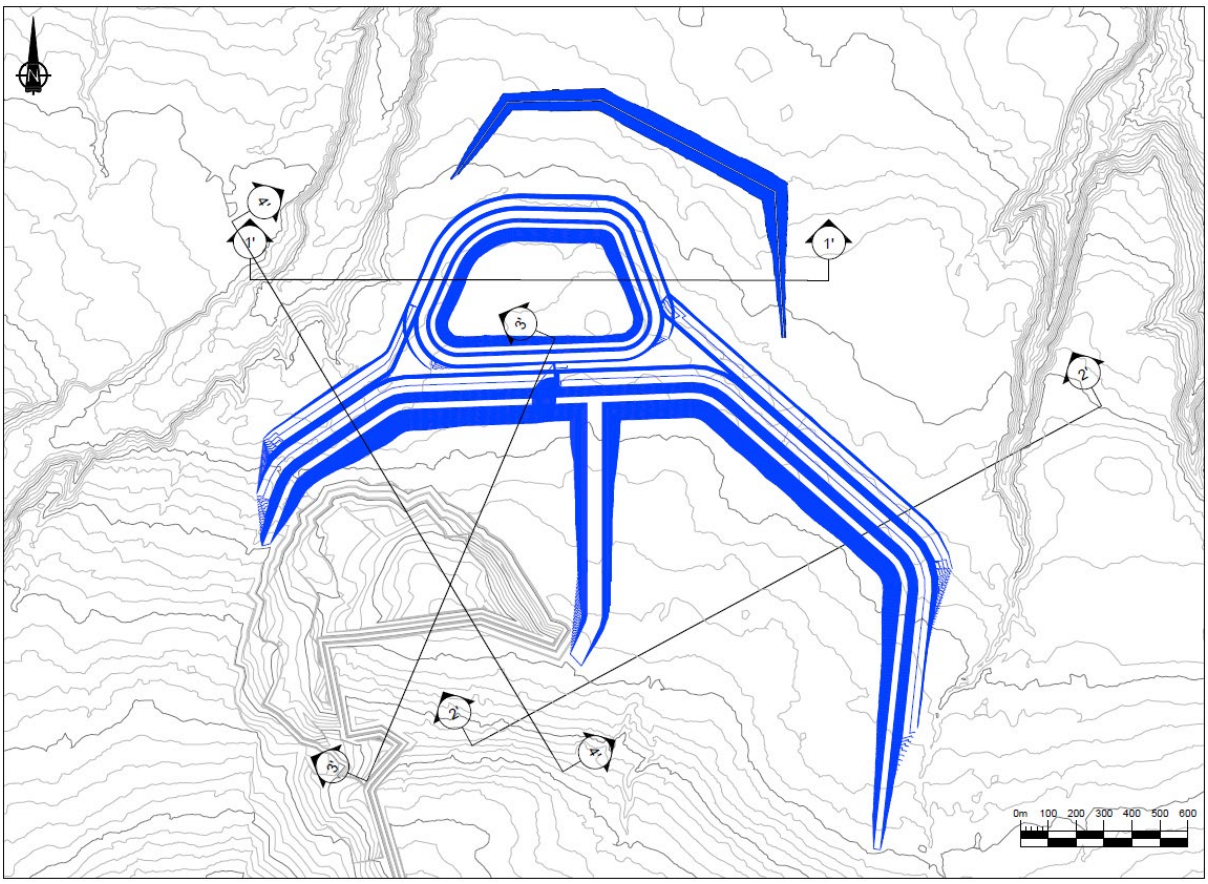



**Figure 1: Cross sections of the North Management Pond (Section 1'-1'), the East Management Pond (Section 2'-2'), and the West Management Pond (Sections 3'-3' and 4'-4') that served as the basis for the seepage models**

## 4.2 Model Assumptions

The seepage models for the EMP, WMP, and NMP were developed based on cross sections that included the site topography, bedrock elevations, and designs of the perimeter dams. For the preliminary seepage assessment only Section 1 for the NMP and Section 2 for the EMP were evaluated. At this early stage, seepage through the WMP was assumed to be equivalent to seepage through the EMP.

The seepage assessment for revision 1 included two additional sections for the WMP that spanned the *In Pit* and *Ex Pit* portions. Seepage through unlined portions of the WMP *In Pit* were determined using FEFLOW® groundwater modeling software by applying a total head of 851 masl (*the dam freeboard elevation*). The WMP *In Pit* portion is assumed to be graded at 2.5H:1V from the *Ex Pit* portion towards the south-southwest. This produces a portion of the north slope that is comprised of overburden and a portion that is a bedrock pit wall. The sub-vertical bedrock cliff at the south of the model is unlined in Model Scenarios 1 to 8 and is re-sloped to 2.5H:1V and lined in Scenarios 9 to 16. These scenarios are discussed in Section 4.4.

Seepage models developed for the preliminary and revision 1 seepage assessments consider the uppermost soil layer to be unsaturated and the underlying soil (below the estimated water table) to be saturated.

## 4.3 Calibration

The site wide groundwater model was developed with FEFLOW® groundwater modeling software. This model utilized data from recent and historic drilling campaigns to distribute the native ground in the vicinity of the MP into *Silty Clay* and *Sand & Gravel*, with hydraulic conductivities of 2E-7 and 3E-6 m/s, respectively. These materials were used as a basis to calibrate the two-dimensional liner seepage models.

To accomplish this calibration, the hydraulic conductivity of the materials in the unlined two-dimensional seepage models were toggled until the seepage rates matched the rates measured with FEFLOW®. For the purposes of this calibration, the resulting material at the EMP and WMP were *Sand & Gravel*, with a hydraulic conductivity of 3E-6 m/s, and the material at the NMP was 40% *Clay* and 60% *Sand & Gravel,* with a hydraulic conductivity of 1.88E-6 m/s.

## 4.4 Liner Configurations

Four liner configurations were modeled as part of the preliminary seepage assessment (Design Revision 0) and one of these configurations was advanced to the focused seepage assessment (Design Revision 1).

### 4.4.1 Preliminary Seepage Assessment (Design Revision 0)

The liner options that were modeled in the two-dimensional SEEP/W (2020) for the preliminary seepage assessment are listed below:

1. Native soil with bentonite disked into the surface at 0.15 or 0.30 m.
2. Clay from Skilhorn Quarry placed to a depth of 1 to 2 m.
3. Clay from Skilhorn Quarry placed to a depth of 1 m with bentonite disked to a depth of 0.15 or 0.30 m.
4. Bentonite placed to a thickness of 0.15 or 0.30 m and covered with a minimum 0.15 m of native soil.

### 4.4.2 Focused Seepage Assessment 1 (Design Revision 1)

The soil-bentonite liner system (Option 1 from Design Revision 0) was progressed to a focused liner seepage assessment in 0.15 m, 0.30 m, 0.45 m, and 0.56 m thicknesses with the optimized bentonite hydraulic conductivity of 1E-10 m/s. Table 3**Error! Reference source not found.** presents the various configurations of the soil-bentonite liner system that were assessed.

Each configuration considers the WMP *Ex Pit* portion to be lined. Configurations 1 to 8 consider the overburden pit slope of the WMP *In Pit* portion to be lined. Configurations 9 to 16 consider the subvertical bedrock cliff to be re-sloped to 2.5H:1V. These configurations were modeled with the base and high case hydraulic conductivity values listed in Table 2.

**Table 3: Soil-Bentonite Liner Systems Assessed as Part of the Focused Seepage Modeling**

| Configuration | Case | SB Thickness (m) | NMP | EMP | WMP Liner Configurations | | |
|---|---|---|---|---|---|---|---|
| | | | | | OVB Slope Liner | In-Pit Liner | BR Pit Wall Resloped |
| **1** | BC | 0.15 | Y | Y | Y | N | N |
| **2** | BC | 0.30 | Y | Y | Y | N | N |
| **3** | BC | 0.45 | Y | Y | Y | N | N |
| **4** | BC | 0.56 | Y | Y | Y | N | N |
| **5** | HC | 0.15 | Y | Y | Y | N | N |
| **6** | HC | 0.30 | Y | Y | Y | N | N |
| **7** | HC | 0.45 | Y | Y | Y | Y | N |
| **8** | HC | 0.56 | Y | Y | Y | Y | N |
| **9** | BC | 0.15 | Y | Y | Y | Y | N |
| **10** | BC | 0.30 | Y | Y | Y | Y | N |
| **11** | BC | 0.45 | Y | Y | Y | Y | N |
| **12** | BC | 0.56 | Y | Y | Y | Y | N |
| **13** | HC | 0.15 | Y | Y | Y | Y | Y |
| **14** | HC | 0.30 | Y | Y | Y | Y | Y |
| **15** | HC | 0.45 | Y | Y | Y | Y | Y |
| **16** | HC | 0.56 | Y | Y | Y | Y | Y |

**Notes:**
(1) BC = Base Case; HC = High Case; MP = Management Pond; BR = Bedrock; OVB = Overburden; SB = Soil-Bentonite.
(2) For the High Case, the hydraulic conductivity of the underlying soils has been increased by a factor of 2.7.
(3) The Soil-Bentonite material assumes an optimized hydraulic conductivity of 1E-10 m/s.

# 5 Seepage Model Results

Seepage rates were quantified through the surface areas corresponding to the upstream perimeter dam slopes and MP pond bottoms. Results of the preliminary seepage modeling (Design Revision 0) are presented in Section 5.1 and results of the focused seepage modeling (Design Revision 1) are presented in Section 5.2.

## 5.1 Results of the Preliminary Seepage Modeling (Design Revision 0)

Preliminary seepage modeling was conducted with the geometry shown in Table 1 for *Design Revision 0.* Only Section 1 for the NMP and Section 2 for the EMP were modeled at this stage and the *In Pit* portion of the WMP was not independently assessed. Based on FEFLOW® groundwater modeling, with a scenario considering a 0.5 m thick compacted clay liner, the seepage from the *Ex Pit* portion of the WMP would be 483 $m^3$/day. This seepage rate was factored into the seepage results calculated for the various liner systems with SEEP/W (2020).

Results of the two-dimensional liner seepage assessment are shown in Table 4 and plotted in Figure 2. Seven liner alternatives provided a seepage rate < 2,800 $m^3$/day, which corresponds to the maximum allowable seepage rate for the *10 Year Dry* scenario. Four of these alternatives barely met the design criteria. However, the design criteria was easily achieved for bentonite placed to a thickness of 0.15 or 0.30 m covered with a minimum 0.15 m of native soil, and the optimized native soil with bentonite disked into the surface at 0.15 m (soil-bentonite). Each of the liner alternatives listed below provide a seepage rate ≤ 4,260 $m^3$/day, which corresponds to the *Average Year* scenario.

**Table 4: Results from the Two-dimensional Liner Seepage Assessment for the Various Liner Configurations Modeled in SEEP/W**

| Model | Seepage ($m^3$/day) | Seepage < 2800 $m^3$/day (Y/N) |
|---|---|---|
| No Liner | 6,992 | N |
| 0.15m Soil-Bentonite | 3,226 | N |
| 0.15m Soil-Bentonite (Optimized) | 1,606 | Y |
| 0.3m Soil-Bentonite | 2,779 | Y |
| 1m Skilhorn Clay | 3,201 | N |
| 2m Skilhorn Clay | 2,779 | Y |
| 1m Skilhorn Clay + 0.15m Clay-Bentonite | 2,788 | Y |
| 1m Skilhorn Clay + 0.30m Clay-Bentonite | 2,580 | Y |
| 0.15m Bentonite | 1,204 | Y |
| 0.30m Bentonite | 843 | Y |

**Notes:**
(1) Seepage limit based on the 10 Year Dry scenario developed in the site water balance is 2,800 $m^3$/day.
(2) Seepage limit based on the Average Year scenario developed in the site water balance is 4,260 $m^3$/day.

Results of the two-dimensional liner seepage assessment are plotted in Figure 2.

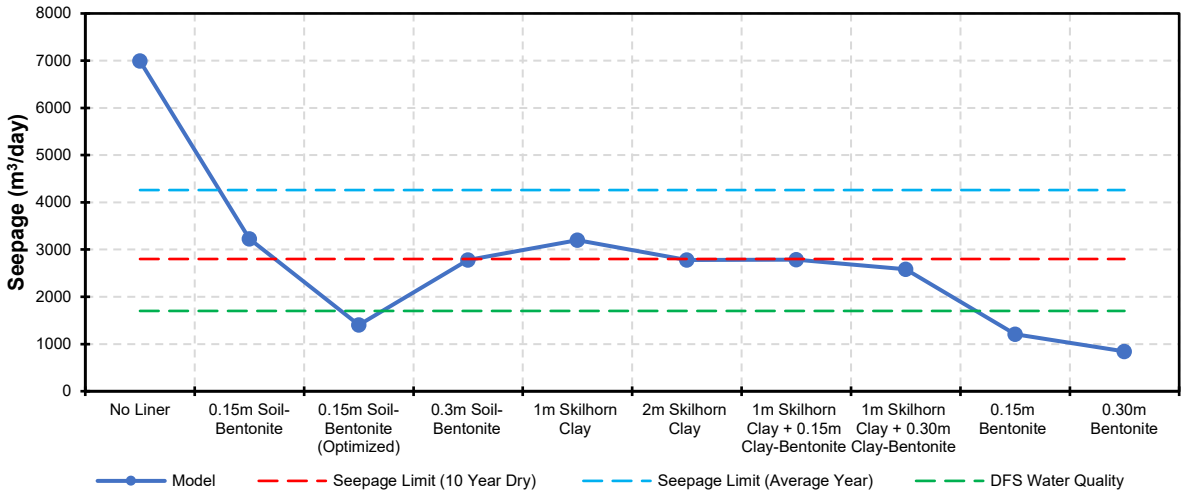



**Figure 2: Results of the Preliminary Liner Seepage Assessment (Design Revision 0) for the Various Liner Configurations Modeled in SEEP/W**

From these scenarios, the 0.15 m soil-bentonite liner system with the optimized bentonite hydraulic conductivity of 1E-10 m/s was advanced to the focused seepage modeling (Design Revision 1). The alternatives for the 0.15 m and 0.30 m pure bentonite were not advanced due to the costs being significantly higher compared to the other liner systems.

## 5.2 Results of the Focused Seepage Modeling (Design Revision 1)

The 0.15 m soil-bentonite liner system with the optimized bentonite hydraulic conductivity of 1E-10 m/s was subjected to a more detailed assessment as part of the focused seepage modeling (Design Revision 1). Additional 0.30 m, 0.45 m, and 0.56 m soil-bentonite liner systems with the optimized bentonite hydraulic conductivity of 1E-10 m/s were also incorporated into the focused seepage modeling. These seepage models were developed with the geometry shown in Table 1 for *Design Revision 1*.

### 5.2.1 WMP Liner Assessment

For the focused seepage modeling, two cross sections were modeled for the WMP (Section 3 and Section 4), in addition to the sections for the NMP and EMP. The new cross sections spanned the WMP *In Pit* and *Ex Pit* portions.

The results of the focused seepage assessment for all MPs with the geometry shown in Table 1 for *Design Revision 1* are listed in Table 5 and shown in Figure 3. The seepage rates for the WMP *In Pit* and *Ex Pit* portions are the average of Sections 3 and 4. As noted in Section 4.4.2, Configurations 1 to 8 consider the overburden pit slope of the WMP *In Pit* portion to be lined. Configurations 9 to 16 consider the subvertical bedrock cliff to be re-sloped to 2.5H:1V.

**Table 5: Results of the Focused Liner Seepage Assessment for the NMP, EMP, and WMP *In Pit* and *Ex Pit* Conducted using the Geometry from Design Revision 1**

| Liner | Case | SB Thickness (m) | WMP Liner Configurations | | | Seepage Rates ($m^3$/day) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | OVB Slope Liner | In-Pit Liner | BR Pit Wall Slope Liner | EMP | NMP | WMP (In-Pit) | WMP (Ex-Pit) | Cumulative |
| **1** | BC | 0.15 | Y | N | N | 738 | 296 | 591 | 706 | 2331 |
| **2** | BC | 0.30 | Y | N | N | 458 | 161 | 665 | 384 | 1667 |
| **3** | BC | 0.45 | Y | N | N | 334 | 109 | 710 | 267 | 1419 |
| **4** | BC | 0.56 | Y | N | N | 277 | 87 | 720 | 215 | 1299 |
| **5** | HC | 0.15 | Y | N | N | 978 | 320 | 1346 | 764 | 3408 |
| **6** | HC | 0.30 | Y | N | N | 536 | 164 | 1395 | 397 | 2492 |
| **7** | HC | 0.45 | Y | N | N | 366 | 112 | 1429 | 277 | 2184 |
| **8** | HC | 0.56 | Y | N | N | 296 | 90 | 1436 | 223 | 2044 |
| **9** | BC | 0.15 | Y | Y | Y | 738 | 296 | 234 | 748 | 2017 |
| **10** | BC | 0.30 | Y | Y | Y | 458 | 161 | 197 | 392 | 1207 |
| **11** | BC | 0.45 | Y | Y | Y | 334 | 109 | 179 | 269 | 891 |
| **12** | BC | 0.56 | Y | Y | Y | 277 | 87 | 186 | 216 | 766 |
| **13** | HC | 0.15 | Y | Y | Y | 978 | 320 | 384 | 759 | 2441 |
| **14** | HC | 0.30 | Y | Y | Y | 536 | 164 | 273 | 385 | 1358 |
| **15** | HC | 0.45 | Y | Y | Y | 366 | 112 | 226 | 265 | 969 |
| **16** | HC | 0.56 | Y | Y | Y | 296 | 90 | 226 | 216 | 827 |

**Notes:**
(1) BC = Base Case; HC = High Case; MP = Management Pond; BR = Bedrock; OVB = Overburden; SB = Soil-Bentonite
(2) For the High Case, the hydraulic conductivity of the underlying soils has been increased by a factor of 2.7.
(3) The Soil-Bentonite material assumes an optimized hydraulic conductivity of 1E-10 m/s.

The results of the focused seepage assessment for all MPs with the geometry shown in Table 1 for *Design Revision 1* are shown in Figure 3.

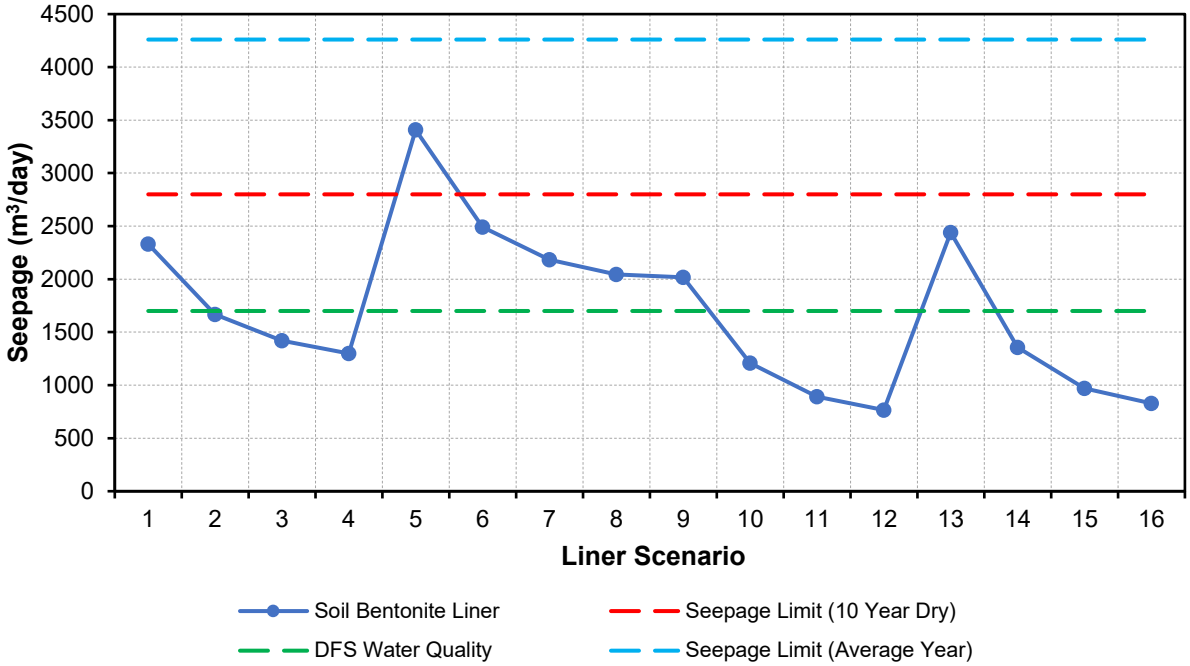



**Figure 3: Results of the Focused Liner Seepage Assessment (Design Revision 1) for the Various Soil-bentonite Liner Configurations Modeled in SEEP/W**

Each of the liner alternatives listed above provide a seepage rate ≤ 4,260 $m^3$/day, which corresponds to the *Average Year* scenario. The 0.3 m, 0.45 m, and 0.56 m soil-bentonite liner systems provide seepage rates < 2,800 $m^3$/day for both the base and high cases, which corresponds to the maximum allowable seepage rate for the *10 Year Dry* scenario.

## 5.3 Recommended Liner Design

The recommended liner design is the 0.45 m soil-bentonite liner constructed in the NMP, EMP and over the *Ex Pit* portion of and the overburden pit slope of the WMP. This liner system provides a seepage rate ≤ 2,800 $m^3$/day for both the base and high cases, which corresponds to the maximum allowable seepage rate for the *10 Year Dry* scenario.

# 6 Construction Methodology

The following section details a preliminary construction methodology for the recommended 0.45 m soil-bentonite liner system that will be constructed in three 0.15 m lifts. This construction methodology was completed at an early design stage level and will be refined in greater detail in detailed design engineering.

## 6.1 Assumptions

It is assumed that construction of the embankments and buttresses are to be completed to the specifications in SRK (2021).

Table 6 lists the lined areas for the various MP that were evaluated in the preliminary cost estimate.

**Table 6: Lined Areas for the Various Liner Alternatives**

| Design Revision[1] | Management Pond | Area Pond ($m^2$) | Area Upstream Dam Slopes ($m^2$) | Cumulative Area ($m^2$) |
|---|---|---|---|---|
| 1 | EMP | 961,939 | 180,136 | 1,142,075 |
| | WMP[2] (Ex Pit) | 361,874 | 141,148 | 503,022 |
| | NMP | 210,190 | 83,017 | 293,207 |

**Notes:**
(1) Model geometry for Design Revision 1 provided by Telkwa on November 17, 2020.
(2) Lining of the WMP *In Pit* portion is not being considered for the construction methodology

Plan view of the areas requiring soil-bentonite liner is shown in Figure 4.

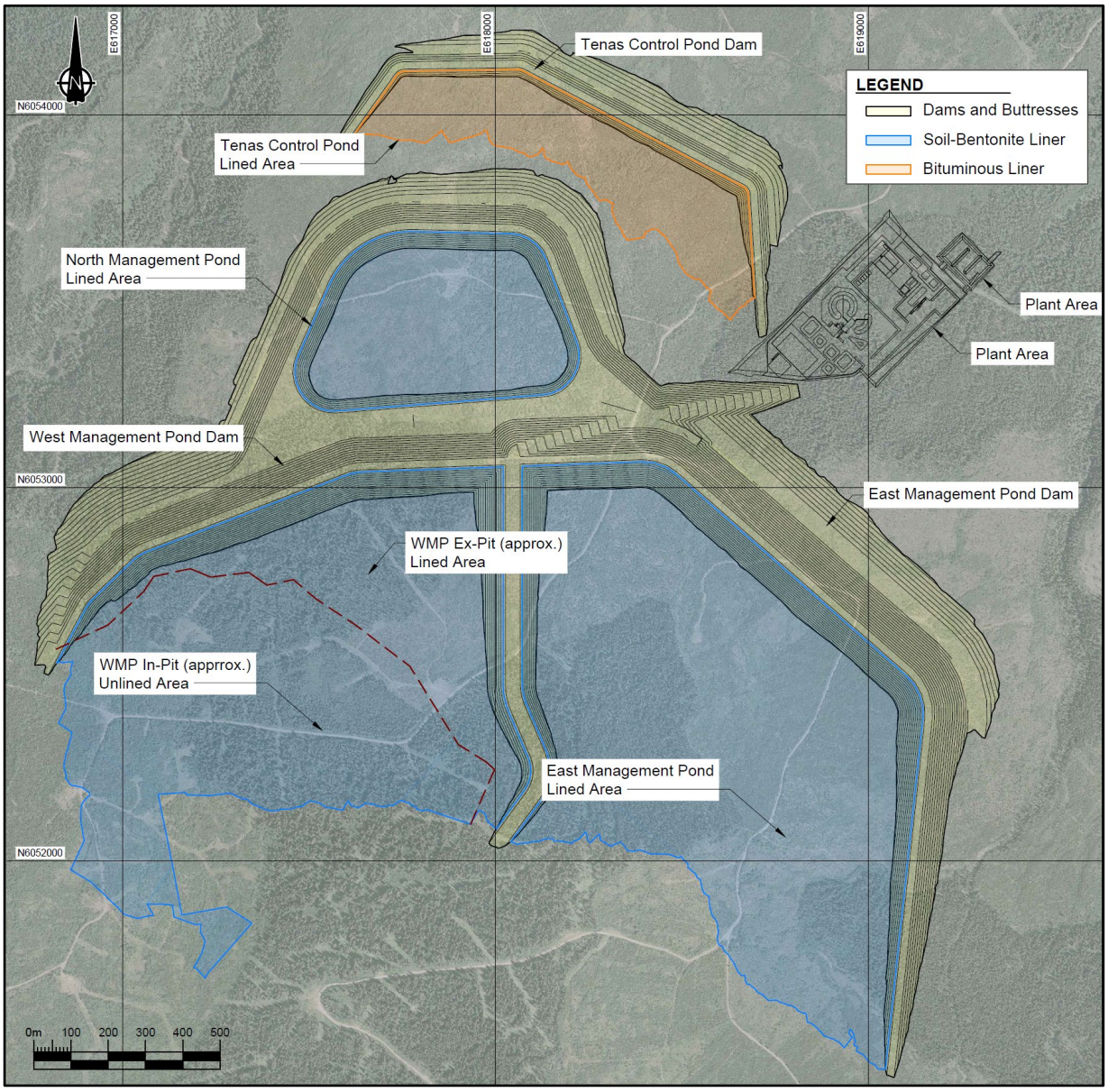



**Figure 4: Plan view of the lined surface areas of the Tenas Control Pond and PAG management ponds at the Tenas Project**

## 6.2 Material Characteristics

The blend of materials used for the soil-bentonite liner system (surface soils and bentonite) depend on the parameters adopted in the design, specifically the geotechnical parameters and hydraulic conductivity. The material characteristics and its adequacy to quality standards will need to be proven in laboratory testing and in the field.

Field obtained geotechnical parameters should be equal to or better than those adopted in the design. The *in-situ* hydraulic conductivity of the soil-bentonite liner should have a hydraulic conductivity ≤ $1x10^{-10}$ m/s; therefore, a correct characterization of the geotechnical parameters (particle-size distribution and clay/bentonite content) and parameters associated with the condition of permeability (degree of compaction, *in-situ* hydraulic conductivity) will be required. Additional characteristic parameters are recommended to be evaluated during the construction works to check compliance with minimum material requirements during construction.

### 6.2.1 On-Site Soil

The selected area for the MP is located at the north and north-east of the projected Tenas open pit. The overburden material is composed principally of a very stiff to hard lean clay (CL), with low to medium plasticity, with intervals of high plasticity clay (CH), clayey silty sand (SC or SM) or gravel (GC or GM) at various depths (with an overburden total thickness equal or higher than 30 m in most of the extension).

Fine-grained and coarse-grained native soil utilized for the soil-bentonite liner system will be exposed during foundation preparation (described in Section 6.3.3). Coarser-grained granular particles such as cobbles and boulders should be removed. The native soil should be subjected to field and laboratory testing to verify the proportion of bentonite required to meet the target hydraulic conductivity ≤ $1x10^{-10}$ m/s, which served as the basis of the liner design.

## 6.3 Execution of the Liner System

### 6.3.1 General

During the construction procedure (cleaning, excavation, embankment construction and operations), additional information related to foundation characteristics and slope materials can be obtained. This information can continue to inform and help to develop processes.

### 6.3.2 Equipment

Equipment options that can be considered for construction of the soil-bentonite liner system include haul trucks, haul trucks equipped with truck mounted spreaders or tractors pulling trailer mounted spreaders, smooth-drum and/or padfoot vibrating compactors, tractors (equipped with or) pulling trailer mounted rotovators or disc harrows, dozers, or graders. The most suitable equipment will be selected by Telkwa Coal based on the soil characteristics and construction requirements.

### 6.3.3 Foundation Preparation

In preparation for construction of the soil-bentonite liner system, clearing and grubbing should be completed until surface soils, trunks, roots, and topsoil materials have been removed and no appreciable content of organic matter remains:

- Clearing involves cutting of tree stumps and brush, and removal of snow and ice.
- Grubbing involves removal of tree stumps, shrubs, grasses, including their complete root system.

The terrain slope should be uniform for consistent pre-disking and subsequent application & mixing of bentonite.

### 6.3.4 Placement, Disking, and Compaction

In this section, preliminary placement, disking, and compaction specifications are provided. These will be further studied and updated during detailed design engineering.

#### Previous Studies

Placement, discing, and compaction equipment and use shall be determined from field studies in trial pads. From these studies, the optimum combination of type of equipment and operation shall be specified. The feasibility of pre-disking the upstream dam surface area shall be assessed on a trial embankment. However, it may be determined that instead of pre-disking, the upstream dam face should be scarified with a toothed excavator bucket or alternative methods.

#### Pre-Disking

Construction of the soil-bentonite liner system involves pre-disking the uppermost 0.15 m of soil to ensure hydraulic connectivity of the native soils and bentonite. This will take place following inspection and approval of preliminary foundation preparation (clearing and grubbing). The field engineer shall carry out visual inspection and approval of the pre-disked surface prior to advancing to bentonite placement. The number of passes required for pre-disking to is dependent on the prepared foundation conditions and selection of equipment.

#### Placement, Disking, and Compaction

Bentonite will be spread onto the uppermost 0.15 m of pre-disked surface soil. Spreading the bentonite may be accomplished from a haul truck mounted cement spreader or a tractor pulling a trailer mounted spreader. Equipment to consider for spreading bentonite are the Stoltz Site Spreader® mounted on a CAT® haul truck. The number of passes to dispense a sufficient quantity of bentonite is dependent on the selection of equipment. For the upstream dam faces it may be necessary to utilize an excavator to roughly dispense the bentonite from 1 $m^3$ bags, followed by manual smoothing/raking of the bentonite by laborers using manual tools such as rakes and shovels.

Following spreading of the bentonite, disking will be undertaken to mix the pre-disked native soil and bentonite. The maximum disking depth per pass is 0.15 m; hence, survey control will need to be achieved using either GPS, rod & level (horizontal levelling), or Total Station. The number of passes of the disking equipment to achieve adequate mixing will be based on the selection of equipment and informed by field studies on trial pads.

To achieve the 0.45 m soil-bentonite liner, 0.15 m layers of local material will need to be placed prior to the second and third additions of bentonite. Placement of the native soil can be completed by hauling native soil with a haul truck, dumping the material in local stockpiles, and then spreading the soil to the target 0.15 m lift thickness with a dozer or grader. For each 0.15 m lift of the soil-bentonite liner system, bentonite will be spread onto the 0.15 m of native soil followed by disking to mix the native soil and bentonite, and compaction.

Compaction of each 0.15 m lift of the 0.45 m soil bentonite liner system will be accomplished with a vibratory smooth drum or sheepsfoot roller. The number of passes of the compactor will be dependent on dry density targets defined in the detailed design engineering and selection of equipment.

Grab samples of the surface soil, bentonite, and soil-bentonite mixture shall be collected and subjected to the testing procedures recommended in Section 6.4.2. Testing of the compacted soil-bentonite liner system *in-situ* shall be undertaken with the testing procedures recommended in Section 6.4.

### 6.3.5 Protective Component

Prior to placement of PAG material, the soil-bentonite liner system will require a protective component to protect the liners from being punctured by large waste rock, which could damage the integrity and functionality of the liner system. Two options were evaluated for this protective layer:

1. Placement of a 1 m thick over-liner layer of locally stockpiled soil.
2. Deployment of a 16 oz. non-woven geotextile.

A protective layer of 16 oz. non-woven geotextile was selected to be placed on top of the liner instead of a soil over-liner. Aside from being the lower cost of the two alternatives, the non-woven geotextile does not reduce the storage capacity of the MPs.

## 6.4 Quality Control and Quality Assurance

The development of an adequate geotechnical campaign, technical specifications for construction and quality controls mitigate the risk of requiring a re-design during construction. The definition of ranges for acceptable parameters ensures flexibility in design tolerances and enables foreseeing actions on possible variabilities in material quality. The design of adequate construction methodologies and its correct control can help prevent contingent quality defects due to negligence and the additional associated costs.

### 6.4.1 Weather Considerations

Weather and runoff conditions during construction can significantly affect the water content of the surface soil material or create hydraulic conditions different from those assumed, which could in turn cause changes in the liner design. For this reason, the project must be continuously evaluated to make sure that the conditions found during construction are compatible with the final design.

### 6.4.2 Recommended Testing

It will be necessary to maintain density control and verify the in-situ hydraulic conductivity of the soil-bentonite liner system to ensure the liner will perform to specification. This will involve a combination of laboratory testing on grab samples collected in the field and *in-situ* (field based) testing.

#### Routine Tests

The following routine testing and visual-manual inspection shall be performed to establish the soil type and *in-situ* condition:

- Natural moisture content testing according to standard ASTM D2216;
- Particle size distribution curves shall be obtained according to standards ASTM D0422 (granular material) and ASTM D2487 (fine material). These shall be obtained for samples of surface soils, bentonite, and soil-bentonite liner material; and
- Permeability tests shall be performed according to standards ASTM D2434 (granular material) and ASTM D5084 (fine material).

### 6.4.3 Compaction

The *in-situ* soil density can be measured by two methods:

- Sand-cone method (ASTM D1556): an excavation is made, and the weight of the extracted material is determined. The excavation volume is computed by filling the hole with sand using a calibrated recipient; and
- Nuclear methods (ASTM D2922, ASTM D3017): based on the interaction between gamma radiation and existing electrons in the soil particles. The difference between energy emitted and received is measured, which is proportional to the soil density.

A systematic on-site control program of the degree of compaction must be elaborated and implemented to determine the density and moisture content of the compacted material and compare the results with the specified limits.

The degree of compaction grade shall be verified in each lift. Control of the fill material shall be carried out continuously by visual inspection of the operations (unloading, spreading, humidification, mixing and compaction).

The number of control tests shall be determined for the detailed level design. No new lift shall be spread until the degree of compaction (moisture and density) has been tested and accepted.

### 6.4.4 Permeability Tests

The soil permeability governs the hydraulic performance of the soil-bentonite liner system. Permeability shall be verified by the use of trial pads, either prior to or during construction, by a Double Ring Infiltrometer, Guelph infiltrometer or *in situ* tests (ASTM D5126).

Permeability results for the soil bentonite liner must be less than or equal to $1x10^{-10}$ m/s in accordance with hypotheses made during the geotechnical design of the embankment.

# 7 Recommendations

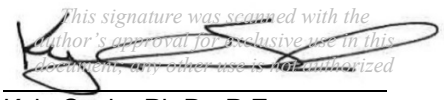
- A 0.45 m soil-bentonite liner system with a hydraulic conductivity of 1E-10 m/s would be sufficient to reduce total seepage below the 2,800 $m^3$/day design criteria target for both the base and high cases.
- To perform a laboratory study to determine the optimal proportion of bentonite-soil blend to produce a soil-bentonite mixture with a hydraulic conductivity ≤ 1E-10 m/s.
- To perform field trials to refine the construction methodology and equipment selection, and verify the soil-bentonite liner system performs to specification with an *in-situ* hydraulic conductivity ≤ 1E-10 m/s.
- The preliminary construction methodology for the recommended 0.45 m soil-bentonite liner system will be constructed in three 0.15 m lifts:
  - Preliminary foundation preparation (clearing & grubbing) followed by pre-disking the native soil;
  - Spreading bentonite to meet the target ≤ $1x10^{-10}$ m/s hydraulic conductivity, disking the first 0.15 m lift of soil-bentonite, and compaction;
  - Placement of 0.15 m lifts of native soil, with each lift followed by application of bentonite to meet the target ≤ $1x10^{-10}$ m/s hydraulic conductivity, disking the 0.15 m lifts of soil-bentonite, and subsequent compaction.
- Quality control and quality assurance procedures should be implemented to mitigate the risk of redesign and prevent quality defects. This includes proper oversight of weather and implementation of routine testing to establish the soil type and *in-situ* condition, as well as maintaining control of the degree of compaction and permeability of the soil-bentonite liner system.

# 8 Closure

This technical memo, “Liner System Seepage Assessment and Construction Methodology for Tenas Management Ponds”, was prepared by SRK Consulting (Canada) Inc. to provide recommendations for a liner system that will reduce seepage rates from the Tenas Management Ponds to below allowable thresholds defined in SRK’s site water balance (SRK, 2020a).

We trust the information included meets your present requirements. If you have any questions regarding the analyses or if you require additional information, please do not hesitate to contact the undersigned.

SRK Consulting (Canada) Inc.

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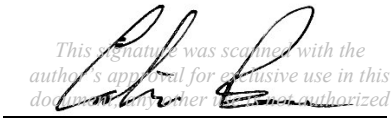


Calvin Boese, M.Sc., P.Eng.
Principal Consultant

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The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

# References

SRK, 2020a. Tenas Project Water and Load Balance Report. Report prepared for Telkwa Coal Limited. Project no. 2CT025.008.

SRK, 2020b. 2020 EA Groundwater Technical Report. Report prepared for Telkwa Coal Limited. Project no. 2CT025.008.

SRK Consulting (Canada) Inc. 2021. Tenas Project – Management and Control Ponds Stability Assessment. Prepared for Telkwa Coal Ltd.: Telkwa, BC. Project number: 2CT025.0082CT025.008. Issued April 2021.

# Appendix F – Estimation of Seepages Underneath the Bituminous Geomembrane of the Control Pond

# LEAKAGE RATE A THROUGH A COMPOSITE LINER

*Source:Giroud, J.P., 1997, "Equations for Calculating the Rate of Liquid Migration Through Composite Liners Due to Geomembrane Defects", Geosynthetics International, Vol. 4, Nos. 3-4, pp. 335-348.*

## INPUTS

**A, Geomembrane area (m2)**

**n, Number of defects per considered geomembrane area (A)**

| Feature | (A) Footprint | (n) Defect density | | | |
|---|---|---|---|---|---|
| | | Excellent | Good | Fair | poor |
| | m2 | *1/acre* | *4/acre* | *10/acre* | *20/acre* |
| - | - | *1* | *4* | *10* | *20* |
| Control Po | 386000 | 96 | 382 | 954 | 1908 |

**$C_{qo}$ or $C_{q\infty}$ , Contact quality factor**

| | Good contact | Poor contact |
|---|---|---|
| $C_{qo}$ | 0.21 | 1.15 |
| Cq ∞ | 0.52 | 1.22 |

$C_{q0}$ => circular, square, rectangular

$C_{q\infty}$ => infinite length

**h. hydraulic heads**

h = 10 m

Note: Limitation of Giroud equation Semi-Prmb => head above geomembrane must be <=3m.

If head above the liner is >3m, the leakage rate is overpredicted (Source: Paul Hubbard, Car

**ts. Thickness of the low-permeability soil component of the composite liner**

ts = 7 m

*CCL, compacted clay liner => typically between 0.3 to 1.5m*

*GCL, geosytnthetic clay liner => typicallybetween 5 and 100mm*

**ks, Permeability of the low-permeability soil (m/s)**

ks = 7.0E-07 m/s Base Case (geomean of the mixed grain till)

ks = 1.9E-06 m/s High Case (base case ks x 2.7)

*ks must be equal or less to kg (see limitations to Giroud equations)*

*kg 5.9E-07 => Calculation kg assumes geomembrane defect is circular*

*k of CCL typically between 1E-10 and 1E-9 m/s*

*k of GCL typically between 5-12 and 5E-11 m/s*

**d, Diameter of circular defect (m)**

d = 3.5 mm 3.5E-03 m

*(min. 0.5mm / max.25mm)*

**case 1**: Typical for liner performance evaluation => defect area of 0.1 $cm^2$
(equivalent to defect diameter of 3.5 mm)

**Case 2**: Conservative design => defect area of 1 $cm^2$
(equivalent to defect diameter of 11.284 mm)

**b, Width of defect (m) for an infinitely long defect**

square defect with side le 3.5E-03 m

infinitely long defect with 3.5E-03 m

**b and B, Width and Length (m) for a recta** m

Rectangular defect with w 3.5E-03 m

Rectangular defect with le 7.0E-03

## CALCULATIONS

**Case 1: Circular defect with diameter (d)**

$$Q = 0.976\ C_{qo}\left[1+0.1(h/t_s)^{0.95}\right] d^{0.2}\ h^{0.9}\ k_s^{0.74}$$

**Q, Leakage rate through the geomembrane defects**
**Unit $m^3/d$**

| | Q per defect x # defect | | | |
|---|---|---|---|---|
| | Excellent | Good | Fair | poor |
| Base Cas | **139** | 551 | 1377 | 2754 |
| High Cas | **289** | 1150 | 2872 | 5744 |

**Case 2: Square defect with side length (b)**

$$Q = C_{qo}\ [1+0.1\ (h/t_s)^{0.95}]\ b^{0.2}\ h^{0.9}\ k_s^{0.74}$$

**Q, Leakage rate through the geomembrane defects**
**Unit $m^3/d$**

| | Q per defect x # defect | | | |
|---|---|---|---|---|
| | Excellent | Good | Fair | poor |
| Base Cas | 142 | 565 | 1411 | 2822 |
| High Cas | 296 | 1178 | 2942 | 5885 |

**Case 3: Infinitely long defect with width (b)**

$$Q^* = C_{q\infty}\ [1+0.2\ (h/t_s)^{0.95}]\ b^{0.1}\ h^{0.45}\ k_s^{0.87}$$

**Q, Leakage rate through the geomembrane defects**
**Unit $m^3/d$**

| | Q per defect x # defect | | | |
|---|---|---|---|---|
| | Excellent | Good | Fair | poor |
| Base Cas | 39 | 155 | 388 | 777 |
| High Cas | 93 | 369 | 921 | 1843 |

**Case 4: Rectangular defect with width (b) and length (B)**

$$Q = C_{qo}\ [1+0.1\ (h/t_s)^{0.95}]\ b^{0.2}\ h^{0.9}\ k_s^{0.74} + C_{q\infty}\ [1+0.2\ (h/t_s)^{0.95}]\ (B-b)\ b^{0.1}\ h^{0.45}\ k_s^{0.87}$$

**Q, Leakage rate through the geomembrane defects**
**Unit $m^3/d$**

| | Q per defect x # defect | | | |
|---|---|---|---|---|
| | Excellent | Good | Fair | poor |
| Base Cas | 142 | 565 | 1412 | 2825 |
| High Cas | 296 | 1180 | 2946 | 5891 |

**Limitations of Giroud (1997) equations**

- If the defects is circular, the defect diameter should be no less than 0.5mm and not greate
- Do not use for very small defects (d<0.5mm because capillarity may prevent free flow;
- In the case of defects that are not circular, it is proposed to use these limitations for the defect width.
- The liquid head on top of the geomembrane should be equal or less than 3m
- The K of the low-permeability soil underlying the geomembrane shoul be equal to or less than a certain value kg
- Limitations to diameter width and groundwater head are linked to the experimental data that were used to deveop the semi-empirical equations

**Conversion factors**

1 m2 = 2.5E-04 acre

## LEAKAGE RATE COMPOSITE LINER (BGM + S/B LINER)

### CALCULATIONS

*Source: Leakage Control using Geomembrane Liners J.P. Giroud. Soils and Rocks, São Paulo, 39(3): 213-235, September-December, 2016.*

**Case 1: Circular defect with diameter of d**

$$Q = 0.21\left[1+0.1\left(\frac{h}{t}\right)^{0.95}\right]a^{0.1}h^{0.9}k^{0.74} \qquad (4)$$

$$k_G = \left\{\frac{0.3891\ d^{1.8}}{C_{qo}\left[1+0.1\left(\frac{h}{t_s}\right)^{0.95}\right]h^{0.4}}\right\}^{1/0.74}$$

$C_{qo}$ = *0.21*

### INPUTS

Instructions => Enter value in yellow cell to modify calculations

| Feature | A ($m^2$) | k (m/s) | h (m) | ts (m) | kg (m/s) | Q ( $m^3$/d) Number of defects per acre: *Excellent* 1 | *Good* 2 | *Fair* 10 | *poor* 20 |
|---|---|---|---|---|---|---|---|---|---|
| EMP | 1,127,069 | 4.1E-10 | 25 | 0.15 | *2.1E-07* | 57.4 | **114.9** | 573.6 | 1147.0 |
| | | | | 0.30 | *4.7E-07* | 31.7 | **63.5** | 316.8 | 633.5 |
| | | | | 0.45 | *7.3E-07* | 22.9 | **45.8** | 228.7 | 457.4 |
| | | | | 0.56 | *9.2E-07* | 19.4 | **38.8** | 193.6 | 387.0 |
| ***Assumption that*** | 286,995 | 4.1E-10 | 20 | 0.15 | *3.1E-07* | 9.8 | **19.7** | 98.4 | 196.6 |
| | | | | 0.30 | *6.8E-07* | 5.5 | **11.0** | 55.1 | 110.1 |
| | | | | 0.45 | *1.0E-06* | 4.0 | **8.0** | 40.2 | 80.4 |
| | | | | 0.56 | *1.3E-06* | 3.4 | **6.9** | 34.3 | 68.5 |
| TCP | 368,603 | 4.1E-10 | 10 | 0.15 | *9.9E-07* | 3.8 | **7.6** | 37.9 | 75.7 |
| | | | | 0.30 | *2.0E-06* | 2.3 | **4.5** | 22.5 | 44.9 |
| | | | | 0.45 | *2.9E-06* | 1.7 | **3.4** | 17.2 | 34.3 |
| | | | | 0.56 | *3.4E-06* | 1.5 | **3.0** | 15.1 | 30.1 |
| WMP ex-pit | 491,397 | 4.1E-10 | 30 | 0.15 | *1.5E-07* | 34.8 | **69.3** | 346.5 | 692.7 |
| | | | | 0.30 | *3.5E-07* | 19.0 | **37.9** | 189.6 | 379.0 |
| | | | | 0.45 | *5.5E-07* | 13.6 | **27.2** | 135.8 | 271.4 |
| | | | | 0.56 | *6.9E-07* | 11.5 | **22.9** | 114.3 | 228.4 |
| WMP in-pit ovb | 123,239 | 4.1E-10 | 30 | 0.15 | *1.5E-07* | 8.8 | **17.4** | 87.0 | 174.0 |
| | | | | 0.30 | *3.5E-07* | 4.8 | **9.5** | 47.6 | 95.2 |
| | | | | 0.45 | *5.5E-07* | 3.5 | **6.8** | 34.1 | 68.2 |
| | | | | 0.56 | *6.9E-07* | 2.9 | **5.7** | 28.7 | 57.4 |
| WMP in-pit rock | 471,130 | 4.1E-10 | 30 | 0.15 | *1.5E-07* | 33.4 | **66.4** | 332.2 | 664.2 |
| | | | | 0.30 | *3.5E-07* | 18.3 | **36.4** | 181.8 | 363.4 |
| | | | | 0.45 | *5.5E-07* | 13.1 | **26.0** | 130.2 | 260.2 |
| | | | | 0.56 | *6.9E-07* | 11.0 | **21.9** | 109.6 | 219.0 |

**NOTES:**

$Q_s$ , Leakage rate through the geomembrane defects

n, defect density (number of defects per acre)

h, hydrauli head

A, liner footprint

ts, thickness of the low-permeability soil component of the composite liner

ks, permeabiliyy of the low-permeability soil component of the composite liner

ks must be equal or less to kg (see limitations to Giroud equations). Calculation kg assumes geomembrane defect is circular.

k of CCL typically between 1E-10 and 1E-9 m/s

k of GCL typically between 5-12 and 5E-11 m/s

**Limitations of Giroud (1997) equations**

- if the defects is circular, the defect diameter should be no less than 0.5mm and not greater than 25mm. Do not use for very small defects (d<0.5mm because capillarity may prevent free flow.
- The liquid head on top of the geomembrane should be equal or less than 3m. If head above the liner is >3m, the leakage rate is overpredicted (Source: Paul Hubbard, Cardiff)
- The K of the low-permeability soil underlying the geomembrane shoul be equal to or less than a certain value kg
- Limitations to diameter width and groundwater head are linked to the experimental data that were used to deveop the semi-empirical equations.

**GENERAL PROPERTIES APPLIED TO ALL CASES:**

**Table 1 Giroud 1997: Contact quality factor Cqo or Cq ∞**

| | Good contact | Poor contact |
|---|---|---|
| $C_{qo}$ | 0.21 | 1.15 |
| Cq ∞ | 0.52 | 1.22 |

Cq0 => circular, square, rectangular

Cq ∞ => infinite length

**Cqo or Cq ∞ , Contact quality factor**

| | |
|---|---|
| Cqo | 0.21 |
| Cq ∞ | 0.52 |

**r, Radius of circular defect (m)**

r 5.65 mm a 100 $mm^2$

(diam. min. 0.5mm / max.25mm)

Giroud 2016: over the years, the practice for engineers as well as researchers has been to consider 2 holes per acre with a hole size of 100 $mm^2$.

**Conversion factors**

1 $m^2$ = 2.5E-04 acre

## SCENARIOS

### Leakage rate ($m^3/d$) for designs with bituminous geomembrane on top of a soil-bentonite liner

| Liner design | TCP | EMP | NMP | WMP ex-pit | WMP in-pit ovb | WMP in-pit rock |
|---|---|---|---|---|---|---|
| B0.15 | 8 | 115 | 20 | 69 | 17 | 66 |
| B0.30 | 5 | 63 | 11 | 38 | 10 | 36 |
| B0.45 | 3 | 46 | 8 | 27 | 7 | 26 |
| B0.56 | 3 | 39 | 7 | 23 | 6 | 22 |

**Mitigation #1 and #2**

Notes:
- Liner design notation: Letter B signifies that a bituminouS liner is placed on top of a soil-bentonite (s/b) liner, the value indicates the thickness in meter of the s/b liner
- nr, option not requested by TCL

### Leakage rate ($m^3/d$) for designs with a soil-bentonite liner (i.e., no BGM) placed on top of overburden or weathered bedrock

| Liner design | TCP | EMP | NMP | WMP ex-pit | WMP in-pit | WMP in-pit ovb | WMP in-pit rock |
|---|---|---|---|---|---|---|---|
| 0.15 | na | 738 | 371 | 762 | 403 | 85 | 318 |
| 0.30 | na | 458 | 198 | 400 | 312 | 66 | 246 |
| 0.45 | na | 334 | 109 | 269 | 186 | 39 | 147 |
| 0.56 | na | 277 | 87 | 216 | 179 | 38 | 141 |

Distribution of leakages in the WMP in-pit between OVB and BDR is based on footprint's proportions (21% OVB, 79% BDR)

Notes:
- Liner design notation: Letter B signifies that a bituminoUS liner is placed on top of a soil-bentonite (s/b) liner, the value indicates the thickness in meter of the s/b liner
- na, not available

### Leakage estimations ($m^3/d$) with variable designs

***Assumption that all MPs are 100% lined (i.e., seepage controlled by the liners)***

| Scenarios | WMP Ex Pit Lined | | WMP Inpit OVB Lined | | WMP Inpit Rock Lined | | Total Q ($m^3/d$) | |
|---|---|---|---|---|---|---|---|---|
| | Design | Q ($m^3/d$) | Design | Q ($m^3/d$) | Design | Q ($m^3/d$) | | |
| **Post EA1** | 0.30 | 400 | B0.30 | 10 | 0.15 | 318 | **728** | |
| **Post EA2** | 0.30 | 400 | 0.30 | 66 | 0.15 | 318 | **784** | |
| Post EA3 | 0.30 | 400 | 0.45 | 39 | 0.15 | 318 | **757** | |
| Post EA4 | 0.30 | 400 | 0.56 | 38 | 0.15 | 318 | **756** | |
| Post EA5 | B0.30 | 38 | B0.30 | 10 | 0.15 | 318 | **366** | |
| Post EA6 | B0.30 | 38 | 0.30 | 66 | 0.15 | 318 | **422** | |
| Post EA7 | B0.30 | 38 | 0.45 | 39 | 0.15 | 318 | **395** | Mitigation #1 |
| Post EA8 | B0.30 | 38 | 0.56 | 38 | 0.15 | 318 | **394** | |
| Post EA9 | 0.45 | 269 | B0.30 | 10 | 0.15 | 318 | **597** | |
| Post EA10 | 0.45 | 269 | 0.30 | 66 | 0.15 | 318 | **653** | |
| Post EA11 | 0.45 | 269 | 0.45 | 39 | 0.15 | 318 | **626** | |
| Post EA12 | 0.45 | 269 | 0.56 | 38 | 0.15 | 318 | **625** | |
| Post EA13 | 0.56 | 216 | B0.30 | 10 | 0.15 | 318 | **544** | Mitigation #2 |
| Post EA14 | 0.56 | 216 | 0.30 | 66 | 0.15 | 318 | **600** | |
| Post EA15 | 0.56 | 216 | 0.45 | 39 | 0.15 | 318 | **573** | |
| Post EA16 | 0.56 | 216 | 0.56 | 38 | 0.15 | 318 | **572** | |
| Post EA17 | 0.30 | 400 | B0.30 | 10 | B0.15 | 66 | **476** | |
| Post EA18 | 0.30 | 400 | 0.30 | 66 | B0.15 | 66 | **532** | |
| Post EA19 | 0.30 | 400 | 0.45 | 39 | B0.15 | 66 | **506** | |
| Post EA20 | 0.30 | 400 | 0.56 | 38 | B0.15 | 66 | **504** | |
| Post EA21 | B0.30 | 38 | B0.30 | 10 | B0.15 | 66 | **114** | |
| Post EA22 | B0.30 | 38 | 0.30 | 66 | B0.15 | 66 | **170** | |
| Post EA23 | B0.30 | 38 | 0.45 | 39 | B0.15 | 66 | **143** | |
| Post EA24 | B0.30 | 38 | 0.56 | 38 | B0.15 | 66 | **142** | |
| Post EA25 | 0.45 | 269 | B0.30 | 10 | B0.15 | 66 | **345** | |
| Post EA26 | 0.45 | 269 | 0.30 | 66 | B0.15 | 66 | **401** | |
| Post EA27 | 0.45 | 269 | 0.45 | 39 | B0.15 | 66 | **375** | |
| Post EA28 | 0.45 | 269 | 0.56 | 38 | B0.15 | 66 | **373** | |
| Post EA29 | 0.56 | 216 | B0.30 | 10 | B0.15 | 66 | **292** | |
| Post EA30 | 0.56 | 216 | 0.30 | 66 | B0.15 | 66 | **348** | |
| Post EA31 | 0.56 | 216 | 0.45 | 39 | B0.15 | 66 | **322** | |
| Post EA32 | 0.56 | 216 | 0.56 | 38 | B0.15 | 66 | **320** | |
| Post EA33 | 0.30 | 400 | B0.30 | 10 | 0.30 | 246 | **656** | |
| Post EA34 | 0.30 | 400 | 0.30 | 66 | 0.30 | 246 | **712** | |
| Post EA35 | 0.30 | 400 | 0.45 | 39 | 0.30 | 246 | **686** | |
| Post EA36 | 0.30 | 400 | 0.56 | 38 | 0.30 | 246 | **684** | |
| Post EA37 | B0.30 | 38 | B0.30 | 10 | 0.30 | 246 | **294** | |
| Post EA38 | B0.30 | 38 | 0.30 | 66 | 0.30 | 246 | **350** | |
| Post EA39 | B0.30 | 38 | 0.45 | 39 | 0.30 | 246 | **323** | |
| Post EA40 | B0.30 | 38 | 0.56 | 38 | 0.30 | 246 | **322** | |
| Post EA41 | 0.45 | 269 | B0.30 | 10 | 0.30 | 246 | **525** | |
| Post EA42 | 0.45 | 269 | 0.30 | 66 | 0.30 | 246 | **581** | |
| Post EA43 | 0.45 | 269 | 0.45 | 39 | 0.30 | 246 | **555** | |
| Post EA44 | 0.45 | 269 | 0.56 | 38 | 0.30 | 246 | **553** | |
| Post EA45 | 0.56 | 216 | B0.30 | 10 | 0.30 | 246 | **472** | |
| Post EA46 | 0.56 | 216 | 0.30 | 66 | 0.30 | 246 | **528** | |
| Post EA47 | 0.56 | 216 | 0.45 | 39 | 0.30 | 246 | **502** | |
| Post EA48 | 0.56 | 216 | 0.56 | 38 | 0.30 | 246 | **500** | |
| Post EA49 | 0.30 | 400 | B0.30 | 10 | B0.30 | 36 | **446** | |
| Post EA50 | 0.30 | 400 | 0.30 | 66 | B0.30 | 36 | **502** | |
| Post EA51 | 0.30 | 400 | 0.45 | 39 | B0.30 | 36 | **475** | |
| Post EA52 | 0.30 | 400 | 0.56 | 38 | B0.30 | 36 | **474** | |
| Post EA53 | B0.30 | 38 | B0.30 | 10 | B0.30 | 36 | **84** | |
| Post EA54 | B0.30 | 38 | 0.30 | 66 | B0.30 | 36 | **140** | |
| Post EA55 | B0.30 | 38 | 0.45 | 39 | B0.30 | 36 | **113** | |
| Post EA56 | B0.30 | 38 | 0.56 | 38 | B0.30 | 36 | **112** | |
| Post EA57 | 0.45 | 269 | B0.30 | 10 | B0.30 | 36 | **315** | |
| Post EA58 | 0.45 | 269 | 0.30 | 66 | B0.30 | 36 | **371** | |
| Post EA59 | 0.45 | 269 | 0.45 | 39 | B0.30 | 36 | **344** | |
| Post EA60 | 0.45 | 269 | 0.56 | 38 | B0.30 | 36 | **343** | |
| Post EA61 | 0.56 | 216 | B0.30 | 10 | B0.30 | 36 | **262** | |
| Post EA62 | 0.56 | 216 | 0.30 | 66 | B0.30 | 36 | **318** | |
| Post EA63 | 0.56 | 216 | 0.45 | 39 | B0.30 | 36 | **291** | |
| Post EA64 | 0.56 | 216 | 0.56 | 38 | B0.30 | 36 | **290** | |

# Appendix G - Model Calibration

| row list model | 13 |
|---|---|
| Model ID | 06-13-lc |

**Hydraulic Head Data**
(Measured between the 6th and 15th of September 2018)

| Observed Label | Unit | Observed (m) | Calculated (m) | Diff Calc-Obs | Squared Error | Absolute Error |
|---|---|---|---|---|---|---|
| T95R-15C | BDR, Coal (#1) | 881.14 | 869.17 | -12.0 | 143.2 | -12.0 |
| T95R-64 | BDR, Coal (#1), 1/1U? | 934.62 | 937.42 | 2.8 | 7.8 | 2.8 |
| T95R-40 | BDR, Coal (#1) | 892.33 | 889.92 | -2.4 | 5.8 | -2.4 |
| T96R-16-19 | BDR, Coal (#1) | 1010.65 | 979.99 | -30.7 | 940.3 | -30.7 |
| T96R-16-28 | BDR, Un-named lower coal | 1011.08 | 976.35 | -34.7 | 1206.2 | -34.7 |
| T96R-34-87 | BDR, Coal (#1), 1/1U? | 934.11 | 915.06 | -19.1 | 362.9 | -19.1 |
| T18-01D (ARD02) | BDR, Sandstone | 945.1 | 939.41 | -5.7 | 32.3 | -5.7 |
| T18-04D (W1D) | BDR, Volcanics | 945.92 | 926.46 | -19.5 | 378.7 | -19.5 |
| T18-08D (W3D) | BDR, Volcanics | 763.42 | 793.26 | 29.8 | 890.5 | 29.8 |
| T19-21S | BDR, Weathered Siltstone | 806.88 | 802.36 | -4.5 | 20.4 | -4.5 |
| T19-22S | BDR, Weathered Siltstone | 802.98 | 806.94 | 4.0 | 15.7 | 4.0 |
| T19-26S | OVB, Clayey Sand | 772.76 | 776.67 | 3.9 | 15.3 | 3.9 |
| T19-34S | BDR, Weathered Siltstone | 808.99 | 826.34 | 17.3 | 300.9 | 17.3 |
| T19-35S | BDR, Weathered Siltstone | 805.77 | 809.62 | 3.8 | 14.8 | 3.8 |
| TOB96-01-05 | OVB, Till | 919.34 | 932.54 | 13.2 | 174.3 | 13.2 |
| TOB96-02-06 | OVB, Till | 850.01 | 845.42 | -4.6 | 21.0 | -4.6 |
| TOB96-11-04 | OVB, Clay | 824.42 | 808.83 | -15.6 | 243.2 | -15.6 |
| T18-04S (W1S) | OVB, Gravelly Fat Clay (Till?) and Volc. | 940.64 | 927.21 | -13.4 | 180.3 | -13.4 |
| T18-06D (W2) | OVB, Cobbles? | 801.12 | 809.05 | 7.9 | 62.8 | 7.9 |
| T18-08S (W3S) | OVB, Sand lense in Till | 770.1 | 793.27 | 23.2 | 536.8 | 23.2 |
| T18-14S | OVB, Silty Sand with Gravel/Till | 677.42 | 673.53 | -3.9 | 15.2 | -3.9 |
| T18-15S | OVB, Sand with Gravel/Till | 704.14 | 687.73 | -16.4 | 269.2 | -16.4 |
| T19-18S | OVB, Clayey Sand | 787.13 | 801.32 | 14.2 | 201.2 | 14.2 |
| T19-27S | OVB, Silty Sand with Gravel | 768.2 | 780.47 | 12.3 | 150.7 | 12.3 |
| T19-36 | OVB, Sand and Gravel | 512.64 | 524.25 | 11.6 | 134.8 | 11.6 |
| T19-37 | OVB, Sand and Gravel | 513.1 | 526.02 | 12.9 | 166.9 | 12.9 |
| TOB96-02-20 | OVB, Sand and gravel | < 833.46 | 845.23 | well not dry | | |
| TOB97-06-21 | OVB, Sand | < 833.58 | 814.73 | dry well | | |
| TOB97-07-24 | OVB, Sand | < 787.05 | 784.50 | dry well | | |
| TOB96-11-19 | OVB, Fine sand | < 807.16 | 808.94 | well not dry | | |
| T18-02S (GEO11) | OVB, Till? Silty SAND with trace clay and trace cob | < 821.22 | 828.58 | well not dry | | |
| T18-11S (GEO22) | OVB, Till? Sandy CLAY with Trace Cobbles | < 779.73 | 759.05 | dry well | | |
| T18-13S (GEO13) | OVB, Till? Gravely CLAY with Some Cobbles | < 796.46 | 788.98 | dry well | | |
| T19-19S | OVB, Clayey Sand (and Siltstone?) | < 795.44 | 823.57 | well not dry | | |
| T19-20S | OVB, Lean Clay with Sand | < 829.29 | 819.47 | dry well | | |

| Hydraulic Head Calibration Statistics | |
|---|---|
| **ME** | -1.0 |
| **Max. AE** | 34.7 |
| **AME** | 13.1 |
| **RMSE** | 15.80 |
| **NRMSE** | 3.17% |
| **R2** | 1.0 |

Hydraulic Head Calibration Statistics
- Mean Error = -1.0 m
- Maximum Absolute Error = 34.7 m
- Absolute Mean Error = 13.1 m
- Root Mean Squared Error = 15.8 m
- Norm. Root Mean Squared Error = 3.2%
- Coeff. of Determ. ($R^2$) = 0.99

| Baseflow Calibration Statistics | |
|---|---|
| **ME** | -1.6 |
| **Max. AE** | 13.0 |
| **AME** | 6.0 |
| **RMSE** | 7.4 |
| **NRMSE** | 3.59% |
| **R2** | 1.0 |

Baseflow Calibration Statistics
- Mean Error = -1.6 L/s
- Maximum Absolute Error = 13.0 L/s
- Absolute Mean Error = 6.0 L/s
- Root Mean Squared Error = 7.4 L/s
- Norm. Root Mean Squared Error = 3.6%
- Coeff. of Determ. ($R^2$) = 1.00

**BUDGET**

| Selection ID | Dirichlet + Cauchy + sink IN ($m^3/d$) | Dirichlet + Cauchy IN + Sink OUT ($m^3/d$) | Dirichlet IN ($m^3/d$) | Dirichlet OUT ($m^3/d$) | Neumann IN ($m^3/d$) | Neumann OUT ($m^3/d$) | Cauchy IN ($m^3/d$) | Cauchy OUT ($m^3/d$) | Well IN ($m^3/d$) | Well OUT ($m^3/d$) | Source/sink IN ($m^3/d$) | Source/sink OUT ($m^3/d$) | Storage Capture(-)/Release(+) IN ($m^3/d$) | Storage Capture(-)/Release(+) OUT ($m^3/d$) | Internal Transfer (Porous Medium) IN (m3/d) | Internal Transfer (Porous Medium) OUT (m3/d) | Imbalance Rate In (+) / Out (-) (m3/d) | Internal Transfer (Discrete Features) IN (m3/d) | Internal Transfer (Discrete Features) OUT (m3/d) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CabinetCk_at_GoathornCk | 783.310 | 8432.735 | 0.000 | 8432.735 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 783.310 | 0.000 | 3.914 | 4.037 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| FourCk_at_GoathornCk | 103.767 | 1488.703 | 0.000 | 1488.703 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 103.767 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GoathonCk_at_CabinetCk | 664.327 | 6253.404 | 0.000 | 6253.404 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 664.327 | 0.000 | 0.814 | 0.705 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Goathorn_Ck_at_FourCk | 1567.126 | 17228.538 | 0.000 | 17228.538 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1567.126 | 0.000 | 5.458 | 4.932 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GoathornCk_at_TenasCk | 1758.826 | 20119.544 | 51.773 | 20119.544 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1707.053 | 0.000 | 5.458 | 4.933 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GoathornCk_at_08EE008 | 1702.425 | 19982.790 | 0.000 | 19982.790 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1702.425 | 0.000 | 5.458 | 4.933 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GoathornCk_at_TelkwaRv | 3814.225 | 29477.819 | 1086.340 | 29477.819 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2727.885 | 0.000 | 5.683 | 5.289 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TenasCk_at_GoathornCk | 2048.955 | 9073.124 | 1034.567 | 9073.124 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1014.388 | 0.000 | 0.224 | 0.356 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TelkwaRv_at_BulkleyRv | 4257.840 | 35315.657 | 1201.343 | 35315.657 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3056.498 | 0.000 | 8.050 | 6.583 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BulkleyRv_at_TelkwaRv | 1072.215 | 10286.165 | 168.837 | 10286.165 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 903.377 | 0.000 | 2.952 | 3.669 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| All_Ck_Rv_nodes | 5346.496 | 45601.822 | 1386.521 | 45601.822 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3959.975 | 0.000 | 11.002 | 10.252 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Domain | 45599.632 | 45601.822 | 1386.521 | 45601.822 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 44213.111 | 0.000 | 133.894 | 132.024 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Baseflow Data (L/s)**

*(NOMENCLATURE: <0 outflow / >0 Inflow to the model)*

| Location | Selection Label | Total watershed ($km^2$) | Mdl watershed ($km^2$) | Estim. | Calc | Stats | |
|---|---|---|---|---|---|---|---|
| | | | | Target (L/s) | Calc. (L/s) | Squared Error | Absolute Error |
| Cabinet Creek | CabinetCk_at_GoathornCk | 54.1 | 54.1 | 97.9 | 97.6 | 1.0E-01 | -0.33% |
| Four Creek | FourCk_at_GoathornCk | 14.1 | 14.1 | 25.6 | 17.2 | 7.0E+01 | -32.72% |
| Tenas Creek | TenasCk_at_GoathornCk | 58.6 | 58.6 | 106.0 | 93.0 | 1.7E+02 | -12.27% |
| Goathorn Creek | GoathonCk_at_CabinetCk | 50.3 | 40.6 | 73.4 | 72.4 | 1.1E+00 | -1.45% |
| | Goathorn_Ck_at_FourCk | 116.7 | 106.9 | 193.6 | 199.4 | 3.4E+01 | 3.02% |
| | GoathornCk_at_08EE008 | 133.5 | 123.7 | 223.9 | 231.3 | 5.5E+01 | 3.30% |
| Telkwa River | TelkwaRv_at_BulkleyRv | 834.3 | 197.9 | 358.2 | 394.8 | not applicable | not applicable |
| Bulkey River | BulkleyRv_at_TelkwaRv | 12400.0 | 280.2 | 507.2 | 511.9 | not applicable | not applicable |

Note:
Goathorn Ck @ Telkwa River = 192.8 km2
Model represents only about 2% of the Bulkey watershed

# Appendix H – Analysis of the Potential Groundwater Quality at Post-closure in the Private Wells Area

**Estimation groundwater quality downgradient of the Project (WQS09), along pathways towards private wells - Base Case**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
(2) **[ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
$C_i$, concentration of from mine feature i (source terms).
$P_i$, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05l-lc (PostClosure) - Base Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 95.6% | 4.4% | 13.4% | 30.9% | 55.3% | na | na | 0.5% |
| WQS09 (TCL 25y) | 95.2% | 4.8% | 12.2% | 28.2% | 50.5% | 8.6% | na | 0.4% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | Base Case Source Terms (Source: Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm) | | | | | | | | | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Post-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 0.68 | 0.75 | 0.55 | 0.55 | 0.39 | 0.39 | 1.20 | 1.20 | 0.05 | 0.05 | 0.86 | 0.89 | 0.54 | 0.54 | 2.43 | 2.43 | 0.54 | 0.54 | 2.42 | 2.42 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.035 | 0.053 | 0.065 | 0.064 | 0.003 | 0.003 | 0.080 | 0.080 | 0.007 | 0.007 | 0.170 | 0.170 | 0.129 | 0.129 | 1.398 | 1.398 | 0.128 | 0.128 | 1.392 | 1.393 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 2.5000 | 3.5000 | 0.6900 | 0.7000 | 0.5500 | 0.5500 | 2.4000 | 2.4000 | 0.0080 | 0.0079 | 0.0230 | 0.0230 | 0.0747 | 0.0748 | 0.0938 | 0.0939 | 0.0848 | 0.0890 | 0.1038 | 0.1080 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0590 | 0.0820 | 0.0160 | 0.0170 | 0.0130 | 0.0130 | 0.0560 | 0.0570 | 0.0002 | 0.0002 | 0.0019 | 0.0019 | 0.0026 | 0.0026 | 0.0064 | 0.0064 | 0.0028 | 0.0029 | 0.0066 | 0.0068 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 20.00 | 21.00 | 10.00 | 10.00 | 13.00 | 13.00 | 33.00 | 33.00 | 1.30 | 1.30 | 4.80 | 4.90 | 11.89 | 11.89 | 6.78 | 6.78 | 11.92 | 11.93 | 6.83 | 6.83 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.0710 | 0.0720 | 0.0300 | 0.0300 | 0.0500 | 0.0500 | 0.1300 | 0.1300 | 0.0035 | 0.0035 | 0.0074 | 0.0073 | 0.0088 | 0.0088 | 0.0122 | 0.0122 | 0.0091 | 0.0091 | 0.0125 | 0.0125 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.00720 | 0.00880 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00009 | 0.00009 | 0.00002 | 0.00002 | 0.00018 | 0.00019 | 0.00048 | 0.00048 | 0.00048 | 0.00048 | 0.00051 | 0.00052 | 0.00051 | 0.00052 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.00680 | 0.00830 | 0.00370 | 0.00370 | 0.00150 | 0.00150 | 0.00760 | 0.00760 | 0.00150 | 0.00140 | 0.00740 | 0.00730 | 0.00090 | 0.00090 | 0.00080 | 0.00080 | 0.00092 | 0.00093 | 0.00083 | 0.00083 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.037 | 0.043 | 0.030 | 0.030 | 0.012 | 0.012 | 0.046 | 0.046 | 0.010 | 0.010 | 0.059 | 0.060 | 0.090 | 0.090 | 0.317 | 0.317 | 0.090 | 0.090 | 0.316 | 0.316 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.28 | 0.35 | 0.16 | 0.16 | 0.06 | 0.06 | 0.33 | 0.33 | 0.06 | 0.06 | 0.32 | 0.32 | 0.11 | 0.11 | 0.16 | 0.16 | 0.11 | 0.11 | 0.16 | 0.16 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.000260 | 0.000280 | 0.000120 | 0.000120 | 0.000100 | 0.000100 | 0.000350 | 0.000360 | 0.000057 | 0.000056 | 0.000140 | 0.000140 | 0.000031 | 0.000031 | 0.000022 | 0.000022 | 0.000032 | 0.000032 | 0.000023 | 0.000023 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 39.00 | 46.00 | 21.00 | 21.00 | 8.30 | 8.30 | 40.00 | 40.00 | 11.00 | 11.00 | 41.00 | 41.00 | 49.16 | 49.16 | 14.70 | 14.70 | 49.12 | 49.15 | 14.80 | 14.83 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0008 | 0.0010 | 0.0005 | 0.0005 | 0.0002 | 0.0002 | 0.0011 | 0.0011 | 0.0002 | 0.0002 | 0.0009 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.01200 | 0.01500 | 0.00640 | 0.00650 | 0.00260 | 0.00260 | 0.01400 | 0.01400 | 0.00250 | 0.00240 | 0.01300 | 0.01300 | 0.00070 | 0.00070 | 0.00070 | 0.00070 | 0.00075 | 0.00076 | 0.00075 | 0.00076 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0024 | 0.0028 | 0.0013 | 0.0013 | 0.0006 | 0.0006 | 0.0026 | 0.0026 | 0.0006 | 0.0006 | 0.0024 | 0.0024 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.033 | 0.035 | 0.018 | 0.018 | 0.019 | 0.019 | 0.055 | 0.056 | 0.003 | 0.003 | 0.019 | 0.019 | 0.030 | 0.030 | 0.064 | 0.064 | 0.030 | 0.030 | 0.064 | 0.064 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00039 | 0.00045 | 0.00024 | 0.00024 | 0.00013 | 0.00013 | 0.00054 | 0.00054 | 0.00008 | 0.00008 | 0.00041 | 0.00041 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.1400 | 0.1700 | 0.0760 | 0.0760 | 0.0320 | 0.0320 | 0.1600 | 0.1600 | 0.0290 | 0.0280 | 0.1500 | 0.1500 | 0.0075 | 0.0075 | 0.0526 | 0.0526 | 0.0080 | 0.0082 | 0.0530 | 0.0531 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 69.00 | 85.00 | 37.00 | 37.00 | 14.00 | 14.00 | 77.00 | 77.00 | 15.00 | 15.00 | 75.00 | 75.00 | 15.49 | 15.49 | 4.13 | 4.13 | 15.71 | 15.78 | 4.40 | 4.46 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.01400 | 0.01600 | 0.00890 | 0.00900 | 0.00570 | 0.00570 | 0.02200 | 0.02200 | 0.00210 | 0.00210 | 0.01400 | 0.01400 | 0.05047 | 0.05047 | 0.01673 | 0.01673 | 0.05032 | 0.05033 | 0.01672 | 0.01673 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.000180 | 0.000190 | 0.000081 | 0.000082 | 0.000081 | 0.000082 | 0.000260 | 0.000260 | 0.000042 | 0.000042 | 0.000065 | 0.000064 | 0.000013 | 0.000013 | 0.000013 | 0.000013 | 0.000013 | 0.000013 | 0.000013 | 0.000013 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0220 | 0.0270 | 0.0120 | 0.0120 | 0.0047 | 0.0048 | 0.0240 | 0.0240 | 0.0052 | 0.0050 | 0.0230 | 0.0230 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0190 | 0.0240 | 0.0100 | 0.0100 | 0.0042 | 0.0042 | 0.0220 | 0.0220 | 0.0040 | 0.0039 | 0.0210 | 0.0200 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 12.0 | 15.0 | 6.6 | 6.6 | 2.5 | 2.5 | 14.0 | 14.0 | 2.6 | 2.5 | 13.0 | 13.0 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.01600 | 0.01900 | 0.00830 | 0.00840 | 0.00340 | 0.00340 | 0.01800 | 0.01800 | 0.00330 | 0.00320 | 0.01700 | 0.01600 | 0.00073 | 0.00073 | 0.00067 | 0.00067 | 0.00079 | 0.00080 | 0.00073 | 0.00074 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.000150 | 0.000160 | 0.000069 | 0.000070 | 0.000075 | 0.000076 | 0.000230 | 0.000230 | 0.000037 | 0.000037 | 0.000042 | 0.000041 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000027 | 0.000027 | 0.000027 | 0.000027 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 11.0 | 17.0 | 23.0 | 23.0 | 1.6 | 1.6 | 30.0 | 30.0 | 1.3 | 1.3 | 58.0 | 61.0 | 19.9 | 19.9 | 302.0 | 302.0 | 19.9 | 19.9 | 300.8 | 300.8 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.01100 | 0.01400 | 0.00590 | 0.00590 | 0.00250 | 0.00250 | 0.01300 | 0.01300 | 0.00230 | 0.00220 | 0.01200 | 0.01200 | 0.00087 | 0.00087 | 0.00087 | 0.00087 | 0.00091 | 0.00092 | 0.00091 | 0.00092 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00380 | 0.00460 | 0.00210 | 0.00210 | 0.00083 | 0.00084 | 0.00430 | 0.00430 | 0.00080 | 0.00078 | 0.00410 | 0.00410 | 0.00122 | 0.00122 | 0.00051 | 0.00051 | 0.00123 | 0.00123 | 0.00053 | 0.00053 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0010 | 0.0012 | 0.0006 | 0.0006 | 0.0003 | 0.0003 | 0.0012 | 0.0012 | 0.0002 | 0.0002 | 0.0011 | 0.0011 | 0.0010 | 0.0010 | 0.0005 | 0.0005 | 0.0010 | 0.0010 | 0.0005 | 0.0005 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0040 | 0.0048 | 0.0025 | 0.0025 | 0.0009 | 0.0009 | 0.0047 | 0.0047 | 0.0009 | 0.0009 | 0.0050 | 0.0051 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

**Estimation groundwater quality downgradient of the Project (WQS09), along pathways towards private wells - HighCase**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
(2) **[ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
$C_i$,, concentration of from mine feature i (source terms).
$P_i$,, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05l-hc (PostClosure) - High Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP-In | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 91.9% | 8.1% | 7.4% | 18.8% | 67.3% | na | na | 6.6% |
| WQS09 (TCL 25y) | 91.1% | 8.9% | 6.7% | 17.0% | 61.1% | 9.2% | na | 6.0% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | High Case Source Terms (Source: Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm) | | | | | | | | | | | | High Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Post-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 29.02 | 28.34 | 11.73 | 11.75 | 6.09 | 6.15 | 37.98 | 38.15 | 6.56 | 6.36 | 30.41 | 30.21 | 2.89 | 2.90 | 4.70 | 4.71 | 3.10 | 3.10 | 4.90 | 4.91 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.049 | 0.085 | 0.069 | 0.069 | 0.004 | 0.004 | 0.082 | 0.082 | 0.007 | 0.007 | 0.166 | 0.172 | 0.127 | 0.127 | 1.347 | 1.347 | 0.126 | 0.127 | 1.336 | 1.337 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 1.8826 | 3.2811 | 0.1686 | 0.1713 | 0.3718 | 0.3755 | 1.2846 | 1.2939 | 0.0075 | 0.0074 | 0.0213 | 0.0217 | 0.0818 | 0.0824 | 0.1001 | 0.1007 | 0.0966 | 0.1086 | 0.1148 | 0.1268 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0434 | 0.0759 | 0.0044 | 0.0045 | 0.0085 | 0.0086 | 0.0302 | 0.0304 | 0.0001 | 0.0001 | 0.0018 | 0.0019 | 0.0027 | 0.0028 | 0.0064 | 0.0064 | 0.0031 | 0.0034 | 0.0067 | 0.0070 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.017 | 0.017 | 0.002 | 0.002 | 0.017 | 0.017 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 664.31 | 632.36 | 250.86 | 251.42 | 150.16 | 151.68 | 879.71 | 883.88 | 145.05 | 140.81 | 637.48 | 632.73 | 65.86 | 66.09 | 60.94 | 61.17 | 70.77 | 70.74 | 65.90 | 65.86 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.1692 | 0.1175 | 0.0211 | 0.0214 | 0.0944 | 0.0954 | 0.2852 | 0.2873 | 0.0036 | 0.0036 | 0.0073 | 0.0073 | 0.0218 | 0.0220 | 0.0251 | 0.0253 | 0.0230 | 0.0227 | 0.0263 | 0.0260 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.01381 | 0.01307 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00009 | 0.00009 | 0.00002 | 0.00002 | 0.00018 | 0.00019 | 0.00047 | 0.00047 | 0.00047 | 0.00047 | 0.00058 | 0.00057 | 0.00058 | 0.00057 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.01319 | 0.01249 | 0.00489 | 0.00490 | 0.00300 | 0.00303 | 0.01707 | 0.01715 | 0.00298 | 0.00290 | 0.01220 | 0.01212 | 0.00172 | 0.00172 | 0.00163 | 0.00163 | 0.00181 | 0.00181 | 0.00172 | 0.00172 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.056 | 0.062 | 0.032 | 0.032 | 0.018 | 0.018 | 0.061 | 0.062 | 0.010 | 0.010 | 0.059 | 0.060 | 0.089 | 0.089 | 0.307 | 0.307 | 0.089 | 0.089 | 0.305 | 0.305 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.48 | 0.47 | 0.20 | 0.20 | 0.10 | 0.10 | 0.63 | 0.64 | 0.11 | 0.10 | 0.52 | 0.52 | 0.13 | 0.13 | 0.19 | 0.19 | 0.14 | 0.14 | 0.19 | 0.19 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.001817 | 0.001335 | 0.000285 | 0.000288 | 0.000702 | 0.000710 | 0.002498 | 0.002515 | 0.000317 | 0.000314 | 0.000262 | 0.000260 | 0.000170 | 0.000171 | 0.000162 | 0.000163 | 0.000184 | 0.000181 | 0.000175 | 0.000172 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 61.02 | 60.69 | 23.15 | 23.18 | 12.98 | 13.09 | 67.65 | 67.93 | 15.12 | 14.84 | 54.61 | 54.41 | 50.40 | 50.42 | 17.29 | 17.31 | 50.49 | 50.50 | 17.65 | 17.66 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0042 | 0.0033 | 0.0009 | 0.0009 | 0.0015 | 0.0015 | 0.0058 | 0.0058 | 0.0008 | 0.0008 | 0.0014 | 0.0014 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.02194 | 0.02099 | 0.00840 | 0.00841 | 0.00476 | 0.00481 | 0.02869 | 0.02882 | 0.00496 | 0.00482 | 0.02146 | 0.02130 | 0.00209 | 0.00209 | 0.00209 | 0.00209 | 0.00225 | 0.00225 | 0.00225 | 0.00225 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0031 | 0.0030 | 0.0011 | 0.0011 | 0.0007 | 0.0007 | 0.0035 | 0.0035 | 0.0007 | 0.0007 | 0.0025 | 0.0025 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.071 | 0.056 | 0.016 | 0.016 | 0.035 | 0.036 | 0.117 | 0.118 | 0.003 | 0.003 | 0.019 | 0.019 | 0.035 | 0.035 | 0.067 | 0.067 | 0.035 | 0.035 | 0.067 | 0.067 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00121 | 0.00094 | 0.00025 | 0.00026 | 0.00045 | 0.00046 | 0.00168 | 0.00169 | 0.00021 | 0.00021 | 0.00035 | 0.00035 | 0.00056 | 0.00056 | 0.00056 | 0.00056 | 0.00057 | 0.00057 | 0.00057 | 0.00057 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.2405 | 0.2338 | 0.0963 | 0.0965 | 0.0512 | 0.0517 | 0.3166 | 0.3180 | 0.0538 | 0.0522 | 0.2494 | 0.2478 | 0.0226 | 0.0227 | 0.0660 | 0.0661 | 0.0244 | 0.0244 | 0.0674 | 0.0674 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 117.84 | 115.75 | 47.36 | 47.44 | 23.18 | 23.41 | 150.18 | 150.83 | 27.84 | 27.03 | 123.84 | 122.95 | 22.21 | 22.24 | 11.29 | 11.33 | 22.99 | 23.01 | 12.17 | 12.19 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.06990 | 0.05394 | 0.01432 | 0.01444 | 0.02697 | 0.02724 | 0.10213 | 0.10281 | 0.01045 | 0.01036 | 0.01915 | 0.01931 | 0.05405 | 0.05410 | 0.02163 | 0.02167 | 0.05418 | 0.05409 | 0.02202 | 0.02194 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.003018 | 0.002150 | 0.000404 | 0.000410 | 0.001216 | 0.001229 | 0.004146 | 0.004176 | 0.000517 | 0.000515 | 0.000181 | 0.000178 | 0.000254 | 0.000256 | 0.000254 | 0.000256 | 0.000276 | 0.000271 | 0.000276 | 0.000271 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0371 | 0.0365 | 0.0147 | 0.0147 | 0.0074 | 0.0075 | 0.0457 | 0.0459 | 0.0089 | 0.0086 | 0.0377 | 0.0374 | 0.0038 | 0.0038 | 0.0038 | 0.0038 | 0.0041 | 0.0041 | 0.0041 | 0.0041 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0341 | 0.0329 | 0.0133 | 0.0133 | 0.0073 | 0.0073 | 0.0446 | 0.0448 | 0.0077 | 0.0075 | 0.0342 | 0.0339 | 0.0037 | 0.0037 | 0.0037 | 0.0037 | 0.0040 | 0.0040 | 0.0040 | 0.0040 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 20.4 | 20.1 | 8.4 | 8.4 | 3.9 | 4.0 | 26.2 | 26.4 | 4.8 | 4.6 | 22.1 | 22.0 | 3.5 | 3.5 | 3.5 | 3.5 | 3.6 | 3.6 | 3.6 | 3.6 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.02758 | 0.02660 | 0.01076 | 0.01078 | 0.00588 | 0.00594 | 0.03594 | 0.03610 | 0.00627 | 0.00609 | 0.02775 | 0.02754 | 0.00246 | 0.00247 | 0.00240 | 0.00241 | 0.00266 | 0.00266 | 0.00260 | 0.00261 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.002976 | 0.002110 | 0.000388 | 0.000394 | 0.001208 | 0.001220 | 0.004091 | 0.004121 | 0.000507 | 0.000506 | 0.000138 | 0.000136 | 0.000264 | 0.000266 | 0.000264 | 0.000266 | 0.000286 | 0.000281 | 0.000286 | 0.000281 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 53.5 | 54.4 | 28.9 | 28.9 | 17.1 | 17.3 | 84.6 | 84.9 | 7.8 | 7.8 | 60.1 | 62.5 | 23.7 | 23.7 | 294.7 | 294.8 | 23.9 | 24.0 | 292.8 | 292.8 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.02089 | 0.01974 | 0.00775 | 0.00777 | 0.00480 | 0.00484 | 0.02748 | 0.02761 | 0.00461 | 0.00448 | 0.01953 | 0.01939 | 0.00219 | 0.00220 | 0.00219 | 0.00220 | 0.00234 | 0.00234 | 0.00234 | 0.00234 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00430 | 0.00340 | 0.00095 | 0.00095 | 0.00153 | 0.00154 | 0.00585 | 0.00589 | 0.00079 | 0.00078 | 0.00148 | 0.00148 | 0.00140 | 0.00141 | 0.00073 | 0.00073 | 0.00143 | 0.00142 | 0.00075 | 0.00075 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0081 | 0.0072 | 0.0025 | 0.0025 | 0.0023 | 0.0023 | 0.0108 | 0.0108 | 0.0017 | 0.0016 | 0.0055 | 0.0054 | 0.0016 | 0.0016 | 0.0012 | 0.0012 | 0.0016 | 0.0016 | 0.0012 | 0.0012 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0233 | 0.0219 | 0.0084 | 0.0084 | 0.0057 | 0.0057 | 0.0302 | 0.0304 | 0.0051 | 0.0050 | 0.0202 | 0.0201 | 0.0065 | 0.0065 | 0.0065 | 0.0065 | 0.0066 | 0.0066 | 0.0066 | 0.0066 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

## Estimation groundwater quality downgradient of the Project and along pathways towards private wells - Base Case

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
(2) **[ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
$C_i$, concentration of from mine feature i (source terms).
$P_i$, percentage contribution of from mine feature i to total mine affected groundwater

### Model: 08-05z-lc (PostClosure) - Base Case

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 96.8% | 3.2% | 8.2% | 26.0% | 65.0% | na | na | 0.8% |
| WQS09 (TCL 25y) | 96.8% | 3.2% | 8.1% | 25.8% | 64.5% | 0.7% | na | 0.8% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | Base Case Source Terms Sources: Control Pond = Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm NMP, EMP, WMP, Pit = Results_MPSeepage_WaterQuality_EAModel_rev07_20220209.xlsm | | | | | | | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Posz-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 0.68 | 0.75 | 8.00 | 8.00 | 2.70 | 2.70 | 20.00 | 20.00 | 22.00 | 22.00 | 22.00 | 22.00 | 0.97 | 0.97 | 2.89 | 2.89 | 0.97 | 0.97 | 2.89 | 2.89 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.035 | 0.053 | 0.069 | 0.069 | 0.004 | 0.004 | 0.083 | 0.082 | 0.170 | 0.170 | 0.170 | 0.170 | 0.130 | 0.130 | 1.415 | 1.415 | 0.130 | 0.130 | 1.415 | 1.415 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 2.5000 | 3.5000 | 0.1900 | 0.1900 | 0.4200 | 0.4300 | 2.6000 | 2.6000 | 0.0210 | 0.0220 | 0.0210 | 0.0220 | 0.0631 | 0.0632 | 0.0824 | 0.0825 | 0.0637 | 0.0640 | 0.0830 | 0.0833 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0590 | 0.0820 | 0.0049 | 0.0050 | 0.0097 | 0.0098 | 0.0600 | 0.0600 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0023 | 0.0023 | 0.0062 | 0.0062 | 0.0023 | 0.0023 | 0.0062 | 0.0062 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 20.00 | 21.00 | 180.00 | 190.00 | 76.00 | 77.00 | 520.00 | 520.00 | 510.00 | 500.00 | 510.00 | 500.00 | 23.07 | 23.11 | 17.90 | 17.93 | 23.07 | 23.11 | 17.90 | 17.93 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.0710 | 0.0720 | 0.0091 | 0.0092 | 0.0270 | 0.0270 | 0.0460 | 0.0460 | 0.0069 | 0.0069 | 0.0069 | 0.0069 | 0.0060 | 0.0061 | 0.0095 | 0.0095 | 0.0061 | 0.0061 | 0.0095 | 0.0095 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.00720 | 0.00880 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00010 | 0.00010 | 0.00018 | 0.00019 | 0.00018 | 0.00019 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.00680 | 0.00830 | 0.00035 | 0.00035 | 0.00015 | 0.00016 | 0.00082 | 0.00082 | 0.00081 | 0.00082 | 0.00081 | 0.00082 | 0.00070 | 0.00070 | 0.00060 | 0.00060 | 0.00070 | 0.00070 | 0.00060 | 0.00060 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.037 | 0.043 | 0.029 | 0.029 | 0.011 | 0.011 | 0.049 | 0.049 | 0.059 | 0.061 | 0.059 | 0.061 | 0.091 | 0.091 | 0.321 | 0.321 | 0.091 | 0.091 | 0.321 | 0.321 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.28 | 0.35 | 0.12 | 0.12 | 0.04 | 0.04 | 0.30 | 0.30 | 0.33 | 0.33 | 0.33 | 0.33 | 0.10 | 0.10 | 0.16 | 0.16 | 0.10 | 0.10 | 0.16 | 0.16 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.000260 | 0.000280 | 0.000049 | 0.000049 | 0.000055 | 0.000056 | 0.000240 | 0.000240 | 0.000100 | 0.000100 | 0.000100 | 0.000100 | 0.000026 | 0.000026 | 0.000017 | 0.000017 | 0.000026 | 0.000026 | 0.000017 | 0.000017 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 39.00 | 46.00 | 7.80 | 7.80 | 3.40 | 3.50 | 13.00 | 13.00 | 16.00 | 16.00 | 16.00 | 16.00 | 48.86 | 48.87 | 13.97 | 13.97 | 48.86 | 48.86 | 13.98 | 13.98 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0008 | 0.0010 | 0.0012 | 0.0012 | 0.0004 | 0.0004 | 0.0029 | 0.0029 | 0.0032 | 0.0032 | 0.0032 | 0.0032 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.01200 | 0.01500 | 0.00040 | 0.00040 | 0.00024 | 0.00025 | 0.00140 | 0.00140 | 0.00094 | 0.00094 | 0.00094 | 0.00094 | 0.00032 | 0.00032 | 0.00032 | 0.00032 | 0.00033 | 0.00033 | 0.00033 | 0.00033 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0024 | 0.0028 | 0.0015 | 0.0015 | 0.0006 | 0.0006 | 0.0038 | 0.0038 | 0.0040 | 0.0040 | 0.0040 | 0.0040 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.033 | 0.035 | 0.011 | 0.011 | 0.013 | 0.013 | 0.039 | 0.040 | 0.019 | 0.019 | 0.019 | 0.019 | 0.030 | 0.030 | 0.064 | 0.064 | 0.030 | 0.030 | 0.064 | 0.064 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00039 | 0.00045 | 0.00018 | 0.00018 | 0.00008 | 0.00008 | 0.00049 | 0.00049 | 0.00046 | 0.00046 | 0.00046 | 0.00046 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.1400 | 0.1700 | 0.0750 | 0.0750 | 0.0270 | 0.0270 | 0.1900 | 0.1900 | 0.2100 | 0.2100 | 0.2100 | 0.2100 | 0.0072 | 0.0072 | 0.0528 | 0.0528 | 0.0072 | 0.0072 | 0.0529 | 0.0529 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 69.00 | 85.00 | 5.90 | 5.90 | 2.30 | 2.30 | 14.00 | 14.00 | 15.00 | 15.00 | 15.00 | 15.00 | 13.69 | 13.69 | 2.18 | 2.18 | 13.70 | 13.70 | 2.20 | 2.20 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.01400 | 0.01600 | 0.01800 | 0.01800 | 0.01100 | 0.01200 | 0.07500 | 0.07500 | 0.04500 | 0.04500 | 0.04500 | 0.04500 | 0.05214 | 0.05215 | 0.01798 | 0.01798 | 0.05213 | 0.05214 | 0.01798 | 0.01798 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.000180 | 0.000190 | 0.000032 | 0.000033 | 0.000043 | 0.000044 | 0.000170 | 0.000180 | 0.000061 | 0.000061 | 0.000061 | 0.000061 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0220 | 0.0270 | 0.0023 | 0.0023 | 0.0011 | 0.0011 | 0.0052 | 0.0052 | 0.0056 | 0.0055 | 0.0056 | 0.0055 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0190 | 0.0240 | 0.0016 | 0.0016 | 0.0008 | 0.0008 | 0.0053 | 0.0053 | 0.0042 | 0.0041 | 0.0042 | 0.0041 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 12.0 | 15.0 | 8.4 | 8.5 | 2.8 | 2.8 | 21.0 | 21.0 | 24.0 | 23.0 | 24.0 | 23.0 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.01600 | 0.01900 | 0.00340 | 0.00340 | 0.00120 | 0.00130 | 0.00880 | 0.00880 | 0.00930 | 0.00920 | 0.00930 | 0.00920 | 0.00040 | 0.00040 | 0.00034 | 0.00034 | 0.00040 | 0.00040 | 0.00034 | 0.00034 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.000150 | 0.000160 | 0.000024 | 0.000024 | 0.000040 | 0.000040 | 0.000150 | 0.000150 | 0.000037 | 0.000037 | 0.000037 | 0.000037 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 11.0 | 17.0 | 220.0 | 220.0 | 67.0 | 68.0 | 540.0 | 540.0 | 620.0 | 620.0 | 620.0 | 620.0 | 31.8 | 31.8 | 317.5 | 317.5 | 31.8 | 31.8 | 317.4 | 317.4 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.01100 | 0.01400 | 0.00430 | 0.00430 | 0.00170 | 0.00170 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.00076 | 0.00076 | 0.00076 | 0.00076 | 0.00077 | 0.00077 | 0.00077 | 0.00077 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00380 | 0.00460 | 0.00130 | 0.00130 | 0.00046 | 0.00047 | 0.00330 | 0.00330 | 0.00350 | 0.00350 | 0.00350 | 0.00350 | 0.00118 | 0.00118 | 0.00046 | 0.00046 | 0.00118 | 0.00118 | 0.00046 | 0.00047 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0010 | 0.0012 | 0.0034 | 0.0034 | 0.0012 | 0.0012 | 0.0087 | 0.0087 | 0.0094 | 0.0094 | 0.0094 | 0.0094 | 0.0012 | 0.0012 | 0.0007 | 0.0007 | 0.0012 | 0.0012 | 0.0007 | 0.0007 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0040 | 0.0048 | 0.0031 | 0.0031 | 0.0013 | 0.0014 | 0.0084 | 0.0085 | 0.0079 | 0.0079 | 0.0079 | 0.0079 | 0.0050 | 0.0050 | 0.0050 | 0.0050 | 0.0050 | 0.0050 | 0.0050 | 0.0050 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

**Estimation groundwater quality downgradient of the Project and along pathways towards private wells - High Case**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
**(2) [ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
$C_i$,, concentration of from mine feature i (source terms).
$P_i$,, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05z-hc (PostClosure) - High Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 96.1% | 3.9% | 6.7% | 22.2% | 54.8% | na | 5.0% | 11.2% |
| WQS09 (TCL 25y) | 96.1% | 3.9% | 6.7% | 22.0% | 54.5% | 0.6% | 5.0% | 11.2% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | High Case Source Terms Sources: Control Pond = Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm NMP, EMP, WMP, Pit = Results_MPSeepage_WaterQuality_EAModel_rev07_20220209.xlsm | | | | | | | | | | High Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Posz-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 29.02 | 28.34 | 16.00 | 16.00 | 6.10 | 6.20 | 42.00 | 42.00 | 43.00 | 42.00 | 43.00 | 42.00 | 1.77 | 1.76 | 3.67 | 3.66 | 1.69 | 1.69 | 3.59 | 3.59 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.049 | 0.085 | 0.069 | 0.069 | 0.004 | 0.004 | 0.083 | 0.082 | 0.170 | 0.170 | 0.170 | 0.170 | 0.130 | 0.130 | 1.406 | 1.406 | 0.130 | 0.130 | 1.405 | 1.405 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 1.8826 | 3.2811 | 0.1900 | 0.1900 | 0.4200 | 0.4300 | 2.6000 | 2.6000 | 0.0210 | 0.0220 | 0.0210 | 0.0220 | 0.0648 | 0.0649 | 0.0840 | 0.0841 | 0.0652 | 0.0656 | 0.0844 | 0.0848 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0434 | 0.0759 | 0.0049 | 0.0050 | 0.0097 | 0.0098 | 0.0600 | 0.0600 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0024 | 0.0024 | 0.0062 | 0.0062 | 0.0024 | 0.0024 | 0.0062 | 0.0062 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 664.31 | 632.36 | 380.00 | 380.00 | 200.00 | 200.00 | 1200.00 | 1200.00 | 1000.00 | 990.00 | 1000.00 | 990.00 | 45.71 | 45.64 | 40.57 | 40.50 | 43.89 | 43.84 | 38.75 | 38.70 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.1692 | 0.1175 | 0.0150 | 0.0150 | 0.0510 | 0.0520 | 0.0860 | 0.0870 | 0.0073 | 0.0073 | 0.0073 | 0.0073 | 0.0072 | 0.0072 | 0.0106 | 0.0107 | 0.0072 | 0.0072 | 0.0107 | 0.0107 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.01381 | 0.01307 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00010 | 0.00010 | 0.00018 | 0.00019 | 0.00018 | 0.00019 | 0.00048 | 0.00048 | 0.00048 | 0.00048 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.01319 | 0.01249 | 0.00071 | 0.00071 | 0.00083 | 0.00084 | 0.00330 | 0.00330 | 0.00130 | 0.00130 | 0.00130 | 0.00130 | 0.00076 | 0.00076 | 0.00066 | 0.00066 | 0.00076 | 0.00076 | 0.00066 | 0.00066 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.056 | 0.062 | 0.031 | 0.031 | 0.015 | 0.015 | 0.061 | 0.061 | 0.059 | 0.060 | 0.059 | 0.060 | 0.091 | 0.091 | 0.319 | 0.319 | 0.091 | 0.091 | 0.319 | 0.319 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.48 | 0.47 | 0.23 | 0.23 | 0.10 | 0.10 | 0.64 | 0.64 | 0.62 | 0.61 | 0.62 | 0.61 | 0.12 | 0.12 | 0.17 | 0.17 | 0.11 | 0.11 | 0.17 | 0.17 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.001817 | 0.001335 | 0.000250 | 0.000250 | 0.000660 | 0.000660 | 0.002300 | 0.002300 | 0.000190 | 0.000190 | 0.000190 | 0.000190 | 0.000077 | 0.000077 | 0.000068 | 0.000068 | 0.000077 | 0.000077 | 0.000068 | 0.000068 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 61.02 | 60.69 | 7.80 | 7.80 | 4.40 | 4.40 | 16.00 | 16.00 | 15.00 | 15.00 | 15.00 | 15.00 | 48.69 | 48.69 | 14.05 | 14.05 | 48.66 | 48.66 | 14.03 | 14.03 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0042 | 0.0033 | 0.0023 | 0.0024 | 0.0014 | 0.0014 | 0.0077 | 0.0077 | 0.0059 | 0.0059 | 0.0059 | 0.0059 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.000088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.02194 | 0.02099 | 0.00097 | 0.00098 | 0.00130 | 0.00130 | 0.00540 | 0.00540 | 0.00170 | 0.00170 | 0.00170 | 0.00170 | 0.00043 | 0.00043 | 0.00043 | 0.00043 | 0.00043 | 0.00043 | 0.00043 | 0.00043 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0031 | 0.0030 | 0.0029 | 0.0029 | 0.0018 | 0.0019 | 0.0095 | 0.0095 | 0.0073 | 0.0072 | 0.0073 | 0.0072 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.071 | 0.056 | 0.014 | 0.014 | 0.024 | 0.025 | 0.067 | 0.068 | 0.019 | 0.019 | 0.019 | 0.019 | 0.031 | 0.031 | 0.064 | 0.064 | 0.031 | 0.031 | 0.064 | 0.064 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00121 | 0.00094 | 0.00037 | 0.00038 | 0.00042 | 0.00043 | 0.00180 | 0.00180 | 0.00074 | 0.00075 | 0.00074 | 0.00075 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.2405 | 0.2338 | 0.1500 | 0.1500 | 0.0640 | 0.0640 | 0.4200 | 0.4200 | 0.4000 | 0.4000 | 0.4000 | 0.4000 | 0.0152 | 0.0152 | 0.0605 | 0.0605 | 0.0144 | 0.0144 | 0.0598 | 0.0598 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 117.84 | 115.75 | 12.00 | 12.00 | 9.40 | 9.50 | 44.00 | 44.00 | 27.00 | 27.00 | 27.00 | 27.00 | 14.49 | 14.49 | 3.07 | 3.07 | 14.46 | 14.46 | 3.04 | 3.04 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.06990 | 0.05394 | 0.03700 | 0.03700 | 0.04100 | 0.04100 | 0.20000 | 0.21000 | 0.08100 | 0.08100 | 0.08100 | 0.08100 | 0.05532 | 0.05553 | 0.02140 | 0.02161 | 0.05516 | 0.05537 | 0.02125 | 0.02146 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.003018 | 0.002150 | 0.000210 | 0.000210 | 0.000600 | 0.000610 | 0.002100 | 0.002100 | 0.000120 | 0.000120 | 0.000120 | 0.000120 | 0.000056 | 0.000056 | 0.000056 | 0.000056 | 0.000057 | 0.000057 | 0.000057 | 0.000057 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0371 | 0.0365 | 0.0040 | 0.0041 | 0.0023 | 0.0023 | 0.0110 | 0.0110 | 0.0097 | 0.0096 | 0.0097 | 0.0096 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0341 | 0.0329 | 0.0034 | 0.0034 | 0.0030 | 0.0030 | 0.0150 | 0.0150 | 0.0078 | 0.0078 | 0.0078 | 0.0078 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 20.4 | 20.1 | 17.0 | 17.0 | 6.6 | 6.6 | 45.0 | 46.0 | 46.0 | 46.0 | 46.0 | 46.0 | 3.3 | 3.3 | 3.3 | 3.3 | 3.2 | 3.2 | 3.2 | 3.2 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.02758 | 0.02660 | 0.00690 | 0.00690 | 0.00340 | 0.00350 | 0.02100 | 0.02100 | 0.01800 | 0.01800 | 0.01800 | 0.01800 | 0.00080 | 0.00081 | 0.00074 | 0.00074 | 0.00078 | 0.00078 | 0.00071 | 0.00071 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.002976 | 0.002110 | 0.000190 | 0.000200 | 0.000600 | 0.000600 | 0.002000 | 0.002000 | 0.000066 | 0.000066 | 0.000066 | 0.000066 | 0.000068 | 0.000068 | 0.000068 | 0.000068 | 0.000069 | 0.000069 | 0.000069 | 0.000069 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 53.5 | 54.4 | 420.0 | 420.0 | 150.0 | 150.0 | 1100.0 | 1100.0 | 1200.0 | 1200.0 | 1200.0 | 1200.0 | 52.7 | 52.7 | 336.3 | 336.3 | 50.4 | 50.4 | 333.9 | 333.9 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.02089 | 0.01974 | 0.00880 | 0.00880 | 0.00460 | 0.00460 | 0.02700 | 0.02700 | 0.02300 | 0.02300 | 0.02300 | 0.02300 | 0.00127 | 0.00127 | 0.00127 | 0.00127 | 0.00123 | 0.00123 | 0.00123 | 0.00123 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00430 | 0.00340 | 0.00260 | 0.00260 | 0.00150 | 0.00160 | 0.00850 | 0.00860 | 0.00680 | 0.00670 | 0.00680 | 0.00670 | 0.00134 | 0.00134 | 0.00063 | 0.00063 | 0.00133 | 0.00133 | 0.00062 | 0.00062 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0081 | 0.0072 | 0.0068 | 0.0068 | 0.0032 | 0.0032 | 0.0200 | 0.0200 | 0.0180 | 0.0180 | 0.0180 | 0.0180 | 0.0015 | 0.0015 | 0.0011 | 0.0011 | 0.0015 | 0.0015 | 0.0011 | 0.0011 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0233 | 0.0219 | 0.0059 | 0.0059 | 0.0045 | 0.0045 | 0.0220 | 0.0220 | 0.0140 | 0.0140 | 0.0140 | 0.0140 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

**Estimation groundwater quality downgradient of the Project and along pathways towards private wells - Base Case**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
(2) **[ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
$C_i$, concentration of from mine feature i (source terms).
$P_i$, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05zb-lc (PostClosure) - Base Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 97.4% | 2.6% | 10.0% | 7.2% | 81.5% | na | na | 1.3% |
| WQS09 (TCL 25y) | 97.3% | 2.7% | 9.9% | 7.2% | 80.8% | 0.9% | na | 1.3% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | Base Case Source Terms Sources: Control Pond = Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm NMP, EMP, WMP, PIt = Results_MPSeepage_WaterQuality_EAModel_rev07_20220209.xlsm | | | | | | | | | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Posz-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 0.68 | 0.75 | 8.00 | 8.00 | 2.70 | 2.70 | 20.00 | 20.00 | 22.00 | 22.00 | 22.00 | 22.00 | 0.97 | 0.97 | 2.90 | 2.90 | 0.97 | 0.97 | 2.90 | 2.90 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.035 | 0.053 | 0.069 | 0.069 | 0.004 | 0.004 | 0.083 | 0.082 | 0.170 | 0.170 | 0.170 | 0.170 | 0.131 | 0.131 | 1.424 | 1.424 | 0.131 | 0.131 | 1.423 | 1.423 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 2.5000 | 3.5000 | 0.1900 | 0.1900 | 0.4200 | 0.4300 | 2.6000 | 2.6000 | 0.0210 | 0.0220 | 0.0210 | 0.0220 | 0.0621 | 0.0621 | 0.0815 | 0.0816 | 0.0627 | 0.0629 | 0.0821 | 0.0824 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0590 | 0.0820 | 0.0049 | 0.0050 | 0.0097 | 0.0098 | 0.0600 | 0.0600 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0023 | 0.0023 | 0.0062 | 0.0062 | 0.0023 | 0.0023 | 0.0062 | 0.0062 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 20.00 | 21.00 | 180.00 | 190.00 | 76.00 | 77.00 | 520.00 | 520.00 | 510.00 | 500.00 | 510.00 | 500.00 | 23.02 | 23.04 | 17.81 | 17.83 | 23.02 | 23.04 | 17.81 | 17.84 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.0710 | 0.0720 | 0.0091 | 0.0092 | 0.0270 | 0.0270 | 0.0460 | 0.0460 | 0.0069 | 0.0069 | 0.0069 | 0.0069 | 0.0059 | 0.0059 | 0.0094 | 0.0094 | 0.0060 | 0.0060 | 0.0095 | 0.0095 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.00720 | 0.00880 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00010 | 0.00010 | 0.00018 | 0.00019 | 0.00018 | 0.00019 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.00680 | 0.00830 | 0.00035 | 0.00035 | 0.00015 | 0.00016 | 0.00082 | 0.00082 | 0.00081 | 0.00082 | 0.00081 | 0.00082 | 0.00070 | 0.00070 | 0.00060 | 0.00060 | 0.00070 | 0.00070 | 0.00060 | 0.00061 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.037 | 0.043 | 0.029 | 0.029 | 0.011 | 0.011 | 0.049 | 0.049 | 0.059 | 0.061 | 0.059 | 0.061 | 0.091 | 0.091 | 0.322 | 0.322 | 0.091 | 0.091 | 0.322 | 0.322 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.28 | 0.35 | 0.12 | 0.12 | 0.04 | 0.04 | 0.30 | 0.30 | 0.33 | 0.33 | 0.33 | 0.33 | 0.10 | 0.10 | 0.16 | 0.16 | 0.10 | 0.10 | 0.16 | 0.16 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.000260 | 0.000280 | 0.000049 | 0.000049 | 0.000055 | 0.000056 | 0.000240 | 0.000240 | 0.000100 | 0.000100 | 0.000100 | 0.000100 | 0.000026 | 0.000026 | 0.000017 | 0.000017 | 0.000026 | 0.000026 | 0.000017 | 0.000017 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 39.00 | 46.00 | 7.80 | 7.80 | 3.40 | 3.50 | 13.00 | 13.00 | 16.00 | 16.00 | 16.00 | 16.00 | 49.14 | 49.14 | 14.04 | 14.04 | 49.14 | 49.14 | 14.05 | 14.05 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0008 | 0.0010 | 0.0012 | 0.0012 | 0.0004 | 0.0004 | 0.0029 | 0.0029 | 0.0032 | 0.0032 | 0.0032 | 0.0032 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.01200 | 0.01500 | 0.00040 | 0.00040 | 0.00024 | 0.00025 | 0.00140 | 0.00140 | 0.00094 | 0.00094 | 0.00094 | 0.00094 | 0.00032 | 0.00032 | 0.00032 | 0.00032 | 0.00033 | 0.00033 | 0.00033 | 0.00033 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0024 | 0.0028 | 0.0015 | 0.0015 | 0.0006 | 0.0006 | 0.0038 | 0.0038 | 0.0040 | 0.0040 | 0.0040 | 0.0040 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.033 | 0.035 | 0.011 | 0.011 | 0.013 | 0.013 | 0.039 | 0.040 | 0.019 | 0.019 | 0.019 | 0.019 | 0.030 | 0.030 | 0.064 | 0.064 | 0.030 | 0.030 | 0.064 | 0.064 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00039 | 0.00045 | 0.00018 | 0.00018 | 0.00008 | 0.00008 | 0.00049 | 0.00049 | 0.00046 | 0.00046 | 0.00046 | 0.00046 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.1400 | 0.1700 | 0.0750 | 0.0750 | 0.0270 | 0.0270 | 0.1900 | 0.1900 | 0.2100 | 0.2100 | 0.2100 | 0.2100 | 0.0071 | 0.0071 | 0.0531 | 0.0531 | 0.0072 | 0.0072 | 0.0531 | 0.0531 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 69.00 | 85.00 | 5.90 | 5.90 | 2.30 | 2.30 | 14.00 | 14.00 | 15.00 | 15.00 | 15.00 | 15.00 | 13.76 | 13.76 | 2.19 | 2.19 | 13.78 | 13.78 | 2.21 | 2.21 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.01400 | 0.01600 | 0.01800 | 0.01800 | 0.01100 | 0.01200 | 0.07500 | 0.07500 | 0.04500 | 0.04500 | 0.04500 | 0.04500 | 0.05242 | 0.05242 | 0.01805 | 0.01805 | 0.05241 | 0.05241 | 0.01805 | 0.01805 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.000180 | 0.000190 | 0.000032 | 0.000033 | 0.000043 | 0.000044 | 0.000170 | 0.000180 | 0.000061 | 0.000061 | 0.000061 | 0.000061 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0220 | 0.0270 | 0.0023 | 0.0023 | 0.0011 | 0.0011 | 0.0052 | 0.0052 | 0.0056 | 0.0055 | 0.0056 | 0.0055 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0190 | 0.0240 | 0.0016 | 0.0016 | 0.0008 | 0.0008 | 0.0053 | 0.0053 | 0.0042 | 0.0041 | 0.0042 | 0.0041 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 12.0 | 15.0 | 8.4 | 8.5 | 2.8 | 2.8 | 21.0 | 21.0 | 24.0 | 23.0 | 24.0 | 23.0 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.01600 | 0.01900 | 0.00340 | 0.00340 | 0.00120 | 0.00130 | 0.00880 | 0.00880 | 0.00930 | 0.00920 | 0.00930 | 0.00920 | 0.00040 | 0.00040 | 0.00034 | 0.00034 | 0.00040 | 0.00040 | 0.00034 | 0.00034 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.000150 | 0.000160 | 0.000024 | 0.000024 | 0.000040 | 0.000040 | 0.000150 | 0.000150 | 0.000037 | 0.000037 | 0.000037 | 0.000037 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 11.0 | 17.0 | 220.0 | 220.0 | 67.0 | 68.0 | 540.0 | 540.0 | 620.0 | 620.0 | 620.0 | 620.0 | 31.9 | 31.9 | 319.2 | 319.2 | 31.9 | 31.9 | 319.1 | 319.1 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.01100 | 0.01400 | 0.00430 | 0.00430 | 0.00170 | 0.00170 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.00076 | 0.00076 | 0.00076 | 0.00076 | 0.00077 | 0.00077 | 0.00077 | 0.00077 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00380 | 0.00460 | 0.00130 | 0.00130 | 0.00046 | 0.00047 | 0.00330 | 0.00330 | 0.00350 | 0.00350 | 0.00350 | 0.00350 | 0.00119 | 0.00119 | 0.00047 | 0.00047 | 0.00119 | 0.00119 | 0.00047 | 0.00047 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0010 | 0.0012 | 0.0034 | 0.0034 | 0.0012 | 0.0012 | 0.0087 | 0.0087 | 0.0094 | 0.0094 | 0.0094 | 0.0094 | 0.0012 | 0.0012 | 0.0007 | 0.0007 | 0.0012 | 0.0012 | 0.0007 | 0.0007 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0040 | 0.0048 | 0.0031 | 0.0031 | 0.0013 | 0.0014 | 0.0084 | 0.0085 | 0.0079 | 0.0079 | 0.0079 | 0.0079 | 0.0051 | 0.0051 | 0.0051 | 0.0051 | 0.0051 | 0.0051 | 0.0051 | 0.0051 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

**Estimation groundwater quality downgradient of the Project and along pathways towards private wells - High Case**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
**(2) [ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
$C_i$,, concentration of from mine feature i (source terms).
$P_i$,, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05zb-hc (PostClosure) - High Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 96.8% | 3.2% | 8.2% | 5.8% | 67.4% | na | 5.1% | 13.5% |
| WQS09 (TCL 25y) | 96.7% | 3.3% | 8.2% | 5.7% | 66.9% | 0.7% | 5.1% | 13.4% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | High Case Source Terms Sources: Control Pond = Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm NMP, EMP, WMP, PIt = Results_MPSeepage_WaterQuality_EAModel_rev07_20220209.xlsm | | | | | | | | | | High Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Posz-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 29.02 | 28.34 | 16.00 | 16.00 | 6.10 | 6.20 | 42.00 | 42.00 | 43.00 | 42.00 | 43.00 | 42.00 | 1.73 | 1.72 | 3.65 | 3.64 | 1.67 | 1.66 | 3.58 | 3.58 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.049 | 0.085 | 0.069 | 0.069 | 0.004 | 0.004 | 0.083 | 0.082 | 0.170 | 0.170 | 0.170 | 0.170 | 0.131 | 0.131 | 1.416 | 1.416 | 0.130 | 0.130 | 1.415 | 1.415 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 1.8826 | 3.2811 | 0.1900 | 0.1900 | 0.4200 | 0.4300 | 2.6000 | 2.6000 | 0.0210 | 0.0220 | 0.0210 | 0.0220 | 0.0628 | 0.0628 | 0.0822 | 0.0822 | 0.0632 | 0.0636 | 0.0826 | 0.0829 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0434 | 0.0759 | 0.0049 | 0.0050 | 0.0097 | 0.0098 | 0.0600 | 0.0600 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0023 | 0.0023 | 0.0062 | 0.0062 | 0.0023 | 0.0023 | 0.0062 | 0.0062 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 664.31 | 632.36 | 380.00 | 380.00 | 200.00 | 200.00 | 1200.00 | 1200.00 | 1000.00 | 990.00 | 1000.00 | 990.00 | 44.48 | 44.42 | 39.31 | 39.25 | 42.99 | 42.94 | 37.81 | 37.76 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.1692 | 0.1175 | 0.0150 | 0.0150 | 0.0510 | 0.0520 | 0.0860 | 0.0870 | 0.0073 | 0.0073 | 0.0073 | 0.0073 | 0.0069 | 0.0069 | 0.0104 | 0.0104 | 0.0069 | 0.0069 | 0.0104 | 0.0104 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.01381 | 0.01307 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00010 | 0.00010 | 0.00018 | 0.00019 | 0.00018 | 0.00019 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.01319 | 0.01249 | 0.00071 | 0.00071 | 0.00083 | 0.00084 | 0.00330 | 0.00330 | 0.00130 | 0.00130 | 0.00130 | 0.00130 | 0.00076 | 0.00076 | 0.00066 | 0.00066 | 0.00076 | 0.00076 | 0.00066 | 0.00066 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.056 | 0.062 | 0.031 | 0.031 | 0.015 | 0.015 | 0.061 | 0.061 | 0.059 | 0.060 | 0.059 | 0.060 | 0.091 | 0.091 | 0.321 | 0.321 | 0.091 | 0.091 | 0.321 | 0.321 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.48 | 0.47 | 0.23 | 0.23 | 0.10 | 0.10 | 0.64 | 0.64 | 0.62 | 0.61 | 0.62 | 0.61 | 0.12 | 0.12 | 0.17 | 0.17 | 0.11 | 0.11 | 0.17 | 0.17 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.001817 | 0.001335 | 0.000250 | 0.000250 | 0.000660 | 0.000660 | 0.002300 | 0.002300 | 0.000190 | 0.000190 | 0.000190 | 0.000190 | 0.000074 | 0.000074 | 0.000065 | 0.000065 | 0.000074 | 0.000074 | 0.000065 | 0.000065 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 61.02 | 60.69 | 7.80 | 7.80 | 4.40 | 4.40 | 16.00 | 16.00 | 15.00 | 15.00 | 15.00 | 15.00 | 49.00 | 49.00 | 14.11 | 14.11 | 48.98 | 48.98 | 14.10 | 14.10 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0042 | 0.0033 | 0.0023 | 0.0024 | 0.0014 | 0.0014 | 0.0077 | 0.0077 | 0.0059 | 0.0059 | 0.0059 | 0.0059 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.000088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.02194 | 0.02099 | 0.00097 | 0.00098 | 0.00130 | 0.00130 | 0.00540 | 0.00540 | 0.00170 | 0.00170 | 0.00170 | 0.00170 | 0.00042 | 0.00042 | 0.00042 | 0.00042 | 0.00043 | 0.00043 | 0.00043 | 0.00043 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0031 | 0.0030 | 0.0029 | 0.0029 | 0.0018 | 0.0019 | 0.0095 | 0.0095 | 0.0073 | 0.0072 | 0.0073 | 0.0072 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.071 | 0.056 | 0.014 | 0.014 | 0.024 | 0.025 | 0.067 | 0.068 | 0.019 | 0.019 | 0.019 | 0.019 | 0.031 | 0.031 | 0.065 | 0.065 | 0.031 | 0.031 | 0.065 | 0.065 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00121 | 0.00094 | 0.00037 | 0.00038 | 0.00042 | 0.00043 | 0.00180 | 0.00180 | 0.00074 | 0.00075 | 0.00074 | 0.00075 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.2405 | 0.2338 | 0.1500 | 0.1500 | 0.0640 | 0.0640 | 0.4200 | 0.4200 | 0.4000 | 0.4000 | 0.4000 | 0.4000 | 0.0148 | 0.0148 | 0.0604 | 0.0604 | 0.0142 | 0.0142 | 0.0598 | 0.0598 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 117.84 | 115.75 | 12.00 | 12.00 | 9.40 | 9.50 | 44.00 | 44.00 | 27.00 | 27.00 | 27.00 | 27.00 | 14.52 | 14.52 | 3.02 | 3.02 | 14.50 | 14.50 | 3.00 | 3.00 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.06990 | 0.05394 | 0.03700 | 0.03700 | 0.04100 | 0.04100 | 0.20000 | 0.21000 | 0.08100 | 0.08100 | 0.08100 | 0.08100 | 0.05543 | 0.05565 | 0.02127 | 0.02149 | 0.05530 | 0.05552 | 0.02115 | 0.02136 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.003018 | 0.002150 | 0.000210 | 0.000210 | 0.000600 | 0.000610 | 0.002100 | 0.002100 | 0.000120 | 0.000120 | 0.000120 | 0.000120 | 0.000053 | 0.000053 | 0.000053 | 0.000053 | 0.000053 | 0.000053 | 0.000053 | 0.000053 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0371 | 0.0365 | 0.0040 | 0.0041 | 0.0023 | 0.0023 | 0.0110 | 0.0110 | 0.0097 | 0.0096 | 0.0097 | 0.0096 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0341 | 0.0329 | 0.0034 | 0.0034 | 0.0030 | 0.0030 | 0.0150 | 0.0150 | 0.0078 | 0.0078 | 0.0078 | 0.0078 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 20.4 | 20.1 | 17.0 | 17.0 | 6.6 | 6.6 | 45.0 | 46.0 | 46.0 | 46.0 | 46.0 | 46.0 | 3.2 | 3.3 | 3.2 | 3.3 | 3.2 | 3.2 | 3.2 | 3.2 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.02758 | 0.02660 | 0.00690 | 0.00690 | 0.00340 | 0.00350 | 0.02100 | 0.02100 | 0.01800 | 0.01800 | 0.01800 | 0.01800 | 0.00078 | 0.00078 | 0.00072 | 0.00072 | 0.00076 | 0.00076 | 0.00070 | 0.00070 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.002976 | 0.002110 | 0.000190 | 0.000200 | 0.000600 | 0.000600 | 0.002000 | 0.002000 | 0.000066 | 0.000066 | 0.000066 | 0.000066 | 0.000065 | 0.000065 | 0.000065 | 0.000065 | 0.000065 | 0.000065 | 0.000065 | 0.000065 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 53.5 | 54.4 | 420.0 | 420.0 | 150.0 | 150.0 | 1100.0 | 1100.0 | 1200.0 | 1200.0 | 1200.0 | 1200.0 | 51.8 | 51.8 | 337.4 | 337.4 | 49.8 | 49.8 | 335.3 | 335.3 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.02089 | 0.01974 | 0.00880 | 0.00880 | 0.00460 | 0.00460 | 0.02700 | 0.02700 | 0.02300 | 0.02300 | 0.02300 | 0.02300 | 0.00124 | 0.00124 | 0.00124 | 0.00124 | 0.00121 | 0.00121 | 0.00121 | 0.00121 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00430 | 0.00340 | 0.00260 | 0.00260 | 0.00150 | 0.00160 | 0.00850 | 0.00860 | 0.00680 | 0.00670 | 0.00680 | 0.00670 | 0.00134 | 0.00134 | 0.00062 | 0.00062 | 0.00133 | 0.00133 | 0.00061 | 0.00061 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0081 | 0.0072 | 0.0068 | 0.0068 | 0.0032 | 0.0032 | 0.0200 | 0.0200 | 0.0180 | 0.0180 | 0.0180 | 0.0180 | 0.0015 | 0.0015 | 0.0011 | 0.0011 | 0.0015 | 0.0015 | 0.0011 | 0.0011 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0233 | 0.0219 | 0.0059 | 0.0059 | 0.0045 | 0.0045 | 0.0220 | 0.0220 | 0.0140 | 0.0140 | 0.0140 | 0.0140 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

# APPENDIX 9: EVALUATION OF ACUTE DAPHNIA MAGNA AND RAINBOW TROUT LC50 TOXICITY SUPPORTING TENAS PROJECT BEST AVAILABLE TECHNOLOGY ASSESSMENT STUDY – PARAMETERS OF CONCERN: NITRITE, IRON (TOTAL) AND IRON (DISSOLVED)

# TECHNICAL MEMORANDUM

**To:** Dan Farmer, COO, Tenas Project (Telkwa Mining)

**Cc:** Soren Jensen, Principal Consultant (Environmental Engineering)
(SRK Consulting (Canada) Inc.)

**From:** Guy Gilron, Principal, Senior Environmental Scientist
(Borealis Environmental Consulting Inc.)

**Subject:** Evaluation of Acute *Daphnia magna* and Rainbow Trout LC50 Toxicity Supporting Tenas Project Best Available Technology assessment study – Parameters of Concern: Nitrite, Iron (total) and Iron (dissolved)

**Date:** December 17, 2024.

## 1.0 Introduction

A Best Available Technology (BAT) assessment supporting the Tenas Project's Environmental Assessment (EA), currently being conducted by SRK (SRK, 2024), has yielded modeling results indicating that effluent concentrations of three parameters of concern (POCs) will potentially exceed BC acute water quality guidelines for the protection for aquatic life (BC ALGs), specifically: nitrite, iron (total) and iron (dissolved). As part of the toxicity reduction section of *Best Achievable Technology Assessment Methodology for Mining Projects* (ENV, 2024; DRAFT), there is a requirement that "…mine effluent must not be acutely toxic to the most sensitive receptor in the receiving environment."

Borealis Environmental Consulting Inc. (Borealis) was retained to provide an evaluation of the effluent data, to confirm the above-mentioned exceedances, and then determine the extent to which effluent concentrations of the above POCs might be acutely toxic. The acute toxicity (LC50s) of the POCs for two standard test species - routinely used to evaluate acute toxicity of industrial effluents (*i.e.,* the cladoceran, *Daphnia magna*, and the salmonid, Rainbow Trout (*Oncorhynchus mykiss*)) – were reviewed and evaluated to understand whether the POCs in the effluent could render it acutely toxic.

This technical memorandum summarizes this evaluation.

# 2.0 Methods

## 2.1 Confirmation of Parameters of Concern based on BC Aquatic Life Guideline Exceedances

Modelling data presented as part of the BAT assessment provided by SRK (2024) were first evaluated to determine whether they exceed BC ALGs. Table 1 below provides a summary of this determination. For the purposes of this evaluation, those parameters that yield an exceedance factor (similar to a hazard quotient) of >1 are considered POCs; all other parameters not exceeding their respective acute BC ALG would not be deemed acutely toxic.

Appendix A provides a copy of the data set provided to Borealis by SRK on behalf of Telkwa Mining.

**Table 1. Exceedance factors (and basis) for parameters exceeding BC ALGs in Tenas Project mine effluent (based on modelling conducted by SRK (2024)).**

| Parameter | Concentration (in mg/L)* | Exceedance Factor (EF)** | Basis | Notes |
|---|---|---|---|---|
| **Nitrite** | 0.17 | 1.42 | Exceedance of BC ALG for nitrite = 0.12 mg/L | Based on chloride concentrations in the range of 2-4 mg/L |
| | 0.19 | 1.58 | | |
| | 0.19 | 1.58 | | |
| | 0.17 | 1.42 | | |
| **Iron (total)** | 1.48 | 1.48 | Exceedance of BC ALG for total iron = 1 mg/L | - |
| | 1.46 | 1.46 | | |
| | 1.10 | 1.10 | | |
| | 1.50 | 1.50 | | |
| **Iron (dissolved)** | 0.41 | 1.17 | Exceedance of BC ALG for dissolved iron = 0.35 mg/L | - |

* from SRK (2024) Best Available Technology Evaluation report.

** EF=[POC]/BC ALG; exceedance factor is equivalent to a hazard quotient, EF>1 indicates potential aquatic risk.

## 2.2 Acute Lethality Toxicity Test Data Acquisition

To evaluate whether it is likely that parameter concentrations from the modeled effluent would be acutely toxic to the two standard test organisms, a comprehensive search of acute lethality (LC50) data for the POCs listed above was conducted.

LC50 data were extracted from the online USEPA ECOTOX database (ECOTOX Database). The search criteria were as follows:

- Species: *Daphnia magna* and rainbow trout (*Oncorhynchus mykiss*).
- Chemicals: Nitrite and Iron (both total and dissolved).
- Endpoint: LC50 with survival as the primary focus.
- Exposure Type: acute, in freshwater conditions.

LC50 data were filtered by species, chemical form, exposure duration, and test conditions (*e.g.,* water hardness, pH). The lowest reported LC50 values were targeted for further evaluation (to remain conservative), and specifically noted for citing the original reference sources (where possible). Results were cross-referenced with published toxicity literature for consistency. As required, additional references were obtained from other searches to ensure a robust dataset.

Where required, toxicity-modifying factors for the three POCs (*e.g.,* chloride concentrations for nitrite) were taken into consideration for the published acute toxicity concentration values used to evaluate whether the effluent modelled for the Project was acutely toxic.

# 3.0 Results

## 3.1 NITRITE

Nitrite ($NO_2^-$) exhibits acute toxicity to aquatic organisms, including *Daphnia magna* and rainbow trout (*Oncorhynchus mykiss*), primarily by interfering with oxygen transport and other physiological processes.

- For *Daphnia magna*, exposure to nitrite can lead to immobilization and mortality, with median lethal concentrations (48-hr LC50) typically in the range of 10–30 mg/L.

- Rainbow trout, sensitive to nitrite's effects on hemoglobin oxygenation (forming methemoglobin), yielded 96-hr LC50 values in the range 0.19–2.5 mg/L, depending on water chemistry factors, like chloride[1] levels and hardness.

Based on the USEPA ECOTOX queries, the lowest reported LC50 values for nitrite were 27.3 mg/L for *Daphnia magna* (Ewell *et al*., 1986) and 0.19 mg/L for rainbow trout (Russo *et al.,* 2011) (Table 2). The more sensitive LC50 (for rainbow trout) of 0.19 mg/L is slightly higher than the lowest concentration in the BAT dataset (*i.e.,* 0.17), indicating that nitrite in the effluent would unlikely result in acute toxicity of the effluent (Table 3).

[1]The BC ALG for nitrite is chloride dependent.

## 3.2 IRON

Iron (Fe) toxicity in aquatic environments, whether in total or dissolved forms, can significantly adversely affect the health of aquatic invertebrates and fish.

- For *Daphnia magna*, elevated iron can cause oxidative stress and disrupt physiological processes critical for survival. Acute toxicity is influenced by bioavailability, which depends on factors like pH, dissolved organic matter, and water hardness (ECCC, 2024). High concentrations can impair mobility and survival, with LC50s typically in the range of several mg/L for dissolved iron under controlled laboratory conditions.

- Rainbow trout (*Oncorhynchus mykiss*), being extremely sensitive to water quality changes, can also be acutely affected by iron toxicity. Iron, particularly in dissolved forms, can precipitate on gill surfaces, impairing respiration and leading to mortality at concentrations as low as 1 mg/L, depending on water chemistry. The bioavailability and toxicity of iron are mitigated by factors such as higher water hardness and the presence of competing ions, which reduce iron uptake.

### 3.2.1 Total Iron

Based on the USEPA ECOTOX (and other search) queries, the lowest reported LC50 values were 6.47 mg/L for *Daphnia magna* (Mahassen *et al*., 2024) and 26 mg/L for rainbow trout (USEPA, 1992) (Table 2). The more sensitive LC50 (for *Daphnia magna*) of 6.47 mg/L is higher than the lowest concentration in the BAT dataset (*i.e.,* 1.1 mg/L), indicating that total iron in the effluent would unlikely result in acute toxicity of the effluent (Table 3).

### 3.2.2 Dissolved Iron

The USEPA ECOTOX query/search did not result in an LC50 for either of the two standard test species; however, to provide some indication of potential acute toxicity for dissolved iron, the lowest LC50 for an invertebrate reported in the rationale for the dissolved iron guideline in BC is for the amphipod, *Hyallela azteca* (ENV, 2008). While *Hyallela azteca* is considered a benthic invertebrate (*cf. Daphnia magna*, which is a planktonic invertebrate), citing this threshold is supported by the fact that both species are crustaceans and are common and representative toxicity test organisms (https://www.canada.ca/en/environment-climate-change/services/wildlife-research-landscape-science/biological-test-method-publications.html).

The reported LC50 for *Hyallela azteca* is 3.5 mg/L (ENV, 2008). This LC50 is higher than the lowest concentration in the BAT dataset (*i.e.,* 0.41 mg/L), indicating that dissolved total iron in the effluent would unlikely result in acute toxicity of the effluent (Table 3).

**Table 2. Lowest reported *Daphnia magna* and Rainbow trout LC50 values for POCs from BAT study for Tenas Project [Accessed from: https://cfpub.epa.gov/ecotox/].**

| Test Species | *Daphnia magna*[c] | | | Rainbow Trout (*Oncorhynchus mykiss*) | | |
|---|---|---|---|---|---|---|
| **POC** | **Duration** | **Value (mg/L)** | **Reference** | **Duration** | **Value (mg/L)** | **Reference** |
| Nitrite | 48 hours | 27.3[a] | Ewell *et al.,* 1986 | 96 hours | 0.19 | Russo *et al.,* 2011 |
| Iron (total) | 48 hours | 6.47 | Mahassen *et al*., 2024 | 96 hours | 26[b] | U.S. Environmental Protection Agency, 1992 |
| Iron (dissolved)[c] | NR | 3.5 | ENV, 2008 | - | - | - |

NR – not reported

[a]*Daphnia magna* was exposed to nitrite as sodium nitrite in this study; the value listed reflects concentration as nitrite.

[b]Original study was not accessed; the value reported in the US EPA ECOTOX database was reported as ferrous sulphide; the value was converted to total iron.

[c]For dissolved iron, no data were reported for *Daphnia magna* or rainbow trout; the LC50 value is based on toxicity data of the benthic invertebrate, *Hyallela azteca*, cited in BC aquatic life guideline document (ENV, 2008).

**Table 3. Summary of evaluation results**

| POC | Lowest LC50 reported (mg/L) | Reference | Test Species | Lowest [POC] (mg/L) | Exceedance Factor | Conclusion |
|---|---|---|---|---|---|---|
| Nitrite | 0.19 | Russo *et al*., 2011 | Rainbow trout | 0.17 | 0.89 | ***Nitrite is unlikely to be acutely lethal at the concentrations modelled for the effluent*** |
| Iron (total) | 6.47 | Mahassen *et al*., 2024 | *Daphnia magna* | 1.1 | 0.17 | ***Total iron is unlikely to be acutely lethal at the concentrations modelled for the effluent*** |
| Iron (dissolved) | 3.5[a] | ENV, 2008 | *Hyallela azteca* | 0.41 | 0.12 | ***Dissolved iron is unlikely to be acutely lethal at the concentrations modelled for the effluent*** |

[a]For dissolved iron, no data were reported for *Daphnia magna* or rainbow trout; the LC50 value is based on toxicity data of the benthic invertebrate, *Hyallela azteca*, cited in BC aquatic life guideline document (ENV, 2008).

## 4.0 Conclusions

For nitrite, while rainbow trout can exhibit acute toxicity at 0.19 mg/L, modeled effluent concentrations (*i.e.,* ≤0.17 mg/L) are below this threshold. Similarly, total iron's lowest reported LC50 for *Daphnia magna* (*i.e.,* 6.47 mg/L) is significantly higher than the modeled concentrations (*i.e.,* ≤1.1 mg/L). Dissolved iron demonstrates similar outcomes, with modeled concentrations well below the acute toxicity thresholds of 3.5 mg/L for the most sensitive invertebrate species (*i.e.,* using the rationale that *Hyallela azteca* can serve as a surrogate for *Daphnia magna*).

The evaluation of effluent concentrations from the BAT assessment study of the Tenas Project EA (SRK, 2024) for three POCs—nitrite, total iron, and dissolved iron - indicates that acute toxicity to aquatic organisms in the receiving environment is unlikely. Using conservative thresholds derived from LC50 values for standard test organisms (where available), none of the modeled effluent concentrations exceed the lowest toxicity benchmarks. This finding suggests that the effluent would comply with the requirement of avoiding acute toxicity to the most sensitive aquatic receptors.

In conclusion, the evaluation supports the environmental feasibility of the Tenas Project effluent, as the modeled concentrations of POCs do not pose a significant acute risk. This aligns with the project's commitment to minimizing ecological impacts and adherence to BAT standards. Further ongoing monitoring is recommended to ensure consistency with these findings.

## Closure

We trust that this information meets your requirements at the present time. Please do not hesitate to contact the undersigned at your convenience to discuss any aspects of this Technical Memorandum.

Sincerely,

**BOREALIS ENVIRONMENTAL CONSULTING INC.**

Guy Gilron, MSc, RPBio*
Senior Environmental Scientist/Principal

*Certificate of Competency attached as Appendix B.

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# Appendix A – Data set from SRK, 2024

# (attached)

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**Table B-3.1 TCP surface discharge (operations), NMP surface discharge (closure) - POPCs**

| | | TCP surface discharge (operations), NMP surface discharge (closure) - POPCs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Goathorn creek (WQSEA1) | | | | | POCs selection | | |
| Parameter | Units | Baseline P50 | Baseline P95 | Acute WQG | CCME WQG Acute | Acute WQG selected | Max TCP discharge - Normal ST | Max NMP discharge -Normal ST | Exceeds at EA1? - Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0070 | 6.14 | | 6.14 | 1.00 | 0.09 | 0.02 |
| Chloride | mg/L | 0.25 | 0.5 | 600 | | 600 | 5.6 | 3.1 | 0.6 |
| Fluoride | mg/L | 0.032 | 0.041 | 1.19 | | 1.19 | 0.14 | 0.03 | 0.05 |
| Nitrate | mg-N/L | 0.041 | 0.076 | 32.8 | | 32.8 | 7.5 | 0.7 | 0.1 |
| Nitrite | mg-N/L | 0.0005 | 0.002 | 0.12 | | 0.12 | 0.173 | 0.015 | 0.004 |
| Aluminum, total | mg/L | 0.092 | 0.75 | 5 | | 5 | 0.390 | 0.39 | 0.165 |
| Antimony, total | mg/L | 0.000073 | 0.00014 | 0.25 | | 0.25 | 0.00066 | 0.00043 | 0.00011 |
| Arsenic, total | mg/L | 0.00023 | 0.00068 | 0.025 | | 0.025 | 0.0016 | 0.0009 | 0.0005 |
| Cadmium, dissolved | mg/L | 0.0000081 | 0.000036 | 0.00041 | | 0.00041 | 0.000024 | 0.000006 | 0.000016 |
| Cobalt, total | mg/L | 0.00005 | 0.00055 | 0.11 | | 0.11 | 0.0031 | 0.001347 | 0.0003 |
| Copper, dissolved | mg/L | 0.0014 | 0.0039 | 0.0078 | | 0.0078 | 0.0014 | 0.0022 | 0.0021 |
| Iron, total | mg/L | 0.085 | 0.78 | 1 | | 1 | 1.48 | 1.46 | 0.28 |
| Iron, dissolved | mg/L | 0.015 | 0.13 | 0.35 | | 0.35 | 0.03 | 0.01 | 0.02 |
| Lead, total | mg/L | 0.000025 | 0.00023 | 0.0518 | | 0.0518 | 0.0014 | 0.0010 | 0.0001 |
| Manganese, total | mg/L | 0.0059 | 0.033 | 8.25 | | 8.25 | 0.053 | 0.030 | 0.010 |
| Molybdenum, total | mg/L | 0.00047 | 0.00062 | 46 | | 46 | 0.032 | 0.008 | 0.001 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0011 | 0.031 | | 0.031 | 0.005 | 0.002 | 0.001 |
| Silver, total | mg/L | 0.000005 | 0.00002 | 0.0001 | | 0.0001 | 0.000023 | 0.000008 | 0.000012 |
| Uranium, total | mg/L | 0.000054 | 0.00014 | | 0.033 | 0.033 | 0.0040 | 0.0025 | 0.0003 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0021 | 0.039 | | 0.039 | 0.008 | 0.002 | 0.002 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241104_basecase_noC02.xlsx]WQ_HighST

**Table B-3.2 MP seepage - POPCs**

| | | MP seepage - POPCs | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Four creek (WQS03_DS) | | | | | POCs selection | |
| Parameter | Units | Baseline P50 | Baseline P95 | BC AWQG Acute | CCME WQG Acute | Acute WQG selected | Max EMP - Normal ST | Exceeds at WQS03_DS? - Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0092 | 6.22 | | 6.22 | 0.27 | 0.05 |
| Chloride | mg/L | 0.25 | 0.5 | 600 | | 600 | 1.4 | 0.5 |
| Fluoride | mg/L | 0.059 | 0.068 | 1.37 | | 1.37 | 0.02 | 0.10 |
| Nitrate | mg-N/L | 0.013 | 0.058 | 32.8 | | 32.8 | 2.1 | 0.4 |
| Nitrite | mg-N/L | 0.0005 | 0.001 | 0.06 | | 0.06 | 0.048 | 0.009 |
| Aluminum, total | mg/L | 0.099 | 1.2 | 5 | | 5 | 0.017 | 0.26 |
| Antimony, total | mg/L | 0.00005 | 0.00012 | 0.25 | | 0.25 | 0.00014 | 0.00009 |
| Arsenic, total | mg/L | 0.00074 | 0.0011 | 0.025 | | 0.025 | 0.0003 | 0.0013 |
| Cadmium, dissolved | mg/L | 0.0000052 | 0.000012 | 0.00065 | | 0.00065 | 0.000056 | 0.000013 |
| Cobalt, total | mg/L | 0.00005 | 0.00047 | 0.11 | | 0.11 | 0.0033 | 0.0006658 |
| Copper, dissolved | mg/L | 0.0014 | 0.0034 | 0.0335 | | 0.0335 | 0.0008 | 0.0024 |
| Iron, total | mg/L | 0.095 | 1.1 | 1 | | 1 | 0.08 | 0.24 |
| Iron, dissolved | mg/L | 0.015 | 0.41 | 0.35 | | 0.35 | 0.08 | 0.05 |
| Lead, total | mg/L | 0.000025 | 0.00028 | 0.0922 | | 0.0922 | 0.0002 | 0.0001 |
| Manganese, total | mg/L | 0.0025 | 0.024 | 1.75 | | 1.75 | 0.061 | 0.013 |
| Molybdenum, total | mg/L | 0.00023 | 0.00038 | 46 | | 46 | 0.006 | 0.001 |
| Nickel, dissolved' | mg/L | 0.00025 | 0.0018 | 0.0547 | | 0.0547 | 0.005 | 0.001 |
| Silver, total | mg/L | 0.000005 | 0.000022 | 0.003 | | 0.003 | 0.000008 | 0.000009 |
| Uranium, total | mg/L | 0.000078 | 0.00025 | | 0.033 | 0.033 | 0.0008 | 0.0002 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0025 | 0.0746 | | 0.0746 | 0.007 | 0.003 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241104_basecase_noC02.xlsx]WQ_HighST

**Table B-3.3 MP seepage - POPCs**

| | | MP seepage - POPCs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Tenas Creek (WQS04) | | | | | POCs selection | | | |
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **BC AWQG Acute** | **CCME WQG Acute** | **Acute WQG selected** | **Max NMP - Normal ST** | **Max WMP - Normal ST** | **Max TCP - Normal ST** | **Exceeds at WQS04? Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 6.22 | | 6.22 | 0.19 | 0.37 | 1.0 | 0.03 |
| Chloride | mg/L | 0.25 | 0.5 | 600 | | 600 | 2.3 | 3 | 6 | 0.5 |
| Fluoride | mg/L | 0.031 | 0.045 | 1.22 | | 1.22 | 0.039 | 0.032 | 0.14 | 0.055 |
| Nitrate | mg-N/L | 0.005 | 0.06 | 32.8 | | 32.8 | 1.4 | 2.8 | 7 | 0.2 |
| Nitrite | mg-N/L | 0.0005 | 0.002 | 0.12 | | 0.12 | 0.033 | 0.07 | 0.17 | 0.006 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 5 | | 5 | 0.03 | 0.022 | 0.02 | 0.11 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.25 | | 0.25 | 0.00033 | 0.0005 | 0.0007 | 0.00022 |
| Arsenic, total | mg/L | 0.00048 | 0.0009 | 0.025 | | 0.025 | 0.0007 | 0.0004 | 0.0011 | 0.0007 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.00044 | | 0.00044 | 0.000081 | 0.00005 | 0.000024 | 0.000007 |
| Cobalt, total | mg/L | 0.00005 | 0.00099 | 0.11 | | 0.11 | 0.0039 | 0.0041 | 0.0025 | 0.0003 |
| Copper, dissolved | mg/L | 0.0011 | 0.003 | 0.0153 | | 0.0153 | 0.0017 | 0.0023 | 0.0014 | 0.0015 |
| Iron, total | mg/L | 0.048 | 1.2 | 1 | | 1 | 0.10 | 0.062 | 0.03 | 0.068 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | | 0.35 | 0.10 | 0.062 | 0.03 | 0.027 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0566 | | 0.0566 | 0.0005 | 0.0006 | 0.0010 | 0.00007 |
| Manganese, total | mg/L | 0.005 | 0.058 | 1.37 | | 1.37 | 0.078 | 0.07 | 0.027 | 0.008 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 46 | | 46 | 0.010 | 0.008 | 0.032 | 0.001 |
| Nickel, dissolved' | mg/L | 0.00025 | 0.0017 | 0.0336 | | 0.0336 | 0.006 | 0.005 | 0.005 | 0.001 |
| Silver, total | mg/L | 0.000005 | 0.00002 | 0.0001 | | 0.0001 | 0.000017 | 0.000009 | 0.000023 | 0.000014 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | | 0.033 | 0.033 | 0.0019 | 0.003 | 0.004 | 0.0003 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0429 | | 0.0429 | 0.009 | 0.007 | 0.008 | 0.0019 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241104_basecase_noC02.xlsx]WQ_HighST

**Table B-3.4 Rail Load Out - POPCs**

| | | Rail Load Out - POPCs | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Bulkley River (WQS11) | | | | | POCs selection | |
| Parameter | Units | Baseline P50 | Baseline P95 | BC AWQG Acute | CCME WQG Acute | Acute WQG selected | Max RLO discharge - Normal ST | Exceeds at WQS11? - Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 5.91 | | 5.91 | 0 | 0.0052 |
| Chloride | mg/L | 0.25 | 0.50 | 600.00 | | 600 | 0.08 | 0.26 |
| Fluoride | mg/L | 0.031 | 0.045 | 0.84 | | 0.84 | 0 | 0.031 |
| Nitrate | mg-N/L | 0.005 | 0.060 | 32.800 | | 32.8 | 0 | 0.014 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.06 | | 0.06 | 0 | 0.0052 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 5 | | 5 | 0.37 | 0.15 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.25 | | 0.25 | 5.4E-06 | 5.2E-05 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.02500 | | 0.025 | 0.00051 | 0.00031 |
| Cadmium, dissolved | mg/L | 2.5E-06 | 5.8E-06 | 0.00016 | | 0.00016 | 0.00009 | 3.1E-06 |
| Cobalt, total | mg/L | 0.00005 | 0.00099 | 0.11 | | 0.11 | 0.0014 | 0.00010 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0063 | | 0.0063 | 0.0002 | 0.00073 |
| Iron, total | mg/L | 0.048 | 1.2 | 1 | | 1 | 1.5 | 0.19 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | | 0.35 | 0.076 | 0.052 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0169 | | 0.0169 | 0.00044 | 0.00016 |
| Manganese, total | mg/L | 0.005 | 0.058 | 0.86 | | 0.86 | 0.07 | 0.018 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 46 | | 46 | 0.00018 | 0.00042 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0169 | | 0.0169 | 0.00228 | 0.00031 |
| Silver, total | mg/L | 0.000005 | 0.00002 | 0.0001 | | 0.0001 | 8.0E-07 | 1.0E-05 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | | 0.033 | 0.033 | 0.00003 | 4.2E-05 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0183 | | 0.0183 | 0.003 | 0.0016 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241104_basecase_noC02.xlsx]WQ_HighST

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# Appendix B – Certificate of Competency for

# Guy Gilron, MSc, RPBio

# (attached)

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BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

# Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals[1], under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional: **Guy Gilron** Title: **Senior Environmental Scientist**
2. Are you a registered member of a professional association in B.C.? X Yes ☐ No
   Name of Association: **College of Applied Biologists** Registration **# 590**
3. Brief description of professional services:

**Evaluation of modelling data for coal mine effluent, comparison against BC aquatic life guidelines to determine exceedance factors/hazard quotients for parameters of concern POCs. Database and literature review of acute lethality (LC50) data to determine most sensitive values, to evaluate whether effluents will have the potential to be acutely toxic in standard toxicity tests using invertebrates and fish.**

This declaration of competency is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

# Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature: Witnessed by:

**X** **X**

Print Name: **Guy Gilron** Print Name: **Joanne Mulhall**

Date signed: December 16th, 2024.

*Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

*a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and*

*b) through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*

# APPENDIX 10: EFFECT OF MITIGATION CONTROLS ON WATER QUALITY AND QUANTITY OF THE TENAS PROJECT, SRK

FINAL

# Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project

The Tenas Project, BC, Canada

Telkwa Mining Limited

SRK Consulting (Canada) Inc. ▪ CAPR002055 ▪ March 13, 2025

srk consulting

**FINAL**

# Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project

The Tenas Project, BC, Canada

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# Useful Definitions

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

| | |
|---|---|
| ANFO | Ammonium Nitrate/fuel oil |
| BAT | Best available Technology |
| BC | British Columbia |
| BMP | Best management practices |
| CPP | Coal Processing Pond |
| EAC | Environmental Assessment Certificate |
| EMP | East Management Pond |
| EoY | End of Year |
| GBR | Gravel Bed Reactor |
| IR | Information Request |
| MP | Management Pond |
| MC | Mitigation control |
| NMP | North Management Pond |
| Non-PAG | Non-Potentially acid generating (relating to rock) |
| PAG | Potentially acid generating (relating to rock) |
| POC | Parameter of Concern |
| TCP | Tenas Control Pond |
| TSS | Total Suspended Solids |
| WMP | West Management Pond |
| WQG | Water Quality Guidelines |

# Executive Summary

Telkwa Mining Limited (TML) is proposing to develop the Tenas Coal Project (the Project) located in northwest British Columbia 25 km Southwest of the town of Smithers, BC. In 2022, Telkwa Mining Limited (TML) applied for an Environmental Assessment Certificate (EAC) for the Project, which is currently under review. Throughout the Project definition and design, TML has focused on incorporating features and measures that would mitigate potential effects on water quality of effluent and in the environment downstream of the Project Area.

This report describes the mitigation controls and documents the beneficial effects these measures could have on effluent water quantity and quality as well as changes to water quality and streamflow in creeks and rivers downstream of the Project. The potential efficacy of several additional mitigation controls was evaluated using the Water and Load Balance Model developed for the Project (SRK 2022) with several updates as described below. The Water and Load Balance Model used to evaluate the additional mitigation controls is an updated version of the model issued 2022 (SRK 2022). Updates include:

- Updated source terms and background water quality data including seasonality (collected since 2022).
- Updated climate, flow and climate change estimates based on data collected up to 2023 and newly available climate change models from 2024.
- Updated calculations to estimate load in the creeks through groundwater seepages from the Project, and
- Updated assumptions regarding site operations that affect water and load balance modelling (e.g., date of Tenas Control Pond decommissioning).

Two categories of mitigation controls were considered in this analysis: best management practices (BMPs) and best achievable technologies (BAT). Model results are presented for both categories. However, recommendations are only provided on whether to adopt one or more of the evaluated BMPs in the Final EAC Project Case (2024). The evaluation, ranking, and selection of preferred BATs are addressed in the BAT assessment report, which is included in Appendix H.

Best management practices considered in this analysis are:

- Use of blasthole liners to reduce residual ammonia and nitrate loadings in contact water.
- Addition of freshet water to improve robustness of water cover in the water management ponds to reduce loadings in effluent.
- Increased process water usage in CPP plant, which would reduce the volume of effluent from the site.

Best Achievable Technologies considered in this analysis include:

- Modified liner design in the management and control ponds with Base Case.
- Active/Passive flocculation in sediment ponds with Base Case.
- In-situ Active gravel bed reactors in management ponds with Base Case.

- Active tank-based treatment with Base Case for end-of-pipe effluent (post Tenas Control Pond).

Water quality model results were produced for surface water discharge from Tenas Control Pond, as well as groundwater seepage (groundwater discharge) from the three management ponds (North, East and West) and from Tenas Control Pond. Water quality result for the Receiving Environment were examined for Tenas Creek, Four Creek and Goathorn Creek as these are the closest creeks downstream of the Project and most likely to see an effect from the site discharge.

Model results for the updated EAC Project Case (2024) indicated that no water quality guidelines are exceeded in the receiving environment downstream of the Project, except for dissolved copper in Goathorn Creek, which has naturally elevated background concentrations (that exceed the guideline). In the modelled effluent from the site (surface and groundwater), eleven parameters of concerns (POC) were identified in the different discharges (surface and groundwater) based on the current definition by BC ENV (2024) of 80% of the BC water quality guidelines for freshwater. The assessment of mitigation controls was focused on these POCs.

When compared to the Updated EAC Project case (2024), several mitigation controls affect streamflow (water quantity) in creeks downstream, particularly in Four Creek that naturally has low flows. Modelled reductions in flows in Four Creek were over 12.5% for the Updated EAC Project case as well as for the mitigation controls that included modified liner designs in the management and control ponds as well as the one including the improvement of water cover in management ponds. These mitigation controls lowered the streamflow up to an additional 20% during open water season over the Updated EAC Project Case (2024).

Modelled changes to water quality of effluent and downstream receiving waters, as compared to the Updated EAC Project Case (2024) are summarized in Table 1 below.

Based on the modelled results for the BMP measures, SRK recommends adopting blasthole liners as a mitigation control for the Project as it the only BMP mitigation control that significantly improves the water quality in the surface water discharges and groundwater seepages. Recommendations for BAT measures can be found in the BAT assessment report found in Appendix H.

**Table 0-1: Impact of mitigation controls on water quality in effluent and in Receiving Environment**

| Mitigation Control ID | Positive | Negative | Recommended for Adoption? |
|---|---|---|---|
| **Best Management Practices** | | | |
| **MC1: Improve Water Cover** | - Reduces most POCs concentrations by a few percent in surface discharge in Tenas Control and North Management Ponds, as well as in groundwater seepage.<br>- Reduces POCs in streams as well to varying degrees in Tenas and Four Creeks with no significant improvements in Goathorn Creek. | - Does not improve concentrations in NMP as it is not targeted. | No |
| **MC4: Increase of process water to CPP** | - No notable improvements of discharge water or water quality in the streams. | - none | No |
| **MC5: Blasthole liners** | - Reduces nitrogen concentrations in the discharge and the environment between 30 to 40%. | - none | Yes |
| **Best Achievable Technologies (Candidates)** | | | |
| **MC2: Modified Liners in Management and Control Ponds (Option 1)** | - Reduces POCs concentrations in Tenas and Four Creeks. | - Worsens TCP surface discharge for a few POCs.<br>- Worsens POCs concentrations in groundwater seepage from TCP and WMP. | See BAT Assessment Report in Appendix H. |
| **MC3: Modified Liners in Management and Control Ponds (Option 2)** | - Greatest improvement for a single mitigation control in reducing concentrations of most POCs in Four Creek.<br>- Reduction of POCs concentrations in Tenas Creek (less than in Four Creek). | - Worsens TCP surface discharge for a few POCs (more than MC2).<br>- Worsens POCs concentrations in groundwater seepage from TCP and WMP (more than MC2). | |
| **MC6: Active/Passive Flocculation in TCP** | - Reduces total metals concentrations in the surface discharge of TCP (Operations) and Closure) | - No effect on seepage water quality | |
| **MC7: In-situ Active GBR in MPs** | - Greatest reduction in selenium, nitrite, and nitrate concentrations in Tenas Creek.<br>- Some improvements in Four Creek water quality for selenium, nitrate, and nitrite.<br>- Reduce maximum concentration of nitrate, selenium, and nitrite at groundwater discharge from both West Management and Tenas Control Ponds. | - none | |
| **MC8: Active treatment post TCP** | - Greatest improvement in surface discharge concentration of identified POCs, including nitrate, nitrite, total selenium, dissolved nickel.<br>- Improvement in Goathorn Creek is like MC7 for nitrite, nitrate, and selenium, but targets other POCs as well such as total molybdenum. | - Slightly worsens POCs concentrations in the groundwater seepage for EMP and TCP. | |

# 1 Introduction

## 1.1 Scope of Work

The Tenas Project (the Project) is a proposed open pit metallurgical coal mine located near Telkwa, British Columbia. In 2022, Telkwa Mining Limited (TML) applied for an Environmental Assessment Certificate (EAC) for the Project, which is currently under review. Throughout the Project definition and design, TML has focused on incorporating features and measures that would mitigate potential effects on water quality within or downstream of the Project Area.

Optimization and review of water quality mitigation controls has continued as part of the EAC application Information Request response process. The potential efficacy of suggested mitigation controls is evaluated using the Water and Load Balance Model developed for the Project (SRK 2022). The purpose of this report is to describe potential water quality mitigation controls and to estimate the performance of such measures in terms of improvements (or changes) to effluent water quantity and quality as well as changes to water quality and streamflow in creeks and rivers downstream of the Project.

## 1.2 Water and Load Balance Model Updates

SRK Consulting (Canada) Inc. (SRK) prepared the Water and Load Balance Model for the Tenas Project in support of the Environmental Assessment (EA) Application for Telkwa Mining Limited (TML) in 2022, which was based on site data collected up to 2020. Since 2020, the water and load balance has been revised in response to Information Requests from reviewers of the EAC Application and has been updated with new site data collected since 2020.

The following model updates have been completed since the original model report was issued in 2022:

- Updated source terms for the model as described in Appendices A and B, based on barrel data collected since 2019 (Appendix A) and new geochemical modelling based on reduced oxidation and water infiltration in the backfill of the open pit (Appendix B).
- Updated background parameter concentrations to seasonal source terms, overburden source term based on the barrel data, also updated with additional available water quality data collected until 2022.
- Updated synthetic climate time series for the Project Site and updated mean average precipitation for the Project.
- Updated the rainfall-runoff models for each catchment based on additional available flow data (up to 2023), updated water course baseflows, and with new synthetic climate timeseries.
- Updated the climate rate of change based on newly available climate models from 2024 (see Appendix C) as well as new evaporation rates.

Other changes include:

- Updated the method for estimating loadings that report to the receiving environment along groundwater flow paths based on updated groundwater modelling results (Appendix D). The estimates now include an appropriate proportionality between groundwater that originates from the Project and background groundwater/non-effected groundwater.
- Incorporation of progressive reclamation of the embankments, buttresses, and non-potentially acid generating (Non-PAG) backfill in the open pit,
- The decommissioning of Tenas Control Pond occurring in 2048 instead of 2044 as provided in the EAC Project Case (August 2022).
- Various minor changes to operation assumptions, e.g. including an assumed PAG rock water cover that fluctuates between 0.5 to 0.7m while PAG material is being placed in management ponds and/or confirmation of mine plan which affects rock placement on site.

Model results for the Updated EAC Project Case (2024) indicates that the mitigation controls included in the Project description would be protective of the downstream receiving environment and that discharges from the Project would not cause BC water quality guidelines (WQGs) to be exceeded in the creeks and rivers downstream of the Project. The only exceedance modelled in the downstream environment studied within the scope of this report is dissolved copper in Goathorn Creek (prediction node WQSEA1), but this exceedance is caused by background loadings (not by loadings from the Project).

## 1.3 Potential Additional Water Quality Mitigation Controls

Even though the Tenas Project is not modelled to cause WQG exceedances in the receiving environment, TML has identified additional potential mitigation controls that could further reduce loadings to the receiving environment as summarized by Table 1-1. Mitigation controls listed in Table 1-1 were evaluated using the water and load balance model and the results of the evaluation are presented in Section 3.

**Table 1-1: Potential Additional Mitigation Controls**

| ID | Description | Candidate BAT or BMP |
|---|---|---|
| **MC1** | Improve the robustness of the water covers in the management ponds and reduce loadings from waste rock by increasing the site water inventory during freshet | BMP |
| **MC2** | Increase MP liner thickness and reduce seepage to streams (case 7) | BAT |
| **MC3** | Increase MP liner thickness and reduce seepage to streams (case 13) | BAT |
| **MC4** | Increase of process water intake to CPP plant | BMP |
| **MC5** | Addition of blasthole liners | BMP |
| **MC6** | Active/Passive flocculation in TCP | BAT |
| **MC7** | In-situ GBR Active in MPs | BAT |

| ID | Description | Candidate BAT or BMP |
|---|---|---|
| **MC8** | Active treatment post TCP | BAT |

## 1.4 BMPs versus BATs

The mitigation controls in Table 1-1 can generally be categorized either as source control measures/best management practices (BMPs) or as potential best achievable technologies (BATs). This distinction is relevant because BC ENV[1] has issued guidance that requires the feasibility and performance of candidate BATs to be evaluated according to the BAT assessment methodology issued in November 2024 (BC ENV 2024), while BMPs must be evaluated separately and prior to a BAT assessment. The distinction between BMPs and BATs are not always well-defined. Table 1-1 indicates which of the two categories each of the mitigation controls belong to according to SRK's interpretation. In general, operational practices that are carried out on a day-to-day basis were considered BMPs, while mitigation controls that require construction of major infrastructure and implementation of water treatment equipment were candidate BATs.

The candidate BATs listed above were evaluated in a BAT assessment, which is included in Appendix H. The BAT assessment was completed in response to Information Requests (IR) 175, 176, 353, 355, and 514 provided by the EAO in their Water IR letter in November of 2022 (SRK 2025). Some of the results of the water and load balance model performance assessment described in this report were used to inform the scoring and ranking of candidate BATs.

As discussed above, BC ENV's BAT assessment guidance stipulates that BMPs should be excluded from consideration in a BAT assessment. However, no guidance on a stand-alone assessment of BMPs is available. Therefore, in the interest of excluding the BMPs from the BAT assessment, the merits of implementing the three BMPs identified were evaluated in this report (Section 4) while the suitability and feasibility of the candidate BATs were evaluated in the BAT assessment report.

[1] January 30th 2025 from BC ENV with review comments on a BAT Assessment summary presentation

# 2 Candidate Mitigation Controls

Details on candidate source controls, BMPs or BAT mitigation controls are summarized in the following sections.

## 2.1 Mitigation Control 1: Improve Robustness of the Water Covers of the Management Ponds by adding Freshet Inflows from Channel C02

The concept behind this mitigation control is to reduce potential loadings from rock stored in the management ponds by routing additional water to the management ponds during freshet to improve the robustness of their water covers. A reduction in loadings and an increase in the water inventory would improve the water quality in the management ponds during the Operation phase. This would be achieved by routing water collected in the Potable Water Storage Pond, located upstream of the East Management Pond, into Tenas Control Pond, East Management Pond, and West Management Pond successively during the freshet months of April and May. This additional water would reduce parameter concentrations in the management ponds but would result in more surface water being discharged throughout the remainder of the year.

The Potable Water Storage Pond will collect non-contact water captured in the C02 diversion channel (Figure 2-1). A portion of this water will be pumped to the Potable Water Treatment Plant, while most of the water would discharge via a channel to Four Creek. Before mining, this catchment area reports to Four Creek further downstream than where it will discharge from the Potable Water Storage Pond due to the Project. The discharge channel from the Potable Water Storage Pond into Four Creek is modelled to increase streamflow in the sections of Four Creek upstream of where this catchment naturally discharges. The Potable Water Storage Pond includes an emergency spillway into East Management Pond, which reduces the amount of runoff reporting to Four Creek during storm events equal to or greater than the 1 in 10-year return period event, to minimize the magnitude of high flows to limit potential erosion in Four Creek (SRK 2021).

This mitigation control uses a gate structure in the emergency spillway and in the discharge channel to Four Creek to enable the full flow from the Potable Water Storage Pond to be discharged directly to the East Management Pond. The model assumes this discharge to the East Management Pond would occur each year in April and May, and the remainder of the year water would report to Four Creek. Once the East Management Pond is covered for reclamation, this water would report to the West Management Pond via either a pipeline or a channel across the covered surface. Before East Management Pond gets built, the model assumes that the discharge goes from the gate structure goes to Tenas Control Pond via a pipeline or channel.

Both the East and West Management Ponds will operate with a target maximum and minimum water cover depth over the PAG rock layer during the active PAG rock deposition period. The minimum cover depth of 0.5 m is required to reduce the risk of oxidation of PAG material. The maximum water cover depth triggers a pumping system to limit the storage volume of water in the pond and thereby reduces the risk of erosion on the dam (maximum of 0.7m). The pumping system discharges water to the Tenas

Control Pond, which then discharges to Goathorn Creek. This mitigation control assumes that no pumping from the active management pond would occur during April and May, allowing the water cover depth to temporarily increase beyond 0.7m but remaining below the elevation of the emergency spillway and for pond water to mix with the non-contact water inflows from the Potable Water Storage Pond. The model assumes that pumping is reactivated in June, and the water cover depth is returned to its target level through the remainder of the open-water season.

Figure 2-1 shows the C02 channel and the discharge direction under Mitigation Control 1.

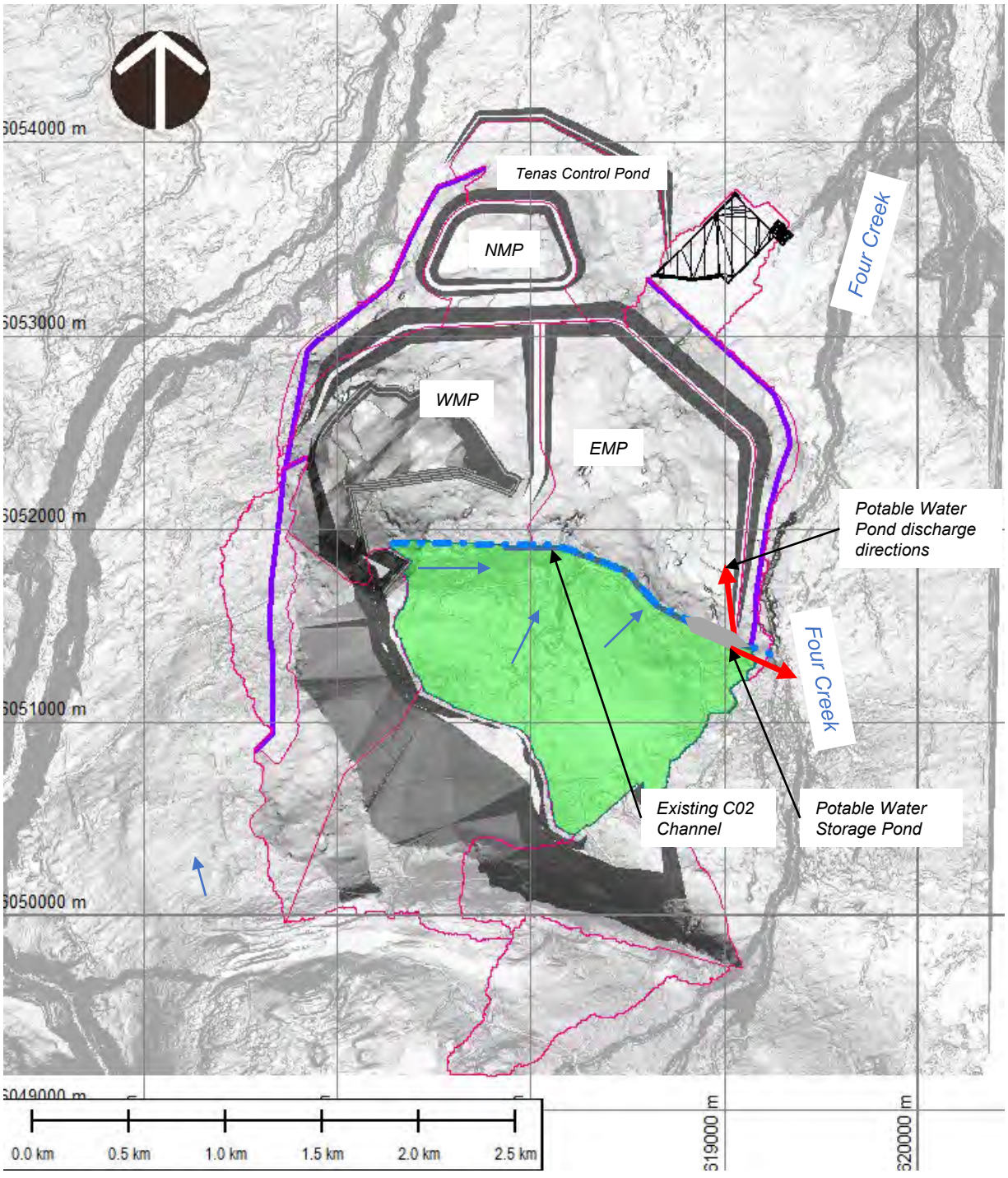



**Figure 2-1: Mitigation Control 1 With Adjusted Discharge from Channel C02**

## 2.2 Mitigation Controls 2, and 3: Modify Liner Design of the Management and Control Ponds

This control considers two liner modification options. Both options involve construction of a liner system in the management ponds and the Tenas Control Pond with a modified design that would improve on the performance assumed for the Updated EAC Project Case (2024). The liner systems considered include:

Updated EAC Project Case (2024):

- Soil-bentonite liner (0.3m) for EMP, NMP, and WMP (excluding WMP End Wall rock);
- Bituminous geomembrane liner for the Tenas Control Pond.

Mitigation Control 2:

- Soil-bentonite liner (0.56m) for EMP, NMP, and WMP (excluding WMP End Wall rock);
- Bituminous geomembrane liner on top of soil-bentonite liner (0.15m) for the Tenas Control Pond.

Mitigation Control 3:

- Bituminous geomembrane liner on top of soil-bentonite liner (0.3m) for EMP;
- Soil-bentonite liner (0.56m) for NMP, and WMP (excluding WMP End Wall rock);
- Bituminous geomembrane liner on top of soil-bentonite liner (0.15m) for the Tenas Control Pond

Mitigation Control 2 includes a thicker bentonite amended liner, covering the management pond bottoms, and upstream dam slopes in the EMP, NMP, WMP, as well as the in-pit overburden portion of the WMP. Liner thicknesses are assumed to be 560 mm in management ponds compared to 300 mm in the EAC Project Case (August 2022). The Tenas Control Pond contains an added soil-bentonite liner of 150mm thickness compared to none in the EAC Project Case (August 2022).

Mitigation Control 3 is the same as Mitigation Control 2 for NMP, WMP, and TCP. The only change is an additional bituminous geomembrane liner on top of the soil-bentonite liner with a reduced thickness of 300mm for the East Management Pond.

Liner seepage modeling and the site groundwater model were used to estimate the seepage losses from the facilities and the associated flow rates and loading in the receiving environment. Table 2-1 presents the revised groundwater inflows and outflows from lined facilities with the modified liners in Mitigation Controls 2 and 3, with the default values incorporated in the Updated EAC Project Case (2024) (as the base case) in brackets for comparison.

It is debatable whether a composite liner is a technology or if construction of such a liner is a BMP. Either way, Mitigation Controls 2 and 3 were included for consideration in the BAT assessment.

**Table 2-1: Revised Groundwater Inflows and Outflows [$m^3$/day] from Project Facilities with Modified Liners in Mitigation Controls 2 and 3**

| Phase | WMP Case 2/Case 3 (base case) | NMP Case 2/Case 3 (base case) | EMP Case 2/Case 3 (base case) | Tenas Control Pond Case 2/Case 3 (base case) |
|---|---|---|---|---|
| **Groundwater inflow to Facilities** | | | | |
| EoY1 | 0/0 (0) | 0/0 (0) | 0/0 (0) | 0/0 (0) |
| EoY7 | 0/0 (0) | 0/0 (0) | 0/0 (0) | 0/0 (0) |
| End of Mining | 0/560 (139) | 0/0 (0) | 0/0 (0) | 0/0 (0) |
| Post-Closure | 129/119 (137) | 0/0 (0) | 0/0 (0) | 0/0 (0) |
| **Seepage outflow to Environment** | | | | |
| EoY1 | 0/0 (0) | 0/0 (0) | 0/0 (0) | 8/8 (140) |
| EoY7 | 0/0 (0) | 87/87 (0) | 277/63 (458) | 8/8 (140) |
| End of Mining | 373/373 (836) | 87/87 (0) | 277/63 (458) | 8/8 (140) |
| Post-Closure | 692/709 (819) | 87/87 (0) | 277/63 (458) | 0 (0) |

Source: Z:\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\500_Water_Balance\Inputs\Groundwater\Telkwa_Summary_2022_GW_model_results_20211103_sab.xlsx

The modified liners would reduce the seepage rate from the management and control ponds to the receiving environment, which reduces streamflow and concentrations of parameters influenced by the Project.

## 2.3 Mitigation Control 4: Increase of Process Water to CPP plant

The current EAC application has the CPP producing a dry (25% moisture) processed rock stream comprised of course and fine material that is then hauled and placed into the management ponds. The primary reason for this was to limit water use by the CPP. However, as the Project discharges water every year when in the Operation phase even during drought conditions there is an opportunity to go to a conventional wet slurry system for the fine processed rock stream. This will double the amount of water required by the CPP (360,000 $m^3$/year vs 180,000 $m^3$/year) with the benefit of permanently tying up this water into the coarse and fine processed rock products within the management ponds. Water is taken out of the Pit Sump, and out of Tenas Control Pond if there is not enough water in the Pit Sump for process make up water which would improve water quality discharged by the Project. The process water intake acts as a sink of water and load in the model and is modelled to reduce load overall for the Project.

## 2.4 Mitigation Control 5: Incorporation of Blasthole Liners

Blasting residuals (undetonated ammonium nitrate fuel oil (ANFO) explosives) is one of the two sources of nitrogen (nitrate, nitrite, and ammonium) in water on site and is accounted for in the source terms where rock is placed in different facilities (backfill pit, management ponds, dams, and buttresses). Exchangeable ammonia present in sedimentary rocks is another potential source of nitrogen for this Project.

Loadings of residual nitrogen species that leach from the rock can be decreased if blasthole liners are used as holes are loaded with explosives as they reduce the potential for dissolution of ANFO prior to blasting. In this mitigation control, the model assumes a total ANFO loss of 1.25% instead of 2% which is based on 75% effectiveness of the blasthole liners and that 50% of available nitrogen comes from blasting while the remaining 50% being sourced from exchangeable ammonia present in sedimentary rocks.

## 2.5 Mitigation Control 6: Active/Passive Flocculation in Tenas Control Pond

Sediment/Control ponds for the Project were designed based on the monthly mean maximum level of Total Suspended Solids (TSS) release of 35 mg/L to remain below the proposed federal Coal Mine Effluent Regulations for TSS. This mitigation control is modelled to reduce total parameter concentrations but will not affect dissolved parameter concentrations. This is one of the available additional mitigation controls reviewed during the BAT analysis (Appendix H).

In Mitigation Control 6, the model assumes that we are adding flocculants to the sediment pond (Tenas Control Pond), therefore allowing us to recalculate the total parameter concentrations based on a new threshold, which was estimated to be 5 mg/L on average.

## 2.6 Mitigation Control 7: In-situ Active Gravel-bed reactors in the management ponds

Mitigation Control 7 assumes that In-situ Active gravel-bed reactors (GBR) is an active water treatment measure that could be implemented within the management ponds to remove nitrate, nitrite, selenium and some metals. This is one of the mitigation controls considered in the BAT assessment (Appendix H).

A GBR is usually defined as an engineered semi-passive treatment system that contains a fixed-film bioreactor containing a uniform media  such as gravel. These reactors usually use a simple organic substrate such as manure, hay, or straw to increase and sustain microbial growth and promote the reduction of parameters such as nitrate, and selenium. However, the GBRs envisioned for the Tenas Project would be actively operated by dosing degradable organic carbon such as methanol to improve the control of reducing conditions within the GBR. As such, the GBRs are considered an active water treatment technology.

PAG and Non-PAG rock is modelled to be the primary source of selenium, nitrogen species (nitrate, nitrite, and ammonia), and metals such as nickel. Non-PAG rock will be used for construction of management pond dams and buttresses as well as the Tenas Control Pond dam, while the remainder of Non-PAG rock is backfilled into the south end the open pit. PAG rock is contained in the management ponds, kept fully submerged after it is placed, and is only a source of selenium and nitrogen species with the initial flush of this rock while it is being submerged.

In the early Operation phase, the seepage from management pond and Tenas Control Pond dams and associated buttresses are the dominant sources of selenium, nitrite, sulphate, and nitrate loading in Project water. Once backfilling of the open pit begins, the open pit dewatering stream becomes additional source of selenium, nitrite, sulphate, and nitrate. Therefore, in addition to water contained in the management ponds, sources of mine water to be treated for the Project include:

- Seepage from the dams and buttresses surrounding Tenas Control Pond and the management ponds.
- Drainage from the open pit backfill reporting to the Pit sump, and
- Water reporting to the CPP Sedimentation Pond.

These water sources will be first be routed to the CPP Sedimentation Pond and then pumped to the active management pond for treatment. Loadings from the rock placed in the management ponds ( primarily PAG with some non-PAG rock) as well as any water reporting through runoffs to the ponds, will be treated in-situ as well.

During freshet, it is assumed that runoff from the surrounding catchments bypasses treatment due to the short residence time in the system. Outside of freshet, any water pumped out of the In-situ Active GBR treatment system is assumed to be treated. Similarly, most of the water contained in the management ponds would be maintained in a state of mild reducing conditions, which will attenuate selenium, nitrate, and some metals species. Therefore, seepage from the management ponds that reports to the groundwater system is assumed to have a composition like treated GBR effluent.

NMP becomes active shortly after the Construction Phase and stops treating once the EMP becomes active, after two years of PAG placement in EMP. WMP also becomes active once it has had two years of PAG placement and remains active indefinitely, while EMP becomes inactive once WMP comes online.

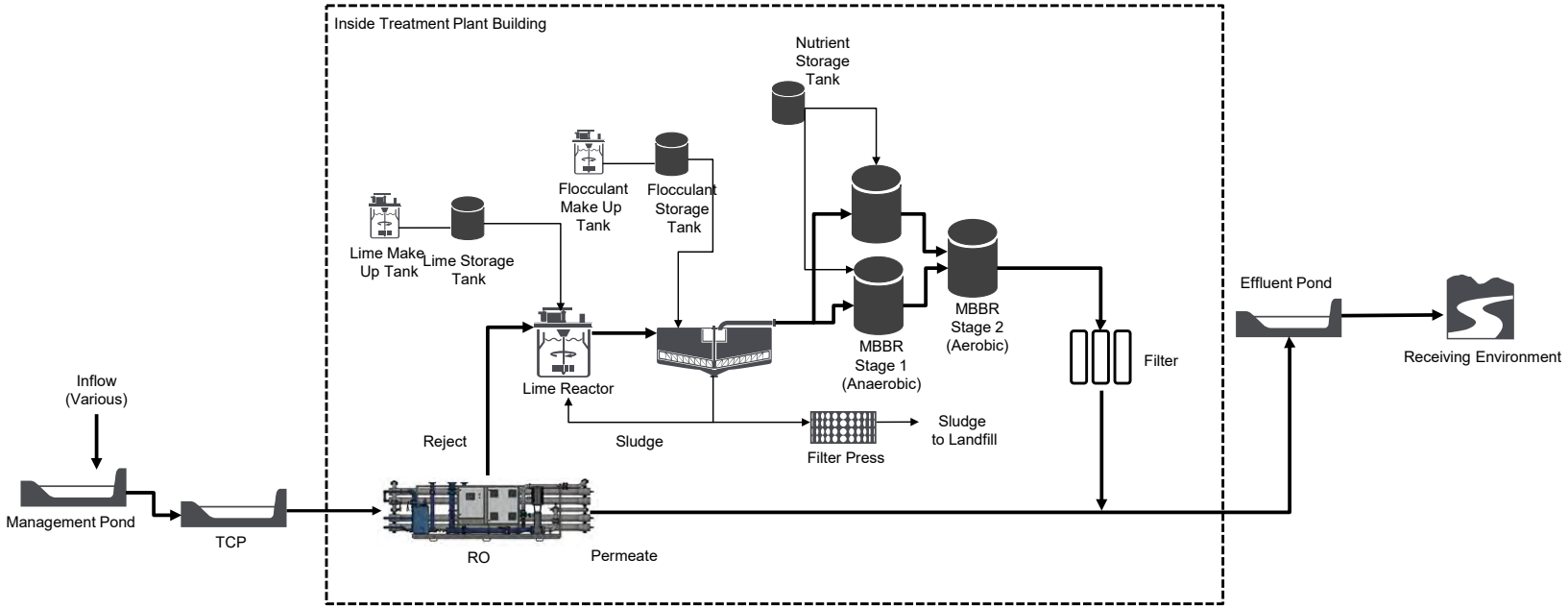
Constituents targeted by the active in-situ GBRs is assumed to be reduced to the following concentrations in the treated effluent:

- Nitrate: 1 mg/L
- Nitrite: 0.02 mg/L
- Selenium: 0.003 mg/L
- Other parameters that get removed but not specifically targeted: Aluminum (0.1 mg/L), Nickel (0.01 mg/L), and Iron (0.3 mg/L).

## 2.7 Mitigation Control 8: Active Tank-Based Treatment of Tenas Control Pond Effluent

Mitigation Control 8 assumes that an active water treatment plant will treat water surplus from Tenas Control Pond, before it is discharged to the receiving environment. Similarly to Mitigation Control 7, active treatment options were reviewed in the BAT assessment (Appendix H). The active treatment processes are assumed to operate indefinitely. To treat the Parameters of Concern based on the assumption that the treatment chain is as follows and as shown in Figure 2-2:

1. Reverse Osmosis (RO)
2. Moving Bed Biofilm Reactor (MBBR)
3. Lime High-Density Sludge plant.




Source:
https://srk.sharepoint.com/sites/NACAPR002055/Deliverables/Board%20Meeting%20Presentation%20Oct%202024/20241216%20Tenas%20BAT%20Assessment%20CAPR002055%20SRJ_CCM.pptx?web=1

**Figure 2-2: Example of Flowsheet for Active Water Treatment with RO, Anaerobic Bioreactor, and Lime Treatment**

Based on this conceptual active water treatment design chain, the water treatment plant would achieve the following treated effluent concentrations:

- Nitrate: 0.5mg/L
- Nitrite: 0.01mg/L
- Sulfate: 200mg/L
- Selenium: 0.001mg/L
- Aluminum: 0.05mg/L
- Cobalt: 0.003mg/L
- Copper: 0.0001mg/L
- Iron: 0.05mg/L
- Nickel: 0.005mg/L

The treatment rate is assumed to match the current surface discharge in the Updated EAC Project Case (2024) [10,000 to 12,000 $m^3$/d], which will be discharged to Goathorn Creek upstream of monitoring station WQSEA1 between May and October. The treatment rate was selected to ensure that there is no overflow from TCP during the Project's Operation and Post-Closure Phases to prevent the release of untreated effluent to the receiving environment.

## 2.8 Summary of Mitigation Control Scenarios

Mitigation Controls 1 through 8 described above were evaluated using the water and load balance model developed for the Project and compared against the Updated EAC Project Case (2024) to evaluate effects of the mitigation controls on downstream water quality and flow. The model was run using average hydrological conditions as well as with typical modelled source terms. The scenarios modelled are summarized by Table 2-2 along with comments on the modelled changes to streams and Project discharge.

**Table 2-2: Summary of Mitigation Control Scenarios and Modelled Changes to Streams and Project Surface Water Discharge**

| ID | Description | Modelled Beneficial Changes | Modelled Adverse Changes |
|---|---|---|---|
| **MC1** | Improve the robustness of the water covers in the management ponds and reduce loadings from waste rock by increasing the site water inventory during freshet | - Improve winter month concentrations in Four and Tenas Creeks<br>- Improves surface water discharge water quality | - Reduces streamflow in Four Creek during freshet |
| **MC2** | Modify MP and TCP liners and reduce seepage to streams | - Improves winter month concentrations in Four and Tenas Creeks | - Reduces winter baseflows in Tenas and Four Creeks<br>- Increased surface water discharge flows and loads from TCP to Goathorn Creek |
| **MC3** | Modify MP and TCP liners and reduce seepage to streams | - Improves winter month concentrations in Four and Tenas Creeks | - Reduces winter baseflows in Tenas and Four Creeks<br>- Increased surface water discharge flows and loads from TCP to Goathorn Creek |
| **MC4** | Increase of process water intake to CPP plant | - Reduced surface water discharged load to Goathorn Creek | - Reduces year-round streamflow in Goathorn Creek |
| **MC5** | Addition of blasthole liners | - Improved nitrogen (nitrate, nitrite, and ammonium) concentrations in groundwater seepage and surface water discharge pathways | - none |
| **MC6** | Active/Passive flocculation in TCP | - Lower total metal concentrations in surface water discharge to Goathorn Creek | - none |
| **MC7** | In-situ Active GBR in MPs | - Improves surface water discharge water quality for surface water and groundwater | - none |
| **MC8** | Active water treatment post TCP | - Improves surface water discharge water quality in Goathorn Creek | - none |

# 3 Results

The following sections present the water and load balance results for each mitigation control along with the Updated EAC Project Case (2024) to evaluate the potential effects of each mitigation control on water quality and flow of effluent and the receiving environment. The results assume average hydrologic conditions and typical modelled geochemical source terms. Alternative assessment cases, such as low flows or high source terms will be presented in the updated Water and Load Model Report (SRK 2025).

WQGs that were used to evaluate water quality model results were selected based on the lowest value of BC Approved Water Quality Guidelines (BC ENV 2024a) or BC Working Water Quality Guidelines for freshwater aquatic life (BC ENV 2024b). For guidelines that depend on toxicity-modifying factors, medium background values from the baseline datasets within each creek were used.

A map of prediction nodes incorporated in the water and load balance model is presented in Figure 3-1. Details concerning the selection of prediction nodes are presented in SRK 2022 with the addition of WQSEA1 requested by regulatory agencies. Results for stream water quality are presented in Section 3.2 and Appendix E, following the description of the results for the Updated EAC Project Case (2024).

Streamflow results are also presented where a mitigation control would influence streamflow. Results consider the maximum monthly change in streamflow throughout the modelled period relative to baseline conditions (without effects of Project).

Discharge water quality results consider the end-of-pipe concentrations from the main site discharge point, which is the Tenas Control Pond (TCP) in operations and the North Management Pond (NMP) in Post-closure, as well as the groundwater seepage from the TCP and the three management ponds.

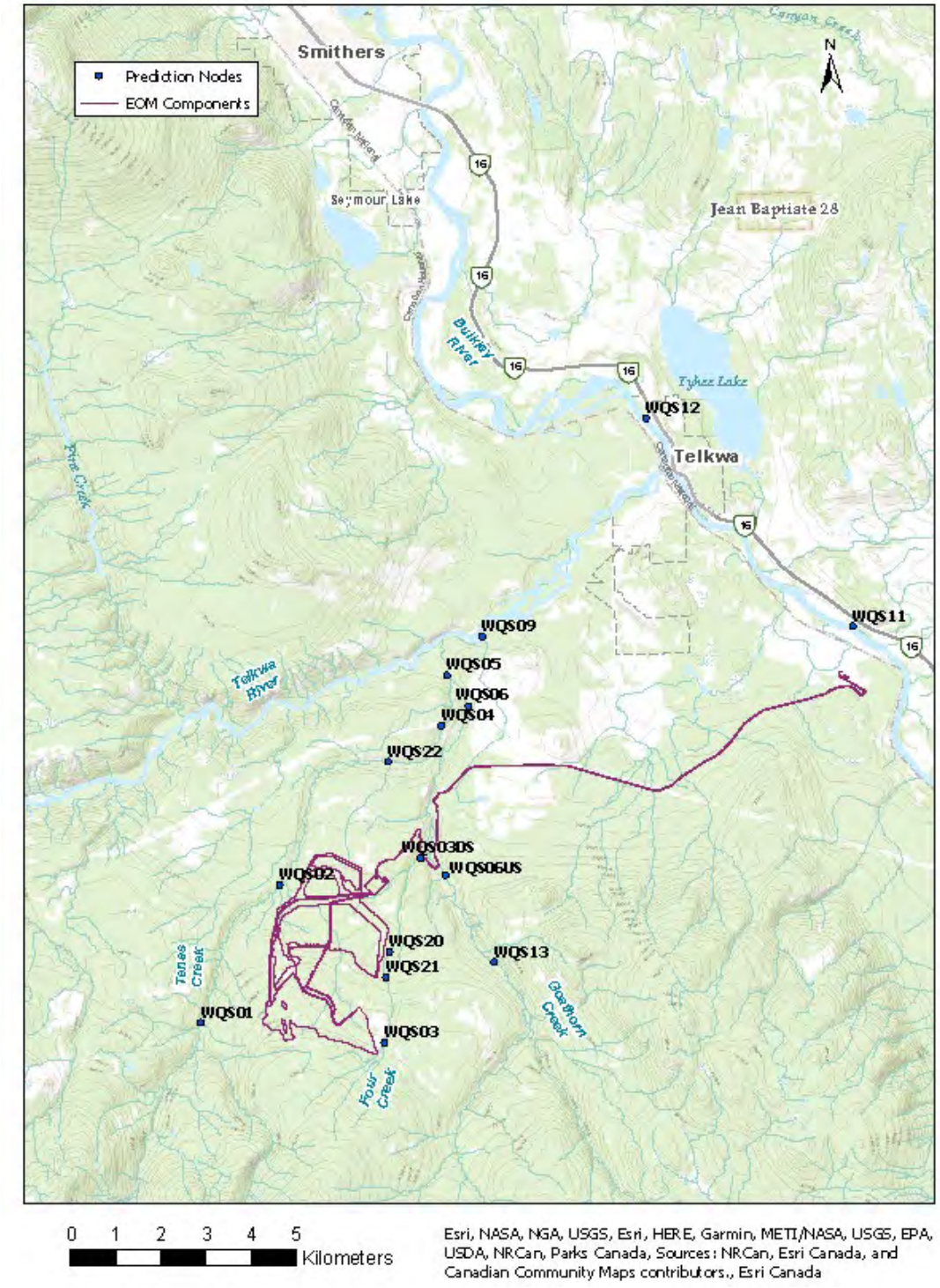



**Figure 3-1: Map of Prediction Nodes in the Receiving Environment for the Tenas Project. Water and Load Balance Results are Produced for all Prediction Nodes that Have Water Quantity and Quality**

## 3.1 Updated EAC Project Case (2024)

This section summarizes any modelled exceedances of WQGs in the environment for the Updated EAC Project Case (2024), as well as parameters of concern (POCs). POCs are identified as part of the BAT assessment process (Appendix H) and are the parameters that must be removed or reduced by candidate BATs. The Updated EAC Project Case (2024) is also referred to as the base case in this report.

### 3.1.1 Receiving Environment Results

The Updated EAC Project Case (2024) shows only one modelled WQG exceedance in the receiving environment in the three downstream creeks closest to the Project (Tenas, Four, and Goathorn Creeks) where the Project discharges directly either as surface water or groundwater. The modelled exceedance was for dissolved copper in Goathorn Creek with a maximum monthly average model result of 0.0021mg/L, which is greater than the calculated BC WQG of 0.0012mg/L for the Creek. However, background concentrations of dissolved copper are typically at similar levels that also exceed the WQG.

Tables summarizing modelled maximum monthly average parameter concentrations for each Creek is included in Appendix E.

### 3.1.2 Parameters of Concern (POC)

Table 3-1 summarizes POCs identified for the surface discharge (end-of-pipe) to the receiving environment or in pond seepage that reports to groundwater. POCs are defined as parameters in untreated effluent with concentrations greater than 80% of the BC WQGs (freshwater - aquatic life) or higher maximum monthly average model results. The maximum monthly average modelled results for the POCs can be found in Appendix E. Eleven POCs were identified based on the 80% of the BC WQG criteria and baseline conditions across the three Creeks (Goathorn, Tenas and Four Creek).

**Table 3-1: Parameters of Concern in the Different Surface Water Discharges and Groundwater Seepages to the Receiving Environment**

| | Surface Water Discharges | | | Groundwater Seepages (Post-Closure) | | | | Background / Baseline |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **TCP Discharge (Operation)** | **NMP Discharge (Post-Closure)** | **RLO discharge to ground – (Operation)** | **TCP Seepage** | **NMP Seepage** | **WMP Seepage** | **EMP Seepage** | **See Footnote** |
| **Nitrogen Nutrients** | | | | | | | | |
| Nitrate | X | | | X | | X | | |
| Nitrite | X | | | X | X | X | X | |
| **Sulphate** | | | | | | | | |
| Sulphate | X | X | | X | X | X | | |
| **Metals** | | | | | | | | |
| Aluminum, total | X | X | X | | | | | X[A] |
| Cadmium, dissolved | | | X[D] | | | | | |
| Cobalt, total | | | | | X | X | X | |
| Copper, dissolved | X | X | | | | X | | X[B] |
| Iron, total | X | X | X | | | | | X[C] |
| Nickel, dissolved | X | X | X | X | X | X | X | |
| Zinc, dissolved | X | | | X | X | X | | |
| **Oxyanions** | | | | | | | | |
| Molybdenum, total | X | | | X | | | | |
| Selenium, total | X | X | | X | X | X | X | |

**Notes:**
A - Background POC for Four, Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
B - Background POC for Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
C - Background POC for Four, Tenas Creeks, Telkwa and Bulkley Rivers.
D - Cd is POC for Rail Load Out only - it is therefore not considered in in this report

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20240925.xlsx]POC Condensed

## 3.2 Stream Water Quality

Since there are no modelled water quality exceedances in the receiving environment for the Updated EAC Project Case (2024) (except for dissolved copper in Goathorn Creek due to background concentrations), the relative change between the Updated EAC Project Case (2024) and the eight mitigation controls will be presented for the POCs identified in Section 3.1.2. These relative changes are presented for the Creeks affected the most by surface flow discharges or groundwater seepages due to their lower flows and proximity to the Project – Goathorn, Four, and Tenas Creeks. No notable effects on water quality are modelled downstream of the prediction nodes in these creeks and therefore will not be discussed further in this document (e.g., Telkwa, and Bulkley Rivers).

Results are summarized in Table 3-2 to Table 3-12 and figures showing modelled time series results for the three creeks are attached in Appendix F. The results are discussed in relation to the water quality guidelines in the respective streams and compared in terms of reduction in maximum monthly average modelled concentrations over the Updated EAC Project Case (2024).

General observations:

- As mentioned in Section 3.1.1, the only water quality exceedance is in Goathorn Creek for dissolved copper, and no mitigation control lowers the maximum monthly average modelled result for this POC.
- No additional exceedances are modelled in Goathorn, Four, or Tenas Creeks due to unintended effects of the mitigation controls considered.
- The mitigation controls with the most effect on groundwater seepages, and therefore Tenas and Four Creeks are Mitigation Controls 2 and 3 that include modified liners in the management ponds and the TCP, which reduce the seepage reaching Four and Tenas Creeks. The reduction in seepage and subsequent load decreases the concentrations of the POCs by 85% (Mitigation Control 3) of the concentration found in the Updated EAC Project Case (2024) for nitrate in Four Creek.
- The mitigation controls with the most effect on the surface water discharge are Mitigation Controls 7 and 8 (active treatment of Project water), which reduce the concentrations of most of the POCs in Goathorn Creek by 82% of the concentration found in Updated EAC Project Case (2024) for total selenium.
- Mitigation Control 1 (increase water inventory in management ponds) reduces concentrations of only some POCs (e.g. nitrate, sulphate, selenium total, nitrite, dissolved nickel) for Tenas and Four Creeks, but does not reduce the POC concentrations that are elevated in background waters such as total iron and dissolved copper since it is background water that is being added to the management ponds for this mitigation control.
- As expected, Mitigation Controls 5 and 6 reduces concentrations of nitrogen species or total metals, respectively.
- Mitigation Control 4 (increase of process water to CPP plant) had very minimal beneficial effect on POC concentrations and in some cases slightly worsened the conditions in the Creeks (Tenas and Four). This is because the seepage from the open pit backfill contains little load at the beginning of

mining (until 2029) and provides some dilution in the active management ponds, which in turn start to seep to the receiving environment. If less dilution is provided in the management ponds, the load seeping through the groundwater system to the receiving environment will therefore be higher, at the same seepage rate.

**Table 3-2: Nitrite Stream Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 0.02 mg/l) | | | Tenas Creek (WQG = 0.02 mg/l) | | | Goathorn Creek (WQG = 0.02 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.015 | 0% | 0.7 | 0.0090 | 0% | 0.5 | 0.0058 | 0% | 0.3 |
| **MC1** | 0.011 | -28% | 0.5 | 0.0079 | -13% | 0.4 | 0.0065 | +11% | 0.3 |
| **MC2** | 0.0084 | -42% | 0.4 | 0.0084 | -6% | 0.4 | 0.0068 | +16% | 0.3 |
| **MC3** | 0.0027 | -81% | 0.1 | 0.0080 | -12% | 0.4 | 0.0066 | +14% | 0.3 |
| **MC4** | 0.015 | +4% | 0.8 | 0.0091 | +1% | 0.5 | 0.0059 | +0% | 0.3 |
| **MC5** | 0.010 | -35% | 0.5 | 0.0060 | -33% | 0.3 | 0.0041 | -30% | 0.2 |
| **MC6** | 0.015 | 0% | 0.7 | 0.0090 | 0% | 0.5 | 0.0058 | 0% | 0.3 |
| **MC7** | 0.010 | -34% | 0.5 | 0.0033 | -63% | 0.2 | 0.0036 | -38% | 0.2 |
| **MC8** | 0.015 | +3% | 0.8 | 0.0091 | +0% | 0.5 | 0.0037 | -37% | 0.2 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners in management and control ponds
4. MC3 = Modify liners in management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

**Table 3-3: Total Selenium Stream Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 0.002 mg/l) | | | Tenas Creek (WQG = 0.002 mg/l) | | | Goathorn Creek (WQG = 0.002 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.00081 | 0% | 0.4 | 0.00078 | 0% | 0.4 | 0.0015 | 0% | 0.8 |
| **MC1** | 0.00063 | -22% | 0.3 | 0.00065 | -18% | 0.3 | 0.0015 | -1% | 0.8 |
| **MC2** | 0.00045 | -44% | 0.2 | 0.00072 | -9% | 0.4 | 0.0018 | +16% | 0.9 |
| **MC3** | 0.00013 | -83% | 0.1 | 0.00063 | -19% | 0.3 | 0.0017 | +12% | 0.8 |
| **MC4** | 0.00085 | +5% | 0.4 | 0.00082 | +4% | 0.4 | 0.0015 | +0% | 0.8 |
| **MC5** | 0.00081 | 0% | 0.4 | 0.00078 | 0% | 0.4 | 0.0015 | 0% | 0.8 |
| **MC6** | 0.00081 | 0% | 0.4 | 0.00078 | 0% | 0.4 | 0.0015 | -0% | 0.8 |
| **MC7** | 0.00066 | -19% | 0.3 | 0.00033 | -58% | 0.2 | 0.00027 | -82% | 0.1 |
| **MC8** | 0.00085 | +5% | 0.4 | 0.00079 | +1% | 0.4 | 0.00034 | -78% | 0.2 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners in management and control ponds
4. MC3 = Modify liners in management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

**Table 3-4: Sulphate Stream Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 309 mg/l) | | | Tenas Creek (WQG = 218 mg/l) | | | Goathorn Creek (WQG = 218 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 33 | 0% | 0.1 | 24 | 0% | 0.1 | 62 | 0% | 0.3 |
| **MC1** | 26 | -19% | 0.1 | 22 | -5% | 0.1 | 62 | -1% | 0.3 |
| **MC2** | 18 | -43% | 0.1 | 22 | -9% | 0.1 | 70 | +14% | 0.3 |
| **MC3** | 6 | -82% | 0.0 | 20 | -15% | 0.1 | 68 | +10% | 0.3 |
| **MC4** | 34 | +3% | 0.1 | 24 | +1% | 0.1 | 62 | +0% | 0.3 |
| **MC5** | 33 | 0% | 0.1 | 24 | 0% | 0.1 | 62 | 0% | 0.3 |
| **MC6** | 33 | 0% | 0.1 | 24 | 0% | 0.1 | 62 | 0% | 0.3 |
| **MC7** | 44 | +36% | 0.1 | 36 | +53% | 0.2 | 48 | -22% | 0.2 |
| **MC8** | 34 | +3% | 0.1 | 24 | -0% | 0.1 | 43 | -30% | 0.2 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners in management and control ponds
4. MC3 = Modify liners in management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

**Table 3-5: Total Aluminum Stream Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 0.69 mg/l) | | | Tenas Creek (WQG = 0.35 mg/l) | | | Goathorn Creek (WQG = 0.27 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.26 | 0% | 0.4 | 0.11 | 0% | 0.3 | 0.19 | 0% | 0.7 |
| **MC1** | 0.25 | -1% | 0.4 | 0.11 | 0% | 0.3 | 0.19 | 0% | 0.7 |
| **MC2** | 0.26 | +2% | 0.4 | 0.11 | +0% | 0.3 | 0.20 | +7% | 0.7 |
| **MC3** | 0.27 | +4% | 0.4 | 0.11 | +0% | 0.3 | 0.20 | +6% | 0.7 |
| **MC4** | 0.26 | 0% | 0.4 | 0.11 | 0% | 0.3 | 0.19 | 0% | 0.7 |
| **MC5** | 0.26 | 0% | 0.4 | 0.11 | 0% | 0.3 | 0.19 | 0% | 0.7 |
| **MC6** | 0.26 | 0% | 0.4 | 0.11 | 0% | 0.3 | 0.13 | -32% | 0.5 |
| **MC7** | 0.26 | 0% | 0.4 | 0.11 | 0% | 0.3 | 0.19 | -0% | 0.7 |
| **MC8** | 0.26 | +0% | 0.4 | 0.11 | 0% | 0.3 | 0.19 | +1% | 0.7 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners of the management and control ponds
4. MC3 = Modify liners of the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

**Table 3-6: Nitrate Stream Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 3 mg/l) | | | Tenas Creek (WQG = 3 mg/l) | | | Goathorn Creek (WQG = 3 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.61 | 0% | 0.2 | 0.37 | 0% | 0.1 | 0.25 | 0% | 0.1 |
| **MC1** | 0.43 | -29% | 0.1 | 0.32 | -13% | 0.1 | 0.27 | +10% | 0.1 |
| **MC2** | 0.34 | -44% | 0.1 | 0.35 | -7% | 0.1 | 0.29 | +18% | 0.1 |
| **MC3** | 0.09 | -85% | 0.0 | 0.33 | -12% | 0.1 | 0.29 | +15% | 0.1 |
| **MC4** | 0.63 | +4% | 0.2 | 0.38 | +1% | 0.1 | 0.25 | +0% | 0.1 |
| **MC5** | 0.38 | -37% | 0.1 | 0.24 | -35% | 0.1 | 0.17 | -31% | 0.1 |
| **MC6** | 0.61 | 0% | 0.2 | 0.37 | 0% | 0.1 | 0.25 | 0% | 0.1 |
| **MC7** | 0.41 | -33% | 0.1 | 0.14 | -64% | 0.0 | 0.16 | -37% | 0.1 |
| **MC8** | 0.62 | +3% | 0.2 | 0.38 | +0% | 0.1 | 0.19 | -22% | 0.1 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners of the management and control ponds
4. MC3 = Modify liners of the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

**Table 3-7: Dissolved Zinc Stream Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 0.014 mg/l) | | | Tenas Creek (WQG = 0.007 mg/l) | | | Goathorn Creek (WQG = 0.007 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.0026 | 0% | 0.2 | 0.0019 | 0% | 0.3 | 0.0021 | 0% | 0.3 |
| **MC1** | 0.0026 | -1% | 0.2 | 0.0019 | 0% | 0.3 | 0.0020 | -3% | 0.3 |
| **MC2** | 0.0027 | +2% | 0.2 | 0.0019 | 0% | 0.3 | 0.0019 | -6% | 0.3 |
| **MC3** | 0.0027 | +3% | 0.2 | 0.0019 | 0% | 0.3 | 0.0019 | -6% | 0.3 |
| **MC4** | 0.0026 | +0% | 0.2 | 0.0019 | 0% | 0.3 | 0.0019 | -6% | 0.3 |
| **MC5** | 0.0026 | 0% | 0.2 | 0.0019 | 0% | 0.3 | 0.0021 | 0% | 0.3 |
| **MC6** | 0.0026 | 0% | 0.2 | 0.0019 | 0% | 0.3 | 0.0021 | 0% | 0.3 |
| **MC7** | 0.0028 | +5% | 0.2 | 0.0020 | +5% | 0.3 | 0.0019 | -6% | 0.3 |
| **MC8** | 0.0026 | +0% | 0.2 | 0.0019 | 0% | 0.3 | 0.0022 | +5% | 0.3 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners of the management and control ponds
4. MC3 = Modify liners of the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

**Table 3-8: Dissolved Copper Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 0.0047 mg/l) | | | Tenas Creek (WQG = 0.0026 mg/l) | | | Goathorn Creek (WQG = 0.0013 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.0024 | 0% | 0.5 | 0.0015 | 0% | 0.6 | 0.0021 | 0% | 1.6 |
| **MC1** | 0.0024 | +0% | 0.5 | 0.0015 | +0% | 0.6 | 0.0021 | 0% | 1.6 |
| **MC2** | 0.0024 | +2% | 0.5 | 0.0015 | -1% | 0.6 | 0.0021 | 0% | 1.6 |
| **MC3** | 0.0025 | +3% | 0.5 | 0.0015 | -1% | 0.6 | 0.0021 | 0% | 1.6 |
| **MC4** | 0.0024 | 0% | 0.5 | 0.0015 | 0% | 0.6 | 0.0021 | 0% | 1.6 |
| **MC5** | 0.0024 | 0% | 0.5 | 0.0015 | 0% | 0.6 | 0.0021 | 0% | 1.6 |
| **MC6** | 0.0024 | 0% | 0.5 | 0.0015 | 0% | 0.6 | 0.0021 | 0% | 1.6 |
| **MC7** | 0.0024 | 0% | 0.5 | 0.0016 | +2% | 0.6 | 0.0021 | -0% | 1.6 |
| **MC8** | 0.0024 | 0% | 0.5 | 0.0015 | +0% | 0.6 | 0.0020 | -2% | 1.6 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners of the management and control ponds
4. MC3 = Modify liners of the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
12. Cells highlighted in orange indicate an exceedance over the water quality guideline.

**Table 3-9: Dissolved Nickel Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 0.005 mg/l) | | | Tenas Creek (WQG = 0.0025 mg/l) | | | Goathorn Creek (WQG = 0.0022 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.0011 | 0% | 0.2 | 0.00068 | 0% | 0.3 | 0.00065 | 0% | 0.3 |
| **MC1** | 0.0010 | -14% | 0.2 | 0.00063 | -8% | 0.3 | 0.00065 | -1% | 0.3 |
| **MC2** | 0.0007 | -34% | 0.2 | 0.00065 | -4% | 0.3 | 0.00072 | +10% | 0.3 |
| **MC3** | 0.0006 | -50% | 0.1 | 0.00062 | -9% | 0.2 | 0.00070 | +7% | 0.3 |
| **MC4** | 0.0012 | +2% | 0.2 | 0.00069 | +2% | 0.3 | 0.00065 | +0% | 0.3 |
| **MC5** | 0.0011 | 0% | 0.2 | 0.00068 | 0% | 0.3 | 0.00065 | 0% | 0.3 |
| **MC6** | 0.0011 | 0% | 0.2 | 0.00068 | 0% | 0.3 | 0.00065 | 0% | 0.3 |
| **MC7** | 0.0013 | +14% | 0.3 | 0.00083 | +22% | 0.3 | 0.00054 | -17% | 0.2 |
| **MC8** | 0.0011 | +2% | 0.2 | 0.00068 | +0% | 0.3 | 0.00086 | +33% | 0.4 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners of the management and control ponds
4. MC3 = Modify liners of the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

**Table 3-10: Total Molybdenum Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 0.034 mg/l) | | | Tenas Creek (WQG = 0.034 mg/l) | | | Goathorn Creek (WQG = 0.034 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.0012 | 0% | 0.03 | 0.00084 | 0% | 0.02 | 0.0022 | 0% | 0.1 |
| **MC1** | 0.0010 | -18% | 0.03 | 0.00072 | -14% | 0.02 | 0.0021 | -1% | 0.1 |
| **MC2** | 0.0007 | -38% | 0.02 | 0.00079 | -6% | 0.02 | 0.0025 | +14% | 0.1 |
| **MC3** | 0.0004 | -66% | 0.01 | 0.00068 | -19% | 0.02 | 0.0024 | +10% | 0.1 |
| **MC4** | 0.0012 | +6% | 0.04 | 0.00089 | +6% | 0.03 | 0.0022 | +0% | 0.1 |
| **MC5** | 0.0012 | 0% | 0.03 | 0.00084 | 0% | 0.02 | 0.0022 | 0% | 0.1 |
| **MC6** | 0.0012 | 0% | 0.03 | 0.00084 | 0% | 0.02 | 0.0022 | -0% | 0.1 |
| **MC7** | 0.0024 | +102% | 0.07 | 0.00197 | +135% | 0.06 | 0.0014 | -37% | 0.0 |
| **MC8** | 0.0012 | +5% | 0.04 | 0.00084 | +1% | 0.02 | 0.0019 | -13% | 0.1 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners of the management and control ponds
4. MC3 = Modify liners of the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

**Table 3-11: Total Iron Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 1 mg/l) | | | Tenas Creek (WQG = 1 mg/l) | | | Goathorn Creek (WQG = 1 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.24 | 0% | 0.2 | 0.068 | 0% | 0.1 | 0.43 | 0% | 0.4 |
| **MC1** | 0.24 | -1% | 0.2 | 0.068 | -0% | 0.1 | 0.43 | 0% | 0.4 |
| **MC2** | 0.25 | +2% | 0.2 | 0.068 | +0% | 0.1 | 0.49 | +13% | 0.5 |
| **MC3** | 0.25 | +4% | 0.3 | 0.068 | +0% | 0.1 | 0.48 | +12% | 0.5 |
| **MC4** | 0.24 | 0% | 0.2 | 0.068 | +0% | 0.1 | 0.43 | 0% | 0.4 |
| **MC5** | 0.24 | 0% | 0.2 | 0.068 | 0% | 0.1 | 0.43 | 0% | 0.4 |
| **MC6** | 0.24 | 0% | 0.2 | 0.068 | 0% | 0.1 | 0.13 | -71% | 0.1 |
| **MC7** | 0.24 | 0% | 0.2 | 0.068 | +0% | 0.1 | 0.43 | -0% | 0.4 |
| **MC8** | 0.24 | 0% | 0.2 | 0.068 | 0% | 0.1 | 0.49 | +13% | 0.5 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners of the management and control ponds
4. MC3 = Modify liners of the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

**Table 3-12: Total Cobalt Stream Water Quality Results with Mitigation Controls**

| Case | Four Creek (WQG = 0.004 mg/l) | | | Tenas Creek (WQG = 0.004 mg/l) | | | Goathorn Creek (WQG = 0.004 mg/l) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | WQG Exceedance Multiplier |
| **Base Case** | 0.00068 | 0% | 0.2 | 0.00034 | 0% | 0.1 | 0.00039 | 0% | 0.1 |
| **MC1** | 0.00056 | -17% | 0.1 | 0.00031 | -10% | 0.1 | 0.00039 | -0% | 0.1 |
| **MC2** | 0.00041 | -39% | 0.1 | 0.00032 | -6% | 0.1 | 0.00044 | +12% | 0.1 |
| **MC3** | 0.00021 | -70% | 0.1 | 0.00030 | -11% | 0.1 | 0.00043 | +10% | 0.1 |
| **MC4** | 0.00069 | +2% | 0.2 | 0.00035 | +3% | 0.1 | 0.00040 | +0% | 0.1 |
| **MC5** | 0.00068 | 0% | 0.2 | 0.00034 | 0% | 0.1 | 0.00039 | 0% | 0.1 |
| **MC6** | 0.00068 | 0% | 0.2 | 0.00034 | 0% | 0.1 | 0.00028 | -28% | 0.1 |
| **MC7** | 0.00075 | +10% | 0.2 | 0.00041 | +19% | 0.1 | 0.00033 | -16% | 0.1 |
| **MC8** | 0.00069 | +2% | 0.2 | 0.00034 | +0% | 0.1 | 0.00065 | +63% | 0.2 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify liners of the management and control ponds
4. MC3 = Modify liners of the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case

## 3.3 Streamflow

Mitigation Controls 1, 2, 3, 4, 7, and 8 have the potential to change the streamflow in the receiving environment.

- Mitigation Control 1 could reduce the natural runoff discharging into Four Creek, which would change streamflow at prediction nodes WQS21 (directly downstream of the C02 Channel discharge) through WQS03DS (the furthest downstream prediction node in Four Creek).
- Mitigation Control 2 and 3 could reduce flows discharging through the liners of the management ponds, which would change the baseflow rates into Four Creek at the downstream prediction node (WQS03DS) and Tenas Creek at the downstream prediction node (WQS04).
- Mitigation Control 4 could reduce the amount of surface discharge from the Project as more water is sent to the CPP plant overall in Goathorn Creek.
- Mitigation Control 7 changes the way the flows are routed within the Project, and therefore could affect timing and magnitude of surface discharge to Goathorn Creek.
- Mitigation Control 8 prevents any overflow from the TCP and therefore also changes timing and magnitude of surface discharge to Goathorn Creek, despite mimicking as closely as possible the discharge plan from the TCP in the Updated EAC Project Case (2024).

Change in streamflow is calculated based on the relative change between monthly average flow with the Project and its associated mitigation controls and the base case without the Project. The comparison presented below focuses on the maximum monthly reduction in streamflow for each month during the Operation phase of the Project. These effects are shown for three Creeks: Four, Tenas, and Goathorn Creek.

During the Decommissioning and Reclamation phase, the Channel C02 in Mitigation Control 1 would discharge to Four Creek year-round. For this reason, no change is modelled relative to the Updated EAC Project Case (2024) during the Post-closure period. The thicker liners in Mitigation Control 2 and 3 would result in a similar reduction to winter baseflows in Post-closure as in Operation phases in both streams.

Table 3-13 presents the maximum monthly reduction in streamflow at the upstream and downstream prediction nodes in Tenas Creek (WQS04, WQS02). Mitigation Controls 2 and 3 are the only cases modelled to influence flows in Tenas Creek.

Table 3-14 presents the maximum monthly reduction in streamflow results in Four Creek for the prediction node directly downstream of channel C02 (WQS21) and the furthest downstream prediction node (WQS03DS).

Table 3-15 presents the maximum monthly reduction in streamflow results in Goathorn Creek for the prediction node the most upstream in Goathorn Creek (WQS06US) and directly downstream of the surface discharge from the Project (WQSEA1).

Tenas Creek flows could be reduced up to 11.6% relative to baseline conditions during operations, which is about 4% more than under the Updated EAC Project Case (2024) (without additional mitigation controls). The effect is most prominent for the downstream prediction node WQS04.

Four Creek winter flows could be reduced by up to 37.8% in the Operation phase, which is about 3% more than under the Updated EAC Project Case (2024) for the upstream prediction node WQS21, and up to 40% for the downstream prediction node WQS03_DS in August, which is 20% more than under the Updated EAC Project Case (2024). Since Mitigation Control 1 only changes the C02 Channel discharge around freshet, only this period is affected in the Operation Phase, and shows minimal reduction in freshet streamflow. The change to the management pond liners results in minimal changes in streamflow during the open-water season (April through October) for the upstream prediction nodes but reflect significant changes in the downstream prediction nodes.

Goathorn Creek maximum monthly reduction shows very minimal changes for any mitigation control. The biggest reduction in flow compared to Updated EAC Project Case (2024) is for Mitigation Control 1 in March for the downstream prediction node WQSEA1. The flow is reduced by up to 10% in the Operation Phase, which is about 3% reduction compared to the Updated EAC Project Case (2024).

**Table 3-13: Monthly Maximum Change (%) in Streamflow Relative to Baseline Conditions in Tenas Creek**

| | Stream | Upstream Tenas Creek (WQS02) | | | | | | | Downstream Tenas Creek (WQS04) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Period** | **Case** | Base Case | MC1 | MC2 | MC3 | MC4 | MC7 | MC8 | Base Case | MC1 | MC2 | MC3 | MC4 | MC7 | MC8 |
| **Operations** | January | -3.9 | -3.9 | -5.1 | -5.2 | -3.9 | -3.9 | -3.9 | -5.5 | -5.5 | -8.8 | -9.1 | -5.5 | -5.5 | -5.5 |
| | February | -3.9 | -3.9 | -5.1 | -5.2 | -3.9 | -3.9 | -3.9 | -5.5 | -5.5 | -8.8 | -9.1 | -5.5 | -5.5 | -5.5 |
| | March | -3.9 | -3.9 | -5.1 | -5.2 | -3.9 | -3.9 | -3.9 | -8.3 | -8.3 | -11.3 | -11.6 | -8.3 | -8.3 | -8.3 |
| | April | -1.6 | -1.6 | -1.9 | -1.9 | -1.6 | -1.6 | -1.6 | -11.0 | -11.0 | -11.2 | -11.2 | -11.0 | -11.0 | -11.0 |
| | May | -1.5 | -1.5 | -1.5 | -1.5 | -1.5 | -1.5 | -1.5 | -8.1 | -8.1 | -8.2 | -8.2 | -8.1 | -8.1 | -8.1 |
| | June | -1.5 | -1.5 | -1.6 | -1.6 | -1.5 | -1.5 | -1.5 | -6.8 | -6.8 | -6.8 | -6.8 | -6.8 | -6.8 | -6.8 |
| | July | -1.7 | -1.7 | -1.9 | -1.9 | -1.7 | -1.7 | -1.7 | -7.2 | -7.2 | -7.6 | -7.7 | -7.2 | -7.2 | -7.2 |
| | August | -1.8 | -1.8 | -1.9 | -2.0 | -1.8 | -1.8 | -1.8 | -7.8 | -7.8 | -8.3 | -8.4 | -7.8 | -7.8 | -7.8 |
| | September | -2.0 | -2.0 | -2.3 | -2.3 | -2.0 | -2.0 | -2.0 | -8.2 | -8.2 | -9.0 | -9.1 | -8.2 | -8.2 | -8.2 |
| | October | -2.1 | -2.1 | -2.3 | -2.3 | -2.1 | -2.1 | -2.1 | -8.4 | -8.4 | -9.0 | -9.1 | -8.4 | -8.4 | -8.4 |
| | November | -4.0 | -4.0 | -5.1 | -5.1 | -4.0 | -4.0 | -4.0 | -7.3 | -7.3 | -10.2 | -10.5 | -7.3 | -7.3 | -7.3 |
| | December | -3.9 | -3.9 | -5.1 | -5.2 | -3.9 | -3.9 | -3.9 | -5.5 | -5.5 | -8.8 | -9.1 | -5.5 | -5.5 | -5.5 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MonthlyChange_Mitigations_v40_20241209.xlsm

Notes
12. MC1 = Improve robustness of water cover in management ponds with freshet flows from channel CO2
13. MC2 and MC3 = modify liners in the management and control ponds
14. MC4 = Increase of process water to CPP
15. MC7 = In-situ Active GBR in management ponds
16. MC8 = Active water treatment of Tenas Control Surface Water Discharge
17. Base Case = Updated EAC Project Case (2024)
18. Red highlighted text indicates where streamflow reduction is greater than or equal to 12.5%

**Table 3-14: Monthly Maximum Change (%) in Streamflow Relative to Baseline Conditions in Four Creek**

| | Stream | Upstream Four Creek (WQS21) | | | | | | | Downstream Four Creek (WQS03_DS) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Period** | **Case** | Base Case | MC1 | MC2 | MC3 | MC4 | MC7 | MC8 | Base Case | MC1 | MC2 | MC3 | MC4 | MC7 | MC8 |
| **Operations** | January | -33.6 | -33.6 | -36.4 | -37.1 | -33.6 | -33.6 | -33.6 | -5.0 | -5.0 | -26.3 | -36.4 | -5.0 | -5.0 | -5.0 |
| | February | -33.6 | -33.6 | -36.4 | -37.2 | -33.6 | -33.6 | -33.6 | -5.0 | -5.0 | -26.4 | -36.4 | -5.0 | -5.0 | -5.0 |
| | March | -13.3 | -22.9 | -15.1 | -15.5 | -13.3 | -13.3 | -13.3 | -9.1 | -15.3 | -25.9 | -32.4 | -9.1 | -9.1 | -9.1 |
| | April | 0.0 | -3.2 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | -24.7 | -37.5 | -25.0 | -25.1 | -24.7 | -24.7 | -24.7 |
| | May | 0.0 | -3.5 | -0.3 | -0.3 | 0.0 | 0.0 | 0.0 | -24.8 | -37.5 | -25.3 | -25.5 | -24.8 | -24.8 | -24.8 |
| | June | -0.1 | -8.4 | -0.6 | -0.6 | -0.1 | -0.1 | -0.1 | -24.9 | -37.9 | -29.2 | -30.9 | -24.9 | -24.9 | -24.9 |
| | July | -0.2 | -11.7 | -1.1 | -1.1 | -0.2 | -0.2 | -0.2 | -24.7 | -38.2 | -31.5 | -34.1 | -24.7 | -24.7 | -24.7 |
| | August | -5.3 | -25.0 | -7.2 | -7.7 | -5.3 | -5.3 | -5.3 | -19.7 | -35.1 | -33.8 | -40.6 | -19.7 | -19.7 | -19.7 |
| | September | -3.2 | -21.6 | -4.8 | -5.2 | -3.2 | -3.2 | -3.2 | -21.2 | -38.0 | -32.0 | -37.7 | -21.2 | -21.2 | -21.2 |
| | October | -6.2 | -23.0 | -7.9 | -8.3 | -6.2 | -6.2 | -6.2 | -15.8 | -23.9 | -32.0 | -38.2 | -15.8 | -15.8 | -15.8 |
| | November | -32.5 | -32.5 | -35.5 | -36.2 | -32.5 | -32.5 | -32.5 | -6.6 | -9.3 | -28.9 | -37.7 | -6.6 | -6.6 | -6.6 |
| | December | -34.4 | -34.4 | -37.1 | -37.8 | -34.4 | -34.4 | -34.4 | -5.0 | -5.0 | -26.7 | -36.7 | -5.0 | -5.0 | -5.0 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MonthlyChange_Mitigations_v40_20241209.xlsm

Notes
1. MC1 = Improve robustness of water cover in management ponds with freshet flows from channel CO2
2. MC2 and MC3 = modify liners in the management and control ponds
3. MC4 = Increase of process water to CPP
4. MC7 = In-situ Active GBR in management ponds
5. MC8 = Active water treatment of Tenas Control Surface Water Discharge
6. Base Case = Updated EAC Project Case (2024)
7. Red highlighted text indicates where streamflow reduction is greater than or equal to 12.5%

**Table 3-15: Monthly Maximum Change (%) in Streamflow Relative to Baseline Conditions in Goathorn Creek**

| | Stream | Upstream Goathorn Creek (WQS06US) | | | | | | | Downstream Goathorn Creek (WQSEA1) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Period** | **Case** | Base Case | MC1 | MC2 | MC3 | MC4 | MC7 | MC8 | Base Case | MC1 | MC2 | MC3 | MC4 | MC7 | MC8 |
| **Operations** | January | -0.2 | -0.2 | -0.1 | -0.1 | -0.2 | -0.2 | -0.2 | -0.5 | -0.5 | -2.0 | -2.8 | -0.5 | -0.5 | -0.5 |
| | February | -0.2 | -0.2 | -0.1 | -0.1 | -0.2 | -0.2 | -0.2 | -0.5 | -0.5 | -2.0 | -2.8 | -0.5 | -0.5 | -0.5 |
| | March | -0.2 | -0.2 | -0.1 | -0.1 | -0.2 | -0.2 | -0.2 | -7.6 | -10.9 | -9.1 | -9.8 | -7.6 | -7.6 | -7.6 |
| | April | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -4.3 | -10.2 | -4.3 | -4.4 | -4.3 | -4.3 | -1.3 |
| | May | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 |
| | June | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | July | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | -0.1 | 0.0 |
| | August | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.4 | -0.6 | -0.7 | -0.4 | -0.3 | -0.3 |
| | September | -0.1 | -0.1 | 0.0 | 0.0 | -0.1 | -0.1 | -0.1 | -0.6 | -0.8 | -1.2 | -1.5 | -0.6 | -0.6 | -0.4 |
| | October | -0.1 | -0.1 | 0.0 | 0.0 | -0.1 | -0.1 | -0.1 | -0.5 | -0.6 | -1.0 | -1.3 | -0.5 | -0.5 | -0.1 |
| | November | -0.2 | -0.2 | -0.1 | -0.1 | -0.2 | -0.2 | -0.2 | -0.5 | -0.5 | -2.0 | -2.8 | -0.5 | -0.5 | -0.5 |
| | December | -0.2 | -0.2 | -0.1 | -0.1 | -0.2 | -0.2 | -0.2 | -0.5 | -0.5 | -2.0 | -2.8 | -0.5 | -0.5 | -0.5 |

Source: CAPR002055/Internal/Water Balance Modelling/Results/12_03_24_Mitigations/Results_Streams_MonthlyChange_Mitigations_v40_20241209.xlsm

Notes
1. MC1 = Improve robustness of water cover in management ponds with freshet flows from channel CO2
2. MC2 and MC3 = modify liners in the management and control ponds
3. MC4 = Increase of process water to CPP
4. MC7 = In-situ Active GBR in management ponds
5. MC8 = Active water treatment of Tenas Control Surface Water Discharge
6. Base Case = Updated EAC Project Case (2024)
7. Red highlighted text indicates where streamflow reduction is greater than or equal to 12.5%

## 3.4 End of Pipe Surface Water Discharge and Groundwater Seepage Water Quality

The primary surface discharge location is from the Tenas Control Pond during the Operation phase, and the North Management Pond during the Post-closure phase (if the Tenas Control Pond is decommissioned). In Mitigation Control 8 (active treatment post-TCP) the Tenas Control Pond would not be decommissioned as it is required for the operation of an active water treatment plant and therefore remains the surface discharge location to Goathorn Creek in the Post-closure phase. As highlighted in section 3.2.1, other discharges from the Project occur through groundwater seepages from the main facilities (TCP and the management ponds), and the modelled results for parameter concentrations for groundwater seepages are also presented here.

Model water quality results from each facility were compiled under each mitigation control listed above and screened against the BC water quality guidelines (freshwater protection of aquatic life). The model does not predict TSS concentration, but the Tenas Control Pond is designed to provide sufficient retention time for particles to settle within the pond to meet the maximum discharge target of 35 mg/L.

The following sections present the results for total selenium, nitrate, and dissolved nickel. The modelled results for the other POCs can be found in Appendix G.

### 3.4.1 Selenium

Maximum average monthly total selenium concentration results for each mitigation control and the Updated EAC Project Case (2024) are presented in Table 3-16 for the surface discharge from the Tenas Control Pond (Operation phase final discharge point) and the North Management Pond (Post-closure phase final discharge point). These results are also shown for groundwater seepages for all facilities (TCP and management ponds) in Table 3-17 and Figure 3-3 during operations and in closure, respectively.

Modelled concentrations that are greater than 80% of the BC WQG of 0.002 mg/L are highlighted in orange which result in total selenium being a POC in the context of the BAT. Model results show that Tenas Control Pond selenium end of pipe concentrations could only be lowered to less than the BC WQG with implementation of Mitigation Control 8 (active treatment) during operations and closure. For other mitigation controls the model results indicate that selenium concentrations would remain higher than the BC WQG in the Tenas Control Pond's end of pipe flows(Table 3-16, Figure 3-2 and Figure 3-3).

No mitigation control achieves total selenium concentration in the groundwater discharge below the BC WQG of 0.002 mg/L during operations (Table 3-17). Mitigation Control 7 (GBR in management ponds) is assumed to lower total selenium by 75% from the Updated EAC Project Case (2024) but remains as high as 0.006 mg/L in the TCP seepage. This is mainly because it was estimated that a GBR could achieve to a treated concentration of 0.003 mg/L, which is higher than the BC WQG. During closure, Mitigation Control 7 does achieve total selenium concentrations lower than the BC WQG in the seepage of most facilities beside west management pond which continues to receive water containing selenium from the reclaimed backfill (Table 3-18 and Figure 3-4).

**Table 3-16: Selenium End of Pipe Surface Water Discharge Quality Results with Mitigation Controls**

| Case | Tenas Control Pond (Operation Phase) | | | North Management Pond (Post-Closure Phase) | | |
|---|---|---|---|---|---|---|
| | Max Monthly Average Concentration [mg/l] | Change from Base Case | Limit Exceedance Multiplier | Max Monthly average Concentration [mg/l] | Change from Base Case | Limit Exceedance Multiplier |
| **Base Case** | **0.024** | 0% | 11.9 | **0.0082** | 0% | 4.1 |
| **MC1** | **0.021** | -10% | 10.7 | **0.0082** | 0% | 4.1 |
| **MC2** | **0.032** | +36% | 16.2 | **0.0077** | -6% | 3.8 |
| **MC3** | **0.030** | +28% | 15.2 | **0.0070** | -15% | 3.5 |
| **MC4** | **0.024** | +1% | 12.0 | **0.0082** | 0% | 4.1 |
| **MC5** | **0.024** | 0% | 11.9 | **0.0082** | 0% | 4.1 |
| **MC6** | **0.024** | -0% | 11.9 | **0.0082** | -0% | 4.1 |
| **MC7** | **0.006** | -75% | 3.0 | **0.0022** | -73% | 1.1 |
| **MC8** | 0.001 | -96% | 0.5 | 0.0010 (Base Case = 0.0085) | -88% | 0.5 |

Source: CAPR002055/Internal/WaterBalanceModelling/Results/12_03_24_Mitigations/Results_MMPs_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify the liners in the management and control ponds
4. MC3 = Modify the liners in the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
12. **Orange bold text** indicates exceedance of 80% of the WQG (Limit exceedance multiplier >1)
13. Green highlighted text show results for TCP discharge, not NMP, as mitigation control 8 assumes that TCP does not get decommissioned. In brackets is the modelled results for the Base Case in TCP during closure

**Table 3-17: Total Selenium Concentration in Groundwater Seepages - Water Quality Results with Mitigation Controls (Operation Phase)**

| Case | Tenas Control Pond (Seepage) | | | North Management Pond (Seepage) | | | East Management Pond (Seepage) | | | West Management Pond (Seepage) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | Max Monthly Concentration [mg/l] | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier | Reduction over Base Case | Limit Exceedance Multiplier | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier |
| **Base Case** | **0.024** | 0% | 11.9 | **0.0069** | 0% | 3.4 | **0.0051** | 0% | 2.6 | **0.0082** | 0% | 4.1 |
| **MC1** | **0.021** | -10% | 10.7 | **0.0069** | 0% | 3.4 | **0.0049** | -5% | 2.5 | **0.0081** | -1% | 4.0 |
| **MC2** | **0.032** | +36% | 16.2 | **0.0064** | -8% | 3.2 | **0.0047** | -8% | 2.4 | **0.0101** | +24% | 5.1 |
| **MC3** | **0.030** | +28% | 15.2 | **0.0064** | -7% | 3.2 | **0.0045** | -12% | 2.2 | **0.0087** | +6% | 4.3 |
| **MC4** | **0.024** | +1% | 12.0 | **0.0069** | +0% | 3.4 | **0.0055** | +6% | 2.7 | **0.0082** | +0% | 4.1 |
| **MC5** | **0.024** | 0% | 11.9 | **0.0069** | 0% | 3.4 | **0.0051** | 0% | 2.6 | **0.0082** | 0% | 4.1 |
| **MC6** | **0.024** | 0% | 11.9 | **0.0069** | 0% | 3.4 | **0.0051** | 0% | 2.6 | **0.0082** | 0% | 4.1 |
| **MC7** | **0.006** | -75% | 3.0 | **0.0031** | -54% | 1.6 | **0.0038** | -26% | 1.9 | **0.0033** | -60% | 1.6 |
| **MC8** | **0.025** | +4% | 12.3 | **0.0069** | -0% | 3.4 | **0.0064** | +25% | 3.2 | **0.0082** | -0% | 4.1 |

Source: CAPR002055/Internal/WaterBalanceModelling/Results/12_03_24_Mitigations/Results_MMPsSEEP_MitigationOptions_EAModel_V40_20241209.xlsm

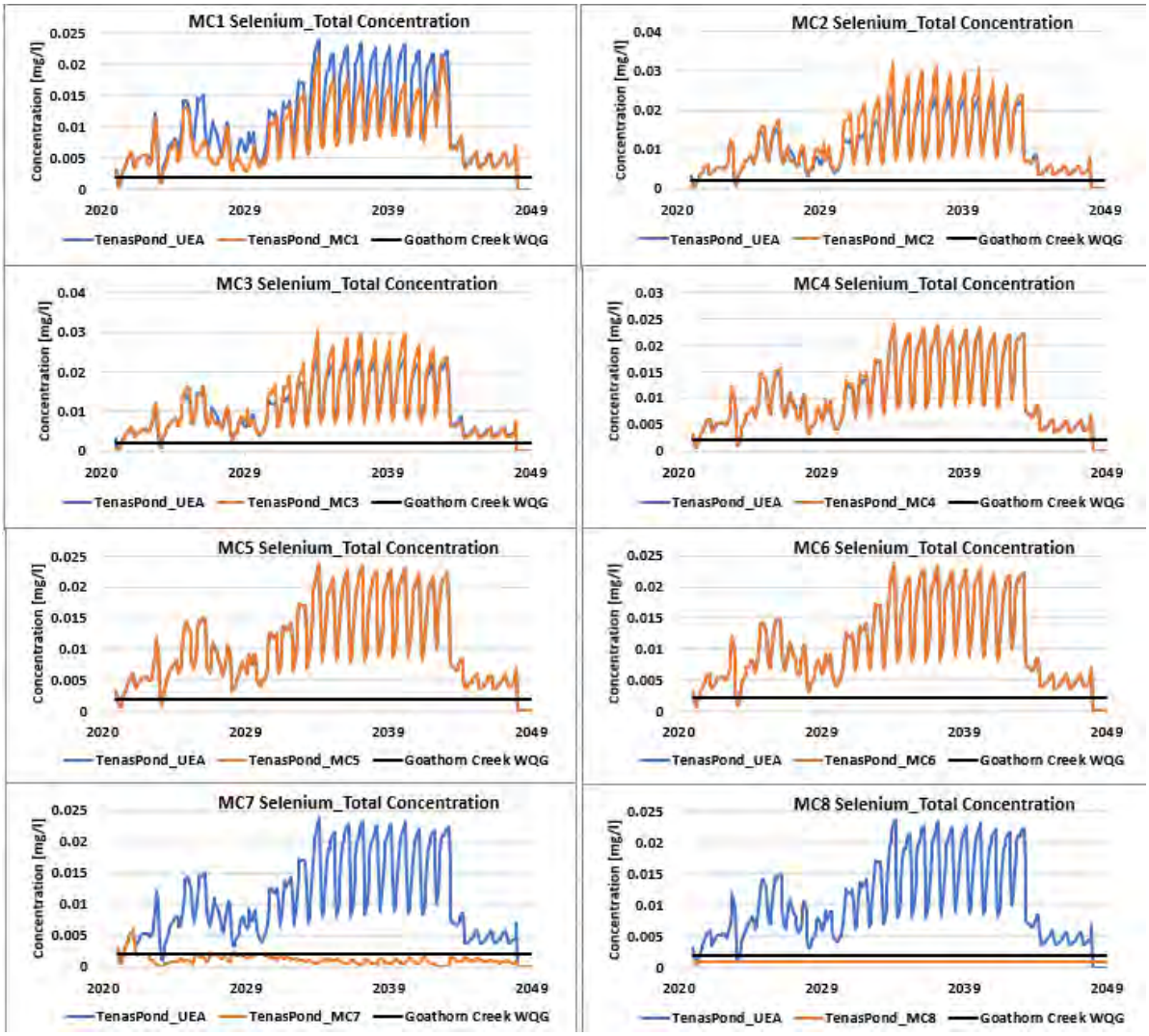
Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify the liners in the management and control ponds
4. MC3 = Modify the liners in the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
12. **Orange bold text** indicates exceedance of 80% of the WQG (Limit exceedance multiplier >1)

**Table 3-18: Total Selenium in Groundwater Seepages - Water Quality Results with Mitigation Controls (Post-Closure Phase)**

| Case | Tenas Control Pond (Seepage) | | | North Management Pond (Seepage) | | | East Management Pond (Seepage) | | | West Management Pond (Seepage) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | Max Monthly Concentration [mg/l] | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier | Reduction over Base Case | Limit Exceedance Multiplier | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier |
| **Base Case** | **0.0085** | 0% | 4.3 | **0.0059** | 0% | 2.9 | **0.0020** | 0% | 1.0 | **0.0082** | 0% | 4.1 |
| **MC1** | **0.0084** | -1% | 4.2 | **0.0059** | 0% | 2.9 | 0.0015 | -23% | 0.8 | **0.0081** | -1% | 4.0 |
| **MC2** | **0.0079** | -8% | 3.9 | **0.0053** | -9% | 2.7 | **0.0026** | +35% | 1.3 | **0.0097** | +19% | 4.9 |
| **MC3** | **0.0075** | -12% | 3.8 | **0.0050** | -15% | 2.5 | **0.0037** | +91% | 1.9 | **0.0085** | +4% | 4.3 |
| **MC4** | **0.0085** | -1% | 4.2 | **0.0059** | 0% | 2.9 | **0.0021** | +5% | 1.0 | **0.0082** | +0% | 4.1 |
| **MC5** | **0.0085** | 0% | 4.3 | **0.0059** | 0% | 2.9 | **0.0020** | 0% | 1.0 | **0.0082** | 0% | 4.1 |
| **MC6** | **0.0085** | 0% | 4.3 | **0.0059** | 0% | 2.9 | **0.0020** | 0% | 1.0 | **0.0082** | 0% | 4.1 |
| **MC7** | 0.0015 | -83% | 0.7 | 0.0010 | -84% | 0.5 | 0.0016 | -17% | 0.8 | **0.0033** | -60% | 1.6 |
| **MC8** | **0.0088** | +3% | 4.4 | **0.0059** | -0% | 2.9 | **0.0021** | +5% | 1.0 | **0.0082** | -0% | 4.1 |

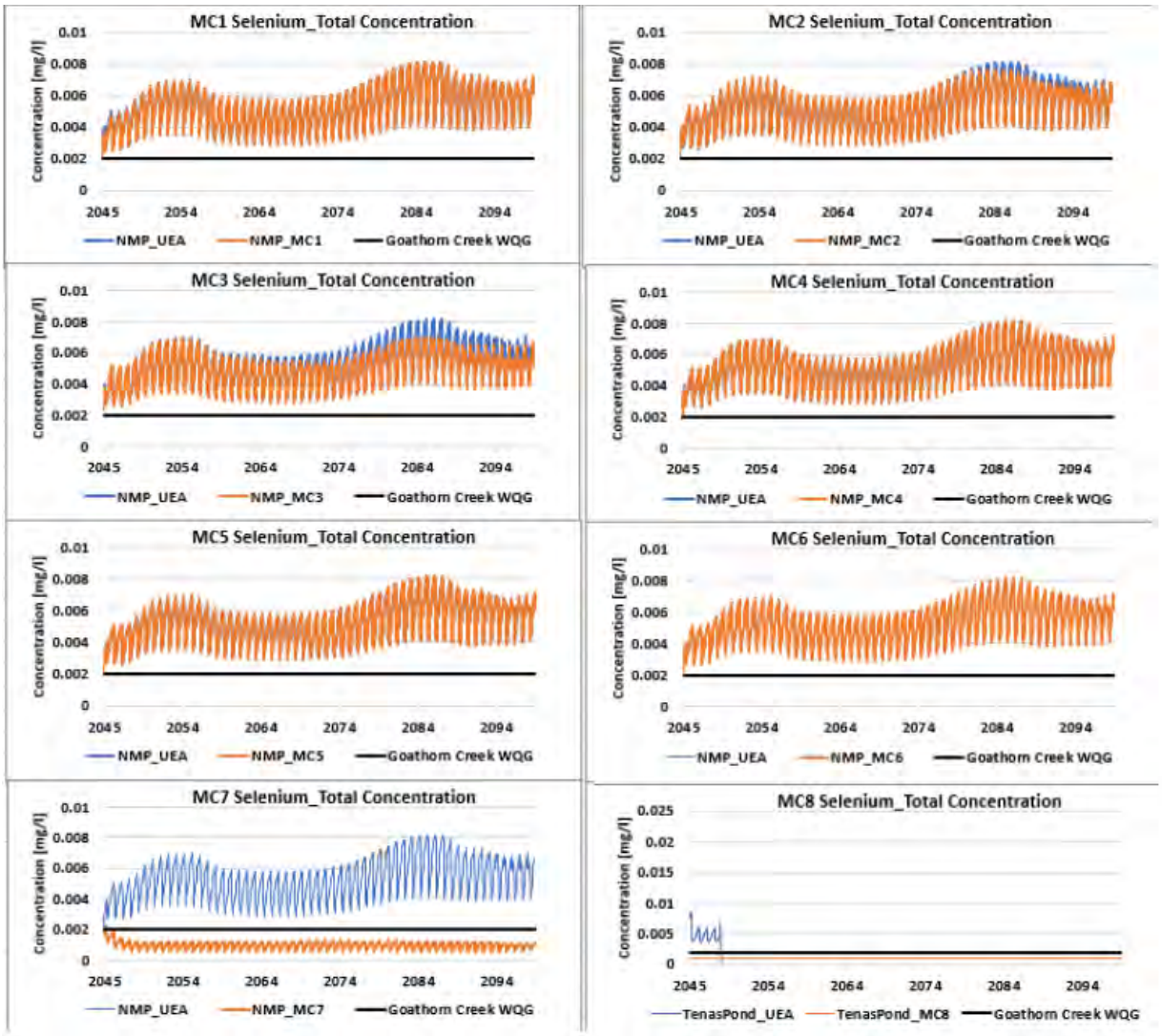
Source: CAPR002055/Internal/WaterBalanceModelling/Results/12_03_24_Mitigations/Results_MMPsSEEP_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify the liners in management and control ponds
4. MC3 = Modify the liners in management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
12. **Orange bold highlighted** text indicates exceedance of 80% of the WQG (Limit exceedance multiplier >1)



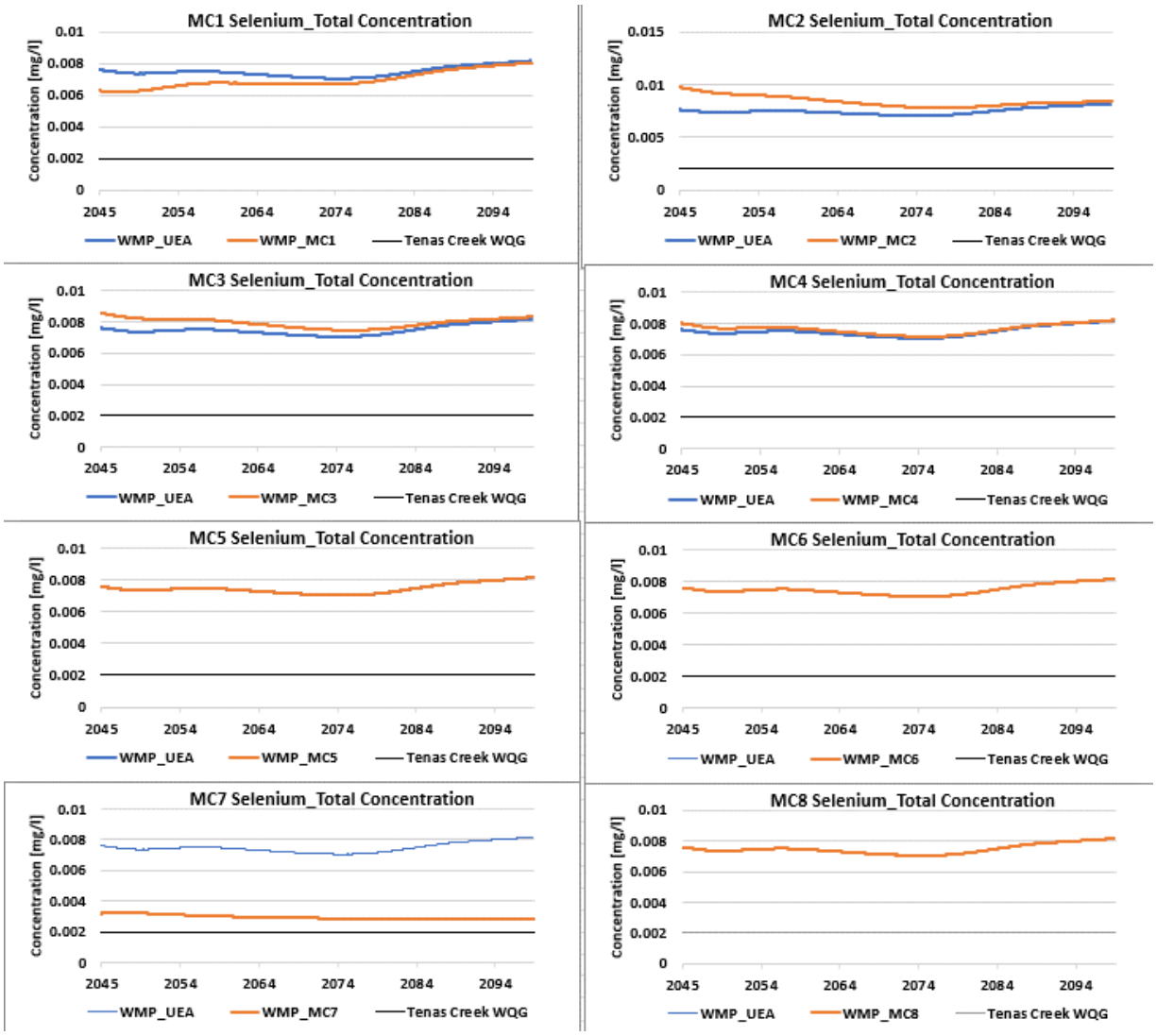

Source:
https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water%20Balance%20Modelling/Results/12_03_24_Mitigations/Results_MMPs_MitigationOptions_EAModel_V40_20241209.xlsm?web=1

**Figure 3-2: Total Selenium Water Quality Results for Tenas Control Pond During the Operation Phase for Surface Water Discharge**




Source:
https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water%20Balance%20Modelling/Results/12_03_24_Mitigations/Results_MMPs_MitigationOptions_EAModel_V40_20241209.xlsm?web=1

**Figure 3-3: Total Selenium Water Quality Results for the North Management Pond (and TCP for MC8) During the Post-Closure Phase for Surface Water Discharge**




Source:
https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water%20Balance%20Modelling/Results/12_03_24_Mitigations/Results_MMPsSEEP_MitigationOptions_EAModel_V40_20241209.xlsm?web=1

**Figure 3-4: Total Selenium Water Quality Results for the West Management Pond During the Post-Closure Phase in Groundwater Seepage**

### 3.4.2 Nitrate

Model results for maximum monthly average nitrate concentrations with each mitigation control and the Updated EAC Project Case (2024) are presented in Table 3-19 for the surface discharge from the Tenas Control Pond (Operation phase final discharge point) and the North Management Pond (Post-closure phase final discharge point). These results are also shown for groundwater seepages for all facilities (TCP and management ponds) in Table 3-20 and Table 3-21 during operations and in closure, respectively.

Nitrate concentrations that are modelled to be higher than 80% of the BC WQG of 3 mg/L are highlighted in orange which result in nitrate being a POC in the context of the BAT. Model results show that Tenas Control Pond nitrate concentrations could only be lowered to level less than the BCWQG with implementation of Mitigation Control 7 or 8 (active treatment) during operations. During closure, nitrate concentrations remain lower than the BC WQG in all cases including the Updated EAC Project Case (2024) because the source of nitrate has been eliminated with the end of mining (Table 3-19, Figure 3-5 and Figure 3-6).

In the groundwater seepage, only Mitigation Control 7 (In-situ GBR Active) lowers nitrate concentrations below the BC WQG of 3 mg/L during operations for the TCP and WMP (Table 3-20). Nitrate in the NMP groundwater seepage remains below the BC WQG throughout operations. Nitrate in EMP groundwater seepage is lowered through Mitigation Controls 5 and 7 (addition of blasthole liners and passive treatment) in operations.

During closure, nitrate in the groundwater seepage remains below the BC WQG for TCP, NMP and EMP in the Updated EAC Project Case (2024) and all other mitigation controls (Table 3-21). In WMP, the groundwater seepage is above the BC WQG at the beginning of closure beside Mitigation Controls 5, and 7 (blasthole liner and passive treatment) (Table 3-21 and Figure 3-4). WMP is the facility where the last of the PAG and Non-PAG rock will be placed, and therefore the nitrate load flushing from the rock placed in the pond tails off during Post-closure but eventually lowers to below BC WQG 10 years past Closure in the Updated EAC Project Case (2024) please see Figure 3-7.

**Table 3-19: Nitrate (as Nitrogen) End of Pipe Surface Water Discharge Quality Results with Mitigation Controls**

| Case | Tenas Control Pond (Operation Phase) | | | North Management Pond (Post-Closure Phase) | | |
|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier |
| **Base Case** | **13.0** | 0% | 4.3 | 2.54 | 0% | 0.8 |
| **MC1** | **12.2** | -6% | 4.1 | 2.32 | -9% | 0.8 |
| **MC2** | **18.8** | +45% | 6.3 | 2.70 | +6% | 0.9 |
| **MC3** | **16.2** | +25% | 5.4 | 2.61 | +3% | 0.9 |
| **MC4** | **14.1** | +9% | 4.7 | 2.55 | +1% | 0.9 |
| **MC5** | **8.1** | -37% | 2.7 | 1.59 | -37% | 0.5 |
| **MC6** | **13.0** | 0% | 4.3 | 2.54 | 0% | 0.8 |
| **MC7** | 2.7 | -79% | 0.9 | 1.79 | -29% | 0.6 |
| **MC8** | 0.5 | -96% | 0.2 | 0.5 (Base Case = 1.8 mg-N/L) | -72% | 0.2 |

Source: https://srk.sharepoint.com/sites/NA1CT027.003/Internal/500_Water_Balance/Results/Feb2022_MitigationControls/Results_MMPs_MitigationOptions_EAModel30_20220811.xlsm

Notes
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify the liners in the management and control ponds
4. MC3 = Modify the liners in the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
12. **Orange bold text** indicates exceedance of end of pipe limit of 80% of WQG (Limit exceedance multiplier > 1)
13. Green highlighted text show results for TCP discharge, not NMP, as mitigation control 8 assumes that TCP does not get decommissioned. In brackets is the modelled results for the Base Case in TCP during closure

**Table 3-20: Nitrate (as Nitrogen) in Groundwater Seepages – Water Quality Results with Mitigation Controls (Operations)**

| Case | Tenas Control Pond (Seepage) | | | North Management Pond (Seepage) | | | East Management Pond (Seepage) | | | West Management Pond (Seepage) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | Max Monthly Concentration [mg/l] | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier | Reduction over Base Case | Limit Exceedance Multiplier | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier |
| **Base Case** | **13.0** | 0% | 4.3 | 2.32 | 0% | 0.8 | **3.45** | 0% | 1.1 | **4.60** | 0% | 1.5 |
| **MC1** | **12.2** | -6% | 4.1 | 2.31 | -0% | 0.8 | **3.05** | -12% | 1.0 | **3.96** | -14% | 1.3 |
| **MC2** | **18.8** | +45% | 6.3 | 2.11 | -9% | 0.7 | **3.37** | -2% | 1.1 | **4.96** | +8% | 1.7 |
| **MC3** | **16.2** | +25% | 5.4 | 2.15 | -7% | 0.7 | **3.05** | -12% | 1.0 | **4.60** | +0% | 1.5 |
| **MC4** | **14.1** | +9% | 4.7 | 2.42 | +4% | 0.8 | **3.58** | +4% | 1.2 | **4.65** | +1% | 1.5 |
| **MC5** | **8.1** | -37% | 2.7 | 1.46 | -37% | 0.5 | 2.16 | -37% | 0.7 | **2.88** | -37% | 1.0 |
| **MC6** | **13.0** | 0% | 4.3 | 2.32 | 0% | 0.8 | **3.45** | 0% | 1.1 | **4.60** | 0% | 1.5 |
| **MC7** | 2.7 | -79% | 0.9 | 1.77 | -24% | 0.6 | 2.29 | -34% | 0.8 | 1.29 | -72% | 0.4 |
| **MC8** | **13.8** | +7% | 4.6 | 2.36 | +2% | 0.8 | **3.55** | +3% | 1.2 | **4.62** | +0% | 1.5 |

Source;
CAPR002055/Internal/WaterBalanceModelling/Results/12_03_24_Mitigations/Results_MMPsSEEP_MitigationOptions_EAModel_V40_20241209.xlsm

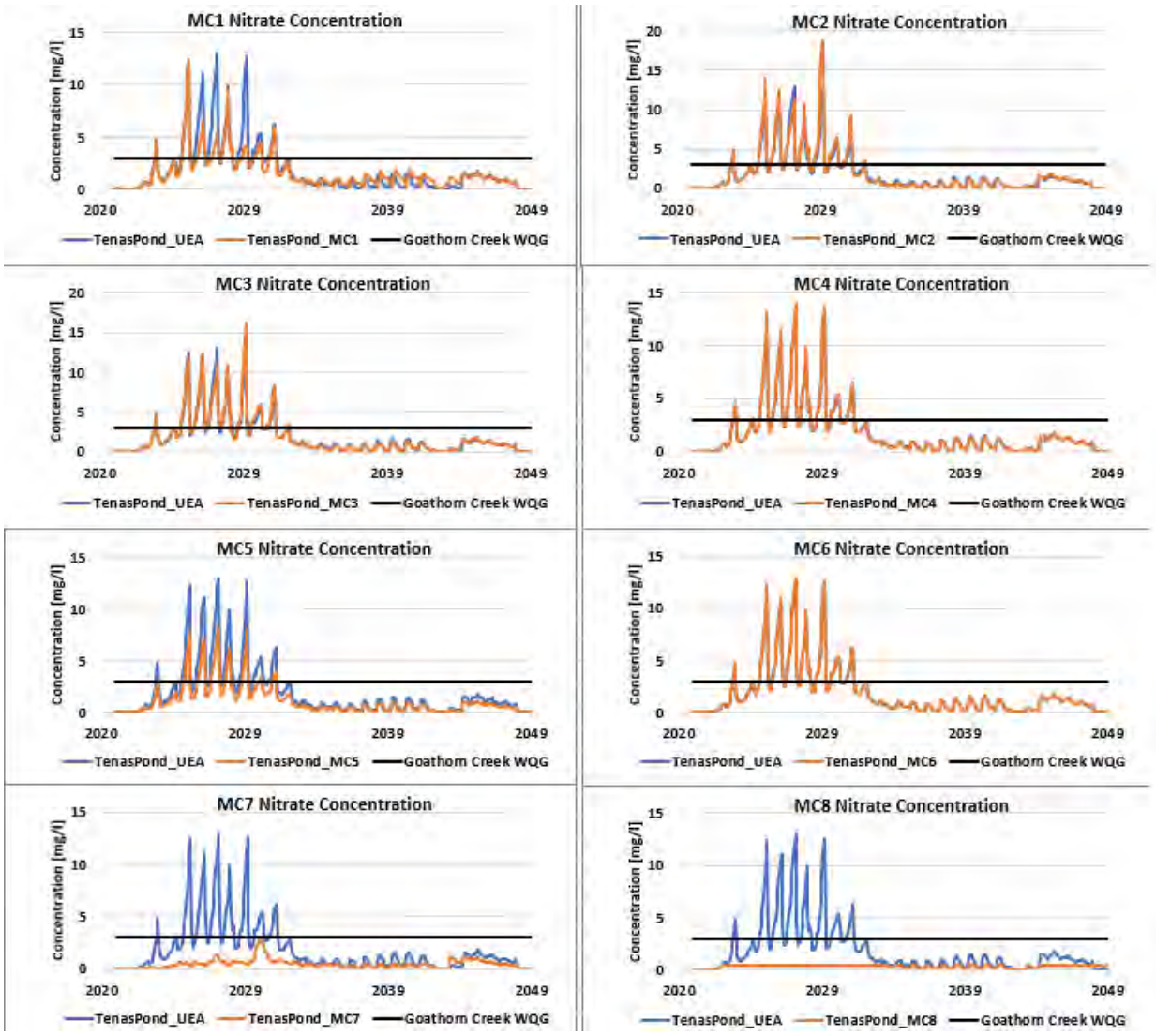
Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify the liners in the management and control ponds
4. MC3 = Modify the liners in the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
12. **Orange bold text** indicates exceedance of 80% of the WQG (Limit exceedance multiplier >1)

**Table 3-21: Nitrate (as Nitrogen) in Groundwater Seepages – Water Quality Results with Mitigation Controls (Post-Closure)**

| Case | Tenas Control Pond (Seepage) | | | North Management Pond (Seepage) | | | East Management Pond (Seepage) | | | West Management Pond (Seepage) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | Max Monthly Concentration [mg/l] | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier | Reduction over Base Case | Limit Exceedance Multiplier | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier |
| **Base Case** | 1.8 | 0% | 0.6 | 1.02 | 0% | 0.3 | 1.69 | 0% | 0.6 | **4.51** | 0% | 1.5 |
| **MC1** | 1.6 | -8% | 0.5 | 0.99 | -3% | 0.3 | 1.18 | -30% | 0.4 | **3.87** | -14% | 1.3 |
| **MC2** | 1.9 | +6% | 0.6 | 1.31 | +28% | 0.4 | 2.19 | +30% | 0.7 | **4.82** | +7% | 1.6 |
| **MC3** | 1.8 | -1% | 0.6 | 1.31 | +29% | 0.4 | 2.77 | +64% | 0.9 | **4.55** | +1% | 1.5 |
| **MC4** | 1.8 | +0% | 0.6 | 1.02 | 0% | 0.3 | 1.75 | +3% | 0.6 | **4.55** | +1% | 1.5 |
| **MC5** | 1.1 | -37% | 0.4 | 0.64 | -37% | 0.2 | 1.06 | -37% | 0.4 | 2.83 | -37% | 0.9 |
| **MC6** | 1.8 | 0% | 0.6 | 1.02 | 0% | 0.3 | 1.69 | 0% | 0.6 | **4.51** | 0% | 1.5 |
| **MC7** | 1.2 | -31% | 0.4 | 0.76 | -26% | 0.3 | 1.16 | -31% | 0.4 | 1.29 | -71% | 0.4 |
| **MC8** | 1.7 | -3% | 0.6 | 1.02 | 0% | 0.3 | 1.73 | +3% | 0.6 | **4.52** | +0% | 1.5 |

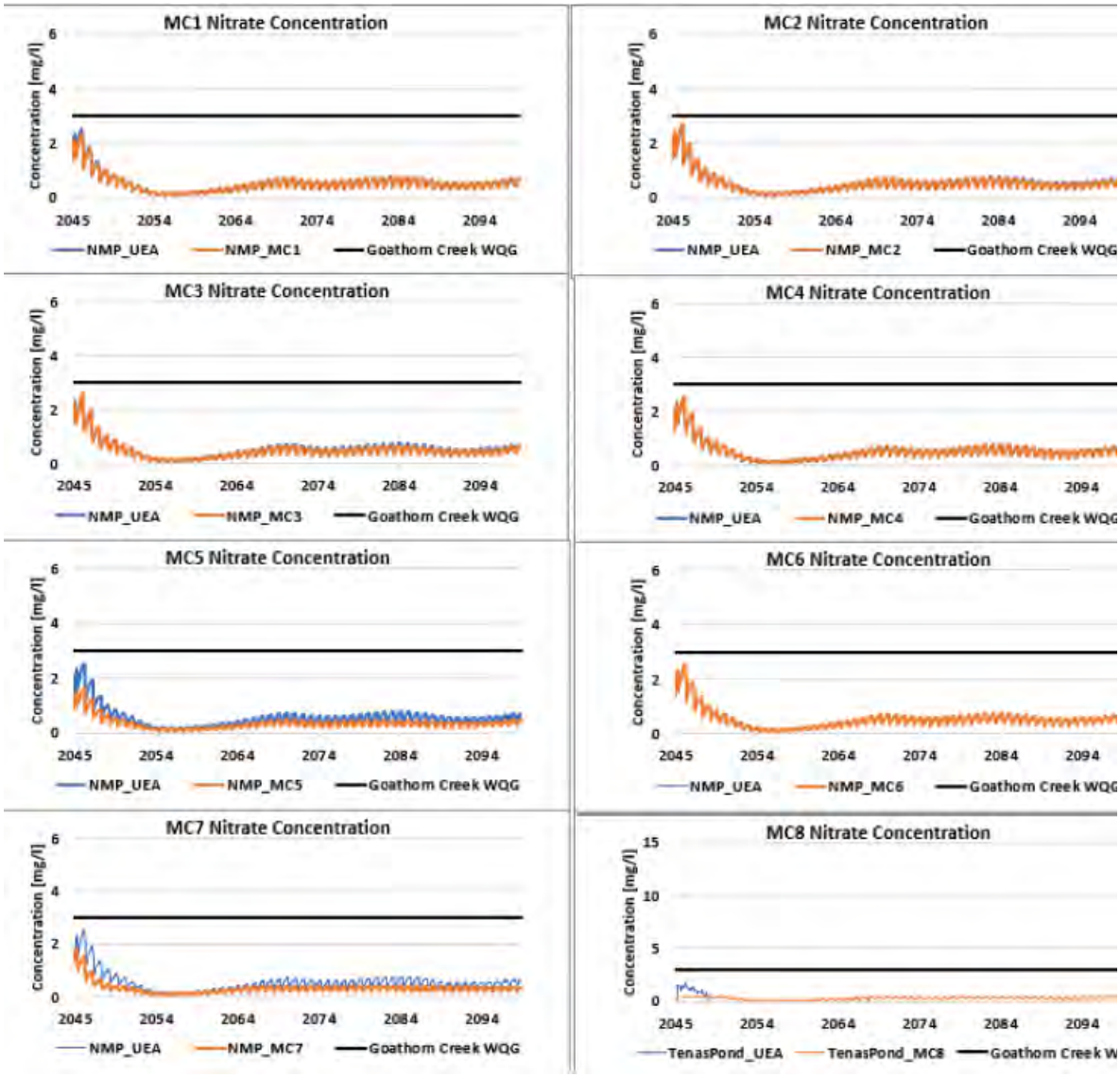
Source: CAPR002055/Internal/WaterBalanceModelling/Results/12_03_24_Mitigations/Results_MMPsSEEP_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify the liners in the management and control ponds
4. MC3 = Modify the liners in the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active/Passive flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
12. **Orange bold text** indicates exceedance of 80% of the WQG (Limit exceedance multiplier >1)



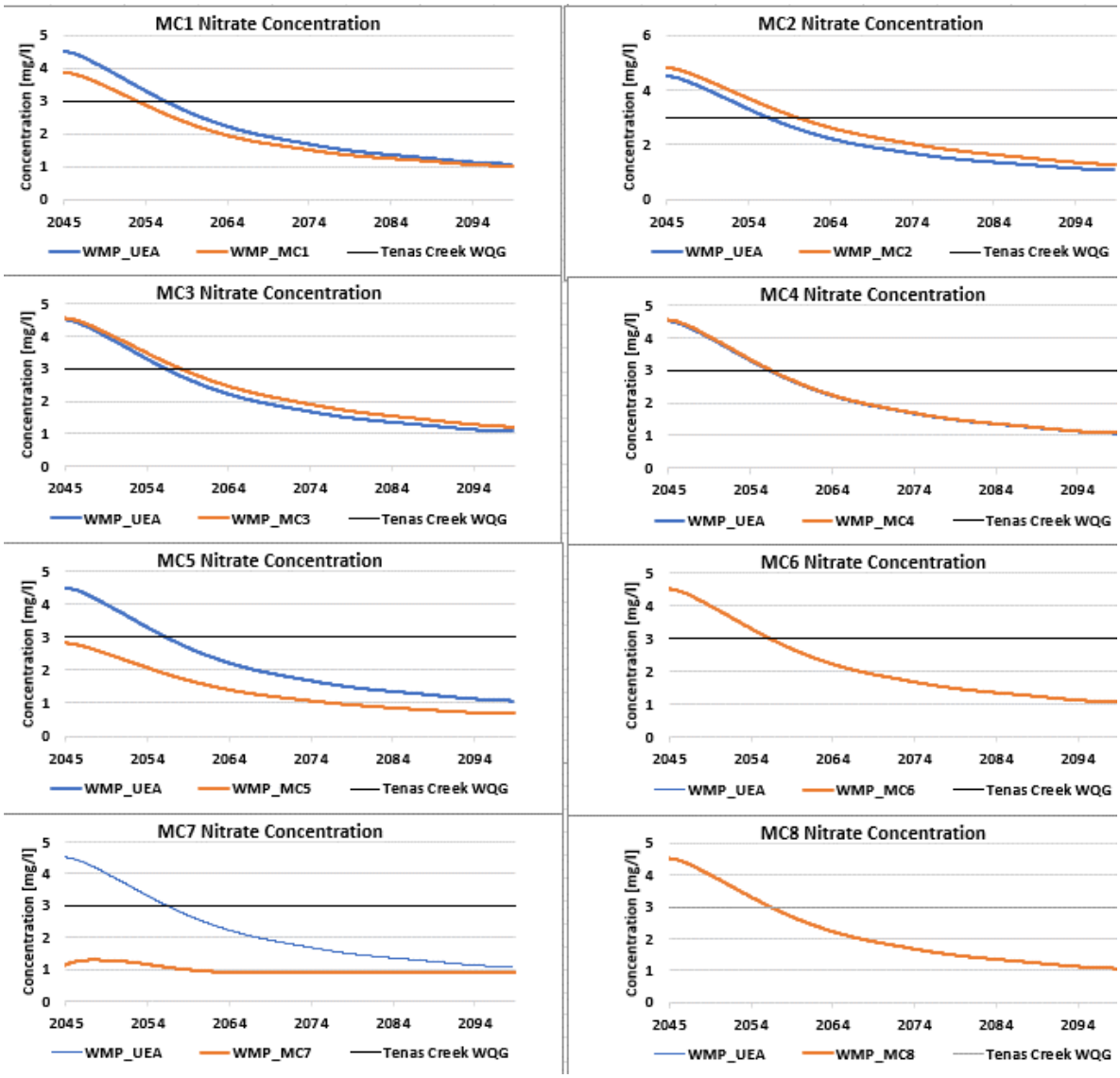

Source: https://srk.sharepoint.com/sites/NA1CT027.003/Internal/500_Water_Balance/Results/Feb2022_MitigationControls/Results_MMPs_MitigationOptions_EAModel29_20220207.xlsm

**Figure 3-5: Nitrate Water Quality Results at Tenas Control Pond During the Operation Phase for Surface Water Discharge**




Source:
https://srk.sharepoint.com/sites/NA1CT027.003/Internal/500_Water_Balance/Results/Feb2022_MitigationControls/Results_MMPs_MitigationOptions_EAModel30_20220811.xlsm

**Figure 3-6: Nitrate Water Quality Results at North Management Pond (and TCP for MC8) During the Post-Closure Phase for Surface Water Discharge**




Source:
https://srk.sharepoint.com/sites/NA1CT027.003/Internal/500_Water_Balance/Results/Feb2022_MitigationControls/Results_MMPs_MitigationOptions_EAModel30_20220811.xlsm

**Figure 3-7: Nitrate Water Quality Results at West Management Pond During the Post-Closure Phase for Groundwater Seepage**

### 3.4.3 Dissolved Nickel

Model results for maximum monthly average dissolved nickel concentration are listed in Table 3-19 for each mitigation control and the Updated EAC Project Case (2024) the Tenas Control Pond (Operation phase final discharge point) and the North Management Pond (Post-closure phase final discharge point). These results are also shown for groundwater seepages for all facilities (TCP and management ponds) in Table 3-23 and Table 3-24 during operations and in closure, respectively.

Results exceeding 80% of the BC water quality guideline for dissolved nickel, calculated based on the biotic ligand model[2] (BC ENV 2024) are highlighted in orange. Model results show that concentrations of dissolved nickel in the Tenas Control Pond are greater than the BC WQG even with Mitigation Controls during operations and hovers around the BC WQG calculated for Goathorn Creek (0.0022mg/L) in Post-Closure (Table 3-22, Figure 3-8 and Figure 3-9). The greatest modelled concentration reduction in TCP for dissolved nickel is noted for Mitigation Control 7 (In-situ Active GBR treatment), which is likely linked to the re-routing of mine water away from the TCP to the management ponds for in-situ treatment of nitrate and selenium in the In-situ Active GBRs in the management ponds, and not actual treatment of dissolved nickel (see Section 2.6). These results are expected as the treated effluent target for dissolved nickel (Mitigation Control 8) at 0.005 mg/L is higher than the BC WQG calculated value of 0.0022 mg/L for Goathorn Creek.

Similarly, for the groundwater seepage, all cases (including the Updated EAC Project Case (2024) and mitigation controls remain above the BC WQG for dissolved nickel during operations (Table 3-23). However, dissolved nickel is equal to or below the BC WQG for most cases (Updated EAC Project Case (2024) included) in the groundwater seepage for TCP, NMP and EMP. Dissolved nickel in WMP groundwater seepage during Post-Closure (Table 3-24) remains above the BC WQG calculated for Four Creek (at 0.0025 mg/L) in all cases, which is due to the continued input of impacted water containing nickel from the reclaimed backfill during the Post-Closure Phase. Dissolved nickel concentrations eventually decrease in the groundwater seepage for the Post-Closure phase approximately 30 years after closure for most cases, except Mitigation Controls 2, 3, and 7. In Mitigation Controls 2, and 3, it is because the liners reduce seepage to the environment and therefore keep a higher load in the management ponds. In Mitigation Control 7, the re-routing of water from the dams and buttresses for all facilities to the WMP result in a higher load of dissolved nickel compared to the Updated EAC Project Case (2024).

[2] Each facility discharges into a specific Creek for which the dissolved nickel guideline was calculated based on the median for historic measured water quality for hardness, Dissolved organic Carbon and temperature individual or each Creek. Surface discharge water is compared to Goathorn Creek nickel dissolved guideline, and for the groundwater seepage, it is compared to the most upstream point where the groundwater seepage connects with the creek. For NMP, WMP and TCP, it is compared to Tenas Creek, and for EMP it is compared to Four Creek.

**Table 3-22: Dissolved Nickel End of Pipe Surface Water Discharge Quality Results with Mitigation Controls**

| Case | Tenas Control Pond (Operation Phase) | | | North Management Pond (Post-Closure Phase) | | |
|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier |
| **Base Case** | **0.0060** | 0% | 2.7 | **0.0023** | 0% | 1.0 |
| **MC1** | **0.0058** | -4% | 2.6 | **0.0023** | 0% | 1.0 |
| **MC2** | **0.0078** | +29% | 3.5 | **0.0022** | -4% | 1.0 |
| **MC3** | **0.0074** | +22% | 3.4 | **0.0021** | -7% | 1.0 |
| **MC4** | **0.0061** | +0% | 2.8 | **0.0023** | 0% | 1.0 |
| **MC5** | **0.0060** | 0% | 2.7 | **0.0023** | 0% | 1.0 |
| **MC6** | **0.0060** | 0% | 2.7 | **0.0023** | 0% | 1.0 |
| **MC7** | **0.0037** | -40% | 1.7 | **0.0023** | +3% | 1.1 |
| **MC8** | **0.0050** | -17% | 2.3 | **0.0023 (Base Case = 0.0022 mg/L)** | +4% | 1.0 |

Source: https://srk.sharepoint.com/sites/NA1CT027.003/Internal/500_Water_Balance/Results/Feb2022_MitigationControls/Results_MMPs_MitigationOptions_EAModel30_20220811.xlsm

Notes
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify the liners in the management and control ponds
4. MC3 = Modify the liners in the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
12. **Orange bold text** indicates exceedance of 80% of the WQG (Limit exceedance multiplier >1)
13. Green highlighted text show results for TCP discharge, not NMP, as Mitigation Control 8 assumes that TCP does not get decommissioned. In brackets is the modelled results for the Base Case in TCP during closure

**Table 3-23: Dissolved Nickel in Groundwater Seepages - Water Quality Results with Mitigation Controls (Operations)**

| Case | Tenas Control Pond (Seepage) | | | North Management Pond (Seepage) | | | East Management Pond (Seepage) | | | West Management Pond (Seepage) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | Max Monthly Concentration [mg/l] | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier | Reduction over Base Case | Limit Exceedance Multiplier | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier |
| **Base Case** | **0.0060** | 0% | 2.7 | **0.0065** | 0% | 2.9 | **0.0053** | 0% | 1.1 | **0.0056** | 0% | 2.2 |
| **MC1** | **0.0058** | -4% | 2.6 | **0.0065** | -0% | 2.9 | **0.0051** | -2% | 1.1 | **0.0054** | -4% | 2.1 |
| **MC2** | **0.0078** | +29% | 3.5 | **0.0061** | -6% | 2.8 | **0.0050** | -4% | 1.1 | **0.0074** | +32% | 3.0 |
| **MC3** | **0.0074** | +22% | 3.4 | **0.0061** | -5% | 2.8 | **0.0051** | -4% | 1.1 | **0.0058** | +4% | 2.3 |
| **MC4** | **0.0061** | +0% | 2.8 | **0.0065** | +1% | 3.0 | **0.0053** | +1% | 1.1 | **0.0060** | +7% | 2.4 |
| **MC5** | **0.0060** | 0% | 2.7 | **0.0065** | 0% | 2.9 | **0.0053** | 0% | 1.1 | **0.0056** | 0% | 2.2 |
| **MC6** | **0.0060** | 0% | 2.7 | **0.0065** | 0% | 2.9 | **0.0053** | 0% | 1.1 | **0.0056** | 0% | 2.2 |
| **MC7** | **0.0037** | -40% | 1.7 | **0.0076** | +17% | 3.4 | **0.0060** | +14% | 1.3 | **0.0069** | +22% | 2.7 |
| **MC8** | **0.0062** | +2% | 2.8 | **0.0065** | +1% | 3.0 | **0.0060** | +14% | 1.3 | **0.0057** | +2% | 2.3 |

Source:CAPR002055/Internal/WaterBalanceModelling/Results/12_03_24_Mitigations/Results_MMPsSEEP_MitigationOptions_EAModel_V40_20241209.xlsm

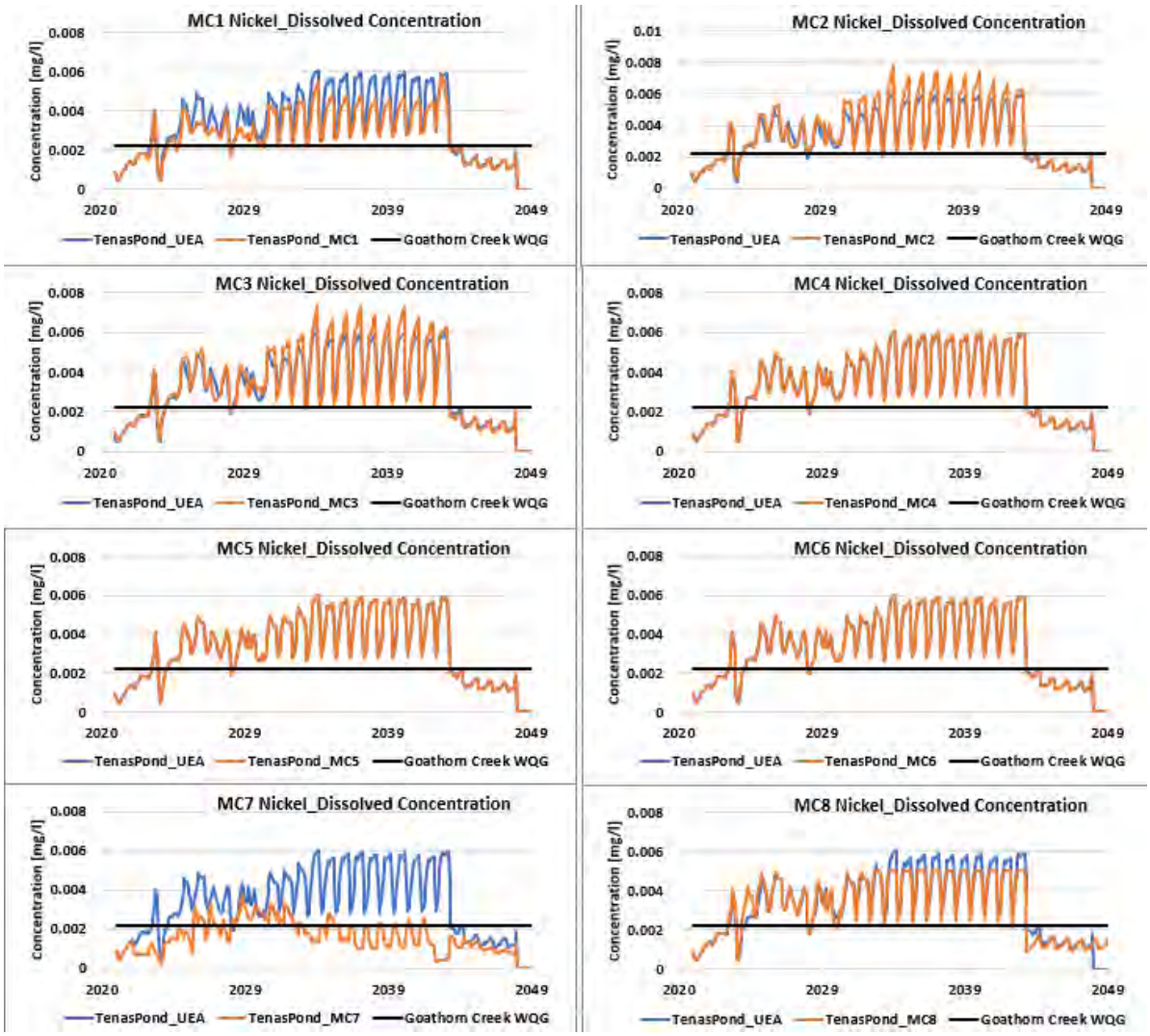
Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify the liners in the management and control ponds
4. MC3 = Modify the liners in the management and control pondsMC4 = Increase of process water to CPP
5. MC5 = Blasthole liners
6. MC6 = Active flocculation in TCP
7. MC7 = In-situ Active GBR in management ponds
8. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
9. Base Case = Updated EAC Project Case (2024)
10. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
11. **Orange bold text** indicates exceedance of 80% of the WQG (Limit exceedance multiplier >1)

**Table 3-24: Dissolved Nickel in Groundwater Seepages - Water Quality Results with Mitigation Controls (Closure)**

| Case | Tenas Control Pond (Seepage) | | | North Management Pond (Seepage) | | | East Management Pond (Seepage) | | | West Management Pond (Seepage) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Base Case | Max Monthly Concentration [mg/l] | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier | Reduction over Base Case | Limit Exceedance Multiplier | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Base Case | Limit Exceedance Multiplier |
| **Base Case** | **0.0022** | 0% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | 0% | 0.4 | **0.0044** | 0% | 1.8 |
| **MC1** | **0.0023** | +5% | 1.0 | 0.0017 | 0% | 0.8 | 0.0017 | -20% | 0.4 | **0.0038** | -13% | 1.5 |
| **MC2** | **0.0021** | -1% | 1.0 | **0.0023** | +37% | 1.0 | 0.0028 | +35% | 0.6 | **0.0051** | +16% | 2.0 |
| **MC3** | 0.0020 | -6% | 0.9 | **0.0023** | +39% | 1.1 | 0.0042 | +100% | 0.9 | **0.0047** | +7% | 1.9 |
| **MC4** | **0.0021** | -1% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | +2% | 0.5 | **0.0046** | +5% | 1.8 |
| **MC5** | **0.0022** | 0% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | 0% | 0.4 | **0.0044** | 0% | 1.8 |
| **MC6** | **0.0022** | 0% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | 0% | 0.4 | **0.0044** | 0% | 1.8 |
| **MC7** | 0.0017 | -23% | 0.8 | 0.0015 | -9% | 0.7 | 0.0025 | +19% | 0.5 | **0.0068** | +56% | 2.7 |
| **MC8** | **0.0023** | +4% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | +2% | 0.5 | **0.0044** | +0% | 1.8 |

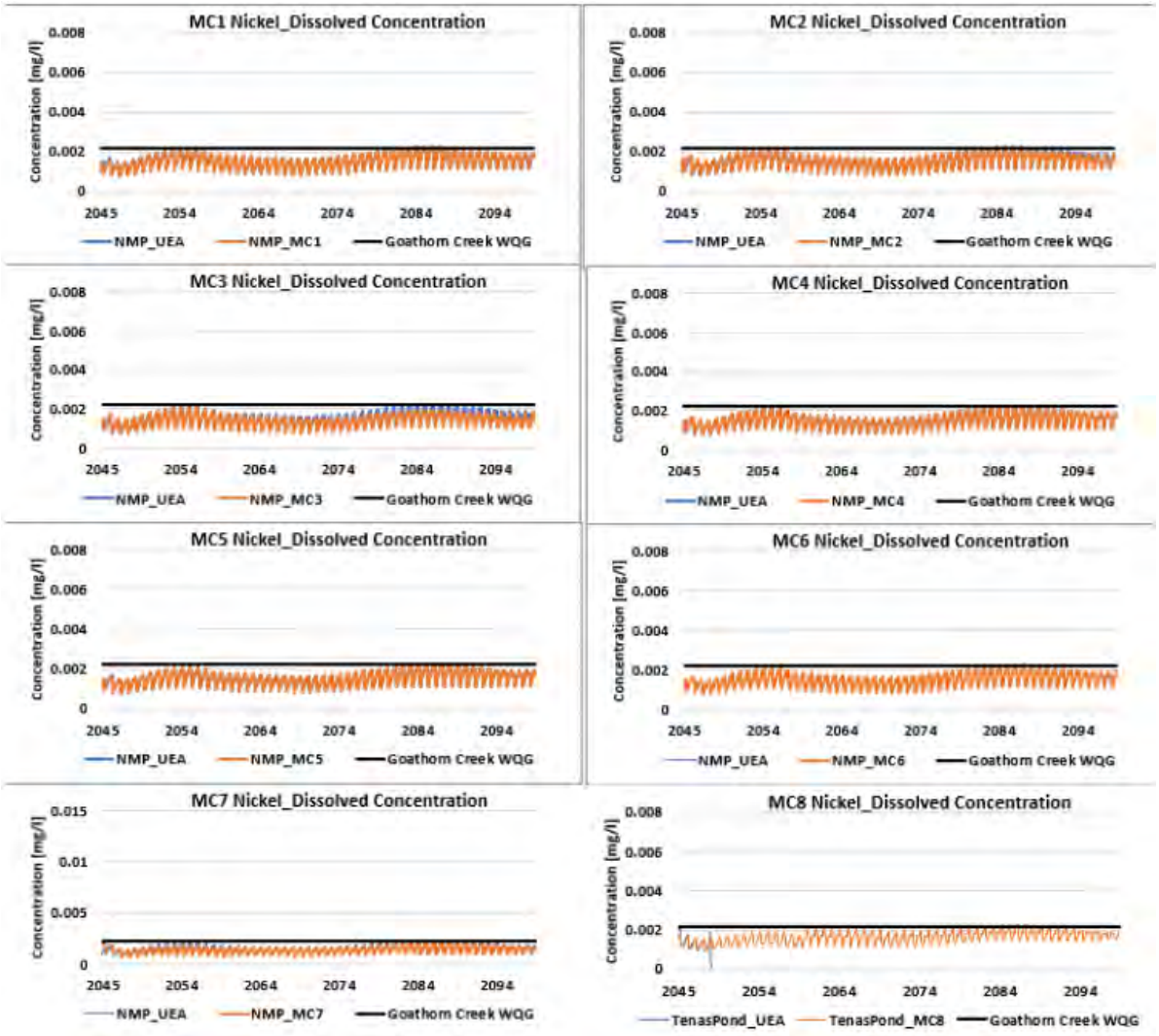
Source: CAPR002055/Internal/WaterBalanceModelling/Results/12_03_24_Mitigations/Results_MMPsSEEP_MitigationOptions_EAModel_V40_20241209.xlsm

Notes:
1. WQG = water quality guideline, calculated based on the median hardness from baseline monitoring in each stream
2. MC1 = Improve robustness of water cover in management ponds with freshet inflows from channel C02
3. MC2 = Modify the liners in the management and control ponds
4. MC3 = Modify the liners in the management and control ponds
5. MC4 = Increase of process water to CPP
6. MC5 = Blasthole liners
7. MC6 = Active flocculation in TCP
8. MC7 = In-situ Active GBR in management ponds
9. MC8 = Active Water Treatment of Tenas Control Pond Surface Water Discharge
10. Base Case = Updated EAC Project Case (2024)
11. Negative value represents reduction over Base Case. Positive value is an increase over Base Case
12. **Orange bold text** indicates exceedance of 80% of the WQG (Limit exceedance multiplier >1)




Source:
https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water%20Balance%20Modelling/Results/12_03_24_Mitigations/Results_MMPs_MitigationOptions_EAModel_V40_20241209.xlsm?web=1

**Figure 3-8: Dissolved Nickel Water Quality Results for Tenas Control Pond During the Operation Phase for Surface Water Discharge**




Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water%20Balance%20Modelling/Results/12_03_24_Mitigations/Results_MMPs_MitigationOptions_EAModel_V40_20241209.xlsm?web=1

Note : Blue line is behind the orange line – showing no change from base case

**Figure 3-9: Dissolved nickel Water Quality Results for North Management Pond (and TCP for MC8) During the Post-Closure Phase for Surface Water Discharge**

## 3.5 Summary

This section summarizes the results of the water quality model assessment of the potential mitigation controls that were identified for the Tenas Project to help improve water quality in the receiving environment relative to conditions presented in Updated EAC Project Case (2024). As there are no modelled exceedances of BC WQG in the downstream receiving waters, the effectiveness of each mitigation control was evaluated in terms of improving the surface water discharge (end-of-pipe) and groundwater seepages from the Project, in Goathorn Creek, Tenas Creek and Four Creek, along with any associated changes to streamflow or Project surface water discharge and groundwater seepage.

In summary, the mitigation controls include:

- Improve the robustness of the water covers of the management ponds by adding freshet inflows from Channel C02.
- Modifying liners constructed for the management and control ponds to reduce seepage rates to the receiving environment.
- Increase of process water usage by the CPP by changing the deposition method for the CPP tailings.
- Use of blasthole liners to decrease nitrogen loads.
- Active/Passive flocculation with the Base Case to reduce total metals concentrations in surface discharge.
- Treating water collected in the open pit, as well as dams and buttresses seepage with the Base Case
  - through In-situ Active GBR treatment in the management ponds for both surface water discharge and groundwater seepage, or
  - through active water treatment post TCP (for surface water discharge treatment)

Table 3-25 summarizes changes to stream water quality and quantity.

**Table 3-25: Summary of Mitigation Control Results**

| Mitigation Control ID | Positive | Negative |
|---|---|---|
| **MC1: Improve Water Cover** | - Reduces most POCs concentrations by a few percent for surface water discharge from the Tenas Control and North Management Ponds, as well as in groundwater seepages.<br>- Reduces POCs in streams as well to varying degrees in Tenas and Four Creeks with no significant improvements in Goathorn Creek. | - Reduces streamflow in Four Creek during the open-water season months.<br>- Does not improve POC concentrations for NMP as it is not targeted. |

| Mitigation Control ID | Positive | Negative |
|---|---|---|
| **MC2: Modified Liners in Management and Control Ponds (Option 1)** | - Reduces POCs concentrations in Tenas and Four Creeks. | - Changes flows for the streams, with main effect on Four Creek (>12.5% reduction of flows, and further reduction over the Updated EAC Project Case (2024)).<br>- Worsens TCP surface water discharge for a few POCs.<br>- Worsens POCs concentrations in groundwater seepage from TCP and WMP. |
| **MC3: Modified Liners in Management and Control Ponds (Option 2)** | - Greatest improvement for a single mitigation control in reducing concentrations of most POCs in Four Creek.<br>- Reduction of POCs concentrations in Tenas Creek (less than in Four Creek). | - Changes for stream flows, primarily Four Creek (>12.5% reduction of flows, and further reduction over the Updated EAC Project Case (2024)) (more than MC2).<br>- Worsens TCP surface water discharge for a few POCs (more than MC2).<br>- Worsens POCs concentrations in groundwater seepage from TCP and WMP (more than MC2). |
| **MC4: Increase of process water to CPP** | - No notable improvements of discharge water or water quality in the streams. | - Increased water usage by the Project. |
| **MC5: Blasthole liners** | - Reduces nitrogen concentrations in the surface water discharge and the environment between 30 to 40%. | - none |
| **MC6: Active/Passive Flocculation in TCP** | - Reduces total metals concentrations in the surface water discharge of TCP (Operations). | - No effect on seepage water quality<br>- No effect on dissolved POC concentrations |
| **MC7: In-situ Active GBR in MPs** | - Greatest reduction in selenium, nitrite, and nitrate concentrations in Tenas Creek.<br>- Some improvements in Four Creek water quality for selenium, nitrate, and nitrite.<br>- Reduce maximum concentration of nitrate, selenium, and nitrite at groundwater discharge from both West Management and Tenas Control Ponds. | - none |
| **MC8: Active treatment post TCP** | - Greatest improvement in surface water discharge concentration of identified POCs, including nitrate, nitrite, total selenium, dissolved nickel.<br>- Improvement in Goathorn Creek like MC7 for nitrite, nitrate, and selenium, but targets other POCs as well such as total molybdenum. | - Slightly worsens POCs concentrations in the groundwater seepage for EMP and TCP. |

# 4 BMP Evaluation

As discussed in Section 1.4, the merits and feasibility of implementing the mitigation controls that were considered BMPs are evaluated here, while the mitigation controls that were candidate BATs were evaluated as part of the BAT assessment (Appendix H).

In summary, the BMP mitigation controls include:

- MC1: Improve the robustness of the water covers in the management ponds and reduce loadings from submerged rock by increasing the Project's water inventory during freshet.
- MC4: Increase of process water intake to CPP plant.
- MC5: Addition of blasthole liners.

Based on the results presented in Section 3, only MC5 (blasthole liners) was considered suitable and feasible as a mitigation control. Reducing loss and dissolution of ANFO is a true source control measure that would reduce loadings of ammonia, nitrite, and nitrate in Project water on site. Mitigation Control 5 (blasthole liners) was therefore recommended to be introduced into the Final EAC Project Case (2024) for subsequent information request responses.

The water and load balance model results showed that the option of improving the robustness of the water cover in the management ponds would cause an apparent reduction in POC concentrations but only because of dilution by additional non-contact water during freshet. Since this option in effect amounts to the addition of fresh dilution water to the management ponds, it was not considered to be consistent with best management practices and was therefore not pursued. Additionally, the model results indicated that increasing the process water intake by the CPP would have no to little effect on the quality of Project water and was also therefore not included either in the Final EAC Project Case (2024).

Evaluation of the water quality mitigation controls that are candidate BATs are discussed in the BAT assessment report (**Appendix H**). This report will recommend if further changes to the Updated EAC Project Case (2024) are required for the Final EAC Project Case (2024).

If any mitigation control or combination thereof is selected for implementation in the Tenas water management strategy, additional modeling is required to consider the effects on the mixing zone in Goathorn Creek, as well as varied hydrologic conditions (i.e., low flows) and source terms, like the scenarios considered and presented in SRK 2022. This will be provided in the Final Water and Load Balance Report (SRK 2025) for the Final EAC Project Case (2024).

# 5 Conclusion

This report summarizes the performance of water quality mitigation controls in terms of improvements (or changes) to effluent water quantity and quality as well as changes to water quality and streamflow in creeks and rivers downstream of the Project. Results were produced using the Water and Load balance model (SRK 2025) and compared against the Updated EA Case (2024) which was used as the Base Case.

The mitigation controls were divided in two categories – Best Management Practices (BMP) and Best Achievable Technologies (BAT). BMP mitigation controls included addition of blasthole liners, improvement of water cover robustness by adding freshet flows to management and control ponds, as well as increased use of process water by CPP from the Project Area. BAT measures included the use of modified liners in the management and control ponds, Active/Passive flocculation in the Tenas Control Pond, In-situ Active Gravel Bed Reactors in the management ponds, as well as active water treatment of end-of-pipe effluent.

Of the BMPs, blasthole liners were recommended to be adopted by the Final EA Case (2024) as other BMPs yielded unchanged to marginally improved water quality. The results for the BATs were presented in this report, but final recommendations as to whether to incorporate these mitigation controls by the Final EA Case (2024) were addressed in the BAT report (Appendix H).

# Closure

This report, Effect of Mitigation Controls on Water Quality and Quantity of the Tenas Project, was prepared by

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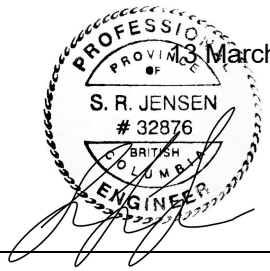


13 March 2025

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SRK Consulting (Canada) Inc Engineers and Geoscientist BC Permit to Practice No: EGBC 1003655

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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SRK. 2022. Tenas Project – Water and Load Balance Modeling Report. Prepared for Telkwa Coal Limited. 1CT027.003. February 2022.

# Appendix A Updated Water Quality Model Source Terms

FINAL. Prepared for : Telkwa Mining Ltd. Project number: CAPR0029337. Issued June. 2024. (SRK Consulting (Canada) Inc. 2024)

FINAL

# Updated Water Quality Model Source Terms

Tenas Project, British Columbia, Canada

Telkwa Mining Ltd.

SRK Consulting (Canada) Inc. ▪ CAPR002933 ▪ June 2024

srk consulting

**FINAL**

# Updated Water Quality Model Source Terms

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# Useful Definitions

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

| | |
|---|---|
| EMA | Environmental Management Act |
| EMP | East Management Pond |
| EOM | End of Mining |
| FS | Feasibility Study |
| HCT | Humidity cell testing |
| MA | Mines Act |
| Non-PAG | Non-potentially acid generating |
| NMP | North Management Pond |
| PAG | Potentially acid generating |
| TML | Telkwa Mining Limited |
| TSS | Total suspended solids |

# 1 Introduction

Telkwa Mining Ltd (TML) submitted an Environmental Assessment Certificate (EAC), application for the Tenas Project, located at the Telkwa Property, near the town of Telkwa, British Columbia in May of 2022. In support of the EA application, SRK Consulting (Canada) Inc. (SRK) developed geochemical source terms (SRK 2022a) that formed the basis for evaluating changes to water quality in downstream receptors. The source terms were based on humidity cell testing (HCT) results. In parallel to the geochemical characterization testing program that was used to support the EAC application, TML initiated a field barrel testing program in late 2019. Release rates from the barrel testing program were compared to the scaled results that formed the basis of the source terms that were developed to support the EAC application. The outcomes indicated that the scaled HCT release rates were underestimated for some constituents while overestimated for others. Updated source terms were developed using the barrel release rates to reflect release rates more accurately under field conditions.

This report describes the conceptual models, methods and assumptions used to derive the site water quality model source term inputs based on the field barrel testing results. The site wide water quality model development and results are described in SRK (2024a).

# 2 Project Background

## 2.1 Geological Setting

### 2.1.1 Bedrock Geology

The Tenas Project is located within the northeast/southwest trending Skeena Arch, which separates Jurassic-age sedimentary rocks of the Bowser Basin in the north from the Jurassic to Cretaceous-age sedimentary rocks of the Nechako Basin to the south. The coal-bearing sedimentary rock sequence of the Project is associated with the Lower Cretaceous age Skeena Group, and unconformably overlies the Jurassic-age Hazelton volcanic group, which will be below the proposed pit limit. A simplified stratigraphic column of the Project's deposit is presented in Figure 2-1.

#### Jurassic Hazelton Volcanic Group

The volcanic rocks include andesite, trachyte, and basalt with associated tuffs and breccias.

#### Lower Cretaceous Skeena Group

The Lower Cretaceous Skeena Group includes marine and continental sediments interbedded with coal seams, often correlated over long lateral distances. It is subdivided into four units (Units I through IV) and a unit of undivided sediments overlying the four units (Figure 2-1).

The economic coal seams in the Tenas area are located within Coal Zone 1 of Unit I and include two seams: C seam and 1 seam (upper and lower). Coal Zones 2 through 10, located in Unit III (Figure 2-1), are absent from the Tenas area. Units I through IV are summarized below.

- The Unit I consists of more than 100 m of fine to coarse-grained cross-bedded sandstone, conglomerate, siltstone, mudstone, and coal (coal zone 1). Overall, Unit I fines upward, from primarily conglomerate and sandstone to almost entirely carbonaceous mudstone, seatearth and coal (1A to 1G). The conglomerate and sandstone were deposited in braided channels and bars, and mudstone accumulated in floodplains. Thin coal seams formed in poorly drained, peat-forming backswamps, and seatearths formed under leaching conditions in less submerged areas. With denudation of the volcanic source area, braid plains were abandoned and extensive low-energy, peat-forming swamps were established, resulting in the formation of thick coal seams in the upper part of the Unit.
- The Unit II separates coal zone 1 and coal zone 2. It consists of up to 140 m of primarily monotonous silty mudstone, occasionally interbedded with beds of chert-rich, micaceous, bioturbated or cross-bedded sandstone. The sediments were deposited in a deltaic/shallow marine environment following a regional marine transgression. The mudstone accumulated in bays, and the sandstones in distributary channels and mouthbars. Locally, thin discontinuous peat beds formed in salt marshes.
- Unit III comprises about 90 m of chert-rich, micaceous sandstone, siltstone, and mudstone, and up to nine coal zones (coal zones 2 through 10). The sandstone and mudstone were deposited and biogenically reworked in a tidal flat environment; siltstone accumulated in a restricted, nearshore marine environment. Peat accumulated in freshwater coastal marshes which periodically prograded over tidal flats.

- Unit IV consists of approximately 150 m of a laterally extensive, bright green, chert-rich, chloritic sandstone or siltstone bed at the base, overlain by massive grey silty mudstone like that of Unit II. The basal sandstone is a transgressive lag deposit, and silty mudstone, the predominant lithofacies, was deposited in a quiet, nearshore, shallow marine environment.

#### Intrusions

Tertiary and Cretaceous-age porphyritic dykes and sills commonly intrude this sequence, the most notable of which includes a Tertiary granodiorite intrusion located on the north side of the Telkwa River. These intrusions are not present in the Tenas area.

#### Geological Structures

The sedimentary sequence in the Tenas area is folded into a syncline in which the gently (typically 10 to 20°) northeast-dipping western limb of the syncline subcrops on the western side of the pit area, while the moderately (40 to 45°) southwest-dipping eastern limb subcrops on the eastern side of the pit. Faulting is generally near-vertical, and can be subdivided into two main groups, one which strikes approximately northwest/southeast and the other which strikes approximately northeast/southwest. A few east/west striking faults have also been interpreted.

The Goathorn area is located within an outlier of the Lower Cretaceous Skeena Group. The structural geology is somewhat more complex than the Tenas area and is characterized by a complex series of sub-parallel north-south trending reverse faults, and to a lesser extent east-west, trending normal faults.

Northeast striking faults are related to emplacement of the Bulkley intrusions in the Late Cretaceous.

### 2.1.2 Surficial Geology

The surficial geology in the Project area consists primarily of two types of deposits, glacial clay- or silt-rich till, and sand and glaciofluvial sand and gravel outwash. At upper elevations and south of the proposed pit, the terrain is mapped as having bedrock outcrops to a limited extent or thin mantles of clay- and silt-rich tills deposits, between 3 m and 10 m thick. North of the proposed pit and towards Tenas Creek and Goathorn Creek, drillholes report thin mantles of clay- and silt-rich tills deposits, between 3 m and 10 m thick underlain by a thick sand and gravel outwash deposit that can exceed 100 m.

Other types of deposits are present locally. Patches of glaciolacustrine deposits are scattered throughout the morainal landscape in low ridges and in depressions; the sediments comprise bedded and laminated mud, and minor sand and gravel (Clague 1984). Recent fluvial deposits form the narrow floodplains of Goathorn Creek and Tenas Creek, which are 40 m to 80 m deep incised into the subdued morainal landscape, and the wide floodplains of the Telkwa and Bulkley Rivers. The fluvial deposits range from extremely coarse, poorly sorted gravel on steep alluvial fans to moderately to well-sorted sand and mud on low-gradient floodplains (Clague 1984).

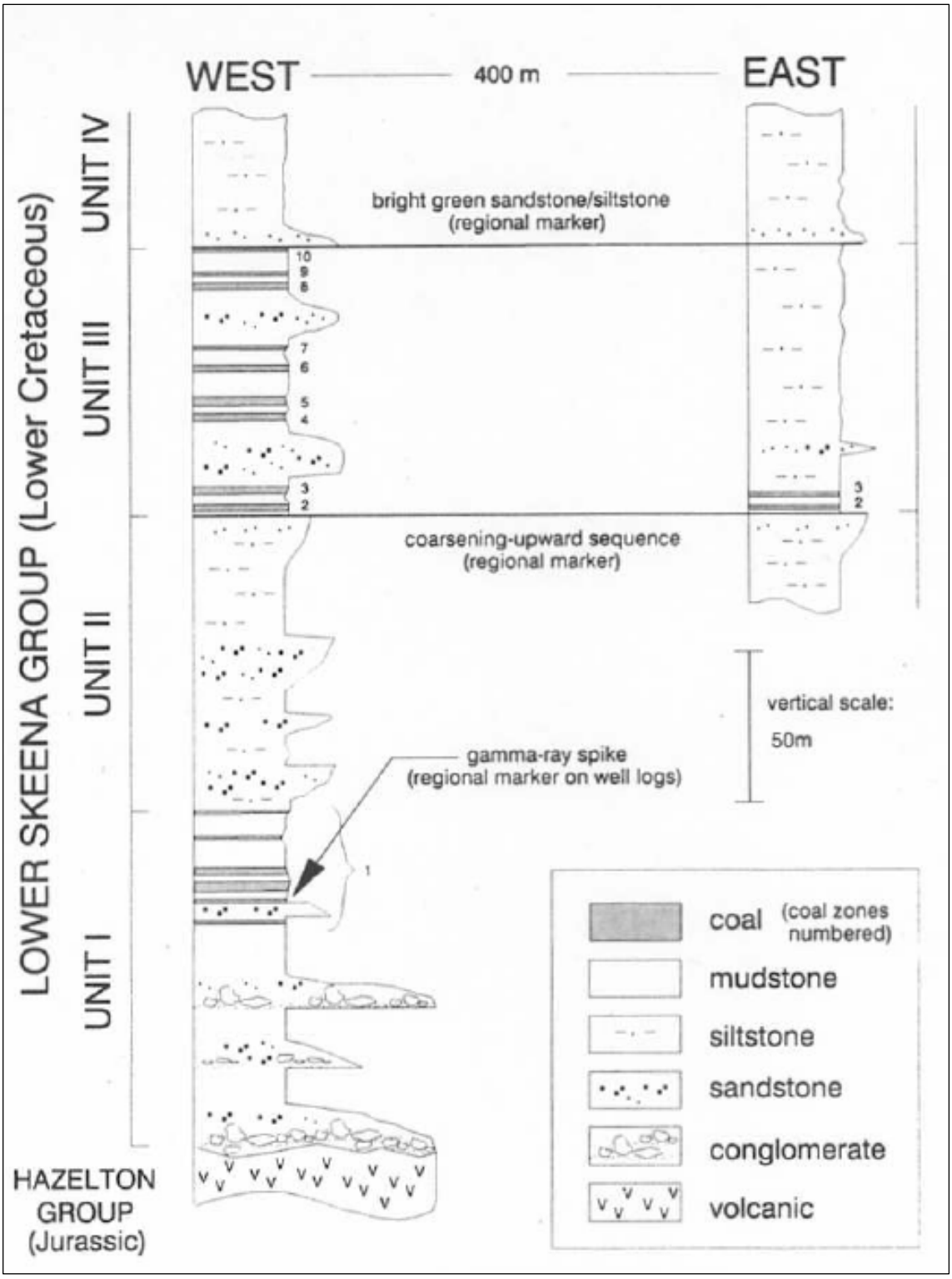



**Figure 2-1. Stratigraphic Sequence of Lower Cretaceous Skeena Group Sediments.**

Source: Telkwa Coal Ltd.

### 2.1.3 Material Zone Designations

Geochemical properties are stratigraphically constrained in coal deposits versus lithologically constrained. For example, the deposition environment of the Tenas Deposit includes marine and deltaic sedimentary sequences and rocks formed in these two different environments will be compositionally different. The deposit was demarcated into stratigraphic zones of sedimentary sequences between the mineable coal seams. The stratigraphic zones were further divided into additional zones if they had different distinct geochemical properties (e.g., Zone 1 and Zone 1a) or grouped if geochemical properties were similar between zones identified between coal seams (e.g., Zone 2 and Zone 3). The stratigraphic zones and classification of PAG and non-PAG based on an NPR of 2.0 identified for the Project are presented in Figure 2-2.

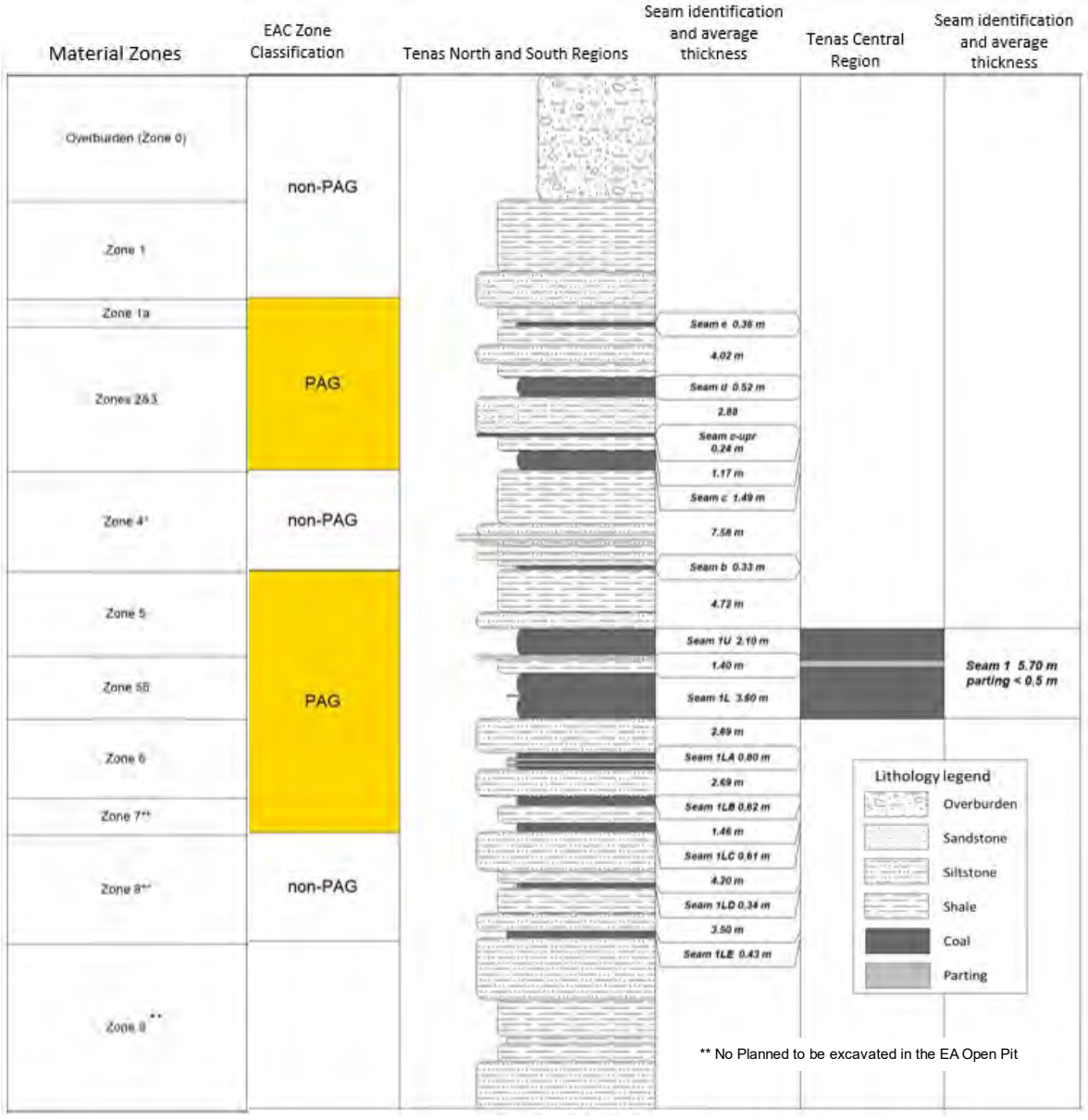



**Figure 2-2. Tenas Deposit Stratigraphic Zones**

## 2.2 Geochemical Characterization Study

Two geochemical studies have been completed to characterize the acid generating and metal leaching potential of the Tenas deposit:

- Norecol Dames and Moore (1999). Draft Report. Assessment of ARD Potential and Water Quality Predictions. Telkwa Coal Project.
- SRK (2022b). Telkwa Coal – Tenas Project Supplemental Geochemical Characterization.

The Norecol Dames and Moore (1999) study included the collection and analysis of over 700 samples. An additional 173 samples were collected as part of the supplemental geochemical characterization study (SRK 2022b). The supplemental samples were used to confirm the results of the 1999 study and correlate the test results to more up-to-date testing methods. For example, samples collected as part of the Norecol Dames and Moore (1999) study were analyzed for total sulfur only and neutralization potential was determined using the Sobek-NP (1978) method. Results from both studies were combined to form a robust geochemical characterization that is reported in SRK (2022b). The reader is referred to SRK (2022b) for additional detail on the geochemical characterization program including sample selection, collection, testing and results.

The outcomes of these studies indicated that a large volume of the rock to be mined from the Tenas deposit is potentially acid generating (PAG) and that acid generating potential is stratigraphically constrained in zones generally separated by coal seams. The geochemical properties of the deposit were therefore described based on mineable stratigraphical zones. The geochemical testing results indicate that all zones contain some PAG rock; however, there are units that are predominantly PAG versus non-PAG. Based on the site-specific neutralization potential ratio of 2.0 (NPR) and the average bulk geochemical properties, the following zones were characterized as PAG and non-PAG:

- Non-PAG: Zone 1, 4 and 8;
- PAG: Zones 1a 2/3, 5, 55, 6 and 7.

The geochemical characterization results also indicate that coarse and fine processed rock are PAG and overburden samples tested are non-PAG, including construction materials.

## 2.3 Summary of Mine Material Management Plan

Mining of the Tenas deposit will produce mine rock and processed rock materials. Previous geochemical testing (Norecol Dames & Moore 1999) indicates that the coarse and fine processed rock and a component of the mine rock will be PAG, and management will be required. Management of mine rock and coarse and fine processed rock are summarized in the following sections.

### 2.3.1 Management of PAG Rock

In advance of, and during mining, TML proposes to progressively construct Management Ponds with a combination of excavation and embankments with buttresses (Figure 2-3). The purpose of the management ponds is to store PAG and processed rock in saturated conditions preventing sulfide oxidation, limiting acidic drainage from occurring. Three management ponds will be constructed including the North, West and East Management Ponds. The North Management pond will be constructed first and is located north of the West Management Pond and is external to the open pit. The East Management is constructed next and is south of the NMP and external of the open pit. The last management pond, which is the West Management Pond which is constructed from a combination of excavation for the open pit for the North Phase and construction of an embankment external to the open pit.

PAG rock will first be placed in North Management Pond. PAG rock will be progressively placed in lifts and flooded as each lift is completed so that exposure of rock to atmospheric oxygen is minimized. TCL is proposing to place PAG rock including processed rock underwater before it becomes acid generating.

Once the storage capacity of the pond has been reached, storage will begin in the East Management pond and then the West Management Pond. The three management ponds will be independent of one another allowing different water levels and PAG material levels in each of the ponds as conditions require. The Management Ponds will be maintained with at least a two-metre water cover once PAG material disposition has been completed.

### 2.3.2 Management of non-PAG Rock and Overburden

Non-PAG rock will be used to progressively backfill the open pit during operations and for constructing portions of the embankments and buttresses for the Management Ponds and Control Ponds. Some non-PAG rock will also be used to cap PAG material in the management ponds once the PAG material has reached its design elevation. Non-PAG rock will be placed in lifts into water, keeping the water level at least 1 metre above PAG rock and at or below the non-PAG placement platform. A 1.5 metre thickness was selected for non-PAG as this is below the expected change in water levels during the Post-closure phase so that this material is never above water.

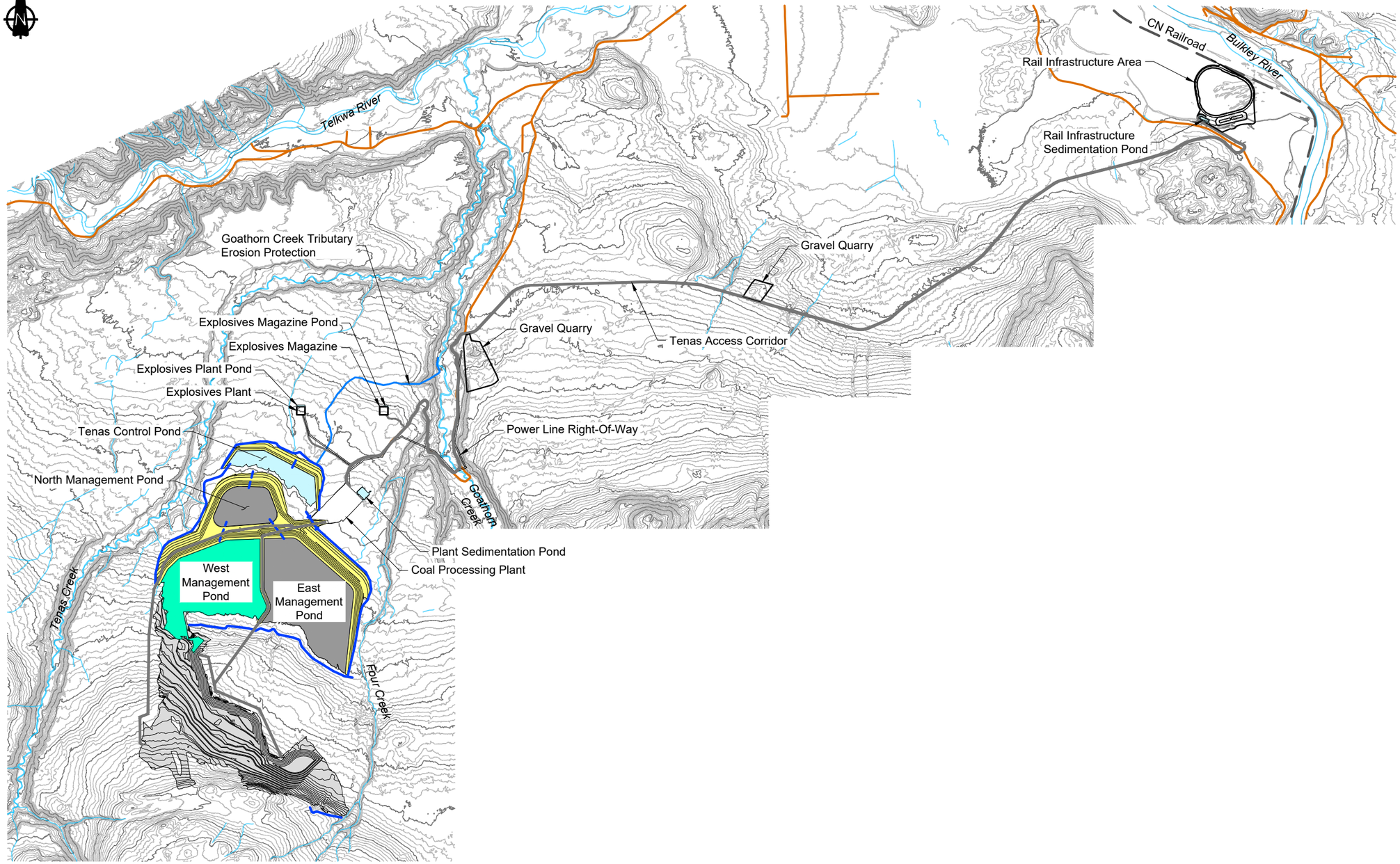
Overburden will be stored in the buttresses during operation and used as a cover material over non-PAG rock placed in the management ponds.

### 2.3.3 Management of Processed Rock

Coarse and fine processed rock materials are expected to be PAG and will also be placed in the Management Ponds with the PAG rock (Figure 2-3).

### 2.3.4 Open Pit Walls

Most of the open pit will be backfilled during the Operation phase. However, a small portion of the hanging wall will exist at post-closure. Meteoric water contacting the open pit walls will report to the end pit lakes, with one of them draining northwards by gravity and mix with Management Pond water prior to discharging into the surrounding environment while the other one discharges to Four Creek once its water quality meets regulatory requirements.  Until this time, this end pit lake also drains toward the north.




## LEGEND

- Water Management Feature
- Spillway
- Existing Watercourse
- Existing Road
- Proposed Road
- Dams and Buttresses
- Sedimentation Pond
- Active Management Pond
- Backfill / NAG Pile
- Covered Inactive Management Pond

## NOTES

1. Contours shown at 5.0m intervals.
2. All dimensions shown in meters unless otherwise stated.
3. Pile designs by SRK Consulting Ltd.

## REFERENCE

NAD83 UTM Zone 9.

0m 500 1000 1500 2000

srk consulting

TELKWA MINING LIMITED

Geochemical Source Terms

Mine Site Facilities

SRK JOB NO.: CAPR002933

FILE NAME: 1CT027.003 Overview.dwg

Tenas Project

DATE: 2024/05/1

APPROVED: MH

FIGURE: 2-3

\\srk.ad\DFS\vancan\Projects\01_SITES\Telkwa Coal\1040_AutoCAD\Water Management\1CT027.003 Overview.dwg

# 3 Conceptual Model

## 3.1 Unsaturated Mine Rock & Processed Rock

Pyrite ($FeS_2$) is the main sulfide mineral in PAG rock and processed rock at the Project (SRK 2022b). Under natural conditions, pyrite is stable in bedrock where it is isolated from atmospheric oxygen. However, following blasting and excavation of the bedrock, pyrite in the rock mined will be exposed to atmospheric oxygen prior to being placed in the management ponds and will begin to oxidize producing sulfate, ferrous iron, and acidity (Rxn1).

$$FeS_{2\,(s)} + \frac{7}{2}O_{2\,(g)} + H_2O_{\,(l)} \leftrightarrow Fe^{2+}{}_{(aq)} + 2SO_4{}^{2-}{}_{(aq)} + 2H^+{}_{(aq)} \text{ (Rxn 1)}$$

Under oxidizing conditions, ferrous iron liberated during sulfide oxidation will subsequently oxidize to ferric iron in neutral pH producing additional acidity according to the following reaction:

$$Fe^{2+}{}_{(aq)} + \frac{1}{4}O_{2\,(g)} + 2\frac{1}{2}H_2O_{\,(l)} \leftrightarrow Fe(OH)_{3\,(s)} + 2H^+{}_{(aq)} \text{ (Rxn 2)}$$

Although oxidation of mine rock and processed rock for the Project will release acidity, acidic conditions are not predicted to occur immediately since these materials also contain carbonate minerals that will neutralize the acid according to the following reactions:

$$CaCO_{3(s)} + H^+{}_{(aq)} \leftrightarrow HCO_3{}^-{}_{(aq)} + Ca^{2+}{}_{(aq)} \text{ (Rxn 3)}$$

$$CaCO_{3(s)} + 2H^+{}_{(aq)} \leftrightarrow H_2CO_{3(aq)} + Ca^{2+}{}_{(aq)} \text{ (Rxn 4)}$$

Depletion calculations (SRK 2022b) indicate that the lag times to acid generation are on the order of years (>5 years based on the average bulk rock properties). The lag time to acid generation prediction based on HCTs was confirmed by the barrel testing results. Barrel 6, which is a composite sample of rock from Zones 6 and 7, became acid generating in October 2023, four years after the barrel program was initiated. SRK (2022b) indicated that these zones were non-PAG based on their average bulk geochemical properties. However, the weighted barrel 6's NPR (0.5) was more closely aligned with the minimum and P5 NPR observed for these zones (see Table 4 in SRK (2022b)). The lag times to the onset of acid generation based on the Zone 6 and 7 minimum NPRs ranged from 3 to 5 years.

TML proposes to place PAG rock identified by verification testing and processed rock in the management ponds under saturated conditions within an average of six months after blasting but no more than 12 months. Theoretically, this will limit sulfide oxidation (i.e., oxygen becomes a limited reactant in reaction 1 limiting oxidation of the PAG rock and coarse and fine processed rock precluding acidic conditions at the Project. However, any oxidation products that are produced prior to placement of PAG rock and processed rock underwater will be flushed and dissolve in water stored in the management ponds.

At closure TML will cap saturated PAG rock and coarse and fine processed rock in the management ponds with non-PAG rock. The non-PAG rock will be below the active water level in the management ponds and will be saturated. Any oxidation products that have accumulated on non-PAG rock surfaces will also be flushed when the rock is placed in the management pond.

## 3.2 Unsaturated Non-PAG Rock

Non-PAG rock that is not used in the management pond cover will be used to backfill the open pit and used in portions of the embankments and buttresses with approximately 50% remaining unsaturated in

post-closure. Under these conditions, the rock will continually oxidize according to Reaction 1 (see Section 3.1) producing oxidation products that will be dissolved in meteoric water contacting the rock. However, non-PAG rock contains more neutralization potential than acid generating potential and the sulfide is predicted to be consumed prior to the neutralization potential (SRK 2022b) and acidic drainage from exposed non-PAG rock will not occur. The non-PAG rock will provide a continuous source of element load under neutral conditions.

## 3.3 Overburden

Overburden that is stripped during mining will be mixed with unsaturated waste rock for use in the buttresses and open pit backfill. Overburden has been characterized as having low sulfur content (SRK 2022b) and is classified as non-PAG. The small amount of sulfide in the overburden will oxidize according to Reaction 1 producing oxidation products that will be solubilized by incident precipitation. Like unsaturated waste rock, the overburden will provide a continuous source of element load that is soluble under neutral conditions.

## 3.4 Open Pit Wall Rock Runoff

Mining of the Tenas Project will result in open pit walls that are exposed to atmospheric oxygen until they are progressively covered with non-PAG rock and/or overburden during the Operation phase with any remaining uncovered open pit walls being covered in the Decommissioning and Reclamation phase. Sulfides that are present in the open pit wall rock will oxidize according to reaction 1 (Section 3.1) producing sulfate, acidity, ferrous iron, and release of trace chalcophile elements. Soluble oxidation products will be flushed from exposed open pit wall surfaces in meteoric water contacting the wall rock.

The open pit will be progressively backfilled with non-PAG rock and/or overburden during operations reducing the exposure of open pit wall to atmospheric oxygen. Oxidation of open pit wall rock that is covered with backfill will be reduced by limiting oxygen ingress.

At closure, two end pit lakes will form in the backfilled open pit. A footwall will exist above the end pit lakes composed mainly of Zone 6 sedimentary rock. Based on the site-specific NPR criterion (2.0), this unit PAG; however, as discussed in Section 2.3.4, the majority of the exposed pit walls will be covered. The end pit lake will be a mixture of wall rock runoff, direct precipitation and runoff from non-PAG backfill.

The pit lake will drain by gravity and mix with the Management Pond before being discharged during closure.

## 3.5 Processed Coal Stockpile Runoff

Processed coal will be temporarily stored at the Rail Infrastructure area in two stockpiles prior to being transported from the site to Ridley terminals. While the processed coal is stored, it will oxidize but long-term oxidation is not a concern since processed coal will only be stored for short durations prior to being loaded into rail cars. Soluble load from the processed coal stockpiles will be collected in the Rail Infrastructure Sedimentation Pond to allow suspended solids to settle.

# 4 Source Term Derivation Methods

Consistent with SRK (2022b), source terms using the barrel testing results were developed in two ways: concentrations and load flushing rates. Unsaturated mine rock, overburden and wall rock runoff source terms were expressed as concentrations. Concentrations were estimated by scaling barrel testing results and mixing estimated annual loads in predicted annual volumes of water and evaluating if the predicted concentrations would be limited by secondary mineral precipitation. PAG rock, coarse and fine processed rock and some non-PAG rock will be stored permanently underwater in the management ponds. Solute produced through oxidative weathering once these materials have been exposed will be flushed from rock surfaces when they are placed in the management ponds. The source term for these materials is therefore represented by a flushing term in milligrams per bank cubic metre (mg/bcm) of rock, also estimated using scaled barrel testing results.

Processed rock (e.g., coal and rejects) barrels were not constructed since there was insufficient material available. Source terms for coal and rejects have therefore not been updated. The reader is referred to SRK (2022a) for the coal and reject source terms. The particulate concentrations source term has also not been updated since it is independent of kinetic testing release rates (i.e., it was derived based solid-phase static testing results) and is not included in this report. The reader is referred to SRK (2022a) for details on the derivation methods and results of these source terms.

The following subsections provide the inputs and assumptions for each of the source terms based on the barrel testing results.

## 4.1 Mine Rock Solute Release Rates

A key input into the source term calculations is the mine rock solute release rates. Barrels were constructed from rock representative of each rock zone and the barrel release rates were used to represent the release rates from individual rock zones. Composite samples for each barrel were prepared from excess sample stored at Bureau Veritas Laboratories in Burnaby, British Columbia. Sample, varying in mass from one to 110 kg were selected for use in the barrels until a minimum mass of 200 kg was achieved. Zones with insufficient sample mass to achieve 200 kg (e.g., Zone 4 PAG and Zone 4 non-PAG) were supplemented with sample from other zones with similar geochemical properties (SRK 2024b).

Leachate sampling from the barrels has been conducted intermittently since October 2019 until present. The source terms only consider samples collected until November 2023. Seven to nine samples have been collected from each barrel during this period. The monitoring results from these sampling events was used to estimate barrel release rates according to the following formula:

$$L_j = C_j * \frac{V}{m} / t \qquad \text{(EQ 1)}$$

Where:

$L_j$ is the load of parameter j expressed in mg/kg/week

$C_j$ is the concentration of parameter j in the leachate sample in mg/L

V is the volume of the sample in L

m is the total mass in the barrel in kg

t is the time between sample events in weeks

The average release rate calculated from each sampling event was used in the source term calculations. As noted in Section 3.1, Barrel 6 began to produce acidic leachate in October 2023. Release rates from this sampling event were not included in the average barrel release rate calculations since the conceptual model for the Project is rock will be managed to minimize acid generation and release rates under acidic conditions are not expected to occur.

As noted above, the barrels were constructed of crushed drill core. This results in the barrel samples having a higher reactive surface area in comparison to rock that will be blasted and used in the pit backfill or construction of the buttresses. Scaling factors were applied to the barrel release rates to account for this difference. Details of the scaling factors that were used are discussed in the following subsections.

## 4.2 Unsaturated Mine Rock and Overburden

### 4.2.1 Base Case Source Term

Unsaturated non-PAG rock and overburden will be used as backfill in the open pit as well as in construction of the management pond buttresses. The backfill will become partially saturated as the open pit floods at closure. Unsaturated portions of the backfill will continue to oxidize and produce soluble load that will be mobilized in meteoric water interacting with the mine rock.

Annual unsaturated mine rock concentrations were estimated as follows:

$$C_{j=\frac{L_{j,annual}}{Q_{annual}}} \quad \text{(Eq 2)}$$

Where: $C_j$ is the concentration of constituent j

$L_{j,annual}$ is the annual load of constituent j released from exposed mine rock and/or overburden

$Q_{annual}$ is the annual average flow contacting exposed mine rock and overburden

Source term concentrations using Equation 2 were estimated for the following timeframes:

- Pit Backfill
  - End of East Management Pond (EMP)
  - End of Mining (EOM)
- Buttresses
  - End of North Management Pond (NMP)
  - End of EMP
  - End of West Management Pond (WMP)

These periods were selected to evaluate changes to water quality throughout the life of mine (LOM) at key stages of the mine development. In the source term calculations, mine rock and overburden present in the above timeframes was assumed to be unsaturated and produce soluble load. In reality, a portion of the waste rock will become inundated as the pit is progressively backfilled. This assumption results in a conservative estimate of the pit backfill and buttress drainage water quality.

The mine plan indicates that the buttresses will be constructed using overburden and mine rock sourced from Zones 1 and 4. Table 4-1 provides a summary of the cumulative mine rock and overburden volumes and tonnages associated with each of the model timeframes. Mine rock tonnages were estimated using an assumed density of 2.55 grams per bank cubic centimetre (g/bcc) and a density of 2.0 g/bcc was assumed to estimate overburden tonnages (TML 2024, pers. comm.). The respective barrel release rates were prorated in proportions estimated based on the volumes provided in Table 4-1 to estimate the unit solute release rates for the backfill and buttresses at each of the model timeframes. This rate was multiplied by the total mass at each timeframe to estimate the annual load produced.

As noted in Section 4.1, scaling factors were applied to the barrel release rates to account for testing and operational field differences. A generic scaling factor of 0.2, based on SRK's experience at other coal mines in British Columbia, was applied to account for grain size differences between the barrel tests and mine rock that will be produced during operations. Channelization and temperature scaling factors, which were applied to the HCT release rates (SRK 2022b), were not applied to the barrel release rates. Due to the size of the tests, the barrels will have a higher degree of flushing in comparison to rock stored in the backfill and in the buttresses and additional channelization is expected to occur under operational conditions. It is difficult to quantify the degree of flushing in the barrels and a channelization factor was conservatively not included in the barrel release rate estimates.

The barrels only contain 200 kg of material and will therefore be more susceptible to temperature variations in comparison to the rock and overburden used in the backfill and buttresses which will exhibit internal heating from sulfide oxidation. However, the average temperature of the water samples collected from the barrel tests was approximately 10°C. It is assumed a similar internal temperature will occur in the mine rock backfill and buttresses from oxidation of sulfide minerals and carbonaceous rock and release rates were therefore not corrected for temperature differences.

**Table 4-1. Summary of Unsaturated Mine Rock & Overburden Quantities**

| Facility | Cumulative Volume (bcm) | | | Cumulative Tonnage (Mt) | | |
|---|---|---|---|---|---|---|
| | Mine Rock | | Overburden | Mine Rock | | Overburden |
| | Zone 1 | Zone 2 | | Zone 1 | Zone 2 | |
| **Backfill** | | | | | | |
| End of EMP | 279,370 | 812,529 | 500,000 | 0.7 | 2.7 | 1.0 |
| EOM | 13,194,743 | 6,667,067 | 8,727,775 | 34 | 17 | 17 |
| **Buttresses** | | | | | | |
| End of NMP | 706,410 | --- | 2,302,531 | 1.8 | --- | 4.6 |
| End of EMP | 2,043,701 | --- | 5,753,394 | 5.2 | --- | 12 |
| End of WMP | 3,621,260 | --- | 10,666,841 | 9.2 | --- | 21 |

Source: https://srk.sharepoint.com/sites/NACAPR002933/Internal/Task 500 Source Term Updates/01_Source_term_updates/[Telkwa_backfill_buttress_volume_summary_CAPR002933_mkh_r0.xlsx

The annual scaled release rate was divided by the annual average volume of water contacting unsaturated mine rock (SRK 2024a) using Equation 2 to estimate the annual average constituent concentrations in drainage from unsaturated mine rock and overburden. Predicted water qualities were entered into the publicly available speciation and mass transfer code PHREEQC v.3 (Parkhurst and Appelo 1999), developed by the United States Geological Survey (USGS), to evaluate mineral and gas phases that were supersaturated in solution. The mineral and gas phases included in the model are presented in Table 4-2. Supersaturated mineral phases were allowed to precipitate from solution and

sorption to ferrihydrite was also considered using the default values of Dzombak and Morel (1990). Sorption to ferrihydrite will limit parameters that form oxyanions (e.g., arsenic) and other ligands from remaining in solution.

**Table 4-2. Model Equilibrium Phases**

| Mineral | Empirical Formula | Mineral | Empirical Formula | Mineral | Empirical Formula |
|---|---|---|---|---|---|
| Carbon Dioxide | $CO_2$ (g) | Chalcanthite | $CuSO_4 \cdot 5H_2O$ | Calcium Molybdenum Oxide | $CaMoO_4$ |
| Gibbsite | $Al(OH)_3$ | Ferrihydrite | $Fe(OH)_3$ | Nickel Hydroxide | $Ni(OH)_2$ |
| Otavite | $CdCO_3$ | Melanterite | $FeSO_4 \cdot 7H_2O$ | Zinc Hydroxide | $Zn(OH)_2$ |
| Brochantite | $Cu_4SO_4(OH)_6$ | Anglesite | $PbSO_4$ | Smithsonite | $ZnCO_3$ |
| Copper Hydroxide | $Cu(OH)_2$ | Birnessite | $MnO_2 \cdot nH_2O$ | Goslarite | $ZnSO_4 \cdot 7H_2O$ |
| Malachite | $Cu_2(CO_3)(OH)_2$ | Manganite | MnO(OH) | Gypsum | $CaSO_4 \cdot 2H_2O$ |
| Azurite | $Cu_3(CO_3)_2(OH)_2$ | Lead Molybdenum Oxide | $PbMoO_4$ | | |

### 4.2.2 High Case Source Term

To account for variability in the source term inputs, a high case source term was developed. The high case source term was estimated by increasing sulfate concentrations to concentrations that are in equilibrium with gypsum (i.e., sulfate concentrations are assumed to be saturated in solution) under the assumed pH and redox conditions. Equilibrium with gypsum was achieved by incrementally adding anhydrite ($CaSO_4$) to the predicted base case solution (Section 4.2.1) until sulfate concentrations reached steady state. Concentrations of other elements were scaled up in the high source term by preserving the metal sulphate ratios ($M/SO_4$) in the base case source term. A key assumption in this approach is that elements in the solution are chalcophile which could result in an overprediction of non-chalcophile elements. Mineral saturation was evaluated by equilibrating the high case unsaturated mine rock water quality with the same mineral phases (Table 4-2) as the base case solution.

## 4.3 Saturated Mine Rock

### 4.3.1 PAG Rock Flushing Source Term

PAG rock produced during mining of the Tenas deposit will be permanently stored in saturated conditions in the management ponds. Placement of PAG rock in the management ponds will result in flushing of oxidation products accumulating on the surfaces of the PAG following exposure during mining. A unit annual flushing rate, in kilograms per tonne of rock (kg/tonne), was estimated by proportioning scaled barrel solute release rates (Section 4.1) in the relative proportion of each zone to be mined in each year (Table 4-3). The same grain size factor used to estimate loadings from unsaturated waste rock (Section 4.2.1) was applied to estimate the mass flushed from PAG rock.

A key input to the PAG rock flushing source term is the exposure time prior to placement in the management ponds. TCL proposes to have PAG rock including processed rock placed in the management ponds within an average of six months which was used when developing the PAG rock flushing source term. Like the unsaturated mine rock source term, a high case was also developed where PAG mine rock was assumed to be exposed for 12 months.

**Table 4-3. Annual PAG Rock Volumes and Relative Proportions**

| Year | Mine Rock Volume (bcm) | | | | | | | | Mine Rock Proportion | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Zone 1a | Zone 2 | Zone 3 | Zone 4 (PAG) | Zone 5 | Zone 55 | Zone 6 | Total | Zone 1A | Zone 2 | Zone 3 | Zone 4 (PAG) | Zone 5 | Zone 55 | Zone 6 |
| -0.5 | --- | --- | --- | 77,481 | 120,526 | 129,135 | --- | 327,142 | --- | --- | --- | 0.24 | 0.37 | 0.39 | --- |
| 0 | --- | 101,036 | 116,673 | 276,461 | 270,055 | 271,264 | 178,523 | 1,214,012 | --- | 0.083 | 0.096 | 0.23 | 0.22 | 0.22 | 0.15 |
| 1 | --- | 179,056 | 229,804 | 620,602 | 320,738 | 99,933 | 99,320 | 1,549,453 | --- | 0.12 | 0.15 | 0.4 | 0.21 | 0.064 | 0.064 |
| 2 | 21,889 | 285,673 | 321,699 | 472,335 | 345,853 | 151,588 | 112,489 | 1,711,526 | 0.013 | 0.17 | 0.19 | 0.28 | 0.2 | 0.089 | 0.066 |
| 3 | 27,407 | 155,626 | 308,582 | 663,762 | 353,038 | 165,727 | 94,900 | 1,769,042 | 0.015 | 0.088 | 0.17 | 0.38 | 0.2 | 0.094 | 0.054 |
| 4 | 130,618 | 312,373 | 397,354 | 613,605 | 290,367 | 160,116 | 75,573 | 1,980,006 | 0.066 | 0.16 | 0.2 | 0.31 | 0.15 | 0.081 | 0.038 |
| 5 | 68,844 | 381,138 | 593,269 | 214,295 | 250,877 | 182,880 | 79,710 | 1,771,013 | 0.039 | 0.22 | 0.33 | 0.12 | 0.14 | 0.1 | 0.045 |
| 6 | 52,353 | 327,938 | 705,510 | --- | 321,128 | 178,341 | 175,380 | 1,760,650 | 0.03 | 0.19 | 0.4 | --- | 0.18 | 0.1 | 0.10 |
| 7 | 18,042 | 198,457 | 378,872 | --- | 378,932 | 89,907 | 66,893 | 1,131,103 | 0.016 | 0.18 | 0.33 | --- | 0.34 | 0.079 | 0.059 |
| 8 | 37,018 | 388,733 | 629,396 | --- | 439,200 | 71,890 | 151,249 | 1,717,486 | 0.022 | 0.23 | 0.37 | --- | 0.26 | 0.042 | 0.088 |
| 9 | 55,727 | 316,821 | 466,150 | --- | 428,117 | 74,035 | 97,842 | 1,438,692 | 0.039 | 0.22 | 0.32 | --- | 0.3 | 0.051 | 0.068 |
| 10 | 98,303 | 381,613 | 547,361 | 238,780 | 386,869 | 55,623 | 148,670 | 1,857,219 | 0.053 | 0.21 | 0.29 | 0.13 | 0.21 | 0.03 | 0.08 |
| 11 | 76,587 | 223,829 | 298,043 | 569,289 | 532,297 | 16,062 | 116,153 | 1,832,260 | 0.042 | 0.12 | 0.16 | 0.31 | 0.29 | 0.0088 | 0.063 |
| 12 | 308,172 | 257,049 | 167,938 | --- | 264,424 | 29,924 | 119,692 | 1,147,199 | 0.27 | 0.22 | 0.15 | --- | 0.23 | 0.026 | 0.1 |
| 13 | 146,459 | 198,589 | 397,430 | --- | 523,609 | --- | 61,069 | 1,327,156 | 0.11 | 0.15 | 0.3 | --- | 0.39 | --- | 0.046 |
| 14 | 325,128 | 307,724 | 365,342 | --- | 495,915 | --- | 95,471 | 1,589,580 | 0.2 | 0.19 | 0.23 | --- | 0.31 | --- | 0.06 |
| 15 | 201,789 | 146,756 | 226,844 | --- | 481,190 | --- | 102,576 | 1,159,155 | 0.17 | 0.13 | 0.2 | --- | 0.42 | --- | 0.088 |
| 16 | 377,112 | 302,140 | 282,975 | --- | 186,028 | 36,948 | 55,034 | 1,240,237 | 0.3 | 0.24 | 0.23 | --- | 0.15 | 0.03 | 0.044 |
| 17 | 162,336 | 261,355 | 238,266 | 419,874 | 434,193 | 49,875 | 136,393 | 1,702,292 | 0.095 | 0.15 | 0.14 | 0.25 | 0.26 | 0.029 | 0.08 |
| 18 | 55,193 | 165,578 | 202,373 | 386,347 | 183,975 | 143,569 | 69,979 | 1,207,014 | 0.046 | 0.14 | 0.17 | 0.32 | 0.15 | 0.12 | 0.058 |
| 19 | 33,669 | 271,177 | 390,325 | 437,687 | 185,176 | 101,005 | 55,193 | 1,474,232 | 0.023 | 0.18 | 0.26 | 0.3 | 0.13 | 0.069 | 0.037 |
| 20 | --- | --- | --- | 495,776 | 188,053 | 102,575 | 135,720 | 922,124 | --- | --- | --- | 0.54 | 0.2 | 0.11 | 0.15 |
| **Total** | 2,196,646 | 5,162,661 | 7,264,206 | 5,486,294 | 7,380,560 | 2,110,397 | 2,227,829 | 31,828,593 | 0.07 | 0.16 | 0.23 | 0.17 | 0.23 | 0.07 | 0.07 |

Source: P:\01_SITES\Telkwa Coal\1CT027.007_2021 Geochemistry Support\Task 500 - Source Term Memo\Tenas_source_term_rpt_tables_1ct027.007_MKH_r1.xlsx

### 4.3.2 Non-PAG Rock Flushing Source Term

As PAG material reaches its designed elevation, non-PAG rock will then be placed in lifts above the saturated PAG. Once this lift is completed, overburden is then placed in a maximum of a 3 metre lift to form dry land reclamation. Surface soils will then be placed in a lift thickness of approximately 30 centimetres. The non-PAG rock will be placed in aqueous conditions and the majority of the overburden will be unsaturated. Oxidation products that have accumulated on the non-PAG mine rock following exposure during mining will be flushed from the surfaces as the rock is placed in the management pond.

TML proposes to use non-PAG rock source from Zone 1 in the management pond cover. A unit flushing rate, in kg/tonne, was estimated by scaling the Zone 1 average barrel release rates results to account for differences between testing and operational field conditions. The same scaling factor used to estimate the PAG rock flushing term was applied (i.e., grain size factor). Flushing rates were estimated for six- and 12-month exposure periods.

### 4.3.3 Flooded non-PAG Rock Backfill

Approximately 50% of the non-PAG rock in the backfill will become flooded in Post-closure. Mass that accumulates in the backfill will be flushed during flooding. As discussed in Section 4.2.1, unsaturated mine rock is not assumed to have a channelization factor and is assumed to have a high leaching efficiency since there is uncertainty in quantifying the degree of channelization in the barrel tests. This provides a conservative estimate of the drainage quality from unsaturated materials, but no mass accumulation will occur using this approach. Therefore, flushing of submerged mass is not accounted for in the source terms.

The water balance model (SRK 2021) indicates there is no hydraulic connection of water stored in the flooded backfill to the management ponds. However, a small volume of the flooded backfill water will report to the groundwater system. Water balancing modelling indicates that the water losses from the flooded backfill represent less than one percent (i.e., 0.4%) of the total flow to the groundwater system. As noted above, there is a high degree of uncertainty in estimating the residual load that will be flushed from the flooded backfill and since the flow is effectively negligible to other flows, a source term was not developed for the flooded non-PAG rock backfill.

## 4.4 Wall Rock Runoff

Exposed wall rock surfaces will produce oxidative load that will be flushed by meteoric water. An annual pit wall drainage water quality was estimated using equation 2; however, in this instance $L_{j,annual}$ is the annual load of constituent j released from exposed wall rock surfaces and $Q_{annual}$ is the annual average flow contacting the exposed wall rock. TML proposes to progressively backfill the open pit during operations. This will continually change the areas of rock exposed in the pit walls. To evaluate changes to the wall rock runoff composition, source terms were developed for the following time periods, which correspond to backfilling of different areas and volumes placed in the open pit:

- End of placement of PAG rock in the North Management Pond (NMP)
- End of placement of PAG rock in the East Management Pond (EMP)
- End of the Operation Phase (EOM)

The reactive mass of each stratigraphic zone in the open pit walls was estimated by multiplying the exposed surface area of each of the zones in the open pit walls by an assumed depth of fractured rock for each of the above time periods. Surface areas for each time period are provided in Table 4-4. The fractured rock depth was assumed to be two metres for blasted areas and five centimetres for free dig areas and the floor of the pit. A density of 2.55 g/cc was assumed to estimate the reactive mass exposed in the pit walls.

The average release rates from each barrel were prorated in relative proportions calculated based on the exposed surface areas (Table 4-4) to estimate the unit solute release rates for the backfill. As discussed in Section 4.1, barrels tests are not available for processed rock. The approach described in SRK (2022a) was used to represent loadings from exposed coal seams. This rate was multiplied by the total reactive mass in the open pit walls to estimate the annual load produced. The annual load was scaled to field conditions using the grain size differences. Since HCT release rates were used to represent release rates from exposed coal seams, a temperature factor was applied to coal (SRK 2022a). It was assumed that the entire fractured rock zone in the open pit walls would be flushed, and a channelization factor was not included.

The annual scaled release rate was divided by the annual average volume of water contacting wall rock runoff (SRK 2022) to estimate drainage concentrations using equation 2. The annual volume for each time period is presented in Table 4-5. Mineral solubility was evaluated and phases that were identified to be supersaturated in solution were allowed to precipitate or off-gas (for gas phases). Mineral phases that were considered are provided in Table 4-2. Sorption to ferrihydrite was also included when this mineral phase precipitated.

Like the unsaturated mine rock source term, a high case wall rock source term was estimated by forcing the predicted solutions to gypsum saturation through incremental anhydrite addition in PHREEQC. Element sulfate ratios in the base case source term were assumed when calculating concentrations of other constituents. The scaled-up solution was subsequently equilibrated with the mineral phases presented in Table 4-2 and sorption to ferrihydrite was permitted when this mineral phase precipitated.

During operations it is assumed that the pit backfill will be fully oxygenated. Therefore, the wall rock that is below the backfill will also be reactive. A load from the backfilled pit walls was also estimated using the same assumptions as exposed wall rock. The annual load originating from covered walls at the end of EMP and EOM was added to unsaturated mine rock load (Section 4.2). The load was estimated by prorating the scaled barrel loads (and HCT for exposed coal seams) in proportions calculated based on the backfilled pit wall surface areas (Table 4-6).

**Table 4-4. Exposed Open Pit Wall Surface Areas ($m^2$)**

| Layer | Type | End of NMP | End of EMP | EOM |
|---|---|---|---|---|
| Zone 1 | Blasted Wall | 34,151 | 92,219 | 15,722 |
| Zone 1a | Blasted Wall | --- | 3,711 | --- |
| Zone 2 | Blasted Wall | 6,392 | 22,123 | --- |
| Zone 3 | Blasted Wall | 5,780 | 33,356 | --- |
| Zone 4 | Blasted Wall | 10,798 | 47,774 | --- |
| Zone 5 | Blasted Wall | 8,489 | 25,854 | --- |
| Zone 6 | Free Dug Wall | 356,326 | 627,457 | --- |
| Overburden | Free Dug Wall | 81,128 | 239,685 | 27,065 |
| Seam C | Free Dug Wall | 554 | 3,197 | --- |
| Seam 1U | Free Dug Wall | 841 | 4,412 | --- |
| Zone 55 | Free Dug Wall | 2,697 | 11,130 | --- |
| Seam 1L | Free Dug Wall | 1,200 | 6,944 | --- |

Note: Areas presented in $m^2$

**Table 4-5. Annual Wall Rock Runoff Volumes**

| Time Period | Volume ($m^3$/year) |
|---|---|
| End of NMP | 302,720 |
| End of EMP | 514,842 |
| EOM | 116,847 |

**Table 4-6. Backfilled Open Pit Wall Surface Areas ($m^2$)**

| Layer | Type | End of EMP | EOM |
|---|---|---|---|
| Zone 1 | Blasted Wall | --- | 93,749 |
| Zone 1a | Blasted Wall | --- | 13,191 |
| Zone 2 | Blasted Wall | 4 | 9,111 |
| Zone 3 | Blasted Wall | 54 | 8,074 |
| Zone 4 | Blasted Wall | 967 | 12,457 |
| Zone 5 | Blasted Wall | 1,088 | 4,654 |
| Zone 6 | Blasted Wall | --- | 10,331 |
| Zone 7 | Blasted Wall | --- | 36,728 |
| Zone 6 | Free Dug Wall | 320,672 | 1,686,406 |
| Overburden | Free Dug Wall | 12,000 | 164,165 |
| Seam C | Free Dug Wall | 93 | 2,515 |
| Seam 1U | Free Dug Wall | 233 | 1,557 |
| Zone 55 | Free Dug Wall | 1,041 | 449 |
| Seam 1L | Free Dug Wall | 280 | 3,201 |
| Seam 1 | Free Dug Wall | --- | 1,426 |

Note: Areas presented in $m^2$

# 5 Source Terms

The following sections present the Tenas Project source terms. The source terms do not represent discharge water quality and how the mine rock flushing source terms influence site drainage water quality cannot be quantified until they are carried forward into the site wide water and load balance. Therefore, limited interpretation of the source terms is included in the following sections. Detailed interpretations of the site wide water and load balance model results using these source terms are included in SRK (2024a).

## 5.1 Unsaturated Mine Rock & Overburden

### 5.1.1 Pit Backfill Source Term Water Quality

The base case and high case pit backfill source terms for end of EMP and EOM are provided in Table 5-1. The charge imbalance for the base case and high case solutions were less than 10%. This is considered acceptable for a modelled solution that have average inputs from multiple sampling rounds and charge imbalances were not corrected. The pH of solutions is alkaline (8.2 to 8.5) and all modelled constituent concentrations are higher in the high case in comparison to the base case source terms since gypsum was not predicted to be supersaturated in the base case source term and the scaling method (i.e., preserving element/sulfate ratios; see Section 4.2.2) results in constituent concentrations being higher in the high case solutions. Predicted constituent concentrations are higher at the EOM in comparison to the end of EMP source terms because of increased reactive mass in the pit backfill (Table 4-1).

**Table 5-1. Pit Backfill Source Term Water Quality**

| Parameter | Units | Non-PAG Backfill - End of EMP | | Non-PAG Backfill - End of EOM | |
|---|---|---|---|---|---|
| | | Typical | High | Typical | High |
| ***Conventional*** | | | | | |
| pH | s.u. | 8.2 | 8.4 | 8.3 | 8.5 |
| % Error | % | -0.3 | -0.3 | -0.2 | -0.2 |
| Alkalinity | mg $CaCO_3$/L | 1904 | 3398 | 2953 | 4468 |
| ***Major Ions*** | | | | | |
| Calcium | mg/L | 53 | 95 | 79 | 119 |
| Magnesium | mg/L | 32 | 57 | 48 | 72 |
| Potassium | mg/L | 13 | 23 | 20 | 31 |
| Sodium | mg/L | 1614 | 2881 | 2505 | 3790 |
| Chloride | mg/L | 24 | 43 | 37 | 56 |
| Sulfate | mg/L | 1803 | 3218 | 2772 | 4193 |
| ***Dissolved Elements*** | | | | | |
| Aluminum | mg/L | 0.0045 | 0.0072 | 0.0064 | 0.0089 |
| Antimony | mg/L | 0.0029 | 0.0052 | 0.0045 | 0.0069 |
| Arsenic | mg/L | 0.0043 | 0.0078 | 0.0067 | 0.01 |
| Barium | mg/L | 0.045 | 0.08 | 0.069 | 0.1 |
| Boron | mg/L | 0.45 | 0.8 | 0.7 | 1.1 |
| Cadmium | mg/L | 0.000095 | 0.00017 | 0.00014 | 0.00021 |
| Chromium | mg/L | 0.0018 | 0.0033 | 0.0029 | 0.0043 |
| Cobalt | mg/L | 0.015 | 0.026 | 0.02 | 0.03 |
| Copper | mg/L | 0.016 | 0.029 | 0.025 | 0.037 |
| Iron | mg/L | 0.00012 | 0.0001 | 0.00011 | 0.0001 |
| Lead | mg/L | 0.0048 | 0.0085 | 0.0074 | 0.011 |
| Lithium | mg/L | 0.14 | 0.24 | 0.21 | 0.32 |
| Manganese | mg/L | 0.11 | 0.19 | 0.12 | 0.18 |
| Mercury | mg/L | 0.00001 | 0.000018 | 0.000016 | 0.000023 |
| Phosphorus | mg/L | 0.026 | 0.046 | 0.04 | 0.06 |
| Molybdenum | mg/L | 0.17 | 0.3 | 0.26 | 0.39 |
| Nickel | mg/L | 0.029 | 0.051 | 0.04 | 0.061 |
| Selenium | mg/L | 0.089 | 0.16 | 0.14 | 0.21 |
| Silica | mg/L | 4.6 | 8.3 | 7.1 | 11 |
| Silver | mg/L | 0.000074 | 0.00013 | 0.00011 | 0.00017 |
| Strontium | mg/L | 0.83 | 1.5 | 1.3 | 1.9 |
| Tin | mg/L | 0.00078 | 0.0014 | 0.0012 | 0.0018 |
| Thallium | mg/L | 0.000078 | 0.00014 | 0.00012 | 0.00018 |
| Uranium | mg/L | 0.019 | 0.034 | 0.029 | 0.044 |
| Vanadium | mg/L | 0.004 | 0.0072 | 0.0062 | 0.0095 |
| Zinc | mg/L | 0.032 | 0.058 | 0.046 | 0.07 |

Source: https://srk.sharepoint.com/sites/NACAPR002933/Internal/Task 500 Source Term Updates/01_Source_term_updates/02_Input_files/[TelkwaSourceTerms_Barrel_Loads_Sc2_CAPR002933_mkh_r4.xlsx

### 5.1.2 Dam/Buttress Source Term Water Quality

The base case and high case dam/buttress source term water quality for end of NMP, end of EMP and end of WMP are provided in Table 5-2. The charge imbalance for the base case and high case solutions were less than 10%. This is considered acceptable for a modelled solution mixing average inputs from multiple HCTs and charge imbalances were not corrected. The pH of solutions is alkaline ranging from 7.6 to 8.3.

The trends in predicted concentrations are like the pit backfill water quality. For example, the modelled constituent concentrations are higher in the high case in comparison to the base case source terms since gypsum was not predicted to be supersaturated in the base case scenario. Constituent concentrations are predicted to increase throughout the LOM because of the reactive mass increasing (Table 4-1).

**Table 5-2. Dam/Buttress Source Term Water Quality**

| Parameter | Units | Dam/Buttress Infiltration - End of NMP | | Dam/Buttress Infiltration - End of EMP | | Dam/Buttress Infiltration - End of WMP | |
|---|---|---|---|---|---|---|---|
| | | Typical | High | Typical | High | Typical | High |
| ***Conventional*** | | | | | | | |
| pH | s.u. | 7.6 | 8.2 | 7.8 | 8.2 | 8.0 | 8.3 |
| % Error | % | -1.5 | -1.5 | -1.3 | -1.4 | -1.4 | -1.4 |
| Alkalinity | mg $CaCO_3$/L | 448 | 1848 | 761 | 2167 | 1074 | 2458 |
| ***Major Ions*** | | | | | | | |
| Calcium | mg/L | 33 | 134 | 50 | 141 | 71 | 163 |
| Magnesium | mg/L | 17 | 69 | 26 | 73 | 37 | 84 |
| Potassium | mg/L | 3.6 | 15 | 5.9 | 17 | 8.3 | 19 |
| Sodium | mg/L | 334 | 1380 | 577 | 1643 | 812 | 1859 |
| Chloride | mg/L | 6.5 | 27 | 11 | 31 | 15 | 35 |
| Sulfate | mg/L | 432 | 1784 | 725 | 2065 | 1026 | 2348 |
| ***Dissolved Elements*** | | | | | | | |
| Aluminum | mg/L | 0.0017 | 0.0044 | 0.0023 | 0.005 | 0.0029 | 0.0055 |
| Antimony | mg/L | 0.00064 | 0.0026 | 0.0011 | 0.0031 | 0.0015 | 0.0035 |
| Arsenic | mg/L | 0.00092 | 0.0038 | 0.0015 | 0.0043 | 0.0021 | 0.0049 |
| Barium | mg/L | 0.017 | 0.072 | 0.028 | 0.079 | 0.039 | 0.09 |
| Boron | mg/L | 0.099 | 0.41 | 0.17 | 0.48 | 0.24 | 0.55 |
| Cadmium | mg/L | 0.000021 | 0.000089 | 0.000036 | 0.0001 | 0.000051 | 0.00012 |
| Chromium | mg/L | 0.00045 | 0.0019 | 0.00076 | 0.0022 | 0.0011 | 0.0025 |
| Cobalt | mg/L | 0.0025 | 0.01 | 0.0043 | 0.012 | 0.0061 | 0.014 |
| Copper | mg/L | 0.01 | 0.043 | 0.016 | 0.046 | 0.023 | 0.053 |
| Iron | mg/L | 0.00032 | 0.00012 | 0.00021 | 0.00012 | 0.00017 | 0.00011 |
| Lead | mg/L | 0.001 | 0.0043 | 0.0018 | 0.0051 | 0.0025 | 0.0058 |
| Lithium | mg/L | 0.028 | 0.11 | 0.048 | 0.14 | 0.067 | 0.15 |
| Manganese | mg/L | 0.034 | 0.14 | 0.052 | 0.15 | 0.074 | 0.17 |
| Mercury | mg/L | 0.0000031 | 0.000013 | 0.000005 | 0.000014 | 0.0000071 | 0.000016 |
| Phosphorus | mg/L | 0.014 | 0.056 | 0.021 | 0.059 | 0.03 | 0.069 |
| Molybdenum | mg/L | 0.034 | 0.14 | 0.058 | 0.16 | 0.082 | 0.19 |
| Nickel | mg/L | 0.0055 | 0.023 | 0.0093 | 0.027 | 0.013 | 0.03 |
| Selenium | mg/L | 0.028 | 0.12 | 0.045 | 0.13 | 0.065 | 0.15 |
| Silica | mg/L | 2.3 | 9.6 | 3.6 | 10 | 5.2 | 12 |
| Silver | mg/L | 0.000018 | 0.000073 | 0.00003 | 0.000085 | 0.000042 | 0.000096 |
| Strontium | mg/L | 0.27 | 1.1 | 0.43 | 1.2 | 0.61 | 1.4 |
| Tin | mg/L | 0.00019 | 0.00077 | 0.00032 | 0.0009 | 0.00045 | 0.001 |
| Thallium | mg/L | 0.000018 | 0.000073 | 0.00003 | 0.000085 | 0.000042 | 0.000096 |
| Uranium | mg/L | 0.0049 | 0.02 | 0.0082 | 0.023 | 0.012 | 0.026 |
| Vanadium | mg/L | 0.00088 | 0.0036 | 0.0015 | 0.0042 | 0.0021 | 0.0048 |
| Zinc | mg/L | 0.009 | 0.037 | 0.015 | 0.042 | 0.021 | 0.047 |

Source: https://srk.sharepoint.com/sites/NACAPR002933/Internal/Task 500 Source Term Updates/01_Source_term_updates/02_Input_files/[TelkwaSourceTerms_Barrel_Loads_Sc2_CAPR002933_mkh_r4.xlsx

## 5.2 Saturated Mine Rock

Saturated rock flushing terms are presented in kg/tonne. The influence of flushing of rock as it is placed in the management ponds cannot be quantified until it is carried forward into the water and load balance. Annual PAG rock flushing rates for the six- and 12-month exposure periods are provided in Table 5-3 and Table 5-4, respectively. The non-PAG rock flushing source terms are provided in Table 5-5, respectively.

## Table 5-3. PAG Rock Annual Flushing Source Term – Six Month Average Exposure

| Parameter | Units | -0.5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Conventional*** | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity | kg CaCO3/tonne | 0.005 | 0.005 | 0.008 | 0.006 | 0.008 | 0.006 | 0.003 | 0.001 | 0.001 | 0.001 | 0.001 | 0.003 | 0.006 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.005 | 0.007 | 0.006 | 0.011 |
| ***Major Ions*** | | | | | | | | | | | | | | | | | | | | | | | |
| Calcium | kg/tonne | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Magnesium | kg/tonne | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.0009 | 0.001 | 0.00 |
| Potassium | kg/tonne | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Sodium | kg/tonne | 0.009 | 0.0087 | 0.01 | 0.009 | 0.01 | 0.011 | 0.008 | 0.007 | 0.007 | 0.007 | 0.007 | 0.009 | 0.011 | 0.015 | 0.01 | 0.013 | 0.012 | 0.015 | 0.0116 | 0.01082 | 0.01 | 0.012 |
| Chloride | kg/tonne | 0.00012 | 0.00012 | 0.00014 | 0.00013 | 0.00014 | 0.00014 | 0.00011 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.00012 | 0.00014 | 0.00014 | 0.00011 | 0.00013 | 0.00012 | 0.00014 | 0.00014 | 0.00014 | 0.00013 | 0.00016 |
| Sulfate | kg/tonne | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.04 | 0.03 | 0.03 | 0.03 | 0.04 | 0.02 | 0.021 | 0.02 | 0.02 |
| ***Elements*** | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | kg/tonne | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.00000 | 0.00000 | 0.0000 | 0.00000 | 0.00000 | 0.00000 | 0.000001 | 0.00000 | 0.00000 | 0.00000 | 0.0000001 | 0.00000 | 0.0000008 | 0.000001 | 0.000001 | 0.000002 |
| Antimony | kg/tonne | 9.9E-09 | 0.00000001 | 1.3E-08 | 1.1E-08 | 1.3E-08 | 1.2E-08 | 0.00000001 | 0.0000000 | 0.0000000 | 3.7E-09 | 4.1E-09 | 7.4E-09 | 1.2E-08 | 7.6E-09 | 5.3E-09 | 6.7E-09 | 6.3E-09 | 8.1E-09 | 1.1E-08 | 0.00000001 | 1.1E-08 | 1.7E-08 |
| Arsenic | kg/tonne | 1.0E-08 | 0.00000001 | 0.00000001 | 1.1E-08 | 1.3E-08 | 1.2E-08 | 0.00000001 | 0.0000000 | 0.0000000 | 3.9E-09 | 4.2E-09 | 7.5E-09 | 1.2E-08 | 7.7E-09 | 5.4E-09 | 6.8E-09 | 6.5E-09 | 8.2E-09 | 1.1E-08 | 1.2E-08 | 0.00000001 | 0.00000002 |
| Barium | kg/tonne | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.000000 | 0.00000 | 0.00000 | 0.0000001 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.0000001 | 0.00000 | 0.0000001 | 0.00000 |
| Boron | kg/tonne | 0.000002 | 0.000001 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000002 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000002 | 0.000002 | 0.000002 | 0.000003 |
| Cadmium | kg/tonne | 4.3E-10 | 8.9E-10 | 7.0E-10 | 0.0000000 | 0.0000000 | 6.2E-10 | 5.3E-10 | 0.0000000 | 5.0E-10 | 5.9E-10 | 0.0000000 | 6.5E-10 | 0.0000000 | 0.0000000 | 0.0000000 | 6.3E-10 | 0.0000000 | 0.0000000 | 7.4E-10 | 6.7E-10 | 5.8E-10 | 0.0000000 |
| Chromium | kg/tonne | 8.8E-09 | 8.5E-09 | 1.1E-08 | 9.2E-09 | 1.0E-08 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 5.9E-09 | 6.2E-09 | 8.0E-09 | 1.0E-08 | 9.8E-09 | 7.4E-09 | 8.8E-09 | 8.4E-09 | 1.0E-08 | 1.0E-08 | 1.0E-08 | 9.6E-09 | 1.2E-08 |
| Cobalt | kg/tonne | 0.00000 | 0.0000005 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.00000 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.00000 | 0.0000005 | 0.0000004 | 0.00000 | 0.00000 |
| Copper | kg/tonne | 0.00000003 | 0.00000002 | 0.00000004 | 0.00000003 | 0.00000004 | 0.00000003 | 0.00000002 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000002 | 0.00000003 | 0.00000002 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000002 | 2.9E-08 | 0.00000003 | 0.00000003 | 0.00000005 |
| Iron | kg/tonne | 0.000001 | 0.000001 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.000001 | 0.000002 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000002 | 0.0000019 | 0.000002 | 0.000003 |
| Lead | kg/tonne | 1.3E-08 | 1.3E-08 | 2.1E-08 | 1.5E-08 | 2.0E-08 | 1.7E-08 | 8.0E-09 | 2.1E-09 | 2.1E-09 | 2.1E-09 | 2.2E-09 | 8.4E-09 | 1.7E-08 | 4.0E-09 | 2.8E-09 | 3.5E-09 | 3.3E-09 | 4.3E-09 | 1.4E-08 | 1.8E-08 | 1.6E-08 | 2.8E-08 |
| Lithium | kg/tonne | 0.0000011 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.0000011 | 0.000001 | 0.000001 | 0.000001 |
| Manganese | kg/tonne | 0.0000 | 0.00001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00001 | 0.000 | 0.000 | 0.00001 | 0.000 | 0.000 | 0.000 | 0.00001 | 0.000 | 0.000 | 0.00001 | 0.00000518 | 0.000 | 0.000 |
| Mercury | kg/tonne | 4.2E-11 | 3.8E-11 | 4.5E-11 | 3.9E-11 | 4.4E-11 | 4.0E-11 | 3.0E-11 | 2.4E-11 | 2.5E-11 | 2.4E-11 | 2.5E-11 | 3.0E-11 | 4.1E-11 | 2.6E-11 | 2.6E-11 | 2.6E-11 | 2.7E-11 | 2.5E-11 | 3.8E-11 | 4.1E-11 | 3.8E-11 | 5.3E-11 |
| Phosphorus | kg/tonne | 0.000000 | 0.000000 | 0.0000001 | 0.000000 | 0.0000001 | 0.0000001 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.0000001 | 0.0000001 | 0.000000 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 |
| Molybdenum | kg/tonne | 0.00000043 | 0.0000004 | 0.00000067 | 0.00000047 | 0.00000063 | 0.00000055 | 0.00000023 | 0.00000004 | 0.00000004 | 0.00000003 | 0.00000004 | 0.00000025 | 0.00000054 | 0.00000013 | 0.00000007 | 0.00000011 | 9.9E-08 | 1.4E-07 | 4.6E-07 | 0.0000006 | 0.00000051 | 0.00000089 |
| Nickel | kg/tonne | 0.00000 | 0.000001 | 0.000001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.000001 | 0.0000 | 0.0000 | 0.000001 | 0.0000 | 0.0000 | 0.0000 | 0.000001 | 0.0000 | 0.0000 | 0.000001 | 0.00000054 | 0.000001 | 0.0000 |
| Selenium | kg/tonne | 0.00000046 | 0.0000004 | 0.00000044 | 0.00000043 | 0.00000049 | 0.00000066 | 0.00000044 | 0.00000035 | 0.00000032 | 0.00000032 | 0.00000041 | 0.00000051 | 0.00000057 | 0.00000138 | 0.00000073 | 0.00000112 | 0.00000101 | 0.00000151 | 0.00000077 | 0.0000006 | 0.00000046 | 0.00000053 |
| Silica | kg/tonne | 0.00001 | 0.00001 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00002 |
| Silver | kg/tonne | 4.9E-10 | 4.4E-10 | 5.0E-10 | 4.7E-10 | 5.1E-10 | 5.6E-10 | 4.4E-10 | 3.8E-10 | 3.8E-10 | 3.7E-10 | 4.0E-10 | 4.7E-10 | 5.3E-10 | 7.6E-10 | 5.2E-10 | 6.6E-10 | 6.3E-10 | 8.1E-10 | 5.9E-10 | 5.4E-10 | 4.8E-10 | 5.6E-10 |
| Strontium | kg/tonne | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00001 |
| Tin | kg/tonne | 0.0000000 | 0.0000000 | 0.00000001 | 0.0000000 | 0.00000001 | 0.00000001 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.0000000 | 0.00000001 |
| Thallium | kg/tonne | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| Uranium | kg/tonne | 0.00000006 | 0.00000005 | 0.00000008 | 6.5E-08 | 8.3E-08 | 0.00000008 | 0.00000004 | 0.00000002 | 0.00000002 | 0.00000002 | 0.00000002 | 4.8E-08 | 7.7E-08 | 7.1E-08 | 4.0E-08 | 5.9E-08 | 5.3E-08 | 7.9E-08 | 7.7E-08 | 0.00000008 | 7.0E-08 | 0.00000011 |
| Vanadium | kg/tonne | 0.00000002 | 0.00000002 | 0.00000002 | 0.00000002 | 0.00000003 | 0.00000003 | 0.00000002 | 0.00000002 | 0.00000002 | 0.00000002 | 0.00000002 | 0.00000002 | 0.00000003 | 0.00000004 | 0.00000003 | 0.00000003 | 0.00000003 | 0.00000004 | 2.9E-08 | 0.00000003 | 2.4E-08 | 0.00000003 |
| Zinc | kg/tonne | 0.00000 | 0.0000007 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.0000006 | 0.000001 | 0.000001 |

Source: https://srk.sharepoint.com/sites/NACAPR002933/Internal/Task 500 Source Term Updates/01_Source_term_updates/02_Input_files/[TelkwaSourceTerms_Barrel_Loads_Sc2_CAPR002933_mkh_r4.xlsx

## Table 5-4. PAG Rock Annual Flushing Source Term – 12 Month Average Exposure

| Parameter | Units | -0.5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Conventional*** | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity | kg $CaCO_3$/tonne | 0.011 | 0.01 | 0.016 | 0.012 | 0.015 | 0.013 | 0.006 | 0.001 | 0.001 | 0.001 | 0.001 | 0.006 | 0.013 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.011 | 0.013 | 0.012 | 0.021 |
| ***Major Ions*** | | | | | | | | | | | | | | | | | | | | | | | |
| Calcium | kg/tonne | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 |
| Magnesium | kg/tonne | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.002 | 0.002 | 0.003 | 0.003 | 0.003 | 0.002 | 0.003 | 0.002 | 0.0018 | 0.002 | 0.001 |
| Potassium | kg/tonne | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |
| Sodium | kg/tonne | 0.019 | 0.0174 | 0.02 | 0.019 | 0.021 | 0.023 | 0.017 | 0.014 | 0.013 | 0.013 | 0.015 | 0.018 | 0.021 | 0.029 | 0.019 | 0.025 | 0.024 | 0.031 | 0.0233 | 0.02164 | 0.019 | 0.024 |
| Chloride | kg/tonne | 0.00024 | 0.00024 | 0.00029 | 0.00026 | 0.00029 | 0.00029 | 0.00023 | 0.0002 | 0.00019 | 0.00019 | 0.0002 | 0.00024 | 0.00028 | 0.00027 | 0.00022 | 0.00025 | 0.00024 | 0.00028 | 0.00028 | 0.00028 | 0.00027 | 0.00032 |
| Sulfate | kg/tonne | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.07 | 0.05 | 0.06 | 0.06 | 0.07 | 0.05 | 0.042 | 0.04 | 0.04 |
| ***Elements*** | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | kg/tonne | 0.000002 | 0.000002 | 0.000003 | 0.000002 | 0.000002 | 0.000002 | 0.000001 | 0.00000 | 0.0000 | 0.00000 | 0.00000 | 0.000001 | 0.000002 | 0.00000 | 0.00000 | 0.00000 | 0.0000001 | 0.00000 | 0.0000017 | 0.000002 | 0.000002 | 0.000004 |
| Antimony | kg/tonne | 2.0E-08 | 0.00000002 | 2.7E-08 | 2.1E-08 | 2.6E-08 | 2.4E-08 | 0.00000001 | 0.00000001 | 0.00000001 | 7.5E-09 | 8.1E-09 | 1.5E-08 | 2.4E-08 | 1.5E-08 | 1.1E-08 | 1.3E-08 | 1.3E-08 | 1.6E-08 | 2.2E-08 | 0.00000002 | 2.2E-08 | 3.4E-08 |
| Arsenic | kg/tonne | 2.0E-08 | 0.00000002 | 0.00000003 | 2.1E-08 | 2.6E-08 | 2.4E-08 | 0.00000001 | 0.00000001 | 0.00000001 | 7.7E-09 | 8.4E-09 | 1.5E-08 | 2.4E-08 | 1.5E-08 | 1.1E-08 | 1.4E-08 | 1.3E-08 | 1.6E-08 | 2.2E-08 | 2.4E-08 | 0.00000002 | 0.00000003 |
| Barium | kg/tonne | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.0000001 | 0.00000 | 0.00000 | 0.0000003 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000002 | 0.00000 | 0.0000002 | 0.00000 |
| Boron | kg/tonne | 0.000003 | 0.000003 | 0.000004 | 0.000003 | 0.000004 | 0.000004 | 0.000002 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000002 | 0.000004 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000003 | 0.000004 | 0.000003 | 0.000005 |
| Cadmium | kg/tonne | 8.7E-10 | 1.8E-09 | 1.4E-09 | 0.0000000 | 0.0000000 | 1.2E-09 | 1.1E-09 | 0.0000000 | 1.0E-09 | 1.2E-09 | 0.0000000 | 1.3E-09 | 0.0000000 | 0.0000000 | 0.0000000 | 1.3E-09 | 0.0000000 | 0.0000000 | 1.5E-09 | 1.3E-09 | 1.2E-09 | 0.0000000 |
| Chromium | kg/tonne | 1.8E-08 | 1.7E-08 | 2.1E-08 | 1.8E-08 | 2.1E-08 | 0.00000002 | 0.00000002 | 0.00000001 | 0.00000001 | 1.2E-08 | 1.2E-08 | 1.6E-08 | 2.0E-08 | 2.0E-08 | 1.5E-08 | 1.8E-08 | 1.7E-08 | 2.1E-08 | 2.0E-08 | 2.1E-08 | 1.9E-08 | 2.5E-08 |
| Cobalt | kg/tonne | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.0000009 | 0.0000009 | 0.000001 | 0.000001 |
| Copper | kg/tonne | 0.00000005 | 0.00000005 | 0.00000007 | 0.00000006 | 0.00000007 | 0.00000006 | 0.00000004 | 0.00000002 | 0.00000002 | 0.00000002 | 0.00000002 | 0.00000004 | 0.00000006 | 0.00000003 | 0.00000002 | 0.00000003 | 0.00000003 | 0.00000003 | 5.7E-08 | 0.00000006 | 0.00000006 | 0.00000009 |
| Iron | kg/tonne | 0.000003 | 0.000003 | 0.000004 | 0.000003 | 0.000004 | 0.000004 | 0.000002 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000002 | 0.000004 | 0.000002 | 0.000001 | 0.000001 | 0.000001 | 0.000002 | 0.000003 | 0.0000037 | 0.000003 | 0.000006 |
| Lead | kg/tonne | 2.7E-08 | 2.6E-08 | 4.2E-08 | 3.0E-08 | 4.0E-08 | 3.4E-08 | 1.6E-08 | 4.2E-09 | 4.1E-09 | 4.1E-09 | 4.4E-09 | 1.7E-08 | 3.4E-08 | 8.1E-09 | 5.6E-09 | 7.1E-09 | 6.7E-09 | 8.6E-09 | 2.9E-08 | 3.5E-08 | 3.2E-08 | 5.5E-08 |
| Lithium | kg/tonne | 0.0000022 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.000002 | 0.0000023 | 0.000002 | 0.000002 | 0.000002 |
| Manganese | kg/tonne | 0.00001 | 0.00001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00001 | 0.000 | 0.000 | 0.00001 | 0.000 | 0.000 | 0.000 | 0.00001 | 0.000 | 0.000 | 0.00001 | 0.00001037 | 0.000 | 0.000 |
| Mercury | kg/tonne | 8.4E-11 | 7.7E-11 | 9.0E-11 | 7.7E-11 | 8.8E-11 | 8.0E-11 | 6.0E-11 | 4.8E-11 | 5.0E-11 | 4.8E-11 | 4.9E-11 | 6.1E-11 | 8.2E-11 | 5.3E-11 | 5.2E-11 | 5.2E-11 | 5.4E-11 | 5.1E-11 | 7.6E-11 | 8.2E-11 | 7.7E-11 | 1.1E-10 |
| Phosphorus | kg/tonne | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000002 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000002 | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 |
| Molybdenum | kg/tonne | 0.00000086 | 0.0000008 | 0.00000134 | 0.00000095 | 0.00000127 | 0.00000109 | 0.00000047 | 0.00000007 | 0.00000008 | 0.00000007 | 0.00000009 | 0.0000005 | 0.00000108 | 0.00000026 | 0.00000015 | 0.00000021 | 2.0E-07 | 2.8E-07 | 9.2E-07 | 0.0000011 | 0.00000101 | 0.00000178 |
| Nickel | kg/tonne | 0.000001 | 0.000001 | 0.000001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.000001 | 0.0000 | 0.0000 | 0.000001 | 0.0000 | 0.0000 | 0.0000 | 0.000001 | 0.0000 | 0.0000 | 0.000001 | 0.00000109 | 0.000001 | 0.0000 |
| Selenium | kg/tonne | 0.00000092 | 0.0000008 | 0.00000087 | 0.00000086 | 0.00000099 | 0.00000132 | 0.00000089 | 0.00000071 | 0.00000064 | 0.00000064 | 0.00000081 | 0.00000102 | 0.00000115 | 0.00000277 | 0.00000145 | 0.00000223 | 0.00000202 | 0.00000303 | 0.00000154 | 0.0000012 | 0.00000091 | 0.00000106 |
| Silica | kg/tonne | 0.00002 | 0.00002 | 0.00003 | 0.00002 | 0.00003 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00002 | 0.00003 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00002 | 0.00003 | 0.00003 | 0.00004 |
| Silver | kg/tonne | 9.7E-10 | 8.9E-10 | 9.9E-10 | 9.4E-10 | 1.0E-09 | 1.1E-09 | 8.9E-10 | 7.7E-10 | 7.5E-10 | 7.4E-10 | 8.1E-10 | 9.3E-10 | 1.1E-09 | 1.5E-09 | 1.0E-09 | 1.3E-09 | 1.3E-09 | 1.6E-09 | 1.2E-09 | 1.1E-09 | 9.7E-10 | 1.1E-09 |
| Strontium | kg/tonne | 0.00003 | 0.00003 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00002 | 0.00004 | 0.00003 | 0.00004 | 0.00004 | 0.00004 | 0.00003 | 0.00002 | 0.00002 | 0.00002 |
| Tin | kg/tonne | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000002 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000002 | 0.00000001 | 0.00000001 | 0.00000001 | 0.00000001 |
| Thallium | kg/tonne | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| Uranium | kg/tonne | 0.00000012 | 0.00000011 | 0.00000017 | 1.3E-07 | 1.7E-07 | 0.00000016 | 0.00000009 | 0.00000004 | 0.00000004 | 0.00000004 | 0.00000005 | 9.6E-08 | 1.5E-07 | 1.4E-07 | 7.9E-08 | 1.2E-07 | 1.1E-07 | 1.6E-07 | 1.5E-07 | 0.00000016 | 1.4E-07 | 0.00000021 |
| Vanadium | kg/tonne | 0.00000005 | 0.00000004 | 0.00000005 | 0.00000005 | 0.00000005 | 0.00000006 | 0.00000004 | 0.00000004 | 0.00000004 | 0.00000004 | 0.00000004 | 0.00000005 | 0.00000005 | 0.00000008 | 0.00000005 | 0.00000007 | 0.00000006 | 0.00000008 | 5.9E-08 | 0.00000005 | 4.8E-08 | 0.00000006 |
| Zinc | kg/tonne | 0.000001 | 0.0000014 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000002 | 0.000001 | 0.000002 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.0000011 | 0.000001 | 0.000001 |

Source: https://srk.sharepoint.com/sites/NACAPR002933/Internal/Task 500 Source Term Updates/01_Source_term_updates/02_Input_files/[TelkwaSourceTerms_Barrel_Loads_Sc2_CAPR002933_mkh_r4.xlsx

**Table 5-5. Non-PAG Rock Flushing Source Term**

| Parameter | Units | Six Month Exposure | Twelve Month Exposure |
|---|---|---|---|
| ***Conventional*** | | | |
| Alkalinity | kg $CaCO_3$/tonne | 0.019 | 0.0381 |
| ***Major Ions*** | | | |
| Calcium | kg/tonne | 0.00 | 0.00 |
| Magnesium | kg/tonne | 0.0001 | 0.00 |
| Potassium | kg/tonne | 0.00012 | 0.00024 |
| Sodium | kg/tonne | 0.01607 | 0.03214 |
| Chloride | kg/tonne | 0.00022 | 0.00044 |
| Sulfate | kg/tonne | 0.016 | 0.03 |
| ***Elements*** | | | |
| Aluminum | kg/tonne | 0.0000032 | 0.000006 |
| Antimony | kg/tonne | 2.8E-08 | 5.6E-08 |
| Arsenic | kg/tonne | 2.8E-08 | 5.6E-08 |
| Barium | kg/tonne | 0.0000003 | 0.000001 |
| Boron | kg/tonne | 0.0000044 | 0.000009 |
| Cadmium | kg/tonne | 7.9E-10 | 1.6E-09 |
| Chromium | kg/tonne | 1.8E-08 | 3.6E-08 |
| Cobalt | kg/tonne | 0.00000011 | 0.00000022 |
| Copper | kg/tonne | 7.8E-08 | 0.00000016 |
| Iron | kg/tonne | 0.0000048 | 0.00001 |
| Lead | kg/tonne | 4.9E-08 | 9.9E-08 |
| Lithium | kg/tonne | 0.0000013 | 0.0000026 |
| Manganese | kg/tonne | 0.00000 | 0.000001 |
| Mercury | kg/tonne | 7.3E-11 | 1.5E-10 |
| Phosphorus | kg/tonne | 0.00000011 | 0.0000002 |
| Molybdenum | kg/tonne | 1.6E-06 | 0.00000324 |
| Nickel | kg/tonne | 0.00000024 | 0.0000005 |
| Selenium | kg/tonne | 0.00000069 | 0.0000014 |
| Silica | kg/tonne | 0.000029 | 0.00006 |
| Silver | kg/tonne | 7.1E-10 | 1.4E-09 |
| Strontium | kg/tonne | 0.000006 | 0.00001 |
| Tin | kg/tonne | 0.00000001 | 0.00000001 |
| Thallium | kg/tonne | 0.0000000 | 0.0000000 |
| Uranium | kg/tonne | 1.8E-07 | 3.7E-07 |
| Vanadium | kg/tonne | 3.6E-08 | 7.1E-08 |
| Zinc | kg/tonne | 0.00000024 | 0.0000005 |

Source: https://srk.sharepoint.com/sites/NACAPR002933/Internal/Task 500 Source Term Updates/01_Source_term_updates/02_Input_files/[TelkwaSourceTerms_Barrel_Loads_Sc2_CAPR002933_mkh_r4.xlsx

## 5.3 Open Pit Wall Rock Runoff

The base case and high case open pit wall rock runoff source terms for the End of NMP, End of EMP and EOM are provided in Table 5-6. The charge balance in of the wall rock source terms is less than 10%, which is considered reasonable for solutions based on averaging several release rates in the field barrel tests. The pH of solutions was alkaline (7.4 to 8.1) and maximum pit wall runoff concentrations occurred at the end of the EMP since this timeframe represents the maximum exposure of pit wall and has the highest reactive mass (Table 4-6).

Most of the constituents were higher in the high case source term in comparison to the base case. Concentrations of iron were lower in the high case source terms. Iron concentrations are low in both scenarios since it is solubility constrained through ferrihydrite ($Fe(OH)_3$) precipitation. Lower iron concentrations occur in the high case source term since these solutions are more alkaline reducing the ferrihydrite solubility (i.e., more ferrihydrite is predicted to precipitate in the high case scenario).

## Table 5-6. Open Pit Wall Rock Runoff Source Terms

| Parameter | Units | Open Pit Wall Runoff - End of NMP | | Open Pit Wall Runoff - End of EMP | | Open Pit Wall Runoff - EOM | |
|---|---|---|---|---|---|---|---|
| | | Typical | High | Typical | High | Typical | High |
| ***Conventional*** | | | | | | | |
| pH | s.u. | 7.4 | 7.8 | 7.6 | 7.8 | 7.4 | 8.1 |
| % Error | % | -0.3 | -0.3 | 0.5 | 0.5 | -0.3 | -0.3 |
| Alkalinity | mg $CaCO_3$/L | 24 | 837 | 40 | 718 | 27 | 1662 |
| ***Major Ions*** | | | | | | | |
| Calcium | mg/L | 2 | 58 | 4 | 65 | 0 | 15 |
| Magnesium | mg/L | 2 | 53 | 3 | 61 | 0 | 13 |
| Potassium | mg/L | 0 | 7 | 0 | 7 | 0 | 11 |
| Sodium | mg/L | 26.3 | 906.0 | 47 | 856 | 23 | 1404 |
| Chloride | mg/L | 0.4 | 12.7 | 0.7 | 11.8 | 0.3 | 19.2 |
| Sulfate | mg/L | 42 | 1442 | 81 | 1469 | 23 | 1432 |
| ***Dissolved Elements*** | | | | | | | |
| Aluminum | mg/L | 0.0013 | 0.0024 | 0.0016 | 0.0022 | 0.0014 | 0.0041 |
| Antimony | mg/L | 0.00004 | 0.00136 | 0.00007 | 0.00122 | 0.00004 | 0.00246 |
| Arsenic | mg/L | 0.00005 | 0.00167 | 0.0001 | 0.002 | 0.00 | 0.002 |
| Barium | mg/L | 0.0006 | 0.0193 | 0.0011 | 0.0198 | 0.0005 | 0.03 |
| Boron | mg/L | 0.01 | 0.21 | 0.01 | 0.19 | 0.01 | 0.39 |
| Cadmium | mg/L | 0.0000 | 0.00013 | 0.00001 | 0.00015 | 0.0000 | 0.00007 |
| Chromium | mg/L | 0.00003 | 0.00097 | 0.00005 | 0.00089 | 0.00003 | 0.00156 |
| Cobalt | mg/L | 0.001 | 0.034 | 0.0017 | 0.0306 | 0.0002 | 0.0098 |
| Copper | mg/L | 0.0001 | 0.0038 | 0.0002 | 0.0035 | 0.0001 | 0.0068 |
| Iron | mg/L | 0.00047 | 0.00021 | 0.00031 | 0.00024 | 0.00042 | 0.00013 |
| Lead | mg/L | 0.00006 | 0.00219 | 0.0001 | 0.0019 | 0.00007 | 0.00432 |
| Lithium | mg/L | 0.003 | 0.09 | 0.005 | 0.09 | 0.0019 | 0.12 |
| Manganese | mg/L | 0.01 | 0.43 | 0.022 | 0.4 | 0.0005 | 0.03 |
| Mercury | mg/L | 0.00000 | 0.000005 | 0.00000 | 0.000006 | 0.00000 | 0.000006 |
| Phosphorus | mg/L | 0.0002 | 0.007 | 0.0004 | 0.0074 | 0.0002 | 0.0096 |
| Molybdenum | mg/L | 0.0021 | 0.0725 | 0.0035 | 0.0636 | 0.0023 | 0.1413 |
| Nickel | mg/L | 0.001 | 0.047 | 0.0023 | 0.041 | 0.0003 | 0.021 |
| Selenium | mg/L | 0.001 | 0.04 | 0.002 | 0.042 | 0.001 | 0.06 |
| Silica | mg/L | 0.05 | 1.6 | 0.1 | 1.5 | 0.04 | 2.5 |
| Silver | mg/L | 0.0000012 | 0.0000425 | 0.0000023 | 0.0000411 | 0.000001 | 0.000062 |
| Strontium | mg/L | 0.02 | 0.79 | 0.05 | 0.82 | 0.01 | 0.52 |
| Tin | mg/L | 0.00002 | 0.00062 | 0.00004 | 0.00074 | 0.00001 | 0.00065 |
| Thallium | mg/L | 0.000003 | 0.000108 | 0.000008 | 0.000152 | 0.000001 | 0.000062 |
| Uranium | mg/L | 0.00024 | 0.00829 | 0.0004 | 0.0075 | 0.0003 | 0.0161 |
| Vanadium | mg/L | 0.0001 | 0.0022 | 0.0001 | 0.0022 | 0.0001 | 0.0031 |
| Zinc | mg/L | 0.001 | 0.049 | 0.0025 | 0.0448 | 0.0003 | 0.0211 |

Source: https://srk.sharepoint.com/sites/NACAPR002933/Internal/Task 500 Source Term Updates/01_Source_term_updates/02_Input_files/[TelkwaSourceTerms_Barrel_Loads_Sc2_CAPR002933_mkh_r4.xlsx

# 6 Summary

SRK (2022a) developed geochemical source terms by scaling HCT testing results to field conditions. A comparison to the scaled HCT and barrel testing results indicated that the release rates of some constituents are higher in the barrels in comparison to the HCT. The geochemical source terms were updated using the barrel release rates. The barrel release rates are considered more appropriate for estimating site drainage water quality because they are more representative of solute release rates under field conditions.

Barrels were constructed using mine rock sample rejects and overburden. Insufficient processed rock (e.g., coal, coarse rejects, etc.) sample precluded barrels being constructed for these materials. Base The following source terms were updated using the barrel testing results:

- Unsaturated non-PAG & overburden
  - Pits backfill
  - Dams/buttresses
- Saturated non-PAG rock
- Saturated PAG rock
- Open pit wall rock runoff

The following source terms were not updated and the SRK (2022a) source terms remain current:

- Processed rock
- Processed coal stockpile runoff
- Particulate concentrations

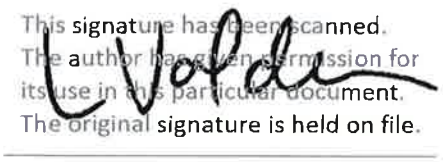
The above source terms will be carried forward into the site wide water and load balance to evaluate the mixed project discharge water quality. To evaluate uncertainty in the model, both the base case and high case scenarios should be evaluated.

# Closure

This report, Updated Water Quality Model Source Terms, was prepared by

Michael Herrell, MSc, PGeo
Principal Consultant (Geochemistry)

and reviewed by

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Senior Consultant (Geochemistry)

EGBC Permit to Practice Reg. No.: EGBC 1003655

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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# Appendix B Tenas Project - Suboxic Evaluation of Non-Acid Generating Mine Rock

Prepared for Telkwa Mining Ltd. OKane August 2024

# Tenas Project - Suboxic Evaluation of Non-Acid Generating Mine Rock

**August 2, 2024**

TELKWA MINING LIMITED

okane

Integrated Mine Closure and Relinquishment Solutions

# Tenas Project - Suboxic Evaluation of Non-Acid Generating Mine Rock

*1288-221-002*

August 2024

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# EXECUTIVE SUMMARY

Okane Consultants (Okane) are providing support to evaluate the development of suboxic conditions for the backfill of non-potentially acid generation (NAG) mine rock into the Open Pit for Telkwa Mining Limited (Telkwa) at their proposed Tenas Project in northwest British Columbia. The current scope focuses on placement of NAG mine rock. The objective of the scope was to develop geochemical source terms for the backfilled mine rock that reflect the construction and reclamation schedule, and the resulting hydrological and oxygen conditions of the backfill.

The source terms were developed using a two-dimensional oxygen model to evaluate the size, location, and timing of suboxic (low oxygen concentration) conditions within the NAG backfill. The formation of suboxic conditions limits oxidation rates of sulfide minerals and decreases the loads of constituents of interest released from sulfide oxidation to the receiving environment. The source terms will be used as inputs for the site-wide water quality model that integrates seepage and chemical loads from all mine domains to understand the overarching water quality effects of the Project on the receiving environment. All years presented herein refer to mine plan years.

Three scenarios were chosen to evaluate the development of suboxic conditions. The three scenarios were:

- Scenario #1: Poorly graded till and sandstone mine rock;
- Scenario #2: Well graded till and mine rock mix (60% siltstone, 35% mudstone, and 5% sandstone);
- Scenario #3: Well graded till and mine rock mix (60% siltstone, 35% mudstone, and 5% sandstone) with no internal cover layers.

During the covered time period for all modelled scenarios, two sequential cover surface conditions (grass cover followed by the establishment of mature forest) were used to simulate the maturing of vegetation on the cover system. These surface conditions affected how oxygen and water move into the cover material and underlying NAG backfill. For a five-year period directly after cover placement the simulation used a grass surface; following this five-year period, a forest surface was used for the remainder of the model timeframe.

GoldSim seepage modelling for the NAG backfill demonstrated a significant reduction in stabilized seepage rates between the modelled scenarios. Stabilized seepage rates for Scenarios #2 and #3 were approximately half of the stabilized rates for Scenario #1. The modelling also demonstrated that the NAG backfill will be wetted up after approximately 40 years in Scenario #1 and approximately 80 years in Scenarios #2 and #3 due to differences in material texture in the cover system. Modelling demonstrated that suboxic conditions within Scenario #1 took approximately 15 years to develop and approximately 13 years in Scenarios #2 and #3 once the cover system was placed. Depths to suboxic conditions varied between the scenarios due to differences in oxygen ingress and net percolation. Scenario #1 had a

long-term depth to suboxia of approximately 15 m while Scenarios #2 and #3 had a long-term depth to suboxia of approximately 3 m.

Estimated stored water volumes increase as mine rock is placed during construction and stabilize after approximately 15 years when construction has ended. Similar to seepage results, the stored water volumes stabilize after approximately 40 years for Scenario #1 and 70-80 years for Scenarios #2 and #3. Stored water volumes in the NAG backfill are predicted to be lower in Scenarios #2 and #3 relative to Scenario #1.

Source terms were developed for Scenarios #1, #2, and #3 using a reactive transport modelling approach. Reactive transport modelling was used to simulate the weathering of sulfide and carbonate minerals and resulting concentrations of related dissolved constituents using mechanistic kinetic weathering rates controlled by the geochemical setting of the NAG backfill. For constituents not directly controlled by sulfide oxidation and carbonate dissolution, a constant loading rate scale-up model was used to develop source terms. The geochemical models were calibrated to on-site kinetic barrel tests containing NAG mine rock and subsequently applied to the full-scale NAG backfill geometry.

The geochemical model incorporated changing cover system surface conditions by changing net percolation into the model for each time period (bare mine rock, grass coverage, and forest coverage). The effects of suboxic zones were simulated by limiting pyrite oxidation to depths where oxygen models simulated oxic conditions.

In general, concentrations for modelled parameters were similar between all scenarios. Although it was evident that less pyrite oxidation was occurring in the Scenario #2 and #3 models due to the larger suboxic zones, which resulted in lower mass release of oxidation products, decreased infiltrating water volumes (i.e., less dilution) in these scenarios resulted in similar concentrations as seen in Scenario #1. The primary benefit of the well-graded cover system scenarios is the overall decrease of released load of oxidation products (e.g., selenium and sulfate) from the NAG backfill. Scenarios #2 and #3 consistently had lower chemical loading relative to Scenario #1 resulting in approximately half the mass of oxidation products released from the NAG backfill on an annual basis. Scenarios #2 and #3 had similar chemical loading due to similar lag-times to suboxic zone development and depth to suboxic conditions. Additionally, geochemical source terms of the NAG backfill from the current model were comparable, although generally slightly lower, than source terms initially developed for the backfill (SRK, 2022a). The NAG backfill source terms from this modelling work will be integrated into the site wide load balance model to quantify the effects of the backfill on water quality around the Tenas project.

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# 1 INTRODUCTION

## 1.1 Project Description

Telkwa Mining Limited (Telkwa) are proposing to develop the Tenas Project (Project), located approximately 25 km southwest of the town of Smithers in northwest British Columbia (BC) within the Telkwa and Bulkley River watersheds. The Project consists of an open pit, backfill, external stockpiles, water management ponds, control ponds, coal processing plant, and rail infrastructure. Elevation of the Project ranges from 750 to 1,050 meters above sea level (masl), with a median elevation of 800 masl. The Project is within the Ministry of Environment and Climate Change Strategy (MECCS) Zone 8 – Nechako Plateau, close to the border with Zone 9 – Southern Hazelton Mountains (Ahmed and Jackson, 2013). The MECCS hydrological zones are areas of homogeneous hydrologic and geomorphic characteristics.

## 1.2 Project Objectives and Scope

Okane Consultants (Okane) is providing support to develop source terms for three scenarios of backfill NAG mine rock in lifts using bottom-up construction methodology with overburden covers within the Open Pit provided by Telkwa. The objective of the backfilled design is to limit oxygen and water ingress to minimize the release of potential contaminants of concern such as selenium and sulfate to the receiving environment.

A geochemical model that incorporated both a mechanistic reactive transport model and geochemical scale-up model was developed to simulate long-term water quality of mine rock backfilled into the Open Pit. Seepage water quality results from the geochemical model were developed as source terms to be used in the Tenas site-wide water quality model developed by SRK Consulting (SRK).

## 1.3 Report Organization

For convenient reference, this report has been subdivided into the following sections:

- Section 2 – Provides pertinent background information for this study;
- Section 3 – Description of modelling processes;
- Section 4 – Modelling results and discussion; and
- Section 5 – Conclusions of the modelling work.

# 2 BACKGROUND

Source control of contaminants of interest (COIs) is a cutting-edge practice. It demonstrates a significant commitment to minimizing water quality impacts in the region to both regulators and stakeholders. Okane has extensive experience in implementing closure strategies to mine storage facilities, ultimately limiting oxygen ingress and net percolation into the underlying waste material. This working experience has led to development of fully integrated models that link hydrology, oxygen conditions, material properties, mine rock structure and climate to develop source terms for site-wide water quality models.

Okane's experience has shown that there are solutions available to improve source control and water quality, therefore, providing the opportunity to relinquish the site at the end of the mine life versus treating water from the mine rock into perpetuity. Such solutions can include progressive reclamation and the application of oxygen-limiting cover systems which can lead to the development of suboxia within the NAG mine rock storage facilities (MRSFs) to help improve long-term seepage quality by inhibiting the oxidation of sulfide minerals within the SOZ, decreasing the release and production of metal leaching in the lower zones of the MRSF.

Currently for the Project, suboxia is defined as pore gas oxygen concentrations less than 1 vol.%, which results in a dissolved oxygen concentration in pore water of less than 1 mg/L. The NAG mine rock is a large porous mass, which during placement will have oxygen concentration in pore spaces reflecting ambient conditions, or near to ambient conditions. Oxygen within NAG mine rock pore spaces will be depleted because of sulfide (pyrite) oxidation.

## 2.1 Net Percolation and Oxygen Ingress Classifications

The term 'net percolation' (NP) is used throughout this memo and is defined as presented in Figure 2.1. Precipitation (PPT) that reaches the cover system surface will either be intercepted by vegetation, run off (RO), or infiltrate into the cover system. A portion of the water that infiltrates will be stored in an active zone ($\Delta S$) where water is actively cycled within the soil profile and into the atmosphere. Water stored in the active zone can be evaporated (AE) into the overlying atmosphere or can be removed by plant transpiration (AT); the combination of evaporation and transpiration is referred to as actual evapotranspiration (AET). Water in the cover system can also potentially move laterally as interflow. Water that moves below the active zone and is no longer available to be removed from the system via AET or laterally is defined as NP. NP is infiltrating water expressed as a percentage of average annual precipitation (PPT) that will migrate beyond the active zone because of gravity overcoming the influence of evapotranspiration, resulting in flow of water into the underlying NAG mine rock and overburden cover.

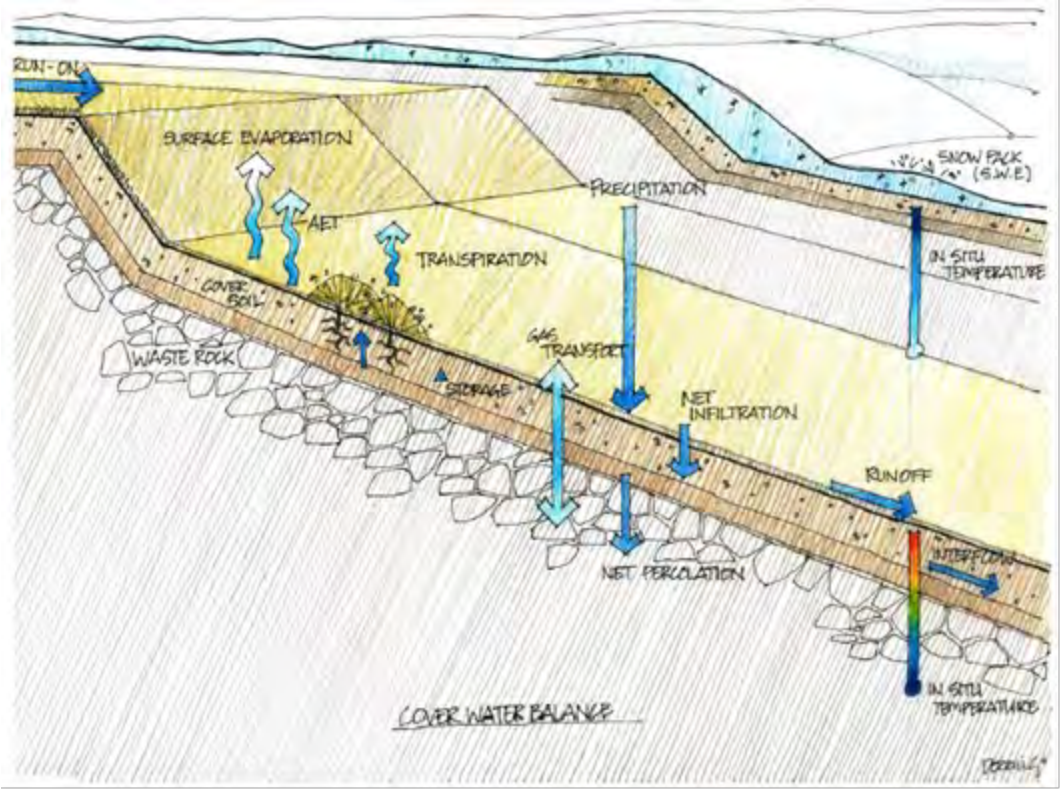


Figure 2.1: Schematic of hydraulic processes that influence performance of a cover system (from INAP, 2017)

As shown by the Project climate data described later in this report, the Project is classified as subarctic (Dfc) using the Köppen-Geiger climate classification (Peel *et al.,* 2007). Based on this classification, the range of cover system performance for the Tenas Project is presented conceptually, as defined in the Global Cover System Design Technical Guidance Document (INAP, 2017), as follows:

- "Very High" NP is greater than 50% PPT;
- "High" NP is between 25% PPT and 50% PPT;
- "Moderate" NP is between 15% PPT and 25% PPT;
- "Low" NP is between 5% PPT and 15% PPT; and
- "Very Low" NP is less than 5% PPT.

Within a single climatic regime, the same range of NP rates may be a result of the influence of differing abilities of a cover system to evapotranspirate water, and to promote runoff and interflow (i.e., lateral flow within the cover system) from the landform. Net percolation rates will also vary from year to year. For example, a high rainfall year (or, more specifically, several successive wetter than average climate

years) may result in a moderate net percolation rate for the year, even for a cover system scenario classified, on average, as having a low net percolation rate.

Cover performance with respect to oxygen ($O_2$) ingress can also be classified using the Global Cover System Design Technical Guidance Document (INAP, 2017) as follows:

- "Very High" $O_2$ ingress is greater than 100 mol/m$^2$/year;
- "High" $O_2$ ingress is between 50 and 100 mol/m$^2$/year;
- "Moderate" $O_2$ ingress is between 10 and 50 mol/m$^2$/year;
- "Low" $O_2$ ingress is between 1 and 10 mol/m$^2$/year; and
- "Very Low" $O_2$ ingress is less than 1 mol/m$^2$/year.

Limiting oxygen ingress is often achieved by limiting diffusion or restricting air flow by reducing pressure and/or thermal gradients. Usually, the most effective way to limit oxygen ingress is to create and sustain saturated conditions in a layer within the cover system. $O_2$ ingress is less challenging to limit in wetter environments where a tension-saturated layer is more easily maintained, and finer-textured material together with the tension saturated conditions will lead to reduced air permeability and therefore, advective gas transport. A similar range of performance exists for $O_2$ ingress as for NP where rates will vary from year to year. For example, a low rainfall year or several successive drier than average years will reduce the degree of saturation maintained within the cover system and may increase the predicted oxygen ingress rate for the year.

Limiting NP and $O_2$ ingress are not necessarily mutually beneficial and achieving reductions in either or both is site specific. Depending on available materials for cover system construction, limiting NP may result in less water available to maintain a saturated layer, whereas limiting $O_2$ ingress may require promoting additional NP. Hence, a technical assessment is required to make decisions on how best to optimize these two aspects to best take advantage of how each facet enhances performance for a particular project.

## 2.2 Site Specific Attributes

Assessment of the NAG backfill and cover system performance requires analysis of site attributes that constrain design alternatives to achieve the desired performance (INAP, 2017). The following site-specific attributes will be used to define performance of the NAG backfill design at Tenas:

- Climate;
- Hydrogeological setting;

- Materials;
- Vegetation; and,
- Geochemistry.

These key site attributes are described in the following sections based on background data provided by Telkwa.

## 2.3 Climate

The regional climate is a subarctic climate where winters are cold, averaging around -5°C during the period of November through February with temperatures potentially dropping to -30°C or colder, and summers are warm, with average temperatures greater than 20°C and highs of greater than 30°C are possible. Precipitation occurs as rain during the warmer months, accounting for 60-65% of annual precipitation. Snow accounts for 35-40% of annual precipitation with maximum accumulation of snow occurring in February-March.

The Project falls near the intersection of Dfc (subarctic climate) and Dsc (Mediterranean-influenced subarctic climate) of the Köppen-Geiger climate classification system (Peel *et al.*, 2007) where:

- D – 'continental' where average temperature of the coolest month is < -3 °C, and average temperature of the warmest month is > 10 °C;
- f – 'without dry season' where precipitation is evenly distributed throughout the year;
- s – 'dry summer' where precipitation of the driest month in summer is less than 40 mm and is also less than a third of the precipitation of the wettest month in winter; and
- c – 'cold summer' where one to three months average temperature reach >10 °C but < 22 °C.

## 2.4 Hydrogeological Setting

The results of historical hydrogeological investigations and *in-situ* testing are presented in Table 2.1. Surficial material is primarily sandy till to silty clay (Piteau, 1997), which is underlain by fractured sedimentary bedrock consisting of mudstones, siltstones, and sandstones (Klohn, 1985; Piteau, 1997; SRK 2018; 2019). *In-situ* hydraulic conductivity of the bedrock ranged from $6.0 \times 10^{-6}$ m/s to $1.0 \times 10^{-10}$ m/s.

Using the British Columbia Groundwater Wells Database, a search was completed, and 11 water wells were found in the vicinity of the mining operations. Nine domestic drinking water wells and two commercial water wells were found to be in the area N-NE of the mine site. Four of the wells are just south of the Telkwa River and west of Tenas Creek while the remaining seven (7) wells are east of Goathorn Creek. The range in finished depth of the water wells is 12 to 43 m below ground level (mbgl),

with a range of static head of 5.5 to 39 m below top of casing (btc), and an estimated yield range from 15 to 114 L/min.

Table 2.1 Record of hydrogeological investigations and *in-situ* testing.

| Location and Geology | Hydrogeological Instrumentation | Groundwater Flow and Piezometric Surface | *In-Situ* Hydraulic Conductivity (K) and Linear Flow Velocity (V) |
|---|---|---|---|
| Telka Site (Klohn, 1985)<br>Variable thicknesses of glacial till and gravel overlying sequences of sandstones, siltstones, mudstones, and coal. Bedrock dips 15-20 degrees to the east and is structurally dominated by several N-S trending reverse faults and normal faults which trend N-S and EW. Bedrock is of low permeability and contains no stratigraphically definable aquifers. The groundwater table is at or close to ground surface for much of the eastern part of the site. Breccia filled fault zones are expected to be significant conductors of groundwater. | 16 piezometers installed<br>(*none of the piezometers are still functional) | 23 rural households within<br>3 km of the mine area obtain their domestic water supplies from groundwater, either by dug wells (2 to 6 m depth) or by drilled wells<br>(less than 50 m depth)<br><br>Domestic well records indicate that groundwater in the area is at about 12.5 m depth within a gravel layer. | Coefficient of permeability,<br>Coal:<br>$5 \times 10^{-7}$ to $5 \times 10^{-9}$ m/s<br><br>Siltstone, Mudstone Sandstone:<br>$2 \times 10^{-7}$ to $1 \times 10^{-10}$ m/s<br>Recharge was estimated as 3% of annual precipitation based on the estimated groundwater flux and a value for hydraulic conductivity derived from the packer tests. |
| Tenas Pit (Piteau, 1997)<br>Telkwa coal lease is underlain by coal-bearing sedimentary sequence comprising siltstone, sandstone, mudstone, and shale strata of the Lower Cretaceous age Skeena Group (Units 1-4). Economic coal seams in Unit 1 – 120 mm thick sequence of interbedded coal and sedimentary rocks.<br>Faulting is near vertical, one group strikes ~NW/SE and other group strikes ~NE/SW. Few E/W striking faults.<br>Surficial deposits are primarily till ranging from sandy silt to silty clay with minor gravel with range in thickness from less than 3 m to more than 10 m. | 4 piezometers within coal seam #1 in 1995<br>5 piezometers in the major coal seams at three new locations in 1996 | NE direction with horizontal hydraulic gradient of ~0.1.<br>Flowing artesian conditions exist in all but 3 piezometers completed in coal seam #1. | K range of<br>$2.1 \times 10^{-8}$ to $6.0 \times 10^{-6}$ m/s<br>Average V is 115 m/year but does not consider local fault or fracture zones.<br>V in the range of<br>10 to 250 m/year may be expected. |

| Location and Geology | Hydrogeological Instrumentation | Groundwater Flow and Piezometric Surface | *In-Situ* Hydraulic Conductivity (K) and Linear Flow Velocity (V) |
|---|---|---|---|
| Waste Dumps (Piteau, 1997)<br>Waste dump sites underlain by till from 3.75 - 13.5 m thick. Thinnest till blanket is deposited directly on the bedrock surface and thickest till deposit overlies outwash sediments. East side of Tenas pit, thin 6.0 m till overlies permeable sands and gravels. Where overburden is more than 10 m thick, bedrock is overlain by high permeability sand and gravel outwash deposits. The thickest of which (106 m) is in the NW corner of the Tenas waste dump sites where a buried channel (clays, sands, and gravels) exists where the depth to bedrock exceeds 117 m.<br>Bedrock from 4.6 - 117 m consists of either volcanic ash or interbedded sequences of siltstone and mudstone with occasional sandstone. | 11 holes drilled at 9 locations | Interpreted to follow topography within surficial sediments between 0.5 - 2.0 m. Depending on location, shallow groundwater flow will either be in a northwesterly or northeasterly direction towards Tenas Creek or Four Creek.<br>At one piezometer nest, strong downward vertical gradients indicative of groundwater recharge conditions exist between upper and lower water-bearing deposits.<br>Due to upland topography of the waste dump sites, groundwater recharge conditions are expected to prevail. | Three single well response tests indicated K of the upper water-bearing till deposit to be in the range of $2.8 \times 10^{-9}$ to $7.2 \times 10^{-7}$ m/s.<br>These values are low and thus vertical infiltration rates through this deposit would similarly be expected to be low. |
| Pit 3 (Piteau, 1997)<br>Bedrock: alternating sequence of siltstone, mudstone, sandstone, and coal with sporadic volcanic tuffs throughout the sequence.<br>Complex series of sub-parallel, N-S trending reverse faults and N-S, and to a lesser extend E-W, trending normal faults. Bedrock overlain by ~10 - 15 m of silty clay till with minor coarse fragments and sand. | 5 piezometers installed at 3 locations in Pit 3. At each location, a piezometer was completed across coal seam #2<br>A second piezometer was installed across coal seam #4 at two locations. | Within coal units, groundwater flow is interpreted to be in a north to northwesterly direction.<br>Horizontal hydraulic gradient of ~0.04.<br>Depth to water ranged from 7.55 - 36.73 mbgs. | From one single well response test, K of coal seam #2 estimated at $4.3 \times 10^{-10}$ m/s.<br>From two single well response tests, K of coal seam #4 estimated at $8.5 \times 10^{-7}$ m/s and $3.7 \times 10^{-6}$ m/s.<br>Average V in coal seams estimated range 20-100 m/year. |
| Mine rock dumps and sediment ponds (SRK, 2018) | 13 sonic drillholes to depths between 9.0 m and 30.8 m upon reaching bedrock or sufficiently high soil density. | Two sonic piezometers were dry, one had water up to ground level and the last had a depth to water of ~14 m. | - |

| Location and Geology | Hydrogeological Instrumentation | Groundwater Flow and Piezometric Surface | *In-Situ* Hydraulic Conductivity (K) and Linear Flow Velocity (V) |
|---|---|---|---|
| | 4 standpipe piezometers were installed for groundwater monitoring in 2017.<br>8 diamond drillholes with lengths from 70 m to 213.7 m were drilled. 3 of these drillholes had piezometers installed in them. | | |
| Management ponds, sediment ponds, external soil/rock piles and infrastructure pad (SRK, 2019) | 12 sonic drillholes were terminated at depths between 10.7 m and 67.1 m upon reaching bedrock. 12 standpipe piezometers were installed for groundwater monitoring in 2018. | The shallowest groundwater levels were approximately 14 mbgs but the piezometric table was located between 20 m and 40 m within the overburden soils. | - |

## 2.5 Materials

Site-specific material characterization and availability are the two main elements for cover system design. Material selection and strategic placement is a key control on cover system performance and is used to provide a means for functions such as vegetation establishment, erosion control, and drainage where required in the cover system design (MEND, 2004).

Surficial deposits (overburden) within the Project Area are primarily till ranging from sandy silt to silty clay with minor gravel (and less than 5% cobbles and boulders) with a range in thickness over the Tenas Project Area from 4 m to 100 m (SRK, 2018). Recent drilling investigations (SRK, 2018; 2019) of the overburden material are in agreement with historical investigations (Klohn, 1985; Piteau, 1997) except for no sand and gravel outwash deposits in the northwest of the project site reported in Piteau (1997) being encountered in current drill holes (SRK, 2018; 2019). The till surface deposits will be excavated in the mining process and stockpiled for later use in the cover systems or direct placed from mining.

The bedrock in the Tenas Open Pit is of the early Cretaceous-aged Skeena Group and consists of alternating sequences of siltstone, mudstone, sandstone, and conglomerates with inter-bedded, bituminous coal seams (SRK, 2018). In Unit 1 a sedimentary sequence from 50 m to 120 m in thickness is interbedded with Coal Seam 1 (Seamas 1A-1F) with individual thicknesses of 1 m to 3 m (SRK, 2018). To access the inter-bedded coal layers, the bedrock will be excavated becoming mine rock to be placed in lifts and covered with the till material.

Particle size distribution (PSD) data was only available for the overburden till material and no information was available for the mine rock. The overburden material can be grouped into two categories based on the PSD data, a poorly-graded till and a well-graded till. Figure 2.2 shows the range of PSDs for each group based on the testing completed by SRK in 2019 (SRK, 2019). Following completion of sample compaction tests, four till samples were assessed for permeability, the results ranged from $1.04 \times 10^{-7}$ m/s to $1.18 \times 10^{-10}$ m/s (SRK, 2018).

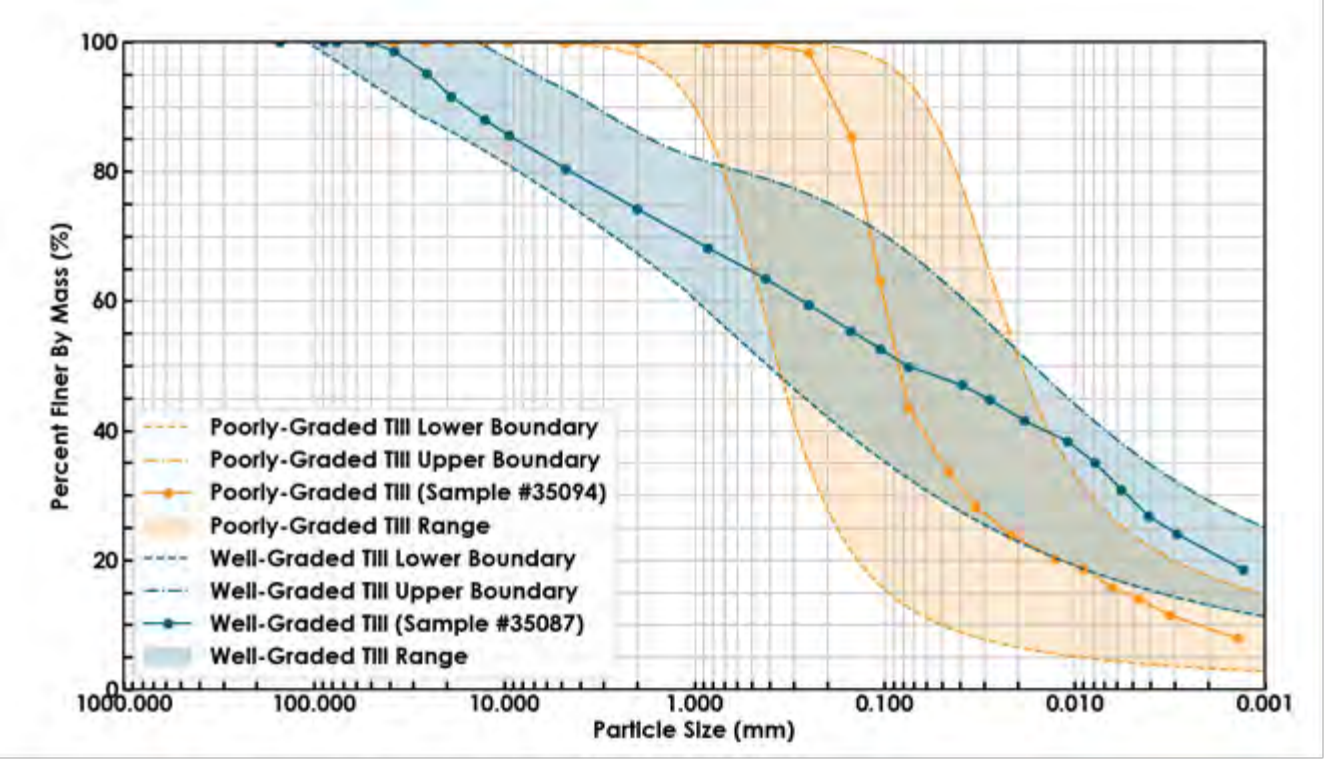


Figure 2.2: Range of PSDs for Poorly-Graded and Well-Graded Till based on SRK (2019).
(adapted from SRK, 2019)

## 2.6 Vegetation

The Project is located within the Sub-Boreal Spruce (SBS) zone of the biogeoclimatic zones of British Columbia. The dominant coniferous tree species in this zone include hybrid white spruce (hybrid of Engelmann spruce and white spruce), sub-alpine fir, lodgepole pine, and occasionally, black spruce and Douglas-fir (BC Ministry of Forests, 1998). Deciduous species include trembling aspen and paper birch.

## 2.7 Geochemistry

Non-potentially acid generating mine rock will be used as backfill into the Open Pit. Although sulfide minerals are present (and sulfide oxidation is expected), these materials contain an excess of neutralization potential (at least 2x) relative to the acid potential (AP) and are not expected to generate acidic drainage (Price, 2009). However, sulfide oxidation products will still be generated and transported through the mine rock by contact water. Concentrations of select dissolved trace metals and sulfate will be constrained by secondary mineral precipitation (e.g., gypsum and metal hydroxide phases) and adsorption to iron hydroxides that typically precipitate in circum-neutral mine waters. However, even with these solubility controls, metal loads from pyrite oxidation could still pose a risk to downstream

receptors. A conceptual model of geochemical reactions occurring along a typical flow path within the Tenas NAG mine rock is shown in Figure 2.3.

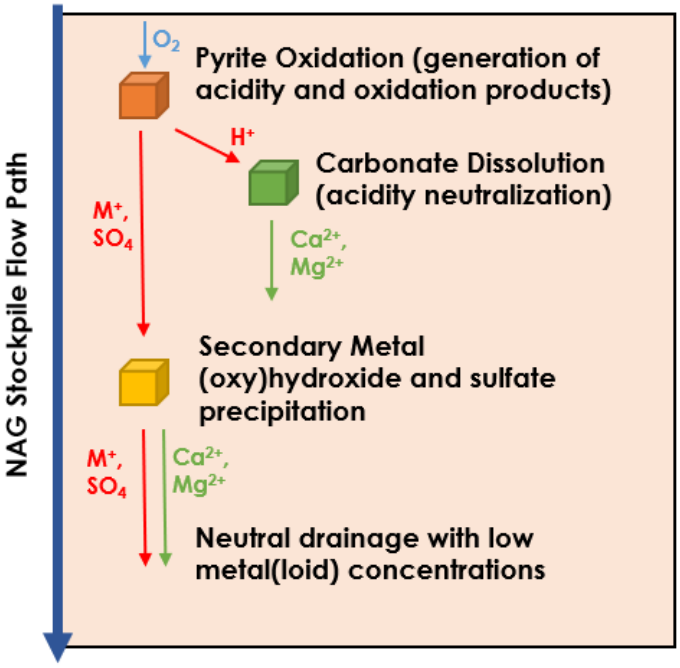


Figure 2.3: Geochemical conceptual model for Tenas NAG mine rock flow path.

Parameters that were elevated above typical crustal concentrations within the Project Area were: arsenic, phosphorus, sulfur, and selenium. Although elevated solid-phase concentrations do not necessarily imply that these species will be mobilized and result in elevated concentrations in contact water, solid-phase metals analysis was completed to flag potential contaminants of concern to evaluate in further geochemical testing.

Current geochemical characterization recommended the use of a neutralization potential ratio (NPR) > 1.60 to classify mine rock as NAG (where, NPR = neutralization potential / acid potential) during verification testing completed during the Operations phase of the Project. For planning and the EAC submission, an NPR cutoff of 2.0 was used to classify mine rock as NAG or PAG, with values > 2.0 considered NAG. This is based on a strong correlation between $NP_{XRD}$ and modified NP following correction for iron carbonates and was developed using calcium and magnesium molar ratios in humidity cell tests (HCTs; SRK, 2022b).

Dolomite-ankerite and calcite are the most abundant carbonate minerals with lesser amounts of siderite in NAG mine rock while PAG mine rock has a higher siderite content. Dolomite-ankerite content ranged from 0.3 to 23.8 wt.% (median = 14.0 wt.%), while calcite ranged from below detection (BD) to 4.4 wt.% (median = 1.4 wt.%). Siderite content ranged from 0.2 to 12.6 wt.% (median = 2.0 wt.%). It is worth noting that siderite does not provide net neutralization to acidity generated from sulfide oxidation. This is because Fe(II) released from siderite dissolution typically oxidizes to Fe(III) which precipitates Fe(III)

hydroxide phases, releasing acidity. Therefore, the bulk of acidity neutralization in the NAG mine rock will come from the dissolution of calcite and dolomite. The primary sulfide mineral in the PAG mine rock is pyrite, which ranges from 0.3 to 2.5 wt.% (median = 0.8 wt.%).

# 3 DESCRIPTION OF MODELLING PROCESSES

To estimate seepage quantity and quality for the backfilled NAG mine rock in the Open Pit, Okane used the following numerical models and modelling process.

1) *One-Dimensional (1D) Soil-Plant-Atmosphere (SPA) Models* using components of the GeoStudio FLOW (Bentley Systems, 2022) modelling suite (namely, SEEP/W and TEMP/W) to simulate the NP rate.

2) *Two-Dimensional (2D) Oxidation Model* using the GeoStudio FLOW suite, including SEEP/W, TEMP/W, CTRAW/W, AIR/W, and the Gas Consumption and Exothermic Reactions Add-In Module to evaluate the size and development of suboxic conditions.

3) *Three-Dimensional (3D) GoldSim Oxidation, Wetting-Up and Draindown Model* to determine a range for potential seepage and oxygen consumption based on hundreds of realizations of the model, using the GoldSim Monte-Carlo formulation (GoldSim, 2021).

4) The *Geochemical Model* using a combination of both a *mechanistic reactive transport model* and a *scale-up geochemical model* to evaluate the evolution of water quality moving through the overburden cover and into the backfilled NAG mine rock.

The source terms from the geochemical model will be provided to SRK to be used in the site-wide water quality model to evaluate the potential effects of key mine facilities on the receiving environment. The following sections describe the numerical models in more detail.

## 3.1 1D Soil-Plant-Atmosphere Model with GeoStudio SEEP/W and TEMP/W

In combination, SEEP/W and TEMP/W are a 2D finite element model (which can also perform 1D simulations) that predict suction in the material profile in response to climatic forcing (such as evaporation) and lower boundary conditions (such as a water table). A key feature of the software is the ability of the model to predict actual evapotranspiration (AET) based on potential evaporation (PE) and predicted suction, as opposed to the user being required to input these surface flux boundary conditions. The AET rate from the surface material is below the potential rate during prolonged dry periods because the suction, or negative pore water pressure, in the material profile increases as the surface desiccates. In addition, SEEP/W and TEMP/W together form a fully coupled (through the vapour pressure term) heat and mass transfer model, which can predict water vapour movement and the influence of freeze/thaw on hydraulic conditions through reductions in the hydraulic conductivity. The 1D SPA models provide runoff and NP estimates, which are used as inputs in the 2D Oxidation and 3D GoldSim Oxidation, Wetting-Up, and Draindown models.

## 3.2 2D Oxidation Models

The 2D oxidation modelling was completed using the GeoStudio FLOW suite (SEEP/W, TEMP/W, CTRAN/W, and AIR/W) and the Gas Consumption and Exothermic Reaction Add-In to evaluate the size and development of suboxic zones within the NAG backfill. The models will account for annual material placement and provide estimates of the timing and depth to the suboxic zones, which are used in the 3D GoldSim model, as well as an estimate of cumulative oxygen ($O_2$) consumption with time, which is used to calibrate and validate the 3D GoldSim results.

## 3.3 3D GoldSim Oxidation, Wetting-Up and Draindown Model

The 3D model is a wetting-up and drain-down model developed by Okane in GoldSim to simulate the water movement in mine rock based on climate data and material properties. In the model, gravity-driven water flow depends on the NP rate and hydraulic conductivity. The hydraulic conductivity of each layer of mine rock is calculated based on the following formula with measured material properties:

$$k(h) = k_s S_e^l \left[1 - \left(S_e^{\frac{1}{m}}\right)^m\right]^2 \quad (1)$$

where $S_e$ is the effective saturation, $k_s$ is the saturated hydraulic conductivity ($LT^{-1}$), $n$ and $m$ are van Genuchten's equation parameters, and $l$ is the pore-connectivity parameter. The effective saturation, $S_e$, within the layer is defined as:

$$S_e = \frac{\theta_w - \theta_{wr}}{\theta_s - \theta_{wr}} \quad (2)$$

where $\theta_w$ is the volumetric water content of the layer, $\theta_{wr}$ is the residual volumetric water content ($L^3/L^3$), and $\theta_s$ is the saturated volumetric water content ($L^3/L^3$). The van Genuchten equation parameter $m$ is defined as a function of $n$ as:

$$m = 1 - \frac{1}{n} \quad (3)$$

In the modelling process, hydraulic conductivity is calculated based on the water content of each layer of mine rock. This parameter is then used to calculate the flow rate of water between layers of mine rock. The change in water content due to the placement of new mine rock can also be simulated as part of the hydrogeology model. The Monte-Carlo formulation is used to vary the material properties for each lift of material within an anticipated range to produce a more realistic estimate of overall backfill performance.

The 3D models were extended an additional 50 years to 2150 using stochastic net percolation inputs based on the 1D water balance to ensure that steady state seepage was reached.

## 3.4 Geochemical Model

The evolution of water quality in the backfilled NAG mine rock was evaluated using a combination of both a mechanistic reactive transport model and a scale-up geochemical model.

The *Mechanistic Reactive Transport Model* was constructed with PHREEQC v.3 (Parkhurst and Appelo, 2013) and accounts for geochemical characteristics such as mineralogy, reaction kinetics, transport time, and oxygen conditions of the mine rock. This model incorporates key reactive minerals including sulfides and carbonates, chronology of the NAG mine rock placement, and cover system placement and source control implementation leading to suboxic zone development.

The *Scale-up Geochemical Model* was completed to estimate parameters that were not modelled using the Mechanistic Geochemical Model, and generally consist of parameters not directly influenced by sulfide oxidation or carbonate mineral dissolution. Parameter concentrations were calculated based on field barrel leachate quality and scaled-up based on the physicochemical differences between the smaller scale test conditions and expected field conditions of the NAG backfill.

## 3.5 Model Inputs

### *3.5.1 Base Case Geometry*

The in-pit NAG backfill will be constructed as 120 m wide by 36 m high cells, with a 3 m cover of compacted overburden on the slope of the cell and 1 m of compacted overburden on the plateau of each cell. The cells will be built starting with the face of the slope as a 4 m by 50 m lift / road (1 in Figure 3.1). The overburden and NAG mine rock will be end dumped and compacted in 1.33 m lifts. The second lift will be a 4 m by 39 m lift (2 in Figure 3.1) on top of the first lift, followed by a third lift of 4 m by 28 m (3 in Figure 3.1). The remaining space within the cell will be end dumped as a 12 m high standard dump (4 in Figure 3.1). This process is planned to occur three times per cell, resulting in a 35 m high cell. The last step of each cell is the addition of a 1 m compacted overburden layer, completing the 36 m high cell.

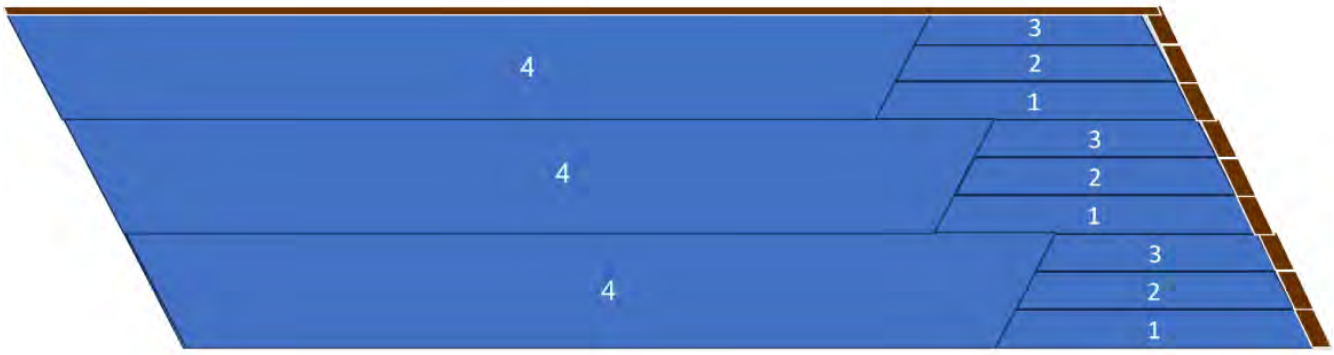


Figure 3.1: Building plan for the cells within the backfilled open pit NAG mine rock landform.

Cells will be stacked and reach an approximate height of three 36 m cells to complete the backfill within the Open Pit, as the bottom and top cells are anticipated to be half height, as shown in Figure 3.2, due to the pit bottom shape and final reclamation goals.

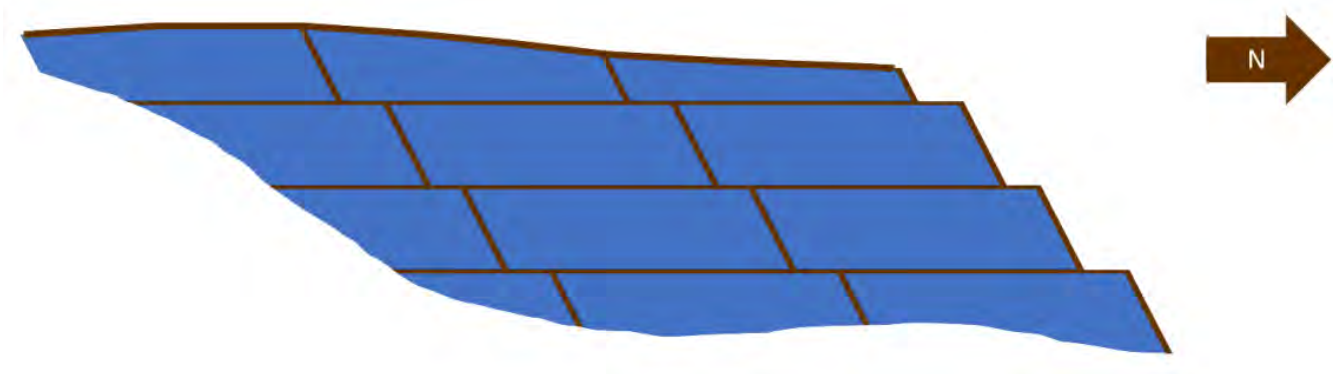


Figure 3.2: Encapsulation plan for NAG in-pit mine rock.

The final cover system on the landform will be 3 m of overburden overlain by approximately 0.3 m of surface soils (topsoil). The 1D models were constructed as 35 m of mine rock with the final cover system at the surface. These models were used to investigate the different material combinations.

A cross-section through the NAG backfill was modelled in 2D to determine the development and extent of the suboxic zone within the backfill. Figure 3.3 shows the approximate location of the cross section while Figure 3.4 shows the 2D geometry that was modelled.

An additional scenario that did not include the internal overburden layers was also modelled. This scenario assumed that the Open Pit would be backfilled following the same procedure as outlined above, but the entire 36 m cell would be composed of mine rock, with only the final cover system being composed of overburden.

Figure 3.3: Plan view of the backfill open pit NAG mine rock showing the strips and approximate location of the projected cross section.

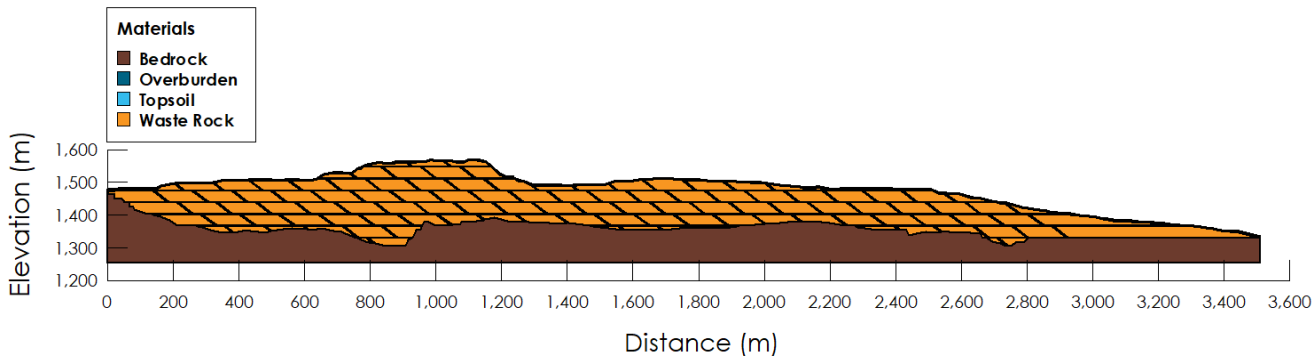


Figure 3.4: Geometry of the project 2D cross section. It should be noted that bedrock refers to bedrock of open pit, waste rock is the NAG mine rock and topsoil includes surface soils.

Within the 3D GoldSim model, the backfilled NAG mine rock was simulated by subdividing its area into 23 main strips, with each strip representing areas with similar timing of cover placement (Figure 3.3). The construction schedule for each strip was assumed based on the filling volumes and timing provided by Telkwa. The following assumptions were made regarding the placement of NAG mine rock for the GoldSim simulations:

- Construction of the NAG backfill is strip dependent, but in general, begins in Year 6 for the main strips and continues until the completion of the Operation phase in Year 21;
- Cover system placement is strip dependent and will be assumed to occur over one year (*e.g.*, cover placement that occurred in Year 8 will be assumed to occur at a uniform rate from January 1 to December 31 of Year 8). Cover system placement is assumed to occur in the year following completion of each strip due to model limitations; and
- Daily NP rate inputs will be derived separately from the 1D GeoStudio model results. In general, daily stochastic inputs will be setup for each day of the year based on the results of the GeoStudio models.

The assumed height of NAG mine rock and overburden in each strip with time, based on the volume of material placed and the surface area of the strip is shown in Figure 3.5. The surface area, total NAG mine rock and overburden volumes, and timing of cover system placement are listed in Table 3.1. For the no internal layers scenario, the internal layer volume was assumed to be NAG mine rock rather than overburden.

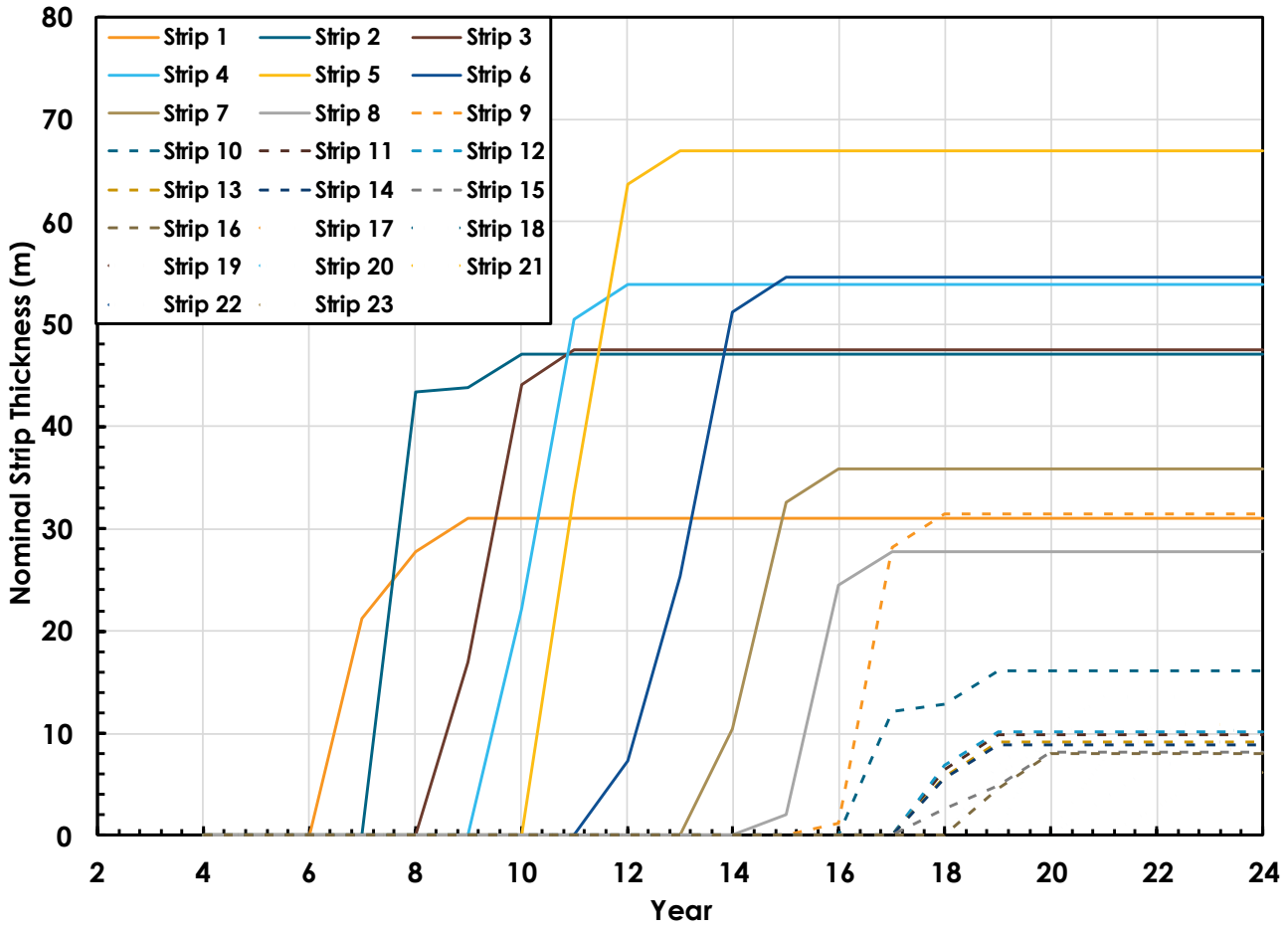


Figure 3.5: Evolution of nominal strip thickness within the GoldSim model for each strip.

Table 3.1: Surface area, volume, and nominal thickness of each strip, along with year of cover system placement.

| Strip | Strip Surface Area ($m^2$) | Mine Rock Volume ($m^3$) | Internal Layers Overburden Volume ($m^3$) | Cover System Overburden Volume ($m^3$) | Total Strip Volume[1] ($m^3$) | Nominal Thickness (m) | Year of Cover Placement |
|---|---|---|---|---|---|---|---|
| 1 | 41,897 | 1,065,383 | 95,548 | 71,661 | 1,232,593 | 31 | Year 8 |
| 2 | 49,774 | 2,035,361 | 143,168 | 107,376 | 2,285,907 | 47 | Year 9 |
| 3 | 61,199 | 2,529,237 | 171,692 | 128,769 | 2,829,695 | 47 | Year 10 |
| 4 | 71,013 | 3,336,530 | 250,260 | 150,156 | 3,736,944 | 54 | Year 11 |
| 5 | 78,079 | 4,660,016 | 305,995 | 183,597 | 5,149,606 | 67 | Year 12 |
| 6 | 95,072 | 4,580,978 | 288,455 | 173,073 | 5,042,504 | 55 | Year 14 |
| 7 | 95,482 | 2,895,869 | 209,244 | 156,933 | 3,262,049 | 36 | Year 15 |
| 8 | 92,182 | 2,102,945 | 155,400 | 116,550 | 2,374,893 | 28 | Year 16 |
| 9 | 61,588 | 1,611,409 | 123,760 | 92,820 | 1,827,988 | 31 | Year 17 |
| 10 | 93,728 | 1,077,586 | 123,928 | 92,946 | 1,294,461 | 16 | Year 18 |

| Strip | Strip Surface Area ($m^2$) | Mine Rock Volume ($m^3$) | Internal Layers Overburden Volume ($m^3$) | Cover System Overburden Volume ($m^3$) | Total Strip Volume[1] ($m^3$) | Nominal Thickness (m) | Year of Cover Placement |
|---|---|---|---|---|---|---|---|
| 11 | 132,059 | 684,134 | 173,334 | 86,667 | 944,138 | 10 | Year 18 |
| 12 | 100,087 | 562,842 | 127,240 | 95,430 | 785,515 | 10 | Year 18 |
| 13 | 105,498 | 486,553 | 126,556 | 94,917 | 708,023 | 9 | Year 18 |
| 14 | 104,842 | 461,895 | 126,664 | 94,998 | 683,556 | 9 | Year 18 |
| 15 | 105,081 | 387,746 | 121,744 | 91,308 | 600,798 | 8 | Year 19 |
| 16 | 95,046 | 343,940 | 98,832 | 98,832 | 541,604 | 8 | Year 19 |
| 17 | 91,078 | 368,246 | 96,090 | 96,090 | 560,424 | 8 | Year 19 |
| 18 | 87,435 | 506,810 | 108,252 | 81,189 | 696,251 | 10 | Year 19 |
| 19 | 88,006 | 412,599 | 108,160 | 81,120 | 601,876 | 9 | Year 19 |
| 20 | 102,696 | 899,529 | 155,640 | 93,384 | 1,148,551 | 14 | Year 20 |
| 21 | 162,765 | 1,054,401 | 184,100 | 110,460 | 1,348,963 | 11 | Year 21 |
| 22 | 120,549 | 336,966 | 106,156 | 79,617 | 522,740 | 7 | Year 21 |
| 23 | 324,682 | 755,903 | 157,040 | 235,560 | 1,148,505 | 6 | Year 22 |
| *Total* | *2,359,838* | *33,156,878* | *3,557,258* | *2,613,453* | *39,327,584* | - | - |

1 - Includes total NAG mine rock and overburden volumes.

### *3.5.2 Material Properties*

The hydraulic properties or functions required for modelling of overburden and NAG mine rock material are as follows:

- Water retention curve (WRC – volumetric water content versus matric suction): a continuous function relating energy and the state of water, and hence describes the water content of a material as a function of the soil suction, or negative pore-water pressure. It is central to the design of an unsaturated soil system.

- Hydraulic conductivity function (k-function – hydraulic conductivity versus matric suction): a measure of the ability of a soil or rock material to transmit water and is a maximum for saturated soil or rock materials. The saturated hydraulic conductivity ($k_{sat}$) and unsaturated hydraulic conductivity function are key input parameters to numerical models analyzing hydraulic performance.

For the best results, WRC and $k_{sat}$ should be measured in the laboratory and field for each material of interest. In this case, only particle size distribution (PSD) data was available for the overburden material and no information was available for the NAG mine rock. Two PSDs for the overburden material were used as representative samples for well-graded (sample# 35087) and poorly-graded (sample# 35094) till found in the SRK 2019 field investigations (Figure 2.2).

For the overburden material the WRC (Figure 3.6) and k-function (Figure 3.7) were estimated from the PSD (both well-graded and poorly-graded) using the Fredlund and Xing (1994) pedotransfer functions in SVSOILS™ Software (Plaxis, 2022). The $k_{sat}$ was estimated using Kozeny (1962) with PSD data as the input.

As no lab or field information was available for the NAG mine rock, three proxy materials (mudstone, siltstone, and sandstone) were provided by Okane based on field testing completed at several mine sites. A well-graded mixed material based on core logs consisting of 35% mudstone, 60% siltstone, and 5% sandstone (D. Farmer, 2024, pers. comm.) was also estimated. The WRC and k-functions for the mine rock proxy materials are found in Figure 3.6 and Figure 3.7, respectively.

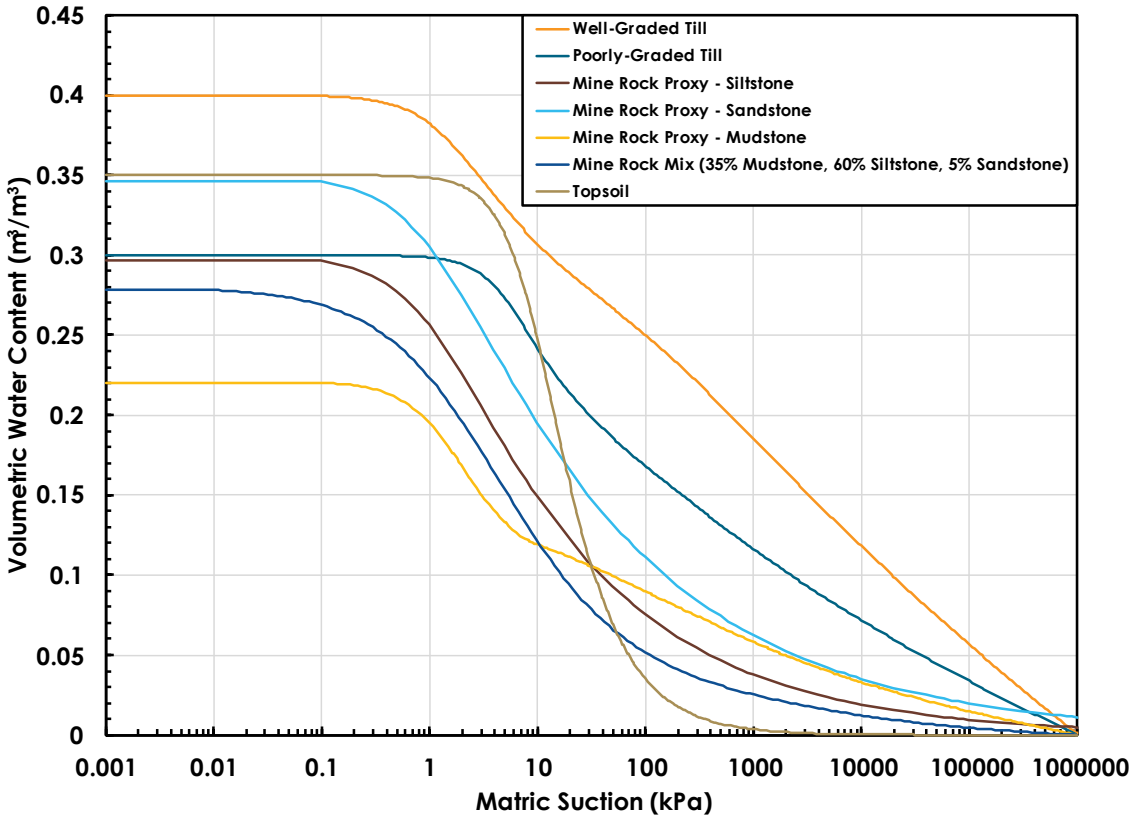


Figure 3.6: Estimated overburden (till) and proxy mine rock water retention curves.

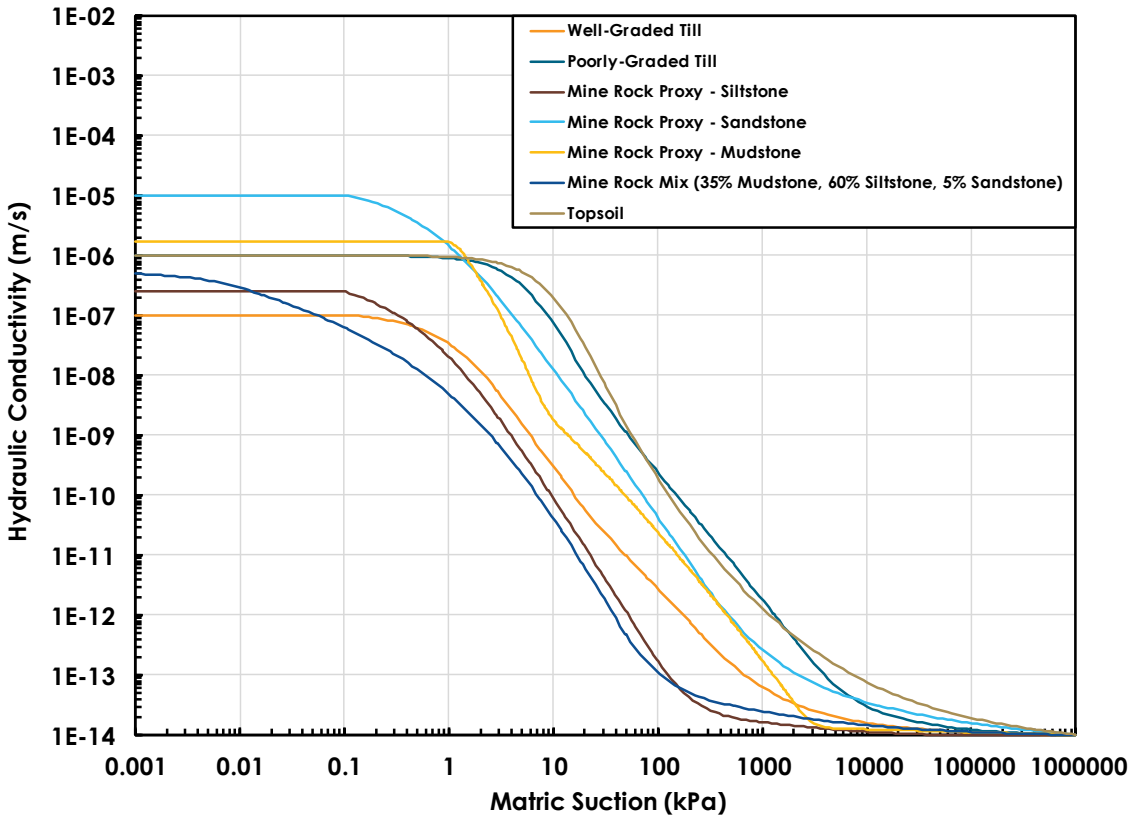


Figure 3.7: Estimated overburden (till) and proxy mine rock k-functions.

### *3.5.3 Climate Model Inputs*

SRK (2022c) developed a project-specific synthetic historical climate database based on transposing regional datasets to the site and adjusting for orographic effects. The historical dataset spans 77 years from 1943 to 2020 and is summarized in Table 3.2.

SRK (2022c) also completed a climate change assessment for the project using the fifth version of the Coupled Model Intercomparison Project (CMIP5) and Representative Concentration Pathway (RCP) 4.5 of the Intergovernmental Panel on Climate Change (IPCC) fifth Assessment Report (AR5) (IPCC, 2014). Monthly rates of changes relative to baseline conditions (1981-2010) were calculated for temperature and precipitation based on the median values of an ensemble of 29 CMIP5 models. Projected climate change effects were evaluated for three consecutive 30-year forecast periods, defined as follows:

- Baseline period from 1981 to 2010 (CMIP5), centred on 1995;
- First forecast period from 2011 to 2040 (CMIP5), centred on 2025;
- Second forecast period from 2041 to 2070 (CMIP5), centred on 2055; and

- Third forecast period from 2071 to 2100 (CMIP5), centred on 2085.

Monthly changes relative to monthly baseline data for RCP4.5 are shown in Table 3.3 for temperature and Table 3.4 for precipitation. A long-term daily dataset (SRK, 2023a) was developed by applying the monthly changes to the average monthly values from the baseline period.

This climate change dataset was used directly as the upper boundary condition in the 1D SPA modelling through the Land-Climate Interaction (LCI) and Surface Energy Balance (SEB) boundary conditions to develop the surface water and energy balance, which was used as the upper boundary conditions in the 2D and 3D models.

Table 3.2 Monthly summary of historical climate database.

| Month | Air Temperature (°C) | | Precipitation[1] (mm) | | | | Solar Radiation (W/m²) | Relative Humidity (%) | Lake Evaporation (mm) | Wind Speed (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Maximum | Minimum | Mean | Rainfall | Snowfall | Total | | | | |
| January | -5.8 | -12.6 | -9.2 | 6.1 | 53.9 | 60.0 | 38 | 83.6 | 0 | 2.0 |
| February | -1.8 | -10.4 | -6.1 | 1.0 | 33.9 | 34.9 | 64 | 79.3 | 0 | 1.9 |
| March | 2.2 | -7.5 | -2.7 | 0.3 | 26.5 | 26.8 | 114 | 71.2 | 0 | 2.0 |
| April | 7.4 | -3.1 | 2.1 | 12.5 | 19.6 | 32.2 | 173 | 63.3 | 60 | 2.2 |
| May | 12.9 | 0.8 | 6.8 | 41.5 | 8.3 | 49.8 | 220 | 61.3 | 97 | 2.1 |
| June | 16.5 | 4.7 | 10.7 | 68.7 | 1.2 | 69.9 | 224 | 65.7 | 108 | 1.9 |
| July | 19.0 | 6.9 | 13.0 | 57.3 | 0.0 | 57.3 | 224 | 68.8 | 116 | 1.7 |
| August | 18.6 | 6.4 | 12.5 | 55.2 | 0.1 | 55.3 | 201 | 72.1 | 99 | 1.5 |
| September | 13.7 | 3.1 | 8.4 | 63.9 | 3.5 | 67.4 | 134 | 79.5 | 50 | 1.5 |
| October | 6.5 | -1.4 | 2.6 | 42.4 | 42.0 | 84.3 | 73 | 82.1 | 0 | 1.9 |
| November | -0.8 | -6.8 | -3.8 | 5.4 | 67.3 | 72.7 | 40 | 85.9 | 0 | 1.9 |
| December | -4.6 | -11.2 | -7.9 | 2.1 | 53.7 | 55.8 | 34 | 85.4 | 0 | 2.0 |
| *Annual* | *7.0* | *-2.6* | *2.2* | *356.4* | *310.0* | *666.4* | *128* | *74.8* | *529* | *1.9* |

(SRK, 2022c)

[1]Total precipitation was updated by SRK (SRK, 2023b) in November 2023 based on analysis against measured data at Tenas Deposit Station. Rainfall and snowfall were calculated by Okane assuming a threshold temperature of 0 °C.

Table 3.3 Monthly average temperature increase from the baseline period for RCP4.5 (in °C).

| Period | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2011-2040 | 1.25 | 1.23 | 1.16 | 1.13 | 1.35 | 1.44 | 1.35 | 1.21 | 1.00 | 0.97 | 1.02 | 0.86 | 1.2 |
| 2041-2070 | 2.89 | 2.16 | 2.42 | 2.30 | 2.60 | 2.51 | 2.45 | 2.39 | 2.11 | 2.07 | 2.26 | 2.48 | 2.4 |
| 2071-2100 | 3.45 | 2.79 | 3.01 | 3.04 | 3.14 | 3.13 | 3.24 | 2.99 | 2.72 | 2.56 | 2.85 | 2.97 | 3.0 |

Table 3.4 Monthly average precipitation variation from the baseline period for RCP4.5 (in %) (from SRK, 2022c).

| Period | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2011-2040 | 5% | 7% | 6% | 0% | 14% | 2% | 1% | -1% | 5% | 7% | 4% | 3% | +5% |
| 2041-2070 | 12% | 8% | 14% | 14% | 34% | 33% | -5% | 0% | 10% | 12% | 11% | 12% | +12% |
| 2071-2100 | 12% | 11% | 16% | 9% | 48% | 23% | -23% | 2% | 14% | 18% | 16% | 18% | +15% |

### *3.5.4 Vegetation Model Inputs*

Vegetation model inputs were based on the SBS bio-geoclimatic zone. Prior to reclamation, no vegetation was assumed. Once areas are reclaimed, vegetation was simulated to re-establish and grow.

To simulate the vegetation re-establishment the following assumptions were made:

- The year after cover system placement, grasses and shrubs are assumed to establish and grow.
- Grasses and shrubs are assumed to be the predominant vegetation for the first five years following cover system placement.
- Forest species are assumed to be the predominant vegetation after the grasses.

#### 3.5.4.1 Rooting Depth and Distribution

The rooting depth and distribution was described by the work of Jackson *et al.* (1996) using the equation:

$$Y = 1 - \beta d \qquad (4)$$

where $Y$ is the cumulative root fraction (a proportion between 0 and 1) from the soil surface to depth $d$ (cm), and $\beta$ is the fitted 'extinction coefficient', which Jackson *et al.* (1996) estimates as 0.943 for both grassland and boreal forest biomes. Hence, the same rooting depth and distribution (Figure 3.8) were used to represent both grasses and forest growth.

The maximum rooting depth is approximately 1.2 m, with 95% in the top 0.5 m of the cover system. This is like the root characteristics described in Klinka *et al.* (2000) for tree species in the region.

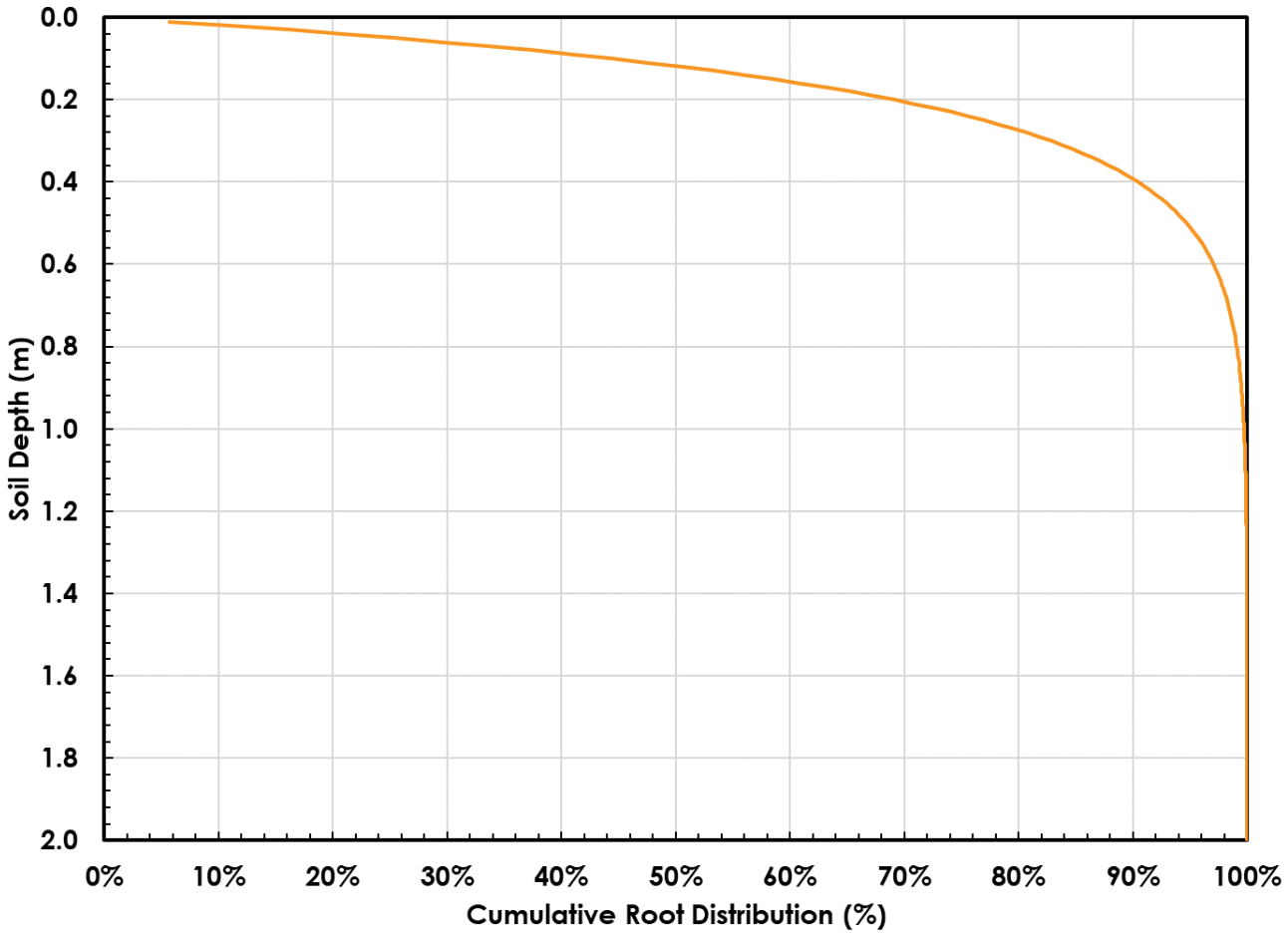


Figure 3.8: Estimated rooting depth and distribution for grasses and forest growth at Tenas Project.

### 3.5.4.2 Leaf Area Index and Percent Ground Cover

The Leaf Area Index (LAI) for grasses is estimated to be 1.7 with a percent ground cover of 70%. Once forest and understory species establish, LAI is estimated to increase to 2.3 with a percent ground cover of 85%. During the first seven years of vegetation, the LAI was increased annual by 0.3, starting at an LAI of 0.3, to gradually reach the mature forest vegetation LAI of 2.3.

### 3.5.4.3 Plant Water Limiting Function

Lack of available water and/or high evaporative demands will cause most plants to biologically react by closing stoma, reducing transpiration, and reducing metabolic reactions (Saxton, 1982). Under continued and increasing stress, the plant will reach its permanent wilting point (PWP), at which point transpiration is estimated to cease. The plant water limiting function (PWLF) defines the reduction in transpiration due to increased soil suction conditions. In general, the PWLF is defined to start to reduce at 10 kPa and stop transpiration entirely at a PWP of 1,500 kPa. This function was used to simulate grasses

growing on the cover system. Lopushinsky and Klock (1974) measured the PWLF for conifer species, which produced the PWLF (Figure 3.9). This PWLF was used to simulate forest growth.

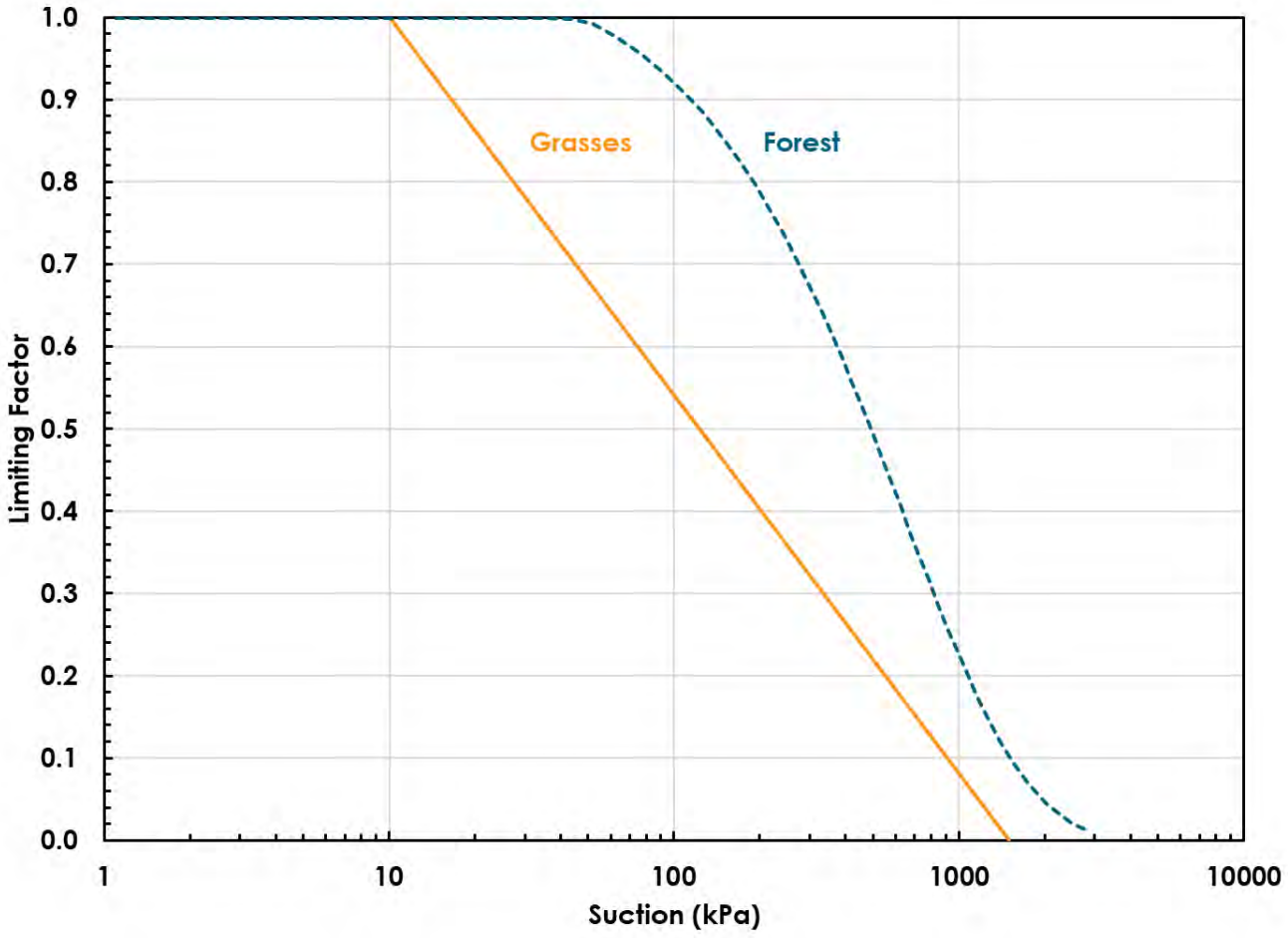


Figure 3.9: PWLFs estimated to simulate grasses and forest growth.

#### 3.5.4.4 Growing Season

To define the growing season, the following assumptions were made:

- The growing season starts once the snowpack is completely melted and mean daily air temperature is above 5°C.
- The growing season ends once the minimum temperature after September 1 drops below 0°C.

### *3.5.5 Lower Boundary Conditions*

The lower boundary condition was assumed to be a unit hydraulic gradient for the 1D simulations. This boundary condition assumes that the movement of water at the depth of the lower boundary is no longer influenced by atmospheric forces and is moving downwards only due to gravity.

#### 3.5.5.1 Initial Conditions

The initial conditions for the 1D SPA model were obtained by running the models twice, using the final conditions of the first simulation as the initial conditions of the second simulation. This is done to remove the subjectivity of the ascribed initial conditions from the model results. The initial conditions of the 2D and 3D models were based on the results of the 1D SPA model.

### *3.5.6 Geochemical Model*

Source terms for the NAG pit backfill were developed using a geochemical model based on the facility specific conceptual model. Source terms were modelled using both mechanistic reactive transport models and geochemical scale-up models. Source terms were developed for three scenarios; two cover system scenarios, a poorly graded till and sandstone mine rock scenario and a well graded till and blended mine rock (60% siltstone, 35% mudstone and 5% sandstone) with internal layers scenario and a third well graded till and blended mine rock (60% siltstone, 35% mudstone and 5% sandstone) without internal layers scenario. Source terms for the NAG pit backfill can be found in Appendix A.

#### 3.5.6.1 Geochemical Model Methodology

Reactive transport models utilized the geochemical code PHREEQC to apply mineralogical kinetics that applicable to NAG mine rock from the Project. The purpose of the reactive transport model was to incorporate mineral kinetics, water flow, and oxygen availability to simulate the evolution of sulfide oxidation rates, metal leaching, and carbonate dissolution simultaneously over a long-term timeframe. Reaction kinetics were calibrated to NAG mine rock barrel tests that are ongoing at the Tenas site (SRK, 2022b). The geochemical scale-up model utilized NAG barrel tests from the Tenas project to calculate loading rates of parameters that are not strongly influenced by sulfide oxidation and carbonate dissolution. Source terms of these parameters were scaled up to conditions representative of the NAG backfill.

Parameters that were modelled via the reactive transport model included pH, alkalinity, $SO_4$, Al, Ag, As, Ca, Co, Cr, Cd, Cu, Fe, Hg, Mg, Mn, Na, Ni, Pb, Si, Sr, Sn, U, V, Zn, $NO_3$, $NH_3$, and $NO_2$. The mechanistic reactive transport model was developed in two phases:

- *Phase 1* – The reactive transport model was developed and calibrated using mineralogical data and barrel test leachate data for representative NAG mine rock.

- *Phase 2* – The calibrated reactive transport model for the barrel test was scaled to field conditions by adjusting for the differences in hydrology, temperature, and mass of the reactive particle size fraction (< 6.35 mm in the barrel tests) between the barrel tests and full-scale conditions.

Parameters not incorporated into the reactive transport model were estimated using a geochemical scale-up model. This model was developed by scaling up barrel test production rates by using facility- and site-specific adjustment factors to obtain representative weathering rates. Parameters incorporated in this model included Ba, B, Be, Li, K, P, Si, Sr, Ti, and Zr. Adjustment to full scale conditions was completed by applying scaling factors for reactive particle size, and water contact.

#### 3.5.6.2 Model Development

Reactive transport models were developed for the B1 and B2 barrel tests combined and for the B7 barrel test. The B1 and B2 were combined as these barrels were constructed using the same NAG mine rock samples while the B7 barrel test used different NAG mine rock samples.

Mineralogical analyses for several samples used in the barrel tests reported a single mass for the dolomite-ankerite phase while other samples reported a unique mass for both dolomite and ankerite. Therefore, for modelling purposes it was assumed that if dolomite-ankerite was reported, 50% of this mass was dolomite and the other 50% was ankerite. The reactive mineralogy modelled in the NAG barrel tests is summarized in Table 3.5.

Table 3.5: Summary of reactive minerology in NAG mine rock barrel tests (from SRK, 2022b).

| Mineral Name | Unit | B1 and B2 | B7 | Median NAG Mine Rock |
|---|---|---|---|---|
| Calcite | wt.% | 2.3 | 0.5 | 1.4 |
| Siderite | wt.% | 7.3 | 7.8 | 2.0 |
| Dolomite | wt.% | 8.9 | 8.0 | 6.9 |
| Ankerite | wt.% | 7.9 | 3.4 | 0.4 |
| Pyrite | wt.% | 4.6 | 2.0 | 0.8 |

Metal leaching was assumed to be predominantly associated with pyrite oxidation. Therefore, metal(loid)s were added to the pyrite mineral phase in PHREEQC based on the molar ratio of respective metals to $SO_4$ in barrel test leachates (Table 3.6). Divalent cationic metals were assumed to substitute for Fe, while anionic metals were assumed to substitute for S in the pyrite structure. This enabled the release of metals commonly associated with pyrite to be closely coupled to the kinetics of pyrite dissolution in the model.

Table 3.6: Molar composition of pyrite phase used in the reactive transport model.

| Parameter | Molar Composition |
|---|---|
| Fe | 0.9999384 |
| Ni | 0.0000177 |
| Co | 0.0000051 |
| Cu | 0.0000044 |
| Pb | 0.0000014 |
| Mn | 0.000022 |
| Zn | 0.0000097 |
| Se | 0.000045 |
| As | 0.0000013 |
| S | 1.99995 |

Kinetic rate equations were added to the reactive transport model based on published rate law equations and reaction rate coefficients for both the oxidation of sulfide minerals and the dissolution of carbonate phases (Table 3.7). Due to limited kinetic and thermodynamic data associated with ankerite in literature it was assumed that ankerite had the same thermodynamic and kinetic properties as dolomite in the model.

The hydraulic regime of the reactive transport model of the barrel test followed leachate collection events when leachate volumes were measured. Material properties for the reactive particle size fraction (< 6.35 mm) from the water balance modelling were used and assumed a porosity of 0.35 and degree of saturation of 50%, corresponding to a volumetric water content of 0.175 $m^3/m^3$ in the barrels.

Table 3.7: Kinetic rate equations for minerals included in the reactive transport model.

| Mineral | Rate Equation | Rate Constant, k (mol $m^{-2}$ $s^{-1}$) | Effective Rate Constant, $k_{eff}$ (mol $m^{-3}$ $s^{-1}$) | Reference |
|---|---|---|---|---|
| Pyrite | $Pyrite\ Rate = k\ x \left(\frac{A}{V}\right)\ x\ [H^+]^{-0.11}\ x\ [O_2]^{0.5}\ x\ \left(\frac{m}{m_0}\right)^{\frac{2}{3}}$ | 1.1 x $10^{-10}$ | - | Williamson and Rimstidt, 1994<br>Xu et al., 1998 |
| Calcite | $Calcite\ Rate = (k_1\ x\ [H^+] + k_2\ x\ [H_2CO_3])\ x \left(\frac{A}{V}\right)\ x \left(\frac{m}{m_0}\right)^{\frac{2}{3}}$ | $k_1 = 10^{-0.05}$<br>$k_2 = 10^{-0.05}$ | - | Chou et al., 1989 |
| Dolomite | $Dolomite\ Rate = k\ x \left(\frac{A}{V}\right)\ x\ [H^+]^{0.5}\ x \left(\frac{m}{m_0}\right)^{\frac{2}{3}}$ | $10^{-2.59}$ | - | Chou et al., 1989 |
| Ankerite | $Ankerite\ Rate = k\ x \left(\frac{A}{V}\right)\ x\ [H^+]^{0.5}\ x \left(\frac{m}{m_0}\right)^{\frac{2}{3}}$ | $10^{-2.59}$ | - | * |
| Siderite | $Siderite\ Rate = k_{eff}\ x \left(\frac{m}{m_0}\right)^{\frac{2}{3}}$ | - | $10^{-9.52}$ | Dresel, 1989 |

*Ankerite kinetic characteristics were assumed to be similar to dolomite.

### 3.5.6.3 Calibration

The reactive transport model was calibrated by adjusting mineral-specific surface areas or effective rate coefficients (Table 3.8) such that modelled barrel test results were comparable to the median leachate concentration of the barrel tests. A separate model was calibrated for the B1 and B2 barrel tests together and another model was calibrated to the B7 barrel test.

Substantial cation exchange between Na, Ca, and Mg was observed in the barrel tests. Carbonate dissolution releases $Ca^{2+}$ and $Mg^{2+}$ that subsequently exchange for $Na^{+}$ from surface sites of the host rock (likely associated with clay minerals). The resulting leachate from the barrel tests is enriched in Na concentrations. In order to calibrate the reaction rate for carbonate dissolution, Ca and Mg concentrations needed to be back calculated from the Na concentrations in the leachate. It was assumed that all Na was sourced from cation exchange with Ca and Mg. The ratio of Ca/Na exchanged compared to Mg/Na exchanged was calculated based on the ratio of ion exchange coefficients of Ca-Na and Mg-Na exchange pairs (Bruggenwert and Kamphorst, 1982).

Table 3.8: Calibrated values of kinetic rate equation parameters.

| Mineral | Calibrated Surface Area/Volume ($dm^{-1}$) | | Calibrated Effective Rate Coefficient (mol $m^{-3}$ $s^{-1}$) | |
|---|---|---|---|---|
| | B1 and B2 | B7 | B1 and B2 | B7 |
| Pyrite | - | - | $10^{-8.585}$ | $10^{-8.72}$ |
| Calcite | 0.01 | 0.009 | - | - |
| Dolomite | 0.02 | 0.007 | - | - |
| Ankerite | 0.01 | 0.007 | - | - |
| Siderite | - | - | $10^{-9.523}$ | $10^{-9.523}$ |

Following the calibration of the barrel test scale reactive transport model, there was good agreement between modelled parameter concentrations and measured leachate chemistry from the mine rock barrel tests (Figure 3.10). The average of the calibrated factors for the B1/B2 and B7 models were used in the full-scale reactive transport model.

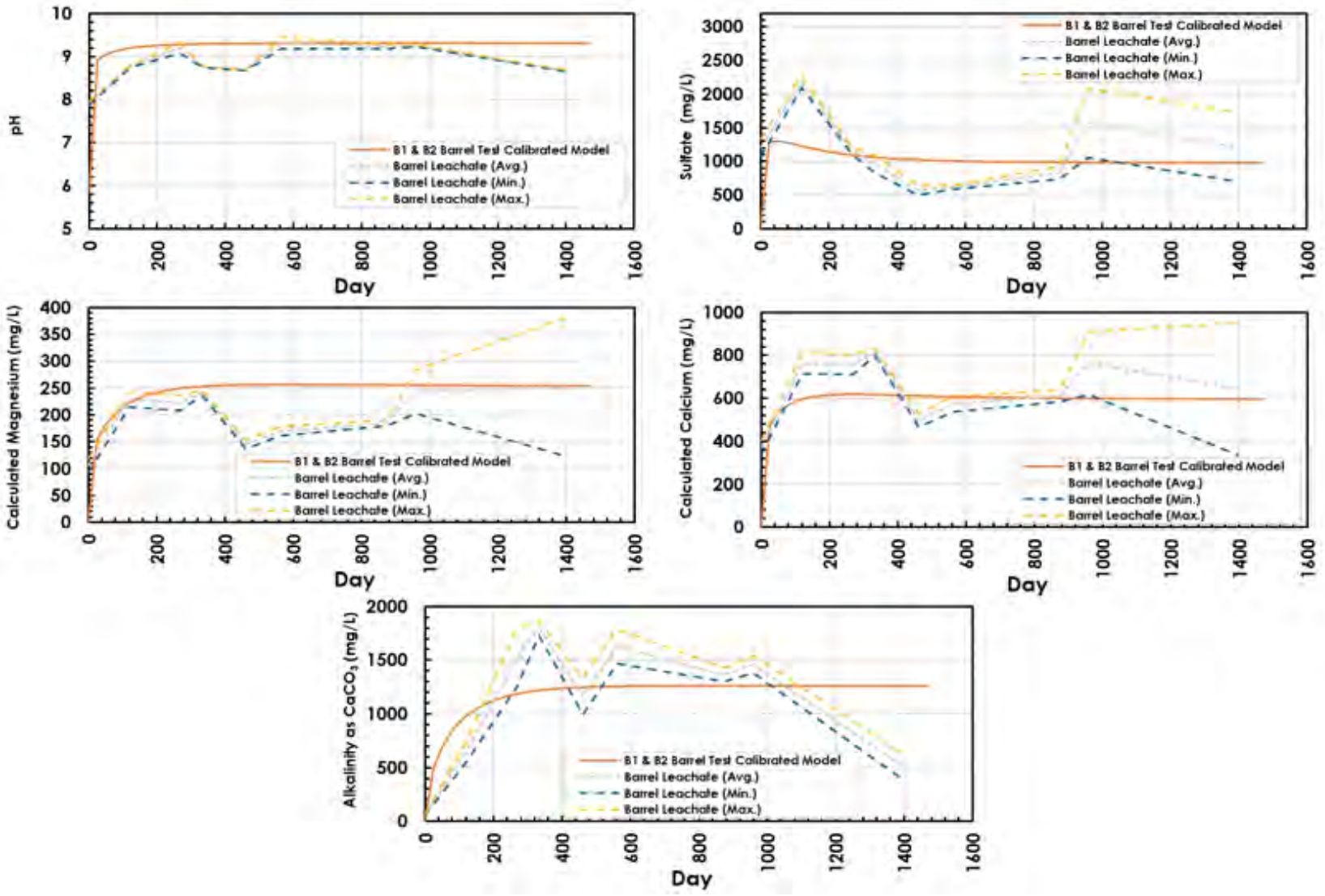


Figure 3.10: Parameter concentrations for the calibrated model versus minimum, maximum, and average B1 and B2 leachate concentrations.

#### 3.5.6.4 Model Scale-Up

Once the geochemical model was calibrated to the field barrel tests, the reactive transport model was scaled up using the nominal height of respective strips (Table 3.1) within the NAG backfill with the final output being stockpile drainage chemistry. GeoStudio oxidation modelling provided stockpile temperature and thickness of both oxic reactive and suboxic non-reactive material. Hydraulic information such as the timing and amount of seepage for the full-scale model was provided by the GoldSim hydrological and seepage models for bare surface and covered conditions.

Temperature Adjustments

The effects of temperature on the literature values for the rate constant of each mineral modelled in the NAG backfill was adjusted using the Arrhenius equation (Equation 4; Gautelier et al., 1999). The temperature adjustment was performed on barrel tests that used an average annual air temperature of 4.9°C. The average internal NAG backfill temperature was estimated to be approximately 3°C based on the GeoStudio oxidation model, and this temperature was used to scale the reaction rates.

$$k_T = k_{25°C}\, x\, A^{\left(\frac{-Ea}{R\Delta T}\right)} \quad (5)$$

Where:

- $k_T$ is the rate constant at temperature, T;
- $k_{25°C}$ is the rate constant at 25°C;
- A is the pre-exponential factor (2.718 $s^{-1}$);
- $E_a$ is the activation energy (kJ);
- R is the molar gas constant (8.314 J $K^{-1}$ $mol^{-1}$); and
- ΔT is the temperature difference $\left(\frac{1}{T\ (K)} - \frac{1}{298.15\ K}\right)$

The activation energies used for the temperature correction of mineral reaction rates are summarized in Table 3.9. Only pyrite, calcite, and dolomite were adjusted for temperature, while reactivity of siderite was maintained under standard conditions due to a lack of information.

Table 3.9: Activation energies for minerals included in the reactive transport model.

| Mineral | Activation Energy (kJ) | Reference |
|---|---|---|
| Pyrite | 70 | Lowson, 1982 |
| Calcite | 20.9 | Sajwan and Evangelou, 1991 |
| Dolomite | 36.1 | Herman and White, 1985 |
| Siderite | - | - |

#### 3.5.6.5 Reactive Transport Model of the NAG Backfill

Infiltrating Water Chemistry

The chemical signature of the infiltrating water (or net percolation) was assumed to be equal to the water chemistry of a site-specific overburden barrel test because of the use of overburden in the cover system (Table 3.10). Initial NAG backfill porewater was assumed to be similar to the initial water chemistry sampled from the NAG barrel tests. An average from the B1/B2 and B7 tests was used in the full-scale model.

Table 3.10: Reactive transport model infiltrating water and initial NAG backfill porewater composition.

| Parameter | Unit | Infiltrating Water Composition | Initial Porewater Composition |
|---|---|---|---|
| pH | - | 8.2 | 7.9 |
| Sulfate (Dissolved) | mg/L | 118 | 1,205 |
| Alkalinity (Total as $CaCO_3$) | mg/L | 0.1 | 106 |
| Chloride (Dissolved) | mg/L | 0.25 | 3.83 |
| Fluoride (Dissolved) | mg/L | 0.13 | - |
| Arsenic (Dissolved) | mg/L | 0.00078 | 0.00012 |
| Calcium (Dissolved) | mg/L | 45.0 | 372 |
| Cobalt (Dissolved) | mg/L | 0.00016 | 0.0057 |
| Copper (Dissolved) | mg/L | 0.011 | 0.001 |
| Iron (Dissolved) | mg/L | 0.005 | 0.01 |
| Lead (Dissolved) | mg/L | 0.00014 | 0.0001 |
| Magnesium (Dissolved) | mg/L | 26.0 | 107 |
| Manganese (Dissolved) | mg/L | 0.00052 | 0.034 |
| Nickel (Dissolved) | mg/L | 0.00025 | 0.0074 |
| Potassium (Dissolved) | mg/L | 1.6 | 3.23 |
| Selenium (Dissolved) | mg/L | 0.00058 | 0.11 |
| Sodium (Dissolved) | mg/L | 19 | 512 |
| Zinc (Dissolved) | mg/L | 0.0005 | 0.0043 |

| Parameter | Unit | Infiltrating Water Composition | Initial Porewater Composition |
|---|---|---|---|
| Nitrate (as N) | mg/L | 0.44 | 56.8 |
| Ammonia (Total) | mg/L | 0.0088 | 7.18 |
| Nitrite (as N) | mg/L | 0.0039 | 1.31 |

Blasting residues from placed mine rock will leach inorganic nitrogen. Initial source terms of N species ($NO_3$, $NO_2$, and $NH_4$) were determined based on the powder factor (0.5 kg/m$^3$) and proportion of inorganic N produced based on emulsion and ammonium nitrate fuel oil (ANFO) composition (SRK, 2022a). To calculate the mass of residual N in the NAG backfill, the method by Ferguson and Leask (1988) was used and assumed the following:

- 0.9% of N from ANFO and 5.1% of N from the emulsion as available for leaching (Ferguson and Leask, 1988);
- ANFO is 75% ammonium-nitrate and emulsion comprise the remaining 25%; and
- Leachable inorganic N load from explosives will result in:
    - 87% as $NO_3$-N;
    - 11% as $NH_4$-N; and
    - 2% as $NO_2$-N.

Nitrogen species leaching was incorporated into the reactive transport model by using an assumed volumetric water content, the total volume of material placed, and the mass of residual N to calculate an N concentration leaching from the backfill. This methodology was used so that the hydraulic transport time simulated in the reactive transport model could also be applied to N leaching. Nitrogen species concentrations used in the model are shown in Table 3.10.

Mineralogy

The NAG backfill reactive transport models included both reactive primary minerals and secondary minerals. Reactive primary minerals were limited to pyrite, calcite, dolomite, ankerite, and siderite. Additional minerals (e.g., primary silicates) were identified in the geochemical characterization program (SRK, 2022b); however, these minerals were assumed to be kinetically insignificant during the modelled time scale due to the neutral pH of the NAG backfill.

Elevated concentrations of dissolved metals under neutral pH conditions can result in the precipitation of secondary minerals. Secondary mineral precipitation was incorporated into the final reactive transport and geochemical scale-up model results by completing equilibrium modelling on the source terms. Minerals applied in the equilibrium modelling step were generally consistent with those used in the

SRK (2022a) (Table 3.11). Surface adsorption reactions were not included in the model because it was assumed that adsorption was accounted for in the barrel test leachate chemistry, therefore, the pyrite stoichiometric composition used in the model.

Table 3.11: Model equilibrium phases.

| Phase | Empirical Formula | Phase | Empirical Formula |
|---|---|---|---|
| Aluminum Hydroxysulfate | $Al_4(OH)_{10}SO_4$ | Ferrihydrite | $Fe(OH)_3$ |
| Amorphous Aluminum Hydroxide | $Al(OH)_3$ | Goslarite | $ZnSO_4 \cdot 7H_2O$ |
| Azurite | $Cu_3(CO_3)_2(OH)_2$ | Gypsum | $CaSO_4 \cdot 2H_2O$ |
| Barite | $BaSO_4$ | Lead Molybdenum Oxide | $PbMoO_4$ |
| Birnessite | $MnO_2 \cdot nH_2O$ | Malachite | $Cu_2(CO_3)(OH)_2$ |
| Brochantite | $Cu_4SO_4(OH)_6$ | Manganite | $MnO(OH)$ |
| Calcium Molybdenum Oxide | $CaMoO_4$ | Melanterite | $FeSO_4 \cdot 7H_2O$ |
| Calcite | $CaCO_3$ | Nickel Hydroxide | $Ni(OH)_2$ |
| Chalcanthite | $CuSO_4 \cdot 5H_2O$ | Otavite | $CdCO_3$ |
| Carbon Dioxide | $CO_{2(g)}$ | Zinc Hydroxide | $Zn(OH)_2$ |
| Copper Hydroxide | $Cu(OH)_2$ | | |

Note: Phases in BOLD not included in SRK (2022a).

Flow Transport

Hydrology is an important component of the NAG reactive transport models. The NAG backfill hydrology used results from the GoldSim hydrological and seepage models (Section 3.3). The NAG backfill reactive transport models were split into 23 cells (Figure 3.3), each having different geometries and mine rock storage capacities (Table 3.1).

Material properties of the bulk mine rock in the NAG backfill were included in the full-scale geochemical model but were adjusted to account for only the reactive fraction of the mine rock (assumed to be the -6.35 mm fraction as used in the barrel tests). Flow of water was assumed to be primarily matrix-dominated. Flow calculations for the model assumed the following material properties for the finer fraction:

- Porosity – The porosity of the finer fraction of the NAG backfill was assumed to be 0.4;
- Degree of saturation – The degree of saturation of the finer fraction in NAG backfill at steady-state was 0.61 based on GoldSim modelling; and
- Proportion of reactive mine rock – The -6.35 mm size fraction typically controls the reactivity of mine rock. The NAG backfill was assumed to composed of 20% -6.35 mm particles based on existing material properties.

The adjusted reactive volumetric water content of the facility was calculated to be 0.049 based on these values and was used to determine cell-specific pore volumes in the reactive transport model.

The volume of water entering of the NAG backfill will change once the mine rock is covered. Additionally, this volume will be different based on the cover system scenario modelled. Three hydrological periods were defined in NAG backfill reactive transport models for each of the modelled scenarios, respectively:

1) *Bare Surface* – This period represented conditions prior to cover system placement on the cell. During this phase, mine rock is exposed to the atmosphere and infiltration rates are 273 mm/year for the poorly graded till and sandstone scenario (Scenario #1) and 143 mm/year for both the well graded till and mixed mine rock scenario (Scenario #2) and the no internal layers scenario (Scenario #3). The duration of the bare surface period is cell-specific and is dependent on the construction and reclamation schedule.

2) Covered Grass NP – This phase represented construction of the closure cover on a cell and occurred for a period of five years as re-vegetation occurs. Once the cover system is placed, both oxygen ingress and NP decrease. Once covered, NP decreases to 197 mm/year in the poorly graded till and sandstone scenario (Scenario #1). Due to differences in runoff between the bare surface and the grass covered surface in the well graded till and mixed mine rock scenarios (Scenarios #2 and #3) NP increased to 148 mm/year.

3) Covered Forest NP – This phase represents maturing of vegetation on the constructed cover system and occurred for the remaining model time following the covered grass NP period. As vegetation matures and shifts to forest dominated NP decreases. Covered forest NP was 124 mm/year for the poorly graded till and sandstone scenario (Scenario #1) and 72 mm/year for the well graded till and mixed mine rock scenarios (Scenarios #2 and #3).

Effects of Suboxic Zones

Potential establishment of suboxia within the NAG backfill is a function of limiting re-supply of oxygen from the atmosphere, either laterally across angle of repose slopes of the backfilled mine rock, or vertically across the horizontal surface of the backfilled mine rock. Limiting airflow capacity across the horizontal surfaces can also limit lateral advective gas transport, in the absence of a limitation of the presence of a limitation on airflow capacity on the sloping backfilled surface, depending on the lift height of the backfilled mine rock. Initially, oxygen concentration in the pore-space of the backfilled NAG material will be atmospheric (nominally 20.9% by volume). Sulfide material within the NAG material will consume this oxygen; however, if re-supply of oxygen is limited as discussed previously, then the availability of further sulfide oxidation will be limited, thus creating suboxic conditions within each encapsulated cell. As oxygen decreases, and the geochemical conditions shift from oxic to suboxic, additional biological reactions that are favourable in the absence of oxygen may occur; however, to provide a conservative prediction of the effect of suboxic conditions, these biological reactions were

not included in any modelling. This is a substantively conservative approach given that in suboxic conditions, and provided there is opportunity and hydraulic residence time for denitrification, it is reasonable to postulate that bio-reduction of selenium will also occur (see MEND, 2015). Once suboxic conditions are established, the reactive transport model assumes that pyrite oxidation only occurs in the oxic zone nearer to the surface, while carbonate minerals can still react throughout the entire depth of the cell as their reactivity is not dependent on oxygen availability in the NAG backfill.

Given the geometry of the NAG backfill, and the different cell volumes and placement timing, zones of suboxia will vary based on the location of the cell in the NAG backfill. Cell-specific reactive and suboxic zone thicknesses for all cells were determined from the GeoStudio Oxygen Ingress Model results (Section 4.2). The development of suboxic conditions occurred at depths of roughly 13 m below the cover system in the poorly graded till and sandstone scenario and occurred within the 3.3 m cover system in both the well graded till and mixed mine rock scenarios. In order to remain conservative and capture sulfide oxidation and subsequent reactions occurring in the mine rock mix cover system, a depth to suboxic conditions of 3 m was used in the well graded cover system scenarios. Cell-specific reactive and suboxic zone thicknesses are summarized below in Table 3.12.

Table 3.12: Cell-specific reactive and suboxic zone thicknesses.

| Cell | Total Cell Height (m)* | Reactive Zone Thickness (m) | | Suboxic Zone Thickness (m) | |
|---|---|---|---|---|---|
| | | Poorly Graded | Well Graded | Poorly Graded Scenario | Well Graded Scenarios |
| 1 | 28 | 13 | 3 | 15 | 25 |
| 2 | 44 | 13 | 3 | 31 | 41 |
| 3 | 44 | 13 | 3 | 31 | 41 |
| 4 | 51 | 13 | 3 | 38 | 48 |
| 5 | 64 | 13 | 3 | 51 | 61 |
| 6 | 51 | 13 | 3 | 38 | 48 |
| 7 | 33 | 13 | 3 | 20 | 30 |
| 8 | 24 | 13 | 3 | 11 | 21 |
| 9 | 28 | 13 | 3 | 15 | 25 |
| 10 | 13 | 13 | 3 | - | 10 |
| 11 | 6 | 6 | 3 | - | 3 |
| 12 | 7 | 7 | 3 | - | 4 |
| 13 | 6 | 6 | 3 | - | 3 |
| 14 | 6 | 6 | 3 | - | 3 |
| 15 | 5 | 5 | 3 | - | 2 |
| 16 | 5 | 5 | 3 | - | 2 |
| 17 | 5 | 5 | 3 | - | 2 |

| Cell | Total Cell Height (m)* | Reactive Zone Thickness (m) | | Suboxic Zone Thickness (m) | |
|---|---|---|---|---|---|
| | | Poorly Graded | Well Graded | Poorly Graded Scenario | Well Graded Scenarios |
| 18 | 7 | 7 | 3 | - | 4 |
| 19 | 6 | 6 | 3 | - | 3 |
| 20 | 10 | 10 | 3 | - | 7 |
| 21 | 8 | 8 | 3 | - | 5 |
| 22 | 4 | 4 | 3 | - | 1 |
| 23 | 3 | 3 | 3 | - | - |

*Not including cover system

Construction Schedule

The construction schedules of the NAG backfill will influence timing of seepage quality. Placement of the cover system will limit oxygen ingress and NP into the NAG backfill as well as the maturing of the cover system vegetation. The construction schedule of both the backfill and cover system was simplified to allow for implementation into the reactive transport model. These simplifications and assumptions were:

- All cells are built instantaneously, and the complete height of the cell was available for reaction once it was placed in the model.
- Cover system placement for the backfill is indicated by the construction schedule provided by Telkwa and detailed in Section 3.5.1.
- Once covered, there will be an instantaneous decrease in NP.
- Once forest vegetation is developed (assumed to be five years after cover construction) there will be an instantaneous decrease in NP.
- Once covered, there will be an approximately 15-year period for suboxic conditions to develop. It was assumed there will be an instantaneous shift to suboxic conditions 15 years after cover construction.

Additional NAG Backfill Reactive Transport Model Assumptions

- Mineralogy was homogeneous throughout the NAG backfill and is defined based on the NAG mine rock barrel tests compositions;
- Mine rock placement in the NAG backfill will include mine rock characterized as the average composition from the mine rock barrel tests;

- Cell-specific annual loads (mg/year) were calculated based on the reactive transport concentration outputs and total annual flow volumes for each cell respectively;
- The timing of seepage from each cell of the reactive transport model was based on wetting-up timing from the GoldSim model. A cell was assumed to be wetted-up when total annual seepage from the GoldSim model was greater or equal to 50% of the steady state total annual seepage for that cell. Prior to a cell being wetted-up, parameter concentrations were set to equal the concentration from Year 0 of the reactive transport model. Seepage rates are negligible during the time the cell is wetting up, and therefore load from the cell is also negligible;
- After an initial wetting-up phase, final concentrations for the NAG backfill were calculated using the total annual loads (mg/year) from each cell divided by the total annual seepage rate (L/year);
- Seasonality was not included in the model. A constant NP based on bare surface, covered grass surface, or covered forest surface was assumed for all cells;
- Cell-specific seepage volumes and concentrations were mixed at the base of the NAG backfill based on the modelled seepage rates from the GoldSim model;
- The performance of the cover system remains constant;
- Parameter concentrations below detection limit were assigned values of the detection limit used in the barrel test leachate chemistry reporting;
- During the bare surface period, seepage and porewater is in equilibrium with the atmosphere ($\log(pO_2) = -0.7$ and $\log(pCO_2) = -3.5$); and
- During the cover period, pore water residing in the suboxic zone is in equilibrium with $O_2$ concentrations of 0.1% ($\log(pO_2) = -3.0$).

#### 3.5.6.6 Geochemical Scale-Up Model

Parameters that were not included in the reactive transport model were modelled using a geochemical scale-up model. The geochemical scale-up model functioned by:

- Developing average loading rates for parameters not included in the reactive transport models using the leachate data from the B1, B2 and B7 barrel tests; and
- Scaling-up the production rates based on material placement, hydraulic properties, and material properties.

Soluble salts can accumulate before kinetic experiments are initiated and result in rapid flushing of constituents. Potentially due to the age of the weathering experiments or variations in collected water volumes it was not entirely apparent if the B2 and B7 barrel tests had fully flushed stored soluble salts; however, loading rates from the last three samples collected were used.

Similar to the reactive transport model, loading rates derived using the barrel leachate data were scaled up based on differences between the barrel test scale and the full backfill scale. The scale up included two scaling factors: particle size and mine rock contact. Temperature scaling factors were not applied as it was assumed that the average temperature in the barrels will be comparable to the full-scale NAG backfill.

Particle Size Factor

The reactive particle sizes of the NAG backfill were assumed to be limited to the < 6.35 mm portion and assumed to be 20% of the bulk mine rock; therefore, the scaling factor for particle size was set to 0.2. This particle size scaling factor was previously used by SRK (2022a) to scale HCT loading rates to field scale.

Contact Factor

The reactivity of the mine rock will be limited to the < 6.35 mm portion; however, only a portion of the seepage will react with this portion given the likely presence of preferential flow paths. A contact factor of 0.5 was used in previous source term development (SRK, 2022a) and was deemed reasonable for the current model.

Geochemical Scale-Up Model Assumptions

The following assumptions were included in the geochemical scale-up model:

- Cell-specific annual loads (mg/year) were calculated based on the annual mass of mine rock for the cell in the given year and the loading rate of the parameter (mg/kg/year). After an initial wetting-up phase, final concentrations for the NAG backfill were calculated using the total annual loads (mg/year) for all cells divided by the total annual seepage rate (L/year);
- The wetting up period for the backfill was estimated as the period of time prior to total annual seepage volumes equalling roughly 50% of steady state annual seepage volumes (roughly 17 years). Seepage concentrations prior to wetting up were set to concentrations calculated for the first year after wetting up;
- Once a cell was fully constructed and wetted-up, the annual loads were assumed to remain constant and estimated parameter concentrations were only influenced by changes in annual seepage rates;
- The seepage of all cells mixed at the base of the NAG backfill;

- Loading rates remained constant and were not affected by changes in mineralogy or kinetic rates over time; and
- Solubility controls were applied by including the geochemical scale-up modelled parameters in the equilibrium modelling discussed in Section 3.5.6.5.

### *3.5.7 Nitrogen Sensitivity Scenarios*

Two additional model sensitivity scenarios were simulated to assess nitrogen source terms under different blasting loss conditions. A high nitrogen source term scenario was run to simulate a scenario where nitrogen losses from blasting are greater than expected. A low nitrogen source term scenario was run to simulate decreased nitrogen losses from blasting resulting from blast hole liners used as a source mitigation.

Nitrogen source term scenarios were modelled by either increasing or decreasing the residual nitrogen available for leaching as calculated by Ferguson & Leask (1988). This in turn increased or decreased the initial pore-water concentration of nitrogen species applied in PHREEQC for the respective nitrogen scenarios (Table 3.13). All other reactive transport model inputs remained the same as in the Well-Graded with No Internal Layers models. The high nitrogen source term scenario represents an increase of 56.25% residual nitrogen. Blasthole liners are assumed to decrease nitrogen losses by 37.5% in the low nitrogen source term scenario (D. Farmer, personal communication, July 15, 2024).

Table 3.13: Initial nitrogen species concentrations in NAG backfill porewater for nitrogen source term scenarios.

| Parameter | Unit | Initial Porewater Composition | | |
|---|---|---|---|---|
| | | Well-Graded No Internal Layers Scenario | High Nitrogen Scenario | Low Nitrogen Scenario |
| Nitrate (as N) | mg/L | 65 | 102 | 41 |
| Ammonia (Total) | mg/L | 8.3 | 13 | 5.2 |
| Nitrite (as N) | mg/L | 1.5 | 2.4 | 0.94 |

# 4 MODELLING RESULTS AND DISCUSSION

## 4.1 Water Balance Results

A landform water balance was completed to develop simplified boundary conditions for the 2D GeoStudio oxidation modelling and the 3D GoldSim modelling. A summary of the 1D water balance for the two material combination scenarios is provided in Table 4.1. The well-graded till and mine rock mix material properties and results were also used for the no internal layers scenario.

Table 4.1: Summary of water balance results for the two material combination scenarios.

| Scenario | Total Precipitation (mm) | Rainfall (% of PPT) | Snow (% of PPT) | Actual Evapotranspiration (% of PPT) | Runoff (% of PPT) | Sublimation (% of PPT) | Net Percolation (% of PPT) |
|---|---|---|---|---|---|---|---|
| PG Till and Sandstone (Bare) | 649 | 61% | 39% | 32% | 2% | 24% | 42% |
| PG Till and Sandstone (Grass – 5 years) | 616 | 52% | 48% | 49% | 0% | 19% | 32% |
| PG Till and Sandstone (Forest – 73 years) | 655 | 61% | 39% | 57% | 3% | 21% | 19% |
| WG Till and Mine Rock Mix (Bare) | 649 | 61% | 39% | 42% | 12% | 24% | 22% |
| WG Till and Mine Rock Mix (Grass – 5 years) | 616 | 52% | 48% | 54% | 3% | 19% | 24% |
| WG Till and Mine Rock Mix (Forest – 73 years) | 655 | 61% | 39% | 59% | 9% | 21% | 11% |
| Mine Rock Mix (Bare) | 649 | 61% | 39% | 28% | 28% | 21% | 22%* |

PG Till – Poorly Graded Till; WG Till – Well Graded Till; PPT – Precipitation

* - Surface net infiltration into the bare Mine Rock Mix

An average year of daily net percolation rates for each time period (bare, grass, and forest) were used as inputs in the 2D GeoStudio models and stochastically in the 3D GoldSim model.

## 4.2 2D GeoStudio Oxidation Model Results

The predicted development of the suboxic zone within the NAG backfill mine rock within the Open Pit with time for the poorly graded till and sandstone mine rock scenario is shown in Figure 4.1. The suboxic zone development for the well graded till and mine rock mix scenario is shown in Figure 4.2, while the suboxic zone development for the scenario with no internal overburden layers is shown in Figure 4.3. The models indicate that the long-term depths to suboxia are, on average, 13 m for the poorly graded till with sandstone mine rock scenario and 3.3 m for the well graded till with the mine rock mix scenario, as well as the no internal overburden layers scenario. The suboxic zone takes approximately 15 years to form in each strip in the poorly graded till with sandstone mine rock scenario. In both the well graded till with the mine rock mix scenario and the no internal layers scenario (using well graded till and mine rock mx material properties), it took approximately 13 years for the suboxic zone to form in each strip. These results were used to estimate the development of the suboxic zone within the 3D GoldSim model.

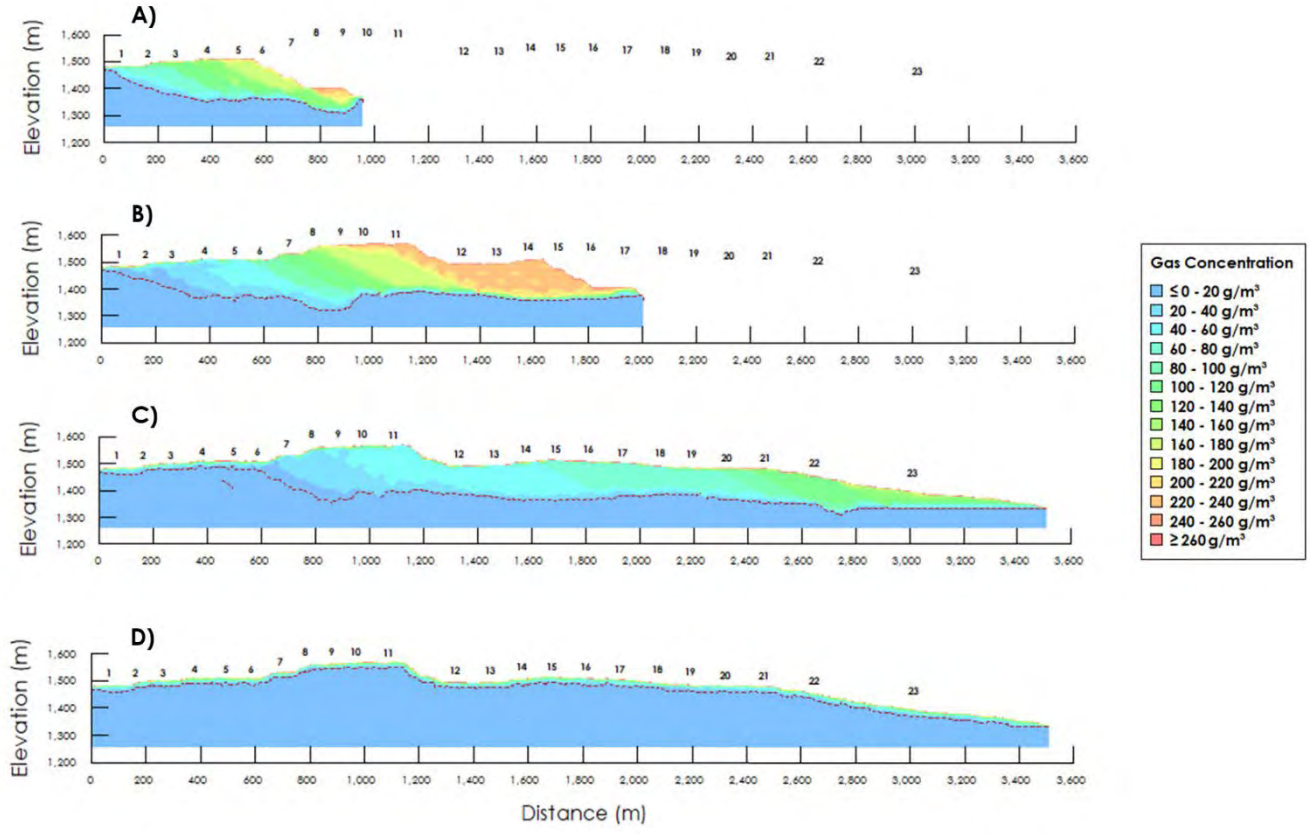


**Figure 4.1: Development of suboxic zone for the poorly graded till and sandstone mine rock scenario (outlined by red dashed line in figures, which represents the zone at, or below, an $O_2$ concentration of 13 g/m³ or 1 vol.%) for the poorly graded till and sandstone mine rock scenario at A) Year 12; B) Year 17; C) Year 23; and d) Year 36/Long Term.**

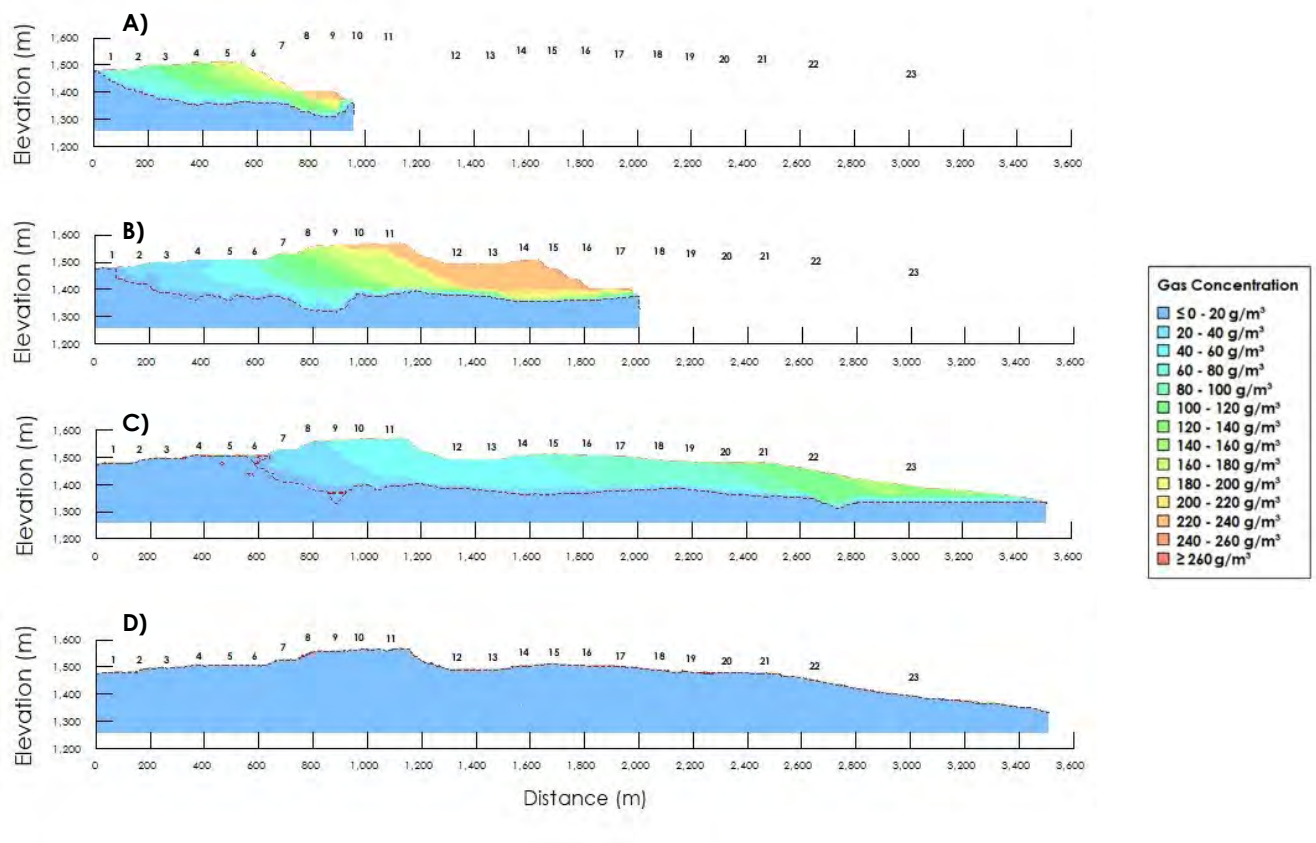


Figure 4.2: Development of suboxic zone (outlined by red dashed line in figures, which represents the zone at, or below, an $O_2$ concentration of 13 g/m³ or 1 vol.%) for the well graded till and mine rock mix scenario at A) Year 12; B) Year 17; C) Year 23; and d) Year 36/Long Term.

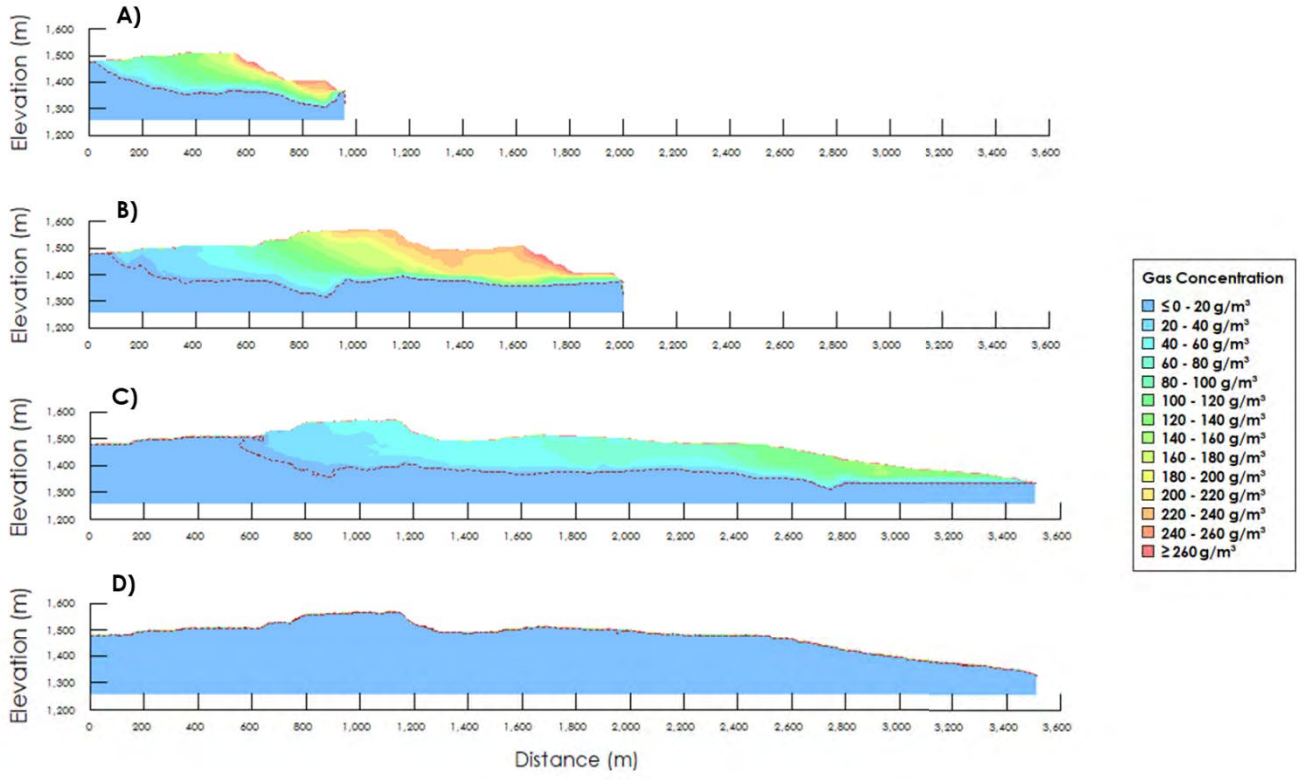


**Figure 4.3: Development of suboxic zone (outlined by red dashed line in figures, which represents the zone at, or below, an $O_2$ concentration of 13 g/m³ or 1 vol.%) for the no internal layers scenario at A) Year 12; B) Year 17; C) Year 23; and d) Year 36/Long Term.**

## 4.3 3D GoldSim Model Results

The 3D GoldSim model was run on calendar time with 2023 representing the first year of placement, or Year 6. The results are therefore presented in calendar time out to 2150, which represents Year 133.

### *4.3.1 Total Seepage*

The total seepage rate of the backfilled NAG mine rock in the Open Pit was simulated in GoldSim for 100 realizations. The mean value, along with the 5th and 95th percentiles of the model results, are plotted in Figure 4.4 for all modelled scenarios. The models predicted long-term stabilized seepage rates from the covered and vegetated backfilled NAG mine rock that were between 31,000 m³/month and 36,000 m³/month for the poorly graded till and sandstone mine rock scenario, and between 14,500 m³/month and 16,000 m³/month for both the well graded till with mine rock mix scenario and the no internal layers scenario. The poorly graded till and sandstone mine rock scenario showed greater variability in monthly seepage rates due to the coarser texture of the material. Prior to cover system placement, the well graded till with mine rock mix scenario differs from the no internal layers scenario

due to the lack of overburden layers, but once the cover system is placed, the two scenarios show almost identical results.

The model results indicate that the backfilled NAG mine rock in the Open Pit will be wetted up, as indicated by the stabilization of the seepage rates, approximately 40 years following completion of construction for the poorly graded till and sandstone mine rock scenario. The finer texture of the material in both the well graded till with mine rock mix scenario and the no internal layers scenario resulted in a longer wetting up period, reaching stabilization approximately 80 years following the completion of construction.

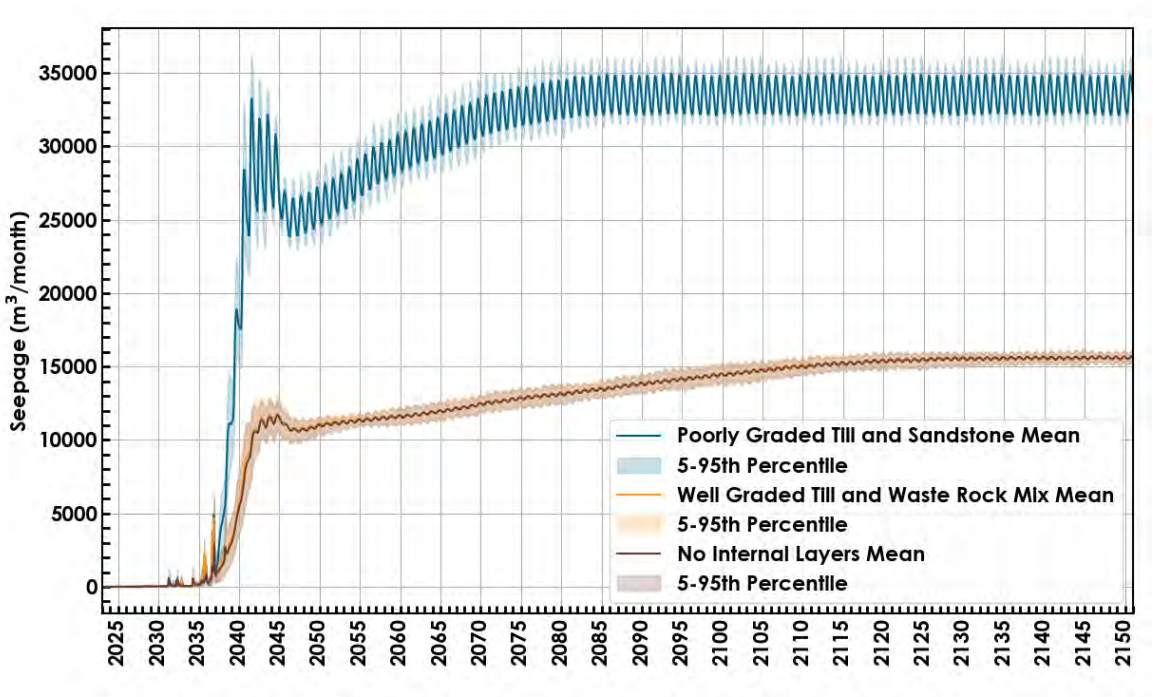


Figure 4.4: Range of seepage rates simulated by the GoldSim model for the backfilled NAG mine rock in the Open Pit for all the scenarios.

### *4.3.2 Total Storage*

The estimated total stored water volume within the backfilled NAG mine rock for the modelled scenarios are shown in Figure 4.5. The modelled water volume increases with mine rock placement during construction before starting to stabilize once construction is complete and the cover system is placed. Similar to the seepage results, the water volume within the backfilled NAG mine rock is estimated to stabilize after approximately 40 years for the poorly graded till and sandstone mine rock scenario and approximately 70-80 years for both the well graded till with mine rock mix scenario and the no internal layers scenario. Once the stored water volume stabilized, very small variations in water volume were predicted, due to the variation in seasonal NP inputs.

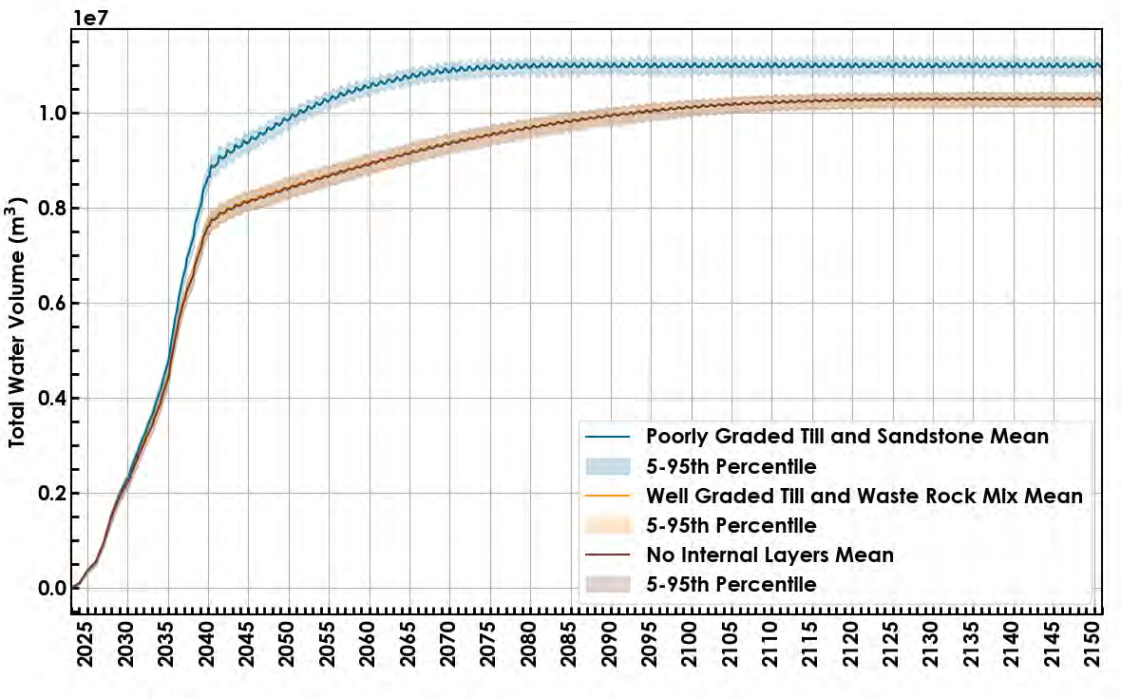


Figure 4.5: Range of total water volume within the backfilled NAG mine rock in the Open Pit simulated by the GoldSim model.

### *4.3.3 Oxygen Ingress*

The range of oxygen ingress from the 3D GoldSim model for all modelled scenarios is presented in Figure 4.6. The well graded till with mine rock mix scenario and the no internal layers scenario both showed a higher long term average oxygen ingress despite having a shallower depth to suboxia. Due to the limitations of the GoldSim model representing each strip as a 1D column, convection is limited to density driven convection (free convection) and oxygen ingress is dominated by diffusion. In this case, with a shallower depth to suboxia, the concentration gradient across the cover system is greater, resulting in a higher diffusive oxygen ingress rate. In the poorly graded till and sandstone mine rock scenario, the depth to suboxia is greater, reducing the concentration gradient across the cover system and lowering the overall diffusive flux. When forced convection (advection) is accounted for, it is likely that the oxygen ingress rate for the poorly graded till and sandstone mine rock scenario would show higher oxygen ingress rates.

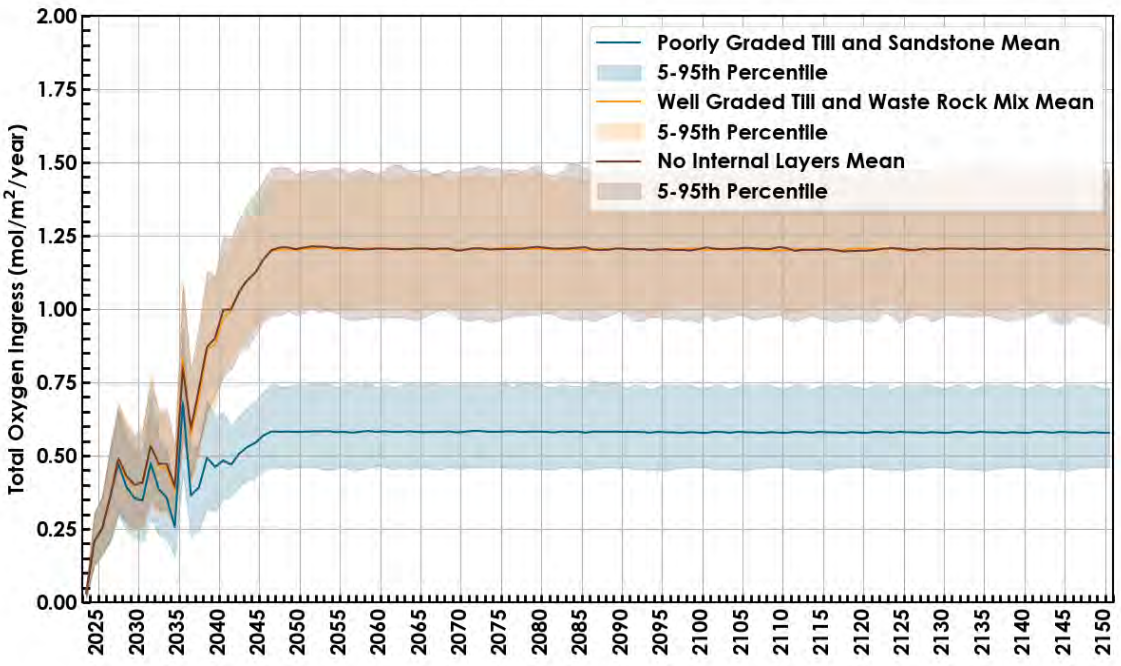


Figure 4.6: Range of oxygen ingress rates simulated by GoldSim for the backfilled NAG mine rock in the Open Pit for all modelled scenarios.

## 4.4 Geochemical Modelling Results

This section summarizes the results of the geochemical models of the NAG backfill cover scenarios and present a time-series of source terms for the NAG backfill during the bare surface, covered grass surface, and covered forest surface timeframes. Model results of select parameters are presented in Figure 4.7 to Figure 4.11. Tables of source terms and annual loads from the three scenarios of the NAG backfill are provided in Appendix A.

In the three modelled scenarios, the cover system construction decreases NP and limits oxygen ingress into the mine rock within the NAG backfill. Suboxic zones were established in almost half of the cells in the poorly graded till and sandstone mine rock scenario and in all but one cell in the well graded till and mine rock mix scenarios (Section 4.3.3). Sulfide oxidation only occurred in the reactive oxic zones, as a result, loading rates of oxidation products are partly controlled by the amount of suboxic mine rock in the backfill.

In general, concentrations for most modelled parameters were similar between the poorly graded till and sandstone and well graded till and mine rock mix scenarios. While the amount of suboxia increased substantially for the well graded till and mine rock mix scenarios, the volume of water infiltrating the surface of the NAG backfill decreased, resulting is less water available to dilute oxidation products from the limited reactive zone. Despite concentrations remaining similar between the three scenarios, the

annual load exiting the NAG backfill as seepage in both the well graded till and mine rock mix scenarios is roughly half the annual load exiting in the poorly graded till and sandstone scenario.

The onset of seepage from the NAG backfill occurs as cells from the model become fully wetted-up, which begins in approximately 2036. Areas of the backfill that contain smaller thicknesses of mine rock wet up faster than areas with greater thicknesses; therefore, the effects of seepage from thinner cells are observed in the model results faster than the effects from thicker cells. Thicker cells will generally produce poorer water quality than thinner cells because there is a longer pathway for water to accumulate oxidation products (ignoring the effects of suboxic zones).

After the initial wetting-up period and prior to the development of suboxic zones within the models, concentrations of parameters associated with pyrite oxidation (e.g., $SO_4$, Se, Cu, etc.) generally have an increasing trend. Concentrations stabilize and tend to decrease once suboxic conditions are established. After the onset of seepage, Se concentrations range between 0.03 to 0.07 mg/L, with the onset of lower concentration occurring near the end of the modelled timeframe. Concentrations of Se are trending lower near the end of the modelled timeframe for the well graded till and mine rock mix scenario. Concentrations of $SO_4$ and Cu are approximately 1,500 mg/L and 0.015 mg/L, respectively, near the end of the modelled timeframes for all three scenarios. Annual loads of parameters related to pyrite oxidation in the well graded till and sandstone scenarios are approximately half of the poorly graded till and mine rock mix scenario. Annual loads are generally similar between the two well graded till and waste rock mix scenarios with the largest differences observed in the last ~20 years of the modelled timeframe.

Nitrate concentrations and loads peak in the initial years that seepage occurs and are controlled by flushing of blast residues that are on the surface of the mine rock. The release of $NO_3$ (and subsequently $NO_2$ and $NH_4$) is spread out over many decades as the transport time is variable in different areas of the backfill depending on the cell thickness.

A slight variation in pH was observed between the modelled scenarios with the well graded till and sandstone scenarios having a slightly higher value. This is likely a result of the longer residence time of water in the suboxic zone of the carbonate-rich mine rock in the well-graded model scenario.

The NAG backfill source terms from the three modelled scenarios are summarized in Table 4.2 and represent the concentrations of parameters at the end of the modelled timeframe (year 2150). The source terms are also compared to source terms developed by SRK (2024). It should be noted that source terms developed by both SRK and Okane utilized NAG field bin data to derive source terms. Differences in source terms are attributed to the implementation of reactive transport modelling and the consideration of changes in net percolation and oxygen ingress into the NAG backfill as a result of the modelled cover systems. In general, the source terms from the current modelling work are lower than the initial SRK source terms. Due to the incorporation of wetting up in the current model, the largest differences in loading rates between both sets of models are observed in the initial 20 years of the model

time frame. Once the modelled loading rates stabilize, mass loads of constituents such as $SO_4$ and Se range from approximately 50 to 75% lower than the initial SRK loads (Figure 4.12).

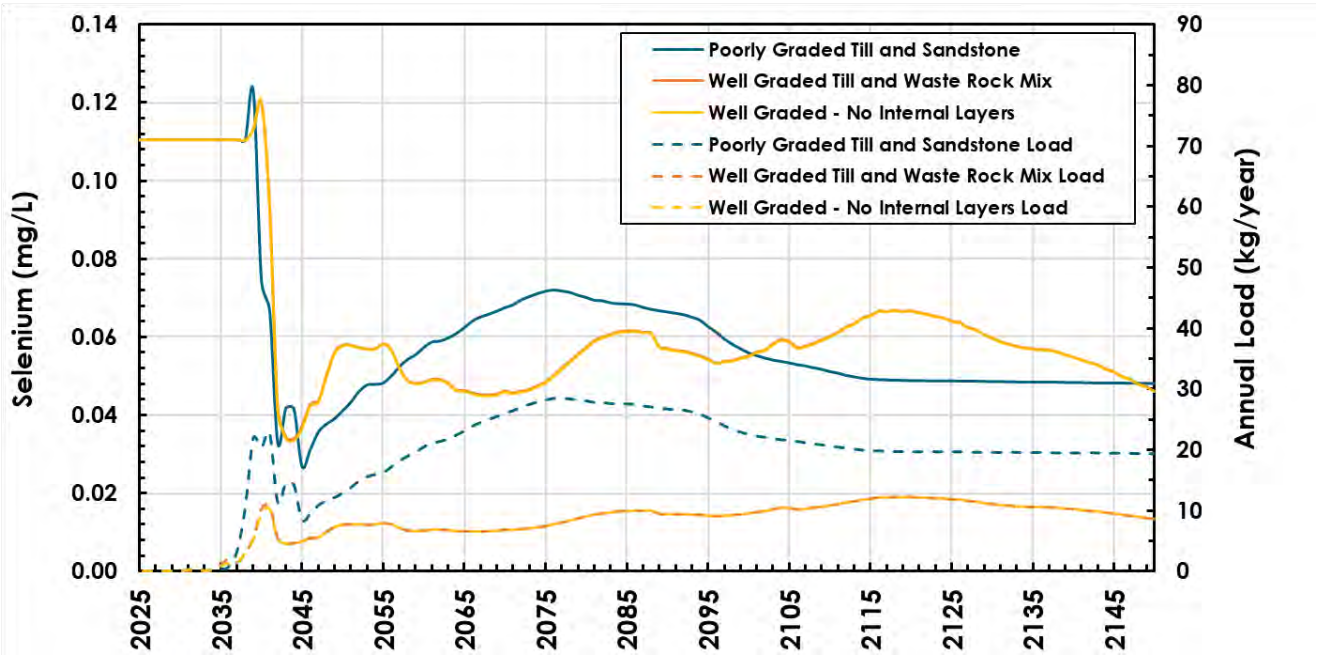


Figure 4.7: Evolution of Se concentrations and annual loads from NAG backfill seepage in the three cover system and mine rock scenarios.

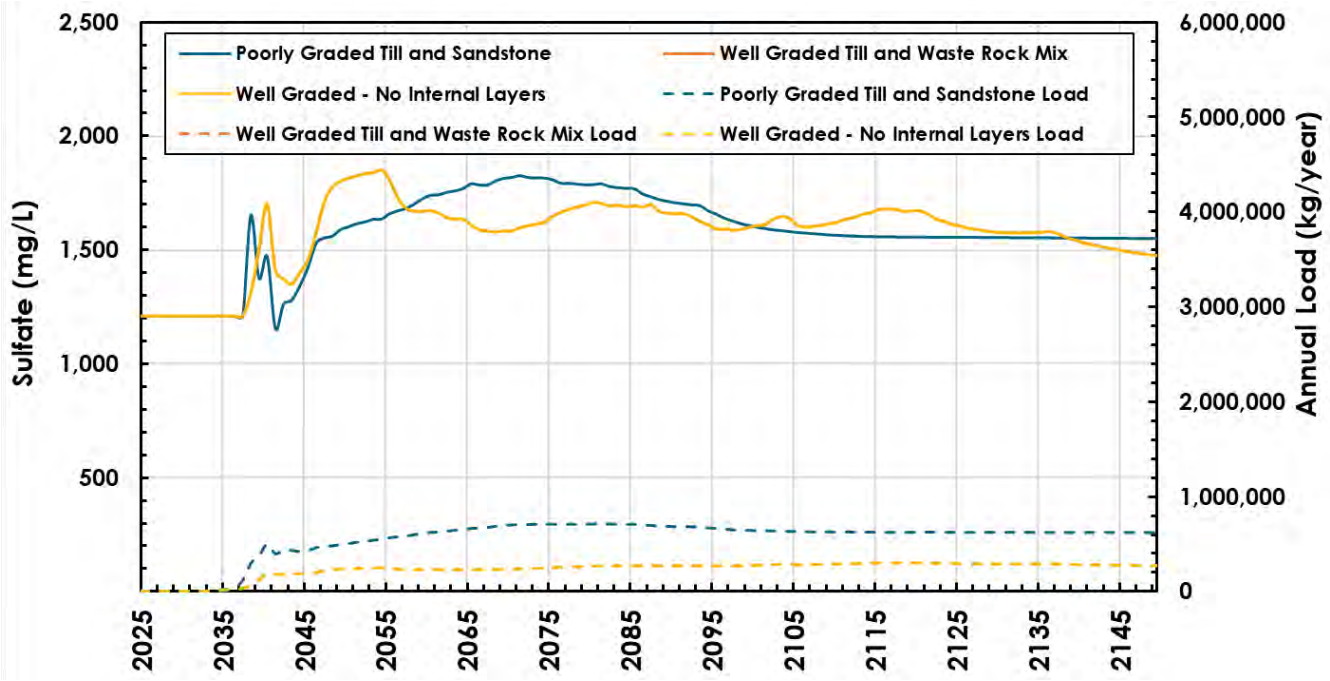


Figure 4.8: Evolution of $SO_4$ concentrations and annual loads from NAG backfill seepage in the three cover system and mine rock scenarios.

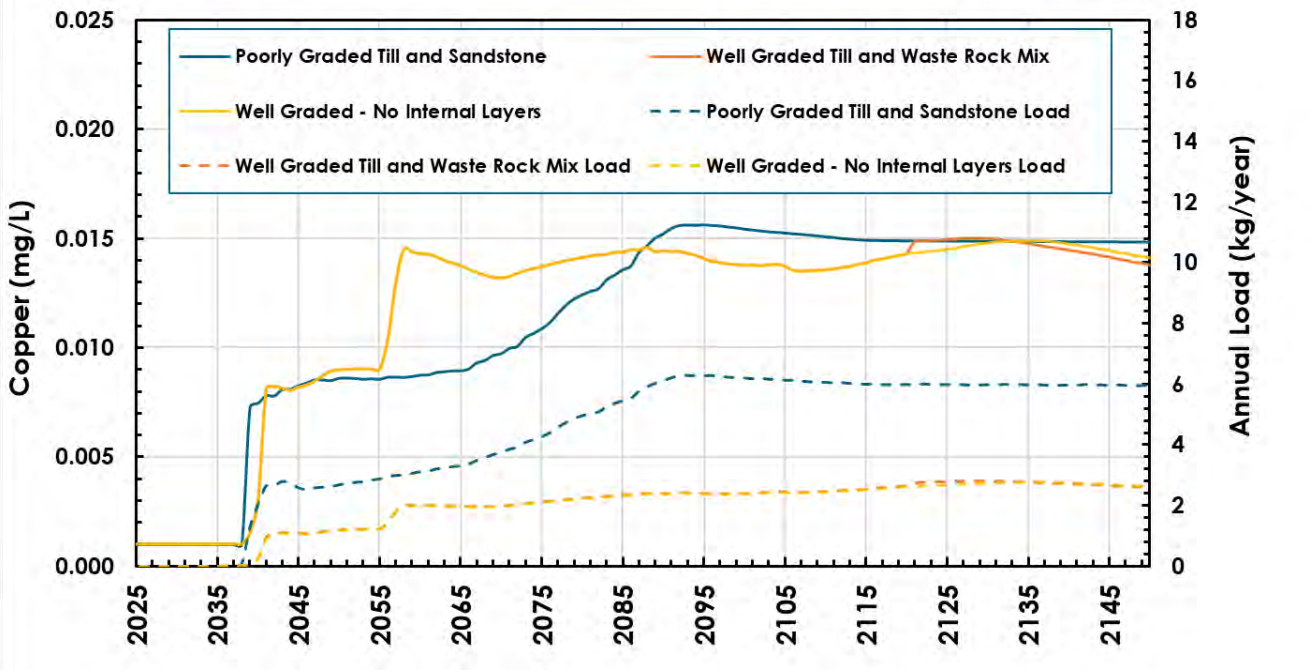


Figure 4.9: Evolution of Cu concentrations and annual loads from NAG backfill seepage in the three cover system and mine rock scenarios.

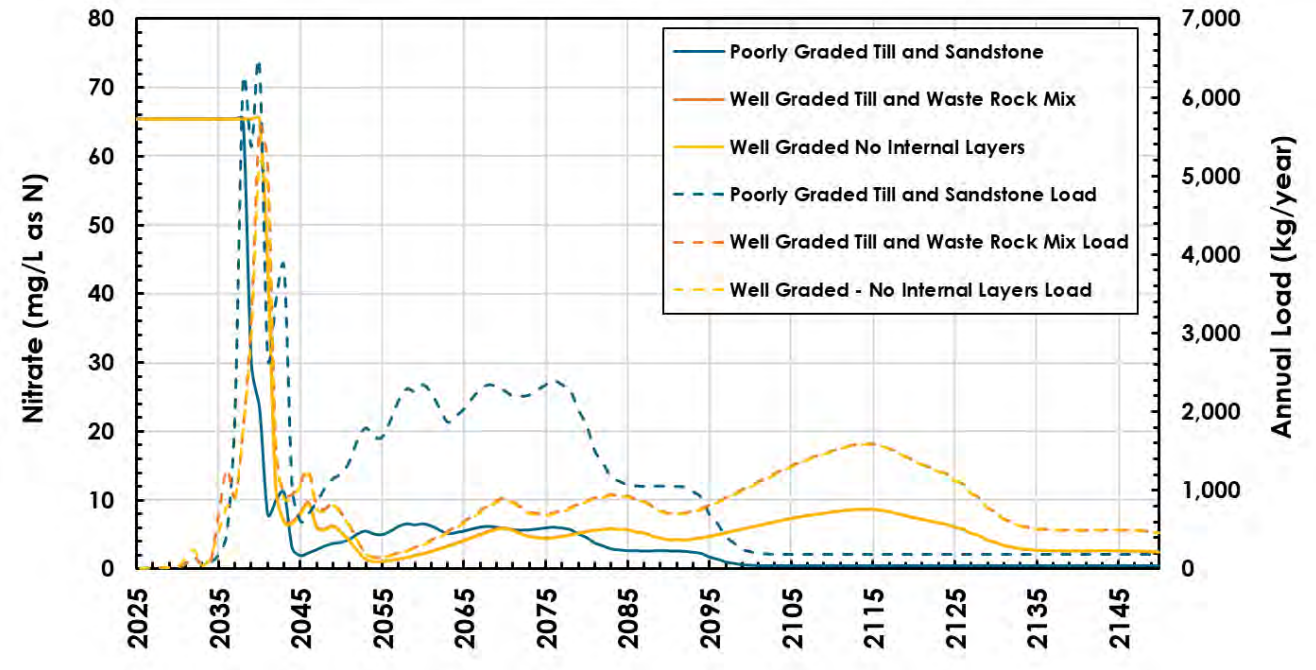


Figure 4.10: Evolution of $NO_3$ concentrations and annual loads from NAG backfill seepage in the three cover system and mine rock scenarios.

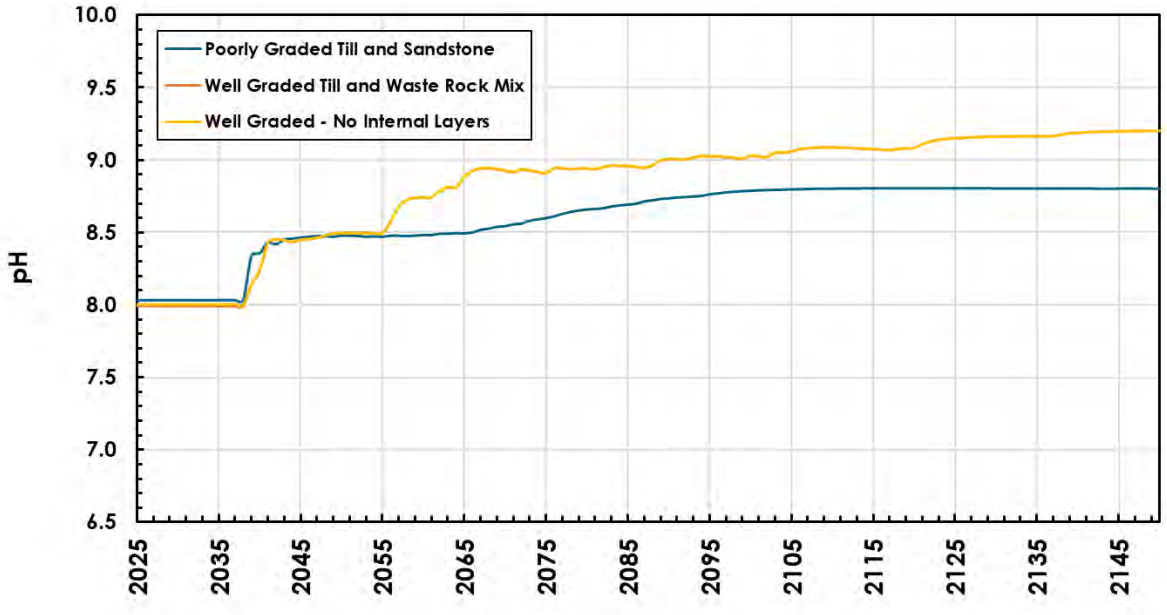


Figure 4.11: Evolution of pH from NAG backfill seepage in the three cover system and mine rock scenarios.

Table 4.2: Comparison of source terms of the NAG backfill from various model scenarios.

| Parameter | Well Graded Model Source Term[1] | Well Graded with No Internal Layers Source Term[1] | Poorly Graded Model Source Term[1] | NAG Backfill – 2021-2029 | | NAG Backfill – 2030-2100 | |
|---|---|---|---|---|---|---|---|
| | | | | NAG Typical[2] | NAG High[2] | NAG Typical[2] | NAG High[2] |
| pH | 9.2 | 9.2 | 8.8 | 8.2 | 8.4 | 8.3 | 8.5 |
| Alkalinity (mg/L as $CaCO_3$) | 3,445 | 3,445 | 1,947 | 1,904 | 3,398 | 2953 | 4468 |
| Ca (mg/L) | 0.85 | 0.85 | 2.6 | 53 | 95 | 79 | 119 |
| Mg (mg/L) | 84 | 84 | 54 | 32 | 57 | 48 | 72 |
| K (mg/L) | 24 | 24 | 11 | 13 | 23 | 20 | 31 |
| Na (mg/L) | 1,335 | 1,335 | 1,083 | 1,614 | 2,881 | 2505 | 3790 |
| Cl (mg/L) | 17 | 17 | 7.9 | 24 | 43 | 37 | 56 |
| SO4 (mg/L) | 1,476 | 1,476 | 1,550 | 1,803 | 3,218 | 2772 | 4193 |
| Al (mg/L) | 0.27 | 0.27 | 0.075 | 0.0045 | 0.0072 | 0.0064 | 0.0089 |
| Sb (mg/L) | 0.0026 | 0.0026 | 0.0027 | 0.0029 | 0.0052 | 0.0045 | 0.0069 |
| As (mg/L) | 0.0019 | 0.0019 | 0.002 | 0.0043 | 0.0078 | 0.0067 | 0.01 |
| Ba (mg/L) | 0.0034 | 0.0034 | 0.0026 | 0.045 | 0.08 | 0.069 | 0.1 |
| B (mg/L) | 0.78 | 0.78 | 0.36 | 0.45 | 0.8 | 0.7 | 1.1 |
| Cd (mg/L) | 0.00004 | 0.00005 | 0.00004 | 0.000095 | 0.00017 | 0.00014 | 0.00021 |
| Cr (mg/L) | 0.0005 | 0.0005 | 0.0005 | 0.0018 | 0.0033 | 0.0029 | 0.0043 |
| Co (mg/L) | 0.0039 | 0.0039 | 0.0042 | 0.015 | 0.026 | 0.02 | 0.03 |

| Parameter | Well Graded Model Source Term[1] | Well Graded with No Internal Layers Source Term[1] | Poorly Graded Model Source Term[1] | NAG Backfill – 2021-2029 | | NAG Backfill – 2030-2100 | |
|---|---|---|---|---|---|---|---|
| | | | | NAG Typical[2] | NAG High[2] | NAG Typical[2] | NAG High[2] |
| Cu (mg/L) | 0.014 | 0.014 | 0.015 | 0.016 | 0.029 | 0.025 | 0.037 |
| Fe (mg/L) | 0.05 | 0.05 | 0.05 | 0.00012 | 0.0001 | 0.00011 | 0.0001 |
| Pb (mg/L) | 0.0036 | 0.0036 | 0.004 | 0.0048 | 0.0085 | 0.0074 | 0.011 |
| Li (mg/L) | 0.43 | 0.43 | 0.2 | 0.14 | 0.24 | 0.21 | 0.32 |
| Mn (mg/L) | 0.016 | 0.016 | 0.017 | 0.11 | 0.19 | 0.12 | 0.18 |
| Hg (mg/L) | 0.000005 | 0.000005 | 0.000005 | 0.00001 | 0.000018 | 0.000016 | 0.000023 |
| P (mg/L) | 0.27 | 0.27 | 0.13 | 0.026 | 0.046 | 0.04 | 0.06 |
| Mo (mg/L) | 0.05 | 0.05 | 0.052 | 0.17 | 0.3 | 0.26 | 0.39 |
| Ni (mg/L) | 0.013 | 0.013 | 0.014 | 0.029 | 0.051 | 0.04 | 0.061 |
| Se (mg/L) | 0.046 | 0.046 | 0.048 | 0.089 | 0.16 | 0.14 | 0.21 |
| Si (mg/L) | 2.8 | 2.8 | 1.3 | 4.6 | 8.3 | 7.1 | 11 |
| Ag (mg/L) | 0.000035 | 0.000035 | 0.000037 | 0.000074 | 0.00013 | 0.00011 | 0.00017 |
| Sr (mg/L) | 1.4 | 1.4 | 0.64 | 0.83 | 1.5 | 1.3 | 1.9 |
| Sn (mg/L) | 0.0005 | 0.0005 | 0.0005 | 0.00078 | 0.0014 | 0.0012 | 0.0018 |
| Tl (mg/L) | 0.000036 | 0.000036 | 0.000037 | 0.000078 | 0.00014 | 0.00012 | 0.00018 |
| U (mg/L) | 0.016 | 0.016 | 0.017 | 0.019 | 0.034 | 0.029 | 0.044 |
| V (mg/L) | 0.005 | 0.005 | 0.005 | 0.004 | 0.0072 | 0.0062 | 0.0095 |
| Zn (mg/L) | 0.01 | 0.01 | 0.01 | 0.032 | 0.058 | 0.046 | 0.07 |

[1] Source term represents the parameter value at the end of the modelled timeframe (year 2150).

[2] Source term from SRK (2024).

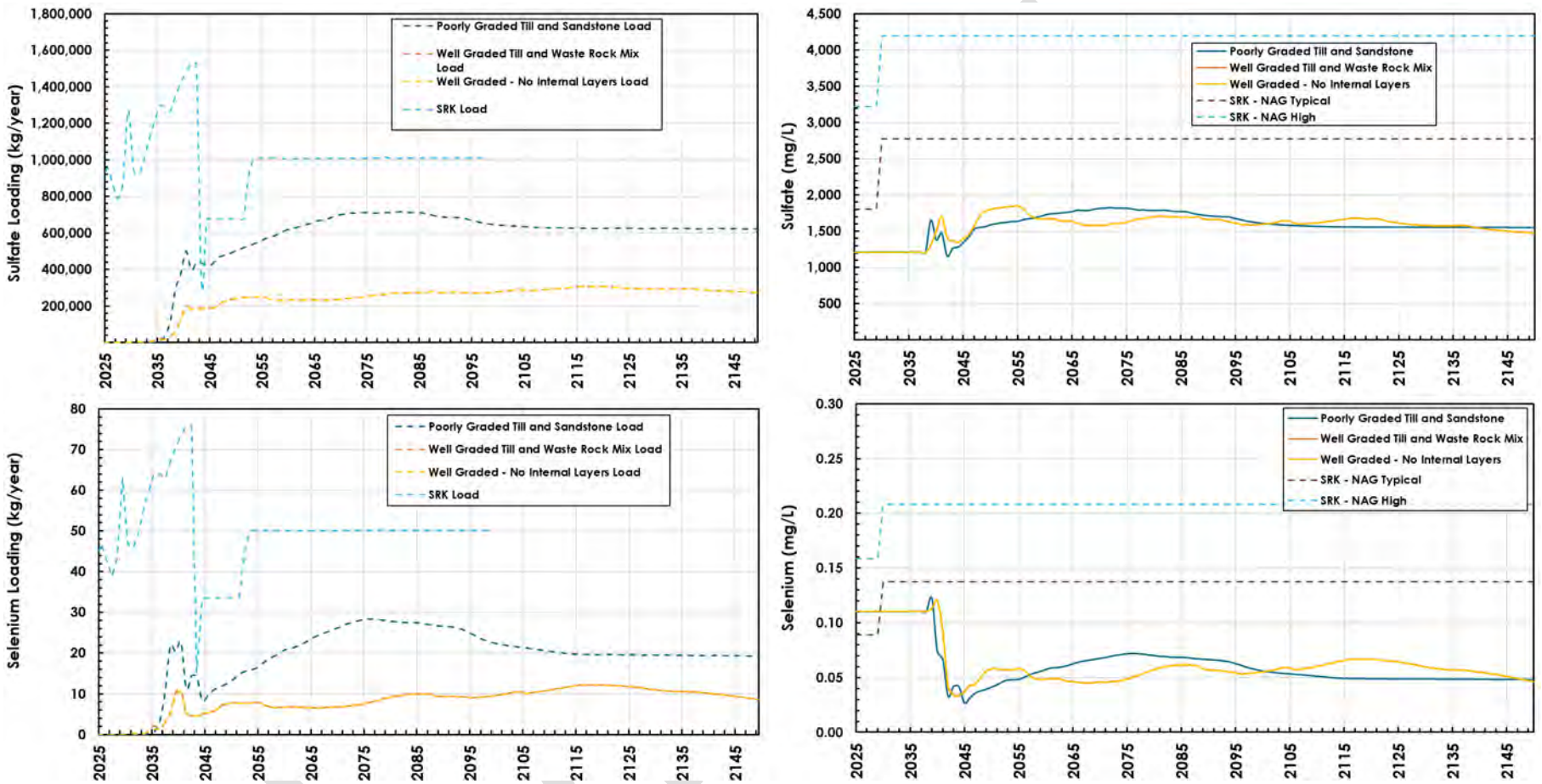


**Figure 4.12: Summary of sulfate and selenium NAG backfill source terms and loading rates.**

### *4.4.1 Nitrogen Source Term Scenarios*

Nitrogen source terms decreased by 37.5% in the low nitrogen scenario and increased by 56.25% in the high nitrogen scenario throughout the first 15 years of the modelled timeframe as the initial porewater from each cell flushed out (Figure 4.13). Once individual cells began to be fully flushed, there were small variations in the percent change in nitrogen concentrations across sensitivities caused by dilution from cells that had been fully flushed of nitrogen. Overall, the differences in nitrogen source terms were similar to the 37.5% decrease or 56.25% increased applied in the respective sensitivity.

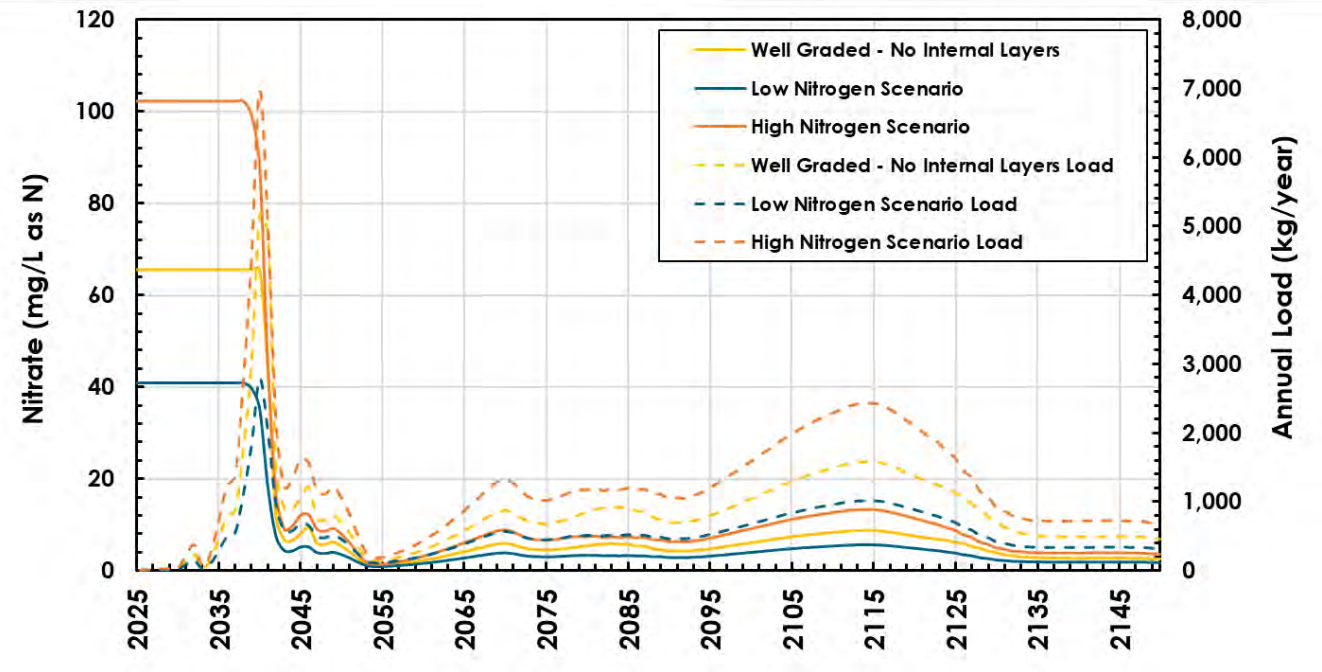


Figure 4.13: Summary of nitrate source terms and loading rates in the well graded – no internal layers scenario and two nitrogen source term scenarios.

# 5 CONCLUSIONS

The scope of this work was to provide Telkwa support in the development of source terms for three scenarios of backfilled NAG mine rock in lifts using bottom-up construction methodology with overburden covers. The objective of the backfilled design is to limit oxygen and water ingress to minimize the release of potential contaminants of concern such as selenium and sulfate to the receiving environment. Based on the modelling that was completed for this work, the following conclusions are made:

- GoldSim modelling indicates that the backfilled NAG mine rock in the Open Pit will be wetted up approximately 40 years following completion of construction for the poorly graded till and sandstone mine rock scenario. The well graded till with mine rock mix scenario and the no internal layers scenario will be wetted up approximately 80 years following the completion of construction due to the finer texture of material.

- Two-dimensional oxygen models indicate that the long-term depths to suboxia are, on average, 13 m for the poorly graded till and sandstone mine rock scenario and 3.3 m for the well graded till with mine rock mix scenario and the no internal layers scenario. The suboxic zone takes approximately 15 years to form in each strip modelled of the poorly graded till and sandstone mine rock once the cover system has been placed. In both the well graded till with mine rock mix scenario and the no internal layers scenario, the suboxic zone takes approximately 13 years to develop following cover system placement.

- It is likely that the oxygen ingress rate for the poorly graded till and sandstone mine rock scenario would be greater than the well graded till and mine rock mix scenarios.

- In general, concentrations in NAG backfill seepage for most modelled parameters will be similar between the three modelled scenarios.

- The decrease in oxygen ingress and infiltrating water into the NAG backfill for the well graded till and mine rock mix scenarios results in an annual chemical load (mass released per year) decrease of approximately half compared to the poorly graded till and sandstone mine rock scenario.

- As a result, mass loads of dissolved constituents such as selenium and sulfate from the NAG backfill are expected to decrease relative to initial source term and load balance models under the conditions modelled herein.

The NAG backfill source terms from this modelling work will be integrated into the site wide load balance model to quantify the effects of the backfill on water quality around the Tenas project.

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# 7 CLOSURE

We trust information provided is satisfactory for your requirements. Please do not hesitate to contact the undersigned for further information or questions.

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# Appendix A

## NAG Backfill Source Terms

**Table A1.** Source terms of the NAG backfill for the poorly graded cover system scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | m$^3$/year |
| 2023 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 16 |
| 2024 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 33 |
| 2025 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 57 |
| 2026 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 87 |
| 2027 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 116 |
| 2028 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 195 |
| 2029 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 221 |
| 2030 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 266 |
| 2031 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 961 |
| 2032 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 2,273 |
| 2033 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 710 |
| 2034 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 1,289 |
| 2035 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 2,755 |
| 2036 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 6,758 |
| 2037 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 30,026 |
| 2038 | 8.0 | 1,210 | 94 | 12 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 0.53 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.29 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.19 | 17 | 0.11 | 1.9 | 0.000029 | 530 | 0.93 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 94,634 |
| 2039 | 8.3 | 1,652 | 609 | 12 | 0.022 | 0.0029 | 0.0015 | 0.0021 | 0.53 | 0.00005 | 21 | 0.0005 | 0.0068 | 0.002 | 0.05 | 0.0011 | 0.29 | 31 | 0.038 | 0.000005 | 0.056 | 0.011 | 0.19 | 17 | 0.12 | 1.9 | 0.00004 | 846 | 0.93 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 30 | 3.8 | 0.69 | 178,458 |
| 2040 | 8.4 | 1,376 | 625 | 12 | 0.023 | 0.0024 | 0.0014 | 0.0023 | 0.53 | 0.00005 | 18 | 0.0005 | 0.0044 | 0.0068 | 0.05 | 0.0013 | 0.29 | 27 | 0.023 | 0.000005 | 0.046 | 0.0085 | 0.19 | 17 | 0.074 | 1.9 | 0.000033 | 730 | 0.93 | 0.000033 | 0.0005 | 0.015 | 0.005 | 0.01 | 23 | 3.0 | 0.54 | 272,969 |
| 2041 | 8.4 | 1,472 | 753 | 9.4 | 0.028 | 0.0026 | 0.0015 | 0.0023 | 0.43 | 0.00005 | 13 | 0.0005 | 0.0041 | 0.008 | 0.05 | 0.0016 | 0.23 | 29 | 0.021 | 0.000005 | 0.05 | 0.0087 | 0.15 | 13 | 0.067 | 1.6 | 0.000035 | 806 | 0.75 | 0.000035 | 0.0005 | 0.016 | 0.005 | 0.01 | 8.0 | 1.0 | 0.18 | 338,914 |
| 2042 | 8.4 | 1,156 | 717 | 9.2 | 0.028 | 0.002 | 0.0013 | 0.0026 | 0.42 | 0.00005 | 13 | 0.0005 | 0.0024 | 0.0078 | 0.05 | 0.0015 | 0.23 | 24 | 0.011 | 0.000005 | 0.039 | 0.0061 | 0.15 | 13 | 0.033 | 1.5 | 0.000028 | 658 | 0.74 | 0.000028 | 0.0005 | 0.012 | 0.005 | 0.01 | 9.9 | 1.3 | 0.23 | 343,355 |
| 2043 | 8.5 | 1,262 | 782 | 9.2 | 0.03 | 0.0022 | 0.0014 | 0.0025 | 0.42 | 0.00005 | 11 | 0.0005 | 0.0029 | 0.0081 | 0.05 | 0.0016 | 0.23 | 26 | 0.014 | 0.000005 | 0.042 | 0.0072 | 0.15 | 13 | 0.042 | 1.5 | 0.00003 | 721 | 0.74 | 0.00003 | 0.0005 | 0.013 | 0.005 | 0.01 | 11 | 1.4 | 0.26 | 345,155 |
| 2044 | 8.5 | 1,280 | 797 | 9.3 | 0.03 | 0.0023 | 0.0014 | 0.0025 | 0.43 | 0.00005 | 11 | 0.0005 | 0.003 | 0.0082 | 0.05 | 0.0019 | 0.23 | 26 | 0.014 | 0.000005 | 0.043 | 0.0078 | 0.15 | 13 | 0.042 | 1.6 | 0.000031 | 733 | 0.75 | 0.000031 | 0.0005 | 0.014 | 0.005 | 0.01 | 3.0 | 0.38 | 0.07 | 339,203 |
| 2045 | 8.5 | 1,343 | 812 | 10 | 0.03 | 0.0024 | 0.0014 | 0.0024 | 0.46 | 0.00005 | 11 | 0.0005 | 0.0023 | 0.0083 | 0.05 | 0.0021 | 0.25 | 27 | 0.0094 | 0.000005 | 0.045 | 0.0074 | 0.16 | 15 | 0.027 | 1.7 | 0.000032 | 764 | 0.82 | 0.000032 | 0.0005 | 0.014 | 0.005 | 0.01 | 1.9 | 0.25 | 0.045 | 312,231 |
| 2046 | 8.5 | 1,424 | 827 | 11 | 0.031 | 0.0025 | 0.0015 | 0.0024 | 0.48 | 0.00005 | 11 | 0.0005 | 0.0026 | 0.0084 | 0.05 | 0.0024 | 0.26 | 29 | 0.011 | 0.000005 | 0.048 | 0.0085 | 0.17 | 15 | 0.031 | 1.8 | 0.000034 | 804 | 0.85 | 0.000034 | 0.0005 | 0.015 | 0.005 | 0.01 | 2.3 | 0.29 | 0.054 | 301,366 |
| 2047 | 8.5 | 1,529 | 845 | 10 | 0.031 | 0.0027 | 0.0017 | 0.0023 | 0.48 | 0.00005 | 11 | 0.0005 | 0.003 | 0.0085 | 0.05 | 0.0027 | 0.26 | 31 | 0.012 | 0.000005 | 0.051 | 0.0096 | 0.17 | 15 | 0.036 | 1.7 | 0.000037 | 855 | 0.84 | 0.000037 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.8 | 0.36 | 0.065 | 302,616 |
| 2048 | 8.5 | 1,553 | 841 | 10 | 0.03 | 0.0027 | 0.0017 | 0.0023 | 0.47 | 0.00005 | 11 | 0.0005 | 0.0031 | 0.0085 | 0.05 | 0.0028 | 0.26 | 31 | 0.013 | 0.000005 | 0.052 | 0.01 | 0.17 | 15 | 0.038 | 1.7 | 0.000037 | 864 | 0.83 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.3 | 0.42 | 0.077 | 305,970 |
| 2049 | 8.5 | 1,561 | 834 | 10 | 0.03 | 0.0028 | 0.0017 | 0.0023 | 0.47 | 0.00005 | 11 | 0.0005 | 0.0032 | 0.0085 | 0.05 | 0.0028 | 0.26 | 31 | 0.013 | 0.000005 | 0.053 | 0.01 | 0.16 | 15 | 0.039 | 1.7 | 0.000037 | 866 | 0.83 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.7 | 0.47 | 0.086 | 308,547 |
| 2050 | 8.5 | 1,590 | 853 | 10 | 0.031 | 0.0028 | 0.0018 | 0.0022 | 0.46 | 0.00005 | 11 | 0.0005 | 0.0034 | 0.0086 | 0.05 | 0.003 | 0.25 | 32 | 0.014 | 0.000005 | 0.054 | 0.011 | 0.16 | 15 | 0.041 | 1.7 | 0.000038 | 884 | 0.82 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 311,965 |
| 2051 | 8.5 | 1,602 | 853 | 10 | 0.031 | 0.0028 | 0.0018 | 0.0022 | 0.46 | 0.00005 | 11 | 0.0005 | 0.0036 | 0.0086 | 0.05 | 0.0031 | 0.25 | 32 | 0.015 | 0.000005 | 0.054 | 0.011 | 0.16 | 14 | 0.043 | 1.7 | 0.000038 | 889 | 0.81 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.3 | 0.55 | 0.099 | 316,216 |
| 2052 | 8.5 | 1,616 | 848 | 9.9 | 0.03 | 0.0028 | 0.0018 | 0.0022 | 0.45 | 0.00005 | 11 | 0.0005 | 0.0038 | 0.0086 | 0.05 | 0.0032 | 0.25 | 32 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.16 | 14 | 0.046 | 1.6 | 0.000039 | 894 | 0.79 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.1 | 0.65 | 0.12 | 321,547 |
| 2053 | 8.5 | 1,623 | 839 | 9.8 | 0.03 | 0.0029 | 0.0019 | 0.0022 | 0.45 | 0.00005 | 11 | 0.0005 | 0.0039 | 0.0085 | 0.05 | 0.0033 | 0.24 | 32 | 0.016 | 0.000005 | 0.055 | 0.012 | 0.16 | 14 | 0.048 | 1.6 | 0.000039 | 895 | 0.78 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.5 | 0.7 | 0.13 | 324,989 |
| 2054 | 8.5 | 1,635 | 843 | 9.6 | 0.03 | 0.0029 | 0.0019 | 0.0022 | 0.44 | 0.00005 | 11 | 0.0005 | 0.0039 | 0.0086 | 0.05 | 0.0034 | 0.24 | 32 | 0.016 | 0.000005 | 0.055 | 0.012 | 0.15 | 14 | 0.048 | 1.6 | 0.000039 | 901 | 0.77 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.1 | 0.64 | 0.12 | 331,093 |
| 2055 | 8.5 | 1,636 | 838 | 9.4 | 0.03 | 0.0029 | 0.0019 | 0.0022 | 0.43 | 0.00005 | 11 | 0.0005 | 0.0039 | 0.0085 | 0.05 | 0.0034 | 0.24 | 32 | 0.016 | 0.000005 | 0.055 | 0.012 | 0.15 | 14 | 0.048 | 1.6 | 0.000039 | 900 | 0.76 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.011 | 5.0 | 0.63 | 0.11 | 335,909 |
| 2056 | 8.5 | 1,659 | 855 | 9.3 | 0.03 | 0.0029 | 0.0019 | 0.0022 | 0.42 | 0.00005 | 11 | 0.0005 | 0.0041 | 0.0086 | 0.05 | 0.0035 | 0.23 | 33 | 0.017 | 0.000005 | 0.056 | 0.013 | 0.15 | 13 | 0.05 | 1.5 | 0.00004 | 915 | 0.75 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.5 | 0.7 | 0.13 | 342,067 |
| 2057 | 8.5 | 1,672 | 854 | 9.2 | 0.03 | 0.0029 | 0.002 | 0.0022 | 0.42 | 0.00005 | 11 | 0.0005 | 0.0042 | 0.0086 | 0.05 | 0.0036 | 0.23 | 33 | 0.018 | 0.000005 | 0.056 | 0.013 | 0.15 | 13 | 0.052 | 1.5 | 0.00004 | 920 | 0.74 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 6.2 | 0.78 | 0.14 | 345,301 |
| 2058 | 8.5 | 1,682 | 851 | 9.1 | 0.03 | 0.003 | 0.002 | 0.0022 | 0.42 | 0.00005 | 11 | 0.00051 | 0.0044 | 0.0086 | 0.05 | 0.0037 | 0.23 | 33 | 0.019 | 0.000005 | 0.057 | 0.014 | 0.15 | 13 | 0.054 | 1.5 | 0.00004 | 924 | 0.73 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 6.6 | 0.83 | 0.15 | 348,168 |
| 2059 | 8.5 | 1,701 | 857 | 9.0 | 0.03 | 0.003 | 0.002 | 0.0022 | 0.41 | 0.00005 | 11 | 0.00051 | 0.0045 | 0.0087 | 0.05 | 0.0038 | 0.23 | 34 | 0.019 | 0.000005 | 0.057 | 0.014 | 0.14 | 13 | 0.056 | 1.5 | 0.000041 | 934 | 0.72 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 6.4 | 0.81 | 0.15 | 352,107 |
| 2060 | 8.5 | 1,724 | 867 | 8.9 | 0.031 | 0.003 | 0.0021 | 0.0021 | 0.41 | 0.00005 | 11 | 0.00052 | 0.0046 | 0.0087 | 0.05 | 0.0039 | 0.22 | 34 | 0.02 | 0.000005 | 0.058 | 0.015 | 0.14 | 13 | 0.057 | 1.5 | 0.000041 | 947 | 0.72 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 6.6 | 0.83 | 0.15 | 356,256 |
| 2061 | 8.5 | 1,741 | 868 | 8.9 | 0.031 | 0.0031 | 0.0021 | 0.0021 | 0.41 | 0.00005 | 11 | 0.00052 | 0.0048 | 0.0088 | 0.05 | 0.0041 | 0.22 | 34 | 0.02 | 0.000005 | 0.059 | 0.015 | 0.14 | 13 | 0.059 | 1.5 | 0.000042 | 954 | 0.71 | 0.000042 | 0.0005 | 0.019 | 0.005 | 0.01 | 6.3 | 0.79 | 0.14 | 358,049 |
| 2062 | 8.5 | 1,742 | 886 | 8.8 | 0.031 | 0.0031 | 0.0022 | 0.0021 | 0.4 | 0.00005 | 11 | 0.00052 | 0.0048 | 0.0089 | 0.05 | 0.0042 | 0.22 | 35 | 0.02 | 0.000005 | 0.059 | 0.015 | 0.14 | 13 | 0.059 | 1.5 | 0.000042 | 959 | 0.71 | 0.000042 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.7 | 0.72 | 0.13 | 361,103 |
| 2063 | 8.5 | 1,753 | 891 | 8.7 | 0.031 | 0.0031 | 0.0022 | 0.0021 | 0.4 | 0.00005 | 11 | 0.00053 | 0.0049 | 0.0089 | 0.05 | 0.0043 | 0.22 | 35 | 0.02 | 0.000005 | 0.059 | 0.016 | 0.14 | 12 | 0.06 | 1.5 | 0.000042 | 965 | 0.7 | 0.000042 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.1 | 0.65 | 0.12 | 363,501 |
| 2064 | 8.5 | 1,759 | 896 | 8.6 | 0.031 | 0.0031 | 0.0022 | 0.0021 | 0.4 | 0.00005 | 11 | 0.00053 | 0.005 | 0.0089 | 0.05 | 0.0044 | 0.22 | 35 | 0.021 | 0.000005 | 0.059 | 0.016 | 0.14 | 12 | 0.061 | 1.4 | 0.000042 | 969 | 0.69 | 0.000042 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.3 | 0.67 | 0.12 | 367,099 |
| 2065 | 8.5 | 1,770 | 895 | 8.6 | 0.031 | 0.0031 | 0.0023 | 0.0021 | 0.39 | 0.00005 | 11 | 0.00053 | 0.0051 | 0.0089 | 0.05 | 0.0045 | 0.22 | 35 | 0.021 | 0.000005 | 0.06 | 0.016 | 0.14 | 12 | 0.062 | 1.4 | 0.000042 | 973 | 0.69 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.5 | 0.7 | 0.13 | 369,105 |
| 2066 | 8.5 | 1,790 | 909 | 8.5 | 0.032 | 0.0032 | 0.0023 | 0.0021 | 0.39 | 0.00005 | 10 | 0.00054 | 0.0052 | 0.009 | 0.05 | 0.0046 | 0.21 | 36 | 0.022 | 0.000005 | 0.06 | 0.017 | 0.14 | 12 | 0.064 | 1.4 | 0.000043 | 985 | 0.69 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.8 | 0.74 | 0.13 | 371,946 |
| 2067 | 8.5 | 1,785 | 952 | 8.5 | 0.033 | 0.0031 | 0.0023 | 0.0021 | 0.39 | 0.00005 | 9.5 | 0.00054 | 0.0053 | 0.0093 | 0.05 | 0.0047 | 0.21 | 36 | 0.022 | 0.000005 | 0.06 | 0.017 | 0.14 | 12 | 0.065 | 1.4 | 0.000043 | 993 | 0.68 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 6.1 | 0.77 | 0.14 | 374,952 |
| 2068 | 8.5 | 1,786 | 969 | 8.4 | 0.034 | 0.0031 | 0.0023 | 0.0021 | 0.38 | 0.00005 | 9.2 | 0.00054 | 0.0054 | 0.0094 | 0.05 | 0.0047 | 0.21 | 37 | 0.022 | 0.000005 | 0.06 | 0.017 | 0.13 | 12 | 0.066 | 1.4 | 0.000043 | 996 | 0.67 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 6.2 | 0.78 | 0.14 | 378,901 |
| 2069 | 8.5 | 1,803 | 1,003 | 8.3 | 0.035 | 0.0032 | 0.0024 | 0.0021 | 0.38 | 0.00005 | 8.7 | 0.00054 | 0.0055 | 0.0096 | 0.05 | 0.0048 | 0.21 | 38 | 0.023 | 0.000005 | 0.061 | 0.017 | 0.13 | 12 | 0.067 | 1.4 | 0.000043 | 1,012 | 0.67 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 6.1 | 0.77 | 0.14 | 381,313 |
| 2070 | 8.5 | 1,815 | 1,013 | 8.3 | 0.036 | 0.0032 | 0.0024 | 0.0021 | 0.38 | 0.00005 | 8.6 | 0.00055 | 0.0055 | 0.0097 | 0.05 | 0.0049 | 0.21 | 38 | 0.023 | 0.000005 | 0.061 | 0.018 | 0.13 | 12 | 0.068 | 1.4 | 0.000043 | 1,019 | 0.66 | 0.000044 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.9 | 0.74 | 0.14 | 384,374 |
| 2071 | 8.6 | 1,818 | 1,048 | 8.2 | 0.037 | 0.0032 | 0.0024 | 0.0021 | 0.38 | 0.00005 | 8.1 | 0.00055 | 0.0056 | 0.01 | 0.05 | 0.005 | 0.21 | 38 | 0.023 | 0.000005 | 0.061 | 0.018 | 0.13 | 12 | 0.068 | 1.4 | 0.000044 | 1,028 | 0.66 | 0.000044 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.7 | 0.72 | 0.13 | 386,328 |
| 2072 | 8.6 | 1,826 | 1,060 | 8.2 | 0.037 | 0.0032 | 0.0025 | 0.0021 | 0.37 | 0.00005 | 7.9 | 0.00055 | 0.0057 | 0.01 | 0.05 | 0.0051 | 0.2 | 39 | 0.024 | 0.000005 | 0.061 | 0.019 | 0.13 | 12 | 0.07 | 1.4 | 0.000044 | 1,034 | 0.66 | 0.000044 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.6 | 0.71 | 0.13 | 388,982 |
| 2073 | 8.6 | 1,817 | 1,116 | 8.2 | 0.039 | 0.0032 | 0.0025 | 0.0022 | 0.37 | 0.00005 | 7.2 | 0.00055 | 0.0058 | 0.01 | 0.05 | 0.0051 | 0.2 | 39 | 0.024 | 0.000005 | 0.061 | 0.019 | 0.13 | 12 | 0.07 | 1.4 | 0.000044 | 1,043 | 0.66 | 0.000044 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.7 | 0.72 | 0.13 | 389,390 |
| 2074 | 8.6 | 1,817 | 1,139 | 8.1 | 0.04 | 0.0032 | 0.0025 | 0.0022 | 0.37 | 0.00005 | 7.0 | 0.00055 | 0.0059 | 0.011 | 0.05 | 0.0052 | 0.2 | 40 | 0.024 | 0.000005 | 0.061 | 0.019 | 0.13 | 12 | 0.071 | 1.4 | 0.000044 | 1,047 | 0.65 | 0.000044 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.8 | 0.74 | 0.13 | 391,164 |
| 2075 | 8.6 | 1,816 | 1,167 | 8.1 | 0.041 | 0.0032 | 0.0025 | 0.0022 | 0.37 | 0.00005 | 6.7 | 0.00055 | 0.0059 | 0.011 | 0.05 | 0.0052 | 0.2 | 40 | 0.024 | 0.000005 | 0.061 | 0.019 | 0.13 | 12 | 0.072 | 1.4 | 0.000043 | 1,052 | 0.65 | 0.000044 | 0.0005 | 0.019 | 0.005 | 0.01 | 6.0 | 0.76 | 0.14 | 391,961 |
| 2076 | 8.6 | 1,808 | 1,202 | 8.1 | 0.043 | 0.0032 | 0.0025 | 0.0022 | 0.37 | 0.00005 | 6.3 | 0.00054 | 0.0059 | 0.011 | 0.05 | 0.0052 | 0.2 | 41 | 0.025 | 0.000005 | 0.061 | 0.019 | 0.13 | 12 | 0.072 | 1.3 | 0.000043 | 1,056 | 0.65 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 6.1 | 0.77 | 0.14 | 394,086 |
| 2077 | 8.6 | 1,793 | 1,254 | 8.0 | 0.045 | 0.0032 | 0.0025 | 0.0022 | 0.37 | 0.00005 | 5.9 | 0.00054 | 0.0059 | 0.012 | 0.05 | 0.0052 | 0.2 | 42 | 0.025 | 0.000005 | 0.06 | 0.019 | 0.13 | 12 | 0.072 | 1.3 | 0.000043 | 1,060 | 0.65 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.9 | 0.75 | 0.14 | 394,666 |
| 2078 | 8.6 | 1,793 | 1,299 | 8.0 | 0.046 | 0.0032 | 0.0025 | 0.0022 | 0.37 | 0.00005 | 5.5 | 0.00054 | 0.0059 | 0.012 | 0.05 | 0.0052 | 0.2 | 42 | 0.024 | 0.000005 | 0.06 | 0.019 | 0.13 | 11 | 0.071 | 1.3 | 0.000043 | 1,070 | 0.64 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.7 | 0.72 | 0.13 | 396,324 |
| 2079 | 8.7 | 1,789 | 1,333 | 8.0 | 0.048 | 0.0032 | 0.0025 | 0.0022 | 0.37 | 0.00005 | 5.3 | 0.00054 | 0.0058 | 0.012 | 0.05 | 0.0052 | 0.2 | 43 | 0.024 | 0.000005 | 0.06 | 0.019 | 0.13 | 11 | 0.071 | 1.3 | 0.000043 | 1,074 | 0.64 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.1 | 0.64 | 0.12 | 397,336 |
| 2080 | 8.7 | 1,786 | 1,355 | 8.0 | 0.049 | 0.0031 | 0.0025 | 0.0022 | 0.36 | 0.00005 | 5.1 | 0.00054 | 0.0058 | 0.012 | 0.05 | 0.0053 | 0.2 | 43 | 0.024 | 0.000005 | 0.06 | 0.019 | 0.13 | 11 | 0.07 | 1.3 | 0.000043 | 1,077 | 0.64 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 4.6 | 0.58 | 0.11 | 398,998 |
| 2081 | 8.7 | 1,787 | 1,371 | 7.9 | 0.049 | 0.0032 | 0.0025 | 0.0023 | 0.36 | 0.00005 | 5.0 | 0.00054 | 0.0058 | 0.013 | 0.05 | 0.0053 | 0.2 | 44 | 0.024 | 0.000005 | 0.06 | 0.019 | 0.13 | 11 | 0.069 | 1.3 | 0.000043 | 1,081 | 0.64 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 3.8 | 0.48 | 0.086 | 399,482 |
| 2082 | 8.7 | 1,790 | 1,384 | 7.9 | 0.05 | 0.0032 | 0.0025 | 0.0023 | 0.36 | 0.00005 | 4.9 | 0.00054 | 0.0058 | 0.013 | 0.05 | 0.0054 | 0.2 | 44 | 0.024 | 0.000005 | 0.06 | 0.019 | 0.13 | 11 | 0.069 | 1.3 | 0.000043 | 1,085 | 0.64 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 3.4 | 0.43 | 0.077 | 400,065 |
| 2083 | 8.7 | 1,778 | 1,429 | 7.9 | 0.052 | 0.0031 | 0.0025 | 0.0023 | 0.36 | 0.00005 | 4.7 | 0.00053 | 0.0058 | 0.013 | 0.05 | 0.0054 | 0.2 | 45 | 0.024 | 0.000005 | 0.06 | 0.019 | 0.13 | 11 | 0.069 | 1.3 | 0.000043 | 1,089 | 0.64 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 2.9 | 0.37 | 0.067 | 400,547 |
| 2084 | 8.7 | 1,773 | 1,453 | 7.9 | 0.053 | 0.0031 | 0.0025 | 0.0023 | 0.36 | 0.00005 | 4.5 | 0.00053 | 0.0058 | 0.013 | 0.05 | 0.0054 | 0.2 | 45 | 0.024 | 0.000005 | 0.06 | 0.019 | 0.13 | 11 | 0.069 | 1.3 | 0.000042 | 1,091 | 0.64 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 2.8 | 0.35 | 0.064 | 401,921 |
| 2085 | 8.7 | 1,770 | 1,479 | 7.9 | 0.054 | 0.0031 | 0.0025 | 0.0023 | 0.36 | 0.00005 | 4.4 | 0.00053 | 0.0058 | 0.014 | 0.05 | 0.0054 | 0.2 | 46 | 0.024 | 0.000005 | 0.06 | 0.019 | 0.13 | 11 | 0.068 | 1.3 | 0.000042 | 1,095 | 0.64 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 2.7 | 0.34 | 0.061 | 401,543 |
| 2086 | 8.7 | 1,769 | 1,496 | 7.9 | 0.054 | 0.0031 | 0.0025 | 0.0023 | 0.36 | 0.00005 | 4.3 | 0.00053 | 0.0058 | 0.014 | 0.05 | 0.0054 | 0.2 | 46 | 0.023 | 0.000005 | 0.06 | 0.019 | 0.13 | 11 | 0.068 | 1.3 | 0.000042 | 1,097 | 0.64 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 401,553 |
| 2087 | 8.7 | 1,746 | 1,561 | 7.9 | 0.057 | 0.0031 | 0.0025 | 0.0023 | 0.36 | 0.00005 | 4.0 | 0.00052 | 0.0057 | 0.014 | 0.05 | 0.0053 | 0.2 | 47 | 0.023 | 0.000005 | 0.059 | 0.019 | 0.13 | 11 | 0.068 | 1.3 | 0.000042 | 1,100 | 0.64 | 0.000042 | 0.0005 | 0.019 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 401,267 |
| 2088 | 8.7 | 1,734 | 1,593 | 7.9 | 0.059 | 0.0031 | 0.0025 | 0.0024 | 0.36 | 0.00005 | 3.8 | 0.00052 | 0.0057 | 0.015 | 0.05 | 0.0053 | 0.2 | 47 | 0.023 | 0.000005 | 0.058 | 0.019 | 0.13 | 11 | 0.067 | 1.3 | 0.000042 | 1,101 | 0.63 | 0.000042 | 0.0005 | 0.019 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 402,320 |
| 2089 | 8.7 | 1,721 | 1,628 | 7.9 | 0.06 | 0.003 | 0.0025 | 0.0024 | 0.36 | 0.00005 | 3.7 | 0.00052 | 0.0056 | 0.015 | 0.05 | 0.0053 | 0.2 | 48 | 0.023 | 0.000005 | 0.058 | 0.019 | 0.13 | 11 | 0.067 | 1.3 | 0.000041 | 1,102 | 0.64 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 401,001 |
| 2090 | 8.7 | 1,714 | 1,647 | 7.9 | 0.061 | 0.003 | 0.0025 | 0.0024 | 0.36 | 0.00005 | 3.6 | 0.00052 | 0.0056 | 0.015 | 0.05 | 0.0052 | 0.2 | 48 | 0.023 | 0.000005 | 0.058 | 0.019 | 0.13 | 11 | 0.066 | 1.3 | 0.000041 | 1,103 | 0.64 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 401,227 |
| 2091 | 8.7 | 1,707 | 1,672 | 7.9 | 0.062 | 0.003 | 0.0025 | 0.0024 | 0.36 | 0.00005 | 3.5 | 0.00051 | 0.0056 | 0.015 | 0.05 | 0.0052 | 0.2 | 49 | 0.023 | 0.000005 | 0.057 | 0.019 | 0.13 | 11 | 0.066 | 1.3 | 0.000041 | 1,104 | 0.64 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 401,098 |
| 2092 | 8.7 | 1,703 | 1,685 | 7.9 | 0.063 | 0.003 | 0.0025 | 0.0024 | 0.36 | 0.00005 | 3.5 | 0.00051 | 0.0056 | 0.016 | 0.05 | 0.0052 | 0.2 | 49 | 0.023 | 0.000005 | 0.057 | 0.019 | 0.13 | 11 | 0.066 | 1.3 | 0.000041 | 1,105 | 0.63 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.6 | 0.33 | 0.059 | 402,800 |
| 2093 | 8.7 | 1,698 | 1,703 | 7.9 | 0.063 | 0.003 | 0.0025 | 0.0024 | 0.36 | 0.00005 | 3.4 | 0.00051 | 0.0055 | 0.016 | 0.05 | 0.0051 | 0.2 | 49 | 0.022 | 0.000005 | 0.057 | 0.018 | 0.13 | 11 | 0.065 | 1.3 | 0.000041 | 1,106 | 0.63 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.4 | 0.31 | 0.056 | 402,142 |
| 2094 | 8.8 | 1,695 | 1,717 | 7.9 | 0.064 | 0.003 | 0.0025 | 0.0024 | 0.36 | 0.00005 | 3.4 | 0.00051 | 0.0055 | 0.016 | 0.05 | 0.0051 | 0.2 | 50 | 0.022 | 0.000005 | 0.057 | 0.018 | 0.13 | 11 | 0.064 | 1.3 | 0.000041 | 1,107 | 0.64 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.3 | 0.29 | 0.052 | 401,911 |
| 2095 | 8.8 | 1,672 | 1,770 | 7.9 | 0.066 | 0.0029 | 0.0024 | 0.0025 | 0.36 | 0.00005 | 3.2 | 0.0005 | 0.0054 | 0.016 | 0.05 | 0.005 | 0.2 | 50 | 0.022 | 0.000005 | 0.056 | 0.018 | 0.13 | 11 | 0.063 | 1.3 | 0.00004 | 1,108 | 0.64 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 1.7 | 0.22 | 0.04 | 401,364 |
| 2096 | 8.8 | 1,658 | 1,797 | 7.9 | 0.068 | 0.0029 | 0.0024 | 0.0025 | 0.36 | 0.00005 | 3.1 | 0.0005 | 0.0052 | 0.016 | 0.05 | 0.005 | 0.2 | 51 | 0.021 | 0.000005 | 0.056 | 0.018 | 0.13 | 11 | 0.061 | 1.3 | 0.00004 | 1,106 | 0.63 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 1.4 | 0.18 | 0.033 | 402,265 |
| 2097 | 8.8 | 1,640 | 1,828 | 7.9 | 0.069 | 0.0029 | 0.0024 | 0.0025 | 0.36 | 0.00005 | 3.0 | 0.0005 | 0.0051 | 0.016 | 0.05 | 0.0049 | 0.2 | 51 | 0.021 | 0.000005 | 0.055 | 0.017 | 0.13 | 11 | 0.06 | 1.3 | 0.000039 | 1,104 | 0.64 | 0.000039 | 0.0005 | 0.018 | 0.005 | 0.01 | 1.0 | 0.13 | 0.024 | 401,193 |
| 2098 | 8.8 | 1,628 | 1,850 | 7.9 | 0.07 | 0.0029 | 0.0023 | 0.0025 | 0.36 | 0.00005 | 2.9 | 0.0005 | 0.005 | 0.016 | 0.05 | 0.0048 | 0.2 | 51 | 0.02 | 0.000005 | 0.055 | 0.017 | 0.13 | 11 | 0.058 | 1.3 | 0.000039 | 1,103 | 0.64 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.82 | 0.1 | 0.019 | 400,659 |
| 2099 | 8.8 | 1,616 | 1,868 | 7.9 | 0.071 | 0.0028 | 0.0023 | 0.0025 | 0.36 | 0.00005 | 2.9 | 0.0005 | 0.0049 | 0.015 | 0.05 | 0.0047 | 0.2 | 52 | 0.02 | 0.000005 | 0.054 | 0.017 | 0.13 | 11 | 0.057 | 1.3 | 0.000039 | 1,101 | 0.64 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.62 | 0.078 | 0.014 | 400,865 |
| 2100 | 8.8 | 1,608 | 1,880 | 7.9 | 0.072 | 0.0028 | 0.0023 | 0.0026 | 0.36 | 0.00005 | 2.8 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0047 | 0.2 | 52 | 0.019 | 0.000005 | 0.054 | 0.016 | 0.13 | 11 | 0.056 | 1.3 | 0.000038 | 1,099 | 0.64 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.54 | 0.069 | 0.012 | 401,623 |
| 2101 | 8.8 | 1,600 | 1,895 | 7.9 | 0.072 | 0.0028 | 0.0023 | 0.0026 | 0.36 | 0.00005 | 2.8 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0046 | 0.2 | 52 | 0.019 | 0.000005 | 0.054 | 0.016 | 0.13 | 11 | 0.055 | 1.3 | 0.000038 | 1,098 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.49 | 0.061 | 0.011 | 401,098 |
| 2102 | 8.8 | 1,594 | 1,902 | 7.9 | 0.073 | 0.0028 | 0.0022 | 0.0026 | 0.36 | 0.00005 | 2.8 | 0.0005 | 0.0047 | 0.015 | 0.05 | 0.0046 | 0.2 | 52 | 0.019 | 0.000005 | 0.054 | 0.016 | 0.13 | 11 | 0.055 | 1.3 | 0.000038 | 1,097 | 0.63 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.47 | 0.059 | 0.011 | 402,800 |
| 2103 | 8.8 | 1,588 | 1,911 | 7.9 | 0.073 | 0.0028 | 0.0022 | 0.0026 | 0.36 | 0.00005 | 2.7 | 0.0005 | 0.0047 | 0.015 | 0.05 | 0.0045 | 0.2 | 53 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.13 | 11 | 0.054 | 1.3 | 0.000038 | 1,096 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.46 | 0.058 | 0.011 | 402,142 |
| 2104 | 8.8 | 1,585 | 1,917 | 7.9 | 0.074 | 0.0028 | 0.0022 | 0.0026 | 0.36 | 0.00005 | 2.7 | 0.0005 | 0.0047 | 0.015 | 0.05 | 0.0045 | 0.2 | 53 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.13 | 11 | 0.054 | 1.3 | 0.000038 | 1,095 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.46 | 0.058 | 0.01 | 401,911 |
| 2105 | 8.8 | 1,581 | 1,927 | 7.9 | 0.074 | 0.0028 | 0.0022 | 0.0026 | 0.36 | 0.00005 | 2.7 | 0.0005 | 0.0046 | 0.015 | 0.05 | 0.0045 | 0.2 | 53 | 0.018 | 0.000005 | 0.053 | 0.016 | 0.13 | 11 | 0.053 | 1.3 | 0.000038 | 1,095 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,364 |
| 2106 | 8.8 | 1,577 | 1,935 | 7.9 | 0.074 | 0.0028 | 0.0022 | 0.0026 | 0.36 | 0.00005 | 2.7 | 0.0005 | 0.0046 | 0.015 | 0.05 | 0.0044 | 0.2 | 53 | 0.018 | 0.000005 | 0.053 | 0.016 | 0.13 | 11 | 0.053 | 1.3 | 0.000038 | 1,095 | 0.63 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,265 |
| 2107 | 8.8 | 1,574 | 1,939 | 7.9 | 0.075 | 0.0028 | 0.0022 | 0.0026 | 0.36 | 0.00005 | 2.7 | 0.0005 | 0.0046 | 0.015 | 0.05 | 0.0044 | 0.2 | 53 | 0.018 | 0.000005 | 0.053 | 0.015 | 0.13 | 11 | 0.053 | 1.3 | 0.000038 | 1,094 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,193 |
| 2108 | 8.8 | 1,571 | 1,946 | 7.9 | 0.075 | 0.0028 | 0.0022 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0045 | 0.015 | 0.05 | 0.0044 | 0.2 | 54 | 0.018 | 0.000005 | 0.053 | 0.015 | 0.13 | 11 | 0.052 | 1.3 | 0.000038 | 1,094 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 400,659 |
| 2109 | 8.8 | 1,569 | 1,948 | 7.9 | 0.075 | 0.0028 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0045 | 0.015 | 0.05 | 0.0043 | 0.2 | 54 | 0.018 | 0.000005 | 0.053 | 0.015 | 0.13 | 11 | 0.052 | 1.3 | 0.000038 | 1,093 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 400,865 |
| 2110 | 8.8 | 1,566 | 1,951 | 7.9 | 0.075 | 0.0028 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0044 | 0.015 | 0.05 | 0.0043 | 0.2 | 54 | 0.018 | 0.000005 | 0.053 | 0.015 | 0.13 | 11 | 0.051 | 1.3 | 0.000037 | 1,092 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,623 |
| 2111 | 8.8 | 1,564 | 1,955 | 7.9 | 0.075 | 0.0028 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0044 | 0.015 | 0.05 | 0.0042 | 0.2 | 54 | 0.018 | 0.000005 | 0.053 | 0.015 | 0.13 | 11 | 0.051 | 1.3 | 0.000037 | 1,092 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,098 |
| 2112 | 8.8 | 1,562 | 1,957 | 7.9 | 0.076 | 0.0028 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0044 | 0.015 | 0.05 | 0.0042 | 0.2 | 54 | 0.017 | 0.000005 | 0.053 | 0.015 | 0.13 | 11 | 0.05 | 1.3 | 0.000037 | 1,091 | 0.63 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,800 |
| 2113 | 8.8 | 1,561 | 1,958 | 7.9 | 0.076 | 0.0028 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0043 | 0.015 | 0.05 | 0.0042 | 0.2 | 54 | 0.017 | 0.000005 | 0.053 | 0.015 | 0.13 | 11 | 0.05 | 1.3 | 0.000037 | 1,091 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,142 |
| 2114 | 8.8 | 1,560 | 1,961 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0043 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.015 | 0.13 | 11 | 0.05 | 1.3 | 0.000037 | 1,091 | 0.64 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,911 |
| 2115 | 8.8 | 1,559 | 1,964 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0043 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,091 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,364 |
| 2116 | 8.8 | 1,558 | 1,965 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0043 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,091 | 0.63 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,265 |
| 2117 | 8.8 | 1,558 | 1,965 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0043 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,090 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,193 |
| 2118 | 8.8 | 1,557 | 1,966 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0043 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,091 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.011 | 0.45 | 0.057 | 0.01 | 400,659 |
| 2119 | 8.8 | 1,557 | 1,965 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0043 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,090 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.011 | 0.45 | 0.057 | 0.01 | 400,865 |
| 2120 | 8.8 | 1,557 | 1,961 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,089 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.011 | 0.45 | 0.057 | 0.01 | 401,623 |
| 2121 | 8.8 | 1,557 | 1,963 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,090 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.011 | 0.45 | 0.057 | 0.01 | 401,098 |
| 2122 | 8.8 | 1,556 | 1,960 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,089 | 0.63 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.011 | 0.45 | 0.057 | 0.01 | 402,800 |
| 2123 | 8.8 | 1,556 | 1,958 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,088 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.011 | 0.45 | 0.057 | 0.01 | 402,142 |
| 2124 | 8.8 | 1,556 | 1,959 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,088 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.011 | 0.45 | 0.057 | 0.01 | 401,911 |
| 2125 | 8.8 | 1,556 | 1,960 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,089 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.011 | 0.45 | 0.057 | 0.01 | 401,364 |
| 2126 | 8.8 | 1,556 | 1,961 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,089 | 0.63 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.011 | 0.45 | 0.057 | 0.01 | 402,265 |
| 2127 | 8.8 | 1,555 | 1,960 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,088 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,193 |
| 2128 | 8.8 | 1,555 | 1,961 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,089 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 400,659 |
| 2129 | 8.8 | 1,555 | 1,960 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,088 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 400,865 |
| 2130 | 8.8 | 1,555 | 1,956 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,087 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,623 |
| 2131 | 8.8 | 1,554 | 1,958 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,088 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,098 |
| 2132 | 8.8 | 1,554 | 1,955 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,087 | 0.63 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,800 |
| 2133 | 8.8 | 1,554 | 1,953 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,086 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,142 |
| 2134 | 8.8 | 1,554 | 1,954 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,087 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,911 |

**Table A1**. Source terms of the NAG backfill for the poorly graded cover system scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | $m^3$/year |
| 2135 | 8.8 | 1,554 | 1,955 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,087 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,364 |
| 2136 | 8.8 | 1,553 | 1,956 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.049 | 1.3 | 0.000037 | 1,087 | 0.63 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,265 |
| 2137 | 8.8 | 1,553 | 1,955 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,086 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,193 |
| 2138 | 8.8 | 1,553 | 1,956 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.0041 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,087 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 400,659 |
| 2139 | 8.8 | 1,553 | 1,955 | 7.9 | 0.076 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,086 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 400,865 |
| 2140 | 8.8 | 1,552 | 1,951 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,085 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,623 |
| 2141 | 8.8 | 1,552 | 1,953 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,086 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,098 |
| 2142 | 8.8 | 1,552 | 1,950 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,085 | 0.63 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,800 |
| 2143 | 8.8 | 1,552 | 1,948 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,085 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,142 |
| 2144 | 8.8 | 1,552 | 1,949 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,085 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,911 |
| 2145 | 8.8 | 1,552 | 1,950 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,085 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,364 |
| 2146 | 8.8 | 1,551 | 1,951 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,085 | 0.63 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 402,265 |
| 2147 | 8.8 | 1,551 | 1,950 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,085 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,193 |
| 2148 | 8.8 | 1,551 | 1,951 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,085 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 400,659 |
| 2149 | 8.8 | 1,550 | 1,950 | 7.9 | 0.075 | 0.0027 | 0.0021 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,084 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 400,865 |
| 2150 | 8.8 | 1,550 | 1,947 | 7.9 | 0.075 | 0.0027 | 0.002 | 0.0026 | 0.36 | 0.00005 | 2.6 | 0.0005 | 0.0042 | 0.015 | 0.05 | 0.004 | 0.2 | 54 | 0.017 | 0.000005 | 0.052 | 0.014 | 0.13 | 11 | 0.048 | 1.3 | 0.000037 | 1,083 | 0.64 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 0.45 | 0.057 | 0.01 | 401,623 |

**Table A2.** Annual loads of the NAG backfill for the poorly graded cover system scenario.

| Model Year | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year as CaCO3 | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | m$^3$/year |
| 2023 | 20 | 1.5 | 0.19 | 0.0002 | 0.000034 | 0.000019 | 0.000037 | 0.0086 | 0.00000065 | 0.45 | 0.0000081 | 0.000092 | 0.000016 | 0.00081 | 0.0000016 | 0.0047 | 0.33 | 0.00054 | 0.00 | 0.00066 | 0.00012 | 0.003 | 0.27 | 0.0018 | 0.031 | 0.00000047 | 8.5 | 0.015 | 0.00000047 | 0.0000081 | 0.00021 | 0.000028 | 0.00007 | 1.1 | 0.13 | 0.024 | 16 |
| 2024 | 40 | 3.1 | 0.38 | 0.0004 | 0.00007 | 0.00004 | 0.000076 | 0.017 | 0.0000013 | 0.92 | 0.000017 | 0.00019 | 0.000033 | 0.0016 | 0.0000033 | 0.0096 | 0.67 | 0.0011 | 0.00000016 | 0.0013 | 0.00025 | 0.0061 | 0.55 | 0.0036 | 0.064 | 0.00000096 | 17 | 0.031 | 0.00000096 | 0.000016 | 0.00043 | 0.000058 | 0.00014 | 2.2 | 0.27 | 0.05 | 33 |
| 2025 | 69 | 5.4 | 0.67 | 0.0007 | 0.00012 | 0.000069 | 0.00013 | 0.03 | 0.0000023 | 1.6 | 0.000029 | 0.00033 | 0.000058 | 0.0029 | 0.0000058 | 0.017 | 1.2 | 0.0019 | 0.00000029 | 0.0023 | 0.00043 | 0.011 | 0.95 | 0.0063 | 0.11 | 0.0000017 | 30 | 0.054 | 0.0000017 | 0.000029 | 0.00074 | 0.0001 | 0.00025 | 3.8 | 0.48 | 0.086 | 57 |
| 2026 | 106 | 8.2 | 1.0 | 0.0011 | 0.00019 | 0.00011 | 0.0002 | 0.046 | 0.0000035 | 2.4 | 0.000044 | 0.0005 | 0.000088 | 0.0044 | 0.0000088 | 0.025 | 1.8 | 0.0029 | 0.00000044 | 0.0036 | 0.00065 | 0.016 | 1.5 | 0.0097 | 0.17 | 0.0000025 | 46 | 0.082 | 0.0000025 | 0.000044 | 0.0011 | 0.00015 | 0.00038 | 5.7 | 0.72 | 0.13 | 87 |
| 2027 | 141 | 11 | 1.3 | 0.0014 | 0.00025 | 0.00014 | 0.00027 | 0.062 | 0.0000047 | 3.2 | 0.000058 | 0.00067 | 0.00012 | 0.0058 | 0.000012 | 0.034 | 2.3 | 0.0039 | 0.00000058 | 0.0047 | 0.00086 | 0.022 | 1.9 | 0.013 | 0.22 | 0.0000034 | 62 | 0.11 | 0.0000034 | 0.000058 | 0.0015 | 0.0002 | 0.0005 | 7.6 | 0.96 | 0.17 | 116 |
| 2028 | 236 | 18 | 2.3 | 0.0024 | 0.00042 | 0.00024 | 0.00045 | 0.1 | 0.0000078 | 5.4 | 0.000098 | 0.0011 | 0.0002 | 0.0098 | 0.00002 | 0.057 | 3.9 | 0.0066 | 0.00000098 | 0.008 | 0.0015 | 0.036 | 3.2 | 0.022 | 0.38 | 0.0000057 | 103 | 0.18 | 0.0000057 | 0.000098 | 0.0025 | 0.00034 | 0.00084 | 13 | 1.6 | 0.29 | 195 |
| 2029 | 267 | 21 | 2.6 | 0.0027 | 0.00047 | 0.00027 | 0.00051 | 0.12 | 0.0000089 | 6.1 | 0.00011 | 0.0013 | 0.00022 | 0.011 | 0.000022 | 0.064 | 4.5 | 0.0074 | 0.0000011 | 0.009 | 0.0016 | 0.041 | 3.7 | 0.024 | 0.43 | 0.0000064 | 117 | 0.21 | 0.0000064 | 0.00011 | 0.0029 | 0.00039 | 0.00095 | 14 | 1.8 | 0.33 | 221 |
| 2030 | 321 | 25 | 3.1 | 0.0032 | 0.00057 | 0.00032 | 0.00061 | 0.14 | 0.000011 | 7.4 | 0.00013 | 0.0015 | 0.00027 | 0.013 | 0.000027 | 0.077 | 5.4 | 0.0089 | 0.0000013 | 0.011 | 0.002 | 0.049 | 4.4 | 0.029 | 0.51 | 0.0000077 | 141 | 0.25 | 0.0000077 | 0.00013 | 0.0034 | 0.00046 | 0.0011 | 17 | 2.2 | 0.4 | 266 |
| 2031 | 1,162 | 91 | 11 | 0.012 | 0.002 | 0.0012 | 0.0022 | 0.51 | 0.000039 | 27 | 0.00048 | 0.0055 | 0.00096 | 0.048 | 0.000096 | 0.28 | 19 | 0.032 | 0.0000048 | 0.039 | 0.0071 | 0.18 | 16 | 0.11 | 1.9 | 0.000028 | 509 | 0.9 | 0.000028 | 0.00048 | 0.012 | 0.0017 | 0.0041 | 63 | 8.0 | 1.4 | 961 |
| 2032 | 2,750 | 214 | 26 | 0.028 | 0.0048 | 0.0027 | 0.0052 | 1.2 | 0.000091 | 63 | 0.0011 | 0.013 | 0.0023 | 0.11 | 0.00023 | 0.66 | 46 | 0.076 | 0.000011 | 0.093 | 0.017 | 0.42 | 38 | 0.25 | 4.4 | 0.000066 | 1,204 | 2.1 | 0.000066 | 0.0011 | 0.029 | 0.004 | 0.0098 | 149 | 19 | 3.4 | 2,273 |
| 2033 | 859 | 67 | 8.2 | 0.0086 | 0.0015 | 0.00086 | 0.0016 | 0.38 | 0.000028 | 20 | 0.00036 | 0.0041 | 0.00071 | 0.036 | 0.000071 | 0.21 | 14 | 0.024 | 0.0000036 | 0.029 | 0.0053 | 0.13 | 12 | 0.078 | 1.4 | 0.000021 | 376 | 0.66 | 0.000021 | 0.00036 | 0.0092 | 0.0012 | 0.0031 | 46 | 5.9 | 1.1 | 710 |
| 2034 | 1,559 | 121 | 15 | 0.016 | 0.0027 | 0.0016 | 0.003 | 0.68 | 0.000052 | 36 | 0.00065 | 0.0074 | 0.0013 | 0.064 | 0.00013 | 0.37 | 26 | 0.043 | 0.0000064 | 0.052 | 0.0096 | 0.24 | 21 | 0.14 | 2.5 | 0.000037 | 682 | 1.2 | 0.000037 | 0.00064 | 0.017 | 0.0023 | 0.0056 | 84 | 11 | 1.9 | 1,289 |
| 2035 | 3,332 | 260 | 32 | 0.033 | 0.0059 | 0.0033 | 0.0063 | 1.5 | 0.00011 | 77 | 0.0014 | 0.016 | 0.0028 | 0.14 | 0.00028 | 0.8 | 56 | 0.093 | 0.000014 | 0.11 | 0.02 | 0.51 | 46 | 0.3 | 5.3 | 0.00008 | 1,459 | 2.6 | 0.00008 | 0.0014 | 0.036 | 0.0048 | 0.012 | 180 | 23 | 4.1 | 2,755 |
| 2036 | 8,174 | 637 | 78 | 0.082 | 0.014 | 0.0081 | 0.016 | 3.6 | 0.00027 | 188 | 0.0034 | 0.039 | 0.0068 | 0.34 | 0.00068 | 2.0 | 137 | 0.23 | 0.000034 | 0.28 | 0.05 | 1.3 | 112 | 0.75 | 13 | 0.0002 | 3,579 | 6.3 | 0.0002 | 0.0034 | 0.087 | 0.012 | 0.029 | 442 | 56 | 10 | 6,758 |
| 2037 | 36,319 | 2,829 | 349 | 0.36 | 0.064 | 0.036 | 0.069 | 16 | 0.0012 | 835 | 0.015 | 0.17 | 0.03 | 1.5 | 0.003 | 8.7 | 607 | 1.0 | 0.00015 | 1.2 | 0.22 | 5.6 | 499 | 3.3 | 58 | 0.00087 | 15,900 | 28 | 0.00087 | 0.015 | 0.39 | 0.053 | 0.13 | 1,966 | 249 | 45 | 30,026 |
| 2038 | 114,469 | 8,916 | 1,099 | 1.1 | 0.2 | 0.11 | 0.22 | 50 | 0.0038 | 2,631 | 0.047 | 0.54 | 0.095 | 4.7 | 0.0095 | 28 | 1,914 | 3.2 | 0.00047 | 3.9 | 0.7 | 18 | 1,572 | 10 | 183 | 0.0027 | 50,111 | 88 | 0.0028 | 0.047 | 1.2 | 0.17 | 0.41 | 6,195 | 783 | 142 | 94,634 |
| 2039 | 294,759 | 108,602 | 2,074 | 3.9 | 0.52 | 0.27 | 0.38 | 95 | 0.0072 | 3,692 | 0.09 | 1.2 | 0.35 | 8.9 | 0.19 | 52 | 5,595 | 6.7 | 0.00089 | 9.9 | 2.0 | 33 | 2,968 | 22 | 346 | 0.0071 | 151,047 | 167 | 0.0071 | 0.089 | 3.1 | 0.43 | 1.2 | 5,376 | 680 | 124 | 178,458 |
| 2040 | 375,606 | 170,679 | 3,171 | 6.4 | 0.66 | 0.39 | 0.64 | 145 | 0.011 | 4,853 | 0.14 | 1.2 | 1.9 | 14 | 0.37 | 79 | 7,282 | 6.4 | 0.0014 | 13 | 2.3 | 51 | 4,538 | 20 | 529 | 0.009 | 199,379 | 255 | 0.009 | 0.14 | 4.0 | 0.54 | 1.4 | 6,406 | 810 | 147 | 272,969 |
| 2041 | 498,712 | 255,334 | 3,172 | 9.3 | 0.88 | 0.5 | 0.78 | 145 | 0.014 | 4,424 | 0.17 | 1.4 | 2.7 | 17 | 0.54 | 79 | 9,903 | 7.2 | 0.0017 | 17 | 2.9 | 51 | 4,539 | 23 | 529 | 0.012 | 273,283 | 255 | 0.012 | 0.17 | 5.3 | 0.72 | 1.8 | 2,699 | 341 | 62 | 338,914 |
| 2042 | 396,987 | 246,288 | 3,170 | 9.5 | 0.7 | 0.44 | 0.89 | 145 | 0.014 | 4,317 | 0.17 | 0.81 | 2.7 | 17 | 0.51 | 79 | 8,082 | 3.8 | 0.0017 | 13 | 2.1 | 51 | 4,537 | 11 | 529 | 0.0095 | 226,085 | 255 | 0.0095 | 0.17 | 4.2 | 0.57 | 1.4 | 3,408 | 431 | 78 | 343,355 |
| 2043 | 435,552 | 270,005 | 3,171 | 10 | 0.77 | 0.48 | 0.86 | 145 | 0.014 | 3,874 | 0.17 | 0.99 | 2.8 | 17 | 0.57 | 79 | 8,919 | 4.7 | 0.0017 | 15 | 2.5 | 51 | 4,538 | 14 | 529 | 0.01 | 248,909 | 255 | 0.01 | 0.17 | 4.7 | 0.63 | 1.6 | 3,841 | 486 | 88 | 345,155 |
| 2044 | 434,078 | 270,470 | 3,171 | 10 | 0.77 | 0.49 | 0.84 | 145 | 0.014 | 3,704 | 0.17 | 1.0 | 2.8 | 17 | 0.63 | 79 | 8,909 | 4.7 | 0.0017 | 15 | 2.6 | 51 | 4,538 | 14 | 529 | 0.01 | 248,527 | 255 | 0.01 | 0.17 | 4.6 | 0.63 | 1.7 | 1,031 | 130 | 24 | 339,203 |
| 2045 | 419,201 | 253,400 | 3,171 | 9.5 | 0.74 | 0.45 | 0.76 | 145 | 0.013 | 3,387 | 0.16 | 0.72 | 2.6 | 16 | 0.65 | 79 | 8,520 | 2.9 | 0.0016 | 14 | 2.3 | 51 | 4,539 | 8.4 | 529 | 0.01 | 238,585 | 255 | 0.01 | 0.16 | 4.5 | 0.61 | 1.5 | 607 | 77 | 14 | 312,231 |
| 2046 | 429,085 | 249,341 | 3,172 | 9.2 | 0.76 | 0.47 | 0.71 | 145 | 0.012 | 3,257 | 0.15 | 0.8 | 2.5 | 15 | 0.72 | 79 | 8,673 | 3.3 | 0.0015 | 14 | 2.6 | 51 | 4,539 | 9.4 | 529 | 0.01 | 242,238 | 255 | 0.01 | 0.15 | 4.6 | 0.62 | 1.7 | 703 | 89 | 16 | 301,366 |
| 2047 | 462,700 | 255,572 | 3,172 | 9.3 | 0.82 | 0.5 | 0.69 | 145 | 0.012 | 3,275 | 0.15 | 0.91 | 2.6 | 15 | 0.81 | 79 | 9,280 | 3.7 | 0.0015 | 16 | 2.9 | 51 | 4,540 | 11 | 529 | 0.011 | 258,595 | 255 | 0.011 | 0.15 | 4.9 | 0.67 | 1.9 | 851 | 108 | 20 | 302,616 |
| 2048 | 475,079 | 257,244 | 3,172 | 9.3 | 0.84 | 0.52 | 0.69 | 145 | 0.012 | 3,367 | 0.15 | 0.96 | 2.6 | 15 | 0.85 | 80 | 9,496 | 4.0 | 0.0015 | 16 | 3.1 | 51 | 4,540 | 12 | 529 | 0.011 | 264,392 | 255 | 0.011 | 0.15 | 5.1 | 0.69 | 2.0 | 1,024 | 129 | 24 | 305,970 |
| 2049 | 481,735 | 257,436 | 3,172 | 9.3 | 0.85 | 0.53 | 0.69 | 145 | 0.012 | 3,453 | 0.15 | 1. | 2.6 | 15 | 0.87 | 80 | 9,605 | 4.1 | 0.0015 | 16 | 3.2 | 51 | 4,541 | 12 | 529 | 0.012 | 267,313 | 255 | 0.012 | 0.15 | 5.1 | 0.7 | 2.0 | 1,149 | 145 | 26 | 308,547 |
| 2050 | 495,931 | 266,156 | 3,173 | 9.6 | 0.87 | 0.55 | 0.7 | 145 | 0.013 | 3,386 | 0.16 | 1.1 | 2.7 | 16 | 0.93 | 80 | 9,905 | 4.4 | 0.0016 | 17 | 3.4 | 51 | 4,541 | 13 | 529 | 0.012 | 275,624 | 255 | 0.012 | 0.16 | 5.3 | 0.72 | 2.2 | 1,211 | 153 | 28 | 311,965 |
| 2051 | 506,546 | 269,609 | 3,173 | 9.7 | 0.89 | 0.57 | 0.7 | 145 | 0.013 | 3,451 | 0.16 | 1.1 | 2.7 | 16 | 0.98 | 80 | 10,108 | 4.7 | 0.0016 | 17 | 3.6 | 51 | 4,541 | 14 | 529 | 0.012 | 281,043 | 255 | 0.012 | 0.16 | 5.4 | 0.73 | 2.3 | 1,365 | 173 | 31 | 316,216 |
| 2052 | 519,492 | 272,711 | 3,173 | 9.8 | 0.92 | 0.59 | 0.71 | 145 | 0.013 | 3,560 | 0.16 | 1.2 | 2.8 | 16 | 1.0 | 80 | 10,331 | 5.1 | 0.0016 | 17 | 3.8 | 51 | 4,541 | 15 | 529 | 0.012 | 287,399 | 255 | 0.012 | 0.16 | 5.5 | 0.75 | 2.4 | 1,641 | 208 | 38 | 321,547 |
| 2053 | 527,425 | 272,692 | 3,173 | 9.8 | 0.93 | 0.61 | 0.72 | 145 | 0.013 | 3,677 | 0.16 | 1.3 | 2.8 | 16 | 1.1 | 80 | 10,460 | 5.3 | 0.0016 | 18 | 4.0 | 51 | 4,541 | 16 | 529 | 0.013 | 290,813 | 255 | 0.013 | 0.16 | 5.6 | 0.76 | 2.5 | 1,793 | 227 | 41 | 324,989 |
| 2054 | 541,271 | 279,264 | 3,173 | 10.0 | 0.95 | 0.62 | 0.73 | 145 | 0.013 | 3,726 | 0.17 | 1.3 | 2.8 | 17 | 1.1 | 80 | 10,735 | 5.4 | 0.0017 | 18 | 4.1 | 51 | 4,541 | 16 | 529 | 0.013 | 298,374 | 255 | 0.013 | 0.17 | 5.8 | 0.78 | 2.6 | 1,681 | 212 | 39 | 331,093 |
| 2055 | 549,412 | 281,438 | 3,173 | 10 | 0.97 | 0.64 | 0.74 | 145 | 0.013 | 3,827 | 0.17 | 1.3 | 2.9 | 17 | 1.1 | 80 | 10,886 | 5.5 | 0.0017 | 18 | 4.2 | 51 | 4,541 | 16 | 529 | 0.013 | 302,375 | 255 | 0.013 | 0.17 | 5.9 | 0.79 | 2.7 | 1,677 | 212 | 39 | 335,909 |
| 2056 | 567,386 | 292,614 | 3,173 | 10 | 1.0 | 0.66 | 0.75 | 145 | 0.014 | 3,782 | 0.17 | 1.4 | 3.0 | 17 | 1.2 | 80 | 11,257 | 5.8 | 0.0017 | 19 | 4.4 | 51 | 4,541 | 17 | 529 | 0.014 | 312,895 | 255 | 0.014 | 0.17 | 6.1 | 0.82 | 2.8 | 1,883 | 238 | 43 | 342,067 |
| 2057 | 577,274 | 295,022 | 3,173 | 10 | 1.0 | 0.68 | 0.75 | 145 | 0.014 | 3,843 | 0.17 | 1.5 | 3.0 | 17 | 1.2 | 80 | 11,440 | 6.2 | 0.0017 | 19 | 4.6 | 51 | 4,541 | 18 | 529 | 0.014 | 317,753 | 255 | 0.014 | 0.17 | 6.2 | 0.83 | 2.9 | 2,140 | 271 | 49 | 345,301 |
| 2058 | 585,688 | 296,388 | 3,173 | 11 | 1.0 | 0.7 | 0.76 | 145 | 0.014 | 3,914 | 0.18 | 1.5 | 3.0 | 17 | 1.3 | 80 | 11,577 | 6.4 | 0.0017 | 20 | 4.8 | 51 | 4,541 | 19 | 529 | 0.014 | 321,759 | 255 | 0.014 | 0.17 | 6.3 | 0.85 | 3.0 | 2,290 | 289 | 53 | 348,168 |
| 2059 | 599,004 | 301,717 | 3,173 | 11 | 1.1 | 0.72 | 0.76 | 145 | 0.014 | 3,937 | 0.18 | 1.6 | 3.1 | 18 | 1.3 | 80 | 11,834 | 6.7 | 0.0018 | 20 | 5.0 | 51 | 4,541 | 20 | 529 | 0.014 | 328,850 | 255 | 0.014 | 0.18 | 6.4 | 0.87 | 3.1 | 2,259 | 286 | 52 | 352,107 |
| 2060 | 614,185 | 309,045 | 3,173 | 11 | 1.1 | 0.74 | 0.76 | 145 | 0.014 | 3,924 | 0.18 | 1.7 | 3.1 | 18 | 1.4 | 80 | 12,138 | 7.0 | 0.0018 | 21 | 5.2 | 51 | 4,542 | 20 | 529 | 0.015 | 337,224 | 255 | 0.015 | 0.18 | 6.6 | 0.89 | 3.3 | 2,342 | 296 | 54 | 356,256 |
| 2061 | 623,220 | 310,786 | 3,173 | 11 | 1.1 | 0.77 | 0.76 | 145 | 0.014 | 3,961 | 0.19 | 1.7 | 3.1 | 18 | 1.5 | 80 | 12,296 | 7.2 | 0.0018 | 21 | 5.4 | 51 | 4,542 | 21 | 529 | 0.015 | 341,621 | 255 | 0.015 | 0.18 | 6.7 | 0.9 | 3.4 | 2,238 | 283 | 51 | 358,049 |
| 2062 | 629,113 | 320,078 | 3,174 | 11 | 1.1 | 0.78 | 0.77 | 145 | 0.014 | 3,848 | 0.19 | 1.7 | 3.2 | 18 | 1.5 | 80 | 12,494 | 7.3 | 0.0018 | 21 | 5.6 | 51 | 4,542 | 21 | 529 | 0.015 | 346,334 | 255 | 0.015 | 0.18 | 6.7 | 0.91 | 3.5 | 2,049 | 259 | 47 | 361,103 |
| 2063 | 637,217 | 323,857 | 3,174 | 11 | 1.1 | 0.8 | 0.78 | 145 | 0.015 | 3,851 | 0.19 | 1.8 | 3.2 | 18 | 1.6 | 80 | 12,682 | 7.4 | 0.0018 | 21 | 5.8 | 51 | 4,542 | 22 | 529 | 0.015 | 350,709 | 255 | 0.015 | 0.18 | 6.8 | 0.92 | 3.6 | 1,868 | 236 | 43 | 363,501 |
| 2064 | 645,763 | 328,913 | 3,174 | 12 | 1.1 | 0.82 | 0.78 | 145 | 0.015 | 3,857 | 0.19 | 1.8 | 3.3 | 18 | 1.6 | 80 | 12,901 | 7.6 | 0.0018 | 22 | 5.9 | 51 | 4,542 | 22 | 529 | 0.015 | 355,546 | 255 | 0.016 | 0.18 | 6.9 | 0.93 | 3.7 | 1,941 | 245 | 45 | 367,099 |
| 2065 | 653,279 | 330,460 | 3,174 | 12 | 1.2 | 0.84 | 0.78 | 145 | 0.015 | 3,897 | 0.2 | 1.9 | 3.3 | 18 | 1.7 | 80 | 13,064 | 7.9 | 0.0018 | 22 | 6.1 | 51 | 4,542 | 23 | 529 | 0.016 | 359,150 | 255 | 0.016 | 0.18 | 7.0 | 0.94 | 3.8 | 2,035 | 257 | 47 | 369,105 |
| 2066 | 665,895 | 338,047 | 3,174 | 12 | 1.2 | 0.86 | 0.79 | 145 | 0.015 | 3,846 | 0.2 | 2.0 | 3.4 | 19 | 1.7 | 80 | 13,365 | 8.1 | 0.0019 | 22 | 6.3 | 51 | 4,543 | 24 | 529 | 0.016 | 366,415 | 255 | 0.016 | 0.19 | 7.1 | 0.96 | 3.9 | 2,170 | 274 | 50 | 371,946 |
| 2067 | 669,364 | 357,055 | 3,174 | 13 | 1.2 | 0.87 | 0.8 | 145 | 0.015 | 3,559 | 0.2 | 2.0 | 3.5 | 19 | 1.7 | 80 | 13,668 | 8.3 | 0.0019 | 23 | 6.4 | 51 | 4,543 | 24 | 529 | 0.016 | 372,203 | 255 | 0.016 | 0.19 | 7.1 | 0.97 | 4.0 | 2,287 | 289 | 53 | 374,952 |
| 2068 | 676,528 | 366,985 | 3,174 | 13 | 1.2 | 0.89 | 0.81 | 145 | 0.015 | 3,489 | 0.2 | 2.0 | 3.6 | 19 | 1.8 | 80 | 13,925 | 8.5 | 0.0019 | 23 | 6.5 | 51 | 4,543 | 25 | 529 | 0.016 | 377,499 | 255 | 0.016 | 0.19 | 7.2 | 0.98 | 4.1 | 2,343 | 296 | 54 | 378,901 |
| 2069 | 687,621 | 382,571 | 3,174 | 13 | 1.2 | 0.9 | 0.81 | 145 | 0.015 | 3,316 | 0.21 | 2.1 | 3.7 | 19 | 1.8 | 80 | 14,316 | 8.7 | 0.0019 | 23 | 6.7 | 51 | 4,543 | 25 | 529 | 0.016 | 385,850 | 255 | 0.017 | 0.19 | 7.3 | 0.99 | 4.2 | 2,318 | 293 | 53 | 381,313 |
| 2070 | 697,446 | 389,524 | 3,174 | 14 | 1.2 | 0.92 | 0.82 | 145 | 0.015 | 3,294 | 0.21 | 2.1 | 3.7 | 19 | 1.9 | 80 | 14,580 | 8.9 | 0.0019 | 23 | 6.8 | 51 | 4,543 | 26 | 529 | 0.017 | 391,677 | 255 | 0.017 | 0.19 | 7.4 | 1.0 | 4.3 | 2,264 | 286 | 52 | 384,374 |
| 2071 | 702,460 | 404,872 | 3,174 | 14 | 1.2 | 0.94 | 0.83 | 145 | 0.016 | 3,122 | 0.21 | 2.2 | 3.9 | 19 | 1.9 | 80 | 14,860 | 9.0 | 0.0019 | 24 | 7.0 | 51 | 4,543 | 26 | 529 | 0.017 | 397,261 | 255 | 0.017 | 0.19 | 7.5 | 1.0 | 4.4 | 2,197 | 278 | 51 | 386,328 |
| 2072 | 710,321 | 412,321 | 3,175 | 14 | 1.3 | 0.96 | 0.83 | 145 | 0.016 | 3,088 | 0.21 | 2.2 | 3.9 | 19 | 2.0 | 80 | 15,089 | 9.2 | 0.0019 | 24 | 7.2 | 51 | 4,543 | 27 | 529 | 0.017 | 402,363 | 255 | 0.017 | 0.19 | 7.6 | 1.0 | 4.5 | 2,195 | 278 | 50 | 388,982 |
| 2073 | 707,678 | 434,637 | 3,175 | 15 | 1.2 | 0.97 | 0.84 | 145 | 0.016 | 2,815 | 0.21 | 2.3 | 4.1 | 19 | 2.0 | 80 | 15,360 | 9.4 | 0.0019 | 24 | 7.3 | 51 | 4,544 | 27 | 529 | 0.017 | 405,978 | 255 | 0.017 | 0.19 | 7.6 | 1.0 | 4.6 | 2,213 | 280 | 51 | 389,390 |
| 2074 | 710,667 | 445,575 | 3,175 | 16 | 1.3 | 0.98 | 0.85 | 145 | 0.016 | 2,728 | 0.21 | 2.3 | 4.2 | 20 | 2.0 | 80 | 15,593 | 9.5 | 0.002 | 24 | 7.4 | 51 | 4,544 | 28 | 530 | 0.017 | 409,588 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.6 | 2,280 | 288 | 52 | 391,164 |
| 2075 | 711,723 | 457,301 | 3,175 | 16 | 1.3 | 0.98 | 0.85 | 145 | 0.016 | 2,620 | 0.21 | 2.3 | 4.3 | 20 | 2.0 | 80 | 15,849 | 9.6 | 0.002 | 24 | 7.5 | 51 | 4,544 | 28 | 530 | 0.017 | 412,422 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.7 | 2,342 | 296 | 54 | 391,961 |
| 2076 | 712,311 | 473,534 | 3,175 | 17 | 1.3 | 0.99 | 0.86 | 145 | 0.016 | 2,496 | 0.21 | 2.3 | 4.4 | 20 | 2.1 | 80 | 16,115 | 9.7 | 0.002 | 24 | 7.5 | 51 | 4,544 | 28 | 530 | 0.017 | 416,076 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.7 | 2,398 | 303 | 55 | 394,086 |
| 2077 | 707,438 | 494,792 | 3,175 | 18 | 1.2 | 0.99 | 0.87 | 145 | 0.016 | 2,312 | 0.21 | 2.3 | 4.6 | 20 | 2.1 | 80 | 16,390 | 9.7 | 0.002 | 24 | 7.5 | 51 | 4,544 | 28 | 530 | 0.017 | 418,346 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.7 | 2,343 | 296 | 54 | 394,666 |
| 2078 | 710,609 | 514,944 | 3,175 | 18 | 1.3 | 1. | 0.88 | 145 | 0.016 | 2,183 | 0.21 | 2.3 | 4.7 | 20 | 2.1 | 80 | 16,746 | 9.7 | 0.002 | 24 | 7.5 | 51 | 4,545 | 28 | 530 | 0.017 | 423,948 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.7 | 2,271 | 287 | 52 | 396,324 |
| 2079 | 710,676 | 529,490 | 3,175 | 19 | 1.3 | 1. | 0.89 | 145 | 0.016 | 2,093 | 0.21 | 2.3 | 4.9 | 20 | 2.1 | 80 | 17,035 | 9.6 | 0.002 | 24 | 7.6 | 51 | 4,545 | 28 | 530 | 0.017 | 426,858 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.7 | 2,020 | 255 | 46 | 397,336 |
| 2080 | 712,491 | 540,563 | 3,175 | 19 | 1.3 | 1.0 | 0.9 | 145 | 0.016 | 2,041 | 0.21 | 2.3 | 5.0 | 20 | 2.1 | 80 | 17,272 | 9.6 | 0.002 | 24 | 7.6 | 51 | 4,545 | 28 | 530 | 0.017 | 429,881 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.8 | 1,826 | 231 | 42 | 398,998 |
| 2081 | 713,835 | 547,810 | 3,176 | 20 | 1.3 | 1.0 | 0.9 | 145 | 0.016 | 2,003 | 0.21 | 2.3 | 5.0 | 20 | 2.1 | 80 | 17,466 | 9.5 | 0.002 | 24 | 7.7 | 51 | 4,545 | 28 | 530 | 0.017 | 431,880 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.8 | 1,502 | 190 | 35 | 399,482 |
| 2082 | 716,077 | 553,651 | 3,176 | 20 | 1.3 | 1.0 | 0.9 | 145 | 0.016 | 1,977 | 0.22 | 2.3 | 5.1 | 20 | 2.1 | 80 | 17,644 | 9.5 | 0.002 | 24 | 7.7 | 51 | 4,545 | 28 | 530 | 0.017 | 433,991 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.8 | 1,347 | 170 | 31 | 400,065 |
| 2083 | 712,212 | 572,301 | 3,176 | 21 | 1.3 | 1.0 | 0.91 | 145 | 0.016 | 1,868 | 0.21 | 2.3 | 5.2 | 20 | 2.2 | 80 | 17,882 | 9.5 | 0.002 | 24 | 7.7 | 51 | 4,545 | 28 | 530 | 0.017 | 436,075 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.8 | 1,166 | 147 | 27 | 400,547 |
| 2084 | 712,767 | 584,072 | 3,176 | 21 | 1.3 | 1.0 | 0.92 | 145 | 0.016 | 1,819 | 0.21 | 2.3 | 5.4 | 20 | 2.2 | 80 | 18,123 | 9.5 | 0.002 | 24 | 7.7 | 51 | 4,545 | 28 | 530 | 0.017 | 438,657 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.9 | 1,115 | 141 | 26 | 401,921 |
| 2085 | 710,811 | 593,882 | 3,176 | 22 | 1.3 | 1.0 | 0.92 | 145 | 0.016 | 1,763 | 0.21 | 2.3 | 5.5 | 20 | 2.2 | 80 | 18,323 | 9.4 | 0.002 | 24 | 7.8 | 51 | 4,545 | 27 | 530 | 0.017 | 439,649 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.9 | 1,067 | 135 | 25 | 401,543 |
| 2086 | 710,147 | 600,804 | 3,176 | 22 | 1.3 | 1.0 | 0.92 | 145 | 0.016 | 1,728 | 0.21 | 2.3 | 5.5 | 20 | 2.2 | 80 | 18,494 | 9.4 | 0.002 | 24 | 7.7 | 51 | 4,546 | 27 | 530 | 0.017 | 440,624 | 255 | 0.017 | 0.2 | 7.6 | 1.0 | 4.9 | 1,057 | 134 | 24 | 401,553 |
| 2087 | 700,533 | 626,419 | 3,176 | 23 | 1.2 | 1.0 | 0.94 | 145 | 0.016 | 1,598 | 0.21 | 2.3 | 5.8 | 20 | 2.1 | 80 | 18,766 | 9.3 | 0.002 | 24 | 7.7 | 51 | 4,546 | 27 | 530 | 0.017 | 441,555 | 255 | 0.017 | 0.2 | 7.5 | 1.0 | 4.8 | 1,051 | 133 | 24 | 401,267 |
| 2088 | 697,502 | 640,694 | 3,176 | 24 | 1.2 | 1.0 | 0.95 | 145 | 0.016 | 1,545 | 0.21 | 2.3 | 5.9 | 20 | 2.1 | 80 | 18,989 | 9.3 | 0.002 | 23 | 7.6 | 51 | 4,546 | 27 | 530 | 0.017 | 443,035 | 255 | 0.017 | 0.2 | 7.4 | 1.0 | 4.8 | 1,055 | 133 | 24 | 402,320 |
| 2089 | 690,123 | 652,790 | 3,176 | 24 | 1.2 | 1.0 | 0.95 | 145 | 0.016 | 1,479 | 0.21 | 2.3 | 6.0 | 20 | 2.1 | 80 | 19,138 | 9.2 | 0.002 | 23 | 7.5 | 51 | 4,546 | 27 | 530 | 0.017 | 442,064 | 255 | 0.017 | 0.2 | 7.4 | 1. | 4.7 | 1,054 | 133 | 24 | 401,001 |
| 2090 | 687,743 | 660,781 | 3,176 | 24 | 1.2 | 1.0 | 0.96 | 145 | 0.016 | 1,449 | 0.21 | 2.3 | 6.1 | 20 | 2.1 | 80 | 19,281 | 9.2 | 0.002 | 23 | 7.5 | 51 | 4,546 | 27 | 530 | 0.016 | 442,513 | 255 | 0.017 | 0.2 | 7.3 | 0.99 | 4.7 | 1,054 | 133 | 24 | 401,227 |
| 2091 | 684,634 | 670,516 | 3,176 | 25 | 1.2 | 1. | 0.96 | 145 | 0.016 | 1,411 | 0.21 | 2.2 | 6.2 | 20 | 2.1 | 80 | 19,472 | 9.1 | 0.002 | 23 | 7.5 | 51 | 4,546 | 27 | 530 | 0.016 | 442,973 | 255 | 0.016 | 0.2 | 7.3 | 0.99 | 4.7 | 1,048 | 133 | 24 | 401,098 |
| 2092 | 685,888 | 678,557 | 3,176 | 25 | 1.2 | 1. | 0.97 | 145 | 0.016 | 1,397 | 0.21 | 2.2 | 6.3 | 20 | 2.1 | 80 | 19,672 | 9.1 | 0.002 | 23 | 7.5 | 51 | 4,546 | 26 | 530 | 0.016 | 445,054 | 255 | 0.016 | 0.2 | 7.3 | 0.99 | 4.7 | 1,038 | 131 | 24 | 402,800 |
| 2093 | 682,917 | 684,848 | 3,176 | 25 | 1.2 | 0.99 | 0.97 | 145 | 0.016 | 1,369 | 0.21 | 2.2 | 6.3 | 20 | 2.1 | 80 | 19,826 | 9.0 | 0.002 | 23 | 7.4 | 51 | 4,546 | 26 | 530 | 0.016 | 444,809 | 255 | 0.016 | 0.2 | 7.3 | 0.99 | 4.6 | 980 | 124 | 23 | 402,142 |
| 2094 | 681,159 | 690,162 | 3,177 | 26 | 1.2 | 0.99 | 0.98 | 145 | 0.016 | 1,348 | 0.2 | 2.2 | 6.3 | 20 | 2.1 | 80 | 19,971 | 8.9 | 0.002 | 23 | 7.3 | 51 | 4,546 | 26 | 530 | 0.016 | 444,956 | 255 | 0.016 | 0.2 | 7.3 | 0.98 | 4.6 | 909 | 115 | 21 | 401,911 |
| 2095 | 671,241 | 710,213 | 3,177 | 27 | 1.2 | 0.97 | 0.99 | 145 | 0.016 | 1,274 | 0.2 | 2.1 | 6.3 | 20 | 2.0 | 80 | 20,167 | 8.7 | 0.002 | 23 | 7.2 | 51 | 4,546 | 25 | 530 | 0.016 | 444,510 | 255 | 0.016 | 0.2 | 7.2 | 0.97 | 4.5 | 696 | 88 | 16 | 401,364 |
| 2096 | 666,795 | 723,032 | 3,177 | 27 | 1.2 | 0.97 | 1.0 | 145 | 0.016 | 1,240 | 0.2 | 2.1 | 6.3 | 20 | 2.0 | 80 | 20,371 | 8.5 | 0.002 | 22 | 7.1 | 51 | 4,546 | 25 | 530 | 0.016 | 444,986 | 255 | 0.016 | 0.2 | 7.1 | 0.96 | 4.5 | 576 | 73 | 13 | 402,265 |
| 2097 | 657,837 | 733,381 | 3,177 | 28 | 1.2 | 0.95 | 1.0 | 145 | 0.016 | 1,197 | 0.2 | 2.1 | 6.2 | 20 | 2.0 | 80 | 20,489 | 8.3 | 0.002 | 22 | 6.9 | 51 | 4,546 | 24 | 530 | 0.016 | 442,877 | 255 | 0.016 | 0.2 | 7.0 | 0.95 | 4.4 | 411 | 52 | 9.5 | 401,193 |
| 2098 | 652,273 | 741,179 | 3,177 | 28 | 1.2 | 0.94 | 1.0 | 145 | 0.016 | 1,169 | 0.2 | 2.0 | 6.2 | 20 | 1.9 | 80 | 20,624 | 8.1 | 0.002 | 22 | 6.8 | 51 | 4,547 | 23 | 530 | 0.016 | 441,807 | 255 | 0.016 | 0.2 | 7.0 | 0.94 | 4.3 | 329 | 42 | 7.6 | 400,659 |
| 2099 | 647,798 | 748,976 | 3,177 | 29 | 1.1 | 0.92 | 1.0 | 145 | 0.016 | 1,147 | 0.2 | 2.0 | 6.2 | 20 | 1.9 | 80 | 20,750 | 7.9 | 0.002 | 22 | 6.7 | 51 | 4,547 | 23 | 530 | 0.016 | 441,232 | 255 | 0.016 | 0.2 | 6.9 | 0.94 | 4.2 | 248 | 31 | 5.7 | 400,865 |
| 2100 | 645,730 | 755,011 | 3,177 | 29 | 1.1 | 0.91 | 1.0 | 145 | 0.016 | 1,135 | 0.2 | 1.9 | 6.2 | 20 | 1.9 | 80 | 20,887 | 7.8 | 0.002 | 22 | 6.6 | 51 | 4,547 | 22 | 530 | 0.015 | 441,384 | 255 | 0.016 | 0.2 | 6.9 | 0.93 | 4.2 | 218 | 28 | 5.0 | 401,623 |
| 2101 | 641,637 | 760,241 | 3,177 | 29 | 1.1 | 0.9 | 1.0 | 145 | 0.016 | 1,116 | 0.2 | 1.9 | 6.2 | 20 | 1.8 | 80 | 20,974 | 7.7 | 0.002 | 22 | 6.5 | 51 | 4,547 | 22 | 530 | 0.015 | 440,486 | 255 | 0.015 | 0.2 | 6.9 | 0.93 | 4.1 | 195 | 25 | 4.5 | 401,098 |
| 2102 | 642,144 | 766,206 | 3,177 | 29 | 1.1 | 0.9 | 1.0 | 145 | 0.016 | 1,112 | 0.2 | 1.9 | 6.2 | 20 | 1.8 | 80 | 21,122 | 7.6 | 0.002 | 22 | 6.5 | 51 | 4,547 | 22 | 530 | 0.015 | 441,791 | 255 | 0.015 | 0.2 | 6.9 | 0.93 | 4.1 | 189 | 24 | 4.3 | 402,800 |
| 2103 | 638,762 | 768,332 | 3,177 | 29 | 1.1 | 0.89 | 1.0 | 145 | 0.016 | 1,101 | 0.2 | 1.9 | 6.2 | 20 | 1.8 | 80 | 21,156 | 7.5 | 0.002 | 21 | 6.4 | 51 | 4,547 | 22 | 530 | 0.015 | 440,627 | 255 | 0.015 | 0.2 | 6.8 | 0.92 | 4.0 | 184 | 23 | 4.2 | 402,142 |
| 2104 | 637,029 | 770,544 | 3,177 | 30 | 1.1 | 0.89 | 1.0 | 145 | 0.016 | 1,093 | 0.2 | 1.9 | 6.1 | 20 | 1.8 | 80 | 21,202 | 7.5 | 0.002 | 21 | 6.4 | 51 | 4,547 | 22 | 530 | 0.015 | 440,213 | 255 | 0.015 | 0.2 | 6.8 | 0.92 | 4.0 | 183 | 23 | 4.2 | 401,911 |
| 2105 | 634,436 | 773,348 | 3,177 | 30 | 1.1 | 0.88 | 1.0 | 145 | 0.016 | 1,082 | 0.2 | 1.9 | 6.1 | 20 | 1.8 | 80 | 21,261 | 7.4 | 0.002 | 21 | 6.3 | 51 | 4,547 | 21 | 530 | 0.015 | 439,533 | 255 | 0.015 | 0.2 | 6.8 | 0.92 | 4.0 | 183 | 23 | 4.2 | 401,364 |
| 2106 | 634,252 | 778,182 | 3,177 | 30 | 1.1 | 0.88 | 1.1 | 145 | 0.016 | 1,076 | 0.2 | 1.8 | 6.1 | 20 | 1.8 | 80 | 21,388 | 7.4 | 0.002 | 21 | 6.3 | 51 | 4,547 | 21 | 530 | 0.015 | 440,320 | 255 | 0.015 | 0.2 | 6.8 | 0.92 | 4.0 | 183 | 23 | 4.2 | 402,265 |
| 2107 | 631,558 | 777,713 | 3,177 | 30 | 1.1 | 0.87 | 1.0 | 145 | 0.016 | 1,069 | 0.2 | 1.8 | 6.1 | 20 | 1.8 | 80 | 21,379 | 7.3 | 0.002 | 21 | 6.2 | 51 | 4,547 | 21 | 530 | 0.015 | 438,946 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.9 | 182 | 23 | 4.2 | 401,193 |
| 2108 | 629,475 | 779,602 | 3,177 | 30 | 1.1 | 0.87 | 1.1 | 145 | 0.016 | 1,060 | 0.2 | 1.8 | 6.1 | 20 | 1.7 | 80 | 21,435 | 7.2 | 0.002 | 21 | 6.1 | 51 | 4,547 | 21 | 530 | 0.015 | 438,281 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.9 | 182 | 23 | 4.2 | 400,659 |
| 2109 | 628,837 | 780,965 | 3,177 | 30 | 1.1 | 0.86 | 1.1 | 145 | 0.016 | 1,058 | 0.2 | 1.8 | 6.1 | 20 | 1.7 | 80 | 21,484 | 7.2 | 0.002 | 21 | 6.1 | 51 | 4,547 | 21 | 530 | 0.015 | 438,226 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.9 | 182 | 23 | 4.2 | 400,865 |
| 2110 | 628,942 | 783,406 | 3,177 | 30 | 1.1 | 0.86 | 1.1 | 145 | 0.016 | 1,057 | 0.2 | 1.8 | 6.1 | 20 | 1.7 | 80 | 21,576 | 7.1 | 0.002 | 21 | 6.0 | 51 | 4,547 | 21 | 530 | 0.015 | 438,653 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.8 | 182 | 23 | 4.2 | 401,623 |
| 2111 | 627,438 | 784,267 | 3,177 | 30 | 1.1 | 0.85 | 1.1 | 145 | 0.016 | 1,051 | 0.2 | 1.8 | 6.0 | 20 | 1.7 | 80 | 21,607 | 7.1 | 0.002 | 21 | 6.0 | 51 | 4,547 | 20 | 530 | 0.015 | 438,079 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.8 | 182 | 23 | 4.2 | 401,098 |
| 2112 | 629,133 | 788,360 | 3,177 | 30 | 1.1 | 0.85 | 1.1 | 145 | 0.016 | 1,053 | 0.2 | 1.8 | 6.0 | 20 | 1.7 | 80 | 21,747 | 7.0 | 0.002 | 21 | 5.9 | 51 | 4,547 | 20 | 530 | 0.015 | 439,576 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.8 | 183 | 23 | 4.2 | 402,800 |
| 2113 | 627,623 | 787,273 | 3,177 | 30 | 1.1 | 0.84 | 1.1 | 145 | 0.016 | 1,051 | 0.2 | 1.7 | 6.0 | 20 | 1.7 | 80 | 21,735 | 7.0 | 0.002 | 21 | 5.9 | 51 | 4,547 | 20 | 530 | 0.015 | 438,616 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.7 | 183 | 23 | 4.2 | 402,142 |
| 2114 | 626,780 | 788,067 | 3,177 | 30 | 1.1 | 0.84 | 1.1 | 145 | 0.016 | 1,047 | 0.2 | 1.7 | 6.0 | 20 | 1.7 | 80 | 21,771 | 6.9 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 438,324 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.7 | 183 | 23 | 4.2 | 401,911 |
| 2115 | 625,566 | 788,198 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,043 | 0.2 | 1.7 | 6.0 | 20 | 1.7 | 80 | 21,780 | 6.9 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 437,767 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 182 | 23 | 4.2 | 401,364 |
| 2116 | 626,770 | 790,411 | 3,177 | 31 | 1.1 | 0.84 | 1.1 | 145 | 0.016 | 1,044 | 0.2 | 1.7 | 6.0 | 20 | 1.7 | 80 | 21,843 | 6.9 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 438,711 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.7 | 183 | 23 | 4.2 | 402,265 |
| 2117 | 624,858 | 788,305 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,041 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,788 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 437,421 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 182 | 23 | 4.2 | 401,193 |
| 2118 | 623,986 | 787,695 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,039 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,770 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 436,918 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 182 | 23 | 4.2 | 400,659 |
| 2119 | 624,107 | 787,540 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,041 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,769 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 436,943 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 182 | 23 | 4.2 | 400,865 |
| 2120 | 625,207 | 787,703 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,045 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,784 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 437,448 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 182 | 23 | 4.2 | 401,623 |
| 2121 | 624,349 | 787,235 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,043 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,766 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 436,996 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 182 | 23 | 4.2 | 401,098 |
| 2122 | 626,837 | 789,528 | 3,177 | 31 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,049 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,836 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 438,569 | 255 | 0.015 | 0.2 | 6.7 | 0.91 | 3.7 | 183 | 23 | 4.2 | 402,800 |
| 2123 | 625,773 | 787,515 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,049 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,784 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 437,691 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 183 | 23 | 4.2 | 402,142 |
| 2124 | 625,374 | 787,183 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,048 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,773 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 437,440 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 183 | 23 | 4.2 | 401,911 |
| 2125 | 624,482 | 786,753 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,045 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,754 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 436,965 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 182 | 23 | 4.2 | 401,364 |
| 2126 | 625,764 | 788,681 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,047 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,804 | 6.8 | 0.002 | 21 | 5.8 | 51 | 4,547 | 20 | 530 | 0.015 | 437,906 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 183 | 23 | 4.2 | 402,265 |
| 2127 | 623,976 | 786,379 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,045 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,742 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 20 | 530 | 0.015 | 436,659 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 182 | 23 | 4.2 | 401,193 |
| 2128 | 623,065 | 785,732 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,042 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,721 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 20 | 530 | 0.015 | 436,117 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 182 | 23 | 4.2 | 400,659 |
| 2129 | 623,185 | 785,535 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,044 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,717 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 20 | 530 | 0.015 | 436,141 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 182 | 23 | 4.2 | 400,865 |
| 2130 | 624,323 | 785,735 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,049 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,732 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 20 | 530 | 0.015 | 436,685 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 182 | 23 | 4.2 | 401,623 |
| 2131 | 623,467 | 785,230 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,046 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,713 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 20 | 530 | 0.015 | 436,194 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 182 | 23 | 4.2 | 401,098 |
| 2132 | 625,992 | 787,555 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,052 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,783 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 20 | 530 | 0.015 | 437,803 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.7 | 183 | 23 | 4.2 | 402,800 |
| 2133 | 624,888 | 785,504 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,052 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,731 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 20 | 530 | 0.015 | 436,887 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 183 | 23 | 4.2 | 402,142 |
| 2134 | 624,530 | 785,214 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,051 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,720 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 20 | 530 | 0.015 | 436,676 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 183 | 23 | 4.2 | 401,911 |

**Table A2.** Annual loads of the NAG backfill for the poorly graded cover system scenario.

| Model Year | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year as CaCO3 | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | $m^3$/year |
| 2135 | 623,599 | 784,746 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,049 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,701 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 436,162 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 182 | 23 | 4.2 | 401,364 |
| 2136 | 624,879 | 786,710 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,050 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,751 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 20 | 530 | 0.015 | 437,142 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 183 | 23 | 4.2 | 402,265 |
| 2137 | 623,093 | 784,413 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,048 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,688 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 435,856 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 182 | 23 | 4.2 | 401,193 |
| 2138 | 622,223 | 783,769 | 3,177 | 30 | 1.1 | 0.82 | 1.1 | 145 | 0.016 | 1,046 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,667 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 435,356 | 255 | 0.015 | 0.2 | 6.6 | 0.9 | 3.6 | 182 | 23 | 4.2 | 400,659 |
| 2139 | 622,343 | 783,571 | 3,177 | 30 | 1.1 | 0.82 | 1.1 | 145 | 0.016 | 1,047 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,664 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 435,380 | 255 | 0.015 | 0.2 | 6.6 | 0.9 | 3.6 | 182 | 23 | 4.2 | 400,865 |
| 2140 | 623,439 | 783,727 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,052 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,678 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 435,922 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 182 | 23 | 4.2 | 401,623 |
| 2141 | 622,625 | 783,264 | 3,177 | 30 | 1.1 | 0.82 | 1.1 | 145 | 0.016 | 1,049 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,660 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 435,432 | 255 | 0.015 | 0.2 | 6.6 | 0.9 | 3.6 | 182 | 23 | 4.2 | 401,098 |
| 2142 | 625,105 | 785,541 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,056 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,729 | 6.8 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 436,998 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 183 | 23 | 4.2 | 402,800 |
| 2143 | 624,044 | 783,533 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,056 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,677 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 436,123 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 183 | 23 | 4.2 | 402,142 |
| 2144 | 623,645 | 783,204 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,055 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,666 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 435,873 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 183 | 23 | 4.2 | 401,911 |
| 2145 | 622,716 | 782,740 | 3,177 | 30 | 1.1 | 0.82 | 1.1 | 145 | 0.016 | 1,052 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,647 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 435,399 | 255 | 0.015 | 0.2 | 6.6 | 0.9 | 3.6 | 182 | 23 | 4.2 | 401,364 |
| 2146 | 623,994 | 784,699 | 3,177 | 30 | 1.1 | 0.83 | 1.1 | 145 | 0.016 | 1,054 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,697 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 436,337 | 255 | 0.015 | 0.2 | 6.7 | 0.9 | 3.6 | 183 | 23 | 4.2 | 402,265 |
| 2147 | 622,211 | 782,407 | 3,177 | 30 | 1.1 | 0.82 | 1.1 | 145 | 0.016 | 1,051 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,635 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 435,094 | 255 | 0.015 | 0.2 | 6.6 | 0.9 | 3.6 | 182 | 23 | 4.2 | 401,193 |
| 2148 | 621,342 | 781,766 | 3,177 | 30 | 1.1 | 0.82 | 1.1 | 145 | 0.016 | 1,049 | 0.2 | 1.7 | 5.9 | 20 | 1.6 | 80 | 21,614 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 434,555 | 255 | 0.015 | 0.2 | 6.6 | 0.9 | 3.6 | 182 | 23 | 4.2 | 400,659 |
| 2149 | 621,461 | 781,567 | 3,177 | 30 | 1.1 | 0.82 | 1.1 | 145 | 0.016 | 1,051 | 0.2 | 1.7 | 5.9 | 20 | 1.6 | 80 | 21,611 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 434,578 | 255 | 0.015 | 0.2 | 6.6 | 0.9 | 3.6 | 182 | 23 | 4.2 | 400,865 |
| 2150 | 622,596 | 781,759 | 3,177 | 30 | 1.1 | 0.82 | 1.1 | 145 | 0.016 | 1,055 | 0.2 | 1.7 | 6.0 | 20 | 1.6 | 80 | 21,625 | 6.7 | 0.002 | 21 | 5.7 | 51 | 4,547 | 19 | 530 | 0.015 | 435,118 | 255 | 0.015 | 0.2 | 6.6 | 0.9 | 3.6 | 182 | 23 | 4.2 | 401,623 |

**Table A3.** Source terms of the NAG backfill for the well graded cover system scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | $m^3$/year |
| 2023 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 16 |
| 2024 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 33 |
| 2025 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 57 |
| 2026 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 87 |
| 2027 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 116 |
| 2028 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 195 |
| 2029 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 221 |
| 2030 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 266 |
| 2031 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 961 |
| 2032 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 2,273 |
| 2033 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 710 |
| 2034 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 1,284 |
| 2035 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 10,477 |
| 2036 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 19,356 |
| 2037 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 14,018 |
| 2038 | 8.0 | 1,210 | 94 | 27 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.2 | 0.00005 | 28 | 0.0005 | 0.0057 | 0.001 | 0.05 | 0.0001 | 0.68 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.44 | 39 | 0.11 | 4.6 | 0.000029 | 528 | 2.2 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 27,168 |
| 2039 | 8.1 | 1,311 | 237 | 27 | 0.015 | 0.0023 | 0.0013 | 0.0023 | 1.2 | 0.00005 | 31 | 0.0005 | 0.006 | 0.0012 | 0.05 | 0.00032 | 0.68 | 23 | 0.035 | 0.000005 | 0.044 | 0.0082 | 0.44 | 39 | 0.11 | 4.6 | 0.000031 | 601 | 2.2 | 0.000032 | 0.0005 | 0.014 | 0.005 | 0.01 | 65 | 3.8 | 0.69 | 48,784 |
| 2040 | 8.2 | 1,499 | 470 | 27 | 0.018 | 0.0026 | 0.0015 | 0.0022 | 1.2 | 0.00005 | 32 | 0.0005 | 0.0065 | 0.0017 | 0.05 | 0.00084 | 0.68 | 28 | 0.037 | 0.000005 | 0.05 | 0.01 | 0.44 | 39 | 0.12 | 4.6 | 0.000036 | 735 | 2.2 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 65 | 3.0 | 0.54 | 85,906 |
| 2041 | 8.4 | 1,703 | 762 | 27 | 0.027 | 0.003 | 0.0016 | 0.0021 | 1.2 | 0.00005 | 14 | 0.00051 | 0.0055 | 0.0058 | 0.05 | 0.0017 | 0.69 | 33 | 0.029 | 0.000005 | 0.057 | 0.011 | 0.44 | 39 | 0.094 | 4.6 | 0.000041 | 909 | 2.2 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 44 | 1.0 | 0.18 | 116,049 |
| 2042 | 8.5 | 1,409 | 792 | 24 | 0.029 | 0.0025 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.0005 | 0.003 | 0.0082 | 0.05 | 0.002 | 0.6 | 28 | 0.014 | 0.000005 | 0.047 | 0.008 | 0.39 | 34 | 0.042 | 4.0 | 0.000034 | 788 | 1.9 | 0.000034 | 0.0005 | 0.015 | 0.005 | 0.01 | 12 | 1.3 | 0.23 | 131,728 |
| 2043 | 8.4 | 1,372 | 778 | 23 | 0.029 | 0.0024 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.0005 | 0.0027 | 0.0081 | 0.05 | 0.002 | 0.59 | 28 | 0.012 | 0.000005 | 0.046 | 0.0077 | 0.37 | 33 | 0.034 | 3.9 | 0.000033 | 768 | 1.9 | 0.000033 | 0.0005 | 0.015 | 0.005 | 0.01 | 6.9 | 1.4 | 0.26 | 135,614 |
| 2044 | 8.4 | 1,350 | 755 | 23 | 0.028 | 0.0024 | 0.0014 | 0.0024 | 1.1 | 0.00005 | 12 | 0.0005 | 0.0026 | 0.008 | 0.05 | 0.002 | 0.58 | 27 | 0.011 | 0.000005 | 0.045 | 0.0075 | 0.37 | 33 | 0.034 | 3.8 | 0.000032 | 752 | 1.8 | 0.000032 | 0.0005 | 0.014 | 0.005 | 0.01 | 6.9 | 0.38 | 0.07 | 137,918 |
| 2045 | 8.5 | 1,400 | 788 | 24 | 0.029 | 0.0025 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.0005 | 0.0028 | 0.0082 | 0.05 | 0.002 | 0.59 | 28 | 0.012 | 0.000005 | 0.047 | 0.0079 | 0.38 | 34 | 0.037 | 3.9 | 0.000034 | 783 | 1.9 | 0.000034 | 0.0005 | 0.015 | 0.005 | 0.01 | 8.2 | 0.25 | 0.045 | 134,843 |
| 2046 | 8.5 | 1,458 | 800 | 24 | 0.029 | 0.0026 | 0.0016 | 0.0023 | 1.1 | 0.00005 | 12 | 0.0005 | 0.0032 | 0.0083 | 0.05 | 0.0023 | 0.61 | 29 | 0.014 | 0.000005 | 0.049 | 0.009 | 0.39 | 35 | 0.043 | 4.1 | 0.000035 | 811 | 2.0 | 0.000035 | 0.0005 | 0.016 | 0.005 | 0.01 | 9.7 | 0.29 | 0.054 | 129,640 |
| 2047 | 8.5 | 1,576 | 822 | 25 | 0.03 | 0.0028 | 0.0017 | 0.0022 | 1.1 | 0.00005 | 12 | 0.0005 | 0.0035 | 0.0084 | 0.05 | 0.0029 | 0.62 | 31 | 0.015 | 0.000005 | 0.053 | 0.011 | 0.39 | 35 | 0.044 | 4.1 | 0.000038 | 869 | 2.0 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.2 | 0.36 | 0.065 | 128,811 |
| 2048 | 8.5 | 1,713 | 861 | 24 | 0.03 | 0.003 | 0.0019 | 0.0022 | 1.1 | 0.00005 | 11 | 0.00051 | 0.004 | 0.0087 | 0.05 | 0.0034 | 0.61 | 34 | 0.017 | 0.000005 | 0.058 | 0.013 | 0.39 | 35 | 0.05 | 4.1 | 0.000041 | 939 | 2.0 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.8 | 0.42 | 0.077 | 130,391 |
| 2049 | 8.5 | 1,776 | 893 | 24 | 0.031 | 0.0031 | 0.0021 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00053 | 0.0045 | 0.0089 | 0.05 | 0.0038 | 0.6 | 35 | 0.019 | 0.000005 | 0.06 | 0.014 | 0.39 | 35 | 0.056 | 4.0 | 0.000043 | 975 | 1.9 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 6.3 | 0.47 | 0.086 | 131,655 |
| 2050 | 8.5 | 1,804 | 902 | 24 | 0.031 | 0.0032 | 0.0022 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00054 | 0.0047 | 0.009 | 0.05 | 0.0042 | 0.6 | 36 | 0.02 | 0.000005 | 0.061 | 0.015 | 0.38 | 34 | 0.058 | 4.0 | 0.000043 | 989 | 1.9 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.3 | 0.49 | 0.089 | 133,193 |
| 2051 | 8.5 | 1,817 | 903 | 24 | 0.032 | 0.0032 | 0.0022 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00055 | 0.0048 | 0.009 | 0.05 | 0.0043 | 0.59 | 36 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.38 | 34 | 0.058 | 3.9 | 0.000044 | 995 | 1.9 | 0.000044 | 0.0005 | 0.019 | 0.005 | 0.01 | 4.1 | 0.55 | 0.099 | 134,254 |
| 2052 | 8.5 | 1,827 | 904 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00055 | 0.0048 | 0.009 | 0.05 | 0.0045 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.37 | 34 | 0.057 | 3.9 | 0.000044 | 1,000 | 1.9 | 0.000044 | 0.0005 | 0.02 | 0.005 | 0.01 | 2.6 | 0.65 | 0.12 | 135,292 |
| 2053 | 8.5 | 1,837 | 904 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00055 | 0.0049 | 0.009 | 0.05 | 0.0046 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.37 | 34 | 0.057 | 3.9 | 0.000044 | 1,004 | 1.9 | 0.000044 | 0.0005 | 0.02 | 0.005 | 0.01 | 1.4 | 0.7 | 0.13 | 135,311 |
| 2054 | 8.5 | 1,840 | 903 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00055 | 0.0049 | 0.009 | 0.05 | 0.0047 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.37 | 33 | 0.057 | 3.9 | 0.000044 | 1,006 | 1.9 | 0.000044 | 0.0005 | 0.02 | 0.005 | 0.01 | 1.1 | 0.64 | 0.12 | 135,939 |
| 2055 | 8.5 | 1,851 | 902 | 23 | 0.031 | 0.0033 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00056 | 0.005 | 0.009 | 0.05 | 0.0048 | 0.58 | 36 | 0.02 | 0.000005 | 0.062 | 0.017 | 0.37 | 33 | 0.058 | 3.9 | 0.000044 | 1,010 | 1.9 | 0.000045 | 0.0005 | 0.02 | 0.005 | 0.011 | 1.1 | 0.63 | 0.11 | 136,744 |
| 2056 | 8.6 | 1,807 | 1,101 | 23 | 0.039 | 0.0032 | 0.0023 | 0.0022 | 1.1 | 0.00005 | 7.4 | 0.00054 | 0.0049 | 0.01 | 0.05 | 0.0046 | 0.58 | 38 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.37 | 33 | 0.057 | 3.8 | 0.000043 | 1,036 | 1.9 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 1.3 | 0.7 | 0.13 | 137,789 |
| 2057 | 8.7 | 1,730 | 1,420 | 23 | 0.052 | 0.003 | 0.0022 | 0.0023 | 1.1 | 0.00005 | 4.7 | 0.00052 | 0.0044 | 0.013 | 0.05 | 0.0042 | 0.58 | 41 | 0.018 | 0.000005 | 0.058 | 0.015 | 0.37 | 33 | 0.052 | 3.8 | 0.000041 | 1,070 | 1.8 | 0.000042 | 0.0005 | 0.018 | 0.005 | 0.01 | 1.5 | 0.78 | 0.14 | 138,099 |
| 2058 | 8.7 | 1,684 | 1,602 | 23 | 0.059 | 0.003 | 0.0021 | 0.0024 | 1.0 | 0.00005 | 3.8 | 0.00051 | 0.0042 | 0.015 | 0.05 | 0.0039 | 0.58 | 42 | 0.017 | 0.000005 | 0.057 | 0.014 | 0.37 | 33 | 0.049 | 3.8 | 0.00004 | 1,088 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 1.7 | 0.83 | 0.15 | 138,393 |
| 2059 | 8.7 | 1,671 | 1,663 | 23 | 0.062 | 0.0029 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.0005 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 43 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.37 | 33 | 0.048 | 3.8 | 0.00004 | 1,094 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.0 | 0.81 | 0.15 | 138,657 |
| 2060 | 8.7 | 1,670 | 1,675 | 23 | 0.062 | 0.0029 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.0005 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 43 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.36 | 33 | 0.048 | 3.8 | 0.00004 | 1,096 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.3 | 0.83 | 0.15 | 139,741 |
| 2061 | 8.7 | 1,673 | 1,672 | 23 | 0.062 | 0.003 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.0005 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 43 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.36 | 32 | 0.049 | 3.8 | 0.00004 | 1,097 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.6 | 0.79 | 0.14 | 140,084 |
| 2062 | 8.8 | 1,663 | 1,742 | 23 | 0.07 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 3.1 | 0.0005 | 0.0041 | 0.014 | 0.05 | 0.0037 | 0.56 | 44 | 0.017 | 0.000005 | 0.056 | 0.013 | 0.36 | 32 | 0.049 | 3.8 | 0.00004 | 1,107 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 3.0 | 0.72 | 0.13 | 140,942 |
| 2063 | 8.8 | 1,642 | 1,814 | 22 | 0.077 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 2.8 | 0.0005 | 0.004 | 0.014 | 0.05 | 0.0036 | 0.56 | 45 | 0.017 | 0.000005 | 0.055 | 0.013 | 0.36 | 32 | 0.048 | 3.7 | 0.000039 | 1,113 | 1.8 | 0.000039 | 0.0005 | 0.018 | 0.005 | 0.01 | 3.3 | 0.65 | 0.12 | 141,850 |
| 2064 | 8.8 | 1,636 | 1,828 | 22 | 0.076 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 2.8 | 0.0005 | 0.004 | 0.014 | 0.05 | 0.0036 | 0.56 | 45 | 0.017 | 0.000005 | 0.055 | 0.013 | 0.35 | 32 | 0.046 | 3.7 | 0.000039 | 1,113 | 1.8 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.8 | 0.67 | 0.12 | 143,090 |
| 2065 | 8.9 | 1,636 | 1,899 | 22 | 0.094 | 0.0029 | 0.0019 | 0.0026 | 1.0 | 0.00005 | 2.4 | 0.0005 | 0.004 | 0.014 | 0.05 | 0.0035 | 0.55 | 46 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.35 | 32 | 0.046 | 3.7 | 0.000039 | 1,128 | 1.8 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.2 | 0.7 | 0.13 | 143,729 |
| 2066 | 8.9 | 1,609 | 1,986 | 22 | 0.11 | 0.0028 | 0.0019 | 0.0026 | 1.0 | 0.00005 | 2.1 | 0.0005 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.55 | 47 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.35 | 31 | 0.046 | 3.7 | 0.000039 | 1,134 | 1.8 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.6 | 0.74 | 0.13 | 144,914 |
| 2067 | 8.9 | 1,589 | 2,043 | 22 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.99 | 0.00005 | 2.0 | 0.0005 | 0.0039 | 0.013 | 0.05 | 0.0033 | 0.54 | 47 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.35 | 31 | 0.045 | 3.6 | 0.000038 | 1,137 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.1 | 0.77 | 0.14 | 146,084 |
| 2068 | 8.9 | 1,583 | 2,073 | 22 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.98 | 0.00005 | 1.9 | 0.0005 | 0.0038 | 0.013 | 0.05 | 0.0033 | 0.54 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 31 | 0.045 | 3.6 | 0.000038 | 1,140 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.5 | 0.78 | 0.14 | 147,667 |
| 2069 | 8.9 | 1,580 | 2,092 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.98 | 0.00005 | 1.9 | 0.0005 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.54 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 31 | 0.045 | 3.6 | 0.000038 | 1,141 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.9 | 0.77 | 0.14 | 148,435 |
| 2070 | 8.9 | 1,584 | 2,093 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.97 | 0.00005 | 2.0 | 0.0005 | 0.0039 | 0.013 | 0.05 | 0.0032 | 0.53 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 30 | 0.046 | 3.5 | 0.000038 | 1,143 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.0 | 0.74 | 0.14 | 149,714 |
| 2071 | 8.9 | 1,584 | 2,095 | 21 | 0.1 | 0.0028 | 0.0019 | 0.0027 | 0.96 | 0.00005 | 2.0 | 0.0005 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.53 | 49 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 30 | 0.046 | 3.5 | 0.000038 | 1,143 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.7 | 0.72 | 0.13 | 150,869 |
| 2072 | 8.9 | 1,600 | 2,101 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.95 | 0.00005 | 2.0 | 0.0005 | 0.0038 | 0.013 | 0.05 | 0.0033 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.33 | 30 | 0.046 | 3.5 | 0.000038 | 1,151 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.1 | 0.71 | 0.13 | 152,259 |
| 2073 | 8.9 | 1,607 | 2,096 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.95 | 0.00005 | 2.0 | 0.0005 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.33 | 30 | 0.047 | 3.5 | 0.000038 | 1,154 | 1.7 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.7 | 0.72 | 0.13 | 152,620 |
| 2074 | 8.9 | 1,614 | 2,086 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0026 | 0.95 | 0.00005 | 2.0 | 0.0005 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.013 | 0.33 | 30 | 0.047 | 3.5 | 0.000039 | 1,155 | 1.7 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.6 | 0.74 | 0.13 | 153,555 |
| 2075 | 8.9 | 1,623 | 2,076 | 21 | 0.1 | 0.0029 | 0.0019 | 0.0026 | 0.94 | 0.00005 | 2.1 | 0.0005 | 0.004 | 0.014 | 0.05 | 0.0035 | 0.52 | 49 | 0.017 | 0.000005 | 0.055 | 0.013 | 0.33 | 29 | 0.048 | 3.4 | 0.000039 | 1,157 | 1.7 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.5 | 0.76 | 0.14 | 154,302 |
| 2076 | 8.9 | 1,650 | 2,086 | 20 | 0.11 | 0.0029 | 0.002 | 0.0026 | 0.94 | 0.00005 | 2.0 | 0.0005 | 0.0041 | 0.014 | 0.05 | 0.0036 | 0.51 | 50 | 0.017 | 0.000005 | 0.056 | 0.013 | 0.33 | 29 | 0.05 | 3.4 | 0.000039 | 1,171 | 1.6 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.6 | 0.77 | 0.14 | 155,300 |
| 2077 | 8.9 | 1,666 | 2,081 | 20 | 0.11 | 0.0029 | 0.002 | 0.0026 | 0.93 | 0.00005 | 2.0 | 0.0005 | 0.0043 | 0.014 | 0.05 | 0.0038 | 0.51 | 50 | 0.018 | 0.000005 | 0.056 | 0.014 | 0.33 | 29 | 0.052 | 3.4 | 0.00004 | 1,177 | 1.6 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.8 | 0.75 | 0.14 | 155,642 |
| 2078 | 8.9 | 1,680 | 2,074 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.93 | 0.00005 | 2.0 | 0.00051 | 0.0044 | 0.014 | 0.05 | 0.0039 | 0.51 | 50 | 0.018 | 0.000005 | 0.057 | 0.014 | 0.32 | 29 | 0.054 | 3.4 | 0.00004 | 1,182 | 1.6 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.0 | 0.72 | 0.13 | 156,520 |
| 2079 | 8.9 | 1,691 | 2,082 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.92 | 0.00005 | 2.0 | 0.00051 | 0.0046 | 0.014 | 0.05 | 0.004 | 0.51 | 50 | 0.019 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.056 | 3.4 | 0.00004 | 1,188 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.2 | 0.64 | 0.12 | 157,526 |
| 2080 | 8.9 | 1,698 | 2,093 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.92 | 0.00005 | 2.0 | 0.00051 | 0.0047 | 0.014 | 0.05 | 0.0041 | 0.5 | 50 | 0.02 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.057 | 3.3 | 0.000041 | 1,194 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.5 | 0.58 | 0.11 | 158,727 |
| 2081 | 8.9 | 1,711 | 2,092 | 20 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 2.0 | 0.00051 | 0.0048 | 0.014 | 0.05 | 0.0042 | 0.5 | 51 | 0.02 | 0.000005 | 0.058 | 0.015 | 0.32 | 29 | 0.059 | 3.3 | 0.000041 | 1,199 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.7 | 0.48 | 0.086 | 159,076 |
| 2082 | 9.0 | 1,705 | 2,128 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 1.9 | 0.00051 | 0.0049 | 0.014 | 0.05 | 0.0043 | 0.5 | 51 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.32 | 28 | 0.06 | 3.3 | 0.000041 | 1,204 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.8 | 0.43 | 0.077 | 160,041 |
| 2083 | 9.0 | 1,694 | 2,167 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.9 | 0.00005 | 1.9 | 0.00051 | 0.0049 | 0.014 | 0.05 | 0.0043 | 0.5 | 52 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.32 | 28 | 0.061 | 3.3 | 0.000041 | 1,207 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.9 | 0.37 | 0.067 | 160,609 |
| 2084 | 9.0 | 1,698 | 2,182 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.9 | 0.00005 | 1.9 | 0.00051 | 0.005 | 0.014 | 0.05 | 0.0044 | 0.49 | 52 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.061 | 3.3 | 0.000041 | 1,212 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.7 | 0.35 | 0.064 | 161,869 |
| 2085 | 9.0 | 1,691 | 2,202 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.9 | 0.00005 | 1.8 | 0.00051 | 0.005 | 0.014 | 0.05 | 0.0044 | 0.49 | 52 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.061 | 3.3 | 0.00004 | 1,212 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.8 | 0.34 | 0.061 | 162,127 |
| 2086 | 9.0 | 1,695 | 2,209 | 19 | 0.12 | 0.003 | 0.0023 | 0.0026 | 0.89 | 0.00005 | 1.9 | 0.00051 | 0.0051 | 0.014 | 0.05 | 0.0045 | 0.49 | 53 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.062 | 3.3 | 0.000041 | 1,215 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.4 | 0.33 | 0.06 | 163,022 |
| 2087 | 8.9 | 1,689 | 2,222 | 19 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.89 | 0.00005 | 1.9 | 0.00051 | 0.005 | 0.014 | 0.05 | 0.0044 | 0.49 | 53 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.061 | 3.2 | 0.00004 | 1,215 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.3 | 0.33 | 0.06 | 163,716 |
| 2088 | 9.0 | 1,701 | 2,235 | 19 | 0.12 | 0.003 | 0.0023 | 0.0026 | 0.88 | 0.00005 | 1.8 | 0.00051 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.48 | 54 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.061 | 3.2 | 0.000041 | 1,222 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.8 | 0.33 | 0.06 | 164,817 |
| 2089 | 9.0 | 1,669 | 2,282 | 19 | 0.13 | 0.0029 | 0.0022 | 0.0027 | 0.88 | 0.00005 | 1.7 | 0.0005 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.48 | 54 | 0.02 | 0.000005 | 0.056 | 0.015 | 0.31 | 28 | 0.057 | 3.2 | 0.00004 | 1,217 | 1.5 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.5 | 0.33 | 0.06 | 165,016 |
| 2090 | 9.0 | 1,663 | 2,315 | 19 | 0.14 | 0.0029 | 0.0022 | 0.0027 | 0.88 | 0.00005 | 1.6 | 0.0005 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.48 | 54 | 0.02 | 0.000005 | 0.056 | 0.015 | 0.31 | 27 | 0.057 | 3.2 | 0.00004 | 1,221 | 1.5 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.3 | 0.33 | 0.06 | 165,702 |
| 2091 | 9.0 | 1,660 | 2,331 | 19 | 0.14 | 0.0029 | 0.0022 | 0.0027 | 0.87 | 0.00005 | 1.6 | 0.0005 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.48 | 55 | 0.019 | 0.000005 | 0.056 | 0.015 | 0.3 | 27 | 0.057 | 3.2 | 0.00004 | 1,223 | 1.5 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.3 | 0.33 | 0.06 | 166,524 |
| 2092 | 9.0 | 1,661 | 2,347 | 19 | 0.14 | 0.0029 | 0.0022 | 0.0027 | 0.87 | 0.00005 | 1.6 | 0.0005 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.47 | 55 | 0.019 | 0.000005 | 0.056 | 0.015 | 0.3 | 27 | 0.056 | 3.2 | 0.00004 | 1,226 | 1.5 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.2 | 0.33 | 0.059 | 167,829 |
| 2093 | 9.0 | 1,647 | 2,387 | 19 | 0.14 | 0.0029 | 0.0021 | 0.0027 | 0.86 | 0.00005 | 1.5 | 0.0005 | 0.0046 | 0.014 | 0.05 | 0.0041 | 0.47 | 56 | 0.019 | 0.000005 | 0.055 | 0.015 | 0.3 | 27 | 0.056 | 3.1 | 0.000039 | 1,227 | 1.5 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.4 | 0.31 | 0.056 | 168,420 |
| 2094 | 9.0 | 1,626 | 2,437 | 19 | 0.15 | 0.0029 | 0.0021 | 0.0028 | 0.86 | 0.00005 | 1.5 | 0.0005 | 0.0046 | 0.014 | 0.05 | 0.0041 | 0.47 | 57 | 0.019 | 0.000005 | 0.055 | 0.015 | 0.3 | 27 | 0.055 | 3.1 | 0.000039 | 1,228 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.5 | 0.29 | 0.052 | 169,379 |
| 2095 | 9.0 | 1,612 | 2,454 | 19 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.85 | 0.00005 | 1.5 | 0.0005 | 0.0045 | 0.014 | 0.05 | 0.0039 | 0.47 | 57 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.3 | 27 | 0.054 | 3.1 | 0.000039 | 1,224 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.8 | 0.22 | 0.04 | 170,071 |
| 2096 | 9.0 | 1,592 | 2,483 | 19 | 0.15 | 0.0028 | 0.002 | 0.0028 | 0.85 | 0.00005 | 1.5 | 0.0005 | 0.0044 | 0.014 | 0.05 | 0.0038 | 0.47 | 57 | 0.018 | 0.000005 | 0.054 | 0.014 | 0.3 | 27 | 0.053 | 3.1 | 0.000038 | 1,221 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.0 | 0.18 | 0.033 | 171,166 |
| 2097 | 9.0 | 1,592 | 2,489 | 19 | 0.14 | 0.0028 | 0.002 | 0.0028 | 0.85 | 0.00005 | 1.5 | 0.0005 | 0.0044 | 0.014 | 0.05 | 0.0038 | 0.46 | 58 | 0.018 | 0.000005 | 0.054 | 0.014 | 0.3 | 27 | 0.054 | 3.1 | 0.000038 | 1,221 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.3 | 0.13 | 0.024 | 171,387 |
| 2098 | 9.0 | 1,587 | 2,506 | 18 | 0.14 | 0.0028 | 0.002 | 0.0028 | 0.84 | 0.00005 | 1.5 | 0.0005 | 0.0044 | 0.014 | 0.05 | 0.0038 | 0.46 | 58 | 0.018 | 0.000005 | 0.053 | 0.014 | 0.29 | 26 | 0.054 | 3.1 | 0.000038 | 1,222 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.6 | 0.1 | 0.019 | 172,099 |
| 2099 | 9.0 | 1,590 | 2,507 | 18 | 0.14 | 0.0028 | 0.002 | 0.0028 | 0.84 | 0.00005 | 1.5 | 0.0005 | 0.0044 | 0.014 | 0.05 | 0.0038 | 0.46 | 58 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.055 | 3.1 | 0.000038 | 1,223 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.8 | 0.078 | 0.014 | 172,718 |
| 2100 | 9.0 | 1,600 | 2,529 | 18 | 0.15 | 0.0028 | 0.002 | 0.0028 | 0.84 | 0.00005 | 1.4 | 0.0005 | 0.0045 | 0.014 | 0.05 | 0.0038 | 0.46 | 59 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.055 | 3.1 | 0.000038 | 1,232 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.1 | 0.069 | 0.012 | 173,742 |
| 2101 | 9.0 | 1,608 | 2,531 | 18 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.4 | 0.0005 | 0.0045 | 0.014 | 0.05 | 0.0039 | 0.46 | 59 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.056 | 3.0 | 0.000038 | 1,235 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.3 | 0.061 | 0.011 | 174,656 |
| 2102 | 9.0 | 1,611 | 2,539 | 18 | 0.14 | 0.0028 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.5 | 0.0005 | 0.0046 | 0.014 | 0.05 | 0.0039 | 0.45 | 60 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.057 | 3.0 | 0.000039 | 1,238 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.6 | 0.059 | 0.011 | 175,434 |
| 2103 | 9.1 | 1,636 | 2,555 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.4 | 0.0005 | 0.0047 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.058 | 3.0 | 0.000039 | 1,252 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.9 | 0.058 | 0.011 | 176,132 |
| 2104 | 9.1 | 1,648 | 2,563 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.82 | 0.00005 | 1.4 | 0.0005 | 0.0048 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.059 | 3.0 | 0.000039 | 1,259 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 7.1 | 0.058 | 0.01 | 177,487 |
| 2105 | 9.1 | 1,639 | 2,581 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.82 | 0.00005 | 1.4 | 0.0005 | 0.0047 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.059 | 3.0 | 0.000039 | 1,258 | 1.4 | 0.000039 | 0.0005 | 0.018 | 0.005 | 0.01 | 7.4 | 0.057 | 0.01 | 177,786 |
| 2106 | 9.1 | 1,608 | 2,628 | 18 | 0.17 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.3 | 0.0005 | 0.0046 | 0.014 | 0.05 | 0.0038 | 0.45 | 62 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 25 | 0.057 | 3.0 | 0.000038 | 1,253 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 7.6 | 0.057 | 0.01 | 178,442 |
| 2107 | 9.1 | 1,602 | 2,658 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.3 | 0.0005 | 0.0046 | 0.014 | 0.05 | 0.0038 | 0.44 | 62 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 25 | 0.058 | 3.0 | 0.000038 | 1,256 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 7.8 | 0.057 | 0.01 | 179,251 |
| 2108 | 9.1 | 1,606 | 2,681 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.2 | 0.0005 | 0.0047 | 0.014 | 0.05 | 0.0039 | 0.44 | 63 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 25 | 0.058 | 2.9 | 0.000038 | 1,262 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 8.0 | 0.057 | 0.01 | 180,376 |
| 2109 | 9.1 | 1,609 | 2,699 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.2 | 0.0005 | 0.0047 | 0.014 | 0.05 | 0.0039 | 0.44 | 63 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.28 | 25 | 0.059 | 2.9 | 0.000038 | 1,267 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 8.1 | 0.057 | 0.01 | 180,436 |
| 2110 | 9.1 | 1,618 | 2,714 | 18 | 0.18 | 0.0029 | 0.0021 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.0005 | 0.0048 | 0.014 | 0.05 | 0.004 | 0.44 | 64 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.28 | 25 | 0.06 | 2.9 | 0.000039 | 1,273 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 8.3 | 0.057 | 0.01 | 181,010 |
| 2111 | 9.1 | 1,624 | 2,726 | 18 | 0.18 | 0.0029 | 0.0021 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.0005 | 0.0049 | 0.014 | 0.05 | 0.004 | 0.44 | 65 | 0.021 | 0.000005 | 0.055 | 0.015 | 0.28 | 25 | 0.061 | 2.9 | 0.000039 | 1,278 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 8.5 | 0.057 | 0.01 | 181,411 |
| 2112 | 9.1 | 1,638 | 2,736 | 17 | 0.18 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.0005 | 0.005 | 0.014 | 0.05 | 0.0041 | 0.44 | 65 | 0.021 | 0.000005 | 0.055 | 0.015 | 0.28 | 25 | 0.063 | 2.9 | 0.000039 | 1,286 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 8.6 | 0.057 | 0.01 | 182,128 |
| 2113 | 9.1 | 1,644 | 2,743 | 17 | 0.18 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.0005 | 0.005 | 0.014 | 0.05 | 0.0042 | 0.44 | 66 | 0.022 | 0.000005 | 0.055 | 0.016 | 0.28 | 25 | 0.063 | 2.9 | 0.000039 | 1,290 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.7 | 0.057 | 0.01 | 182,005 |
| 2114 | 9.1 | 1,659 | 2,749 | 17 | 0.17 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.3 | 0.0005 | 0.0052 | 0.014 | 0.05 | 0.0043 | 0.44 | 66 | 0.022 | 0.000005 | 0.056 | 0.016 | 0.28 | 25 | 0.065 | 2.9 | 0.00004 | 1,297 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.7 | 0.057 | 0.01 | 182,253 |
| 2115 | 9.1 | 1,665 | 2,755 | 17 | 0.17 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.3 | 0.0005 | 0.0052 | 0.014 | 0.05 | 0.0043 | 0.44 | 67 | 0.022 | 0.000005 | 0.056 | 0.016 | 0.28 | 25 | 0.065 | 2.9 | 0.00004 | 1,300 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.7 | 0.057 | 0.01 | 182,451 |
| 2116 | 9.1 | 1,679 | 2,756 | 17 | 0.17 | 0.003 | 0.0023 | 0.0028 | 0.79 | 0.00005 | 1.3 | 0.0005 | 0.0053 | 0.014 | 0.05 | 0.0044 | 0.43 | 67 | 0.023 | 0.000005 | 0.057 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,307 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.6 | 0.057 | 0.01 | 183,471 |
| 2117 | 9.1 | 1,681 | 2,759 | 17 | 0.17 | 0.003 | 0.0023 | 0.0028 | 0.79 | 0.00005 | 1.3 | 0.00051 | 0.0053 | 0.014 | 0.05 | 0.0045 | 0.43 | 67 | 0.023 | 0.000005 | 0.057 | 0.017 | 0.28 | 25 | 0.066 | 2.9 | 0.00004 | 1,308 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.3 | 0.057 | 0.01 | 183,498 |
| 2118 | 9.1 | 1,680 | 2,784 | 17 | 0.17 | 0.003 | 0.0023 | 0.0028 | 0.79 | 0.00005 | 1.3 | 0.0005 | 0.0054 | 0.014 | 0.05 | 0.0045 | 0.43 | 68 | 0.023 | 0.000005 | 0.057 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,312 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 8.1 | 0.057 | 0.01 | 183,749 |
| 2119 | 9.1 | 1,670 | 2,817 | 17 | 0.18 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.0005 | 0.0054 | 0.014 | 0.05 | 0.0045 | 0.43 | 68 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,314 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 7.8 | 0.057 | 0.01 | 183,758 |
| 2120 | 9.1 | 1,673 | 2,830 | 17 | 0.18 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.0005 | 0.0054 | 0.014 | 0.05 | 0.0046 | 0.43 | 69 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,317 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 7.5 | 0.057 | 0.01 | 184,333 |
| 2121 | 9.1 | 1,673 | 2,864 | 17 | 0.19 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.0005 | 0.0054 | 0.014 | 0.05 | 0.0046 | 0.43 | 69 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.066 | 2.9 | 0.00004 | 1,324 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 7.2 | 0.057 | 0.01 | 184,127 |
| 2122 | 9.1 | 1,658 | 2,906 | 17 | 0.2 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.1 | 0.0005 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 70 | 0.022 | 0.000005 | 0.056 | 0.017 | 0.27 | 25 | 0.066 | 2.9 | 0.00004 | 1,326 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 7.0 | 0.057 | 0.01 | 184,511 |
| 2123 | 9.1 | 1,635 | 2,962 | 17 | 0.21 | 0.0029 | 0.0023 | 0.003 | 0.79 | 0.00005 | 1.1 | 0.0005 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 71 | 0.022 | 0.000005 | 0.055 | 0.017 | 0.27 | 25 | 0.065 | 2.9 | 0.000039 | 1,326 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.011 | 6.7 | 0.057 | 0.01 | 184,738 |
| 2124 | 9.1 | 1,627 | 2,985 | 17 | 0.22 | 0.0029 | 0.0023 | 0.003 | 0.78 | 0.00005 | 1.1 | 0.0005 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 71 | 0.022 | 0.000005 | 0.055 | 0.017 | 0.27 | 25 | 0.065 | 2.9 | 0.000039 | 1,327 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.011 | 6.5 | 0.057 | 0.01 | 185,454 |
| 2125 | 9.2 | 1,611 | 3,022 | 17 | 0.22 | 0.0028 | 0.0023 | 0.003 | 0.78 | 0.00005 | 1.0 | 0.0005 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 72 | 0.022 | 0.000005 | 0.054 | 0.017 | 0.27 | 25 | 0.064 | 2.9 | 0.000039 | 1,326 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.011 | 6.1 | 0.057 | 0.01 | 185,444 |
| 2126 | 9.2 | 1,606 | 3,037 | 17 | 0.22 | 0.0028 | 0.0023 | 0.003 | 0.78 | 0.00005 | 1.0 | 0.0005 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 72 | 0.022 | 0.000005 | 0.054 | 0.017 | 0.27 | 24 | 0.064 | 2.9 | 0.000038 | 1,327 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.011 | 5.8 | 0.057 | 0.01 | 185,945 |
| 2127 | 9.2 | 1,594 | 3,068 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 1.0 | 0.0005 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 73 | 0.021 | 0.000005 | 0.054 | 0.017 | 0.27 | 24 | 0.062 | 2.9 | 0.000038 | 1,327 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.2 | 0.057 | 0.01 | 186,004 |
| 2128 | 9.2 | 1,591 | 3,085 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 1.0 | 0.0005 | 0.0051 | 0.015 | 0.05 | 0.0046 | 0.43 | 73 | 0.021 | 0.000005 | 0.054 | 0.017 | 0.27 | 24 | 0.062 | 2.8 | 0.000038 | 1,328 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.8 | 0.057 | 0.01 | 186,369 |
| 2129 | 9.2 | 1,583 | 3,109 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.99 | 0.0005 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.43 | 74 | 0.021 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.061 | 2.9 | 0.000038 | 1,329 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.2 | 0.057 | 0.01 | 185,968 |
| 2130 | 9.2 | 1,580 | 3,121 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.99 | 0.0005 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.43 | 75 | 0.021 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.06 | 2.9 | 0.000038 | 1,329 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.9 | 0.057 | 0.01 | 186,144 |
| 2131 | 9.2 | 1,577 | 3,142 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.98 | 0.0005 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 75 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.059 | 2.9 | 0.000038 | 1,331 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.4 | 0.057 | 0.01 | 186,102 |
| 2132 | 9.2 | 1,576 | 3,151 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.98 | 0.0005 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 76 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.058 | 2.8 | 0.000038 | 1,332 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.2 | 0.057 | 0.01 | 186,692 |
| 2133 | 9.2 | 1,575 | 3,168 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 76 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.058 | 2.9 | 0.000038 | 1,334 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.9 | 0.057 | 0.01 | 186,155 |
| 2134 | 9.2 | 1,576 | 3,174 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 77 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,335 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.8 | 0.057 | 0.01 | 186,362 |

**Table A3.** Source terms of the NAG backfill for the well graded cover system scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | $m^3$/year |
| 2135 | 9.2 | 1,577 | 3,187 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 77 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,338 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.7 | 0.057 | 0.01 | 186,587 |
| 2136 | 9.2 | 1,578 | 3,192 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 78 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,339 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.7 | 0.057 | 0.01 | 187,193 |
| 2137 | 9.2 | 1,581 | 3,204 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 78 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,342 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 186,724 |
| 2138 | 9.2 | 1,570 | 3,233 | 17 | 0.24 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.94 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 79 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,342 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 186,796 |
| 2139 | 9.2 | 1,553 | 3,271 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.92 | 0.0005 | 0.0047 | 0.015 | 0.05 | 0.0043 | 0.43 | 79 | 0.019 | 0.000005 | 0.052 | 0.016 | 0.27 | 24 | 0.055 | 2.8 | 0.000037 | 1,342 | 1.4 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 187,060 |
| 2140 | 9.2 | 1,545 | 3,291 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.91 | 0.0005 | 0.0046 | 0.015 | 0.05 | 0.0043 | 0.43 | 80 | 0.019 | 0.000005 | 0.052 | 0.015 | 0.27 | 24 | 0.055 | 2.8 | 0.000037 | 1,342 | 1.4 | 0.000037 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 187,517 |
| 2141 | 9.2 | 1,532 | 3,320 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0033 | 0.78 | 0.00005 | 0.9 | 0.0005 | 0.0046 | 0.015 | 0.05 | 0.0042 | 0.43 | 80 | 0.019 | 0.000005 | 0.052 | 0.015 | 0.27 | 24 | 0.054 | 2.8 | 0.000037 | 1,341 | 1.4 | 0.000037 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 186,898 |
| 2142 | 9.2 | 1,525 | 3,335 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.89 | 0.0005 | 0.0045 | 0.015 | 0.05 | 0.0042 | 0.43 | 81 | 0.018 | 0.000005 | 0.051 | 0.015 | 0.27 | 24 | 0.053 | 2.8 | 0.000036 | 1,341 | 1.4 | 0.000037 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 186,889 |
| 2143 | 9.2 | 1,516 | 3,353 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.88 | 0.0005 | 0.0045 | 0.015 | 0.05 | 0.0041 | 0.43 | 81 | 0.018 | 0.000005 | 0.051 | 0.015 | 0.27 | 24 | 0.053 | 2.8 | 0.000036 | 1,340 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 187,035 |
| 2144 | 9.2 | 1,509 | 3,369 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.88 | 0.0005 | 0.0044 | 0.015 | 0.05 | 0.004 | 0.43 | 82 | 0.018 | 0.000005 | 0.051 | 0.014 | 0.27 | 24 | 0.052 | 2.8 | 0.000036 | 1,339 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 187,551 |
| 2145 | 9.2 | 1,502 | 3,386 | 17 | 0.26 | 0.0026 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.87 | 0.0005 | 0.0043 | 0.014 | 0.05 | 0.004 | 0.43 | 82 | 0.018 | 0.000005 | 0.051 | 0.014 | 0.27 | 24 | 0.051 | 2.8 | 0.000036 | 1,338 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 187,020 |
| 2146 | 9.2 | 1,496 | 3,399 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.87 | 0.0005 | 0.0042 | 0.014 | 0.05 | 0.0039 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.014 | 0.27 | 24 | 0.05 | 2.8 | 0.000036 | 1,337 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 187,082 |
| 2147 | 9.2 | 1,490 | 3,412 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.0005 | 0.0042 | 0.014 | 0.05 | 0.0038 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.014 | 0.27 | 24 | 0.049 | 2.8 | 0.000036 | 1,337 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 187,212 |
| 2148 | 9.2 | 1,485 | 3,424 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.0005 | 0.0041 | 0.014 | 0.05 | 0.0037 | 0.42 | 84 | 0.017 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.048 | 2.8 | 0.000035 | 1,336 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.057 | 0.01 | 187,667 |
| 2149 | 9.2 | 1,480 | 3,436 | 17 | 0.27 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.85 | 0.0005 | 0.004 | 0.014 | 0.05 | 0.0037 | 0.43 | 84 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.047 | 2.8 | 0.000035 | 1,336 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.5 | 0.057 | 0.01 | 187,030 |
| 2150 | 9.2 | 1,476 | 3,445 | 17 | 0.27 | 0.0026 | 0.0019 | 0.0034 | 0.78 | 0.00005 | 0.85 | 0.0005 | 0.0039 | 0.014 | 0.05 | 0.0036 | 0.43 | 84 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.046 | 2.8 | 0.000035 | 1,335 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.4 | 0.057 | 0.01 | 186,985 |

**Table A4.** Annual loads of the NAG backfill for the well graded cover system scenario.

| Model Year | SO4 kg/year | Alkalinity kg/year as CaCO3 | Cl kg/year | Al kg/year | Sb kg/year | As kg/year | Ba kg/year | B kg/year | Cd kg/year | Ca kg/year | Cr kg/year | Co kg/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | 20 | 1.5 | 0.44 | 0.00019 | 0.000034 | 0.000019 | 0.000037 | 0.02 | 0.00000065 | 0.45 | 0.0000081 | 0.000092 |
| 2024 | 40 | 3.1 | 0.9 | 0.00038 | 0.00007 | 0.00004 | 0.000076 | 0.041 | 0.0000013 | 0.92 | 0.000017 | 0.00019 |
| 2025 | 69 | 5.4 | 1.6 | 0.00067 | 0.00012 | 0.000069 | 0.00013 | 0.072 | 0.0000023 | 1.6 | 0.000029 | 0.00033 |
| 2026 | 106 | 8.2 | 2.4 | 0.001 | 0.00019 | 0.00011 | 0.0002 | 0.11 | 0.0000035 | 2.4 | 0.000044 | 0.0005 |
| 2027 | 141 | 11 | 3.2 | 0.0013 | 0.00025 | 0.00014 | 0.00027 | 0.15 | 0.0000047 | 3.2 | 0.000058 | 0.00067 |
| 2028 | 236 | 18 | 5.3 | 0.0023 | 0.00042 | 0.00024 | 0.00045 | 0.24 | 0.0000078 | 5.4 | 0.000098 | 0.0011 |
| 2029 | 267 | 21 | 6.0 | 0.0026 | 0.00047 | 0.00027 | 0.00051 | 0.28 | 0.0000089 | 6.1 | 0.00011 | 0.0013 |
| 2030 | 321 | 25 | 7.3 | 0.0031 | 0.00057 | 0.00032 | 0.00062 | 0.33 | 0.000011 | 7.4 | 0.00013 | 0.0015 |
| 2031 | 1,162 | 91 | 26 | 0.011 | 0.002 | 0.0012 | 0.0022 | 1.2 | 0.000039 | 27 | 0.00048 | 0.0055 |
| 2032 | 2,750 | 214 | 62 | 0.026 | 0.0048 | 0.0027 | 0.0053 | 2.8 | 0.000091 | 63 | 0.0011 | 0.013 |
| 2033 | 858 | 67 | 19 | 0.0082 | 0.0015 | 0.00086 | 0.0016 | 0.89 | 0.000028 | 20 | 0.00036 | 0.0041 |
| 2034 | 1,554 | 121 | 35 | 0.015 | 0.0027 | 0.0015 | 0.003 | 1.6 | 0.000051 | 36 | 0.00064 | 0.0074 |
| 2035 | 12,672 | 987 | 286 | 0.12 | 0.022 | 0.013 | 0.024 | 13 | 0.00042 | 291 | 0.0052 | 0.06 |
| 2036 | 23,413 | 1,824 | 529 | 0.22 | 0.041 | 0.023 | 0.045 | 24 | 0.00078 | 538 | 0.0097 | 0.11 |
| 2037 | 16,957 | 1,321 | 383 | 0.16 | 0.03 | 0.017 | 0.033 | 17 | 0.00056 | 390 | 0.007 | 0.08 |
| 2038 | 32,863 | 2,560 | 742 | 0.32 | 0.058 | 0.033 | 0.063 | 34 | 0.0011 | 755 | 0.014 | 0.16 |
| 2039 | 63,961 | 11,571 | 1,332 | 0.72 | 0.11 | 0.062 | 0.11 | 61 | 0.002 | 1,527 | 0.024 | 0.29 |
| 2040 | 128,782 | 40,409 | 2,348 | 1.5 | 0.23 | 0.13 | 0.19 | 107 | 0.0034 | 2,749 | 0.043 | 0.56 |
| 2041 | 197,654 | 88,386 | 3,173 | 3.1 | 0.35 | 0.19 | 0.25 | 145 | 0.0047 | 1,619 | 0.059 | 0.64 |
| 2042 | 185,591 | 104,355 | 3,172 | 3.9 | 0.33 | 0.19 | 0.31 | 145 | 0.0053 | 1,539 | 0.066 | 0.4 |
| 2043 | 186,076 | 105,488 | 3,171 | 3.9 | 0.33 | 0.2 | 0.33 | 145 | 0.0054 | 1,615 | 0.068 | 0.36 |
| 2044 | 186,190 | 104,188 | 3,171 | 3.9 | 0.33 | 0.2 | 0.33 | 145 | 0.0055 | 1,717 | 0.069 | 0.36 |
| 2045 | 188,820 | 106,262 | 3,172 | 3.9 | 0.33 | 0.2 | 0.32 | 145 | 0.0054 | 1,585 | 0.068 | 0.38 |
| 2046 | 188,964 | 103,720 | 3,172 | 3.8 | 0.33 | 0.2 | 0.3 | 145 | 0.0052 | 1,515 | 0.065 | 0.41 |
| 2047 | 203,032 | 105,866 | 3,173 | 3.8 | 0.36 | 0.22 | 0.29 | 145 | 0.0052 | 1,496 | 0.065 | 0.45 |
| 2048 | 223,360 | 112,202 | 3,173 | 4.0 | 0.39 | 0.25 | 0.28 | 145 | 0.0052 | 1,458 | 0.067 | 0.53 |
| 2049 | 233,846 | 117,629 | 3,174 | 4.1 | 0.41 | 0.27 | 0.28 | 145 | 0.0053 | 1,404 | 0.07 | 0.59 |
| 2050 | 240,268 | 120,082 | 3,174 | 4.2 | 0.42 | 0.29 | 0.28 | 145 | 0.0053 | 1,409 | 0.072 | 0.63 |
| 2051 | 243,939 | 121,288 | 3,174 | 4.2 | 0.43 | 0.3 | 0.28 | 145 | 0.0054 | 1,421 | 0.073 | 0.65 |
| 2052 | 247,218 | 122,306 | 3,174 | 4.3 | 0.44 | 0.31 | 0.28 | 145 | 0.0054 | 1,435 | 0.074 | 0.66 |
| 2053 | 248,540 | 122,377 | 3,174 | 4.3 | 0.44 | 0.31 | 0.28 | 145 | 0.0054 | 1,438 | 0.075 | 0.66 |
| 2054 | 250,169 | 122,780 | 3,174 | 4.3 | 0.44 | 0.31 | 0.29 | 145 | 0.0055 | 1,450 | 0.075 | 0.67 |
| 2055 | 253,168 | 123,343 | 3,174 | 4.3 | 0.45 | 0.32 | 0.29 | 145 | 0.0055 | 1,467 | 0.076 | 0.68 |
| 2056 | 249,012 | 151,733 | 3,175 | 5.3 | 0.44 | 0.32 | 0.3 | 145 | 0.0055 | 1,021 | 0.075 | 0.67 |
| 2057 | 238,870 | 196,129 | 3,175 | 7.1 | 0.42 | 0.3 | 0.32 | 145 | 0.0055 | 643 | 0.072 | 0.61 |
| 2058 | 233,012 | 221,733 | 3,176 | 8.2 | 0.41 | 0.28 | 0.33 | 145 | 0.0056 | 520 | 0.07 | 0.58 |
| 2059 | 231,696 | 230,559 | 3,176 | 8.6 | 0.41 | 0.28 | 0.34 | 145 | 0.0056 | 488 | 0.07 | 0.57 |
| 2060 | 233,410 | 234,067 | 3,176 | 8.7 | 0.41 | 0.28 | 0.34 | 145 | 0.0056 | 486 | 0.07 | 0.57 |
| 2061 | 234,402 | 234,276 | 3,176 | 8.7 | 0.41 | 0.28 | 0.34 | 145 | 0.0056 | 489 | 0.07 | 0.58 |
| 2062 | 234,343 | 245,464 | 3,176 | 9.9 | 0.41 | 0.28 | 0.35 | 145 | 0.0057 | 436 | 0.071 | 0.58 |
| 2063 | 232,890 | 257,359 | 3,176 | 11 | 0.41 | 0.28 | 0.36 | 145 | 0.0057 | 398 | 0.071 | 0.57 |
| 2064 | 234,081 | 261,497 | 3,176 | 11 | 0.41 | 0.28 | 0.36 | 145 | 0.0057 | 402 | 0.072 | 0.57 |
| 2065 | 235,155 | 272,984 | 3,176 | 14 | 0.41 | 0.28 | 0.37 | 145 | 0.0058 | 339 | 0.072 | 0.57 |
| 2066 | 233,224 | 287,755 | 3,177 | 16 | 0.41 | 0.28 | 0.38 | 145 | 0.0058 | 303 | 0.073 | 0.57 |
| 2067 | 232,156 | 298,507 | 3,177 | 17 | 0.41 | 0.28 | 0.39 | 145 | 0.0059 | 288 | 0.073 | 0.56 |
| 2068 | 233,756 | 306,039 | 3,177 | 17 | 0.41 | 0.28 | 0.4 | 145 | 0.0059 | 287 | 0.074 | 0.57 |
| 2069 | 234,467 | 310,511 | 3,177 | 17 | 0.41 | 0.28 | 0.4 | 145 | 0.006 | 288 | 0.075 | 0.57 |
| 2070 | 237,133 | 313,382 | 3,177 | 16 | 0.42 | 0.28 | 0.4 | 145 | 0.006 | 297 | 0.075 | 0.58 |
| 2071 | 238,917 | 316,056 | 3,177 | 16 | 0.42 | 0.28 | 0.4 | 145 | 0.0061 | 305 | 0.076 | 0.58 |
| 2072 | 243,538 | 319,835 | 3,177 | 17 | 0.43 | 0.28 | 0.41 | 145 | 0.0061 | 297 | 0.076 | 0.58 |
| 2073 | 245,306 | 319,891 | 3,177 | 17 | 0.43 | 0.29 | 0.41 | 145 | 0.0061 | 303 | 0.077 | 0.59 |
| 2074 | 247,823 | 320,362 | 3,177 | 16 | 0.44 | 0.29 | 0.41 | 145 | 0.0062 | 312 | 0.077 | 0.6 |
| 2075 | 250,494 | 320,300 | 3,177 | 16 | 0.44 | 0.3 | 0.41 | 145 | 0.0062 | 322 | 0.078 | 0.62 |
| 2076 | 256,213 | 323,939 | 3,177 | 18 | 0.45 | 0.31 | 0.41 | 145 | 0.0062 | 304 | 0.078 | 0.64 |
| 2077 | 259,315 | 323,891 | 3,177 | 18 | 0.46 | 0.31 | 0.4 | 145 | 0.0063 | 308 | 0.078 | 0.67 |
| 2078 | 262,984 | 324,669 | 3,177 | 17 | 0.46 | 0.32 | 0.4 | 145 | 0.0063 | 314 | 0.079 | 0.69 |
| 2079 | 266,345 | 327,890 | 3,177 | 18 | 0.47 | 0.33 | 0.41 | 145 | 0.0063 | 314 | 0.08 | 0.72 |
| 2080 | 269,535 | 332,232 | 3,177 | 18 | 0.48 | 0.34 | 0.41 | 145 | 0.0064 | 315 | 0.081 | 0.75 |
| 2081 | 272,116 | 332,708 | 3,177 | 18 | 0.48 | 0.35 | 0.41 | 145 | 0.0064 | 320 | 0.082 | 0.77 |
| 2082 | 272,869 | 340,630 | 3,177 | 19 | 0.48 | 0.35 | 0.41 | 145 | 0.0064 | 308 | 0.082 | 0.78 |
| 2083 | 272,120 | 348,104 | 3,177 | 19 | 0.48 | 0.35 | 0.42 | 145 | 0.0065 | 299 | 0.082 | 0.79 |
| 2084 | 274,821 | 353,230 | 3,178 | 19 | 0.48 | 0.36 | 0.42 | 145 | 0.0065 | 301 | 0.083 | 0.81 |
| 2085 | 274,109 | 357,053 | 3,178 | 19 | 0.48 | 0.36 | 0.42 | 145 | 0.0065 | 299 | 0.082 | 0.81 |
| 2086 | 276,257 | 360,164 | 3,178 | 19 | 0.49 | 0.37 | 0.43 | 145 | 0.0066 | 304 | 0.083 | 0.82 |
| 2087 | 276,500 | 363,696 | 3,178 | 19 | 0.49 | 0.37 | 0.43 | 145 | 0.0066 | 306 | 0.083 | 0.82 |
| 2088 | 280,271 | 368,398 | 3,178 | 20 | 0.49 | 0.37 | 0.43 | 145 | 0.0066 | 299 | 0.084 | 0.83 |
| 2089 | 275,396 | 376,485 | 3,178 | 22 | 0.49 | 0.36 | 0.44 | 145 | 0.0066 | 274 | 0.083 | 0.78 |
| 2090 | 275,529 | 383,534 | 3,178 | 23 | 0.49 | 0.36 | 0.45 | 145 | 0.0067 | 268 | 0.083 | 0.78 |
| 2091 | 276,362 | 388,183 | 3,178 | 23 | 0.49 | 0.36 | 0.45 | 145 | 0.0067 | 268 | 0.084 | 0.78 |
| 2092 | 278,748 | 393,879 | 3,178 | 23 | 0.49 | 0.36 | 0.45 | 145 | 0.0067 | 270 | 0.084 | 0.79 |
| 2093 | 277,320 | 402,001 | 3,178 | 24 | 0.49 | 0.36 | 0.46 | 145 | 0.0068 | 260 | 0.085 | 0.78 |
| 2094 | 275,444 | 412,709 | 3,178 | 25 | 0.49 | 0.36 | 0.47 | 145 | 0.0068 | 252 | 0.085 | 0.77 |
| 2095 | 274,222 | 417,353 | 3,178 | 25 | 0.48 | 0.35 | 0.47 | 145 | 0.0068 | 251 | 0.085 | 0.76 |
| 2096 | 272,497 | 424,921 | 3,178 | 25 | 0.48 | 0.35 | 0.48 | 145 | 0.0069 | 249 | 0.086 | 0.75 |
| 2097 | 272,865 | 426,547 | 3,178 | 25 | 0.48 | 0.35 | 0.48 | 145 | 0.0069 | 252 | 0.086 | 0.75 |
| 2098 | 273,173 | 431,194 | 3,178 | 25 | 0.48 | 0.35 | 0.49 | 145 | 0.0069 | 253 | 0.086 | 0.76 |
| 2099 | 274,674 | 432,953 | 3,179 | 24 | 0.48 | 0.35 | 0.49 | 145 | 0.0069 | 257 | 0.087 | 0.77 |
| 2100 | 278,005 | 439,464 | 3,179 | 26 | 0.49 | 0.36 | 0.49 | 145 | 0.007 | 248 | 0.087 | 0.78 |
| 2101 | 280,794 | 442,036 | 3,179 | 26 | 0.5 | 0.36 | 0.49 | 145 | 0.007 | 252 | 0.088 | 0.79 |
| 2102 | 282,642 | 445,462 | 3,179 | 25 | 0.5 | 0.36 | 0.5 | 145 | 0.0071 | 255 | 0.088 | 0.8 |
| 2103 | 288,151 | 450,051 | 3,179 | 28 | 0.51 | 0.37 | 0.49 | 145 | 0.0071 | 243 | 0.089 | 0.83 |
| 2104 | 292,516 | 454,953 | 3,179 | 28 | 0.52 | 0.38 | 0.5 | 145 | 0.0071 | 245 | 0.089 | 0.85 |
| 2105 | 291,427 | 458,777 | 3,179 | 29 | 0.51 | 0.37 | 0.5 | 145 | 0.0071 | 241 | 0.089 | 0.84 |
| 2106 | 286,935 | 468,857 | 3,179 | 31 | 0.51 | 0.37 | 0.51 | 145 | 0.0072 | 230 | 0.09 | 0.82 |
| 2107 | 287,106 | 476,395 | 3,179 | 32 | 0.51 | 0.37 | 0.52 | 145 | 0.0072 | 226 | 0.09 | 0.83 |
| 2108 | 289,593 | 483,606 | 3,179 | 32 | 0.51 | 0.37 | 0.52 | 145 | 0.0073 | 225 | 0.091 | 0.84 |
| 2109 | 290,357 | 486,978 | 3,179 | 32 | 0.51 | 0.38 | 0.52 | 145 | 0.0073 | 224 | 0.091 | 0.85 |
| 2110 | 292,783 | 491,206 | 3,180 | 32 | 0.52 | 0.38 | 0.52 | 145 | 0.0073 | 224 | 0.091 | 0.87 |
| 2111 | 294,684 | 494,473 | 3,180 | 32 | 0.52 | 0.39 | 0.52 | 145 | 0.0073 | 225 | 0.091 | 0.88 |
| 2112 | 298,326 | 498,249 | 3,180 | 32 | 0.53 | 0.39 | 0.52 | 145 | 0.0073 | 226 | 0.092 | 0.91 |
| 2113 | 299,198 | 499,295 | 3,180 | 32 | 0.53 | 0.4 | 0.52 | 145 | 0.0073 | 227 | 0.092 | 0.92 |
| 2114 | 302,322 | 500,942 | 3,180 | 32 | 0.53 | 0.4 | 0.52 | 145 | 0.0073 | 229 | 0.092 | 0.94 |
| 2115 | 303,689 | 502,579 | 3,180 | 31 | 0.54 | 0.41 | 0.52 | 145 | 0.0073 | 230 | 0.092 | 0.95 |
| 2116 | 308,102 | 505,590 | 3,180 | 31 | 0.54 | 0.42 | 0.52 | 145 | 0.0074 | 234 | 0.093 | 0.98 |
| 2117 | 308,423 | 506,215 | 3,180 | 31 | 0.54 | 0.42 | 0.52 | 145 | 0.0074 | 235 | 0.093 | 0.98 |
| 2118 | 308,662 | 511,484 | 3,180 | 32 | 0.54 | 0.42 | 0.52 | 145 | 0.0074 | 231 | 0.093 | 0.99 |
| 2119 | 306,858 | 517,555 | 3,180 | 32 | 0.54 | 0.42 | 0.53 | 145 | 0.0074 | 226 | 0.092 | 0.98 |
| 2120 | 308,297 | 521,571 | 3,180 | 32 | 0.54 | 0.43 | 0.53 | 145 | 0.0074 | 226 | 0.093 | 0.99 |
| 2121 | 308,008 | 527,340 | 3,181 | 36 | 0.54 | 0.43 | 0.53 | 145 | 0.0074 | 213 | 0.093 | 0.99 |
| 2122 | 305,993 | 536,189 | 3,181 | 37 | 0.54 | 0.43 | 0.54 | 145 | 0.0074 | 206 | 0.093 | 0.98 |
| 2123 | 301,991 | 547,268 | 3,181 | 39 | 0.53 | 0.43 | 0.55 | 145 | 0.0074 | 198 | 0.093 | 0.98 |
| 2124 | 301,714 | 553,653 | 3,181 | 40 | 0.53 | 0.43 | 0.56 | 145 | 0.0075 | 196 | 0.093 | 0.98 |
| 2125 | 298,732 | 560,394 | 3,181 | 41 | 0.53 | 0.43 | 0.56 | 145 | 0.0075 | 192 | 0.093 | 0.97 |
| 2126 | 298,628 | 564,660 | 3,181 | 41 | 0.53 | 0.43 | 0.57 | 145 | 0.0075 | 191 | 0.094 | 0.97 |
| 2127 | 296,453 | 570,679 | 3,181 | 42 | 0.52 | 0.43 | 0.57 | 145 | 0.0075 | 188 | 0.094 | 0.96 |
| 2128 | 296,420 | 574,930 | 3,181 | 42 | 0.52 | 0.43 | 0.57 | 145 | 0.0075 | 187 | 0.094 | 0.95 |
| 2129 | 294,443 | 578,211 | 3,181 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0075 | 185 | 0.094 | 0.94 |
| 2130 | 294,182 | 580,975 | 3,181 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0075 | 184 | 0.094 | 0.93 |
| 2131 | 293,409 | 584,696 | 3,181 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0075 | 182 | 0.094 | 0.92 |
| 2132 | 294,171 | 588,305 | 3,182 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0075 | 183 | 0.094 | 0.91 |
| 2133 | 293,194 | 589,740 | 3,182 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0075 | 181 | 0.094 | 0.9 |
| 2134 | 293,631 | 591,512 | 3,182 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0075 | 181 | 0.094 | 0.9 |

| Model Year | Cu kg/year | Fe kg/year | Pb kg/year | Li kg/year | Mg kg/year | Mn kg/year | Hg kg/year | Mo kg/year | Ni kg/year | P kg/year | K kg/year | Se kg/year | Si kg/year | Ag kg/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | 0.000016 | 0.00081 | 0.0000016 | 0.011 | 0.33 | 0.00054 | 0.00 | 0.00066 | 0.00012 | 0.007 | 0.63 | 0.0018 | 0.073 | 0.00000047 |
| 2024 | 0.000033 | 0.0016 | 0.0000033 | 0.023 | 0.67 | 0.0011 | 0.00000016 | 0.0013 | 0.00025 | 0.014 | 1.3 | 0.0036 | 0.15 | 0.00000096 |
| 2025 | 0.000058 | 0.0029 | 0.0000058 | 0.039 | 1.2 | 0.0019 | 0.00000029 | 0.0023 | 0.00043 | 0.025 | 2.2 | 0.0063 | 0.26 | 0.0000017 |
| 2026 | 0.000088 | 0.0044 | 0.0000088 | 0.06 | 1.8 | 0.0029 | 0.00000044 | 0.0036 | 0.00065 | 0.038 | 3.4 | 0.0097 | 0.4 | 0.0000025 |
| 2027 | 0.00012 | 0.0058 | 0.000012 | 0.08 | 2.3 | 0.0039 | 0.00000058 | 0.0047 | 0.00086 | 0.051 | 4.5 | 0.013 | 0.53 | 0.0000034 |
| 2028 | 0.0002 | 0.0098 | 0.00002 | 0.13 | 4.0 | 0.0066 | 0.00000098 | 0.008 | 0.0015 | 0.085 | 7.6 | 0.022 | 0.89 | 0.0000057 |
| 2029 | 0.00022 | 0.011 | 0.000022 | 0.15 | 4.5 | 0.0074 | 0.0000011 | 0.009 | 0.0016 | 0.097 | 8.6 | 0.024 | 1.0 | 0.0000064 |
| 2030 | 0.00027 | 0.013 | 0.000027 | 0.18 | 5.4 | 0.0089 | 0.0000013 | 0.011 | 0.002 | 0.12 | 10 | 0.029 | 1.2 | 0.0000077 |
| 2031 | 0.00097 | 0.048 | 0.000096 | 0.66 | 19 | 0.032 | 0.0000048 | 0.039 | 0.0071 | 0.42 | 38 | 0.11 | 4.4 | 0.000028 |
| 2032 | 0.0023 | 0.11 | 0.00023 | 1.6 | 46 | 0.076 | 0.000011 | 0.093 | 0.017 | 0.99 | 89 | 0.25 | 10 | 0.000066 |
| 2033 | 0.00071 | 0.035 | 0.000071 | 0.49 | 14 | 0.024 | 0.0000035 | 0.029 | 0.0053 | 0.31 | 28 | 0.078 | 3.2 | 0.000021 |
| 2034 | 0.0013 | 0.064 | 0.00013 | 0.88 | 26 | 0.043 | 0.0000064 | 0.052 | 0.0095 | 0.56 | 50 | 0.14 | 5.8 | 0.000037 |
| 2035 | 0.011 | 0.52 | 0.0011 | 7.2 | 212 | 0.35 | 0.000052 | 0.43 | 0.078 | 4.6 | 409 | 1.2 | 48 | 0.0003 |
| 2036 | 0.019 | 0.97 | 0.0019 | 13 | 391 | 0.65 | 0.000097 | 0.79 | 0.14 | 8.5 | 756 | 2.1 | 88 | 0.00056 |
| 2037 | 0.014 | 0.7 | 0.0014 | 9.6 | 283 | 0.47 | 0.00007 | 0.57 | 0.1 | 6.1 | 548 | 1.5 | 64 | 0.00041 |
| 2038 | 0.027 | 1.4 | 0.0027 | 19 | 549 | 0.91 | 0.00014 | 1.1 | 0.2 | 12 | 1,062 | 3.0 | 124 | 0.00079 |
| 2039 | 0.059 | 2.4 | 0.015 | 33 | 1,111 | 1.7 | 0.00024 | 2.2 | 0.4 | 21 | 1,907 | 5.5 | 222 | 0.0015 |
| 2040 | 0.15 | 4.3 | 0.073 | 59 | 2,362 | 3.2 | 0.00043 | 4.3 | 0.87 | 38 | 3,360 | 10 | 392 | 0.0031 |
| 2041 | 0.67 | 5.8 | 0.2 | 80 | 3,854 | 3.4 | 0.00058 | 6.7 | 1.2 | 51 | 4,542 | 11 | 529 | 0.0047 |
| 2042 | 1.1 | 6.6 | 0.26 | 79 | 3,722 | 1.8 | 0.00066 | 6.2 | 1.1 | 51 | 4,539 | 5.5 | 529 | 0.0045 |
| 2043 | 1.1 | 6.8 | 0.27 | 79 | 3,734 | 1.6 | 0.00068 | 6.3 | 1.0 | 51 | 4,539 | 4.7 | 529 | 0.0045 |
| 2044 | 1.1 | 6.9 | 0.27 | 79 | 3,726 | 1.6 | 0.00069 | 6.3 | 1.0 | 51 | 4,539 | 4.7 | 529 | 0.0045 |
| 2045 | 1.1 | 6.7 | 0.28 | 79 | 3,791 | 1.7 | 0.00067 | 6.4 | 1.1 | 51 | 4,539 | 5.0 | 529 | 0.0045 |
| 2046 | 1.1 | 6.5 | 0.3 | 79 | 3,787 | 1.8 | 0.00065 | 6.4 | 1.2 | 51 | 4,540 | 5.5 | 529 | 0.0045 |
| 2047 | 1.1 | 6.4 | 0.37 | 80 | 4,033 | 1.9 | 0.00064 | 6.8 | 1.4 | 51 | 4,541 | 5.6 | 529 | 0.0049 |
| 2048 | 1.1 | 6.5 | 0.45 | 80 | 4,420 | 2.2 | 0.00065 | 7.5 | 1.7 | 51 | 4,542 | 6.5 | 529 | 0.0054 |
| 2049 | 1.2 | 6.6 | 0.51 | 80 | 4,637 | 2.5 | 0.00066 | 7.9 | 1.9 | 51 | 4,543 | 7.4 | 529 | 0.0056 |
| 2050 | 1.2 | 6.7 | 0.55 | 80 | 4,757 | 2.6 | 0.00067 | 8.1 | 2.0 | 51 | 4,543 | 7.7 | 529 | 0.0058 |
| 2051 | 1.2 | 6.7 | 0.58 | 80 | 4,821 | 2.7 | 0.00067 | 8.2 | 2.1 | 51 | 4,543 | 7.8 | 529 | 0.0058 |
| 2052 | 1.2 | 6.8 | 0.61 | 80 | 4,882 | 2.7 | 0.00068 | 8.3 | 2.2 | 51 | 4,543 | 7.7 | 529 | 0.0059 |
| 2053 | 1.2 | 6.8 | 0.62 | 80 | 4,905 | 2.7 | 0.00068 | 8.4 | 2.2 | 51 | 4,543 | 7.7 | 529 | 0.006 |
| 2054 | 1.2 | 6.8 | 0.63 | 80 | 4,934 | 2.7 | 0.00068 | 8.4 | 2.2 | 51 | 4,543 | 7.7 | 529 | 0.006 |
| 2055 | 1.2 | 6.8 | 0.65 | 80 | 4,987 | 2.7 | 0.00068 | 8.5 | 2.3 | 51 | 4,543 | 8.0 | 529 | 0.0061 |
| 2056 | 1.4 | 6.9 | 0.63 | 80 | 5,237 | 2.7 | 0.00069 | 8.4 | 2.2 | 51 | 4,544 | 7.8 | 529 | 0.006 |
| 2057 | 1.8 | 6.9 | 0.58 | 80 | 5,612 | 2.5 | 0.00069 | 8.0 | 2.1 | 51 | 4,544 | 7.2 | 530 | 0.0057 |
| 2058 | 2.0 | 6.9 | 0.54 | 80 | 5,863 | 2.3 | 0.00069 | 7.8 | 1.9 | 51 | 4,545 | 6.8 | 530 | 0.0056 |
| 2059 | 2.0 | 6.9 | 0.53 | 80 | 5,977 | 2.3 | 0.00069 | 7.8 | 1.9 | 51 | 4,545 | 6.7 | 530 | 0.0055 |
| 2060 | 2.0 | 7.0 | 0.53 | 80 | 6,061 | 2.3 | 0.0007 | 7.9 | 1.9 | 51 | 4,545 | 6.8 | 530 | 0.0056 |
| 2061 | 2.0 | 7.0 | 0.53 | 80 | 6,088 | 2.4 | 0.0007 | 7.9 | 1.9 | 51 | 4,545 | 6.9 | 530 | 0.0056 |
| 2062 | 2.0 | 7.0 | 0.53 | 80 | 6,206 | 2.4 | 0.0007 | 7.9 | 1.9 | 51 | 4,546 | 6.9 | 530 | 0.0056 |
| 2063 | 2.0 | 7.1 | 0.51 | 80 | 6,350 | 2.3 | 0.00071 | 7.8 | 1.9 | 51 | 4,546 | 6.8 | 530 | 0.0056 |
| 2064 | 2.0 | 7.2 | 0.51 | 80 | 6,432 | 2.4 | 0.00072 | 7.9 | 1.8 | 51 | 4,546 | 6.6 | 530 | 0.0056 |
| 2065 | 2.0 | 7.2 | 0.51 | 80 | 6,587 | 2.4 | 0.00072 | 7.9 | 1.8 | 51 | 4,546 | 6.6 | 530 | 0.0056 |
| 2066 | 2.0 | 7.2 | 0.49 | 80 | 6,742 | 2.4 | 0.00072 | 7.8 | 1.8 | 51 | 4,546 | 6.6 | 530 | 0.0056 |
| 2067 | 2.0 | 7.3 | 0.49 | 80 | 6,877 | 2.4 | 0.00073 | 7.8 | 1.8 | 51 | 4,546 | 6.6 | 530 | 0.0056 |
| 2068 | 2.0 | 7.4 | 0.48 | 80 | 7,031 | 2.4 | 0.00074 | 7.9 | 1.8 | 51 | 4,546 | 6.7 | 530 | 0.0056 |
| 2069 | 2.0 | 7.4 | 0.48 | 80 | 7,136 | 2.4 | 0.00074 | 7.9 | 1.7 | 51 | 4,547 | 6.7 | 530 | 0.0056 |
| 2070 | 2.0 | 7.5 | 0.49 | 80 | 7,238 | 2.4 | 0.00075 | 8.0 | 1.8 | 51 | 4,547 | 6.9 | 530 | 0.0057 |
| 2071 | 2.0 | 7.5 | 0.49 | 80 | 7,328 | 2.4 | 0.00075 | 8.0 | 1.8 | 51 | 4,547 | 6.9 | 530 | 0.0057 |
| 2072 | 2.0 | 7.6 | 0.5 | 80 | 7,448 | 2.4 | 0.00076 | 8.2 | 1.8 | 51 | 4,547 | 7.0 | 530 | 0.0058 |
| 2073 | 2.1 | 7.6 | 0.51 | 80 | 7,488 | 2.5 | 0.00076 | 8.3 | 1.9 | 51 | 4,547 | 7.1 | 530 | 0.0059 |
| 2074 | 2.1 | 7.7 | 0.53 | 80 | 7,532 | 2.5 | 0.00077 | 8.3 | 1.9 | 51 | 4,547 | 7.3 | 530 | 0.0059 |
| 2075 | 2.1 | 7.7 | 0.54 | 80 | 7,577 | 2.6 | 0.00077 | 8.4 | 2.0 | 51 | 4,547 | 7.5 | 530 | 0.006 |
| 2076 | 2.1 | 7.8 | 0.56 | 80 | 7,698 | 2.7 | 0.00078 | 8.6 | 2.1 | 51 | 4,547 | 7.8 | 530 | 0.0061 |
| 2077 | 2.2 | 7.8 | 0.58 | 80 | 7,746 | 2.8 | 0.00078 | 8.7 | 2.1 | 51 | 4,547 | 8.1 | 530 | 0.0062 |
| 2078 | 2.2 | 7.8 | 0.61 | 80 | 7,807 | 2.9 | 0.00078 | 8.9 | 2.2 | 51 | 4,547 | 8.4 | 530 | 0.0063 |
| 2079 | 2.2 | 7.9 | 0.63 | 80 | 7,896 | 3.0 | 0.00079 | 9.0 | 2.3 | 51 | 4,547 | 8.8 | 530 | 0.0064 |
| 2080 | 2.2 | 7.9 | 0.65 | 80 | 8,005 | 3.1 | 0.00079 | 9.1 | 2.4 | 51 | 4,547 | 9.1 | 530 | 0.0065 |
| 2081 | 2.3 | 8.0 | 0.67 | 80 | 8,059 | 3.2 | 0.0008 | 9.2 | 2.5 | 51 | 4,548 | 9.4 | 530 | 0.0065 |
| 2082 | 2.3 | 8.0 | 0.68 | 80 | 8,173 | 3.3 | 0.0008 | 9.2 | 2.5 | 51 | 4,548 | 9.6 | 530 | 0.0065 |
| 2083 | 2.3 | 8.0 | 0.69 | 80 | 8,273 | 3.3 | 0.0008 | 9.2 | 2.5 | 51 | 4,548 | 9.7 | 530 | 0.0065 |
| 2084 | 2.3 | 8.1 | 0.71 | 80 | 8,405 | 3.4 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 9.9 | 530 | 0.0066 |
| 2085 | 2.3 | 8.1 | 0.71 | 80 | 8,478 | 3.4 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 10.0 | 530 | 0.0066 |
| 2086 | 2.4 | 8.2 | 0.73 | 80 | 8,584 | 3.4 | 0.00082 | 9.3 | 2.6 | 51 | 4,548 | 10 | 530 | 0.0066 |
| 2087 | 2.4 | 8.2 | 0.72 | 80 | 8,675 | 3.4 | 0.00082 | 9.3 | 2.6 | 51 | 4,548 | 10 | 530 | 0.0066 |
| 2088 | 2.4 | 8.2 | 0.74 | 80 | 8,822 | 3.4 | 0.00082 | 9.4 | 2.7 | 51 | 4,548 | 10 | 530 | 0.0067 |
| 2089 | 2.4 | 8.3 | 0.7 | 80 | 8,871 | 3.2 | 0.00083 | 9.3 | 2.5 | 51 | 4,548 | 9.5 | 530 | 0.0066 |
| 2090 | 2.4 | 8.3 | 0.7 | 80 | 9,001 | 3.2 | 0.00083 | 9.3 | 2.5 | 51 | 4,549 | 9.4 | 530 | 0.0066 |
| 2091 | 2.4 | 8.3 | 0.7 | 80 | 9,122 | 3.2 | 0.00083 | 9.3 | 2.5 | 51 | 4,549 | 9.4 | 530 | 0.0066 |
| 2092 | 2.4 | 8.4 | 0.7 | 80 | 9,285 | 3.2 | 0.00084 | 9.4 | 2.5 | 51 | 4,549 | 9.5 | 530 | 0.0067 |
| 2093 | 2.4 | 8.4 | 0.69 | 80 | 9,409 | 3.2 | 0.00084 | 9.3 | 2.5 | 51 | 4,549 | 9.4 | 530 | 0.0066 |
| 2094 | 2.4 | 8.5 | 0.69 | 80 | 9,573 | 3.2 | 0.00085 | 9.3 | 2.5 | 51 | 4,549 | 9.3 | 530 | 0.0066 |
| 2095 | 2.4 | 8.5 | 0.67 | 80 | 9,662 | 3.2 | 0.00085 | 9.2 | 2.4 | 51 | 4,549 | 9.2 | 530 | 0.0066 |
| 2096 | 2.4 | 8.6 | 0.66 | 80 | 9,796 | 3.1 | 0.00086 | 9.2 | 2.4 | 51 | 4,549 | 9.1 | 530 | 0.0065 |
| 2097 | 2.4 | 8.6 | 0.66 | 80 | 9,863 | 3.1 | 0.00086 | 9.2 | 2.4 | 51 | 4,549 | 9.2 | 530 | 0.0065 |
| 2098 | 2.4 | 8.6 | 0.65 | 80 | 9,992 | 3.2 | 0.00086 | 9.2 | 2.4 | 51 | 4,549 | 9.3 | 530 | 0.0065 |
| 2099 | 2.4 | 8.6 | 0.66 | 80 | 10,074 | 3.2 | 0.00086 | 9.2 | 2.4 | 51 | 4,549 | 9.4 | 530 | 0.0066 |
| 2100 | 2.4 | 8.7 | 0.66 | 80 | 10,262 | 3.3 | 0.00087 | 9.4 | 2.4 | 51 | 4,549 | 9.6 | 530 | 0.0067 |
| 2101 | 2.4 | 8.7 | 0.68 | 80 | 10,370 | 3.3 | 0.00087 | 9.5 | 2.5 | 51 | 4,549 | 9.8 | 530 | 0.0067 |
| 2102 | 2.4 | 8.8 | 0.68 | 80 | 10,504 | 3.4 | 0.00088 | 9.5 | 2.5 | 51 | 4,550 | 9.9 | 530 | 0.0068 |
| 2103 | 2.4 | 8.8 | 0.7 | 80 | 10,666 | 3.5 | 0.00088 | 9.7 | 2.6 | 51 | 4,550 | 10 | 530 | 0.0069 |
| 2104 | 2.5 | 8.9 | 0.72 | 80 | 10,855 | 3.6 | 0.00089 | 9.8 | 2.7 | 51 | 4,550 | 11 | 530 | 0.007 |
| 2105 | 2.4 | 8.9 | 0.71 | 80 | 10,899 | 3.6 | 0.00089 | 9.8 | 2.6 | 51 | 4,550 | 10 | 530 | 0.007 |
| 2106 | 2.4 | 8.9 | 0.68 | 80 | 10,998 | 3.5 | 0.00089 | 9.7 | 2.5 | 51 | 4,550 | 10 | 530 | 0.0069 |
| 2107 | 2.4 | 9.0 | 0.69 | 80 | 11,130 | 3.5 | 0.0009 | 9.7 | 2.6 | 51 | 4,550 | 10 | 530 | 0.0069 |
| 2108 | 2.4 | 9.0 | 0.7 | 80 | 11,329 | 3.6 | 0.0009 | 9.7 | 2.6 | 51 | 4,550 | 11 | 530 | 0.0069 |
| 2109 | 2.4 | 9.0 | 0.71 | 80 | 11,430 | 3.6 | 0.0009 | 9.8 | 2.6 | 51 | 4,551 | 11 | 530 | 0.0069 |
| 2110 | 2.5 | 9.1 | 0.72 | 80 | 11,588 | 3.7 | 0.00091 | 9.9 | 2.7 | 51 | 4,551 | 11 | 530 | 0.007 |
| 2111 | 2.5 | 9.1 | 0.73 | 80 | 11,708 | 3.8 | 0.00091 | 9.9 | 2.7 | 51 | 4,551 | 11 | 530 | 0.007 |
| 2112 | 2.5 | 9.1 | 0.75 | 80 | 11,875 | 3.9 | 0.00091 | 10 | 2.8 | 51 | 4,551 | 11 | 530 | 0.0071 |
| 2113 | 2.5 | 9.1 | 0.76 | 80 | 11,944 | 3.9 | 0.00091 | 10 | 2.8 | 51 | 4,551 | 12 | 530 | 0.0072 |
| 2114 | 2.5 | 9.1 | 0.78 | 80 | 12,058 | 4.0 | 0.00091 | 10 | 2.9 | 51 | 4,551 | 12 | 530 | 0.0072 |
| 2115 | 2.5 | 9.1 | 0.79 | 80 | 12,147 | 4.1 | 0.00091 | 10 | 3.0 | 51 | 4,551 | 12 | 530 | 0.0073 |
| 2116 | 2.6 | 9.2 | 0.82 | 80 | 12,297 | 4.2 | 0.00092 | 10 | 3.0 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2117 | 2.6 | 9.2 | 0.82 | 80 | 12,347 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2118 | 2.6 | 9.2 | 0.83 | 80 | 12,450 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2119 | 2.6 | 9.2 | 0.83 | 80 | 12,546 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0073 |
| 2120 | 2.6 | 9.2 | 0.85 | 80 | 12,669 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2121 | 2.6 | 9.2 | 0.85 | 80 | 12,779 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2122 | 2.7 | 9.2 | 0.85 | 80 | 12,896 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 531 | 0.0073 |
| 2123 | 2.7 | 9.2 | 0.85 | 80 | 13,042 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0072 |
| 2124 | 2.7 | 9.3 | 0.85 | 80 | 13,181 | 4.1 | 0.00093 | 10 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0072 |
| 2125 | 2.7 | 9.3 | 0.85 | 80 | 13,306 | 4.1 | 0.00093 | 10 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 |
| 2126 | 2.7 | 9.3 | 0.85 | 80 | 13,410 | 4.0 | 0.00093 | 10 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 |
| 2127 | 2.7 | 9.3 | 0.85 | 80 | 13,548 | 4.0 | 0.00093 | 10.0 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 |
| 2128 | 2.7 | 9.3 | 0.85 | 80 | 13,678 | 3.9 | 0.00093 | 10.0 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 |
| 2129 | 2.7 | 9.3 | 0.85 | 80 | 13,781 | 3.9 | 0.00093 | 9.9 | 3.1 | 51 | 4,553 | 11 | 531 | 0.007 |
| 2130 | 2.8 | 9.3 | 0.84 | 80 | 13,879 | 3.8 | 0.00093 | 9.9 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 |
| 2131 | 2.8 | 9.3 | 0.84 | 80 | 14,009 | 3.8 | 0.00093 | 9.9 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 |
| 2132 | 2.8 | 9.3 | 0.84 | 80 | 14,131 | 3.7 | 0.00093 | 9.9 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 |
| 2133 | 2.8 | 9.3 | 0.83 | 80 | 14,216 | 3.7 | 0.00093 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.007 |
| 2134 | 2.8 | 9.3 | 0.83 | 80 | 14,294 | 3.7 | 0.00093 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.007 |

| Model Year | Na kg/year | Sr kg/year | Tl kg/year | Sn kg/year | U kg/year | V kg/year | Zn kg/year | NO3 kg/year | NH3 kg/year | NO2 kg/year | Seepage Rate $m^3$/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | 8.5 | 0.035 | 0.00000047 | 0.0000081 | 0.00021 | 0.000028 | 0.00007 | 1.1 | 0.13 | 0.024 | 16 |
| 2024 | 17 | 0.072 | 0.00000096 | 0.000016 | 0.00043 | 0.000058 | 0.00014 | 2.2 | 0.27 | 0.05 | 33 |
| 2025 | 30 | 0.13 | 0.0000017 | 0.000029 | 0.00074 | 0.0001 | 0.00025 | 3.8 | 0.48 | 0.086 | 57 |
| 2026 | 46 | 0.19 | 0.0000025 | 0.000044 | 0.0011 | 0.00015 | 0.00038 | 5.7 | 0.72 | 0.13 | 87 |
| 2027 | 61 | 0.26 | 0.0000034 | 0.000058 | 0.0015 | 0.0002 | 0.0005 | 7.6 | 0.96 | 0.17 | 116 |
| 2028 | 103 | 0.43 | 0.0000057 | 0.000098 | 0.0025 | 0.00034 | 0.00084 | 13 | 1.6 | 0.29 | 195 |
| 2029 | 117 | 0.49 | 0.0000064 | 0.00011 | 0.0029 | 0.00039 | 0.00095 | 14 | 1.8 | 0.33 | 221 |
| 2030 | 140 | 0.58 | 0.0000077 | 0.00013 | 0.0034 | 0.00046 | 0.0011 | 17 | 2.2 | 0.4 | 266 |
| 2031 | 508 | 2.1 | 0.000028 | 0.00048 | 0.012 | 0.0017 | 0.0041 | 63 | 8.0 | 1.4 | 961 |
| 2032 | 1,201 | 5.0 | 0.000066 | 0.0011 | 0.029 | 0.004 | 0.0098 | 149 | 19 | 3.4 | 2,273 |
| 2033 | 375 | 1.6 | 0.000021 | 0.00035 | 0.0092 | 0.0012 | 0.0031 | 46 | 5.9 | 1.1 | 710 |
| 2034 | 679 | 2.8 | 0.000037 | 0.00064 | 0.017 | 0.0022 | 0.0055 | 84 | 11 | 1.9 | 1,284 |
| 2035 | 5,534 | 23 | 0.0003 | 0.0052 | 0.14 | 0.018 | 0.045 | 686 | 87 | 16 | 10,477 |
| 2036 | 10,225 | 42 | 0.00056 | 0.0097 | 0.25 | 0.034 | 0.084 | 1,267 | 160 | 29 | 19,356 |
| 2037 | 7,405 | 31 | 0.00041 | 0.007 | 0.18 | 0.025 | 0.061 | 918 | 116 | 21 | 14,018 |
| 2038 | 14,352 | 60 | 0.00079 | 0.014 | 0.35 | 0.048 | 0.12 | 1,778 | 225 | 41 | 27,168 |
| 2039 | 29,310 | 107 | 0.0015 | 0.024 | 0.68 | 0.092 | 0.23 | 3,194 | 186 | 34 | 48,784 |
| 2040 | 63,111 | 189 | 0.0031 | 0.043 | 1.4 | 0.19 | 0.51 | 5,626 | 255 | 46 | 85,906 |
| 2041 | 105,502 | 255 | 0.0048 | 0.058 | 2.1 | 0.29 | 0.76 | 5,144 | 117 | 21 | 116,049 |
| 2042 | 103,736 | 255 | 0.0045 | 0.066 | 2.0 | 0.27 | 0.68 | 1,545 | 165 | 30 | 131,728 |
| 2043 | 104,118 | 255 | 0.0045 | 0.068 | 2.0 | 0.27 | 0.68 | 942 | 191 | 35 | 135,614 |
| 2044 | 103,774 | 255 | 0.0045 | 0.069 | 2.0 | 0.27 | 0.68 | 947 | 53 | 9.6 | 137,918 |
| 2045 | 105,535 | 255 | 0.0045 | 0.067 | 2.0 | 0.27 | 0.69 | 1,107 | 33 | 6.0 | 134,843 |
| 2046 | 105,107 | 255 | 0.0045 | 0.065 | 2.0 | 0.27 | 0.75 | 1,252 | 38 | 6.9 | 129,640 |
| 2047 | 111,892 | 255 | 0.0049 | 0.064 | 2.2 | 0.29 | 0.88 | 792 | 46 | 8.3 | 128,811 |
| 2048 | 122,389 | 255 | 0.0054 | 0.065 | 2.4 | 0.32 | 1.0 | 762 | 55 | 10 | 130,391 |
| 2049 | 128,307 | 255 | 0.0056 | 0.066 | 2.5 | 0.34 | 1.2 | 833 | 62 | 11 | 131,655 |
| 2050 | 131,710 | 255 | 0.0058 | 0.067 | 2.6 | 0.35 | 1.3 | 710 | 65 | 12 | 133,193 |
| 2051 | 133,609 | 255 | 0.0059 | 0.067 | 2.6 | 0.35 | 1.3 | 552 | 73 | 13 | 134,254 |
| 2052 | 135,278 | 255 | 0.0059 | 0.068 | 2.6 | 0.36 | 1.4 | 353 | 87 | 16 | 135,292 |
| 2053 | 135,880 | 255 | 0.006 | 0.068 | 2.7 | 0.36 | 1.4 | 193 | 94 | 17 | 135,311 |
| 2054 | 136,687 | 255 | 0.006 | 0.068 | 2.7 | 0.36 | 1.4 | 145 | 87 | 16 | 135,939 |
| 2055 | 138,125 | 255 | 0.0061 | 0.068 | 2.7 | 0.37 | 1.5 | 151 | 86 | 16 | 136,744 |
| 2056 | 142,694 | 255 | 0.006 | 0.069 | 2.7 | 0.36 | 1.4 | 174 | 96 | 17 | 137,789 |
| 2057 | 147,766 | 255 | 0.0057 | 0.069 | 2.6 | 0.35 | 1.3 | 202 | 108 | 20 | 138,099 |
| 2058 | 150,502 | 255 | 0.0056 | 0.069 | 2.5 | 0.34 | 1.2 | 234 | 115 | 21 | 138,393 |
| 2059 | 151,719 | 255 | 0.0056 | 0.069 | 2.5 | 0.33 | 1.2 | 271 | 112 | 20 | 138,657 |
| 2060 | 153,184 | 255 | 0.0056 | 0.07 | 2.5 | 0.34 | 1.2 | 316 | 116 | 21 | 139,741 |
| 2061 | 153,658 | 255 | 0.0056 | 0.07 | 2.5 | 0.34 | 1.2 | 364 | 111 | 20 | 140,084 |
| 2062 | 156,036 | 255 | 0.0056 | 0.07 | 2.5 | 0.34 | 1.2 | 417 | 101 | 18 | 140,942 |
| 2063 | 157,837 | 255 | 0.0056 | 0.071 | 2.5 | 0.34 | 1.2 | 474 | 92 | 17 | 141,850 |
| 2064 | 159,202 | 255 | 0.0056 | 0.072 | 2.5 | 0.34 | 1.2 | 537 | 96 | 17 | 143,090 |
| 2065 | 162,126 | 255 | 0.0057 | 0.072 | 2.5 | 0.34 | 1.2 | 600 | 100 | 18 | 143,729 |
| 2066 | 164,332 | 255 | 0.0056 | 0.072 | 2.5 | 0.34 | 1.1 | 669 | 107 | 19 | 144,914 |
| 2067 | 166,053 | 255 | 0.0056 | 0.073 | 2.5 | 0.34 | 1.1 | 741 | 113 | 20 | 146,084 |
| 2068 | 168,266 | 255 | 0.0056 | 0.074 | 2.5 | 0.34 | 1.1 | 813 | 115 | 21 | 147,667 |
| 2069 | 169,423 | 255 | 0.0056 | 0.074 | 2.5 | 0.34 | 1.1 | 871 | 114 | 21 | 148,435 |
| 2070 | 171,153 | 255 | 0.0057 | 0.075 | 2.5 | 0.34 | 1.1 | 897 | 112 | 20 | 149,714 |
| 2071 | 172,459 | 255 | 0.0057 | 0.075 | 2.6 | 0.35 | 1.1 | 857 | 108 | 20 | 150,869 |
| 2072 | 175,311 | 255 | 0.0059 | 0.076 | 2.6 | 0.35 | 1.2 | 780 | 109 | 20 | 152,259 |
| 2073 | 176,093 | 255 | 0.0059 | 0.076 | 2.6 | 0.35 | 1.2 | 721 | 110 | 20 | 152,620 |
| 2074 | 177,310 | 255 | 0.006 | 0.077 | 2.6 | 0.36 | 1.2 | 707 | 113 | 21 | 153,555 |
| 2075 | 178,481 | 255 | 0.006 | 0.077 | 2.7 | 0.36 | 1.3 | 694 | 117 | 21 | 154,302 |
| 2076 | 181,840 | 255 | 0.0062 | 0.078 | 2.7 | 0.37 | 1.3 | 716 | 119 | 22 | 155,300 |
| 2077 | 183,222 | 255 | 0.0062 | 0.078 | 2.8 | 0.37 | 1.3 | 741 | 117 | 21 | 155,642 |
| 2078 | 185,022 | 255 | 0.0063 | 0.078 | 2.8 | 0.38 | 1.4 | 781 | 113 | 21 | 156,520 |
| 2079 | 187,204 | 255 | 0.0064 | 0.079 | 2.8 | 0.39 | 1.5 | 824 | 101 | 18 | 157,526 |
| 2080 | 189,520 | 255 | 0.0065 | 0.079 | 2.9 | 0.39 | 1.5 | 867 | 92 | 17 | 158,727 |
| 2081 | 190,764 | 255 | 0.0065 | 0.08 | 2.9 | 0.39 | 1.5 | 903 | 76 | 14 | 159,076 |
| 2082 | 192,737 | 255 | 0.0066 | 0.08 | 2.9 | 0.39 | 1.6 | 921 | 68 | 12 | 160,041 |
| 2083 | 193,919 | 255 | 0.0066 | 0.08 | 2.9 | 0.39 | 1.6 | 944 | 59 | 11 | 160,609 |
| 2084 | 196,136 | 255 | 0.0066 | 0.081 | 2.9 | 0.4 | 1.6 | 930 | 57 | 10 | 161,869 |
| 2085 | 196,531 | 255 | 0.0066 | 0.081 | 2.9 | 0.4 | 1.6 | 934 | 54 | 9.9 | 162,127 |
| 2086 | 198,072 | 255 | 0.0067 | 0.082 | 2.9 | 0.4 | 1.7 | 880 | 54 | 9.9 | 163,022 |
| 2087 | 198,833 | 255 | 0.0066 | 0.082 | 3.0 | 0.4 | 1.7 | 869 | 54 | 9.9 | 163,716 |
| 2088 | 201,439 | 255 | 0.0067 | 0.082 | 3.0 | 0.41 | 1.7 | 795 | 55 | 9.9 | 164,817 |
| 2089 | 200,891 | 255 | 0.0066 | 0.083 | 2.9 | 0.4 | 1.6 | 749 | 55 | 10.0 | 165,016 |
| 2090 | 202,339 | 255 | 0.0066 | 0.083 | 2.9 | 0.4 | 1.6 | 707 | 55 | 10 | 165,702 |
| 2091 | 203,575 | 255 | 0.0066 | 0.083 | 3.0 | 0.4 | 1.6 | 718 | 55 | 10 | 166,524 |
| 2092 | 205,708 | 255 | 0.0067 | 0.084 | 3.0 | 0.4 | 1.6 | 711 | 55 | 9.9 | 167,829 |
| 2093 | 206,668 | 255 | 0.0067 | 0.084 | 3.0 | 0.4 | 1.6 | 740 | 52 | 9.4 | 168,420 |
| 2094 | 207,930 | 256 | 0.0066 | 0.085 | 2.9 | 0.4 | 1.6 | 767 | 48 | 8.8 | 169,379 |
| 2095 | 208,234 | 255 | 0.0066 | 0.085 | 2.9 | 0.4 | 1.5 | 812 | 37 | 6.8 | 170,071 |
| 2096 | 208,909 | 256 | 0.0066 | 0.086 | 2.9 | 0.39 | 1.5 | 859 | 31 | 5.6 | 171,166 |
| 2097 | 209,332 | 256 | 0.0066 | 0.086 | 2.9 | 0.39 | 1.5 | 907 | 22 | 4.0 | 171,387 |
| 2098 | 210,288 | 256 | 0.0066 | 0.086 | 2.9 | 0.39 | 1.5 | 956 | 18 | 3.2 | 172,099 |
| 2099 | 211,252 | 256 | 0.0066 | 0.086 | 2.9 | 0.4 | 1.5 | 1,007 | 14 | 2.5 | 172,718 |
| 2100 | 213,999 | 256 | 0.0067 | 0.087 | 3.0 | 0.4 | 1.5 | 1,058 | 12 | 2.2 | 173,742 |
| 2101 | 215,717 | 256 | 0.0068 | 0.087 | 3.0 | 0.41 | 1.6 | 1,109 | 11 | 2.0 | 174,656 |
| 2102 | 217,135 | 256 | 0.0068 | 0.088 | 3.0 | 0.41 | 1.6 | 1,160 | 10 | 1.9 | 175,434 |
| 2103 | 220,517 | 256 | 0.0069 | 0.088 | 3.1 | 0.42 | 1.6 | 1,212 | 10 | 1.9 | 176,132 |
| 2104 | 223,385 | 256 | 0.007 | 0.089 | 3.1 | 0.42 | 1.7 | 1,267 | 10 | 1.9 | 177,487 |
| 2105 | 223,655 | 256 | 0.007 | 0.089 | 3.1 | 0.42 | 1.7 | 1,312 | 10 | 1.9 | 177,786 |
| 2106 | 223,642 | 256 | 0.0069 | 0.089 | 3.1 | 0.41 | 1.6 | 1,355 | 10 | 1.9 | 178,442 |
| 2107 | 225,211 | 256 | 0.0069 | 0.09 | 3.1 | 0.42 | 1.6 | 1,395 | 10 | 1.9 | 179,251 |
| 2108 | 227,670 | 256 | 0.007 | 0.09 | 3.1 | 0.42 | 1.6 | 1,436 | 10 | 1.9 | 180,376 |
| 2109 | 228,630 | 256 | 0.007 | 0.09 | 3.1 | 0.42 | 1.7 | 1,467 | 10 | 1.9 | 180,436 |
| 2110 | 230,462 | 256 | 0.007 | 0.091 | 3.1 | 0.42 | 1.7 | 1,501 | 10 | 1.9 | 181,010 |
| 2111 | 231,880 | 256 | 0.0071 | 0.091 | 3.1 | 0.43 | 1.7 | 1,533 | 10 | 1.9 | 181,411 |
| 2112 | 234,181 | 256 | 0.0072 | 0.091 | 3.2 | 0.43 | 1.8 | 1,565 | 10 | 1.9 | 182,128 |
| 2113 | 234,714 | 256 | 0.0072 | 0.091 | 3.2 | 0.43 | 1.8 | 1,582 | 10 | 1.9 | 182,005 |
| 2114 | 236,364 | 256 | 0.0073 | 0.091 | 3.2 | 0.44 | 1.8 | 1,590 | 10 | 1.9 | 182,253 |
| 2115 | 237,222 | 256 | 0.0073 | 0.091 | 3.2 | 0.44 | 1.9 | 1,587 | 10 | 1.9 | 182,451 |
| 2116 | 239,741 | 256 | 0.0074 | 0.092 | 3.3 | 0.45 | 1.9 | 1,571 | 11 | 1.9 | 183,471 |
| 2117 | 239,941 | 256 | 0.0074 | 0.092 | 3.3 | 0.45 | 1.9 | 1,531 | 11 | 1.9 | 183,498 |
| 2118 | 241,079 | 256 | 0.0074 | 0.092 | 3.3 | 0.45 | 1.9 | 1,485 | 11 | 1.9 | 183,749 |
| 2119 | 241,440 | 256 | 0.0074 | 0.092 | 3.3 | 0.44 | 1.9 | 1,428 | 11 | 1.9 | 183,758 |
| 2120 | 242,804 | 256 | 0.0074 | 0.092 | 3.3 | 0.45 | 2.0 | 1,379 | 11 | 1.9 | 184,333 |
| 2121 | 243,803 | 256 | 0.0074 | 0.092 | 3.3 | 0.45 | 2.0 | 1,327 | 11 | 1.9 | 184,127 |
| 2122 | 244,643 | 256 | 0.0074 | 0.092 | 3.3 | 0.44 | 2.0 | 1,292 | 11 | 1.9 | 184,511 |
| 2123 | 245,018 | 256 | 0.0073 | 0.092 | 3.2 | 0.44 | 2.0 | 1,239 | 11 | 1.9 | 184,738 |
| 2124 | 246,078 | 256 | 0.0073 | 0.093 | 3.2 | 0.44 | 2.0 | 1,210 | 11 | 1.9 | 185,454 |
| 2125 | 245,973 | 256 | 0.0072 | 0.093 | 3.2 | 0.43 | 2.0 | 1,126 | 11 | 1.9 | 185,444 |
| 2126 | 246,694 | 256 | 0.0072 | 0.093 | 3.2 | 0.43 | 2.0 | 1,080 | 11 | 1.9 | 185,945 |
| 2127 | 246,772 | 256 | 0.0071 | 0.093 | 3.2 | 0.43 | 1.9 | 963 | 11 | 1.9 | 186,004 |
| 2128 | 247,498 | 256 | 0.0071 | 0.093 | 3.2 | 0.43 | 1.9 | 904 | 11 | 1.9 | 186,369 |
| 2129 | 247,096 | 256 | 0.0071 | 0.093 | 3.1 | 0.43 | 1.9 | 777 | 11 | 1.9 | 185,968 |
| 2130 | 247,423 | 256 | 0.0071 | 0.093 | 3.1 | 0.43 | 1.9 | 725 | 11 | 1.9 | 186,144 |
| 2131 | 247,684 | 256 | 0.0071 | 0.093 | 3.1 | 0.42 | 1.9 | 631 | 11 | 1.9 | 186,102 |
| 2132 | 248,637 | 256 | 0.0071 | 0.093 | 3.1 | 0.43 | 1.9 | 600 | 11 | 1.9 | 186,692 |
| 2133 | 248,350 | 256 | 0.007 | 0.093 | 3.1 | 0.42 | 1.9 | 544 | 11 | 1.9 | 186,155 |
| 2134 | 248,793 | 256 | 0.0071 | 0.093 | 3.1 | 0.42 | 1.9 | 529 | 11 | 1.9 | 186,362 |

**Table A4.** Annual loads of the NAG backfill for the well graded cover system scenario.

| Model Year | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year as CaCO3 | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | $m^3$/year |
| 2135 | 294,248 | 594,560 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0075 | 181 | 0.094 | 0.9 | 2.8 | 9.3 | 0.83 | 80 | 14,424 | 3.7 | 0.00093 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.007 | 249,560 | 256 | 0.0071 | 0.093 | 3.1 | 0.43 | 1.9 | 506 | 11 | 1.9 | 186,587 |
| 2136 | 295,465 | 597,538 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0075 | 181 | 0.094 | 0.9 | 2.8 | 9.4 | 0.83 | 80 | 14,530 | 3.7 | 0.00094 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.0071 | 250,632 | 256 | 0.0071 | 0.094 | 3.2 | 0.43 | 1.9 | 503 | 11 | 2.0 | 187,193 |
| 2137 | 295,267 | 598,264 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0075 | 180 | 0.094 | 0.89 | 2.8 | 9.3 | 0.83 | 80 | 14,607 | 3.6 | 0.00093 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.0071 | 250,546 | 256 | 0.0071 | 0.093 | 3.2 | 0.43 | 1.9 | 494 | 11 | 1.9 | 186,724 |
| 2138 | 293,288 | 603,873 | 3,182 | 45 | 0.52 | 0.41 | 0.59 | 145 | 0.0075 | 176 | 0.094 | 0.89 | 2.8 | 9.3 | 0.82 | 80 | 14,678 | 3.6 | 0.00093 | 9.9 | 2.9 | 51 | 4,554 | 10 | 531 | 0.007 | 250,755 | 256 | 0.007 | 0.093 | 3.1 | 0.42 | 1.9 | 493 | 11 | 2.0 | 186,796 |
| 2139 | 290,505 | 611,856 | 3,182 | 46 | 0.51 | 0.41 | 0.6 | 145 | 0.0075 | 172 | 0.094 | 0.88 | 2.8 | 9.4 | 0.81 | 80 | 14,802 | 3.6 | 0.00094 | 9.8 | 2.9 | 51 | 4,554 | 10 | 531 | 0.0069 | 251,035 | 256 | 0.007 | 0.094 | 3.1 | 0.42 | 1.8 | 492 | 11 | 2.0 | 187,060 |
| 2140 | 289,638 | 617,098 | 3,182 | 47 | 0.51 | 0.41 | 0.61 | 145 | 0.0075 | 171 | 0.094 | 0.87 | 2.8 | 9.4 | 0.8 | 80 | 14,924 | 3.5 | 0.00094 | 9.7 | 2.9 | 51 | 4,554 | 10 | 531 | 0.0069 | 251,572 | 256 | 0.007 | 0.094 | 3.1 | 0.42 | 1.8 | 492 | 11 | 2.0 | 187,517 |
| 2141 | 286,309 | 620,463 | 3,182 | 48 | 0.5 | 0.4 | 0.61 | 145 | 0.0075 | 167 | 0.094 | 0.86 | 2.8 | 9.3 | 0.79 | 80 | 14,989 | 3.5 | 0.00093 | 9.6 | 2.8 | 51 | 4,555 | 10 | 531 | 0.0068 | 250,649 | 256 | 0.0069 | 0.093 | 3.1 | 0.41 | 1.8 | 492 | 11 | 2.0 | 186,898 |
| 2142 | 285,025 | 623,257 | 3,182 | 48 | 0.5 | 0.4 | 0.61 | 145 | 0.0075 | 166 | 0.094 | 0.84 | 2.7 | 9.3 | 0.78 | 80 | 15,070 | 3.4 | 0.00093 | 9.6 | 2.8 | 51 | 4,554 | 10.0 | 531 | 0.0068 | 250,525 | 256 | 0.0068 | 0.093 | 3.0 | 0.41 | 1.8 | 492 | 11 | 2.0 | 186,889 |
| 2143 | 283,564 | 627,204 | 3,182 | 48 | 0.5 | 0.4 | 0.62 | 145 | 0.0075 | 165 | 0.094 | 0.84 | 2.7 | 9.4 | 0.77 | 80 | 15,161 | 3.4 | 0.00094 | 9.5 | 2.8 | 51 | 4,554 | 9.9 | 531 | 0.0068 | 250,553 | 256 | 0.0068 | 0.094 | 3.0 | 0.41 | 1.7 | 493 | 11 | 2.0 | 187,035 |
| 2144 | 283,034 | 631,917 | 3,182 | 49 | 0.5 | 0.39 | 0.62 | 145 | 0.0075 | 164 | 0.094 | 0.82 | 2.7 | 9.4 | 0.75 | 80 | 15,311 | 3.3 | 0.00094 | 9.5 | 2.7 | 51 | 4,555 | 9.7 | 531 | 0.0068 | 251,094 | 256 | 0.0068 | 0.094 | 3.0 | 0.41 | 1.7 | 495 | 11 | 2.0 | 187,551 |
| 2145 | 280,847 | 633,211 | 3,183 | 49 | 0.5 | 0.39 | 0.62 | 145 | 0.0075 | 163 | 0.094 | 0.81 | 2.7 | 9.4 | 0.74 | 80 | 15,352 | 3.3 | 0.00094 | 9.5 | 2.7 | 51 | 4,555 | 9.6 | 531 | 0.0067 | 250,270 | 256 | 0.0068 | 0.094 | 3.0 | 0.41 | 1.7 | 493 | 11 | 2.0 | 187,020 |
| 2146 | 279,837 | 635,834 | 3,182 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0075 | 162 | 0.094 | 0.79 | 2.7 | 9.4 | 0.72 | 80 | 15,458 | 3.2 | 0.00094 | 9.4 | 2.6 | 51 | 4,555 | 9.3 | 531 | 0.0067 | 250,203 | 256 | 0.0067 | 0.094 | 3.0 | 0.4 | 1.6 | 492 | 11 | 2.0 | 187,082 |
| 2147 | 278,890 | 638,693 | 3,183 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0075 | 161 | 0.094 | 0.78 | 2.7 | 9.4 | 0.72 | 80 | 15,545 | 3.2 | 0.00094 | 9.4 | 2.6 | 51 | 4,555 | 9.2 | 531 | 0.0067 | 250,228 | 256 | 0.0067 | 0.094 | 3.0 | 0.4 | 1.6 | 488 | 11 | 2.0 | 187,212 |
| 2148 | 278,629 | 642,477 | 3,183 | 50 | 0.49 | 0.37 | 0.64 | 145 | 0.0076 | 161 | 0.094 | 0.76 | 2.7 | 9.4 | 0.7 | 80 | 15,681 | 3.1 | 0.00094 | 9.4 | 2.5 | 51 | 4,555 | 9.0 | 531 | 0.0067 | 250,723 | 256 | 0.0067 | 0.094 | 3.0 | 0.4 | 1.6 | 485 | 11 | 2.0 | 187,667 |
| 2149 | 276,730 | 642,673 | 3,183 | 50 | 0.49 | 0.37 | 0.64 | 145 | 0.0075 | 159 | 0.094 | 0.75 | 2.7 | 9.4 | 0.69 | 80 | 15,708 | 3.0 | 0.00094 | 9.3 | 2.5 | 51 | 4,555 | 8.8 | 531 | 0.0066 | 249,798 | 256 | 0.0067 | 0.094 | 3.0 | 0.4 | 1.6 | 469 | 11 | 2.0 | 187,030 |
| 2150 | 275,915 | 644,201 | 3,183 | 50 | 0.49 | 0.36 | 0.64 | 145 | 0.0075 | 159 | 0.094 | 0.73 | 2.6 | 9.3 | 0.67 | 80 | 15,786 | 3.0 | 0.00093 | 9.3 | 2.4 | 51 | 4,555 | 8.6 | 531 | 0.0066 | 249,606 | 256 | 0.0066 | 0.093 | 2.9 | 0.4 | 1.5 | 458 | 11 | 2.0 | 186,985 |

**Table A5.** Source terms of the NAG backfill for the well graded cover system and no internal layer scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| 2023 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2024 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2025 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2026 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2027 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2028 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2029 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2030 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2031 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2032 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2033 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2034 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2035 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2036 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2037 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2038 | 8.0 | 1,210 | 94 | 29 | 0.012 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.0005 |
| 2039 | 8.1 | 1,310 | 236 | 29 | 0.015 | 0.0023 | 0.0013 | 0.0023 | 1.3 | 0.00005 | 31 | 0.0005 |
| 2040 | 8.2 | 1,513 | 481 | 29 | 0.018 | 0.0027 | 0.0015 | 0.0022 | 1.3 | 0.00005 | 31 | 0.0005 |
| 2041 | 8.4 | 1,702 | 763 | 29 | 0.027 | 0.003 | 0.0016 | 0.0022 | 1.3 | 0.00005 | 14 | 0.00051 |
| 2042 | 8.5 | 1,410 | 794 | 25 | 0.029 | 0.0025 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.0005 |
| 2043 | 8.4 | 1,372 | 781 | 24 | 0.029 | 0.0024 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.0005 |
| 2044 | 8.4 | 1,350 | 759 | 23 | 0.028 | 0.0024 | 0.0014 | 0.0024 | 1.1 | 0.00005 | 12 | 0.0005 |
| 2045 | 8.5 | 1,399 | 790 | 24 | 0.029 | 0.0025 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.0005 |
| 2046 | 8.5 | 1,457 | 802 | 25 | 0.029 | 0.0026 | 0.0016 | 0.0023 | 1.1 | 0.00005 | 12 | 0.0005 |
| 2047 | 8.5 | 1,577 | 824 | 25 | 0.03 | 0.0028 | 0.0017 | 0.0022 | 1.1 | 0.00005 | 12 | 0.0005 |
| 2048 | 8.5 | 1,714 | 862 | 24 | 0.03 | 0.003 | 0.0019 | 0.0022 | 1.1 | 0.00005 | 11 | 0.00051 |
| 2049 | 8.5 | 1,776 | 894 | 24 | 0.031 | 0.0031 | 0.0021 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00053 |
| 2050 | 8.5 | 1,804 | 902 | 24 | 0.031 | 0.0032 | 0.0022 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00054 |
| 2051 | 8.5 | 1,817 | 904 | 24 | 0.032 | 0.0032 | 0.0022 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00055 |
| 2052 | 8.5 | 1,827 | 904 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00055 |
| 2053 | 8.5 | 1,837 | 905 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00055 |
| 2054 | 8.5 | 1,841 | 904 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00055 |
| 2055 | 8.5 | 1,852 | 903 | 23 | 0.031 | 0.0033 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.00056 |
| 2056 | 8.6 | 1,808 | 1,102 | 23 | 0.039 | 0.0032 | 0.0023 | 0.0022 | 1.1 | 0.00005 | 7.4 | 0.00054 |
| 2057 | 8.7 | 1,730 | 1,422 | 23 | 0.052 | 0.0031 | 0.0022 | 0.0023 | 1.1 | 0.00005 | 4.6 | 0.00052 |
| 2058 | 8.7 | 1,684 | 1,604 | 23 | 0.059 | 0.003 | 0.0021 | 0.0024 | 1.1 | 0.00005 | 3.7 | 0.00051 |
| 2059 | 8.7 | 1,672 | 1,665 | 23 | 0.062 | 0.0029 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.0005 |
| 2060 | 8.7 | 1,671 | 1,678 | 23 | 0.063 | 0.0029 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.0005 |
| 2061 | 8.7 | 1,674 | 1,676 | 23 | 0.062 | 0.003 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.0005 |
| 2062 | 8.8 | 1,663 | 1,745 | 23 | 0.071 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 3.1 | 0.0005 |
| 2063 | 8.8 | 1,642 | 1,818 | 22 | 0.078 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 2.8 | 0.0005 |
| 2064 | 8.8 | 1,637 | 1,831 | 22 | 0.077 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 2.8 | 0.0005 |
| 2065 | 8.9 | 1,636 | 1,903 | 22 | 0.095 | 0.0029 | 0.0019 | 0.0026 | 1.0 | 0.00005 | 2.3 | 0.0005 |
| 2066 | 8.9 | 1,609 | 1,989 | 22 | 0.11 | 0.0028 | 0.0019 | 0.0026 | 1.0 | 0.00005 | 2.1 | 0.0005 |
| 2067 | 8.9 | 1,589 | 2,048 | 22 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 1. | 0.00005 | 2.0 | 0.0005 |
| 2068 | 8.9 | 1,583 | 2,077 | 22 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.99 | 0.00005 | 1.9 | 0.0005 |
| 2069 | 8.9 | 1,580 | 2,097 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.98 | 0.00005 | 1.9 | 0.0005 |
| 2070 | 8.9 | 1,584 | 2,098 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.97 | 0.00005 | 2.0 | 0.0005 |
| 2071 | 8.9 | 1,584 | 2,100 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.96 | 0.00005 | 2.0 | 0.0005 |
| 2072 | 8.9 | 1,599 | 2,104 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.96 | 0.00005 | 1.9 | 0.0005 |
| 2073 | 8.9 | 1,607 | 2,100 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.95 | 0.00005 | 2.0 | 0.0005 |
| 2074 | 8.9 | 1,614 | 2,090 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0026 | 0.95 | 0.00005 | 2.0 | 0.0005 |
| 2075 | 8.9 | 1,623 | 2,079 | 21 | 0.1 | 0.0029 | 0.0019 | 0.0026 | 0.94 | 0.00005 | 2.1 | 0.0005 |
| 2076 | 8.9 | 1,649 | 2,089 | 20 | 0.11 | 0.0029 | 0.002 | 0.0026 | 0.94 | 0.00005 | 2.0 | 0.0005 |
| 2077 | 8.9 | 1,665 | 2,084 | 20 | 0.11 | 0.0029 | 0.002 | 0.0026 | 0.93 | 0.00005 | 2.0 | 0.0005 |
| 2078 | 8.9 | 1,680 | 2,077 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.93 | 0.00005 | 2.0 | 0.00051 |
| 2079 | 8.9 | 1,690 | 2,084 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.92 | 0.00005 | 2.0 | 0.00051 |
| 2080 | 8.9 | 1,698 | 2,096 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.92 | 0.00005 | 2.0 | 0.00051 |
| 2081 | 8.9 | 1,710 | 2,094 | 20 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 2.0 | 0.00051 |
| 2082 | 9.0 | 1,705 | 2,131 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 1.9 | 0.00051 |
| 2083 | 9.0 | 1,694 | 2,170 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 1.9 | 0.00051 |
| 2084 | 9.0 | 1,698 | 2,185 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.9 | 0.00005 | 1.8 | 0.00051 |
| 2085 | 9.0 | 1,691 | 2,205 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.9 | 0.00005 | 1.8 | 0.00051 |
| 2086 | 9.0 | 1,695 | 2,213 | 20 | 0.12 | 0.003 | 0.0023 | 0.0026 | 0.89 | 0.00005 | 1.9 | 0.00051 |
| 2087 | 8.9 | 1,689 | 2,225 | 19 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.89 | 0.00005 | 1.9 | 0.00051 |
| 2088 | 9.0 | 1,701 | 2,239 | 19 | 0.12 | 0.003 | 0.0023 | 0.0026 | 0.88 | 0.00005 | 1.8 | 0.00051 |
| 2089 | 9.0 | 1,669 | 2,284 | 19 | 0.13 | 0.0029 | 0.0022 | 0.0027 | 0.88 | 0.00005 | 1.7 | 0.0005 |
| 2090 | 9.0 | 1,663 | 2,317 | 19 | 0.14 | 0.0029 | 0.0022 | 0.0027 | 0.88 | 0.00005 | 1.6 | 0.0005 |
| 2091 | 9.0 | 1,660 | 2,334 | 19 | 0.14 | 0.0029 | 0.0022 | 0.0027 | 0.87 | 0.00005 | 1.6 | 0.0005 |
| 2092 | 9.0 | 1,661 | 2,350 | 19 | 0.14 | 0.0029 | 0.0022 | 0.0027 | 0.87 | 0.00005 | 1.6 | 0.0005 |
| 2093 | 9.0 | 1,647 | 2,390 | 19 | 0.14 | 0.0029 | 0.0021 | 0.0027 | 0.86 | 0.00005 | 1.5 | 0.0005 |
| 2094 | 9.0 | 1,626 | 2,440 | 19 | 0.15 | 0.0029 | 0.0021 | 0.0028 | 0.86 | 0.00005 | 1.5 | 0.0005 |
| 2095 | 9.0 | 1,612 | 2,458 | 19 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.86 | 0.00005 | 1.5 | 0.0005 |
| 2096 | 9.0 | 1,592 | 2,486 | 19 | 0.15 | 0.0028 | 0.002 | 0.0028 | 0.85 | 0.00005 | 1.4 | 0.0005 |
| 2097 | 9.0 | 1,592 | 2,493 | 19 | 0.15 | 0.0028 | 0.002 | 0.0028 | 0.85 | 0.00005 | 1.5 | 0.0005 |
| 2098 | 9.0 | 1,588 | 2,509 | 18 | 0.14 | 0.0028 | 0.002 | 0.0028 | 0.85 | 0.00005 | 1.5 | 0.0005 |
| 2099 | 9.0 | 1,591 | 2,511 | 18 | 0.14 | 0.0028 | 0.002 | 0.0028 | 0.84 | 0.00005 | 1.5 | 0.0005 |
| 2100 | 9.0 | 1,600 | 2,533 | 18 | 0.15 | 0.0028 | 0.002 | 0.0028 | 0.84 | 0.00005 | 1.4 | 0.0005 |
| 2101 | 9.0 | 1,608 | 2,535 | 18 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.4 | 0.0005 |
| 2102 | 9.0 | 1,611 | 2,543 | 18 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.4 | 0.0005 |
| 2103 | 9.1 | 1,636 | 2,558 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.4 | 0.0005 |
| 2104 | 9.1 | 1,648 | 2,566 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.82 | 0.00005 | 1.4 | 0.0005 |
| 2105 | 9.1 | 1,638 | 2,583 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.82 | 0.00005 | 1.4 | 0.0005 |
| 2106 | 9.1 | 1,607 | 2,630 | 18 | 0.17 | 0.0028 | 0.0021 | 0.0029 | 0.82 | 0.00005 | 1.3 | 0.0005 |
| 2107 | 9.1 | 1,601 | 2,660 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.3 | 0.0005 |
| 2108 | 9.1 | 1,605 | 2,683 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.2 | 0.0005 |
| 2109 | 9.1 | 1,608 | 2,701 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.2 | 0.0005 |
| 2110 | 9.1 | 1,617 | 2,716 | 18 | 0.18 | 0.0029 | 0.0021 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.0005 |
| 2111 | 9.1 | 1,624 | 2,728 | 18 | 0.18 | 0.0029 | 0.0021 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.0005 |
| 2112 | 9.1 | 1,637 | 2,738 | 17 | 0.18 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.0005 |
| 2113 | 9.1 | 1,643 | 2,745 | 17 | 0.18 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.0005 |
| 2114 | 9.1 | 1,659 | 2,750 | 17 | 0.17 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.3 | 0.0005 |
| 2115 | 9.1 | 1,664 | 2,756 | 17 | 0.17 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.3 | 0.0005 |
| 2116 | 9.1 | 1,679 | 2,757 | 17 | 0.17 | 0.003 | 0.0023 | 0.0028 | 0.79 | 0.00005 | 1.3 | 0.0005 |
| 2117 | 9.1 | 1,681 | 2,760 | 17 | 0.17 | 0.003 | 0.0023 | 0.0028 | 0.79 | 0.00005 | 1.3 | 0.00051 |
| 2118 | 9.1 | 1,680 | 2,785 | 17 | 0.17 | 0.003 | 0.0023 | 0.0028 | 0.79 | 0.00005 | 1.3 | 0.0005 |
| 2119 | 9.1 | 1,670 | 2,818 | 17 | 0.18 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.0005 |
| 2120 | 9.1 | 1,673 | 2,831 | 17 | 0.18 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.0005 |
| 2121 | 9.1 | 1,673 | 2,865 | 17 | 0.19 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.0005 |
| 2122 | 9.1 | 1,658 | 2,907 | 17 | 0.2 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.1 | 0.0005 |
| 2123 | 9.1 | 1,635 | 2,964 | 17 | 0.21 | 0.0029 | 0.0023 | 0.003 | 0.79 | 0.00005 | 1.1 | 0.0005 |
| 2124 | 9.1 | 1,627 | 2,986 | 17 | 0.22 | 0.0029 | 0.0023 | 0.003 | 0.78 | 0.00005 | 1.1 | 0.0005 |
| 2125 | 9.2 | 1,611 | 3,023 | 17 | 0.22 | 0.0028 | 0.0023 | 0.003 | 0.78 | 0.00005 | 1.0 | 0.0005 |
| 2126 | 9.2 | 1,606 | 3,038 | 17 | 0.22 | 0.0028 | 0.0023 | 0.003 | 0.78 | 0.00005 | 1.0 | 0.0005 |
| 2127 | 9.2 | 1,594 | 3,069 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 1.0 | 0.0005 |
| 2128 | 9.2 | 1,590 | 3,086 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 1.0 | 0.0005 |
| 2129 | 9.2 | 1,583 | 3,110 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.99 | 0.0005 |
| 2130 | 9.2 | 1,580 | 3,122 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.99 | 0.0005 |
| 2131 | 9.2 | 1,576 | 3,143 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.98 | 0.0005 |
| 2132 | 9.2 | 1,575 | 3,152 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.98 | 0.0005 |
| 2133 | 9.2 | 1,575 | 3,169 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 |
| 2134 | 9.2 | 1,575 | 3,175 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 |

| Model Year | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| 2023 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2024 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2025 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2026 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2027 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2028 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2029 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2030 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2031 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2032 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2033 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2034 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2035 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2036 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2037 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2038 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 |
| 2039 | 0.0059 | 0.004 | 0.05 | 0.00032 | 0.72 | 23 | 0.035 | 0.000005 | 0.044 | 0.0082 | 0.46 | 41 | 0.11 | 4.8 | 0.000031 |
| 2040 | 0.0065 | 0.004 | 0.05 | 0.00088 | 0.72 | 28 | 0.037 | 0.000005 | 0.051 | 0.01 | 0.46 | 41 | 0.12 | 4.8 | 0.000035 |
| 2041 | 0.0055 | 0.0059 | 0.05 | 0.0017 | 0.72 | 33 | 0.029 | 0.000005 | 0.057 | 0.011 | 0.46 | 41 | 0.093 | 4.8 | 0.000036 |
| 2042 | 0.003 | 0.0082 | 0.05 | 0.002 | 0.62 | 28 | 0.014 | 0.000005 | 0.047 | 0.008 | 0.39 | 35 | 0.041 | 4.1 | 0.000034 |
| 2043 | 0.0026 | 0.0081 | 0.05 | 0.002 | 0.59 | 28 | 0.012 | 0.000005 | 0.046 | 0.0077 | 0.38 | 34 | 0.034 | 4.0 | 0.000033 |
| 2044 | 0.0026 | 0.008 | 0.05 | 0.002 | 0.58 | 27 | 0.011 | 0.000005 | 0.045 | 0.0075 | 0.37 | 33 | 0.033 | 3.9 | 0.000032 |
| 2045 | 0.0028 | 0.0082 | 0.05 | 0.002 | 0.59 | 28 | 0.012 | 0.000005 | 0.047 | 0.0079 | 0.38 | 34 | 0.037 | 4.0 | 0.000034 |
| 2046 | 0.0032 | 0.0083 | 0.05 | 0.0023 | 0.62 | 29 | 0.014 | 0.000005 | 0.049 | 0.009 | 0.39 | 35 | 0.042 | 4.1 | 0.000035 |
| 2047 | 0.0035 | 0.0084 | 0.05 | 0.0029 | 0.62 | 31 | 0.015 | 0.000005 | 0.053 | 0.011 | 0.4 | 35 | 0.043 | 4.1 | 0.000038 |
| 2048 | 0.004 | 0.0087 | 0.05 | 0.0034 | 0.61 | 34 | 0.017 | 0.000005 | 0.058 | 0.013 | 0.39 | 35 | 0.05 | 4.1 | 0.000041 |
| 2049 | 0.0045 | 0.0089 | 0.05 | 0.0038 | 0.61 | 35 | 0.019 | 0.000005 | 0.06 | 0.014 | 0.39 | 35 | 0.056 | 4.0 | 0.000043 |
| 2050 | 0.0047 | 0.009 | 0.05 | 0.0042 | 0.6 | 36 | 0.02 | 0.000005 | 0.061 | 0.015 | 0.38 | 34 | 0.058 | 4.0 | 0.000043 |
| 2051 | 0.0048 | 0.009 | 0.05 | 0.0043 | 0.59 | 36 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.38 | 34 | 0.058 | 4.0 | 0.000044 |
| 2052 | 0.0048 | 0.009 | 0.05 | 0.0045 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.38 | 34 | 0.057 | 3.9 | 0.000044 |
| 2053 | 0.0049 | 0.009 | 0.05 | 0.0046 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.38 | 34 | 0.057 | 3.9 | 0.000044 |
| 2054 | 0.0049 | 0.009 | 0.05 | 0.0047 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.37 | 33 | 0.057 | 3.9 | 0.000044 |
| 2055 | 0.005 | 0.009 | 0.05 | 0.0048 | 0.58 | 36 | 0.02 | 0.000005 | 0.062 | 0.017 | 0.37 | 33 | 0.058 | 3.9 | 0.000044 |
| 2056 | 0.0048 | 0.01 | 0.05 | 0.0046 | 0.58 | 38 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.37 | 33 | 0.057 | 3.8 | 0.000043 |
| 2057 | 0.0044 | 0.013 | 0.05 | 0.0042 | 0.58 | 41 | 0.018 | 0.000005 | 0.058 | 0.015 | 0.37 | 33 | 0.052 | 3.8 | 0.000041 |
| 2058 | 0.0042 | 0.015 | 0.05 | 0.0039 | 0.58 | 42 | 0.017 | 0.000005 | 0.057 | 0.014 | 0.37 | 33 | 0.049 | 3.8 | 0.00004 |
| 2059 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 43 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.37 | 33 | 0.048 | 3.8 | 0.00004 |
| 2060 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 43 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.36 | 33 | 0.048 | 3.8 | 0.00004 |
| 2061 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 44 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.36 | 33 | 0.049 | 3.8 | 0.00004 |
| 2062 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 44 | 0.017 | 0.000005 | 0.056 | 0.013 | 0.36 | 32 | 0.049 | 3.8 | 0.00004 |
| 2063 | 0.004 | 0.014 | 0.05 | 0.0036 | 0.56 | 45 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.36 | 32 | 0.048 | 3.7 | 0.000039 |
| 2064 | 0.004 | 0.014 | 0.05 | 0.0036 | 0.56 | 45 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.36 | 32 | 0.046 | 3.7 | 0.000039 |
| 2065 | 0.004 | 0.014 | 0.05 | 0.0035 | 0.56 | 46 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.35 | 32 | 0.046 | 3.7 | 0.000039 |
| 2066 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.55 | 47 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.35 | 31 | 0.045 | 3.7 | 0.000039 |
| 2067 | 0.0039 | 0.013 | 0.05 | 0.0033 | 0.55 | 47 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.35 | 31 | 0.045 | 3.6 | 0.000038 |
| 2068 | 0.0038 | 0.013 | 0.05 | 0.0033 | 0.54 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 31 | 0.045 | 3.6 | 0.000038 |
| 2069 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.54 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 31 | 0.045 | 3.6 | 0.000038 |
| 2070 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.53 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 30 | 0.046 | 3.5 | 0.000038 |
| 2071 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.53 | 49 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 30 | 0.045 | 3.5 | 0.000038 |
| 2072 | 0.0038 | 0.013 | 0.05 | 0.0033 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.33 | 30 | 0.046 | 3.5 | 0.000038 |
| 2073 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.33 | 30 | 0.046 | 3.5 | 0.000038 |
| 2074 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.33 | 30 | 0.047 | 3.5 | 0.000039 |
| 2075 | 0.004 | 0.014 | 0.05 | 0.0035 | 0.52 | 49 | 0.017 | 0.000005 | 0.055 | 0.013 | 0.33 | 30 | 0.048 | 3.4 | 0.000039 |
| 2076 | 0.0041 | 0.014 | 0.05 | 0.0036 | 0.51 | 50 | 0.017 | 0.000005 | 0.056 | 0.013 | 0.33 | 29 | 0.05 | 3.4 | 0.000039 |
| 2077 | 0.0043 | 0.014 | 0.05 | 0.0038 | 0.51 | 50 | 0.018 | 0.000005 | 0.056 | 0.014 | 0.33 | 29 | 0.052 | 3.4 | 0.00004 |
| 2078 | 0.0044 | 0.014 | 0.05 | 0.0039 | 0.51 | 50 | 0.018 | 0.000005 | 0.057 | 0.014 | 0.32 | 29 | 0.054 | 3.4 | 0.00004 |
| 2079 | 0.0046 | 0.014 | 0.05 | 0.004 | 0.51 | 50 | 0.019 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.055 | 3.4 | 0.00004 |
| 2080 | 0.0047 | 0.014 | 0.05 | 0.0041 | 0.5 | 50 | 0.02 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.057 | 3.3 | 0.000041 |
| 2081 | 0.0048 | 0.014 | 0.05 | 0.0042 | 0.5 | 51 | 0.02 | 0.000005 | 0.058 | 0.015 | 0.32 | 29 | 0.059 | 3.3 | 0.000041 |
| 2082 | 0.0049 | 0.014 | 0.05 | 0.0043 | 0.5 | 51 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.32 | 28 | 0.06 | 3.3 | 0.000041 |
| 2083 | 0.0049 | 0.014 | 0.05 | 0.0043 | 0.5 | 52 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.32 | 28 | 0.06 | 3.3 | 0.000041 |
| 2084 | 0.005 | 0.014 | 0.05 | 0.0044 | 0.49 | 52 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.061 | 3.3 | 0.000041 |
| 2085 | 0.005 | 0.014 | 0.05 | 0.0044 | 0.49 | 52 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.061 | 3.3 | 0.00004 |
| 2086 | 0.0051 | 0.015 | 0.05 | 0.0045 | 0.49 | 53 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.061 | 3.3 | 0.000041 |
| 2087 | 0.005 | 0.014 | 0.05 | 0.0044 | 0.49 | 53 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.061 | 3.2 | 0.00004 |
| 2088 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.48 | 54 | 0.021 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.061 | 3.2 | 0.000041 |
| 2089 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.48 | 54 | 0.02 | 0.000005 | 0.056 | 0.015 | 0.31 | 28 | 0.057 | 3.2 | 0.00004 |
| 2090 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.48 | 54 | 0.019 | 0.000005 | 0.056 | 0.015 | 0.31 | 27 | 0.057 | 3.2 | 0.00004 |
| 2091 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.48 | 55 | 0.019 | 0.000005 | 0.056 | 0.015 | 0.31 | 27 | 0.056 | 3.2 | 0.00004 |
| 2092 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.48 | 55 | 0.019 | 0.000005 | 0.056 | 0.015 | 0.3 | 27 | 0.056 | 3.2 | 0.00004 |
| 2093 | 0.0046 | 0.014 | 0.05 | 0.0041 | 0.47 | 56 | 0.019 | 0.000005 | 0.055 | 0.015 | 0.3 | 27 | 0.056 | 3.2 | 0.000039 |
| 2094 | 0.0046 | 0.014 | 0.05 | 0.0041 | 0.47 | 57 | 0.019 | 0.000005 | 0.055 | 0.015 | 0.3 | 27 | 0.055 | 3.1 | 0.000039 |
| 2095 | 0.0045 | 0.014 | 0.05 | 0.0039 | 0.47 | 57 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.3 | 27 | 0.054 | 3.1 | 0.000039 |
| 2096 | 0.0044 | 0.014 | 0.05 | 0.0038 | 0.47 | 57 | 0.018 | 0.000005 | 0.054 | 0.014 | 0.3 | 27 | 0.053 | 3.1 | 0.000038 |
| 2097 | 0.0044 | 0.014 | 0.05 | 0.0038 | 0.47 | 58 | 0.018 | 0.000005 | 0.054 | 0.014 | 0.3 | 27 | 0.054 | 3.1 | 0.000038 |
| 2098 | 0.0044 | 0.014 | 0.05 | 0.0038 | 0.46 | 58 | 0.018 | 0.000005 | 0.053 | 0.014 | 0.3 | 26 | 0.054 | 3.1 | 0.000038 |
| 2099 | 0.0044 | 0.014 | 0.05 | 0.0038 | 0.46 | 58 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.054 | 3.1 | 0.000038 |
| 2100 | 0.0045 | 0.014 | 0.05 | 0.0038 | 0.46 | 59 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.055 | 3.1 | 0.000038 |
| 2101 | 0.0045 | 0.014 | 0.05 | 0.0039 | 0.46 | 59 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.056 | 3.0 | 0.000038 |
| 2102 | 0.0046 | 0.014 | 0.05 | 0.0039 | 0.45 | 60 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.056 | 3.0 | 0.000039 |
| 2103 | 0.0047 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.058 | 3.0 | 0.000039 |
| 2104 | 0.0048 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.059 | 3.0 | 0.000039 |
| 2105 | 0.0047 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.059 | 3.0 | 0.000039 |
| 2106 | 0.0046 | 0.014 | 0.05 | 0.0038 | 0.45 | 62 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.28 | 26 | 0.057 | 3.0 | 0.000038 |
| 2107 | 0.0046 | 0.014 | 0.05 | 0.0038 | 0.45 | 62 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 25 | 0.057 | 3.0 | 0.000038 |
| 2108 | 0.0047 | 0.014 | 0.05 | 0.0039 | 0.44 | 63 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 25 | 0.058 | 2.9 | 0.000038 |
| 2109 | 0.0047 | 0.014 | 0.05 | 0.0039 | 0.44 | 63 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.28 | 25 | 0.059 | 2.9 | 0.000038 |
| 2110 | 0.0048 | 0.014 | 0.05 | 0.004 | 0.44 | 64 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.28 | 25 | 0.06 | 2.9 | 0.000039 |
| 2111 | 0.0049 | 0.014 | 0.05 | 0.004 | 0.44 | 65 | 0.021 | 0.000005 | 0.055 | 0.015 | 0.28 | 25 | 0.061 | 2.9 | 0.000039 |
| 2112 | 0.005 | 0.014 | 0.05 | 0.0041 | 0.44 | 65 | 0.021 | 0.000005 | 0.055 | 0.015 | 0.28 | 25 | 0.062 | 2.9 | 0.000039 |
| 2113 | 0.005 | 0.014 | 0.05 | 0.0042 | 0.44 | 66 | 0.022 | 0.000005 | 0.055 | 0.016 | 0.28 | 25 | 0.063 | 2.9 | 0.000039 |
| 2114 | 0.0052 | 0.014 | 0.05 | 0.0043 | 0.44 | 66 | 0.022 | 0.000005 | 0.056 | 0.016 | 0.28 | 25 | 0.065 | 2.9 | 0.00004 |
| 2115 | 0.0052 | 0.014 | 0.05 | 0.0043 | 0.44 | 67 | 0.022 | 0.000005 | 0.056 | 0.016 | 0.28 | 25 | 0.065 | 2.9 | 0.00004 |
| 2116 | 0.0053 | 0.014 | 0.05 | 0.0044 | 0.43 | 67 | 0.023 | 0.000005 | 0.057 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 |
| 2117 | 0.0053 | 0.014 | 0.05 | 0.0045 | 0.43 | 67 | 0.023 | 0.000005 | 0.057 | 0.017 | 0.28 | 25 | 0.066 | 2.9 | 0.00004 |
| 2118 | 0.0054 | 0.014 | 0.05 | 0.0045 | 0.43 | 68 | 0.023 | 0.000005 | 0.057 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 |
| 2119 | 0.0054 | 0.014 | 0.05 | 0.0045 | 0.43 | 68 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.066 | 2.9 | 0.00004 |
| 2120 | 0.0054 | 0.014 | 0.05 | 0.0046 | 0.43 | 69 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 |
| 2121 | 0.0054 | 0.014 | 0.05 | 0.0046 | 0.43 | 69 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.066 | 2.9 | 0.00004 |
| 2122 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 70 | 0.022 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.066 | 2.9 | 0.00004 |
| 2123 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 71 | 0.022 | 0.000005 | 0.055 | 0.017 | 0.27 | 25 | 0.065 | 2.9 | 0.000039 |
| 2124 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 71 | 0.022 | 0.000005 | 0.055 | 0.017 | 0.27 | 25 | 0.065 | 2.9 | 0.000039 |
| 2125 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 72 | 0.022 | 0.000005 | 0.054 | 0.017 | 0.27 | 25 | 0.064 | 2.9 | 0.000039 |
| 2126 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 72 | 0.022 | 0.000005 | 0.054 | 0.017 | 0.27 | 24 | 0.064 | 2.9 | 0.000038 |
| 2127 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 73 | 0.021 | 0.000005 | 0.054 | 0.017 | 0.27 | 24 | 0.062 | 2.9 | 0.000038 |
| 2128 | 0.0051 | 0.015 | 0.05 | 0.0046 | 0.43 | 73 | 0.021 | 0.000005 | 0.054 | 0.017 | 0.27 | 24 | 0.062 | 2.8 | 0.000038 |
| 2129 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.43 | 74 | 0.021 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.061 | 2.9 | 0.000038 |
| 2130 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.43 | 75 | 0.021 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.06 | 2.9 | 0.000038 |
| 2131 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 75 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.059 | 2.9 | 0.000038 |
| 2132 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 76 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.058 | 2.8 | 0.000038 |
| 2133 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 76 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.058 | 2.9 | 0.000038 |
| 2134 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 77 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 |

| Model Year | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | m³/year |
| 2023 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 24 |
| 2024 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 44 |
| 2025 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 80 |
| 2026 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 125 |
| 2027 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 158 |
| 2028 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 289 |
| 2029 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 270 |
| 2030 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 348 |
| 2031 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 2,236 |
| 2032 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 3,634 |
| 2033 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 620 |
| 2034 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 2,492 |
| 2035 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 7,085 |
| 2036 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 12,083 |
| 2037 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 13,464 |
| 2038 | 528 | 2.3 | 0.000029 | 0.0005 | 0.013 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 26,952 |
| 2039 | 600 | 2.3 | 0.000031 | 0.0005 | 0.014 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 45,912 |
| 2040 | 744 | 2.3 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 65 | 8.3 | 1.5 | 79,056 |
| 2041 | 909 | 2.3 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 44 | 5.5 | 1.0 | 110,907 |
| 2042 | 788 | 2.0 | 0.000034 | 0.0005 | 0.015 | 0.005 | 0.01 | 12 | 1.5 | 0.26 | 128,839 |
| 2043 | 768 | 1.9 | 0.000033 | 0.0005 | 0.015 | 0.005 | 0.01 | 6.7 | 0.84 | 0.15 | 133,866 |
| 2044 | 753 | 1.9 | 0.000032 | 0.0005 | 0.014 | 0.005 | 0.01 | 6.5 | 0.83 | 0.15 | 136,575 |
| 2045 | 783 | 1.9 | 0.000034 | 0.0005 | 0.015 | 0.005 | 0.01 | 7.9 | 1. | 0.18 | 133,758 |
| 2046 | 811 | 2.0 | 0.000035 | 0.0005 | 0.016 | 0.005 | 0.01 | 9.4 | 1.2 | 0.21 | 128,763 |
| 2047 | 870 | 2.0 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.9 | 0.75 | 0.14 | 128,089 |
| 2048 | 939 | 2.0 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.6 | 0.71 | 0.13 | 129,793 |
| 2049 | 975 | 1.9 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 6.2 | 0.78 | 0.14 | 131,172 |
| 2050 | 989 | 1.9 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 5.2 | 0.66 | 0.12 | 132,811 |
| 2051 | 995 | 1.9 | 0.000044 | 0.0005 | 0.019 | 0.005 | 0.01 | 4.0 | 0.51 | 0.093 | 133,964 |
| 2052 | 1,000 | 1.9 | 0.000044 | 0.0005 | 0.02 | 0.005 | 0.01 | 2.6 | 0.33 | 0.059 | 135,076 |
| 2053 | 1,004 | 1.9 | 0.000044 | 0.0005 | 0.02 | 0.005 | 0.01 | 1.4 | 0.18 | 0.032 | 135,145 |
| 2054 | 1,006 | 1.9 | 0.000044 | 0.0005 | 0.02 | 0.005 | 0.01 | 1.0 | 0.13 | 0.024 | 135,795 |
| 2055 | 1,011 | 1.9 | 0.000045 | 0.0005 | 0.02 | 0.005 | 0.011 | 1.1 | 0.13 | 0.024 | 136,601 |
| 2056 | 1,036 | 1.9 | 0.000043 | 0.0005 | 0.019 | 0.005 | 0.01 | 1.2 | 0.15 | 0.028 | 137,639 |
| 2057 | 1,071 | 1.9 | 0.000042 | 0.0005 | 0.018 | 0.005 | 0.01 | 1.4 | 0.18 | 0.032 | 137,940 |
| 2058 | 1,088 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 1.6 | 0.2 | 0.037 | 138,218 |
| 2059 | 1,095 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 1.9 | 0.24 | 0.043 | 138,460 |
| 2060 | 1,097 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.2 | 0.27 | 0.05 | 139,518 |
| 2061 | 1,098 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.5 | 0.31 | 0.057 | 139,838 |
| 2062 | 1,108 | 1.8 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 2.8 | 0.36 | 0.065 | 140,676 |
| 2063 | 1,114 | 1.8 | 0.000039 | 0.0005 | 0.018 | 0.005 | 0.01 | 3.2 | 0.41 | 0.074 | 141,568 |
| 2064 | 1,114 | 1.8 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.6 | 0.46 | 0.083 | 142,789 |
| 2065 | 1,129 | 1.8 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.0 | 0.51 | 0.093 | 143,409 |
| 2066 | 1,135 | 1.8 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.5 | 0.57 | 0.1 | 144,573 |
| 2067 | 1,138 | 1.8 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.9 | 0.62 | 0.11 | 145,722 |
| 2068 | 1,140 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.3 | 0.68 | 0.12 | 147,284 |
| 2069 | 1,142 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.7 | 0.72 | 0.13 | 148,041 |
| 2070 | 1,144 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.8 | 0.74 | 0.13 | 149,328 |
| 2071 | 1,144 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.5 | 0.7 | 0.13 | 150,505 |
| 2072 | 1,152 | 1.7 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.0 | 0.63 | 0.12 | 151,916 |
| 2073 | 1,154 | 1.7 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.6 | 0.58 | 0.11 | 152,292 |
| 2074 | 1,155 | 1.7 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.5 | 0.57 | 0.1 | 153,237 |
| 2075 | 1,157 | 1.7 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.4 | 0.55 | 0.1 | 153,995 |
| 2076 | 1,171 | 1.6 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.5 | 0.57 | 0.1 | 155,005 |
| 2077 | 1,177 | 1.6 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.6 | 0.59 | 0.11 | 155,356 |
| 2078 | 1,182 | 1.6 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.9 | 0.62 | 0.11 | 156,236 |
| 2079 | 1,189 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.1 | 0.65 | 0.12 | 157,251 |
| 2080 | 1,194 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.4 | 0.68 | 0.12 | 158,470 |
| 2081 | 1,200 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.6 | 0.71 | 0.13 | 158,838 |
| 2082 | 1,205 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.7 | 0.72 | 0.13 | 159,814 |
| 2083 | 1,208 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.8 | 0.73 | 0.13 | 160,383 |
| 2084 | 1,212 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.7 | 0.72 | 0.13 | 161,637 |
| 2085 | 1,213 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.7 | 0.72 | 0.13 | 161,890 |
| 2086 | 1,216 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.3 | 0.67 | 0.12 | 162,778 |
| 2087 | 1,215 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 5.2 | 0.66 | 0.12 | 163,470 |
| 2088 | 1,223 | 1.6 | 0.000041 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.7 | 0.6 | 0.11 | 164,570 |
| 2089 | 1,218 | 1.6 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.4 | 0.56 | 0.1 | 164,772 |
| 2090 | 1,222 | 1.5 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.2 | 0.53 | 0.096 | 165,462 |
| 2091 | 1,223 | 1.5 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.2 | 0.53 | 0.097 | 166,285 |
| 2092 | 1,226 | 1.5 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.1 | 0.52 | 0.095 | 167,587 |
| 2093 | 1,228 | 1.5 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 4.3 | 0.54 | 0.099 | 168,175 |
| 2094 | 1,228 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.4 | 0.56 | 0.1 | 169,130 |
| 2095 | 1,225 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.7 | 0.59 | 0.11 | 169,816 |
| 2096 | 1,221 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.9 | 0.62 | 0.11 | 170,905 |
| 2097 | 1,222 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.2 | 0.66 | 0.12 | 171,124 |
| 2098 | 1,223 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.5 | 0.69 | 0.13 | 171,837 |
| 2099 | 1,224 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.7 | 0.73 | 0.13 | 172,453 |
| 2100 | 1,233 | 1.5 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.0 | 0.76 | 0.14 | 173,472 |
| 2101 | 1,236 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.3 | 0.79 | 0.14 | 174,383 |
| 2102 | 1,238 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.5 | 0.82 | 0.15 | 175,164 |
| 2103 | 1,252 | 1.5 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 6.8 | 0.86 | 0.16 | 175,863 |
| 2104 | 1,259 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 7.1 | 0.89 | 0.16 | 177,220 |
| 2105 | 1,258 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 7.3 | 0.92 | 0.17 | 177,533 |
| 2106 | 1,254 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 7.5 | 0.95 | 0.17 | 178,211 |
| 2107 | 1,257 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 7.7 | 0.98 | 0.18 | 179,040 |
| 2108 | 1,262 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 7.9 | 1. | 0.18 | 180,178 |
| 2109 | 1,267 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 8.1 | 1.0 | 0.19 | 180,248 |
| 2110 | 1,273 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 8.2 | 1.0 | 0.19 | 180,830 |
| 2111 | 1,278 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 8.4 | 1.1 | 0.19 | 181,243 |
| 2112 | 1,286 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.01 | 8.5 | 1.1 | 0.2 | 181,975 |
| 2113 | 1,290 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.6 | 1.1 | 0.2 | 181,870 |
| 2114 | 1,297 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.7 | 1.1 | 0.2 | 182,135 |
| 2115 | 1,301 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.7 | 1.1 | 0.2 | 182,344 |
| 2116 | 1,307 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.5 | 1.1 | 0.2 | 183,370 |
| 2117 | 1,308 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.01 | 8.3 | 1.1 | 0.19 | 183,400 |
| 2118 | 1,312 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 8.1 | 1.0 | 0.19 | 183,657 |
| 2119 | 1,314 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 7.7 | 0.98 | 0.18 | 183,671 |
| 2120 | 1,318 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 7.5 | 0.94 | 0.17 | 184,250 |
| 2121 | 1,324 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 7.2 | 0.91 | 0.17 | 184,044 |
| 2122 | 1,326 | 1.4 | 0.00004 | 0.0005 | 0.018 | 0.005 | 0.011 | 7.0 | 0.88 | 0.16 | 184,430 |
| 2123 | 1,326 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.011 | 6.7 | 0.85 | 0.15 | 184,660 |
| 2124 | 1,327 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.011 | 6.5 | 0.82 | 0.15 | 185,381 |
| 2125 | 1,326 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.011 | 6.1 | 0.77 | 0.14 | 185,380 |
| 2126 | 1,327 | 1.4 | 0.000039 | 0.0005 | 0.017 | 0.005 | 0.011 | 5.8 | 0.73 | 0.13 | 185,890 |
| 2127 | 1,327 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 5.2 | 0.65 | 0.12 | 185,957 |
| 2128 | 1,328 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.8 | 0.61 | 0.11 | 186,328 |
| 2129 | 1,329 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 4.2 | 0.53 | 0.096 | 185,930 |
| 2130 | 1,329 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 186,107 |
| 2131 | 1,331 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.4 | 0.43 | 0.078 | 186,064 |
| 2132 | 1,332 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 3.2 | 0.4 | 0.074 | 186,657 |
| 2133 | 1,334 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.9 | 0.37 | 0.067 | 186,125 |
| 2134 | 1,335 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.8 | 0.36 | 0.065 | 186,338 |

**Table A5.** Source terms of the NAG backfill for the well graded cover system and no internal layer scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | $m^3$/year |
| 2135 | 9.2 | 1,577 | 3,187 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 77 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,338 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.7 | 0.34 | 0.062 | 186,569 |
| 2136 | 9.2 | 1,578 | 3,193 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 78 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,339 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.7 | 0.34 | 0.062 | 187,180 |
| 2137 | 9.2 | 1,581 | 3,204 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.0005 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 78 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,342 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.6 | 0.33 | 0.061 | 186,716 |
| 2138 | 9.2 | 1,570 | 3,233 | 17 | 0.24 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.94 | 0.0005 | 0.0047 | 0.015 | 0.05 | 0.0044 | 0.43 | 79 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,342 | 1.4 | 0.000038 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.6 | 0.33 | 0.061 | 186,790 |
| 2139 | 9.2 | 1,553 | 3,271 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.92 | 0.0005 | 0.0047 | 0.015 | 0.05 | 0.0043 | 0.43 | 79 | 0.019 | 0.000005 | 0.052 | 0.016 | 0.27 | 24 | 0.055 | 2.8 | 0.000037 | 1,342 | 1.4 | 0.000037 | 0.0005 | 0.017 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 187,056 |
| 2140 | 9.2 | 1,545 | 3,291 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.91 | 0.0005 | 0.0046 | 0.015 | 0.05 | 0.0043 | 0.43 | 80 | 0.019 | 0.000005 | 0.052 | 0.015 | 0.27 | 24 | 0.055 | 2.8 | 0.000037 | 1,342 | 1.4 | 0.000037 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 187,514 |
| 2141 | 9.2 | 1,532 | 3,320 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0033 | 0.78 | 0.00005 | 0.9 | 0.0005 | 0.0046 | 0.015 | 0.05 | 0.0042 | 0.43 | 80 | 0.019 | 0.000005 | 0.052 | 0.015 | 0.27 | 24 | 0.054 | 2.8 | 0.000037 | 1,341 | 1.4 | 0.000037 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 186,895 |
| 2142 | 9.2 | 1,525 | 3,335 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.89 | 0.0005 | 0.0045 | 0.015 | 0.05 | 0.0042 | 0.43 | 81 | 0.018 | 0.000005 | 0.051 | 0.015 | 0.27 | 24 | 0.053 | 2.8 | 0.000036 | 1,341 | 1.4 | 0.000037 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.33 | 0.061 | 186,886 |
| 2143 | 9.2 | 1,516 | 3,354 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.88 | 0.0005 | 0.0045 | 0.015 | 0.05 | 0.0041 | 0.43 | 81 | 0.018 | 0.000005 | 0.051 | 0.015 | 0.27 | 24 | 0.053 | 2.8 | 0.000036 | 1,340 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.33 | 0.061 | 187,034 |
| 2144 | 9.2 | 1,509 | 3,370 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.88 | 0.0005 | 0.0044 | 0.015 | 0.05 | 0.004 | 0.43 | 82 | 0.018 | 0.000005 | 0.051 | 0.014 | 0.27 | 24 | 0.052 | 2.8 | 0.000036 | 1,339 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.33 | 0.061 | 187,551 |
| 2145 | 9.2 | 1,502 | 3,386 | 17 | 0.26 | 0.0026 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.87 | 0.0005 | 0.0043 | 0.014 | 0.05 | 0.004 | 0.43 | 82 | 0.018 | 0.000005 | 0.051 | 0.014 | 0.27 | 24 | 0.051 | 2.8 | 0.000036 | 1,338 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.33 | 0.061 | 187,019 |
| 2146 | 9.2 | 1,496 | 3,399 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.87 | 0.0005 | 0.0042 | 0.014 | 0.05 | 0.0039 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.014 | 0.27 | 24 | 0.05 | 2.8 | 0.000036 | 1,337 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 187,081 |
| 2147 | 9.2 | 1,490 | 3,412 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.0005 | 0.0042 | 0.014 | 0.05 | 0.0038 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.014 | 0.27 | 24 | 0.049 | 2.8 | 0.000036 | 1,337 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.33 | 0.06 | 187,212 |
| 2148 | 9.2 | 1,485 | 3,424 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.0005 | 0.0041 | 0.014 | 0.05 | 0.0037 | 0.42 | 84 | 0.017 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.048 | 2.8 | 0.000035 | 1,336 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.6 | 0.33 | 0.059 | 187,667 |
| 2149 | 9.2 | 1,480 | 3,436 | 17 | 0.27 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.85 | 0.0005 | 0.004 | 0.014 | 0.05 | 0.0037 | 0.43 | 84 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.047 | 2.8 | 0.000035 | 1,336 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.5 | 0.32 | 0.058 | 187,030 |
| 2150 | 9.2 | 1,476 | 3,445 | 17 | 0.27 | 0.0026 | 0.0019 | 0.0034 | 0.78 | 0.00005 | 0.85 | 0.0005 | 0.0039 | 0.014 | 0.05 | 0.0036 | 0.43 | 84 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.046 | 2.8 | 0.000035 | 1,335 | 1.4 | 0.000036 | 0.0005 | 0.016 | 0.005 | 0.01 | 2.4 | 0.31 | 0.056 | 186,985 |

**Table A6.** Annual loads of the NAG backfill for the well graded cover system and no internal layer scenario.

| Model Year | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year as CaCO3 | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year |
| 2023 | 29 | 2.3 | 0.69 | 0.00029 | 0.000052 | 0.000029 | 0.000056 | 0.032 | 0.0000012 | 0.67 | 0.000024 | 0.00014 |
| 2024 | 53 | 4.1 | 1.3 | 0.00052 | 0.000094 | 0.000053 | 0.0001 | 0.057 | 0.0000022 | 1.2 | 0.000044 | 0.00025 |
| 2025 | 97 | 7.6 | 2.3 | 0.00096 | 0.00017 | 0.000097 | 0.00019 | 0.11 | 0.000004 | 2.2 | 0.00008 | 0.00046 |
| 2026 | 152 | 12 | 3.6 | 0.0015 | 0.00027 | 0.00015 | 0.00029 | 0.16 | 0.0000063 | 3.5 | 0.00013 | 0.00072 |
| 2027 | 191 | 15 | 4.5 | 0.0019 | 0.00034 | 0.00019 | 0.00037 | 0.21 | 0.0000079 | 4.4 | 0.00016 | 0.0009 |
| 2028 | 349 | 27 | 8.2 | 0.0034 | 0.00062 | 0.00035 | 0.00067 | 0.38 | 0.000014 | 8.0 | 0.00029 | 0.0017 |
| 2029 | 326 | 25 | 7.7 | 0.0032 | 0.00057 | 0.00032 | 0.00063 | 0.35 | 0.000013 | 7.5 | 0.00027 | 0.0015 |
| 2030 | 421 | 33 | 9.9 | 0.0041 | 0.00074 | 0.00042 | 0.00081 | 0.45 | 0.000017 | 9.7 | 0.00035 | 0.002 |
| 2031 | 2,705 | 211 | 64 | 0.027 | 0.0048 | 0.0027 | 0.0052 | 2.9 | 0.00011 | 62 | 0.0022 | 0.013 |
| 2032 | 4,396 | 343 | 104 | 0.043 | 0.0078 | 0.0044 | 0.0084 | 4.7 | 0.00018 | 101 | 0.0036 | 0.021 |
| 2033 | 750 | 58 | 18 | 0.0074 | 0.0013 | 0.00075 | 0.0014 | 0.81 | 0.000031 | 17 | 0.00062 | 0.0035 |
| 2034 | 3,014 | 235 | 71 | 0.03 | 0.0053 | 0.003 | 0.0058 | 3.3 | 0.00012 | 69 | 0.0025 | 0.014 |
| 2035 | 8,570 | 669 | 202 | 0.084 | 0.015 | 0.0085 | 0.016 | 9.3 | 0.00035 | 197 | 0.0071 | 0.041 |
| 2036 | 14,615 | 1,141 | 345 | 0.14 | 0.026 | 0.015 | 0.028 | 16 | 0.0006 | 336 | 0.012 | 0.069 |
| 2037 | 16,286 | 1,271 | 385 | 0.16 | 0.029 | 0.016 | 0.031 | 18 | 0.00067 | 374 | 0.013 | 0.077 |
| 2038 | 32,601 | 2,544 | 770 | 0.32 | 0.057 | 0.032 | 0.063 | 35 | 0.0013 | 749 | 0.027 | 0.15 |
| 2039 | 60,149 | 10,833 | 1,312 | 0.69 | 0.11 | 0.059 | 0.11 | 60 | 0.0023 | 1,436 | 0.046 | 0.27 |
| 2040 | 119,581 | 38,041 | 2,261 | 1.4 | 0.21 | 0.12 | 0.17 | 103 | 0.004 | 2,436 | 0.079 | 0.52 |
| 2041 | 188,787 | 84,647 | 3,173 | 3.0 | 0.33 | 0.18 | 0.24 | 145 | 0.0055 | 1,541 | 0.11 | 0.61 |
| 2042 | 181,599 | 102,301 | 3,172 | 3.8 | 0.32 | 0.19 | 0.31 | 145 | 0.0064 | 1,499 | 0.13 | 0.39 |
| 2043 | 183,623 | 104,498 | 3,172 | 3.9 | 0.32 | 0.19 | 0.32 | 145 | 0.0067 | 1,583 | 0.13 | 0.35 |
| 2044 | 184,376 | 103,656 | 3,171 | 3.9 | 0.33 | 0.2 | 0.33 | 145 | 0.0068 | 1,686 | 0.14 | 0.35 |
| 2045 | 187,168 | 105,697 | 3,172 | 3.9 | 0.33 | 0.2 | 0.32 | 145 | 0.0067 | 1,564 | 0.13 | 0.37 |
| 2046 | 187,633 | 103,314 | 3,172 | 3.8 | 0.33 | 0.2 | 0.3 | 145 | 0.0064 | 1,497 | 0.13 | 0.41 |
| 2047 | 202,021 | 105,599 | 3,173 | 3.8 | 0.36 | 0.22 | 0.29 | 145 | 0.0064 | 1,480 | 0.13 | 0.44 |
| 2048 | 222,427 | 111,893 | 3,173 | 4.0 | 0.39 | 0.25 | 0.28 | 145 | 0.0065 | 1,447 | 0.13 | 0.52 |
| 2049 | 232,948 | 117,236 | 3,174 | 4.1 | 0.41 | 0.27 | 0.28 | 145 | 0.0066 | 1,398 | 0.13 | 0.59 |
| 2050 | 239,538 | 119,755 | 3,174 | 4.2 | 0.42 | 0.29 | 0.28 | 145 | 0.0066 | 1,405 | 0.13 | 0.63 |
| 2051 | 243,385 | 121,046 | 3,174 | 4.2 | 0.43 | 0.3 | 0.28 | 145 | 0.0067 | 1,417 | 0.13 | 0.65 |
| 2052 | 246,811 | 122,148 | 3,174 | 4.3 | 0.44 | 0.3 | 0.28 | 145 | 0.0068 | 1,432 | 0.14 | 0.65 |
| 2053 | 248,249 | 122,284 | 3,174 | 4.3 | 0.44 | 0.31 | 0.28 | 145 | 0.0068 | 1,435 | 0.14 | 0.66 |
| 2054 | 249,944 | 122,730 | 3,174 | 4.3 | 0.44 | 0.31 | 0.28 | 145 | 0.0068 | 1,447 | 0.14 | 0.66 |
| 2055 | 252,972 | 123,320 | 3,174 | 4.3 | 0.45 | 0.32 | 0.29 | 145 | 0.0068 | 1,463 | 0.14 | 0.68 |
| 2056 | 248,809 | 151,733 | 3,175 | 5.3 | 0.44 | 0.31 | 0.3 | 145 | 0.0069 | 1,018 | 0.14 | 0.67 |
| 2057 | 238,664 | 196,137 | 3,175 | 7.1 | 0.42 | 0.3 | 0.32 | 145 | 0.0069 | 641 | 0.14 | 0.61 |
| 2058 | 232,800 | 221,757 | 3,176 | 8.2 | 0.41 | 0.28 | 0.33 | 145 | 0.0069 | 518 | 0.14 | 0.58 |
| 2059 | 231,450 | 230,578 | 3,176 | 8.6 | 0.41 | 0.28 | 0.34 | 145 | 0.0069 | 486 | 0.14 | 0.57 |
| 2060 | 233,135 | 234,084 | 3,176 | 8.7 | 0.41 | 0.28 | 0.34 | 145 | 0.007 | 484 | 0.14 | 0.57 |
| 2061 | 234,102 | 234,298 | 3,176 | 8.7 | 0.41 | 0.28 | 0.34 | 145 | 0.007 | 487 | 0.14 | 0.58 |
| 2062 | 233,972 | 245,423 | 3,176 | 10.0 | 0.41 | 0.28 | 0.35 | 145 | 0.007 | 432 | 0.14 | 0.58 |
| 2063 | 232,497 | 257,328 | 3,176 | 11 | 0.41 | 0.28 | 0.36 | 145 | 0.0071 | 394 | 0.14 | 0.57 |
| 2064 | 233,675 | 261,461 | 3,176 | 11 | 0.41 | 0.28 | 0.36 | 145 | 0.0071 | 397 | 0.14 | 0.57 |
| 2065 | 234,617 | 272,850 | 3,176 | 14 | 0.41 | 0.28 | 0.37 | 145 | 0.0072 | 336 | 0.14 | 0.57 |
| 2066 | 232,662 | 287,614 | 3,176 | 16 | 0.41 | 0.28 | 0.38 | 145 | 0.0072 | 300 | 0.14 | 0.56 |
| 2067 | 231,552 | 298,380 | 3,177 | 17 | 0.41 | 0.27 | 0.39 | 145 | 0.0073 | 285 | 0.15 | 0.56 |
| 2068 | 233,135 | 305,923 | 3,177 | 17 | 0.41 | 0.28 | 0.39 | 145 | 0.0074 | 284 | 0.15 | 0.56 |
| 2069 | 233,831 | 310,413 | 3,177 | 17 | 0.41 | 0.27 | 0.4 | 145 | 0.0074 | 285 | 0.15 | 0.56 |
| 2070 | 236,506 | 313,306 | 3,177 | 16 | 0.42 | 0.28 | 0.4 | 145 | 0.0075 | 293 | 0.15 | 0.57 |
| 2071 | 238,355 | 316,001 | 3,177 | 16 | 0.42 | 0.28 | 0.4 | 145 | 0.0075 | 301 | 0.15 | 0.57 |
| 2072 | 242,928 | 319,691 | 3,177 | 17 | 0.43 | 0.28 | 0.41 | 145 | 0.0076 | 295 | 0.15 | 0.58 |
| 2073 | 244,733 | 319,752 | 3,177 | 17 | 0.43 | 0.29 | 0.41 | 145 | 0.0076 | 301 | 0.15 | 0.59 |
| 2074 | 247,278 | 320,249 | 3,177 | 16 | 0.44 | 0.29 | 0.41 | 145 | 0.0077 | 310 | 0.15 | 0.6 |
| 2075 | 249,980 | 320,217 | 3,177 | 16 | 0.44 | 0.3 | 0.41 | 145 | 0.0077 | 319 | 0.15 | 0.62 |
| 2076 | 255,619 | 323,744 | 3,177 | 18 | 0.45 | 0.31 | 0.41 | 145 | 0.0078 | 302 | 0.16 | 0.64 |
| 2077 | 258,731 | 323,701 | 3,177 | 18 | 0.46 | 0.31 | 0.4 | 145 | 0.0078 | 306 | 0.16 | 0.66 |
| 2078 | 262,398 | 324,502 | 3,177 | 17 | 0.46 | 0.32 | 0.4 | 145 | 0.0078 | 312 | 0.16 | 0.69 |
| 2079 | 265,770 | 327,742 | 3,177 | 18 | 0.47 | 0.33 | 0.41 | 145 | 0.0079 | 312 | 0.16 | 0.72 |
| 2080 | 269,002 | 332,121 | 3,177 | 18 | 0.47 | 0.34 | 0.41 | 145 | 0.0079 | 313 | 0.16 | 0.74 |
| 2081 | 271,645 | 332,624 | 3,177 | 18 | 0.48 | 0.34 | 0.41 | 145 | 0.0079 | 318 | 0.16 | 0.77 |
| 2082 | 272,418 | 340,563 | 3,177 | 19 | 0.48 | 0.35 | 0.41 | 145 | 0.008 | 307 | 0.16 | 0.78 |
| 2083 | 271,705 | 348,063 | 3,178 | 19 | 0.48 | 0.35 | 0.42 | 145 | 0.008 | 297 | 0.16 | 0.79 |
| 2084 | 274,395 | 353,193 | 3,178 | 19 | 0.48 | 0.36 | 0.42 | 145 | 0.0081 | 299 | 0.16 | 0.81 |
| 2085 | 273,707 | 357,031 | 3,178 | 19 | 0.48 | 0.36 | 0.42 | 145 | 0.0081 | 297 | 0.16 | 0.81 |
| 2086 | 275,893 | 360,180 | 3,178 | 19 | 0.49 | 0.37 | 0.43 | 145 | 0.0081 | 302 | 0.16 | 0.82 |
| 2087 | 276,149 | 363,720 | 3,178 | 19 | 0.49 | 0.37 | 0.43 | 145 | 0.0082 | 304 | 0.16 | 0.82 |
| 2088 | 279,900 | 368,389 | 3,178 | 20 | 0.49 | 0.37 | 0.43 | 145 | 0.0082 | 297 | 0.16 | 0.83 |
| 2089 | 274,989 | 376,389 | 3,178 | 22 | 0.48 | 0.36 | 0.44 | 145 | 0.0082 | 273 | 0.16 | 0.78 |
| 2090 | 275,131 | 383,442 | 3,178 | 23 | 0.49 | 0.36 | 0.44 | 145 | 0.0083 | 267 | 0.17 | 0.78 |
| 2091 | 275,967 | 388,093 | 3,178 | 23 | 0.49 | 0.36 | 0.45 | 145 | 0.0083 | 267 | 0.17 | 0.78 |
| 2092 | 278,346 | 393,814 | 3,178 | 23 | 0.49 | 0.36 | 0.45 | 145 | 0.0084 | 268 | 0.17 | 0.78 |
| 2093 | 276,900 | 401,954 | 3,178 | 24 | 0.49 | 0.36 | 0.46 | 145 | 0.0084 | 259 | 0.17 | 0.78 |
| 2094 | 275,023 | 412,661 | 3,178 | 25 | 0.48 | 0.36 | 0.47 | 145 | 0.0085 | 250 | 0.17 | 0.77 |
| 2095 | 273,812 | 417,324 | 3,178 | 25 | 0.48 | 0.35 | 0.47 | 145 | 0.0085 | 250 | 0.17 | 0.76 |
| 2096 | 272,115 | 424,905 | 3,178 | 25 | 0.48 | 0.35 | 0.48 | 145 | 0.0085 | 248 | 0.17 | 0.75 |
| 2097 | 272,498 | 426,544 | 3,178 | 25 | 0.48 | 0.35 | 0.48 | 145 | 0.0086 | 250 | 0.17 | 0.75 |
| 2098 | 272,808 | 431,208 | 3,178 | 25 | 0.48 | 0.35 | 0.49 | 145 | 0.0086 | 251 | 0.17 | 0.76 |
| 2099 | 274,304 | 432,960 | 3,179 | 24 | 0.48 | 0.35 | 0.49 | 145 | 0.0086 | 255 | 0.17 | 0.77 |
| 2100 | 277,589 | 439,421 | 3,179 | 26 | 0.49 | 0.36 | 0.49 | 145 | 0.0087 | 247 | 0.17 | 0.77 |
| 2101 | 280,374 | 441,975 | 3,179 | 26 | 0.49 | 0.36 | 0.49 | 145 | 0.0087 | 250 | 0.17 | 0.79 |
| 2102 | 282,224 | 445,407 | 3,179 | 26 | 0.5 | 0.36 | 0.49 | 145 | 0.0088 | 253 | 0.18 | 0.8 |
| 2103 | 287,623 | 449,892 | 3,179 | 28 | 0.51 | 0.37 | 0.49 | 145 | 0.0088 | 242 | 0.18 | 0.82 |
| 2104 | 291,969 | 454,781 | 3,179 | 28 | 0.51 | 0.38 | 0.5 | 145 | 0.0089 | 244 | 0.18 | 0.84 |
| 2105 | 290,870 | 458,603 | 3,179 | 29 | 0.51 | 0.37 | 0.5 | 145 | 0.0089 | 240 | 0.18 | 0.84 |
| 2106 | 286,439 | 468,714 | 3,179 | 31 | 0.5 | 0.37 | 0.51 | 145 | 0.0089 | 229 | 0.18 | 0.82 |
| 2107 | 286,625 | 476,247 | 3,179 | 32 | 0.51 | 0.37 | 0.52 | 145 | 0.009 | 225 | 0.18 | 0.82 |
| 2108 | 289,132 | 483,491 | 3,179 | 32 | 0.51 | 0.37 | 0.52 | 145 | 0.009 | 225 | 0.18 | 0.84 |
| 2109 | 289,892 | 486,885 | 3,180 | 32 | 0.51 | 0.38 | 0.52 | 145 | 0.009 | 223 | 0.18 | 0.85 |
| 2110 | 292,330 | 491,134 | 3,180 | 32 | 0.52 | 0.38 | 0.52 | 145 | 0.009 | 224 | 0.18 | 0.87 |
| 2111 | 294,267 | 494,413 | 3,180 | 32 | 0.52 | 0.39 | 0.52 | 145 | 0.0091 | 224 | 0.18 | 0.88 |
| 2112 | 297,967 | 498,213 | 3,180 | 32 | 0.53 | 0.39 | 0.52 | 145 | 0.0091 | 226 | 0.18 | 0.91 |
| 2113 | 298,885 | 499,270 | 3,180 | 32 | 0.53 | 0.4 | 0.52 | 145 | 0.0091 | 226 | 0.18 | 0.92 |
| 2114 | 302,071 | 500,944 | 3,180 | 32 | 0.53 | 0.4 | 0.52 | 145 | 0.0091 | 228 | 0.18 | 0.94 |
| 2115 | 303,494 | 502,577 | 3,180 | 31 | 0.54 | 0.41 | 0.52 | 145 | 0.0091 | 229 | 0.18 | 0.95 |
| 2116 | 307,951 | 505,605 | 3,180 | 31 | 0.54 | 0.42 | 0.52 | 145 | 0.0092 | 233 | 0.18 | 0.98 |
| 2117 | 308,296 | 506,240 | 3,180 | 31 | 0.54 | 0.42 | 0.52 | 145 | 0.0092 | 234 | 0.18 | 0.98 |
| 2118 | 308,543 | 511,520 | 3,180 | 32 | 0.54 | 0.42 | 0.52 | 145 | 0.0092 | 230 | 0.18 | 0.98 |
| 2119 | 306,750 | 517,586 | 3,180 | 32 | 0.54 | 0.42 | 0.53 | 145 | 0.0092 | 225 | 0.18 | 0.98 |
| 2120 | 308,195 | 521,611 | 3,181 | 32 | 0.54 | 0.43 | 0.53 | 145 | 0.0092 | 225 | 0.18 | 0.99 |
| 2121 | 307,851 | 527,324 | 3,181 | 36 | 0.54 | 0.43 | 0.53 | 145 | 0.0092 | 213 | 0.18 | 0.99 |
| 2122 | 305,840 | 536,155 | 3,181 | 37 | 0.54 | 0.43 | 0.54 | 145 | 0.0092 | 206 | 0.18 | 0.98 |
| 2123 | 301,845 | 547,239 | 3,181 | 39 | 0.53 | 0.43 | 0.55 | 145 | 0.0092 | 197 | 0.18 | 0.98 |
| 2124 | 301,559 | 553,620 | 3,181 | 40 | 0.53 | 0.43 | 0.56 | 145 | 0.0093 | 196 | 0.19 | 0.98 |
| 2125 | 298,592 | 560,386 | 3,181 | 41 | 0.53 | 0.43 | 0.56 | 145 | 0.0093 | 192 | 0.19 | 0.97 |
| 2126 | 298,503 | 564,642 | 3,181 | 41 | 0.53 | 0.43 | 0.57 | 145 | 0.0093 | 191 | 0.19 | 0.97 |
| 2127 | 296,322 | 570,664 | 3,181 | 42 | 0.52 | 0.43 | 0.57 | 145 | 0.0093 | 188 | 0.19 | 0.96 |
| 2128 | 296,317 | 574,933 | 3,181 | 42 | 0.52 | 0.43 | 0.57 | 145 | 0.0093 | 187 | 0.19 | 0.95 |
| 2129 | 294,327 | 578,205 | 3,181 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 184 | 0.19 | 0.94 |
| 2130 | 294,049 | 580,970 | 3,181 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 184 | 0.19 | 0.93 |
| 2131 | 293,274 | 584,707 | 3,182 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 182 | 0.19 | 0.92 |
| 2132 | 294,059 | 588,305 | 3,182 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 183 | 0.19 | 0.91 |
| 2133 | 293,090 | 589,755 | 3,182 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 181 | 0.19 | 0.9 |
| 2134 | 293,519 | 591,529 | 3,182 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 181 | 0.19 | 0.9 |

| Model Year | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year |
| 2023 | 0.000097 | 0.0012 | 0.0000024 | 0.017 | 0.49 | 0.00081 | 0.00000012 | 0.00098 | 0.00018 | 0.011 | 0.99 | 0.0027 | 0.12 | 0.0000007 |
| 2024 | 0.00018 | 0.0022 | 0.0000044 | 0.031 | 0.89 | 0.0015 | 0.00000022 | 0.0018 | 0.00033 | 0.02 | 1.8 | 0.0048 | 0.21 | 0.0000013 |
| 2025 | 0.00032 | 0.004 | 0.0000081 | 0.058 | 1.6 | 0.0027 | 0.0000004 | 0.0033 | 0.0006 | 0.037 | 3.3 | 0.0089 | 0.38 | 0.0000023 |
| 2026 | 0.0005 | 0.0063 | 0.000013 | 0.09 | 2.5 | 0.0042 | 0.00000063 | 0.0051 | 0.00093 | 0.057 | 5.1 | 0.014 | 0.6 | 0.0000036 |
| 2027 | 0.00063 | 0.0079 | 0.000016 | 0.11 | 3.2 | 0.0053 | 0.00000079 | 0.0064 | 0.0012 | 0.072 | 6.5 | 0.017 | 0.75 | 0.0000046 |
| 2028 | 0.0012 | 0.014 | 0.000029 | 0.21 | 5.8 | 0.0097 | 0.0000014 | 0.012 | 0.0021 | 0.13 | 12 | 0.032 | 1.4 | 0.0000084 |
| 2029 | 0.0011 | 0.013 | 0.000027 | 0.19 | 5.5 | 0.0091 | 0.0000013 | 0.011 | 0.002 | 0.12 | 11 | 0.03 | 1.3 | 0.0000078 |
| 2030 | 0.0014 | 0.017 | 0.000035 | 0.25 | 7.0 | 0.012 | 0.0000017 | 0.014 | 0.0026 | 0.16 | 14 | 0.038 | 1.7 | 0.00001 |
| 2031 | 0.0089 | 0.11 | 0.00022 | 1.6 | 45 | 0.075 | 0.000011 | 0.091 | 0.017 | 1.0 | 91 | 0.25 | 11 | 0.000065 |
| 2032 | 0.015 | 0.18 | 0.00036 | 2.6 | 73 | 0.12 | 0.000018 | 0.15 | 0.027 | 1.7 | 149 | 0.4 | 17 | 0.00011 |
| 2033 | 0.0025 | 0.031 | 0.000062 | 0.44 | 13 | 0.021 | 0.0000031 | 0.025 | 0.0046 | 0.28 | 25 | 0.068 | 3.0 | 0.000018 |
| 2034 | 0.01 | 0.12 | 0.00025 | 1.8 | 50 | 0.084 | 0.000012 | 0.1 | 0.019 | 1.1 | 102 | 0.28 | 12 | 0.000072 |
| 2035 | 0.028 | 0.35 | 0.00071 | 5.1 | 143 | 0.24 | 0.000035 | 0.29 | 0.053 | 3.2 | 290 | 0.78 | 34 | 0.00021 |
| 2036 | 0.048 | 0.6 | 0.0012 | 8.7 | 244 | 0.41 | 0.00006 | 0.49 | 0.09 | 5.5 | 494 | 1.3 | 58 | 0.00035 |
| 2037 | 0.054 | 0.67 | 0.0014 | 9.6 | 272 | 0.45 | 0.000067 | 0.55 | 0.1 | 6.2 | 551 | 1.5 | 64 | 0.00039 |
| 2038 | 0.11 | 1.3 | 0.0027 | 19 | 545 | 0.91 | 0.00013 | 1.1 | 0.2 | 12 | 1,102 | 3.0 | 128 | 0.00078 |
| 2039 | 0.18 | 2.3 | 0.014 | 33 | 1,044 | 1.6 | 0.00023 | 2.0 | 0.38 | 21 | 1,878 | 5.2 | 219 | 0.0014 |
| 2040 | 0.32 | 4.0 | 0.07 | 57 | 2,201 | 2.9 | 0.0004 | 4.0 | 0.81 | 36 | 3,235 | 9.5 | 377 | 0.0028 |
| 2041 | 0.65 | 5.5 | 0.19 | 80 | 3,682 | 3.2 | 0.00055 | 6.4 | 1.2 | 51 | 4,542 | 10 | 529 | 0.004 |
| 2042 | 1.1 | 6.4 | 0.25 | 79 | 3,643 | 1.8 | 0.00064 | 6.1 | 1.0 | 51 | 4,539 | 5.3 | 529 | 0.0044 |
| 2043 | 1.1 | 6.7 | 0.27 | 79 | 3,687 | 1.5 | 0.00067 | 6.2 | 1.0 | 51 | 4,539 | 4.5 | 529 | 0.0044 |
| 2044 | 1.1 | 6.8 | 0.27 | 79 | 3,693 | 1.5 | 0.00068 | 6.2 | 1.0 | 51 | 4,539 | 4.6 | 529 | 0.0044 |
| 2045 | 1.1 | 6.7 | 0.27 | 79 | 3,760 | 1.6 | 0.00067 | 6.3 | 1.1 | 51 | 4,539 | 4.9 | 529 | 0.0045 |
| 2046 | 1.1 | 6.4 | 0.3 | 79 | 3,762 | 1.8 | 0.00064 | 6.3 | 1.2 | 51 | 4,540 | 5.4 | 529 | 0.0045 |
| 2047 | 1.1 | 6.4 | 0.37 | 80 | 4,014 | 1.9 | 0.00064 | 6.8 | 1.4 | 51 | 4,541 | 5.5 | 529 | 0.0048 |
| 2048 | 1.1 | 6.5 | 0.45 | 80 | 4,403 | 2.2 | 0.00065 | 7.5 | 1.6 | 51 | 4,542 | 6.5 | 529 | 0.0053 |
| 2049 | 1.2 | 6.6 | 0.5 | 80 | 4,619 | 2.5 | 0.00066 | 7.8 | 1.9 | 51 | 4,542 | 7.3 | 529 | 0.0056 |
| 2050 | 1.2 | 6.6 | 0.55 | 80 | 4,743 | 2.6 | 0.00066 | 8.1 | 2.0 | 51 | 4,543 | 7.7 | 529 | 0.0057 |
| 2051 | 1.2 | 6.7 | 0.58 | 80 | 4,810 | 2.7 | 0.00067 | 8.2 | 2.1 | 51 | 4,543 | 7.7 | 529 | 0.0058 |
| 2052 | 1.2 | 6.8 | 0.61 | 80 | 4,874 | 2.7 | 0.00068 | 8.3 | 2.2 | 51 | 4,543 | 7.7 | 529 | 0.0059 |
| 2053 | 1.2 | 6.8 | 0.62 | 80 | 4,899 | 2.7 | 0.00068 | 8.4 | 2.2 | 51 | 4,543 | 7.7 | 529 | 0.0059 |
| 2054 | 1.2 | 6.8 | 0.63 | 80 | 4,930 | 2.7 | 0.00068 | 8.4 | 2.2 | 51 | 4,543 | 7.7 | 529 | 0.006 |
| 2055 | 1.2 | 6.8 | 0.65 | 80 | 4,984 | 2.7 | 0.00068 | 8.5 | 2.3 | 51 | 4,543 | 8.0 | 529 | 0.0061 |
| 2056 | 1.4 | 6.9 | 0.63 | 80 | 5,234 | 2.7 | 0.00069 | 8.4 | 2.2 | 51 | 4,544 | 7.8 | 529 | 0.006 |
| 2057 | 1.8 | 6.9 | 0.58 | 80 | 5,609 | 2.5 | 0.00069 | 8.0 | 2.1 | 51 | 4,544 | 7.2 | 530 | 0.0057 |
| 2058 | 2.0 | 6.9 | 0.54 | 80 | 5,859 | 2.3 | 0.00069 | 7.8 | 1.9 | 51 | 4,545 | 6.7 | 530 | 0.0056 |
| 2059 | 2.0 | 6.9 | 0.53 | 80 | 5,973 | 2.3 | 0.00069 | 7.8 | 1.9 | 51 | 4,545 | 6.6 | 530 | 0.0055 |
| 2060 | 2.0 | 7.0 | 0.53 | 80 | 6,057 | 2.3 | 0.0007 | 7.8 | 1.9 | 51 | 4,545 | 6.7 | 530 | 0.0056 |
| 2061 | 2.0 | 7.0 | 0.53 | 80 | 6,083 | 2.4 | 0.0007 | 7.9 | 1.9 | 51 | 4,545 | 6.9 | 530 | 0.0056 |
| 2062 | 2.0 | 7.0 | 0.53 | 80 | 6,199 | 2.4 | 0.0007 | 7.9 | 1.9 | 51 | 4,546 | 6.9 | 530 | 0.0056 |
| 2063 | 2.0 | 7.1 | 0.51 | 80 | 6,343 | 2.3 | 0.00071 | 7.8 | 1.8 | 51 | 4,546 | 6.8 | 530 | 0.0056 |
| 2064 | 2.0 | 7.1 | 0.51 | 80 | 6,425 | 2.4 | 0.00071 | 7.9 | 1.8 | 51 | 4,546 | 6.6 | 530 | 0.0056 |
| 2065 | 2.0 | 7.2 | 0.5 | 80 | 6,577 | 2.4 | 0.00072 | 7.9 | 1.8 | 51 | 4,546 | 6.6 | 530 | 0.0056 |
| 2066 | 2.0 | 7.2 | 0.49 | 80 | 6,732 | 2.3 | 0.00072 | 7.8 | 1.8 | 51 | 4,546 | 6.6 | 530 | 0.0056 |
| 2067 | 2.0 | 7.3 | 0.49 | 80 | 6,866 | 2.3 | 0.00073 | 7.8 | 1.8 | 51 | 4,546 | 6.5 | 530 | 0.0055 |
| 2068 | 2.0 | 7.4 | 0.48 | 80 | 7,020 | 2.4 | 0.00074 | 7.8 | 1.7 | 51 | 4,546 | 6.6 | 530 | 0.0056 |
| 2069 | 2.0 | 7.4 | 0.48 | 80 | 7,125 | 2.4 | 0.00074 | 7.9 | 1.7 | 51 | 4,546 | 6.7 | 530 | 0.0056 |
| 2070 | 2.0 | 7.5 | 0.48 | 80 | 7,227 | 2.4 | 0.00075 | 8.0 | 1.8 | 51 | 4,547 | 6.8 | 530 | 0.0057 |
| 2071 | 2.0 | 7.5 | 0.49 | 80 | 7,318 | 2.4 | 0.00075 | 8.0 | 1.8 | 51 | 4,547 | 6.8 | 530 | 0.0057 |
| 2072 | 2.0 | 7.6 | 0.5 | 80 | 7,437 | 2.4 | 0.00076 | 8.2 | 1.8 | 51 | 4,547 | 7.0 | 530 | 0.0058 |
| 2073 | 2.1 | 7.6 | 0.51 | 80 | 7,478 | 2.5 | 0.00076 | 8.2 | 1.9 | 51 | 4,547 | 7.1 | 530 | 0.0059 |
| 2074 | 2.1 | 7.7 | 0.53 | 80 | 7,522 | 2.5 | 0.00077 | 8.3 | 1.9 | 51 | 4,547 | 7.2 | 530 | 0.0059 |
| 2075 | 2.1 | 7.7 | 0.54 | 80 | 7,568 | 2.6 | 0.00077 | 8.4 | 2.0 | 51 | 4,547 | 7.4 | 530 | 0.006 |
| 2076 | 2.1 | 7.8 | 0.56 | 80 | 7,687 | 2.7 | 0.00078 | 8.6 | 2.0 | 51 | 4,547 | 7.7 | 530 | 0.0061 |
| 2077 | 2.2 | 7.8 | 0.58 | 80 | 7,735 | 2.8 | 0.00078 | 8.7 | 2.1 | 51 | 4,547 | 8.0 | 530 | 0.0062 |
| 2078 | 2.2 | 7.8 | 0.61 | 80 | 7,796 | 2.9 | 0.00078 | 8.8 | 2.2 | 51 | 4,547 | 8.4 | 530 | 0.0063 |
| 2079 | 2.2 | 7.9 | 0.63 | 80 | 7,886 | 3.0 | 0.00079 | 8.9 | 2.3 | 51 | 4,547 | 8.7 | 530 | 0.0064 |
| 2080 | 2.2 | 7.9 | 0.65 | 80 | 7,995 | 3.1 | 0.00079 | 9.1 | 2.4 | 51 | 4,547 | 9.0 | 530 | 0.0064 |
| 2081 | 2.3 | 7.9 | 0.67 | 80 | 8,050 | 3.2 | 0.00079 | 9.1 | 2.4 | 51 | 4,548 | 9.3 | 530 | 0.0065 |
| 2082 | 2.3 | 8.0 | 0.68 | 80 | 8,165 | 3.3 | 0.0008 | 9.2 | 2.5 | 51 | 4,548 | 9.6 | 530 | 0.0065 |
| 2083 | 2.3 | 8.0 | 0.69 | 80 | 8,265 | 3.3 | 0.0008 | 9.1 | 2.5 | 51 | 4,548 | 9.7 | 530 | 0.0065 |
| 2084 | 2.3 | 8.1 | 0.71 | 80 | 8,398 | 3.4 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 9.9 | 530 | 0.0066 |
| 2085 | 2.3 | 8.1 | 0.71 | 80 | 8,471 | 3.4 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 9.9 | 530 | 0.0066 |
| 2086 | 2.4 | 8.1 | 0.73 | 80 | 8,578 | 3.4 | 0.00081 | 9.3 | 2.6 | 51 | 4,548 | 10 | 530 | 0.0066 |
| 2087 | 2.4 | 8.2 | 0.72 | 80 | 8,669 | 3.4 | 0.00082 | 9.3 | 2.6 | 51 | 4,548 | 10.0 | 530 | 0.0066 |
| 2088 | 2.4 | 8.2 | 0.74 | 80 | 8,815 | 3.4 | 0.00082 | 9.4 | 2.7 | 51 | 4,548 | 10 | 530 | 0.0067 |
| 2089 | 2.4 | 8.2 | 0.7 | 80 | 8,863 | 3.2 | 0.00082 | 9.3 | 2.5 | 51 | 4,548 | 9.5 | 530 | 0.0066 |
| 2090 | 2.4 | 8.3 | 0.7 | 80 | 8,993 | 3.2 | 0.00083 | 9.3 | 2.5 | 51 | 4,548 | 9.4 | 530 | 0.0066 |
| 2091 | 2.4 | 8.3 | 0.7 | 80 | 9,115 | 3.2 | 0.00083 | 9.3 | 2.5 | 51 | 4,549 | 9.4 | 530 | 0.0066 |
| 2092 | 2.4 | 8.4 | 0.7 | 80 | 9,278 | 3.2 | 0.00084 | 9.4 | 2.5 | 51 | 4,549 | 9.4 | 530 | 0.0067 |
| 2093 | 2.4 | 8.4 | 0.69 | 80 | 9,401 | 3.2 | 0.00084 | 9.3 | 2.5 | 51 | 4,549 | 9.4 | 530 | 0.0066 |
| 2094 | 2.4 | 8.5 | 0.69 | 80 | 9,565 | 3.2 | 0.00085 | 9.3 | 2.5 | 51 | 4,549 | 9.3 | 530 | 0.0066 |
| 2095 | 2.4 | 8.5 | 0.67 | 80 | 9,655 | 3.2 | 0.00085 | 9.2 | 2.4 | 51 | 4,549 | 9.2 | 530 | 0.0066 |
| 2096 | 2.4 | 8.5 | 0.65 | 80 | 9,789 | 3.1 | 0.00085 | 9.2 | 2.4 | 51 | 4,549 | 9.1 | 530 | 0.0065 |
| 2097 | 2.4 | 8.6 | 0.66 | 80 | 9,856 | 3.1 | 0.00086 | 9.2 | 2.4 | 51 | 4,549 | 9.2 | 530 | 0.0065 |
| 2098 | 2.4 | 8.6 | 0.65 | 80 | 9,986 | 3.2 | 0.00086 | 9.2 | 2.4 | 51 | 4,549 | 9.2 | 530 | 0.0065 |
| 2099 | 2.4 | 8.6 | 0.66 | 80 | 10,068 | 3.2 | 0.00086 | 9.2 | 2.4 | 51 | 4,549 | 9.4 | 530 | 0.0066 |
| 2100 | 2.4 | 8.7 | 0.66 | 80 | 10,254 | 3.3 | 0.00087 | 9.3 | 2.4 | 51 | 4,549 | 9.5 | 530 | 0.0066 |
| 2101 | 2.4 | 8.7 | 0.68 | 80 | 10,363 | 3.3 | 0.00087 | 9.4 | 2.5 | 51 | 4,549 | 9.8 | 530 | 0.0067 |
| 2102 | 2.4 | 8.8 | 0.68 | 80 | 10,497 | 3.4 | 0.00088 | 9.5 | 2.5 | 51 | 4,550 | 9.9 | 530 | 0.0068 |
| 2103 | 2.4 | 8.8 | 0.7 | 80 | 10,656 | 3.5 | 0.00088 | 9.7 | 2.6 | 51 | 4,550 | 10 | 530 | 0.0069 |
| 2104 | 2.5 | 8.9 | 0.71 | 80 | 10,844 | 3.6 | 0.00089 | 9.8 | 2.6 | 51 | 4,550 | 10 | 530 | 0.007 |
| 2105 | 2.4 | 8.9 | 0.71 | 80 | 10,888 | 3.6 | 0.00089 | 9.8 | 2.6 | 51 | 4,550 | 10 | 530 | 0.007 |
| 2106 | 2.4 | 8.9 | 0.68 | 80 | 10,989 | 3.5 | 0.00089 | 9.6 | 2.5 | 51 | 4,550 | 10 | 530 | 0.0069 |
| 2107 | 2.4 | 9.0 | 0.68 | 80 | 11,121 | 3.5 | 0.0009 | 9.6 | 2.6 | 51 | 4,550 | 10 | 530 | 0.0069 |
| 2108 | 2.4 | 9.0 | 0.69 | 80 | 11,321 | 3.6 | 0.0009 | 9.7 | 2.6 | 51 | 4,550 | 10 | 530 | 0.0069 |
| 2109 | 2.4 | 9.0 | 0.7 | 80 | 11,421 | 3.6 | 0.0009 | 9.8 | 2.6 | 51 | 4,551 | 11 | 530 | 0.0069 |
| 2110 | 2.5 | 9.0 | 0.71 | 80 | 11,579 | 3.7 | 0.0009 | 9.8 | 2.7 | 51 | 4,551 | 11 | 530 | 0.007 |
| 2111 | 2.5 | 9.1 | 0.73 | 80 | 11,700 | 3.8 | 0.00091 | 9.9 | 2.7 | 51 | 4,551 | 11 | 530 | 0.007 |
| 2112 | 2.5 | 9.1 | 0.75 | 80 | 11,869 | 3.9 | 0.00091 | 10 | 2.8 | 51 | 4,551 | 11 | 530 | 0.0071 |
| 2113 | 2.5 | 9.1 | 0.76 | 80 | 11,939 | 3.9 | 0.00091 | 10 | 2.8 | 51 | 4,551 | 12 | 530 | 0.0071 |
| 2114 | 2.5 | 9.1 | 0.78 | 80 | 12,054 | 4.0 | 0.00091 | 10 | 2.9 | 51 | 4,551 | 12 | 530 | 0.0072 |
| 2115 | 2.5 | 9.1 | 0.79 | 80 | 12,144 | 4.0 | 0.00091 | 10 | 3.0 | 51 | 4,551 | 12 | 530 | 0.0073 |
| 2116 | 2.6 | 9.2 | 0.82 | 80 | 12,295 | 4.1 | 0.00092 | 10 | 3.0 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2117 | 2.6 | 9.2 | 0.82 | 80 | 12,345 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2118 | 2.6 | 9.2 | 0.83 | 80 | 12,448 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2119 | 2.6 | 9.2 | 0.83 | 80 | 12,544 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0073 |
| 2120 | 2.6 | 9.2 | 0.85 | 80 | 12,667 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2121 | 2.6 | 9.2 | 0.85 | 80 | 12,776 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0074 |
| 2122 | 2.7 | 9.2 | 0.85 | 80 | 12,893 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0073 |
| 2123 | 2.7 | 9.2 | 0.85 | 80 | 13,039 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 531 | 0.0072 |
| 2124 | 2.7 | 9.3 | 0.85 | 80 | 13,178 | 4.1 | 0.00093 | 10 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0072 |
| 2125 | 2.7 | 9.3 | 0.85 | 80 | 13,303 | 4.1 | 0.00093 | 10 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 |
| 2126 | 2.7 | 9.3 | 0.85 | 80 | 13,407 | 4.0 | 0.00093 | 10 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 |
| 2127 | 2.7 | 9.3 | 0.85 | 80 | 13,546 | 4.0 | 0.00093 | 10.0 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 |
| 2128 | 2.7 | 9.3 | 0.85 | 80 | 13,676 | 3.9 | 0.00093 | 10.0 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 |
| 2129 | 2.7 | 9.3 | 0.84 | 80 | 13,779 | 3.9 | 0.00093 | 9.9 | 3.1 | 51 | 4,553 | 11 | 531 | 0.007 |
| 2130 | 2.8 | 9.3 | 0.84 | 80 | 13,877 | 3.8 | 0.00093 | 9.9 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 |
| 2131 | 2.8 | 9.3 | 0.84 | 80 | 14,007 | 3.8 | 0.00093 | 9.9 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 |
| 2132 | 2.8 | 9.3 | 0.84 | 80 | 14,129 | 3.7 | 0.00093 | 9.9 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 |
| 2133 | 2.8 | 9.3 | 0.83 | 80 | 14,215 | 3.7 | 0.00093 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.007 |
| 2134 | 2.8 | 9.3 | 0.83 | 80 | 14,293 | 3.7 | 0.00093 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.007 |

| Model Year | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | $m^3$/year |
| 2023 | 13 | 0.056 | 0.0000007 | 0.000007 | 0.00031 | 0.00012 | 0.00024 | 1.6 | 0.2 | 0.036 | 24 |
| 2024 | 23 | 0.1 | 0.0000013 | 0.000013 | 0.00057 | 0.00022 | 0.00044 | 2.9 | 0.36 | 0.066 | 44 |
| 2025 | 42 | 0.18 | 0.0000023 | 0.000023 | 0.001 | 0.0004 | 0.0008 | 5.3 | 0.67 | 0.12 | 80 |
| 2026 | 66 | 0.29 | 0.0000036 | 0.000036 | 0.0016 | 0.00063 | 0.0013 | 8.2 | 1.0 | 0.19 | 125 |
| 2027 | 83 | 0.36 | 0.0000046 | 0.000046 | 0.002 | 0.00079 | 0.0016 | 10 | 1.3 | 0.24 | 158 |
| 2028 | 152 | 0.66 | 0.0000084 | 0.000084 | 0.0037 | 0.0014 | 0.0029 | 19 | 2.4 | 0.43 | 289 |
| 2029 | 142 | 0.62 | 0.0000078 | 0.000078 | 0.0035 | 0.0013 | 0.0027 | 18 | 2.2 | 0.41 | 270 |
| 2030 | 184 | 0.8 | 0.00001 | 0.0001 | 0.0045 | 0.0017 | 0.0035 | 23 | 2.9 | 0.52 | 348 |
| 2031 | 1,181 | 5.1 | 0.000065 | 0.00065 | 0.029 | 0.011 | 0.022 | 146 | 19 | 3.4 | 2,236 |
| 2032 | 1,919 | 8.3 | 0.00011 | 0.0011 | 0.047 | 0.018 | 0.036 | 238 | 30 | 5.5 | 3,634 |
| 2033 | 327 | 1.4 | 0.000018 | 0.00018 | 0.008 | 0.0031 | 0.0062 | 41 | 5.1 | 0.93 | 620 |
| 2034 | 1,316 | 5.7 | 0.000072 | 0.00072 | 0.032 | 0.012 | 0.025 | 163 | 21 | 3.8 | 2,492 |
| 2035 | 3,742 | 16 | 0.00021 | 0.0021 | 0.092 | 0.035 | 0.071 | 464 | 59 | 11 | 7,085 |
| 2036 | 6,382 | 28 | 0.00035 | 0.0035 | 0.16 | 0.06 | 0.12 | 791 | 100 | 18 | 12,083 |
| 2037 | 7,112 | 31 | 0.00039 | 0.0039 | 0.17 | 0.067 | 0.13 | 881 | 111 | 20 | 13,464 |
| 2038 | 14,236 | 62 | 0.00078 | 0.0078 | 0.35 | 0.13 | 0.27 | 1,764 | 223 | 41 | 26,952 |
| 2039 | 27,549 | 105 | 0.0014 | 0.014 | 0.64 | 0.23 | 0.46 | 3,006 | 380 | 69 | 45,912 |
| 2040 | 58,833 | 182 | 0.0029 | 0.029 | 1.3 | 0.4 | 0.79 | 5,177 | 655 | 119 | 79,056 |
| 2041 | 100,813 | 255 | 0.0045 | 0.045 | 2.0 | 0.55 | 1.1 | 4,861 | 615 | 112 | 110,907 |
| 2042 | 101,547 | 255 | 0.0044 | 0.044 | 1.9 | 0.64 | 1.3 | 1,485 | 188 | 34 | 128,839 |
| 2043 | 102,842 | 255 | 0.0044 | 0.044 | 2.0 | 0.67 | 1.3 | 894 | 113 | 21 | 133,866 |
| 2044 | 102,878 | 255 | 0.0044 | 0.044 | 2.0 | 0.68 | 1.4 | 893 | 113 | 21 | 136,575 |
| 2045 | 104,694 | 255 | 0.0045 | 0.045 | 2.0 | 0.67 | 1.3 | 1,055 | 133 | 24 | 133,758 |
| 2046 | 104,445 | 255 | 0.0045 | 0.045 | 2.0 | 0.64 | 1.3 | 1,204 | 152 | 28 | 128,763 |
| 2047 | 111,397 | 255 | 0.0049 | 0.049 | 2.2 | 0.64 | 1.3 | 760 | 96 | 17 | 128,089 |
| 2048 | 121,916 | 255 | 0.0054 | 0.053 | 2.4 | 0.65 | 1.3 | 733 | 93 | 17 | 129,793 |
| 2049 | 127,828 | 255 | 0.0056 | 0.056 | 2.5 | 0.66 | 1.3 | 808 | 102 | 19 | 131,172 |
| 2050 | 131,320 | 255 | 0.0058 | 0.058 | 2.6 | 0.66 | 1.3 | 693 | 88 | 16 | 132,811 |
| 2051 | 133,315 | 255 | 0.0058 | 0.059 | 2.6 | 0.67 | 1.3 | 542 | 68 | 12 | 133,964 |
| 2052 | 135,071 | 255 | 0.0059 | 0.059 | 2.6 | 0.68 | 1.4 | 348 | 44 | 8.0 | 135,076 |
| 2053 | 135,740 | 255 | 0.006 | 0.06 | 2.7 | 0.68 | 1.4 | 190 | 24 | 4.4 | 135,145 |
| 2054 | 136,583 | 255 | 0.006 | 0.06 | 2.7 | 0.68 | 1.4 | 140 | 18 | 3.2 | 135,795 |
| 2055 | 138,036 | 255 | 0.0061 | 0.061 | 2.7 | 0.68 | 1.5 | 145 | 18 | 3.3 | 136,601 |
| 2056 | 142,607 | 255 | 0.006 | 0.06 | 2.7 | 0.69 | 1.4 | 166 | 21 | 3.8 | 137,639 |
| 2057 | 147,678 | 255 | 0.0057 | 0.057 | 2.5 | 0.69 | 1.4 | 192 | 24 | 4.4 | 137,940 |
| 2058 | 150,409 | 255 | 0.0056 | 0.056 | 2.5 | 0.69 | 1.4 | 223 | 28 | 5.1 | 138,218 |
| 2059 | 151,614 | 255 | 0.0056 | 0.056 | 2.5 | 0.69 | 1.4 | 259 | 33 | 5.9 | 138,460 |
| 2060 | 153,080 | 255 | 0.0056 | 0.056 | 2.5 | 0.7 | 1.4 | 301 | 38 | 6.9 | 139,518 |
| 2061 | 153,528 | 255 | 0.0056 | 0.056 | 2.5 | 0.7 | 1.4 | 348 | 44 | 8.0 | 139,838 |
| 2062 | 155,869 | 255 | 0.0056 | 0.056 | 2.5 | 0.7 | 1.4 | 400 | 51 | 9.2 | 140,676 |
| 2063 | 157,664 | 255 | 0.0056 | 0.056 | 2.5 | 0.71 | 1.4 | 456 | 58 | 10 | 141,568 |
| 2064 | 159,010 | 255 | 0.0056 | 0.056 | 2.5 | 0.71 | 1.4 | 517 | 65 | 12 | 142,789 |
| 2065 | 161,866 | 255 | 0.0056 | 0.056 | 2.5 | 0.72 | 1.4 | 580 | 73 | 13 | 143,409 |
| 2066 | 164,062 | 255 | 0.0056 | 0.056 | 2.5 | 0.72 | 1.4 | 647 | 82 | 15 | 144,573 |
| 2067 | 165,759 | 255 | 0.0056 | 0.056 | 2.5 | 0.73 | 1.5 | 717 | 91 | 16 | 145,722 |
| 2068 | 167,962 | 255 | 0.0056 | 0.056 | 2.5 | 0.74 | 1.5 | 788 | 100 | 18 | 147,284 |
| 2069 | 169,122 | 255 | 0.0056 | 0.056 | 2.5 | 0.74 | 1.5 | 846 | 107 | 19 | 148,041 |
| 2070 | 170,877 | 255 | 0.0057 | 0.057 | 2.5 | 0.75 | 1.5 | 872 | 110 | 20 | 149,328 |
| 2071 | 172,193 | 255 | 0.0057 | 0.057 | 2.5 | 0.75 | 1.5 | 835 | 106 | 19 | 150,505 |
| 2072 | 175,007 | 255 | 0.0058 | 0.058 | 2.6 | 0.76 | 1.5 | 760 | 96 | 17 | 151,916 |
| 2073 | 175,806 | 255 | 0.0059 | 0.059 | 2.6 | 0.76 | 1.5 | 702 | 89 | 16 | 152,292 |
| 2074 | 177,050 | 255 | 0.0059 | 0.059 | 2.6 | 0.77 | 1.5 | 688 | 87 | 16 | 153,237 |
| 2075 | 178,234 | 255 | 0.006 | 0.06 | 2.7 | 0.77 | 1.5 | 675 | 85 | 16 | 153,995 |
| 2076 | 181,527 | 255 | 0.0062 | 0.061 | 2.7 | 0.78 | 1.6 | 698 | 88 | 16 | 155,005 |
| 2077 | 182,917 | 255 | 0.0062 | 0.062 | 2.8 | 0.78 | 1.6 | 722 | 91 | 17 | 155,356 |
| 2078 | 184,733 | 255 | 0.0063 | 0.063 | 2.8 | 0.78 | 1.6 | 763 | 96 | 18 | 156,236 |
| 2079 | 186,924 | 255 | 0.0064 | 0.064 | 2.8 | 0.79 | 1.6 | 806 | 102 | 19 | 157,251 |
| 2080 | 189,260 | 255 | 0.0065 | 0.065 | 2.9 | 0.79 | 1.6 | 850 | 108 | 20 | 158,470 |
| 2081 | 190,543 | 255 | 0.0065 | 0.065 | 2.9 | 0.79 | 1.6 | 888 | 112 | 20 | 158,838 |
| 2082 | 192,527 | 255 | 0.0066 | 0.066 | 2.9 | 0.8 | 1.6 | 907 | 115 | 21 | 159,814 |
| 2083 | 193,727 | 255 | 0.0065 | 0.065 | 2.9 | 0.8 | 1.6 | 930 | 118 | 21 | 160,383 |
| 2084 | 195,937 | 255 | 0.0066 | 0.066 | 2.9 | 0.81 | 1.6 | 915 | 116 | 21 | 161,637 |
| 2085 | 196,356 | 255 | 0.0066 | 0.066 | 2.9 | 0.81 | 1.6 | 918 | 116 | 21 | 161,890 |
| 2086 | 197,906 | 255 | 0.0066 | 0.066 | 2.9 | 0.81 | 1.7 | 864 | 109 | 20 | 162,778 |
| 2087 | 198,681 | 255 | 0.0066 | 0.066 | 2.9 | 0.82 | 1.7 | 853 | 108 | 20 | 163,470 |
| 2088 | 201,269 | 255 | 0.0067 | 0.067 | 3.0 | 0.82 | 1.7 | 779 | 98 | 18 | 164,570 |
| 2089 | 200,693 | 255 | 0.0066 | 0.066 | 2.9 | 0.82 | 1.6 | 733 | 93 | 17 | 164,772 |
| 2090 | 202,145 | 255 | 0.0066 | 0.066 | 2.9 | 0.83 | 1.7 | 692 | 87 | 16 | 165,462 |
| 2091 | 203,383 | 255 | 0.0066 | 0.066 | 2.9 | 0.83 | 1.7 | 702 | 89 | 16 | 166,285 |
| 2092 | 205,512 | 255 | 0.0067 | 0.067 | 3.0 | 0.84 | 1.7 | 695 | 88 | 16 | 167,587 |
| 2093 | 206,468 | 255 | 0.0067 | 0.067 | 3.0 | 0.84 | 1.7 | 724 | 92 | 17 | 168,175 |
| 2094 | 207,726 | 256 | 0.0066 | 0.066 | 2.9 | 0.85 | 1.7 | 750 | 95 | 17 | 169,130 |
| 2095 | 208,059 | 256 | 0.0066 | 0.066 | 2.9 | 0.85 | 1.7 | 795 | 101 | 18 | 169,816 |
| 2096 | 208,727 | 256 | 0.0065 | 0.065 | 2.9 | 0.85 | 1.7 | 841 | 106 | 19 | 170,905 |
| 2097 | 209,165 | 256 | 0.0066 | 0.066 | 2.9 | 0.86 | 1.7 | 890 | 112 | 20 | 171,124 |
| 2098 | 210,139 | 256 | 0.0066 | 0.066 | 2.9 | 0.86 | 1.7 | 939 | 119 | 22 | 171,837 |
| 2099 | 211,100 | 256 | 0.0066 | 0.066 | 2.9 | 0.86 | 1.7 | 990 | 125 | 23 | 172,453 |
| 2100 | 213,804 | 256 | 0.0067 | 0.067 | 3.0 | 0.87 | 1.7 | 1,040 | 131 | 24 | 173,472 |
| 2101 | 215,520 | 256 | 0.0067 | 0.067 | 3.0 | 0.87 | 1.7 | 1,091 | 138 | 25 | 174,383 |
| 2102 | 216,923 | 256 | 0.0068 | 0.068 | 3.0 | 0.88 | 1.8 | 1,143 | 144 | 26 | 175,164 |
| 2103 | 220,250 | 256 | 0.0069 | 0.069 | 3.1 | 0.88 | 1.8 | 1,194 | 151 | 27 | 175,863 |
| 2104 | 223,102 | 256 | 0.007 | 0.07 | 3.1 | 0.89 | 1.8 | 1,249 | 158 | 29 | 177,220 |
| 2105 | 223,372 | 256 | 0.007 | 0.07 | 3.1 | 0.89 | 1.8 | 1,295 | 164 | 30 | 177,533 |
| 2106 | 223,388 | 256 | 0.0069 | 0.069 | 3.1 | 0.89 | 1.8 | 1,340 | 169 | 31 | 178,211 |
| 2107 | 224,964 | 256 | 0.0069 | 0.069 | 3.1 | 0.9 | 1.8 | 1,381 | 175 | 32 | 179,040 |
| 2108 | 227,439 | 256 | 0.007 | 0.07 | 3.1 | 0.9 | 1.8 | 1,423 | 180 | 33 | 180,178 |
| 2109 | 228,392 | 256 | 0.007 | 0.07 | 3.1 | 0.9 | 1.8 | 1,455 | 184 | 33 | 180,248 |
| 2110 | 230,233 | 256 | 0.007 | 0.07 | 3.1 | 0.9 | 1.8 | 1,490 | 188 | 34 | 180,830 |
| 2111 | 231,683 | 256 | 0.0071 | 0.071 | 3.1 | 0.91 | 1.8 | 1,522 | 192 | 35 | 181,243 |
| 2112 | 234,020 | 256 | 0.0072 | 0.072 | 3.2 | 0.91 | 1.8 | 1,555 | 197 | 36 | 181,975 |
| 2113 | 234,576 | 256 | 0.0072 | 0.072 | 3.2 | 0.91 | 1.8 | 1,573 | 199 | 36 | 181,870 |
| 2114 | 236,266 | 256 | 0.0073 | 0.073 | 3.2 | 0.91 | 1.8 | 1,583 | 200 | 36 | 182,135 |
| 2115 | 237,139 | 256 | 0.0073 | 0.073 | 3.2 | 0.91 | 1.9 | 1,580 | 200 | 36 | 182,344 |
| 2116 | 239,683 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 1,564 | 198 | 36 | 183,370 |
| 2117 | 239,888 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 1,525 | 193 | 35 | 183,400 |
| 2118 | 241,031 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 1,479 | 187 | 34 | 183,657 |
| 2119 | 241,399 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 1,422 | 180 | 33 | 183,671 |
| 2120 | 242,768 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 2.0 | 1,374 | 174 | 32 | 184,250 |
| 2121 | 243,730 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 2.0 | 1,321 | 167 | 30 | 184,044 |
| 2122 | 244,572 | 256 | 0.0073 | 0.074 | 3.3 | 0.92 | 2.0 | 1,286 | 163 | 30 | 184,430 |
| 2123 | 244,932 | 256 | 0.0073 | 0.073 | 3.2 | 0.92 | 2.0 | 1,234 | 156 | 28 | 184,660 |
| 2124 | 246,000 | 256 | 0.0073 | 0.073 | 3.2 | 0.93 | 2.0 | 1,206 | 152 | 28 | 185,381 |
| 2125 | 245,888 | 256 | 0.0072 | 0.072 | 3.2 | 0.93 | 2.0 | 1,122 | 142 | 26 | 185,380 |
| 2126 | 246,639 | 256 | 0.0072 | 0.072 | 3.2 | 0.93 | 2.0 | 1,077 | 136 | 25 | 185,890 |
| 2127 | 246,709 | 256 | 0.0071 | 0.071 | 3.2 | 0.93 | 1.9 | 959 | 121 | 22 | 185,957 |
| 2128 | 247,443 | 256 | 0.0071 | 0.071 | 3.2 | 0.93 | 1.9 | 901 | 114 | 21 | 186,328 |
| 2129 | 247,045 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 775 | 98 | 18 | 185,930 |
| 2130 | 247,374 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 723 | 91 | 17 | 186,107 |
| 2131 | 247,614 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 628 | 79 | 14 | 186,064 |
| 2132 | 248,590 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 597 | 76 | 14 | 186,657 |
| 2133 | 248,290 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 542 | 69 | 12 | 186,125 |
| 2134 | 248,761 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 528 | 67 | 12 | 186,338 |

**Table A6.** Annual loads of the NAG backfill for the well graded cover system and no internal layer scenario.

| Model Year | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year as CaCO3 | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | $m^3$/year |
| 2135 | 294,182 | 594,578 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 181 | 0.19 | 0.9 | 2.8 | 9.3 | 0.83 | 80 | 14,422 | 3.7 | 0.00093 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.007 | 249,536 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 505 | 64 | 12 | 186,569 |
| 2136 | 295,407 | 597,572 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0094 | 181 | 0.19 | 0.9 | 2.8 | 9.4 | 0.83 | 80 | 14,529 | 3.7 | 0.00094 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.0071 | 250,615 | 256 | 0.0071 | 0.071 | 3.2 | 0.94 | 1.9 | 502 | 63 | 12 | 187,180 |
| 2137 | 295,235 | 598,275 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 180 | 0.19 | 0.89 | 2.8 | 9.3 | 0.83 | 80 | 14,606 | 3.6 | 0.00093 | 9.9 | 3.0 | 51 | 4,554 | 11 | 531 | 0.0071 | 250,535 | 256 | 0.0071 | 0.071 | 3.2 | 0.93 | 1.9 | 493 | 62 | 11 | 186,716 |
| 2138 | 293,260 | 603,891 | 3,182 | 45 | 0.52 | 0.41 | 0.59 | 145 | 0.0093 | 176 | 0.19 | 0.89 | 2.8 | 9.3 | 0.82 | 80 | 14,678 | 3.6 | 0.00093 | 9.9 | 2.9 | 51 | 4,554 | 10 | 531 | 0.007 | 250,747 | 256 | 0.007 | 0.071 | 3.1 | 0.93 | 1.9 | 492 | 62 | 11 | 186,790 |
| 2139 | 290,498 | 611,880 | 3,182 | 46 | 0.51 | 0.41 | 0.6 | 145 | 0.0094 | 172 | 0.19 | 0.88 | 2.8 | 9.4 | 0.81 | 80 | 14,802 | 3.6 | 0.00094 | 9.8 | 2.9 | 51 | 4,554 | 10 | 531 | 0.0069 | 251,030 | 256 | 0.007 | 0.07 | 3.1 | 0.94 | 1.9 | 491 | 62 | 11 | 187,056 |
| 2140 | 289,615 | 617,108 | 3,182 | 47 | 0.51 | 0.41 | 0.61 | 145 | 0.0094 | 171 | 0.19 | 0.87 | 2.8 | 9.4 | 0.8 | 80 | 14,924 | 3.5 | 0.00094 | 9.7 | 2.9 | 51 | 4,554 | 10 | 531 | 0.0069 | 251,587 | 256 | 0.007 | 0.07 | 3.1 | 0.94 | 1.9 | 492 | 62 | 11 | 187,514 |
| 2141 | 286,304 | 620,491 | 3,182 | 48 | 0.5 | 0.4 | 0.61 | 145 | 0.0093 | 167 | 0.19 | 0.86 | 2.8 | 9.3 | 0.79 | 80 | 14,988 | 3.5 | 0.00093 | 9.6 | 2.8 | 51 | 4,554 | 10 | 531 | 0.0068 | 250,645 | 256 | 0.0069 | 0.069 | 3.1 | 0.93 | 1.9 | 491 | 62 | 11 | 186,895 |
| 2142 | 285,021 | 623,285 | 3,182 | 48 | 0.5 | 0.4 | 0.61 | 145 | 0.0093 | 166 | 0.19 | 0.84 | 2.7 | 9.3 | 0.78 | 80 | 15,070 | 3.4 | 0.00093 | 9.6 | 2.8 | 51 | 4,554 | 10.0 | 531 | 0.0068 | 250,521 | 256 | 0.0068 | 0.069 | 3.0 | 0.93 | 1.9 | 492 | 62 | 11 | 186,886 |
| 2143 | 283,562 | 627,217 | 3,182 | 48 | 0.5 | 0.4 | 0.62 | 145 | 0.0094 | 165 | 0.19 | 0.84 | 2.7 | 9.4 | 0.77 | 80 | 15,161 | 3.4 | 0.00094 | 9.5 | 2.8 | 51 | 4,555 | 9.9 | 531 | 0.0068 | 250,550 | 256 | 0.0068 | 0.068 | 3.0 | 0.94 | 1.9 | 493 | 62 | 11 | 187,034 |
| 2144 | 283,033 | 631,952 | 3,182 | 49 | 0.5 | 0.39 | 0.62 | 145 | 0.0094 | 164 | 0.19 | 0.82 | 2.7 | 9.4 | 0.75 | 80 | 15,311 | 3.3 | 0.00094 | 9.5 | 2.7 | 51 | 4,555 | 9.7 | 531 | 0.0068 | 251,111 | 256 | 0.0068 | 0.068 | 3.0 | 0.94 | 1.9 | 494 | 63 | 11 | 187,551 |
| 2145 | 280,846 | 633,246 | 3,183 | 49 | 0.5 | 0.39 | 0.62 | 145 | 0.0094 | 163 | 0.19 | 0.81 | 2.7 | 9.4 | 0.74 | 80 | 15,352 | 3.3 | 0.00094 | 9.5 | 2.7 | 51 | 4,555 | 9.6 | 531 | 0.0067 | 250,287 | 256 | 0.0068 | 0.068 | 3.0 | 0.94 | 1.9 | 493 | 62 | 11 | 187,019 |
| 2146 | 279,836 | 635,870 | 3,182 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0094 | 162 | 0.19 | 0.79 | 2.7 | 9.4 | 0.72 | 80 | 15,458 | 3.2 | 0.00094 | 9.4 | 2.6 | 51 | 4,555 | 9.3 | 531 | 0.0067 | 250,202 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 492 | 62 | 11 | 187,081 |
| 2147 | 278,890 | 638,712 | 3,183 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0094 | 161 | 0.19 | 0.78 | 2.7 | 9.4 | 0.72 | 80 | 15,545 | 3.2 | 0.00094 | 9.4 | 2.6 | 51 | 4,555 | 9.2 | 531 | 0.0067 | 250,228 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 488 | 62 | 11 | 187,212 |
| 2148 | 278,629 | 642,514 | 3,183 | 50 | 0.49 | 0.37 | 0.64 | 145 | 0.0094 | 161 | 0.19 | 0.76 | 2.7 | 9.4 | 0.7 | 80 | 15,681 | 3.1 | 0.00094 | 9.4 | 2.5 | 51 | 4,555 | 9.0 | 531 | 0.0067 | 250,723 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 485 | 61 | 11 | 187,667 |
| 2149 | 276,730 | 642,692 | 3,183 | 50 | 0.49 | 0.37 | 0.64 | 145 | 0.0094 | 160 | 0.19 | 0.75 | 2.7 | 9.4 | 0.69 | 80 | 15,708 | 3.0 | 0.00094 | 9.3 | 2.5 | 51 | 4,555 | 8.8 | 531 | 0.0066 | 249,797 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 469 | 59 | 11 | 187,030 |
| 2150 | 275,915 | 644,238 | 3,183 | 50 | 0.49 | 0.36 | 0.64 | 145 | 0.0093 | 159 | 0.19 | 0.73 | 2.6 | 9.3 | 0.67 | 80 | 15,786 | 3.0 | 0.00093 | 9.3 | 2.4 | 51 | 4,555 | 8.6 | 531 | 0.0066 | 249,625 | 256 | 0.0066 | 0.066 | 2.9 | 0.93 | 1.9 | 458 | 58 | 11 | 186,985 |

**Table A7.** Source terms of the NAG backfill for the low nitrogen scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | $m^3$/year |
| 2023 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 24 |
| 2024 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 44 |
| 2025 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 80 |
| 2026 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 125 |
| 2027 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 158 |
| 2028 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 289 |
| 2029 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 270 |
| 2030 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 348 |
| 2031 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 2,236 |
| 2032 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 3,634 |
| 2033 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 620 |
| 2034 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 2,492 |
| 2035 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 7,085 |
| 2036 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 12,083 |
| 2037 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 13,464 |
| 2038 | 8.2 | 1,210 | 73 | 29 | 0.017 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 540 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 41 | 5.2 | 0.94 | 26,952 |
| 2039 | 8.3 | 1,301 | 139 | 29 | 0.021 | 0.0023 | 0.0013 | 0.0023 | 1.3 | 0.00005 | 31 | 0.001 | 0.0058 | 0.004 | 0.05 | 0.00032 | 0.72 | 23 | 0.034 | 0.000005 | 0.044 | 0.008 | 0.46 | 41 | 0.11 | 4.8 | 0.000031 | 606 | 2.3 | 0.000031 | 0.00031 | 0.014 | 0.005 | 0.01 | 40 | 5.0 | 0.91 | 45,912 |
| 2040 | 8.3 | 1,464 | 246 | 29 | 0.018 | 0.0026 | 0.0014 | 0.0022 | 1.3 | 0.00005 | 29 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.00082 | 0.72 | 27 | 0.032 | 0.000005 | 0.049 | 0.009 | 0.46 | 41 | 0.1 | 4.8 | 0.000035 | 728 | 2.3 | 0.000035 | 0.00035 | 0.016 | 0.005 | 0.01 | 35 | 4.5 | 0.81 | 79,056 |
| 2041 | 8.4 | 1,507 | 382 | 29 | 0.028 | 0.0027 | 0.0015 | 0.0023 | 1.3 | 0.00005 | 13 | 0.001 | 0.0042 | 0.0081 | 0.05 | 0.0017 | 0.72 | 30 | 0.021 | 0.000005 | 0.051 | 0.0089 | 0.46 | 41 | 0.067 | 4.8 | 0.000036 | 823 | 2.3 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 18 | 2.3 | 0.42 | 110,907 |
| 2042 | 8.5 | 1,408 | 398 | 25 | 0.029 | 0.0025 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.001 | 0.003 | 0.0082 | 0.05 | 0.002 | 0.62 | 28 | 0.014 | 0.000005 | 0.047 | 0.008 | 0.39 | 35 | 0.042 | 4.1 | 0.000034 | 788 | 2.0 | 0.000034 | 0.00034 | 0.015 | 0.005 | 0.01 | 7.3 | 0.93 | 0.17 | 128,839 |
| 2043 | 8.4 | 1,371 | 392 | 24 | 0.029 | 0.0024 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.001 | 0.0026 | 0.0081 | 0.05 | 0.002 | 0.59 | 28 | 0.012 | 0.000005 | 0.046 | 0.0077 | 0.38 | 34 | 0.034 | 4.0 | 0.000033 | 769 | 1.9 | 0.000033 | 0.00033 | 0.015 | 0.005 | 0.01 | 4.3 | 0.55 | 0.099 | 133,866 |
| 2044 | 8.4 | 1,350 | 381 | 23 | 0.028 | 0.0024 | 0.0014 | 0.0024 | 1.1 | 0.00005 | 12 | 0.001 | 0.0026 | 0.008 | 0.05 | 0.002 | 0.58 | 27 | 0.011 | 0.000005 | 0.045 | 0.0075 | 0.37 | 33 | 0.033 | 3.9 | 0.000032 | 754 | 1.9 | 0.000032 | 0.00032 | 0.014 | 0.005 | 0.01 | 4.2 | 0.54 | 0.098 | 136,575 |
| 2045 | 8.5 | 1,399 | 396 | 24 | 0.029 | 0.0025 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.001 | 0.0028 | 0.0082 | 0.05 | 0.002 | 0.59 | 28 | 0.012 | 0.000005 | 0.047 | 0.0079 | 0.38 | 34 | 0.037 | 4.0 | 0.000034 | 783 | 1.9 | 0.000034 | 0.00034 | 0.015 | 0.005 | 0.01 | 5.1 | 0.64 | 0.12 | 133,758 |
| 2046 | 8.5 | 1,450 | 402 | 25 | 0.03 | 0.0026 | 0.0016 | 0.0023 | 1.1 | 0.00005 | 12 | 0.001 | 0.003 | 0.0083 | 0.05 | 0.0023 | 0.62 | 29 | 0.013 | 0.000005 | 0.049 | 0.0089 | 0.39 | 35 | 0.04 | 4.1 | 0.000035 | 809 | 2.0 | 0.000035 | 0.00035 | 0.015 | 0.005 | 0.01 | 5.1 | 0.64 | 0.12 | 128,763 |
| 2047 | 8.5 | 1,577 | 414 | 25 | 0.03 | 0.0028 | 0.0017 | 0.0023 | 1.1 | 0.00005 | 11 | 0.001 | 0.0035 | 0.0084 | 0.05 | 0.0029 | 0.62 | 31 | 0.015 | 0.000005 | 0.053 | 0.011 | 0.4 | 35 | 0.043 | 4.1 | 0.000038 | 870 | 2.0 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 128,089 |
| 2048 | 8.5 | 1,714 | 432 | 24 | 0.031 | 0.003 | 0.0019 | 0.0022 | 1.1 | 0.00005 | 11 | 0.001 | 0.004 | 0.0087 | 0.05 | 0.0034 | 0.61 | 34 | 0.017 | 0.000005 | 0.058 | 0.013 | 0.39 | 35 | 0.05 | 4.1 | 0.000041 | 940 | 2.0 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.7 | 0.47 | 0.085 | 129,793 |
| 2049 | 8.5 | 1,775 | 447 | 24 | 0.031 | 0.0031 | 0.0021 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0045 | 0.0089 | 0.05 | 0.0038 | 0.61 | 35 | 0.019 | 0.000005 | 0.06 | 0.014 | 0.39 | 35 | 0.056 | 4.0 | 0.000043 | 974 | 1.9 | 0.000043 | 0.00043 | 0.019 | 0.005 | 0.01 | 3.9 | 0.5 | 0.09 | 131,172 |
| 2050 | 8.5 | 1,803 | 451 | 24 | 0.032 | 0.0032 | 0.0022 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0047 | 0.009 | 0.05 | 0.0042 | 0.6 | 36 | 0.02 | 0.000005 | 0.061 | 0.015 | 0.38 | 34 | 0.058 | 4.0 | 0.000043 | 989 | 1.9 | 0.000043 | 0.00043 | 0.019 | 0.005 | 0.01 | 3.4 | 0.43 | 0.079 | 132,811 |
| 2051 | 8.5 | 1,816 | 452 | 24 | 0.032 | 0.0032 | 0.0022 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0048 | 0.009 | 0.05 | 0.0043 | 0.59 | 36 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.38 | 34 | 0.058 | 4.0 | 0.000044 | 995 | 1.9 | 0.000044 | 0.00044 | 0.019 | 0.005 | 0.01 | 2.7 | 0.34 | 0.062 | 133,964 |
| 2052 | 8.5 | 1,827 | 452 | 23 | 0.032 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0048 | 0.009 | 0.05 | 0.0045 | 0.59 | 36 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.38 | 34 | 0.057 | 3.9 | 0.000044 | 1,000 | 1.9 | 0.000044 | 0.00044 | 0.02 | 0.005 | 0.01 | 1.8 | 0.22 | 0.041 | 135,076 |
| 2053 | 8.5 | 1,837 | 453 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0049 | 0.009 | 0.05 | 0.0046 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.38 | 34 | 0.057 | 3.9 | 0.000044 | 1,004 | 1.9 | 0.000044 | 0.00044 | 0.02 | 0.005 | 0.01 | 1.0 | 0.13 | 0.024 | 135,145 |
| 2054 | 8.5 | 1,841 | 452 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0049 | 0.009 | 0.05 | 0.0047 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.37 | 33 | 0.057 | 3.9 | 0.000044 | 1,006 | 1.9 | 0.000044 | 0.00044 | 0.02 | 0.005 | 0.01 | 0.81 | 0.1 | 0.02 | 135,795 |
| 2055 | 8.5 | 1,852 | 452 | 23 | 0.031 | 0.0033 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.005 | 0.009 | 0.05 | 0.0048 | 0.58 | 36 | 0.02 | 0.000005 | 0.062 | 0.017 | 0.37 | 33 | 0.058 | 3.9 | 0.000044 | 1,011 | 1.9 | 0.000045 | 0.00045 | 0.02 | 0.005 | 0.011 | 0.83 | 0.1 | 0.02 | 136,601 |
| 2056 | 8.6 | 1,808 | 551 | 23 | 0.039 | 0.0032 | 0.0023 | 0.0022 | 1.1 | 0.00005 | 7.4 | 0.001 | 0.0048 | 0.01 | 0.05 | 0.0046 | 0.58 | 38 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.37 | 33 | 0.057 | 3.8 | 0.000043 | 1,036 | 1.9 | 0.000043 | 0.00043 | 0.019 | 0.005 | 0.01 | 0.92 | 0.12 | 0.021 | 137,639 |
| 2057 | 8.7 | 1,730 | 711 | 23 | 0.052 | 0.0031 | 0.0022 | 0.0023 | 1.1 | 0.00005 | 4.6 | 0.001 | 0.0044 | 0.013 | 0.05 | 0.0042 | 0.58 | 41 | 0.018 | 0.000005 | 0.058 | 0.015 | 0.37 | 33 | 0.052 | 3.8 | 0.000041 | 1,071 | 1.9 | 0.000042 | 0.00042 | 0.018 | 0.005 | 0.01 | 1.0 | 0.13 | 0.024 | 137,940 |
| 2058 | 8.7 | 1,684 | 803 | 23 | 0.059 | 0.003 | 0.0021 | 0.0024 | 1.1 | 0.00005 | 3.7 | 0.001 | 0.0042 | 0.015 | 0.05 | 0.0039 | 0.58 | 42 | 0.017 | 0.000005 | 0.057 | 0.014 | 0.37 | 33 | 0.049 | 3.8 | 0.00004 | 1,088 | 1.8 | 0.00004 | 0.00041 | 0.018 | 0.005 | 0.01 | 1.2 | 0.15 | 0.027 | 138,218 |
| 2059 | 8.7 | 1,672 | 833 | 23 | 0.063 | 0.0029 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 43 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.37 | 33 | 0.048 | 3.8 | 0.00004 | 1,095 | 1.8 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 1.3 | 0.17 | 0.031 | 138,460 |
| 2060 | 8.7 | 1,671 | 840 | 23 | 0.063 | 0.0029 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 43 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.36 | 33 | 0.048 | 3.8 | 0.00004 | 1,098 | 1.8 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 1.5 | 0.19 | 0.035 | 139,518 |
| 2061 | 8.7 | 1,674 | 839 | 23 | 0.063 | 0.003 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 44 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.36 | 33 | 0.049 | 3.8 | 0.00004 | 1,098 | 1.8 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 1.7 | 0.22 | 0.04 | 139,838 |
| 2062 | 8.8 | 1,663 | 873 | 23 | 0.073 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 3.0 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 44 | 0.017 | 0.000005 | 0.056 | 0.013 | 0.36 | 32 | 0.049 | 3.8 | 0.00004 | 1,108 | 1.8 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 1.9 | 0.25 | 0.045 | 140,676 |
| 2063 | 8.8 | 1,642 | 909 | 22 | 0.08 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 2.7 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0036 | 0.56 | 45 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.36 | 32 | 0.048 | 3.7 | 0.000039 | 1,114 | 1.8 | 0.000039 | 0.00039 | 0.018 | 0.005 | 0.01 | 2.2 | 0.28 | 0.05 | 141,568 |
| 2064 | 8.8 | 1,636 | 916 | 22 | 0.079 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 2.7 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0036 | 0.56 | 45 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.36 | 32 | 0.048 | 3.7 | 0.000039 | 1,114 | 1.8 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 2.4 | 0.31 | 0.056 | 142,789 |
| 2065 | 8.9 | 1,636 | 951 | 22 | 0.096 | 0.0029 | 0.0019 | 0.0026 | 1.0 | 0.00005 | 2.3 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0035 | 0.56 | 46 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.35 | 32 | 0.048 | 3.7 | 0.000039 | 1,129 | 1.8 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 2.7 | 0.34 | 0.062 | 143,409 |
| 2066 | 8.9 | 1,609 | 995 | 22 | 0.11 | 0.0028 | 0.0019 | 0.0026 | 1.0 | 0.00005 | 2.1 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.55 | 47 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.35 | 31 | 0.048 | 3.7 | 0.000039 | 1,135 | 1.8 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 3.0 | 0.37 | 0.068 | 144,573 |
| 2067 | 8.9 | 1,588 | 1,024 | 22 | 0.12 | 0.0028 | 0.0019 | 0.0027 | 1. | 0.00005 | 1.9 | 0.001 | 0.0039 | 0.013 | 0.05 | 0.0033 | 0.55 | 47 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.35 | 31 | 0.047 | 3.6 | 0.000038 | 1,137 | 1.8 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.2 | 0.41 | 0.074 | 145,722 |
| 2068 | 9.0 | 1,582 | 1,039 | 22 | 0.12 | 0.0028 | 0.0019 | 0.0027 | 0.99 | 0.00005 | 1.9 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0033 | 0.54 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 31 | 0.047 | 3.6 | 0.000038 | 1,140 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.5 | 0.44 | 0.08 | 147,284 |
| 2069 | 8.9 | 1,579 | 1,049 | 21 | 0.12 | 0.0028 | 0.0019 | 0.0027 | 0.98 | 0.00005 | 1.9 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.54 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 31 | 0.047 | 3.6 | 0.000038 | 1,142 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.7 | 0.47 | 0.086 | 148,041 |
| 2070 | 8.9 | 1,583 | 1,050 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.97 | 0.00005 | 1.9 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.53 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 30 | 0.048 | 3.5 | 0.000038 | 1,144 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.8 | 0.48 | 0.088 | 149,328 |
| 2071 | 8.9 | 1,583 | 1,051 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.96 | 0.00005 | 2.0 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.53 | 49 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 30 | 0.047 | 3.5 | 0.000038 | 1,144 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.6 | 0.46 | 0.083 | 150,505 |
| 2072 | 8.9 | 1,599 | 1,053 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.96 | 0.00005 | 1.9 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0033 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.33 | 30 | 0.047 | 3.5 | 0.000038 | 1,152 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.3 | 0.42 | 0.076 | 151,916 |
| 2073 | 8.9 | 1,607 | 1,050 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.95 | 0.00005 | 2.0 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.33 | 30 | 0.047 | 3.5 | 0.000038 | 1,155 | 1.7 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 3.0 | 0.38 | 0.07 | 152,292 |
| 2074 | 8.9 | 1,613 | 1,046 | 21 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.95 | 0.00005 | 2.0 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.013 | 0.33 | 30 | 0.048 | 3.5 | 0.000039 | 1,155 | 1.7 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 3.0 | 0.37 | 0.068 | 153,237 |
| 2075 | 8.9 | 1,623 | 1,040 | 21 | 0.11 | 0.0029 | 0.0019 | 0.0026 | 0.94 | 0.00005 | 2.0 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0035 | 0.52 | 49 | 0.017 | 0.000005 | 0.055 | 0.013 | 0.33 | 30 | 0.049 | 3.4 | 0.000039 | 1,158 | 1.7 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 2.9 | 0.37 | 0.067 | 153,995 |
| 2076 | 8.9 | 1,649 | 1,044 | 20 | 0.11 | 0.0029 | 0.002 | 0.0026 | 0.94 | 0.00005 | 1.9 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0036 | 0.51 | 50 | 0.017 | 0.000005 | 0.055 | 0.013 | 0.33 | 29 | 0.05 | 3.4 | 0.000039 | 1,171 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 3.0 | 0.38 | 0.068 | 155,005 |
| 2077 | 8.9 | 1,665 | 1,042 | 20 | 0.11 | 0.0029 | 0.002 | 0.0026 | 0.93 | 0.00005 | 2.0 | 0.001 | 0.0043 | 0.014 | 0.05 | 0.0038 | 0.51 | 50 | 0.018 | 0.000005 | 0.056 | 0.014 | 0.33 | 29 | 0.052 | 3.4 | 0.00004 | 1,177 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 3.1 | 0.39 | 0.07 | 155,356 |
| 2078 | 8.9 | 1,678 | 1,039 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.93 | 0.00005 | 2.0 | 0.001 | 0.0044 | 0.014 | 0.05 | 0.0039 | 0.51 | 50 | 0.018 | 0.000005 | 0.056 | 0.014 | 0.32 | 29 | 0.054 | 3.4 | 0.00004 | 1,182 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 3.2 | 0.4 | 0.073 | 156,236 |
| 2079 | 8.9 | 1,688 | 1,042 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.92 | 0.00005 | 2.0 | 0.001 | 0.0045 | 0.014 | 0.05 | 0.004 | 0.51 | 50 | 0.019 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.055 | 3.4 | 0.00004 | 1,188 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.2 | 0.41 | 0.074 | 157,251 |
| 2080 | 8.9 | 1,694 | 1,048 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.92 | 0.00005 | 2.0 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0041 | 0.5 | 50 | 0.019 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.057 | 3.3 | 0.000041 | 1,193 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.2 | 0.41 | 0.074 | 158,470 |
| 2081 | 8.9 | 1,705 | 1,047 | 20 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 2.0 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0042 | 0.5 | 51 | 0.02 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.058 | 3.3 | 0.000041 | 1,198 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.3 | 0.41 | 0.075 | 158,838 |
| 2082 | 9.0 | 1,698 | 1,066 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 1.9 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0043 | 0.5 | 51 | 0.02 | 0.000005 | 0.057 | 0.015 | 0.32 | 28 | 0.058 | 3.3 | 0.000041 | 1,202 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.2 | 0.4 | 0.073 | 159,814 |
| 2083 | 9.0 | 1,686 | 1,086 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 1.8 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0043 | 0.5 | 51 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.32 | 28 | 0.059 | 3.3 | 0.000041 | 1,205 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.2 | 0.41 | 0.074 | 160,383 |
| 2084 | 9.0 | 1,688 | 1,093 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.9 | 0.00005 | 1.8 | 0.001 | 0.0049 | 0.014 | 0.05 | 0.0044 | 0.49 | 52 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.06 | 3.3 | 0.000041 | 1,208 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.2 | 0.4 | 0.072 | 161,637 |
| 2085 | 9.0 | 1,681 | 1,104 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.9 | 0.00005 | 1.8 | 0.001 | 0.0049 | 0.014 | 0.05 | 0.0044 | 0.49 | 52 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.06 | 3.3 | 0.00004 | 1,209 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 3.2 | 0.41 | 0.074 | 161,890 |
| 2086 | 9.0 | 1,685 | 1,107 | 20 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.89 | 0.00005 | 1.8 | 0.001 | 0.005 | 0.015 | 0.05 | 0.0044 | 0.49 | 53 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.06 | 3.3 | 0.000041 | 1,212 | 1.6 | 0.00004 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.1 | 0.4 | 0.072 | 162,778 |
| 2087 | 9.0 | 1,679 | 1,114 | 19 | 0.12 | 0.003 | 0.0022 | 0.0026 | 0.89 | 0.00005 | 1.8 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0044 | 0.49 | 53 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.06 | 3.2 | 0.00004 | 1,211 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 3.1 | 0.4 | 0.072 | 163,470 |
| 2088 | 9.0 | 1,691 | 1,120 | 19 | 0.12 | 0.003 | 0.0023 | 0.0026 | 0.88 | 0.00005 | 1.8 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0044 | 0.48 | 53 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.06 | 3.2 | 0.000041 | 1,219 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.0 | 0.37 | 0.068 | 164,570 |
| 2089 | 9.0 | 1,688 | 1,142 | 19 | 0.13 | 0.003 | 0.0022 | 0.0027 | 0.88 | 0.00005 | 1.7 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0044 | 0.48 | 54 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.059 | 3.2 | 0.00004 | 1,226 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 3.0 | 0.37 | 0.068 | 164,772 |
| 2090 | 9.0 | 1,679 | 1,158 | 19 | 0.14 | 0.003 | 0.0022 | 0.0027 | 0.88 | 0.00005 | 1.6 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0044 | 0.48 | 55 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 27 | 0.059 | 3.2 | 0.00004 | 1,229 | 1.5 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 2.8 | 0.35 | 0.064 | 165,462 |
| 2091 | 9.0 | 1,674 | 1,167 | 19 | 0.14 | 0.003 | 0.0022 | 0.0027 | 0.87 | 0.00005 | 1.6 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0043 | 0.48 | 55 | 0.02 | 0.000005 | 0.056 | 0.016 | 0.31 | 27 | 0.058 | 3.2 | 0.00004 | 1,230 | 1.5 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 2.8 | 0.35 | 0.064 | 166,285 |
| 2092 | 9.0 | 1,674 | 1,175 | 19 | 0.14 | 0.003 | 0.0022 | 0.0027 | 0.87 | 0.00005 | 1.6 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0043 | 0.48 | 56 | 0.02 | 0.000005 | 0.056 | 0.016 | 0.3 | 27 | 0.058 | 3.2 | 0.00004 | 1,232 | 1.5 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 2.8 | 0.35 | 0.063 | 167,587 |
| 2093 | 9.0 | 1,659 | 1,195 | 19 | 0.14 | 0.0029 | 0.0022 | 0.0027 | 0.86 | 0.00005 | 1.5 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0043 | 0.47 | 56 | 0.02 | 0.000005 | 0.056 | 0.015 | 0.3 | 27 | 0.058 | 3.2 | 0.000039 | 1,233 | 1.5 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 2.9 | 0.36 | 0.066 | 168,175 |
| 2094 | 9.0 | 1,636 | 1,221 | 19 | 0.15 | 0.0029 | 0.0022 | 0.0028 | 0.86 | 0.00005 | 1.5 | 0.001 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.47 | 57 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.3 | 27 | 0.057 | 3.1 | 0.000039 | 1,233 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 2.9 | 0.37 | 0.067 | 169,130 |
| 2095 | 9.0 | 1,622 | 1,230 | 19 | 0.15 | 0.0029 | 0.0021 | 0.0028 | 0.86 | 0.00005 | 1.5 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0041 | 0.47 | 57 | 0.019 | 0.000005 | 0.055 | 0.015 | 0.3 | 27 | 0.056 | 3.1 | 0.000039 | 1,230 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 3.1 | 0.39 | 0.071 | 169,816 |
| 2096 | 9.0 | 1,600 | 1,244 | 19 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.85 | 0.00005 | 1.4 | 0.001 | 0.0045 | 0.014 | 0.05 | 0.004 | 0.47 | 57 | 0.019 | 0.000005 | 0.054 | 0.015 | 0.3 | 27 | 0.055 | 3.1 | 0.000038 | 1,225 | 1.5 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.2 | 0.41 | 0.074 | 170,905 |
| 2097 | 9.0 | 1,599 | 1,248 | 19 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.85 | 0.00005 | 1.4 | 0.001 | 0.0045 | 0.014 | 0.05 | 0.004 | 0.47 | 58 | 0.019 | 0.000005 | 0.054 | 0.015 | 0.3 | 27 | 0.056 | 3.1 | 0.000038 | 1,226 | 1.5 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.4 | 0.43 | 0.078 | 171,124 |
| 2098 | 9.0 | 1,593 | 1,256 | 18 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.85 | 0.00005 | 1.4 | 0.001 | 0.0045 | 0.014 | 0.05 | 0.0039 | 0.46 | 58 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.3 | 26 | 0.056 | 3.1 | 0.000038 | 1,226 | 1.5 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.6 | 0.45 | 0.082 | 171,837 |
| 2099 | 9.0 | 1,595 | 1,257 | 18 | 0.14 | 0.0028 | 0.0021 | 0.0028 | 0.84 | 0.00005 | 1.5 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.004 | 0.46 | 59 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.056 | 3.1 | 0.000038 | 1,227 | 1.5 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.7 | 0.47 | 0.086 | 172,453 |
| 2100 | 9.0 | 1,603 | 1,268 | 18 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.84 | 0.00005 | 1.4 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0039 | 0.46 | 59 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.057 | 3.1 | 0.000038 | 1,234 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 3.9 | 0.49 | 0.09 | 173,472 |
| 2101 | 9.0 | 1,610 | 1,269 | 18 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.4 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.004 | 0.46 | 60 | 0.019 | 0.000005 | 0.054 | 0.015 | 0.29 | 26 | 0.057 | 3.0 | 0.000038 | 1,238 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 4.1 | 0.51 | 0.093 | 174,383 |
| 2102 | 9.0 | 1,612 | 1,273 | 18 | 0.15 | 0.0028 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.4 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.004 | 0.45 | 60 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.29 | 26 | 0.058 | 3.0 | 0.000039 | 1,240 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 4.2 | 0.54 | 0.097 | 175,164 |
| 2103 | 9.1 | 1,636 | 1,280 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.4 | 0.001 | 0.0047 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.059 | 3.0 | 0.000039 | 1,253 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 4.4 | 0.56 | 0.101 | 175,863 |
| 2104 | 9.1 | 1,648 | 1,284 | 18 | 0.16 | 0.0029 | 0.0022 | 0.0028 | 0.82 | 0.00005 | 1.4 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0041 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.06 | 3.0 | 0.000039 | 1,259 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 4.6 | 0.58 | 0.105 | 177,220 |
| 2105 | 9.1 | 1,638 | 1,292 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.82 | 0.00005 | 1.3 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.06 | 3.0 | 0.000039 | 1,258 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 4.7 | 0.6 | 0.108 | 177,533 |
| 2106 | 9.1 | 1,606 | 1,315 | 18 | 0.17 | 0.0028 | 0.0021 | 0.0029 | 0.82 | 0.00005 | 1.3 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0038 | 0.45 | 62 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 26 | 0.058 | 3.0 | 0.000038 | 1,253 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 4.9 | 0.61 | 0.112 | 178,211 |
| 2107 | 9.1 | 1,600 | 1,330 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.3 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0038 | 0.45 | 62 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 25 | 0.058 | 3.0 | 0.000038 | 1,256 | 1.4 | 0.000039 | 0.00038 | 0.017 | 0.005 | 0.01 | 5.0 | 0.63 | 0.114 | 179,040 |
| 2108 | 9.1 | 1,603 | 1,342 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.2 | 0.001 | 0.0047 | 0.014 | 0.05 | 0.0039 | 0.44 | 63 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 25 | 0.059 | 2.9 | 0.000038 | 1,262 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 5.1 | 0.64 | 0.117 | 180,178 |
| 2109 | 9.1 | 1,607 | 1,351 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.2 | 0.001 | 0.0047 | 0.014 | 0.05 | 0.0039 | 0.44 | 63 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.28 | 25 | 0.06 | 2.9 | 0.000038 | 1,266 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 5.2 | 0.66 | 0.119 | 180,248 |
| 2110 | 9.1 | 1,615 | 1,358 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.004 | 0.44 | 64 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.28 | 25 | 0.061 | 2.9 | 0.000039 | 1,272 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 5.3 | 0.67 | 0.122 | 180,830 |
| 2111 | 9.1 | 1,622 | 1,364 | 18 | 0.18 | 0.0029 | 0.0021 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.001 | 0.0049 | 0.014 | 0.05 | 0.004 | 0.44 | 65 | 0.021 | 0.000005 | 0.055 | 0.015 | 0.28 | 25 | 0.062 | 2.9 | 0.000039 | 1,278 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 5.4 | 0.68 | 0.124 | 181,243 |
| 2112 | 9.1 | 1,636 | 1,369 | 17 | 0.18 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.001 | 0.005 | 0.014 | 0.05 | 0.0041 | 0.44 | 65 | 0.021 | 0.000005 | 0.055 | 0.015 | 0.28 | 25 | 0.063 | 2.9 | 0.000039 | 1,285 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 5.5 | 0.69 | 0.13 | 181,975 |
| 2113 | 9.1 | 1,642 | 1,373 | 17 | 0.18 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.001 | 0.005 | 0.014 | 0.05 | 0.0042 | 0.44 | 66 | 0.022 | 0.000005 | 0.055 | 0.016 | 0.28 | 25 | 0.064 | 2.9 | 0.000039 | 1,289 | 1.4 | 0.00004 | 0.00039 | 0.018 | 0.005 | 0.01 | 5.6 | 0.7 | 0.13 | 181,870 |
| 2114 | 9.1 | 1,657 | 1,375 | 17 | 0.18 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.001 | 0.0052 | 0.014 | 0.05 | 0.0043 | 0.44 | 66 | 0.022 | 0.000005 | 0.056 | 0.016 | 0.28 | 25 | 0.065 | 2.9 | 0.00004 | 1,296 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 5.6 | 0.71 | 0.13 | 182,135 |
| 2115 | 9.1 | 1,663 | 1,378 | 17 | 0.17 | 0.0029 | 0.0023 | 0.0029 | 0.8 | 0.00005 | 1.3 | 0.001 | 0.0052 | 0.014 | 0.05 | 0.0043 | 0.44 | 67 | 0.022 | 0.000005 | 0.056 | 0.016 | 0.28 | 25 | 0.066 | 2.9 | 0.00004 | 1,300 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 5.6 | 0.7 | 0.13 | 182,344 |
| 2116 | 9.1 | 1,678 | 1,379 | 17 | 0.17 | 0.003 | 0.0023 | 0.0028 | 0.79 | 0.00005 | 1.3 | 0.001 | 0.0053 | 0.014 | 0.05 | 0.0044 | 0.43 | 67 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,306 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 5.5 | 0.69 | 0.13 | 183,370 |
| 2117 | 9.1 | 1,671 | 1,392 | 17 | 0.18 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.001 | 0.0053 | 0.014 | 0.05 | 0.0045 | 0.43 | 67 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,308 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 5.3 | 0.68 | 0.12 | 183,400 |
| 2118 | 9.1 | 1,667 | 1,407 | 17 | 0.18 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.001 | 0.0054 | 0.014 | 0.05 | 0.0045 | 0.43 | 68 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,312 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.011 | 5.2 | 0.66 | 0.12 | 183,657 |
| 2119 | 9.1 | 1,664 | 1,415 | 17 | 0.18 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.001 | 0.0054 | 0.014 | 0.05 | 0.0045 | 0.43 | 68 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,314 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.011 | 5.0 | 0.63 | 0.11 | 183,671 |
| 2120 | 9.1 | 1,663 | 1,425 | 17 | 0.18 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.001 | 0.0054 | 0.014 | 0.05 | 0.0046 | 0.43 | 69 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,317 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.011 | 4.8 | 0.61 | 0.11 | 184,250 |
| 2121 | 9.1 | 1,656 | 1,451 | 17 | 0.2 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.1 | 0.001 | 0.0054 | 0.014 | 0.05 | 0.0046 | 0.43 | 70 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,325 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.011 | 4.6 | 0.58 | 0.106 | 184,044 |
| 2122 | 9.1 | 1,633 | 1,480 | 17 | 0.21 | 0.0029 | 0.0023 | 0.003 | 0.79 | 0.00005 | 1.1 | 0.001 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 70 | 0.022 | 0.000005 | 0.055 | 0.017 | 0.28 | 25 | 0.066 | 2.9 | 0.00004 | 1,325 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.011 | 4.4 | 0.56 | 0.101 | 184,430 |
| 2123 | 9.1 | 1,623 | 1,492 | 17 | 0.22 | 0.0029 | 0.0023 | 0.003 | 0.79 | 0.00005 | 1.1 | 0.001 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 71 | 0.022 | 0.000005 | 0.055 | 0.017 | 0.27 | 25 | 0.065 | 2.9 | 0.000039 | 1,325 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.011 | 4.2 | 0.54 | 0.098 | 184,660 |
| 2124 | 9.2 | 1,607 | 1,511 | 17 | 0.22 | 0.0028 | 0.0023 | 0.003 | 0.78 | 0.00005 | 1.0 | 0.001 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 72 | 0.022 | 0.000005 | 0.054 | 0.017 | 0.27 | 25 | 0.065 | 2.9 | 0.000039 | 1,325 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.011 | 4.0 | 0.5 | 0.091 | 185,381 |
| 2125 | 9.2 | 1,601 | 1,519 | 17 | 0.22 | 0.0028 | 0.0023 | 0.003 | 0.78 | 0.00005 | 1.0 | 0.001 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 72 | 0.022 | 0.000005 | 0.054 | 0.017 | 0.27 | 25 | 0.064 | 2.9 | 0.000039 | 1,325 | 1.4 | 0.000039 | 0.00038 | 0.017 | 0.005 | 0.011 | 3.8 | 0.48 | 0.087 | 185,380 |
| 2126 | 9.2 | 1,589 | 1,533 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 1.01 | 0.001 | 0.0051 | 0.015 | 0.05 | 0.0046 | 0.43 | 73 | 0.021 | 0.000005 | 0.053 | 0.017 | 0.27 | 24 | 0.063 | 2.9 | 0.000038 | 1,324 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.4 | 0.43 | 0.077 | 185,890 |
| 2127 | 9.2 | 1,585 | 1,541 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 1. | 0.001 | 0.0051 | 0.015 | 0.05 | 0.0046 | 0.43 | 73 | 0.021 | 0.000005 | 0.053 | 0.017 | 0.27 | 24 | 0.062 | 2.9 | 0.000038 | 1,325 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.2 | 0.4 | 0.073 | 185,957 |
| 2128 | 9.2 | 1,576 | 1,555 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.99 | 0.001 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.43 | 74 | 0.021 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.061 | 2.8 | 0.000038 | 1,326 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 2.7 | 0.35 | 0.063 | 186,328 |
| 2129 | 9.2 | 1,576 | 1,560 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.99 | 0.001 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.43 | 74 | 0.021 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.06 | 2.9 | 0.000038 | 1,327 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 2.6 | 0.32 | 0.059 | 185,930 |
| 2130 | 9.2 | 1,568 | 1,571 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.98 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 75 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.059 | 2.9 | 0.000038 | 1,327 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 2.2 | 0.28 | 0.052 | 186,107 |
| 2131 | 9.2 | 1,571 | 1,576 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.98 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 76 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.058 | 2.9 | 0.000038 | 1,330 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 2.1 | 0.27 | 0.049 | 186,064 |
| 2132 | 9.2 | 1,566 | 1,585 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 76 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,330 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 2.0 | 0.25 | 0.045 | 186,657 |
| 2133 | 9.2 | 1,570 | 1,589 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 77 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.9 | 0.000038 | 1,333 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 1.9 | 0.24 | 0.044 | 186,125 |
| 2134 | 9.2 | 1,568 | 1,595 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.96 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 77 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,334 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 1.8 | 0.23 | 0.042 | 186,338 |

**Table A7.** Source terms of the NAG backfill for the low nitrogen scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | $m^3$/year |
| 2135 | 9.2 | 1,573 | 1,597 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 78 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,337 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 1.8 | 0.23 | 0.042 | 186,569 |
| 2136 | 9.2 | 1,572 | 1,603 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.96 | 0.001 | 0.0047 | 0.015 | 0.05 | 0.0044 | 0.43 | 78 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,338 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 1.8 | 0.23 | 0.041 | 187,180 |
| 2137 | 9.2 | 1,578 | 1,606 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.96 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 78 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,341 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 1.8 | 0.23 | 0.041 | 186,716 |
| 2138 | 9.2 | 1,565 | 1,622 | 17 | 0.24 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.94 | 0.001 | 0.0047 | 0.015 | 0.05 | 0.0043 | 0.43 | 79 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,342 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 1.8 | 0.23 | 0.041 | 186,790 |
| 2139 | 9.2 | 1,549 | 1,640 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.92 | 0.001 | 0.0046 | 0.015 | 0.05 | 0.0043 | 0.43 | 80 | 0.019 | 0.000005 | 0.052 | 0.015 | 0.27 | 24 | 0.055 | 2.8 | 0.000037 | 1,341 | 1.4 | 0.000037 | 0.00037 | 0.017 | 0.005 | 0.01 | 1.8 | 0.23 | 0.041 | 187,056 |
| 2140 | 9.2 | 1,541 | 1,650 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.91 | 0.001 | 0.0046 | 0.015 | 0.05 | 0.0042 | 0.43 | 80 | 0.019 | 0.000005 | 0.052 | 0.015 | 0.27 | 24 | 0.054 | 2.8 | 0.000037 | 1,341 | 1.4 | 0.000037 | 0.00037 | 0.016 | 0.005 | 0.01 | 1.8 | 0.23 | 0.041 | 187,514 |
| 2141 | 9.2 | 1,529 | 1,664 | 17 | 0.26 | 0.0027 | 0.0022 | 0.0033 | 0.78 | 0.00005 | 0.89 | 0.001 | 0.0045 | 0.015 | 0.05 | 0.0042 | 0.43 | 81 | 0.018 | 0.000005 | 0.051 | 0.015 | 0.27 | 24 | 0.054 | 2.8 | 0.000037 | 1,341 | 1.4 | 0.000037 | 0.00037 | 0.016 | 0.005 | 0.01 | 1.8 | 0.23 | 0.042 | 186,895 |
| 2142 | 9.2 | 1,523 | 1,670 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.89 | 0.001 | 0.0045 | 0.015 | 0.05 | 0.0041 | 0.43 | 81 | 0.018 | 0.000005 | 0.051 | 0.015 | 0.27 | 24 | 0.053 | 2.8 | 0.000036 | 1,340 | 1.4 | 0.000037 | 0.00037 | 0.016 | 0.005 | 0.01 | 1.8 | 0.23 | 0.042 | 186,886 |
| 2143 | 9.2 | 1,512 | 1,682 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.88 | 0.001 | 0.0044 | 0.015 | 0.05 | 0.004 | 0.43 | 82 | 0.018 | 0.000005 | 0.051 | 0.014 | 0.27 | 24 | 0.052 | 2.8 | 0.000036 | 1,339 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 1.8 | 0.23 | 0.042 | 187,034 |
| 2144 | 9.2 | 1,507 | 1,687 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.87 | 0.001 | 0.0043 | 0.014 | 0.05 | 0.004 | 0.43 | 82 | 0.018 | 0.000005 | 0.051 | 0.014 | 0.27 | 24 | 0.051 | 2.8 | 0.000036 | 1,338 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 1.8 | 0.23 | 0.042 | 187,551 |
| 2145 | 9.2 | 1,498 | 1,697 | 17 | 0.26 | 0.0026 | 0.0021 | 0.0034 | 0.78 | 0.00005 | 0.87 | 0.001 | 0.0042 | 0.014 | 0.05 | 0.0039 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.014 | 0.27 | 24 | 0.05 | 2.8 | 0.000036 | 1,338 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 1.8 | 0.23 | 0.042 | 187,019 |
| 2146 | 9.2 | 1,494 | 1,702 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.001 | 0.0042 | 0.014 | 0.05 | 0.0038 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.014 | 0.27 | 24 | 0.049 | 2.8 | 0.000036 | 1,337 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 1.8 | 0.23 | 0.042 | 187,081 |
| 2147 | 9.2 | 1,487 | 1,710 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0037 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.048 | 2.8 | 0.000036 | 1,336 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 1.8 | 0.23 | 0.041 | 187,212 |
| 2148 | 9.2 | 1,483 | 1,714 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0037 | 0.42 | 84 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.048 | 2.8 | 0.000035 | 1,336 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 1.8 | 0.23 | 0.041 | 187,667 |
| 2149 | 9.2 | 1,477 | 1,721 | 17 | 0.27 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.85 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0036 | 0.43 | 84 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.046 | 2.8 | 0.000035 | 1,335 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 1.7 | 0.22 | 0.04 | 187,030 |
| 2150 | 9.2 | 1,474 | 1,724 | 17 | 0.27 | 0.0026 | 0.0019 | 0.0034 | 0.78 | 0.00005 | 0.85 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0035 | 0.43 | 85 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.046 | 2.8 | 0.000035 | 1,335 | 1.4 | 0.000035 | 0.00035 | 0.016 | 0.005 | 0.01 | 1.7 | 0.21 | 0.039 | 186,985 |

**Table A8.** Annual loads of the NAG backfill for the low nitrogen scenario.

| Model Year | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year as CaCO3 | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year |
| 2023 | 29 | 1.8 | 0.69 | 0.00041 | 0.000052 | 0.000029 | 0.000057 | 0.032 | 0.0000012 | 0.67 | 0.000024 | 0.00014 |
| 2024 | 53 | 3.2 | 1.3 | 0.00074 | 0.000094 | 0.000053 | 0.0001 | 0.057 | 0.0000022 | 1.2 | 0.000044 | 0.00025 |
| 2025 | 97 | 5.9 | 2.3 | 0.0014 | 0.00017 | 0.000097 | 0.00019 | 0.11 | 0.000004 | 2.2 | 0.00008 | 0.00046 |
| 2026 | 152 | 9.1 | 3.6 | 0.0021 | 0.00027 | 0.00015 | 0.00029 | 0.16 | 0.0000063 | 3.5 | 0.00013 | 0.00072 |
| 2027 | 191 | 11 | 4.5 | 0.0027 | 0.00034 | 0.00019 | 0.00037 | 0.21 | 0.0000079 | 4.4 | 0.00016 | 0.0009 |
| 2028 | 349 | 21 | 8.2 | 0.0048 | 0.00062 | 0.00035 | 0.00068 | 0.38 | 0.000014 | 8.0 | 0.00029 | 0.0017 |
| 2029 | 326 | 20 | 7.7 | 0.0045 | 0.00057 | 0.00032 | 0.00063 | 0.35 | 0.000013 | 7.5 | 0.00027 | 0.0015 |
| 2030 | 421 | 25 | 9.9 | 0.0058 | 0.00074 | 0.00042 | 0.00081 | 0.45 | 0.000017 | 9.7 | 0.00035 | 0.002 |
| 2031 | 2,705 | 163 | 64 | 0.038 | 0.0048 | 0.0027 | 0.0052 | 2.9 | 0.00011 | 62 | 0.0022 | 0.013 |
| 2032 | 4,396 | 264 | 104 | 0.061 | 0.0078 | 0.0044 | 0.0085 | 4.7 | 0.00018 | 101 | 0.0036 | 0.021 |
| 2033 | 750 | 45 | 18 | 0.01 | 0.0013 | 0.00075 | 0.0015 | 0.81 | 0.000031 | 17 | 0.00062 | 0.0035 |
| 2034 | 3,015 | 181 | 71 | 0.042 | 0.0053 | 0.003 | 0.0058 | 3.3 | 0.00012 | 69 | 0.0025 | 0.014 |
| 2035 | 8,570 | 516 | 202 | 0.12 | 0.015 | 0.0085 | 0.017 | 9.3 | 0.00035 | 197 | 0.0071 | 0.041 |
| 2036 | 14,616 | 879 | 345 | 0.2 | 0.026 | 0.015 | 0.028 | 16 | 0.0006 | 336 | 0.012 | 0.069 |
| 2037 | 16,287 | 980 | 385 | 0.23 | 0.029 | 0.016 | 0.032 | 18 | 0.00067 | 374 | 0.013 | 0.077 |
| 2038 | 32,604 | 1,961 | 770 | 0.45 | 0.057 | 0.032 | 0.063 | 35 | 0.0013 | 749 | 0.027 | 0.15 |
| 2039 | 59,745 | 6,372 | 1,312 | 0.94 | 0.11 | 0.058 | 0.11 | 60 | 0.0023 | 1,423 | 0.046 | 0.27 |
| 2040 | 115,715 | 19,463 | 2,260 | 1.5 | 0.2 | 0.11 | 0.18 | 103 | 0.004 | 2,290 | 0.079 | 0.45 |
| 2041 | 167,182 | 42,337 | 3,172 | 3.1 | 0.29 | 0.16 | 0.25 | 145 | 0.0055 | 1,440 | 0.11 | 0.46 |
| 2042 | 181,431 | 51,233 | 3,172 | 3.8 | 0.32 | 0.19 | 0.31 | 145 | 0.0064 | 1,494 | 0.13 | 0.39 |
| 2043 | 183,557 | 52,414 | 3,172 | 3.9 | 0.32 | 0.19 | 0.32 | 145 | 0.0067 | 1,574 | 0.13 | 0.35 |
| 2044 | 184,376 | 52,092 | 3,171 | 3.9 | 0.33 | 0.2 | 0.33 | 145 | 0.0068 | 1,671 | 0.14 | 0.35 |
| 2045 | 187,155 | 52,976 | 3,172 | 3.9 | 0.33 | 0.2 | 0.32 | 145 | 0.0067 | 1,557 | 0.13 | 0.37 |
| 2046 | 186,745 | 51,799 | 3,172 | 3.8 | 0.33 | 0.2 | 0.3 | 145 | 0.0064 | 1,486 | 0.13 | 0.39 |
| 2047 | 201,983 | 52,985 | 3,173 | 3.8 | 0.36 | 0.22 | 0.29 | 145 | 0.0064 | 1,470 | 0.13 | 0.44 |
| 2048 | 222,414 | 56,058 | 3,173 | 4.0 | 0.39 | 0.25 | 0.28 | 145 | 0.0065 | 1,442 | 0.13 | 0.52 |
| 2049 | 232,882 | 58,638 | 3,174 | 4.1 | 0.41 | 0.27 | 0.28 | 145 | 0.0066 | 1,397 | 0.13 | 0.59 |
| 2050 | 239,485 | 59,886 | 3,174 | 4.2 | 0.42 | 0.29 | 0.28 | 145 | 0.0066 | 1,404 | 0.13 | 0.63 |
| 2051 | 243,278 | 60,526 | 3,174 | 4.2 | 0.43 | 0.3 | 0.28 | 145 | 0.0067 | 1,417 | 0.13 | 0.65 |
| 2052 | 246,757 | 61,084 | 3,174 | 4.3 | 0.44 | 0.3 | 0.28 | 145 | 0.0068 | 1,431 | 0.14 | 0.65 |
| 2053 | 248,235 | 61,157 | 3,174 | 4.3 | 0.44 | 0.31 | 0.28 | 145 | 0.0068 | 1,435 | 0.14 | 0.66 |
| 2054 | 249,944 | 61,387 | 3,174 | 4.3 | 0.44 | 0.31 | 0.28 | 145 | 0.0068 | 1,446 | 0.14 | 0.66 |
| 2055 | 252,972 | 61,688 | 3,174 | 4.3 | 0.45 | 0.32 | 0.29 | 145 | 0.0068 | 1,462 | 0.14 | 0.68 |
| 2056 | 248,809 | 75,905 | 3,175 | 5.4 | 0.44 | 0.31 | 0.3 | 145 | 0.0069 | 1,017 | 0.14 | 0.67 |
| 2057 | 238,664 | 98,121 | 3,175 | 7.1 | 0.42 | 0.3 | 0.32 | 145 | 0.0069 | 641 | 0.14 | 0.61 |
| 2058 | 232,800 | 110,938 | 3,176 | 8.2 | 0.41 | 0.28 | 0.33 | 145 | 0.0069 | 518 | 0.14 | 0.58 |
| 2059 | 231,450 | 115,350 | 3,176 | 8.7 | 0.41 | 0.28 | 0.34 | 145 | 0.0069 | 480 | 0.14 | 0.57 |
| 2060 | 233,135 | 117,134 | 3,176 | 8.8 | 0.41 | 0.28 | 0.34 | 145 | 0.007 | 483 | 0.14 | 0.57 |
| 2061 | 234,102 | 117,262 | 3,176 | 8.7 | 0.41 | 0.28 | 0.34 | 145 | 0.007 | 486 | 0.14 | 0.58 |
| 2062 | 233,972 | 122,782 | 3,176 | 10 | 0.41 | 0.28 | 0.35 | 145 | 0.007 | 425 | 0.14 | 0.58 |
| 2063 | 232,497 | 128,745 | 3,176 | 11 | 0.41 | 0.28 | 0.36 | 145 | 0.0071 | 387 | 0.14 | 0.57 |
| 2064 | 233,632 | 130,824 | 3,176 | 11 | 0.41 | 0.28 | 0.36 | 145 | 0.0071 | 389 | 0.14 | 0.57 |
| 2065 | 234,574 | 136,451 | 3,176 | 14 | 0.41 | 0.28 | 0.37 | 145 | 0.0072 | 335 | 0.14 | 0.57 |
| 2066 | 232,619 | 143,839 | 3,176 | 16 | 0.41 | 0.28 | 0.38 | 145 | 0.0072 | 299 | 0.14 | 0.56 |
| 2067 | 231,421 | 149,219 | 3,177 | 17 | 0.41 | 0.27 | 0.39 | 145 | 0.0073 | 283 | 0.15 | 0.56 |
| 2068 | 232,988 | 153,013 | 3,177 | 17 | 0.41 | 0.28 | 0.4 | 145 | 0.0074 | 281 | 0.15 | 0.56 |
| 2069 | 233,683 | 155,281 | 3,177 | 17 | 0.41 | 0.28 | 0.4 | 145 | 0.0074 | 282 | 0.15 | 0.56 |
| 2070 | 236,372 | 156,735 | 3,177 | 17 | 0.42 | 0.28 | 0.4 | 145 | 0.0075 | 289 | 0.15 | 0.57 |
| 2071 | 238,235 | 158,106 | 3,177 | 16 | 0.42 | 0.28 | 0.4 | 145 | 0.0075 | 296 | 0.15 | 0.57 |
| 2072 | 242,837 | 159,906 | 3,177 | 17 | 0.43 | 0.29 | 0.41 | 145 | 0.0076 | 292 | 0.15 | 0.58 |
| 2073 | 244,688 | 159,952 | 3,177 | 17 | 0.43 | 0.29 | 0.41 | 145 | 0.0076 | 297 | 0.15 | 0.59 |
| 2074 | 247,186 | 160,209 | 3,177 | 17 | 0.44 | 0.29 | 0.41 | 145 | 0.0077 | 305 | 0.15 | 0.6 |
| 2075 | 249,903 | 160,201 | 3,177 | 16 | 0.44 | 0.3 | 0.41 | 145 | 0.0077 | 314 | 0.15 | 0.62 |
| 2076 | 255,542 | 161,888 | 3,177 | 18 | 0.45 | 0.31 | 0.41 | 145 | 0.0078 | 302 | 0.16 | 0.64 |
| 2077 | 258,668 | 161,866 | 3,177 | 18 | 0.46 | 0.32 | 0.4 | 145 | 0.0078 | 305 | 0.16 | 0.66 |
| 2078 | 262,211 | 162,267 | 3,177 | 18 | 0.46 | 0.32 | 0.4 | 145 | 0.0078 | 311 | 0.16 | 0.69 |
| 2079 | 265,455 | 163,902 | 3,177 | 18 | 0.47 | 0.33 | 0.41 | 145 | 0.0079 | 311 | 0.16 | 0.71 |
| 2080 | 268,416 | 166,108 | 3,177 | 18 | 0.47 | 0.34 | 0.41 | 145 | 0.0079 | 311 | 0.16 | 0.74 |
| 2081 | 270,883 | 166,367 | 3,177 | 18 | 0.48 | 0.35 | 0.41 | 145 | 0.0079 | 316 | 0.16 | 0.76 |
| 2082 | 271,299 | 170,361 | 3,177 | 19 | 0.48 | 0.35 | 0.41 | 145 | 0.008 | 304 | 0.16 | 0.77 |
| 2083 | 270,406 | 174,128 | 3,178 | 20 | 0.48 | 0.35 | 0.42 | 145 | 0.008 | 294 | 0.16 | 0.78 |
| 2084 | 272,860 | 176,718 | 3,178 | 20 | 0.48 | 0.36 | 0.42 | 145 | 0.0081 | 295 | 0.16 | 0.79 |
| 2085 | 272,104 | 178,645 | 3,178 | 20 | 0.48 | 0.36 | 0.43 | 145 | 0.0081 | 293 | 0.16 | 0.79 |
| 2086 | 274,233 | 180,244 | 3,178 | 20 | 0.48 | 0.37 | 0.43 | 145 | 0.0081 | 296 | 0.16 | 0.81 |
| 2087 | 274,498 | 182,023 | 3,178 | 19 | 0.48 | 0.37 | 0.43 | 145 | 0.0082 | 298 | 0.16 | 0.8 |
| 2088 | 278,287 | 184,335 | 3,178 | 20 | 0.49 | 0.37 | 0.43 | 145 | 0.0082 | 293 | 0.16 | 0.81 |
| 2089 | 278,103 | 188,088 | 3,178 | 22 | 0.49 | 0.37 | 0.44 | 145 | 0.0082 | 274 | 0.16 | 0.81 |
| 2090 | 277,811 | 191,638 | 3,178 | 23 | 0.49 | 0.37 | 0.44 | 145 | 0.0083 | 268 | 0.17 | 0.81 |
| 2091 | 278,428 | 193,988 | 3,178 | 23 | 0.49 | 0.37 | 0.45 | 145 | 0.0083 | 267 | 0.17 | 0.81 |
| 2092 | 280,491 | 196,915 | 3,178 | 23 | 0.49 | 0.37 | 0.45 | 145 | 0.0084 | 268 | 0.17 | 0.81 |
| 2093 | 278,918 | 201,019 | 3,178 | 24 | 0.49 | 0.37 | 0.46 | 145 | 0.0084 | 258 | 0.17 | 0.8 |
| 2094 | 276,748 | 206,424 | 3,178 | 25 | 0.49 | 0.37 | 0.47 | 145 | 0.0085 | 249 | 0.17 | 0.8 |
| 2095 | 275,408 | 208,789 | 3,178 | 25 | 0.49 | 0.36 | 0.47 | 145 | 0.0085 | 248 | 0.17 | 0.79 |
| 2096 | 273,448 | 212,623 | 3,178 | 26 | 0.48 | 0.36 | 0.48 | 145 | 0.0085 | 246 | 0.17 | 0.77 |
| 2097 | 273,679 | 213,477 | 3,178 | 26 | 0.48 | 0.36 | 0.48 | 145 | 0.0086 | 247 | 0.17 | 0.78 |
| 2098 | 273,719 | 215,844 | 3,179 | 25 | 0.48 | 0.36 | 0.49 | 145 | 0.0086 | 248 | 0.17 | 0.78 |
| 2099 | 275,097 | 216,739 | 3,179 | 25 | 0.49 | 0.36 | 0.49 | 145 | 0.0086 | 252 | 0.17 | 0.79 |
| 2100 | 278,144 | 219,910 | 3,179 | 26 | 0.49 | 0.36 | 0.49 | 145 | 0.0087 | 245 | 0.17 | 0.79 |
| 2101 | 280,827 | 221,205 | 3,179 | 26 | 0.5 | 0.37 | 0.49 | 145 | 0.0087 | 248 | 0.17 | 0.81 |
| 2102 | 282,435 | 222,914 | 3,179 | 26 | 0.5 | 0.37 | 0.49 | 145 | 0.0088 | 250 | 0.18 | 0.81 |
| 2103 | 287,764 | 225,069 | 3,179 | 28 | 0.51 | 0.38 | 0.49 | 145 | 0.0088 | 242 | 0.18 | 0.84 |
| 2104 | 291,969 | 227,497 | 3,179 | 28 | 0.51 | 0.38 | 0.5 | 145 | 0.0089 | 244 | 0.18 | 0.85 |
| 2105 | 290,746 | 229,390 | 3,179 | 29 | 0.51 | 0.38 | 0.5 | 145 | 0.0089 | 240 | 0.18 | 0.85 |
| 2106 | 286,225 | 234,419 | 3,179 | 31 | 0.5 | 0.37 | 0.51 | 145 | 0.0089 | 229 | 0.18 | 0.82 |
| 2107 | 286,393 | 238,177 | 3,179 | 32 | 0.5 | 0.37 | 0.52 | 145 | 0.009 | 225 | 0.18 | 0.83 |
| 2108 | 288,844 | 241,781 | 3,179 | 32 | 0.51 | 0.38 | 0.52 | 145 | 0.009 | 224 | 0.18 | 0.84 |
| 2109 | 289,604 | 243,478 | 3,180 | 32 | 0.51 | 0.38 | 0.52 | 145 | 0.009 | 223 | 0.18 | 0.85 |
| 2110 | 292,022 | 245,603 | 3,180 | 32 | 0.51 | 0.38 | 0.52 | 145 | 0.009 | 223 | 0.18 | 0.87 |
| 2111 | 293,958 | 247,234 | 3,180 | 32 | 0.52 | 0.39 | 0.52 | 145 | 0.0091 | 224 | 0.18 | 0.88 |
| 2112 | 297,657 | 249,143 | 3,180 | 32 | 0.52 | 0.4 | 0.52 | 145 | 0.0091 | 225 | 0.18 | 0.91 |
| 2113 | 298,576 | 249,671 | 3,180 | 32 | 0.53 | 0.4 | 0.52 | 145 | 0.0091 | 226 | 0.18 | 0.92 |
| 2114 | 301,761 | 250,509 | 3,180 | 32 | 0.53 | 0.41 | 0.52 | 145 | 0.0091 | 227 | 0.18 | 0.94 |
| 2115 | 303,202 | 251,343 | 3,180 | 32 | 0.53 | 0.41 | 0.52 | 145 | 0.0091 | 228 | 0.18 | 0.95 |
| 2116 | 307,639 | 252,867 | 3,180 | 32 | 0.54 | 0.42 | 0.52 | 145 | 0.0092 | 232 | 0.18 | 0.98 |
| 2117 | 306,517 | 255,238 | 3,180 | 32 | 0.54 | 0.42 | 0.52 | 145 | 0.0092 | 227 | 0.18 | 0.98 |
| 2118 | 306,082 | 258,478 | 3,180 | 33 | 0.54 | 0.42 | 0.53 | 145 | 0.0092 | 223 | 0.18 | 0.99 |
| 2119 | 305,611 | 259,895 | 3,180 | 33 | 0.54 | 0.43 | 0.53 | 145 | 0.0092 | 222 | 0.18 | 0.98 |
| 2120 | 306,444 | 262,593 | 3,181 | 33 | 0.54 | 0.43 | 0.53 | 145 | 0.0092 | 221 | 0.18 | 0.99 |
| 2121 | 304,851 | 267,122 | 3,181 | 37 | 0.54 | 0.43 | 0.54 | 145 | 0.0092 | 206 | 0.18 | 0.99 |
| 2122 | 301,229 | 272,900 | 3,181 | 39 | 0.53 | 0.43 | 0.55 | 145 | 0.0092 | 197 | 0.18 | 0.98 |
| 2123 | 299,684 | 275,549 | 3,181 | 40 | 0.53 | 0.43 | 0.55 | 145 | 0.0092 | 195 | 0.18 | 0.98 |
| 2124 | 297,851 | 280,147 | 3,181 | 41 | 0.53 | 0.43 | 0.56 | 145 | 0.0093 | 191 | 0.19 | 0.97 |
| 2125 | 296,775 | 281,667 | 3,181 | 41 | 0.52 | 0.43 | 0.57 | 145 | 0.0093 | 190 | 0.19 | 0.97 |
| 2126 | 295,324 | 284,951 | 3,181 | 42 | 0.52 | 0.43 | 0.57 | 145 | 0.0093 | 188 | 0.19 | 0.96 |
| 2127 | 294,760 | 286,541 | 3,181 | 42 | 0.52 | 0.43 | 0.57 | 145 | 0.0093 | 186 | 0.19 | 0.95 |
| 2128 | 293,597 | 289,665 | 3,181 | 43 | 0.52 | 0.43 | 0.58 | 145 | 0.0093 | 184 | 0.19 | 0.94 |
| 2129 | 293,007 | 290,125 | 3,181 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 183 | 0.19 | 0.93 |
| 2130 | 291,816 | 292,356 | 3,182 | 43 | 0.51 | 0.42 | 0.58 | 145 | 0.0093 | 182 | 0.19 | 0.91 |
| 2131 | 292,214 | 293,256 | 3,182 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 182 | 0.19 | 0.91 |
| 2132 | 292,249 | 295,795 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 181 | 0.19 | 0.9 |
| 2133 | 292,216 | 295,678 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 180 | 0.19 | 0.9 |
| 2134 | 292,084 | 297,209 | 3,182 | 43 | 0.51 | 0.42 | 0.59 | 145 | 0.0093 | 180 | 0.19 | 0.89 |

| Model Year | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year |
| 2023 | 0.000097 | 0.0012 | 0.0000024 | 0.017 | 0.49 | 0.00081 | 0.00000012 | 0.00098 | 0.00018 | 0.011 | 0.99 | 0.0027 | 0.12 |
| 2024 | 0.00018 | 0.0022 | 0.0000044 | 0.031 | 0.89 | 0.0015 | 0.00000022 | 0.0018 | 0.00033 | 0.02 | 1.8 | 0.0048 | 0.21 |
| 2025 | 0.00032 | 0.004 | 0.0000081 | 0.058 | 1.6 | 0.0027 | 0.0000004 | 0.0033 | 0.0006 | 0.037 | 3.3 | 0.0089 | 0.38 |
| 2026 | 0.0005 | 0.0063 | 0.000013 | 0.09 | 2.5 | 0.0042 | 0.00000063 | 0.0051 | 0.00093 | 0.057 | 5.1 | 0.014 | 0.6 |
| 2027 | 0.00063 | 0.0079 | 0.000016 | 0.11 | 3.2 | 0.0053 | 0.00000079 | 0.0064 | 0.0012 | 0.072 | 6.5 | 0.017 | 0.75 |
| 2028 | 0.0012 | 0.014 | 0.000029 | 0.21 | 5.8 | 0.0097 | 0.0000014 | 0.012 | 0.0021 | 0.13 | 12 | 0.032 | 1.4 |
| 2029 | 0.0011 | 0.013 | 0.000027 | 0.19 | 5.5 | 0.0091 | 0.0000013 | 0.011 | 0.002 | 0.12 | 11 | 0.03 | 1.3 |
| 2030 | 0.0014 | 0.017 | 0.000035 | 0.25 | 7.0 | 0.012 | 0.0000017 | 0.014 | 0.0026 | 0.16 | 14 | 0.038 | 1.7 |
| 2031 | 0.0089 | 0.11 | 0.00022 | 1.6 | 45 | 0.075 | 0.000011 | 0.091 | 0.017 | 1.0 | 91 | 0.25 | 11 |
| 2032 | 0.015 | 0.18 | 0.00036 | 2.6 | 73 | 0.12 | 0.000018 | 0.15 | 0.027 | 1.7 | 149 | 0.4 | 17 |
| 2033 | 0.0025 | 0.031 | 0.000062 | 0.44 | 13 | 0.021 | 0.0000031 | 0.025 | 0.0046 | 0.28 | 25 | 0.068 | 3.0 |
| 2034 | 0.01 | 0.12 | 0.00025 | 1.8 | 50 | 0.084 | 0.000012 | 0.1 | 0.019 | 1.1 | 102 | 0.28 | 12 |
| 2035 | 0.028 | 0.35 | 0.00071 | 5.1 | 143 | 0.24 | 0.000035 | 0.29 | 0.053 | 3.2 | 290 | 0.78 | 34 |
| 2036 | 0.048 | 0.6 | 0.0012 | 8.7 | 244 | 0.41 | 0.00006 | 0.49 | 0.09 | 5.5 | 494 | 1.3 | 58 |
| 2037 | 0.054 | 0.67 | 0.0014 | 9.6 | 272 | 0.45 | 0.000067 | 0.55 | 0.1 | 6.2 | 551 | 1.5 | 64 |
| 2038 | 0.11 | 1.3 | 0.0027 | 19 | 545 | 0.91 | 0.00013 | 1.1 | 0.2 | 12 | 1,102 | 3.0 | 128 |
| 2039 | 0.18 | 2.3 | 0.015 | 33 | 1,035 | 1.5 | 0.00023 | 2.0 | 0.37 | 21 | 1,878 | 5.0 | 219 |
| 2040 | 0.32 | 4.0 | 0.065 | 57 | 2,115 | 2.5 | 0.0004 | 3.9 | 0.71 | 36 | 3,235 | 8.2 | 377 |
| 2041 | 0.9 | 5.5 | 0.18 | 79 | 3,299 | 2.4 | 0.00055 | 5.6 | 0.98 | 51 | 4,540 | 7.5 | 529 |
| 2042 | 1.1 | 6.4 | 0.25 | 79 | 3,643 | 1.8 | 0.00064 | 6.1 | 1.0 | 51 | 4,539 | 5.4 | 529 |
| 2043 | 1.1 | 6.7 | 0.27 | 79 | 3,688 | 1.5 | 0.00067 | 6.2 | 1.0 | 51 | 4,539 | 4.6 | 529 |
| 2044 | 1.1 | 6.8 | 0.27 | 79 | 3,693 | 1.5 | 0.00068 | 6.2 | 1.0 | 51 | 4,539 | 4.6 | 529 |
| 2045 | 1.1 | 6.7 | 0.27 | 79 | 3,757 | 1.6 | 0.00067 | 6.3 | 1.1 | 51 | 4,539 | 4.9 | 529 |
| 2046 | 1.1 | 6.4 | 0.3 | 79 | 3,742 | 1.7 | 0.00064 | 6.3 | 1.1 | 51 | 4,540 | 5.1 | 529 |
| 2047 | 1.1 | 6.4 | 0.37 | 80 | 4,015 | 1.9 | 0.00064 | 6.8 | 1.4 | 51 | 4,541 | 5.6 | 529 |
| 2048 | 1.1 | 6.5 | 0.45 | 80 | 4,401 | 2.2 | 0.00065 | 7.5 | 1.6 | 51 | 4,542 | 6.5 | 529 |
| 2049 | 1.2 | 6.6 | 0.5 | 80 | 4,615 | 2.5 | 0.00066 | 7.8 | 1.9 | 51 | 4,542 | 7.3 | 529 |
| 2050 | 1.2 | 6.6 | 0.55 | 80 | 4,741 | 2.6 | 0.00066 | 8.1 | 2.0 | 51 | 4,543 | 7.7 | 529 |
| 2051 | 1.2 | 6.7 | 0.58 | 80 | 4,811 | 2.7 | 0.00067 | 8.2 | 2.1 | 51 | 4,543 | 7.8 | 529 |
| 2052 | 1.2 | 6.8 | 0.61 | 80 | 4,875 | 2.7 | 0.00068 | 8.3 | 2.2 | 51 | 4,543 | 7.7 | 529 |
| 2053 | 1.2 | 6.8 | 0.62 | 80 | 4,900 | 2.7 | 0.00068 | 8.4 | 2.2 | 51 | 4,543 | 7.7 | 529 |
| 2054 | 1.2 | 6.8 | 0.63 | 80 | 4,930 | 2.7 | 0.00068 | 8.4 | 2.2 | 51 | 4,543 | 7.7 | 529 |
| 2055 | 1.2 | 6.8 | 0.65 | 80 | 4,984 | 2.7 | 0.00068 | 8.5 | 2.3 | 51 | 4,543 | 8.0 | 529 |
| 2056 | 1.4 | 6.9 | 0.63 | 80 | 5,234 | 2.7 | 0.00069 | 8.4 | 2.2 | 51 | 4,544 | 7.8 | 529 |
| 2057 | 1.8 | 6.9 | 0.58 | 80 | 5,609 | 2.5 | 0.00069 | 8.0 | 2.1 | 51 | 4,544 | 7.2 | 530 |
| 2058 | 2.0 | 6.9 | 0.54 | 80 | 5,859 | 2.3 | 0.00069 | 7.8 | 1.9 | 51 | 4,545 | 6.7 | 530 |
| 2059 | 2.0 | 6.9 | 0.53 | 80 | 5,973 | 2.3 | 0.00069 | 7.8 | 1.9 | 51 | 4,545 | 6.6 | 530 |
| 2060 | 2.0 | 7.0 | 0.53 | 80 | 6,057 | 2.3 | 0.0007 | 7.8 | 1.9 | 51 | 4,545 | 6.7 | 530 |
| 2061 | 2.0 | 7.0 | 0.53 | 80 | 6,083 | 2.4 | 0.0007 | 7.9 | 1.9 | 51 | 4,545 | 6.9 | 530 |
| 2062 | 2.0 | 7.0 | 0.53 | 80 | 6,199 | 2.4 | 0.0007 | 7.9 | 1.9 | 51 | 4,546 | 6.9 | 530 |
| 2063 | 2.0 | 7.1 | 0.51 | 80 | 6,343 | 2.3 | 0.00071 | 7.8 | 1.8 | 51 | 4,546 | 6.8 | 530 |
| 2064 | 2.0 | 7.1 | 0.51 | 80 | 6,425 | 2.4 | 0.00071 | 7.9 | 1.8 | 51 | 4,546 | 6.9 | 530 |
| 2065 | 2.0 | 7.2 | 0.5 | 80 | 6,576 | 2.4 | 0.00072 | 7.9 | 1.8 | 51 | 4,546 | 6.9 | 530 |
| 2066 | 2.0 | 7.2 | 0.49 | 80 | 6,730 | 2.3 | 0.00072 | 7.8 | 1.8 | 51 | 4,546 | 6.9 | 530 |
| 2067 | 2.0 | 7.3 | 0.49 | 80 | 6,867 | 2.3 | 0.00073 | 7.8 | 1.8 | 51 | 4,546 | 6.9 | 530 |
| 2068 | 2.0 | 7.4 | 0.48 | 80 | 7,020 | 2.4 | 0.00074 | 7.8 | 1.8 | 51 | 4,546 | 7.0 | 530 |
| 2069 | 2.0 | 7.4 | 0.48 | 80 | 7,126 | 2.4 | 0.00074 | 7.9 | 1.8 | 51 | 4,546 | 7.0 | 530 |
| 2070 | 2.0 | 7.5 | 0.48 | 80 | 7,228 | 2.4 | 0.00075 | 8.0 | 1.8 | 51 | 4,547 | 7.1 | 530 |
| 2071 | 2.0 | 7.5 | 0.49 | 80 | 7,319 | 2.4 | 0.00075 | 8.0 | 1.8 | 51 | 4,547 | 7.1 | 530 |
| 2072 | 2.0 | 7.6 | 0.5 | 80 | 7,437 | 2.4 | 0.00076 | 8.2 | 1.8 | 51 | 4,547 | 7.1 | 530 |
| 2073 | 2.1 | 7.6 | 0.51 | 80 | 7,477 | 2.5 | 0.00076 | 8.2 | 1.9 | 51 | 4,547 | 7.2 | 530 |
| 2074 | 2.1 | 7.7 | 0.53 | 80 | 7,523 | 2.5 | 0.00077 | 8.3 | 1.9 | 51 | 4,547 | 7.3 | 530 |
| 2075 | 2.1 | 7.7 | 0.54 | 80 | 7,568 | 2.6 | 0.00077 | 8.4 | 2.0 | 51 | 4,547 | 7.5 | 530 |
| 2076 | 2.1 | 7.8 | 0.56 | 80 | 7,686 | 2.7 | 0.00078 | 8.6 | 2.0 | 51 | 4,547 | 7.8 | 530 |
| 2077 | 2.2 | 7.8 | 0.58 | 80 | 7,734 | 2.8 | 0.00078 | 8.7 | 2.1 | 51 | 4,547 | 8.1 | 530 |
| 2078 | 2.2 | 7.8 | 0.61 | 80 | 7,796 | 2.9 | 0.00078 | 8.8 | 2.2 | 51 | 4,547 | 8.4 | 530 |
| 2079 | 2.2 | 7.9 | 0.63 | 80 | 7,884 | 3.0 | 0.00079 | 8.9 | 2.3 | 51 | 4,547 | 8.7 | 530 |
| 2080 | 2.3 | 7.9 | 0.65 | 80 | 7,990 | 3.1 | 0.00079 | 9.0 | 2.4 | 51 | 4,547 | 9.0 | 530 |
| 2081 | 2.3 | 7.9 | 0.67 | 80 | 8,041 | 3.1 | 0.00079 | 9.1 | 2.4 | 51 | 4,548 | 9.2 | 530 |
| 2082 | 2.3 | 8.0 | 0.68 | 80 | 8,150 | 3.2 | 0.0008 | 9.1 | 2.5 | 51 | 4,548 | 9.3 | 530 |
| 2083 | 2.3 | 8.0 | 0.69 | 80 | 8,248 | 3.2 | 0.0008 | 9.1 | 2.5 | 51 | 4,548 | 9.4 | 530 |
| 2084 | 2.3 | 8.1 | 0.7 | 80 | 8,376 | 3.3 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 9.6 | 530 |
| 2085 | 2.3 | 8.1 | 0.7 | 80 | 8,448 | 3.3 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 9.7 | 530 |
| 2086 | 2.4 | 8.1 | 0.72 | 80 | 8,554 | 3.3 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 9.8 | 530 |
| 2087 | 2.4 | 8.2 | 0.72 | 80 | 8,645 | 3.3 | 0.00082 | 9.2 | 2.6 | 51 | 4,548 | 9.8 | 530 |
| 2088 | 2.4 | 8.2 | 0.73 | 80 | 8,791 | 3.4 | 0.00082 | 9.4 | 2.6 | 51 | 4,548 | 9.9 | 530 |
| 2089 | 2.4 | 8.2 | 0.72 | 80 | 8,913 | 3.3 | 0.00082 | 9.4 | 2.6 | 51 | 4,548 | 9.8 | 530 |
| 2090 | 2.4 | 8.3 | 0.73 | 80 | 9,038 | 3.3 | 0.00083 | 9.4 | 2.6 | 51 | 4,549 | 9.7 | 530 |
| 2091 | 2.4 | 8.3 | 0.72 | 80 | 9,159 | 3.3 | 0.00083 | 9.4 | 2.6 | 51 | 4,549 | 9.7 | 530 |
| 2092 | 2.4 | 8.4 | 0.73 | 80 | 9,318 | 3.3 | 0.00084 | 9.4 | 2.6 | 51 | 4,549 | 9.8 | 530 |
| 2093 | 2.4 | 8.4 | 0.72 | 80 | 9,439 | 3.3 | 0.00084 | 9.4 | 2.6 | 51 | 4,549 | 9.7 | 530 |
| 2094 | 2.4 | 8.5 | 0.71 | 80 | 9,600 | 3.3 | 0.00085 | 9.3 | 2.6 | 51 | 4,549 | 9.7 | 530 |
| 2095 | 2.4 | 8.5 | 0.7 | 80 | 9,687 | 3.3 | 0.00085 | 9.3 | 2.5 | 51 | 4,549 | 9.6 | 530 |
| 2096 | 2.4 | 8.5 | 0.68 | 80 | 9,817 | 3.2 | 0.00085 | 9.2 | 2.5 | 51 | 4,549 | 9.4 | 530 |
| 2097 | 2.4 | 8.6 | 0.68 | 80 | 9,883 | 3.2 | 0.00086 | 9.2 | 2.5 | 51 | 4,549 | 9.5 | 530 |
| 2098 | 2.4 | 8.6 | 0.68 | 80 | 10,008 | 3.3 | 0.00086 | 9.2 | 2.5 | 51 | 4,549 | 9.6 | 530 |
| 2099 | 2.4 | 8.6 | 0.68 | 80 | 10,088 | 3.3 | 0.00086 | 9.3 | 2.5 | 51 | 4,549 | 10 | 530 |
| 2100 | 2.4 | 8.7 | 0.68 | 80 | 10,271 | 3.3 | 0.00087 | 9.4 | 2.5 | 51 | 4,549 | 10 | 530 |
| 2101 | 2.4 | 8.7 | 0.69 | 80 | 10,378 | 3.4 | 0.00087 | 9.5 | 2.6 | 51 | 4,549 | 10 | 530 |
| 2102 | 2.4 | 8.8 | 0.69 | 80 | 10,510 | 3.4 | 0.00088 | 9.5 | 2.6 | 51 | 4,550 | 10 | 530 |
| 2103 | 2.4 | 8.8 | 0.71 | 80 | 10,667 | 3.5 | 0.00088 | 9.7 | 2.6 | 51 | 4,550 | 10 | 530 |
| 2104 | 2.5 | 8.9 | 0.72 | 80 | 10,854 | 3.6 | 0.00089 | 9.8 | 2.7 | 51 | 4,550 | 11 | 530 |
| 2105 | 2.4 | 8.9 | 0.71 | 80 | 10,899 | 3.6 | 0.00089 | 9.8 | 2.6 | 51 | 4,550 | 11 | 530 |
| 2106 | 2.4 | 8.9 | 0.68 | 80 | 10,998 | 3.5 | 0.00089 | 9.6 | 2.5 | 51 | 4,550 | 10 | 530 |
| 2107 | 2.4 | 9.0 | 0.69 | 80 | 11,130 | 3.5 | 0.0009 | 9.6 | 2.6 | 51 | 4,550 | 10 | 530 |
| 2108 | 2.4 | 9.0 | 0.7 | 80 | 11,329 | 3.6 | 0.0009 | 9.7 | 2.6 | 51 | 4,550 | 11 | 530 |
| 2109 | 2.4 | 9.0 | 0.7 | 80 | 11,430 | 3.6 | 0.0009 | 9.7 | 2.6 | 51 | 4,551 | 11 | 530 |
| 2110 | 2.5 | 9.0 | 0.72 | 80 | 11,588 | 3.7 | 0.0009 | 9.8 | 2.7 | 51 | 4,551 | 11 | 530 |
| 2111 | 2.5 | 9.1 | 0.73 | 80 | 11,709 | 3.8 | 0.00091 | 9.9 | 2.7 | 51 | 4,551 | 11 | 530 |
| 2112 | 2.5 | 9.1 | 0.75 | 80 | 11,877 | 3.9 | 0.00091 | 10 | 2.8 | 51 | 4,551 | 11 | 530 |
| 2113 | 2.5 | 9.1 | 0.76 | 80 | 11,947 | 3.9 | 0.00091 | 10 | 2.8 | 51 | 4,551 | 12 | 530 |
| 2114 | 2.5 | 9.1 | 0.78 | 80 | 12,063 | 4.0 | 0.00091 | 10 | 2.9 | 51 | 4,551 | 12 | 530 |
| 2115 | 2.5 | 9.1 | 0.79 | 80 | 12,153 | 4.0 | 0.00091 | 10 | 3.0 | 51 | 4,551 | 12 | 530 |
| 2116 | 2.6 | 9.2 | 0.82 | 80 | 12,303 | 4.1 | 0.00092 | 10 | 3.0 | 51 | 4,552 | 12 | 530 |
| 2117 | 2.6 | 9.2 | 0.82 | 80 | 12,375 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 |
| 2118 | 2.6 | 9.2 | 0.83 | 80 | 12,496 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 |
| 2119 | 2.6 | 9.2 | 0.84 | 80 | 12,572 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 |
| 2120 | 2.6 | 9.2 | 0.85 | 80 | 12,714 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 |
| 2121 | 2.6 | 9.2 | 0.85 | 80 | 12,830 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 |
| 2122 | 2.7 | 9.2 | 0.85 | 80 | 12,987 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 531 |
| 2123 | 2.7 | 9.2 | 0.85 | 80 | 13,089 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,553 | 12 | 531 |
| 2124 | 2.7 | 9.3 | 0.85 | 80 | 13,268 | 4.1 | 0.00093 | 10 | 3.1 | 51 | 4,553 | 12 | 531 |
| 2125 | 2.7 | 9.3 | 0.85 | 80 | 13,351 | 4.0 | 0.00093 | 10 | 3.1 | 51 | 4,553 | 12 | 531 |
| 2126 | 2.7 | 9.3 | 0.85 | 80 | 13,494 | 4.0 | 0.00093 | 9.9 | 3.1 | 51 | 4,553 | 12 | 531 |
| 2127 | 2.7 | 9.3 | 0.85 | 80 | 13,593 | 3.9 | 0.00093 | 9.9 | 3.1 | 51 | 4,553 | 12 | 531 |
| 2128 | 2.8 | 9.3 | 0.84 | 80 | 13,762 | 3.9 | 0.00093 | 9.9 | 3.1 | 51 | 4,553 | 11 | 531 |
| 2129 | 2.8 | 9.3 | 0.84 | 80 | 13,826 | 3.8 | 0.00093 | 9.9 | 3.0 | 51 | 4,553 | 11 | 531 |
| 2130 | 2.8 | 9.3 | 0.83 | 80 | 13,964 | 3.7 | 0.00093 | 9.8 | 3.0 | 51 | 4,553 | 11 | 531 |
| 2131 | 2.8 | 9.3 | 0.83 | 80 | 14,055 | 3.7 | 0.00093 | 9.8 | 3.0 | 51 | 4,553 | 11 | 531 |
| 2132 | 2.8 | 9.3 | 0.83 | 80 | 14,220 | 3.7 | 0.00093 | 9.8 | 3.0 | 51 | 4,553 | 11 | 531 |
| 2133 | 2.8 | 9.3 | 0.83 | 80 | 14,264 | 3.7 | 0.00093 | 9.8 | 3.0 | 51 | 4,554 | 11 | 531 |
| 2134 | 2.8 | 9.3 | 0.82 | 80 | 14,386 | 3.6 | 0.00093 | 9.8 | 2.9 | 51 | 4,554 | 11 | 531 |

| Model Year | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | $m^3$/year |
| 2023 | 0.0000007 | 13 | 0.056 | 0.0000007 | 0.000007 | 0.00031 | 0.00012 | 0.00024 | 0.99 | 0.13 | 0.023 | 24 |
| 2024 | 0.0000013 | 24 | 0.1 | 0.0000013 | 0.000013 | 0.00057 | 0.00022 | 0.00044 | 1.8 | 0.23 | 0.041 | 44 |
| 2025 | 0.0000023 | 43 | 0.18 | 0.0000023 | 0.000023 | 0.001 | 0.0004 | 0.0008 | 3.3 | 0.42 | 0.076 | 80 |
| 2026 | 0.0000036 | 68 | 0.29 | 0.0000036 | 0.000036 | 0.0016 | 0.00063 | 0.0013 | 5.1 | 0.65 | 0.12 | 125 |
| 2027 | 0.0000046 | 85 | 0.36 | 0.0000046 | 0.000046 | 0.002 | 0.00079 | 0.0016 | 6.5 | 0.82 | 0.15 | 158 |
| 2028 | 0.0000084 | 156 | 0.66 | 0.0000084 | 0.000084 | 0.0037 | 0.0014 | 0.0029 | 12 | 1.5 | 0.27 | 289 |
| 2029 | 0.0000078 | 146 | 0.62 | 0.0000078 | 0.000078 | 0.0035 | 0.0013 | 0.0027 | 11 | 1.4 | 0.25 | 270 |
| 2030 | 0.00001 | 188 | 0.8 | 0.00001 | 0.0001 | 0.0045 | 0.0017 | 0.0035 | 14 | 1.8 | 0.33 | 348 |
| 2031 | 0.000065 | 1,208 | 5.1 | 0.000065 | 0.00065 | 0.029 | 0.011 | 0.022 | 92 | 12 | 2.1 | 2,236 |
| 2032 | 0.00011 | 1,962 | 8.3 | 0.00011 | 0.0011 | 0.047 | 0.018 | 0.036 | 149 | 19 | 3.4 | 3,634 |
| 2033 | 0.000018 | 335 | 1.4 | 0.000018 | 0.00018 | 0.008 | 0.0031 | 0.0062 | 25 | 3.2 | 0.58 | 620 |
| 2034 | 0.000072 | 1,346 | 5.7 | 0.000072 | 0.00072 | 0.032 | 0.012 | 0.025 | 102 | 13 | 2.3 | 2,492 |
| 2035 | 0.00021 | 3,825 | 16 | 0.00021 | 0.0021 | 0.092 | 0.035 | 0.071 | 290 | 37 | 6.7 | 7,085 |
| 2036 | 0.00035 | 6,524 | 28 | 0.00035 | 0.0035 | 0.16 | 0.06 | 0.12 | 494 | 63 | 11 | 12,083 |
| 2037 | 0.00039 | 7,270 | 31 | 0.00039 | 0.0039 | 0.17 | 0.067 | 0.13 | 551 | 70 | 13 | 13,464 |
| 2038 | 0.00078 | 14,553 | 62 | 0.00078 | 0.0078 | 0.35 | 0.13 | 0.27 | 1,103 | 139 | 25 | 26,952 |
| 2039 | 0.0014 | 27,828 | 105 | 0.0014 | 0.014 | 0.64 | 0.23 | 0.46 | 1,824 | 231 | 42 | 45,912 |
| 2040 | 0.0028 | 57,514 | 182 | 0.0028 | 0.028 | 1.2 | 0.4 | 0.79 | 2,790 | 353 | 64 | 79,056 |
| 2041 | 0.004 | 91,316 | 255 | 0.004 | 0.04 | 1.8 | 0.55 | 1.1 | 2,013 | 255 | 46 | 110,907 |
| 2042 | 0.0044 | 101,510 | 255 | 0.0044 | 0.044 | 1.9 | 0.64 | 1.3 | 946 | 120 | 22 | 128,839 |
| 2043 | 0.0044 | 102,890 | 255 | 0.0044 | 0.044 | 2.0 | 0.67 | 1.3 | 579 | 73 | 13 | 133,866 |
| 2044 | 0.0044 | 103,017 | 255 | 0.0044 | 0.044 | 2.0 | 0.68 | 1.4 | 579 | 73 | 13 | 136,575 |
| 2045 | 0.0045 | 104,762 | 255 | 0.0045 | 0.045 | 2.0 | 0.67 | 1.3 | 679 | 86 | 16 | 133,758 |
| 2046 | 0.0045 | 104,136 | 255 | 0.0045 | 0.045 | 2.0 | 0.64 | 1.3 | 655 | 83 | 15 | 128,763 |
| 2047 | 0.0048 | 111,476 | 255 | 0.0049 | 0.049 | 2.2 | 0.64 | 1.3 | 495 | 63 | 11 | 128,089 |
| 2048 | 0.0053 | 121,971 | 255 | 0.0054 | 0.053 | 2.4 | 0.65 | 1.3 | 479 | 61 | 11 | 129,793 |
| 2049 | 0.0056 | 127,814 | 255 | 0.0056 | 0.056 | 2.5 | 0.66 | 1.3 | 516 | 65 | 12 | 131,172 |
| 2050 | 0.0057 | 131,300 | 255 | 0.0058 | 0.058 | 2.6 | 0.66 | 1.3 | 454 | 57 | 10 | 132,811 |
| 2051 | 0.0058 | 133,263 | 255 | 0.0058 | 0.059 | 2.6 | 0.67 | 1.3 | 360 | 46 | 8.3 | 133,964 |
| 2052 | 0.0059 | 135,046 | 255 | 0.0059 | 0.059 | 2.6 | 0.68 | 1.4 | 239 | 30 | 5.5 | 135,076 |
| 2053 | 0.0059 | 135,740 | 255 | 0.006 | 0.06 | 2.7 | 0.68 | 1.4 | 141 | 18 | 3.2 | 135,145 |
| 2054 | 0.006 | 136,596 | 255 | 0.006 | 0.06 | 2.7 | 0.68 | 1.4 | 111 | 14 | 2.7 | 135,795 |
| 2055 | 0.0061 | 138,049 | 255 | 0.0061 | 0.061 | 2.7 | 0.68 | 1.5 | 113 | 14 | 2.7 | 136,601 |
| 2056 | 0.006 | 142,635 | 255 | 0.006 | 0.06 | 2.7 | 0.69 | 1.4 | 127 | 16 | 2.9 | 137,639 |
| 2057 | 0.0057 | 147,692 | 255 | 0.0057 | 0.057 | 2.5 | 0.69 | 1.4 | 143 | 18 | 3.3 | 137,940 |
| 2058 | 0.0056 | 150,436 | 255 | 0.0056 | 0.056 | 2.5 | 0.69 | 1.4 | 162 | 21 | 3.7 | 138,218 |
| 2059 | 0.0055 | 151,656 | 255 | 0.0056 | 0.056 | 2.5 | 0.69 | 1.4 | 185 | 23 | 4.2 | 138,460 |
| 2060 | 0.0056 | 153,122 | 255 | 0.0056 | 0.056 | 2.5 | 0.7 | 1.4 | 212 | 27 | 4.9 | 139,518 |
| 2061 | 0.0056 | 153,584 | 255 | 0.0056 | 0.056 | 2.5 | 0.7 | 1.4 | 240 | 30 | 5.5 | 139,838 |
| 2062 | 0.0056 | 155,911 | 255 | 0.0056 | 0.056 | 2.5 | 0.7 | 1.4 | 273 | 35 | 6.3 | 140,676 |
| 2063 | 0.0056 | 157,707 | 255 | 0.0056 | 0.056 | 2.5 | 0.71 | 1.4 | 308 | 39 | 7.1 | 141,568 |
| 2064 | 0.0056 | 159,053 | 255 | 0.0056 | 0.056 | 2.5 | 0.71 | 1.4 | 346 | 44 | 8.0 | 142,789 |
| 2065 | 0.0056 | 161,851 | 255 | 0.0056 | 0.056 | 2.5 | 0.72 | 1.4 | 385 | 49 | 8.9 | 143,409 |
| 2066 | 0.0056 | 164,047 | 255 | 0.0056 | 0.056 | 2.5 | 0.72 | 1.4 | 427 | 54 | 9.8 | 144,573 |
| 2067 | 0.0055 | 165,715 | 255 | 0.0056 | 0.056 | 2.5 | 0.73 | 1.5 | 471 | 60 | 11 | 145,722 |
| 2068 | 0.0056 | 167,918 | 255 | 0.0056 | 0.056 | 2.5 | 0.74 | 1.5 | 516 | 65 | 12 | 147,284 |
| 2069 | 0.0056 | 169,093 | 255 | 0.0056 | 0.056 | 2.5 | 0.74 | 1.5 | 552 | 70 | 13 | 148,041 |
| 2070 | 0.0057 | 170,847 | 255 | 0.0057 | 0.057 | 2.5 | 0.75 | 1.5 | 569 | 72 | 13 | 149,328 |
| 2071 | 0.0057 | 172,193 | 255 | 0.0057 | 0.057 | 2.5 | 0.75 | 1.5 | 545 | 69 | 13 | 150,505 |
| 2072 | 0.0058 | 174,992 | 255 | 0.0058 | 0.058 | 2.6 | 0.76 | 1.5 | 499 | 63 | 11 | 151,916 |
| 2073 | 0.0059 | 175,821 | 255 | 0.0059 | 0.059 | 2.6 | 0.76 | 1.5 | 463 | 59 | 11 | 152,292 |
| 2074 | 0.0059 | 177,034 | 255 | 0.0059 | 0.059 | 2.6 | 0.77 | 1.5 | 454 | 57 | 10 | 153,237 |
| 2075 | 0.006 | 178,249 | 255 | 0.006 | 0.06 | 2.7 | 0.77 | 1.5 | 447 | 56 | 10 | 153,995 |
| 2076 | 0.0061 | 181,511 | 255 | 0.0062 | 0.061 | 2.7 | 0.78 | 1.6 | 461 | 58 | 11 | 155,005 |
| 2077 | 0.0062 | 182,886 | 255 | 0.0062 | 0.062 | 2.8 | 0.78 | 1.6 | 476 | 60 | 11 | 155,356 |
| 2078 | 0.0063 | 184,639 | 255 | 0.0063 | 0.063 | 2.8 | 0.78 | 1.6 | 496 | 63 | 11 | 156,236 |
| 2079 | 0.0064 | 186,782 | 255 | 0.0064 | 0.064 | 2.8 | 0.79 | 1.6 | 509 | 64 | 12 | 157,251 |
| 2080 | 0.0064 | 189,023 | 255 | 0.0064 | 0.065 | 2.9 | 0.79 | 1.6 | 510 | 64 | 12 | 158,470 |
| 2081 | 0.0065 | 190,209 | 255 | 0.0065 | 0.065 | 2.9 | 0.79 | 1.6 | 518 | 65 | 12 | 158,838 |
| 2082 | 0.0065 | 192,048 | 255 | 0.0065 | 0.065 | 2.9 | 0.8 | 1.6 | 505 | 64 | 12 | 159,814 |
| 2083 | 0.0065 | 193,181 | 255 | 0.0065 | 0.065 | 2.9 | 0.8 | 1.6 | 514 | 65 | 12 | 160,383 |
| 2084 | 0.0066 | 195,290 | 255 | 0.0066 | 0.066 | 2.9 | 0.81 | 1.6 | 510 | 64 | 12 | 161,637 |
| 2085 | 0.0066 | 195,692 | 255 | 0.0065 | 0.065 | 2.9 | 0.81 | 1.6 | 520 | 66 | 12 | 161,890 |
| 2086 | 0.0066 | 197,239 | 255 | 0.0066 | 0.066 | 2.9 | 0.81 | 1.6 | 510 | 64 | 12 | 162,778 |
| 2087 | 0.0066 | 198,011 | 255 | 0.0066 | 0.066 | 2.9 | 0.82 | 1.6 | 514 | 65 | 12 | 163,470 |
| 2088 | 0.0067 | 200,610 | 255 | 0.0067 | 0.067 | 3.0 | 0.82 | 1.7 | 488 | 62 | 11 | 164,570 |
| 2089 | 0.0066 | 202,044 | 255 | 0.0067 | 0.067 | 3.0 | 0.82 | 1.7 | 486 | 61 | 11 | 164,772 |
| 2090 | 0.0066 | 203,304 | 255 | 0.0067 | 0.067 | 3.0 | 0.83 | 1.7 | 459 | 58 | 11 | 165,462 |
| 2091 | 0.0066 | 204,448 | 255 | 0.0067 | 0.067 | 3.0 | 0.83 | 1.7 | 466 | 59 | 11 | 166,285 |
| 2092 | 0.0067 | 206,468 | 255 | 0.0068 | 0.067 | 3.0 | 0.84 | 1.7 | 462 | 58 | 11 | 167,587 |
| 2093 | 0.0066 | 207,376 | 256 | 0.0067 | 0.067 | 3.0 | 0.84 | 1.7 | 480 | 61 | 11 | 168,175 |
| 2094 | 0.0066 | 208,538 | 256 | 0.0067 | 0.067 | 3.0 | 0.85 | 1.7 | 496 | 63 | 11 | 169,130 |
| 2095 | 0.0066 | 208,823 | 256 | 0.0066 | 0.066 | 2.9 | 0.85 | 1.7 | 524 | 66 | 12 | 169,816 |
| 2096 | 0.0065 | 209,393 | 256 | 0.0066 | 0.066 | 2.9 | 0.85 | 1.7 | 553 | 70 | 13 | 170,905 |
| 2097 | 0.0065 | 209,764 | 256 | 0.0066 | 0.066 | 2.9 | 0.86 | 1.7 | 583 | 74 | 13 | 171,124 |
| 2098 | 0.0065 | 210,638 | 256 | 0.0066 | 0.066 | 2.9 | 0.86 | 1.7 | 614 | 78 | 14 | 171,837 |
| 2099 | 0.0066 | 211,548 | 256 | 0.0066 | 0.066 | 2.9 | 0.86 | 1.7 | 646 | 82 | 15 | 172,453 |
| 2100 | 0.0066 | 214,133 | 256 | 0.0067 | 0.067 | 3.0 | 0.87 | 1.7 | 677 | 86 | 16 | 173,472 |
| 2101 | 0.0067 | 215,799 | 256 | 0.0067 | 0.068 | 3.0 | 0.87 | 1.7 | 709 | 90 | 16 | 174,383 |
| 2102 | 0.0068 | 217,116 | 256 | 0.0068 | 0.068 | 3.0 | 0.88 | 1.8 | 741 | 94 | 17 | 175,164 |
| 2103 | 0.0069 | 220,356 | 256 | 0.0069 | 0.069 | 3.1 | 0.88 | 1.8 | 774 | 98 | 18 | 175,863 |
| 2104 | 0.007 | 223,119 | 256 | 0.007 | 0.07 | 3.1 | 0.89 | 1.8 | 808 | 102 | 19 | 177,220 |
| 2105 | 0.007 | 223,336 | 256 | 0.007 | 0.07 | 3.1 | 0.89 | 1.8 | 837 | 106 | 19 | 177,533 |
| 2106 | 0.0069 | 223,299 | 256 | 0.0069 | 0.069 | 3.1 | 0.89 | 1.8 | 865 | 109 | 20 | 178,211 |
| 2107 | 0.0069 | 224,857 | 256 | 0.0069 | 0.069 | 3.1 | 0.9 | 1.8 | 890 | 113 | 20 | 179,040 |
| 2108 | 0.0069 | 227,313 | 256 | 0.0069 | 0.069 | 3.1 | 0.9 | 1.8 | 917 | 116 | 21 | 180,178 |
| 2109 | 0.0069 | 228,265 | 256 | 0.007 | 0.07 | 3.1 | 0.9 | 1.8 | 937 | 118 | 22 | 180,248 |
| 2110 | 0.007 | 230,088 | 256 | 0.007 | 0.07 | 3.1 | 0.9 | 1.8 | 958 | 121 | 22 | 180,830 |
| 2111 | 0.007 | 231,538 | 256 | 0.0071 | 0.071 | 3.1 | 0.91 | 1.8 | 979 | 124 | 22 | 181,243 |
| 2112 | 0.0071 | 233,857 | 256 | 0.0072 | 0.072 | 3.2 | 0.91 | 1.8 | 999 | 126 | 23 | 181,975 |
| 2113 | 0.0071 | 234,413 | 256 | 0.0072 | 0.072 | 3.2 | 0.91 | 1.8 | 1,010 | 128 | 23 | 181,870 |
| 2114 | 0.0072 | 236,120 | 256 | 0.0073 | 0.073 | 3.2 | 0.91 | 1.8 | 1,016 | 128 | 23 | 182,135 |
| 2115 | 0.0073 | 237,011 | 256 | 0.0073 | 0.073 | 3.2 | 0.91 | 1.9 | 1,015 | 128 | 23 | 182,344 |
| 2116 | 0.0074 | 239,554 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 1,005 | 127 | 23 | 183,370 |
| 2117 | 0.0074 | 239,961 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 981 | 124 | 23 | 183,400 |
| 2118 | 0.0074 | 241,031 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 952 | 120 | 22 | 183,657 |
| 2119 | 0.0073 | 241,308 | 256 | 0.0074 | 0.073 | 3.3 | 0.92 | 1.9 | 917 | 116 | 21 | 183,671 |
| 2120 | 0.0074 | 242,675 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 2.0 | 886 | 112 | 20 | 184,250 |
| 2121 | 0.0074 | 243,785 | 256 | 0.0073 | 0.073 | 3.3 | 0.92 | 2.0 | 850 | 107 | 20 | 184,044 |
| 2122 | 0.0073 | 244,406 | 256 | 0.0072 | 0.072 | 3.2 | 0.92 | 2.0 | 814 | 103 | 19 | 184,430 |
| 2123 | 0.0072 | 244,692 | 256 | 0.0072 | 0.072 | 3.2 | 0.92 | 2.0 | 784 | 99 | 18 | 184,660 |
| 2124 | 0.0072 | 245,592 | 256 | 0.0072 | 0.072 | 3.2 | 0.93 | 2.0 | 734 | 93 | 17 | 185,381 |
| 2125 | 0.0071 | 245,610 | 256 | 0.0071 | 0.071 | 3.2 | 0.93 | 1.9 | 698 | 88 | 16 | 185,380 |
| 2126 | 0.0071 | 246,156 | 256 | 0.0071 | 0.071 | 3.2 | 0.93 | 1.9 | 626 | 79 | 14 | 185,890 |
| 2127 | 0.0071 | 246,430 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 587 | 74 | 14 | 185,957 |
| 2128 | 0.0071 | 246,996 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 510 | 64 | 12 | 186,328 |
| 2129 | 0.007 | 246,804 | 256 | 0.0071 | 0.07 | 3.1 | 0.93 | 1.9 | 476 | 60 | 11 | 185,930 |
| 2130 | 0.007 | 247,001 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 417 | 53 | 9.6 | 186,107 |
| 2131 | 0.007 | 247,428 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 397 | 50 | 9.1 | 186,064 |
| 2132 | 0.007 | 248,310 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 365 | 46 | 8.4 | 186,657 |
| 2133 | 0.007 | 248,160 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 356 | 45 | 8.2 | 186,125 |
| 2134 | 0.007 | 248,556 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 342 | 43 | 7.9 | 186,338 |

**Table A8.** Annual loads of the NAG backfill for the low nitrogen scenario.

| Model Year | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year as CaCO3 | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | $m^3$/year |
| 2135 | 293,473 | 298,007 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 180 | 0.19 | 0.89 | 2.8 | 9.3 | 0.82 | 80 | 14,473 | 3.6 | 0.00093 | 9.9 | 2.9 | 51 | 4,554 | 11 | 531 | 0.007 | 249,424 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 341 | 43 | 7.8 | 186,569 |
| 2136 | 294,228 | 300,087 | 3,182 | 44 | 0.52 | 0.42 | 0.59 | 145 | 0.0094 | 180 | 0.19 | 0.88 | 2.8 | 9.4 | 0.82 | 80 | 14,624 | 3.6 | 0.00094 | 9.9 | 2.9 | 51 | 4,554 | 10 | 531 | 0.0071 | 250,465 | 256 | 0.0071 | 0.071 | 3.1 | 0.94 | 1.9 | 338 | 43 | 7.8 | 187,180 |
| 2137 | 294,638 | 299,791 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 180 | 0.19 | 0.89 | 2.8 | 9.3 | 0.82 | 80 | 14,657 | 3.6 | 0.00093 | 9.9 | 2.9 | 51 | 4,554 | 11 | 531 | 0.0071 | 250,461 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 337 | 43 | 7.7 | 186,716 |
| 2138 | 292,401 | 302,917 | 3,182 | 45 | 0.52 | 0.41 | 0.59 | 145 | 0.0093 | 175 | 0.19 | 0.88 | 2.8 | 9.3 | 0.81 | 80 | 14,754 | 3.6 | 0.00093 | 9.8 | 2.9 | 51 | 4,554 | 10 | 531 | 0.007 | 250,635 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 337 | 43 | 7.7 | 186,790 |
| 2139 | 289,806 | 306,735 | 3,182 | 46 | 0.51 | 0.41 | 0.6 | 145 | 0.0094 | 171 | 0.19 | 0.87 | 2.8 | 9.4 | 0.8 | 80 | 14,872 | 3.5 | 0.00094 | 9.8 | 2.9 | 51 | 4,554 | 10 | 531 | 0.0069 | 250,917 | 256 | 0.007 | 0.07 | 3.1 | 0.94 | 1.9 | 337 | 43 | 7.7 | 187,056 |
| 2140 | 288,865 | 309,435 | 3,182 | 47 | 0.51 | 0.41 | 0.61 | 145 | 0.0094 | 170 | 0.19 | 0.86 | 2.8 | 9.4 | 0.79 | 80 | 15,001 | 3.5 | 0.00094 | 9.7 | 2.8 | 51 | 4,554 | 10 | 531 | 0.0069 | 251,475 | 256 | 0.0069 | 0.069 | 3.1 | 0.94 | 1.9 | 338 | 43 | 7.8 | 187,514 |
| 2141 | 285,669 | 310,955 | 3,182 | 48 | 0.5 | 0.4 | 0.61 | 145 | 0.0093 | 167 | 0.19 | 0.84 | 2.7 | 9.3 | 0.78 | 80 | 15,058 | 3.4 | 0.00093 | 9.6 | 2.8 | 51 | 4,554 | 10 | 531 | 0.0068 | 250,532 | 256 | 0.0069 | 0.069 | 3.0 | 0.93 | 1.9 | 338 | 43 | 7.8 | 186,895 |
| 2142 | 284,553 | 312,156 | 3,182 | 48 | 0.5 | 0.4 | 0.61 | 145 | 0.0093 | 166 | 0.19 | 0.84 | 2.7 | 9.3 | 0.77 | 80 | 15,121 | 3.4 | 0.00093 | 9.6 | 2.8 | 51 | 4,555 | 10 | 531 | 0.0068 | 250,428 | 256 | 0.0068 | 0.068 | 3.0 | 0.93 | 1.9 | 338 | 43 | 7.8 | 186,886 |
| 2143 | 282,757 | 314,534 | 3,182 | 48 | 0.5 | 0.39 | 0.62 | 145 | 0.0094 | 164 | 0.19 | 0.82 | 2.7 | 9.4 | 0.75 | 80 | 15,255 | 3.3 | 0.00094 | 9.5 | 2.7 | 51 | 4,555 | 10 | 531 | 0.0068 | 250,419 | 256 | 0.0068 | 0.068 | 3.0 | 0.94 | 1.9 | 339 | 43 | 7.8 | 187,034 |
| 2144 | 282,620 | 316,435 | 3,182 | 49 | 0.5 | 0.39 | 0.62 | 145 | 0.0094 | 164 | 0.19 | 0.81 | 2.7 | 9.4 | 0.75 | 80 | 15,360 | 3.3 | 0.00094 | 9.5 | 2.7 | 51 | 4,555 | 10 | 531 | 0.0068 | 251,018 | 256 | 0.0068 | 0.068 | 3.0 | 0.94 | 1.9 | 340 | 43 | 7.8 | 187,551 |
| 2145 | 280,136 | 317,427 | 3,183 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0094 | 162 | 0.19 | 0.79 | 2.7 | 9.4 | 0.72 | 80 | 15,442 | 3.2 | 0.00094 | 9.4 | 2.6 | 51 | 4,555 | 9.4 | 531 | 0.0067 | 250,138 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 339 | 43 | 7.8 | 187,019 |
| 2146 | 279,462 | 318,319 | 3,183 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0094 | 162 | 0.19 | 0.78 | 2.7 | 9.4 | 0.72 | 80 | 15,504 | 3.2 | 0.00094 | 9.4 | 2.6 | 51 | 4,555 | 9.2 | 531 | 0.0067 | 250,109 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 338 | 43 | 7.8 | 187,081 |
| 2147 | 278,291 | 320,039 | 3,183 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0094 | 161 | 0.19 | 0.76 | 2.7 | 9.4 | 0.7 | 80 | 15,627 | 3.1 | 0.00094 | 9.4 | 2.5 | 51 | 4,555 | 9.0 | 531 | 0.0067 | 250,097 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 336 | 42 | 7.7 | 187,212 |
| 2148 | 278,328 | 321,567 | 3,183 | 50 | 0.49 | 0.37 | 0.64 | 145 | 0.0094 | 161 | 0.19 | 0.75 | 2.7 | 9.4 | 0.69 | 80 | 15,722 | 3.1 | 0.00094 | 9.4 | 2.5 | 51 | 4,555 | 8.9 | 531 | 0.0067 | 250,648 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 334 | 42 | 7.7 | 187,667 |
| 2149 | 276,244 | 321,860 | 3,183 | 50 | 0.49 | 0.37 | 0.64 | 145 | 0.0094 | 159 | 0.19 | 0.73 | 2.6 | 9.4 | 0.67 | 80 | 15,777 | 3.0 | 0.00094 | 9.3 | 2.4 | 51 | 4,555 | 8.7 | 531 | 0.0066 | 249,685 | 256 | 0.0066 | 0.066 | 2.9 | 0.94 | 1.9 | 324 | 41 | 7.5 | 187,030 |
| 2150 | 275,672 | 322,362 | 3,183 | 50 | 0.49 | 0.36 | 0.64 | 145 | 0.0093 | 159 | 0.19 | 0.72 | 2.6 | 9.3 | 0.66 | 80 | 15,820 | 2.9 | 0.00093 | 9.3 | 2.4 | 51 | 4,555 | 8.6 | 531 | 0.0066 | 249,550 | 256 | 0.0066 | 0.066 | 2.9 | 0.93 | 1.9 | 317 | 40 | 7.3 | 186,985 |

**Table A9.** Source terms of the NAG backfill for the high nitrogen scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | $m^3$/year |
| 2023 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 24 |
| 2024 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 44 |
| 2025 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 80 |
| 2026 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 125 |
| 2027 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 158 |
| 2028 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 289 |
| 2029 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 270 |
| 2030 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 348 |
| 2031 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 2,236 |
| 2032 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 3,634 |
| 2033 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 620 |
| 2034 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 2,492 |
| 2035 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 7,085 |
| 2036 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 12,083 |
| 2037 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 13,464 |
| 2038 | 6.9 | 1,210 | 8.4 | 29 | 0.15 | 0.0021 | 0.0012 | 0.0023 | 1.3 | 0.00005 | 28 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.0001 | 0.72 | 20 | 0.034 | 0.000005 | 0.041 | 0.0074 | 0.46 | 41 | 0.11 | 4.8 | 0.000029 | 510 | 2.3 | 0.000029 | 0.00029 | 0.013 | 0.005 | 0.01 | 102 | 13 | 2.4 | 26,952 |
| 2039 | 7.8 | 1,302 | 85 | 29 | 0.0094 | 0.0023 | 0.0013 | 0.0023 | 1.3 | 0.00005 | 31 | 0.001 | 0.0058 | 0.004 | 0.05 | 0.00032 | 0.72 | 23 | 0.034 | 0.000005 | 0.044 | 0.008 | 0.46 | 41 | 0.11 | 4.8 | 0.000031 | 581 | 2.3 | 0.000031 | 0.00031 | 0.014 | 0.005 | 0.01 | 99 | 13 | 2.3 | 45,912 |
| 2040 | 8.2 | 1,465 | 225 | 29 | 0.017 | 0.0026 | 0.0014 | 0.0022 | 1.3 | 0.00005 | 34 | 0.001 | 0.0057 | 0.004 | 0.05 | 0.00082 | 0.72 | 27 | 0.032 | 0.000005 | 0.049 | 0.009 | 0.46 | 41 | 0.1 | 4.8 | 0.000035 | 712 | 2.3 | 0.000035 | 0.00035 | 0.016 | 0.005 | 0.01 | 88 | 11 | 2.0 | 79,056 |
| 2041 | 8.4 | 1,508 | 378 | 29 | 0.028 | 0.0027 | 0.0015 | 0.0023 | 1.3 | 0.00005 | 13 | 0.001 | 0.0042 | 0.0081 | 0.05 | 0.0017 | 0.72 | 30 | 0.021 | 0.000005 | 0.051 | 0.0089 | 0.46 | 41 | 0.067 | 4.8 | 0.000036 | 821 | 2.3 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 45 | 5.7 | 1.0 | 110,907 |
| 2042 | 8.5 | 1,409 | 396 | 25 | 0.029 | 0.0025 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.001 | 0.003 | 0.0082 | 0.05 | 0.002 | 0.62 | 28 | 0.014 | 0.000005 | 0.047 | 0.008 | 0.39 | 35 | 0.042 | 4.1 | 0.000034 | 787 | 2.0 | 0.000034 | 0.00034 | 0.015 | 0.005 | 0.01 | 17 | 2.1 | 0.38 | 128,839 |
| 2043 | 8.4 | 1,372 | 388 | 24 | 0.029 | 0.0024 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.001 | 0.0026 | 0.0081 | 0.05 | 0.002 | 0.59 | 28 | 0.012 | 0.000005 | 0.046 | 0.0077 | 0.38 | 34 | 0.034 | 4.0 | 0.000033 | 767 | 1.9 | 0.000033 | 0.00033 | 0.015 | 0.005 | 0.01 | 9.1 | 1.1 | 0.21 | 133,866 |
| 2044 | 8.4 | 1,350 | 377 | 23 | 0.028 | 0.0024 | 0.0014 | 0.0024 | 1.1 | 0.00005 | 13 | 0.001 | 0.0026 | 0.008 | 0.05 | 0.002 | 0.58 | 27 | 0.011 | 0.000005 | 0.045 | 0.0075 | 0.37 | 33 | 0.033 | 3.9 | 0.000032 | 752 | 1.9 | 0.000032 | 0.00032 | 0.014 | 0.005 | 0.01 | 9.8 | 1.2 | 0.22 | 136,575 |
| 2045 | 8.5 | 1,399 | 394 | 24 | 0.029 | 0.0025 | 0.0015 | 0.0024 | 1.1 | 0.00005 | 12 | 0.001 | 0.0028 | 0.0082 | 0.05 | 0.002 | 0.59 | 28 | 0.012 | 0.000005 | 0.047 | 0.0079 | 0.38 | 34 | 0.037 | 4.0 | 0.000034 | 782 | 1.9 | 0.000034 | 0.00034 | 0.015 | 0.005 | 0.01 | 12 | 1.5 | 0.28 | 133,758 |
| 2046 | 8.5 | 1,450 | 399 | 25 | 0.029 | 0.0026 | 0.0016 | 0.0023 | 1.1 | 0.00005 | 12 | 0.001 | 0.003 | 0.0082 | 0.05 | 0.0023 | 0.62 | 29 | 0.013 | 0.000005 | 0.049 | 0.0089 | 0.39 | 35 | 0.04 | 4.1 | 0.000035 | 807 | 2.0 | 0.000035 | 0.00035 | 0.015 | 0.005 | 0.01 | 12 | 1.5 | 0.28 | 128,763 |
| 2047 | 8.5 | 1,577 | 410 | 25 | 0.03 | 0.0028 | 0.0017 | 0.0022 | 1.1 | 0.00005 | 12 | 0.001 | 0.0035 | 0.0084 | 0.05 | 0.0029 | 0.62 | 31 | 0.015 | 0.000005 | 0.053 | 0.011 | 0.4 | 35 | 0.043 | 4.1 | 0.000038 | 868 | 2.0 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 9.0 | 1.1 | 0.21 | 128,089 |
| 2048 | 8.5 | 1,714 | 430 | 24 | 0.03 | 0.003 | 0.0019 | 0.0022 | 1.1 | 0.00005 | 11 | 0.001 | 0.004 | 0.0087 | 0.05 | 0.0034 | 0.61 | 34 | 0.017 | 0.000005 | 0.058 | 0.013 | 0.39 | 35 | 0.05 | 4.1 | 0.000041 | 939 | 2.0 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 8.6 | 1.1 | 0.2 | 129,793 |
| 2049 | 8.5 | 1,776 | 447 | 24 | 0.031 | 0.0031 | 0.0021 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0045 | 0.0089 | 0.05 | 0.0038 | 0.61 | 35 | 0.019 | 0.000005 | 0.06 | 0.014 | 0.39 | 35 | 0.056 | 4.0 | 0.000043 | 974 | 1.9 | 0.000043 | 0.00043 | 0.019 | 0.005 | 0.01 | 9.2 | 1.2 | 0.21 | 131,172 |
| 2050 | 8.5 | 1,803 | 451 | 24 | 0.031 | 0.0032 | 0.0022 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0047 | 0.009 | 0.05 | 0.0042 | 0.6 | 36 | 0.02 | 0.000005 | 0.061 | 0.015 | 0.38 | 34 | 0.058 | 4.0 | 0.000043 | 988 | 1.9 | 0.000043 | 0.00043 | 0.019 | 0.005 | 0.01 | 7.9 | 1.0 | 0.18 | 132,811 |
| 2051 | 8.5 | 1,816 | 452 | 24 | 0.031 | 0.0032 | 0.0022 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0048 | 0.009 | 0.05 | 0.0043 | 0.59 | 36 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.38 | 34 | 0.058 | 4.0 | 0.000044 | 995 | 1.9 | 0.000044 | 0.00044 | 0.019 | 0.005 | 0.01 | 6.1 | 0.77 | 0.14 | 133,964 |
| 2052 | 8.5 | 1,827 | 452 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0048 | 0.009 | 0.05 | 0.0045 | 0.59 | 36 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.38 | 34 | 0.057 | 3.9 | 0.000044 | 1,000 | 1.9 | 0.000044 | 0.00044 | 0.02 | 0.005 | 0.01 | 3.8 | 0.48 | 0.087 | 135,076 |
| 2053 | 8.5 | 1,837 | 452 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0049 | 0.009 | 0.05 | 0.0046 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.38 | 34 | 0.057 | 3.9 | 0.000044 | 1,004 | 1.9 | 0.000044 | 0.00044 | 0.02 | 0.005 | 0.01 | 1.9 | 0.25 | 0.045 | 135,145 |
| 2054 | 8.5 | 1,841 | 452 | 23 | 0.031 | 0.0032 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.0049 | 0.009 | 0.05 | 0.0047 | 0.59 | 36 | 0.02 | 0.000005 | 0.062 | 0.016 | 0.37 | 33 | 0.057 | 3.9 | 0.000044 | 1,006 | 1.9 | 0.000044 | 0.00044 | 0.02 | 0.005 | 0.01 | 1.4 | 0.17 | 0.031 | 135,795 |
| 2055 | 8.5 | 1,852 | 451 | 23 | 0.031 | 0.0033 | 0.0023 | 0.0021 | 1.1 | 0.00005 | 11 | 0.001 | 0.005 | 0.009 | 0.05 | 0.0048 | 0.58 | 36 | 0.02 | 0.000005 | 0.062 | 0.017 | 0.37 | 33 | 0.058 | 3.9 | 0.000044 | 1,010 | 1.9 | 0.000045 | 0.00045 | 0.02 | 0.005 | 0.011 | 1.4 | 0.18 | 0.032 | 136,601 |
| 2056 | 8.6 | 1,808 | 551 | 23 | 0.039 | 0.0032 | 0.0023 | 0.0022 | 1.1 | 0.00005 | 7.4 | 0.001 | 0.0048 | 0.01 | 0.05 | 0.0046 | 0.58 | 38 | 0.02 | 0.000005 | 0.061 | 0.016 | 0.37 | 33 | 0.057 | 3.8 | 0.000043 | 1,036 | 1.9 | 0.000043 | 0.00043 | 0.019 | 0.005 | 0.01 | 1.6 | 0.21 | 0.037 | 137,639 |
| 2057 | 8.7 | 1,730 | 710 | 23 | 0.052 | 0.0031 | 0.0022 | 0.0023 | 1.1 | 0.00005 | 4.7 | 0.001 | 0.0044 | 0.013 | 0.05 | 0.0042 | 0.58 | 41 | 0.018 | 0.000005 | 0.058 | 0.015 | 0.37 | 33 | 0.052 | 3.8 | 0.000041 | 1,070 | 1.9 | 0.000042 | 0.00042 | 0.018 | 0.005 | 0.01 | 1.9 | 0.24 | 0.044 | 137,940 |
| 2058 | 8.7 | 1,684 | 801 | 23 | 0.059 | 0.003 | 0.0021 | 0.0024 | 1.1 | 0.00005 | 3.8 | 0.001 | 0.0042 | 0.015 | 0.05 | 0.0039 | 0.58 | 42 | 0.017 | 0.000005 | 0.057 | 0.014 | 0.37 | 33 | 0.049 | 3.8 | 0.00004 | 1,088 | 1.8 | 0.00004 | 0.00041 | 0.018 | 0.005 | 0.01 | 2.3 | 0.29 | 0.052 | 138,218 |
| 2059 | 8.7 | 1,672 | 832 | 23 | 0.062 | 0.0029 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 43 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.37 | 33 | 0.048 | 3.8 | 0.00004 | 1,095 | 1.8 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 2.7 | 0.34 | 0.061 | 138,460 |
| 2060 | 8.7 | 1,671 | 838 | 23 | 0.062 | 0.0029 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 43 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.36 | 33 | 0.048 | 3.8 | 0.00004 | 1,097 | 1.8 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 3.1 | 0.4 | 0.072 | 139,518 |
| 2061 | 8.7 | 1,674 | 837 | 23 | 0.062 | 0.003 | 0.002 | 0.0024 | 1.0 | 0.00005 | 3.5 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 44 | 0.017 | 0.000005 | 0.056 | 0.014 | 0.36 | 33 | 0.049 | 3.8 | 0.00004 | 1,097 | 1.8 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 3.6 | 0.46 | 0.084 | 139,838 |
| 2062 | 8.8 | 1,663 | 872 | 23 | 0.065 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 3.3 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0038 | 0.57 | 44 | 0.017 | 0.000005 | 0.056 | 0.013 | 0.36 | 32 | 0.049 | 3.8 | 0.00004 | 1,108 | 1.8 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 4.2 | 0.53 | 0.096 | 140,676 |
| 2063 | 8.8 | 1,642 | 908 | 22 | 0.07 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 3.0 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0036 | 0.56 | 45 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.36 | 32 | 0.048 | 3.7 | 0.000039 | 1,113 | 1.8 | 0.000039 | 0.00039 | 0.018 | 0.005 | 0.01 | 4.8 | 0.61 | 0.11 | 141,568 |
| 2064 | 8.8 | 1,636 | 915 | 22 | 0.069 | 0.0029 | 0.002 | 0.0025 | 1.0 | 0.00005 | 3.0 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0036 | 0.56 | 45 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.36 | 32 | 0.048 | 3.7 | 0.000039 | 1,113 | 1.8 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 5.4 | 0.68 | 0.12 | 142,789 |
| 2065 | 8.9 | 1,636 | 951 | 22 | 0.092 | 0.0029 | 0.0019 | 0.0026 | 1.0 | 0.00005 | 2.4 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0035 | 0.56 | 46 | 0.016 | 0.000005 | 0.055 | 0.013 | 0.35 | 32 | 0.048 | 3.7 | 0.000039 | 1,128 | 1.8 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 6.1 | 0.77 | 0.14 | 143,409 |
| 2066 | 8.9 | 1,609 | 994 | 22 | 0.1 | 0.0028 | 0.0019 | 0.0026 | 1.0 | 0.00005 | 2.1 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.55 | 47 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.35 | 31 | 0.048 | 3.7 | 0.000039 | 1,134 | 1.8 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 6.8 | 0.85 | 0.16 | 144,573 |
| 2067 | 8.9 | 1,588 | 1,023 | 22 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 1. | 0.00005 | 2.0 | 0.001 | 0.0039 | 0.013 | 0.05 | 0.0033 | 0.55 | 47 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.35 | 31 | 0.047 | 3.6 | 0.000038 | 1,137 | 1.8 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 7.5 | 0.94 | 0.17 | 145,722 |
| 2068 | 8.9 | 1,582 | 1,038 | 22 | 0.11 | 0.0028 | 0.0019 | 0.0027 | 0.99 | 0.00005 | 2.0 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0033 | 0.54 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 31 | 0.047 | 3.6 | 0.000038 | 1,139 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 8.1 | 1.0 | 0.19 | 147,284 |
| 2069 | 8.9 | 1,578 | 1,048 | 21 | 0.1 | 0.0028 | 0.0019 | 0.0027 | 0.98 | 0.00005 | 2.0 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.54 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 31 | 0.047 | 3.6 | 0.000038 | 1,141 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 8.7 | 1.1 | 0.2 | 148,041 |
| 2070 | 8.9 | 1,583 | 1,048 | 21 | 0.1 | 0.0028 | 0.0019 | 0.0027 | 0.97 | 0.00005 | 2.1 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.53 | 48 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 30 | 0.048 | 3.5 | 0.000038 | 1,143 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 8.9 | 1.1 | 0.2 | 149,328 |
| 2071 | 8.9 | 1,583 | 1,049 | 21 | 0.095 | 0.0028 | 0.0019 | 0.0027 | 0.96 | 0.00005 | 2.1 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0032 | 0.53 | 49 | 0.016 | 0.000005 | 0.053 | 0.012 | 0.34 | 30 | 0.047 | 3.5 | 0.000038 | 1,143 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 8.4 | 1.1 | 0.19 | 150,505 |
| 2072 | 8.9 | 1,598 | 1,052 | 21 | 0.1 | 0.0028 | 0.0019 | 0.0027 | 0.96 | 0.00005 | 2.0 | 0.001 | 0.0038 | 0.013 | 0.05 | 0.0033 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.33 | 30 | 0.047 | 3.5 | 0.000038 | 1,151 | 1.7 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 7.6 | 0.96 | 0.17 | 151,916 |
| 2073 | 8.9 | 1,607 | 1,049 | 21 | 0.1 | 0.0028 | 0.0019 | 0.0027 | 0.95 | 0.00005 | 2.1 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.012 | 0.33 | 30 | 0.047 | 3.5 | 0.000038 | 1,154 | 1.7 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 7.0 | 0.88 | 0.16 | 152,292 |
| 2074 | 8.9 | 1,613 | 1,044 | 21 | 0.097 | 0.0028 | 0.0019 | 0.0026 | 0.95 | 0.00005 | 2.1 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0034 | 0.52 | 49 | 0.016 | 0.000005 | 0.054 | 0.013 | 0.33 | 30 | 0.048 | 3.5 | 0.000039 | 1,155 | 1.7 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 6.8 | 0.86 | 0.16 | 153,237 |
| 2075 | 8.9 | 1,623 | 1,039 | 21 | 0.093 | 0.0029 | 0.0019 | 0.0026 | 0.94 | 0.00005 | 2.2 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0035 | 0.52 | 49 | 0.017 | 0.000005 | 0.055 | 0.013 | 0.33 | 30 | 0.049 | 3.4 | 0.000039 | 1,157 | 1.7 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 6.6 | 0.84 | 0.15 | 153,995 |
| 2076 | 8.9 | 1,649 | 1,044 | 20 | 0.11 | 0.0029 | 0.002 | 0.0026 | 0.94 | 0.00005 | 2.0 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0036 | 0.51 | 50 | 0.017 | 0.000005 | 0.055 | 0.013 | 0.33 | 29 | 0.05 | 3.4 | 0.000039 | 1,171 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 6.8 | 0.86 | 0.16 | 155,005 |
| 2077 | 8.9 | 1,665 | 1,042 | 20 | 0.11 | 0.0029 | 0.002 | 0.0026 | 0.93 | 0.00005 | 2.0 | 0.001 | 0.0043 | 0.014 | 0.05 | 0.0038 | 0.51 | 50 | 0.018 | 0.000005 | 0.056 | 0.014 | 0.33 | 29 | 0.052 | 3.4 | 0.00004 | 1,177 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 7.0 | 0.89 | 0.16 | 155,356 |
| 2078 | 8.9 | 1,678 | 1,038 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.93 | 0.00005 | 2.0 | 0.001 | 0.0044 | 0.014 | 0.05 | 0.0039 | 0.51 | 50 | 0.018 | 0.000005 | 0.056 | 0.014 | 0.32 | 29 | 0.054 | 3.4 | 0.00004 | 1,182 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 7.3 | 0.92 | 0.17 | 156,236 |
| 2079 | 8.9 | 1,688 | 1,042 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.92 | 0.00005 | 2.0 | 0.001 | 0.0045 | 0.014 | 0.05 | 0.004 | 0.51 | 50 | 0.019 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.055 | 3.4 | 0.00004 | 1,187 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 7.5 | 0.94 | 0.17 | 157,251 |
| 2080 | 8.9 | 1,694 | 1,048 | 20 | 0.11 | 0.003 | 0.0021 | 0.0026 | 0.92 | 0.00005 | 2.0 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0041 | 0.5 | 50 | 0.019 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.057 | 3.3 | 0.00004 | 1,192 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 7.4 | 0.94 | 0.17 | 158,470 |
| 2081 | 8.9 | 1,705 | 1,047 | 20 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 2.0 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0042 | 0.5 | 51 | 0.02 | 0.000005 | 0.057 | 0.015 | 0.32 | 29 | 0.058 | 3.3 | 0.00004 | 1,197 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 7.5 | 0.95 | 0.17 | 158,838 |
| 2082 | 8.9 | 1,697 | 1,065 | 20 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 2.0 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0043 | 0.5 | 51 | 0.02 | 0.000005 | 0.057 | 0.015 | 0.32 | 28 | 0.058 | 3.3 | 0.00004 | 1,201 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 7.3 | 0.92 | 0.17 | 159,814 |
| 2083 | 8.9 | 1,686 | 1,085 | 20 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.91 | 0.00005 | 1.9 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0043 | 0.5 | 51 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.32 | 28 | 0.059 | 3.3 | 0.00004 | 1,204 | 1.6 | 0.00004 | 0.00041 | 0.018 | 0.005 | 0.01 | 7.4 | 0.93 | 0.17 | 160,383 |
| 2084 | 8.9 | 1,688 | 1,092 | 20 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.9 | 0.00005 | 1.9 | 0.001 | 0.0049 | 0.014 | 0.05 | 0.0044 | 0.49 | 52 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.06 | 3.3 | 0.00004 | 1,207 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 7.2 | 0.92 | 0.17 | 161,637 |
| 2085 | 8.9 | 1,680 | 1,102 | 20 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.9 | 0.00005 | 1.9 | 0.001 | 0.0049 | 0.014 | 0.05 | 0.0044 | 0.49 | 52 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.06 | 3.3 | 0.00004 | 1,208 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 7.4 | 0.94 | 0.17 | 161,890 |
| 2086 | 8.9 | 1,684 | 1,106 | 20 | 0.11 | 0.003 | 0.0022 | 0.0026 | 0.89 | 0.00005 | 1.9 | 0.001 | 0.005 | 0.015 | 0.05 | 0.0044 | 0.49 | 53 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.06 | 3.3 | 0.00004 | 1,211 | 1.6 | 0.00004 | 0.00041 | 0.018 | 0.005 | 0.01 | 7.2 | 0.91 | 0.17 | 162,778 |
| 2087 | 8.9 | 1,679 | 1,112 | 19 | 0.1 | 0.003 | 0.0022 | 0.0026 | 0.89 | 0.00005 | 2.0 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0044 | 0.49 | 53 | 0.02 | 0.000005 | 0.056 | 0.016 | 0.31 | 28 | 0.06 | 3.2 | 0.00004 | 1,210 | 1.6 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 7.2 | 0.91 | 0.17 | 163,470 |
| 2088 | 8.9 | 1,691 | 1,119 | 19 | 0.11 | 0.003 | 0.0023 | 0.0026 | 0.88 | 0.00005 | 1.9 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0044 | 0.48 | 53 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.06 | 3.2 | 0.00004 | 1,218 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 6.8 | 0.86 | 0.16 | 164,570 |
| 2089 | 9.0 | 1,688 | 1,141 | 19 | 0.13 | 0.003 | 0.0022 | 0.0027 | 0.88 | 0.00005 | 1.7 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0044 | 0.48 | 54 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 28 | 0.059 | 3.2 | 0.00004 | 1,226 | 1.6 | 0.000041 | 0.00041 | 0.018 | 0.005 | 0.01 | 6.7 | 0.85 | 0.15 | 164,772 |
| 2090 | 9.0 | 1,679 | 1,158 | 19 | 0.13 | 0.003 | 0.0022 | 0.0027 | 0.88 | 0.00005 | 1.6 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0044 | 0.48 | 55 | 0.02 | 0.000005 | 0.057 | 0.016 | 0.31 | 27 | 0.059 | 3.2 | 0.00004 | 1,228 | 1.5 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 6.3 | 0.8 | 0.14 | 165,462 |
| 2091 | 9.0 | 1,674 | 1,166 | 19 | 0.13 | 0.003 | 0.0022 | 0.0027 | 0.87 | 0.00005 | 1.6 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0043 | 0.48 | 55 | 0.02 | 0.000005 | 0.056 | 0.016 | 0.31 | 27 | 0.058 | 3.2 | 0.00004 | 1,229 | 1.5 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 6.4 | 0.8 | 0.15 | 166,285 |
| 2092 | 9.0 | 1,674 | 1,174 | 19 | 0.13 | 0.003 | 0.0022 | 0.0027 | 0.87 | 0.00005 | 1.6 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0043 | 0.48 | 56 | 0.02 | 0.000005 | 0.056 | 0.016 | 0.3 | 27 | 0.058 | 3.2 | 0.00004 | 1,232 | 1.5 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 6.2 | 0.79 | 0.14 | 167,587 |
| 2093 | 9.0 | 1,658 | 1,195 | 19 | 0.14 | 0.0029 | 0.0022 | 0.0027 | 0.86 | 0.00005 | 1.6 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0043 | 0.47 | 56 | 0.02 | 0.000005 | 0.056 | 0.015 | 0.3 | 27 | 0.058 | 3.2 | 0.000039 | 1,233 | 1.5 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 6.5 | 0.82 | 0.15 | 168,175 |
| 2094 | 9.0 | 1,636 | 1,220 | 19 | 0.14 | 0.0029 | 0.0022 | 0.0028 | 0.86 | 0.00005 | 1.5 | 0.001 | 0.0047 | 0.014 | 0.05 | 0.0042 | 0.47 | 57 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.3 | 27 | 0.057 | 3.1 | 0.000039 | 1,232 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 6.7 | 0.85 | 0.15 | 169,130 |
| 2095 | 9.0 | 1,622 | 1,228 | 19 | 0.14 | 0.0029 | 0.0021 | 0.0028 | 0.86 | 0.00005 | 1.5 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0041 | 0.47 | 57 | 0.019 | 0.000005 | 0.055 | 0.015 | 0.3 | 27 | 0.056 | 3.1 | 0.000039 | 1,229 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 7.1 | 0.9 | 0.16 | 169,816 |
| 2096 | 9.0 | 1,600 | 1,243 | 19 | 0.14 | 0.0028 | 0.0021 | 0.0028 | 0.85 | 0.00005 | 1.5 | 0.001 | 0.0045 | 0.014 | 0.05 | 0.004 | 0.47 | 57 | 0.019 | 0.000005 | 0.054 | 0.015 | 0.3 | 27 | 0.055 | 3.1 | 0.000039 | 1,224 | 1.5 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 7.5 | 0.94 | 0.17 | 170,905 |
| 2097 | 9.0 | 1,599 | 1,246 | 19 | 0.13 | 0.0028 | 0.0021 | 0.0028 | 0.85 | 0.00005 | 1.5 | 0.001 | 0.0045 | 0.014 | 0.05 | 0.004 | 0.47 | 58 | 0.019 | 0.000005 | 0.054 | 0.015 | 0.3 | 27 | 0.056 | 3.1 | 0.000039 | 1,225 | 1.5 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 7.9 | 1. | 0.18 | 171,124 |
| 2098 | 9.0 | 1,593 | 1,254 | 18 | 0.13 | 0.0028 | 0.0021 | 0.0028 | 0.85 | 0.00005 | 1.5 | 0.001 | 0.0045 | 0.014 | 0.05 | 0.0039 | 0.46 | 58 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.3 | 26 | 0.056 | 3.1 | 0.000039 | 1,225 | 1.5 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 8.3 | 1.05 | 0.19 | 171,837 |
| 2099 | 9.0 | 1,595 | 1,255 | 18 | 0.13 | 0.0028 | 0.0021 | 0.0028 | 0.84 | 0.00005 | 1.6 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0039 | 0.46 | 59 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.056 | 3.1 | 0.000039 | 1,226 | 1.5 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 8.7 | 1.1 | 0.2 | 172,453 |
| 2100 | 9.0 | 1,603 | 1,267 | 18 | 0.14 | 0.0028 | 0.0021 | 0.0028 | 0.84 | 0.00005 | 1.5 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0039 | 0.46 | 59 | 0.019 | 0.000005 | 0.054 | 0.014 | 0.29 | 26 | 0.057 | 3.1 | 0.000039 | 1,234 | 1.5 | 0.000038 | 0.00039 | 0.017 | 0.005 | 0.01 | 9.1 | 1.15 | 0.21 | 173,472 |
| 2101 | 9.0 | 1,610 | 1,267 | 18 | 0.14 | 0.0028 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.5 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.004 | 0.46 | 60 | 0.019 | 0.000005 | 0.054 | 0.015 | 0.29 | 26 | 0.057 | 3.0 | 0.000039 | 1,237 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 9.5 | 1.21 | 0.22 | 174,383 |
| 2102 | 9.0 | 1,612 | 1,271 | 18 | 0.14 | 0.0028 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.5 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.004 | 0.45 | 60 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.29 | 26 | 0.058 | 3.0 | 0.000039 | 1,238 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 10.0 | 1.26 | 0.23 | 175,164 |
| 2103 | 9.1 | 1,636 | 1,280 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.83 | 0.00005 | 1.4 | 0.001 | 0.0047 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.059 | 3.0 | 0.000039 | 1,253 | 1.5 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 10.4 | 1.31 | 0.24 | 175,863 |
| 2104 | 9.1 | 1,647 | 1,284 | 18 | 0.16 | 0.0029 | 0.0022 | 0.0028 | 0.82 | 0.00005 | 1.4 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.0041 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.06 | 3.0 | 0.000039 | 1,259 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 10.8 | 1.36 | 0.25 | 177,220 |
| 2105 | 9.1 | 1,637 | 1,292 | 18 | 0.16 | 0.0029 | 0.0021 | 0.0028 | 0.82 | 0.00005 | 1.4 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.004 | 0.45 | 61 | 0.02 | 0.000005 | 0.055 | 0.015 | 0.29 | 26 | 0.06 | 3.0 | 0.000039 | 1,257 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 11.2 | 1.41 | 0.26 | 177,533 |
| 2106 | 9.1 | 1,606 | 1,315 | 18 | 0.17 | 0.0028 | 0.0021 | 0.0029 | 0.82 | 0.00005 | 1.3 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0038 | 0.45 | 62 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 26 | 0.058 | 3.0 | 0.000039 | 1,253 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 11.5 | 1.46 | 0.26 | 178,211 |
| 2107 | 9.1 | 1,599 | 1,330 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.3 | 0.001 | 0.0046 | 0.014 | 0.05 | 0.0038 | 0.45 | 62 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 25 | 0.058 | 3.0 | 0.000038 | 1,255 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 11.8 | 1.5 | 0.27 | 179,040 |
| 2108 | 9.1 | 1,603 | 1,342 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.3 | 0.001 | 0.0047 | 0.014 | 0.05 | 0.0039 | 0.44 | 63 | 0.02 | 0.000005 | 0.054 | 0.014 | 0.28 | 25 | 0.059 | 2.9 | 0.000038 | 1,261 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 12.1 | 1.53 | 0.28 | 180,178 |
| 2109 | 9.1 | 1,606 | 1,351 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.81 | 0.00005 | 1.2 | 0.001 | 0.0047 | 0.014 | 0.05 | 0.0039 | 0.44 | 63 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.28 | 25 | 0.06 | 2.9 | 0.000038 | 1,266 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 12.4 | 1.57 | 0.28 | 180,248 |
| 2110 | 9.1 | 1,614 | 1,358 | 18 | 0.18 | 0.0028 | 0.0021 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.001 | 0.0048 | 0.014 | 0.05 | 0.004 | 0.44 | 64 | 0.02 | 0.000005 | 0.054 | 0.015 | 0.28 | 25 | 0.061 | 2.9 | 0.000038 | 1,272 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 12.6 | 1.6 | 0.29 | 180,830 |
| 2111 | 9.1 | 1,621 | 1,364 | 18 | 0.18 | 0.0029 | 0.0021 | 0.0029 | 0.8 | 0.00005 | 1.2 | 0.001 | 0.0049 | 0.014 | 0.05 | 0.004 | 0.44 | 65 | 0.021 | 0.000005 | 0.055 | 0.015 | 0.28 | 25 | 0.062 | 2.9 | 0.000039 | 1,277 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 12.9 | 1.6 | 0.3 | 181,243 |
| 2112 | 9.1 | 1,635 | 1,369 | 17 | 0.17 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.3 | 0.001 | 0.005 | 0.014 | 0.05 | 0.0041 | 0.44 | 65 | 0.021 | 0.000005 | 0.055 | 0.015 | 0.28 | 25 | 0.063 | 2.9 | 0.000039 | 1,284 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.01 | 13.1 | 1.7 | 0.3 | 181,975 |
| 2113 | 9.1 | 1,641 | 1,372 | 17 | 0.17 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.3 | 0.001 | 0.005 | 0.014 | 0.05 | 0.0042 | 0.44 | 66 | 0.021 | 0.000005 | 0.055 | 0.016 | 0.28 | 25 | 0.064 | 2.9 | 0.000039 | 1,288 | 1.4 | 0.000039 | 0.00039 | 0.018 | 0.005 | 0.01 | 13.3 | 1.7 | 0.31 | 181,870 |
| 2114 | 9.1 | 1,656 | 1,375 | 17 | 0.17 | 0.0029 | 0.0022 | 0.0029 | 0.8 | 0.00005 | 1.3 | 0.001 | 0.0052 | 0.014 | 0.05 | 0.0043 | 0.44 | 66 | 0.022 | 0.000005 | 0.056 | 0.016 | 0.28 | 25 | 0.065 | 2.9 | 0.000039 | 1,295 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 13.4 | 1.7 | 0.31 | 182,135 |
| 2115 | 9.1 | 1,662 | 1,378 | 17 | 0.17 | 0.0029 | 0.0023 | 0.0029 | 0.8 | 0.00005 | 1.3 | 0.001 | 0.0052 | 0.014 | 0.05 | 0.0043 | 0.44 | 67 | 0.022 | 0.000005 | 0.056 | 0.016 | 0.28 | 25 | 0.066 | 2.9 | 0.000039 | 1,299 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 13.3 | 1.7 | 0.31 | 182,344 |
| 2116 | 9.1 | 1,677 | 1,378 | 17 | 0.16 | 0.003 | 0.0023 | 0.0028 | 0.79 | 0.00005 | 1.3 | 0.001 | 0.0053 | 0.014 | 0.05 | 0.0044 | 0.43 | 67 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,305 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 13.1 | 1.7 | 0.3 | 183,370 |
| 2117 | 9.1 | 1,670 | 1,391 | 17 | 0.17 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.3 | 0.001 | 0.0053 | 0.014 | 0.05 | 0.0045 | 0.43 | 68 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,307 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.01 | 12.8 | 1.6 | 0.29 | 183,400 |
| 2118 | 9.1 | 1,666 | 1,406 | 17 | 0.17 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.3 | 0.001 | 0.0054 | 0.014 | 0.05 | 0.0045 | 0.43 | 68 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,311 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.011 | 12.4 | 1.6 | 0.28 | 183,657 |
| 2119 | 9.1 | 1,663 | 1,414 | 17 | 0.17 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.001 | 0.0054 | 0.014 | 0.05 | 0.0045 | 0.43 | 69 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.000039 | 1,313 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.011 | 11.9 | 1.5 | 0.27 | 183,671 |
| 2120 | 9.1 | 1,662 | 1,424 | 17 | 0.17 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.2 | 0.001 | 0.0054 | 0.014 | 0.05 | 0.0046 | 0.43 | 69 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.00004 | 1,316 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.011 | 11.4 | 1.4 | 0.26 | 184,250 |
| 2121 | 9.1 | 1,656 | 1,451 | 17 | 0.2 | 0.0029 | 0.0023 | 0.0029 | 0.79 | 0.00005 | 1.1 | 0.001 | 0.0054 | 0.014 | 0.05 | 0.0046 | 0.43 | 70 | 0.023 | 0.000005 | 0.056 | 0.017 | 0.28 | 25 | 0.067 | 2.9 | 0.000039 | 1,324 | 1.4 | 0.00004 | 0.0004 | 0.018 | 0.005 | 0.011 | 10.9 | 1.4 | 0.25 | 184,044 |
| 2122 | 9.1 | 1,633 | 1,480 | 17 | 0.21 | 0.0029 | 0.0023 | 0.003 | 0.79 | 0.00005 | 1.1 | 0.001 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 70 | 0.022 | 0.000005 | 0.055 | 0.017 | 0.28 | 25 | 0.066 | 2.9 | 0.000039 | 1,325 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.011 | 10.4 | 1.3 | 0.24 | 184,430 |
| 2123 | 9.1 | 1,622 | 1,492 | 17 | 0.22 | 0.0029 | 0.0023 | 0.003 | 0.79 | 0.00005 | 1.1 | 0.001 | 0.0053 | 0.014 | 0.05 | 0.0046 | 0.43 | 71 | 0.022 | 0.000005 | 0.055 | 0.017 | 0.27 | 25 | 0.065 | 2.9 | 0.000039 | 1,325 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.011 | 10.0 | 1.3 | 0.23 | 184,660 |
| 2124 | 9.2 | 1,606 | 1,511 | 17 | 0.22 | 0.0028 | 0.0023 | 0.003 | 0.78 | 0.00005 | 1.0 | 0.001 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 72 | 0.022 | 0.000005 | 0.054 | 0.017 | 0.27 | 25 | 0.065 | 2.9 | 0.000038 | 1,324 | 1.4 | 0.000039 | 0.00039 | 0.017 | 0.005 | 0.011 | 9.3 | 1.2 | 0.21 | 185,381 |
| 2125 | 9.2 | 1,600 | 1,519 | 17 | 0.22 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 1.02 | 0.001 | 0.0052 | 0.015 | 0.05 | 0.0046 | 0.43 | 72 | 0.022 | 0.000005 | 0.054 | 0.017 | 0.27 | 25 | 0.064 | 2.9 | 0.000038 | 1,325 | 1.4 | 0.000039 | 0.00038 | 0.017 | 0.005 | 0.011 | 8.8 | 1.1 | 0.2 | 185,380 |
| 2126 | 9.2 | 1,588 | 1,533 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 1.01 | 0.001 | 0.0051 | 0.015 | 0.05 | 0.0046 | 0.43 | 73 | 0.021 | 0.000005 | 0.053 | 0.017 | 0.27 | 24 | 0.063 | 2.9 | 0.000038 | 1,324 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 7.8 | 0.98 | 0.18 | 185,890 |
| 2127 | 9.2 | 1,585 | 1,541 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 1. | 0.001 | 0.0051 | 0.015 | 0.05 | 0.0046 | 0.43 | 73 | 0.021 | 0.000005 | 0.053 | 0.017 | 0.27 | 24 | 0.062 | 2.9 | 0.000038 | 1,325 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 7.3 | 0.92 | 0.17 | 185,957 |
| 2128 | 9.2 | 1,575 | 1,555 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.99 | 0.001 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.43 | 74 | 0.021 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.061 | 2.8 | 0.000038 | 1,325 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 6.2 | 0.78 | 0.14 | 186,328 |
| 2129 | 9.2 | 1,576 | 1,560 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.99 | 0.001 | 0.005 | 0.015 | 0.05 | 0.0045 | 0.43 | 74 | 0.021 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.06 | 2.9 | 0.000038 | 1,327 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 5.8 | 0.73 | 0.13 | 185,930 |
| 2130 | 9.2 | 1,568 | 1,571 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.98 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 75 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.059 | 2.9 | 0.000038 | 1,327 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 5.0 | 0.63 | 0.11 | 186,107 |
| 2131 | 9.2 | 1,570 | 1,576 | 17 | 0.23 | 0.0028 | 0.0023 | 0.0031 | 0.78 | 0.00005 | 0.98 | 0.001 | 0.0049 | 0.015 | 0.05 | 0.0045 | 0.43 | 76 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.058 | 2.9 | 0.000038 | 1,330 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 4.7 | 0.59 | 0.11 | 186,064 |
| 2132 | 9.2 | 1,565 | 1,585 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.97 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 76 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,330 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 4.2 | 0.54 | 0.097 | 186,657 |
| 2133 | 9.2 | 1,570 | 1,589 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0031 | 0.78 | 0.00005 | 0.97 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 77 | 0.02 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.9 | 0.000038 | 1,333 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 4.1 | 0.52 | 0.095 | 186,125 |
| 2134 | 9.2 | 1,567 | 1,595 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.96 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 77 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,334 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.9 | 0.5 | 0.09 | 186,338 |

**Table A9.** Source terms of the NAG backfill for the high nitrogen scenario.

| Model Year | pH | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | mg/L | mg/L as CaCO3 | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | $m^3$/year |
| 2135 | 9.2 | 1,573 | 1,597 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.97 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 78 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.057 | 2.8 | 0.000038 | 1,337 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.9 | 0.49 | 0.09 | 186,569 |
| 2136 | 9.2 | 1,571 | 1,603 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.96 | 0.001 | 0.0047 | 0.015 | 0.05 | 0.0044 | 0.43 | 78 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,338 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.8 | 0.49 | 0.088 | 187,180 |
| 2137 | 9.2 | 1,577 | 1,606 | 17 | 0.23 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.96 | 0.001 | 0.0048 | 0.015 | 0.05 | 0.0044 | 0.43 | 79 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,341 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 186,716 |
| 2138 | 9.2 | 1,565 | 1,622 | 17 | 0.24 | 0.0028 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.94 | 0.001 | 0.0047 | 0.015 | 0.05 | 0.0043 | 0.43 | 79 | 0.019 | 0.000005 | 0.053 | 0.016 | 0.27 | 24 | 0.056 | 2.8 | 0.000038 | 1,342 | 1.4 | 0.000038 | 0.00038 | 0.017 | 0.005 | 0.01 | 3.8 | 0.49 | 0.088 | 186,790 |
| 2139 | 9.2 | 1,549 | 1,640 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.92 | 0.001 | 0.0046 | 0.015 | 0.05 | 0.0043 | 0.43 | 80 | 0.019 | 0.000005 | 0.052 | 0.015 | 0.27 | 24 | 0.055 | 2.8 | 0.000037 | 1,341 | 1.4 | 0.000037 | 0.00037 | 0.017 | 0.005 | 0.01 | 3.8 | 0.49 | 0.088 | 187,056 |
| 2140 | 9.2 | 1,540 | 1,650 | 17 | 0.25 | 0.0027 | 0.0022 | 0.0032 | 0.78 | 0.00005 | 0.91 | 0.001 | 0.0046 | 0.015 | 0.05 | 0.0042 | 0.43 | 80 | 0.019 | 0.000005 | 0.052 | 0.015 | 0.27 | 24 | 0.054 | 2.8 | 0.000037 | 1,341 | 1.4 | 0.000037 | 0.00037 | 0.016 | 0.005 | 0.01 | 3.8 | 0.49 | 0.088 | 187,514 |
| 2141 | 9.2 | 1,528 | 1,664 | 17 | 0.26 | 0.0027 | 0.0022 | 0.0033 | 0.78 | 0.00005 | 0.89 | 0.001 | 0.0045 | 0.015 | 0.05 | 0.0042 | 0.43 | 81 | 0.018 | 0.000005 | 0.051 | 0.015 | 0.27 | 24 | 0.054 | 2.8 | 0.000037 | 1,340 | 1.4 | 0.000037 | 0.00037 | 0.016 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 186,895 |
| 2142 | 9.2 | 1,522 | 1,670 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.89 | 0.001 | 0.0045 | 0.015 | 0.05 | 0.0041 | 0.43 | 81 | 0.018 | 0.000005 | 0.051 | 0.015 | 0.27 | 24 | 0.053 | 2.8 | 0.000037 | 1,340 | 1.4 | 0.000037 | 0.00037 | 0.016 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 186,886 |
| 2143 | 9.2 | 1,512 | 1,682 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.88 | 0.001 | 0.0044 | 0.015 | 0.05 | 0.004 | 0.43 | 82 | 0.018 | 0.000005 | 0.051 | 0.014 | 0.27 | 24 | 0.052 | 2.8 | 0.000036 | 1,339 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 187,034 |
| 2144 | 9.2 | 1,507 | 1,687 | 17 | 0.26 | 0.0027 | 0.0021 | 0.0033 | 0.78 | 0.00005 | 0.87 | 0.001 | 0.0043 | 0.014 | 0.05 | 0.004 | 0.43 | 82 | 0.018 | 0.000005 | 0.051 | 0.014 | 0.27 | 24 | 0.051 | 2.8 | 0.000036 | 1,338 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 187,551 |
| 2145 | 9.2 | 1,498 | 1,697 | 17 | 0.26 | 0.0026 | 0.0021 | 0.0034 | 0.78 | 0.00005 | 0.87 | 0.001 | 0.0042 | 0.014 | 0.05 | 0.0039 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.014 | 0.27 | 24 | 0.05 | 2.8 | 0.000036 | 1,337 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 187,019 |
| 2146 | 9.2 | 1,494 | 1,701 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.001 | 0.0042 | 0.014 | 0.05 | 0.0038 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.014 | 0.27 | 24 | 0.049 | 2.8 | 0.000036 | 1,337 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 3.9 | 0.49 | 0.089 | 187,081 |
| 2147 | 9.2 | 1,486 | 1,709 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.001 | 0.0041 | 0.014 | 0.05 | 0.0037 | 0.43 | 83 | 0.017 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.048 | 2.8 | 0.000036 | 1,336 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 3.8 | 0.48 | 0.088 | 187,212 |
| 2148 | 9.2 | 1,483 | 1,714 | 17 | 0.26 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.86 | 0.001 | 0.004 | 0.014 | 0.05 | 0.0037 | 0.42 | 84 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.048 | 2.8 | 0.000036 | 1,335 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 3.8 | 0.48 | 0.087 | 187,667 |
| 2149 | 9.2 | 1,477 | 1,721 | 17 | 0.27 | 0.0026 | 0.002 | 0.0034 | 0.78 | 0.00005 | 0.85 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0036 | 0.43 | 84 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.046 | 2.8 | 0.000036 | 1,335 | 1.4 | 0.000036 | 0.00036 | 0.016 | 0.005 | 0.01 | 3.7 | 0.46 | 0.084 | 187,030 |
| 2150 | 9.2 | 1,474 | 1,724 | 17 | 0.27 | 0.0026 | 0.0019 | 0.0034 | 0.78 | 0.00005 | 0.85 | 0.001 | 0.0039 | 0.014 | 0.05 | 0.0035 | 0.43 | 85 | 0.016 | 0.000005 | 0.05 | 0.013 | 0.27 | 24 | 0.046 | 2.8 | 0.000035 | 1,335 | 1.4 | 0.000035 | 0.00035 | 0.016 | 0.005 | 0.01 | 3.6 | 0.45 | 0.082 | 186,985 |

**Table A10.** Annual loads of the NAG backfill for the high nitrogen scenario.

| Model Year | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year as CaCO3 | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | $m^3$/year |
| 2023 | 29 | 0.2 | 0.69 | 0.0037 | 0.000052 | 0.000029 | 0.000055 | 0.032 | 0.0000012 | 0.67 | 0.000024 | 0.00014 | 0.000097 | 0.0012 | 0.0000024 | 0.017 | 0.49 | 0.00081 | 0.00000012 | 0.00098 | 0.00018 | 0.011 | 0.99 | 0.0027 | 0.12 | 0.0000007 | 12 | 0.056 | 0.0000007 | 0.000007 | 0.00031 | 0.00012 | 0.00024 | 2.5 | 0.31 | 0.057 | 24 |
| 2024 | 53 | 0.37 | 1.3 | 0.0067 | 0.000094 | 0.000053 | 0.0001 | 0.057 | 0.0000022 | 1.2 | 0.000044 | 0.00025 | 0.00018 | 0.0022 | 0.0000044 | 0.031 | 0.89 | 0.0015 | 0.00000022 | 0.0018 | 0.00033 | 0.02 | 1.8 | 0.0048 | 0.21 | 0.0000013 | 22 | 0.1 | 0.0000013 | 0.000013 | 0.00057 | 0.00022 | 0.00044 | 4.5 | 0.57 | 0.1 | 44 |
| 2025 | 97 | 0.68 | 2.3 | 0.012 | 0.00017 | 0.000097 | 0.00018 | 0.11 | 0.000004 | 2.2 | 0.00008 | 0.00046 | 0.00032 | 0.004 | 0.0000081 | 0.058 | 1.6 | 0.0027 | 0.0000004 | 0.0033 | 0.0006 | 0.037 | 3.3 | 0.0089 | 0.38 | 0.0000023 | 41 | 0.18 | 0.0000023 | 0.000023 | 0.001 | 0.0004 | 0.0008 | 8.2 | 1.0 | 0.19 | 80 |
| 2026 | 152 | 1.1 | 3.6 | 0.019 | 0.00027 | 0.00015 | 0.00029 | 0.16 | 0.0000063 | 3.5 | 0.00013 | 0.00072 | 0.0005 | 0.0063 | 0.000013 | 0.09 | 2.5 | 0.0042 | 0.00000063 | 0.0051 | 0.00093 | 0.057 | 5.1 | 0.014 | 0.6 | 0.0000036 | 64 | 0.29 | 0.0000036 | 0.000036 | 0.0016 | 0.00063 | 0.0013 | 13 | 1.6 | 0.3 | 125 |
| 2027 | 191 | 1.3 | 4.5 | 0.024 | 0.00034 | 0.00019 | 0.00036 | 0.21 | 0.0000079 | 4.4 | 0.00016 | 0.0009 | 0.00063 | 0.0079 | 0.000016 | 0.11 | 3.2 | 0.0053 | 0.00000079 | 0.0064 | 0.0012 | 0.072 | 6.5 | 0.017 | 0.75 | 0.0000046 | 81 | 0.36 | 0.0000046 | 0.000046 | 0.002 | 0.00079 | 0.0016 | 16 | 2.0 | 0.37 | 158 |
| 2028 | 349 | 2.4 | 8.2 | 0.044 | 0.00062 | 0.00035 | 0.00066 | 0.38 | 0.000014 | 8.0 | 0.00029 | 0.0017 | 0.0012 | 0.014 | 0.000029 | 0.21 | 5.8 | 0.0097 | 0.0000014 | 0.012 | 0.0021 | 0.13 | 12 | 0.032 | 1.4 | 0.0000084 | 147 | 0.66 | 0.0000084 | 0.000084 | 0.0037 | 0.0014 | 0.0029 | 30 | 3.7 | 0.68 | 289 |
| 2029 | 326 | 2.3 | 7.7 | 0.041 | 0.00057 | 0.00032 | 0.00062 | 0.35 | 0.000013 | 7.5 | 0.00027 | 0.0015 | 0.0011 | 0.013 | 0.000027 | 0.19 | 5.5 | 0.0091 | 0.0000013 | 0.011 | 0.002 | 0.12 | 11 | 0.03 | 1.3 | 0.0000078 | 138 | 0.62 | 0.0000078 | 0.000078 | 0.0035 | 0.0013 | 0.0027 | 28 | 3.5 | 0.63 | 270 |
| 2030 | 421 | 2.9 | 9.9 | 0.053 | 0.00074 | 0.00042 | 0.0008 | 0.45 | 0.000017 | 9.7 | 0.00035 | 0.002 | 0.0014 | 0.017 | 0.000035 | 0.25 | 7.0 | 0.012 | 0.0000017 | 0.014 | 0.0026 | 0.16 | 14 | 0.038 | 1.7 | 0.00001 | 178 | 0.8 | 0.00001 | 0.0001 | 0.0045 | 0.0017 | 0.0035 | 36 | 4.5 | 0.82 | 348 |
| 2031 | 2,706 | 19 | 64 | 0.34 | 0.0048 | 0.0027 | 0.0051 | 2.9 | 0.00011 | 62 | 0.0022 | 0.013 | 0.0089 | 0.11 | 0.00022 | 1.6 | 45 | 0.075 | 0.000011 | 0.091 | 0.017 | 1.0 | 91 | 0.25 | 11 | 0.000065 | 1,141 | 5.1 | 0.000065 | 0.00065 | 0.029 | 0.011 | 0.022 | 229 | 29 | 5.3 | 2,236 |
| 2032 | 4,396 | 31 | 104 | 0.56 | 0.0078 | 0.0044 | 0.0083 | 4.7 | 0.00018 | 101 | 0.0036 | 0.021 | 0.015 | 0.18 | 0.00036 | 2.6 | 73 | 0.12 | 0.000018 | 0.15 | 0.027 | 1.7 | 149 | 0.4 | 17 | 0.00011 | 1,854 | 8.3 | 0.00011 | 0.0011 | 0.047 | 0.018 | 0.036 | 372 | 47 | 8.5 | 3,634 |
| 2033 | 750 | 5.2 | 18 | 0.095 | 0.0013 | 0.00075 | 0.0014 | 0.81 | 0.000031 | 17 | 0.00062 | 0.0035 | 0.0025 | 0.031 | 0.000062 | 0.44 | 13 | 0.021 | 0.0000031 | 0.025 | 0.0046 | 0.28 | 25 | 0.068 | 3.0 | 0.000018 | 316 | 1.4 | 0.000018 | 0.00018 | 0.008 | 0.0031 | 0.0062 | 63 | 8.0 | 1.5 | 620 |
| 2034 | 3,015 | 21 | 71 | 0.38 | 0.0053 | 0.003 | 0.0057 | 3.3 | 0.00012 | 69 | 0.0025 | 0.014 | 0.01 | 0.12 | 0.00025 | 1.8 | 50 | 0.084 | 0.000012 | 0.1 | 0.019 | 1.1 | 102 | 0.28 | 12 | 0.000072 | 1,271 | 5.7 | 0.000072 | 0.00072 | 0.032 | 0.012 | 0.025 | 255 | 32 | 5.9 | 2,492 |
| 2035 | 8,571 | 60 | 202 | 1.1 | 0.015 | 0.0085 | 0.016 | 9.3 | 0.00035 | 197 | 0.0071 | 0.041 | 0.028 | 0.35 | 0.00071 | 5.1 | 143 | 0.24 | 0.000035 | 0.29 | 0.053 | 3.2 | 290 | 0.78 | 34 | 0.00021 | 3,614 | 16 | 0.00021 | 0.0021 | 0.092 | 0.035 | 0.071 | 725 | 92 | 17 | 7,085 |
| 2036 | 14,618 | 102 | 345 | 1.9 | 0.026 | 0.015 | 0.028 | 16 | 0.0006 | 336 | 0.012 | 0.069 | 0.048 | 0.6 | 0.0012 | 8.7 | 244 | 0.41 | 0.00006 | 0.49 | 0.09 | 5.5 | 494 | 1.3 | 58 | 0.00035 | 6,163 | 28 | 0.00035 | 0.0035 | 0.16 | 0.06 | 0.12 | 1,236 | 156 | 28 | 12,083 |
| 2037 | 16,289 | 113 | 385 | 2.1 | 0.029 | 0.016 | 0.031 | 18 | 0.00067 | 374 | 0.013 | 0.077 | 0.054 | 0.67 | 0.0014 | 9.6 | 272 | 0.45 | 0.000067 | 0.55 | 0.1 | 6.2 | 551 | 1.5 | 64 | 0.00039 | 6,868 | 31 | 0.00039 | 0.0039 | 0.17 | 0.067 | 0.13 | 1,377 | 174 | 32 | 13,464 |
| 2038 | 32,606 | 227 | 770 | 4.1 | 0.057 | 0.032 | 0.062 | 35 | 0.0013 | 749 | 0.027 | 0.15 | 0.11 | 1.3 | 0.0027 | 19 | 545 | 0.91 | 0.00013 | 1.1 | 0.2 | 12 | 1,102 | 3.0 | 128 | 0.00078 | 13,748 | 62 | 0.00078 | 0.0078 | 0.35 | 0.13 | 0.27 | 2,757 | 349 | 63 | 26,952 |
| 2039 | 59,768 | 3,889 | 1,312 | 0.43 | 0.11 | 0.058 | 0.1 | 60 | 0.0023 | 1,430 | 0.046 | 0.27 | 0.18 | 2.3 | 0.015 | 33 | 1,040 | 1.5 | 0.00023 | 2.0 | 0.37 | 21 | 1,878 | 5.0 | 219 | 0.0014 | 26,682 | 105 | 0.0014 | 0.014 | 0.64 | 0.23 | 0.46 | 4,560 | 577 | 105 | 45,912 |
| 2040 | 115,810 | 17,792 | 2,260 | 1.3 | 0.2 | 0.11 | 0.18 | 103 | 0.004 | 2,717 | 0.079 | 0.45 | 0.32 | 4.0 | 0.065 | 57 | 2,136 | 2.5 | 0.0004 | 3.9 | 0.71 | 36 | 3,235 | 8.2 | 377 | 0.0028 | 56,264 | 182 | 0.0028 | 0.028 | 1.2 | 0.4 | 0.79 | 6,967 | 881 | 160 | 79,056 |
| 2041 | 167,259 | 41,951 | 3,172 | 3.1 | 0.29 | 0.16 | 0.25 | 145 | 0.0055 | 1,465 | 0.11 | 0.46 | 0.89 | 5.5 | 0.18 | 79 | 3,331 | 2.4 | 0.00055 | 5.6 | 0.98 | 51 | 4,540 | 7.5 | 529 | 0.004 | 91,088 | 255 | 0.004 | 0.04 | 1.8 | 0.55 | 1.1 | 4,991 | 631 | 115 | 110,907 |
| 2042 | 181,534 | 50,979 | 3,172 | 3.8 | 0.32 | 0.19 | 0.31 | 145 | 0.0064 | 1,508 | 0.13 | 0.39 | 1.1 | 6.4 | 0.25 | 79 | 3,653 | 1.8 | 0.00064 | 6.1 | 1.0 | 51 | 4,539 | 5.4 | 529 | 0.0044 | 101,408 | 255 | 0.0044 | 0.044 | 1.9 | 0.64 | 1.3 | 2,152 | 272 | 49 | 128,839 |
| 2043 | 183,623 | 51,985 | 3,171 | 3.9 | 0.32 | 0.19 | 0.32 | 145 | 0.0067 | 1,598 | 0.13 | 0.35 | 1.1 | 6.7 | 0.27 | 79 | 3,688 | 1.5 | 0.00067 | 6.2 | 1.0 | 51 | 4,539 | 4.6 | 529 | 0.0044 | 102,699 | 255 | 0.0044 | 0.044 | 2.0 | 0.67 | 1.3 | 1,212 | 153 | 28 | 133,866 |
| 2044 | 184,376 | 51,422 | 3,171 | 3.8 | 0.33 | 0.2 | 0.33 | 145 | 0.0068 | 1,711 | 0.14 | 0.35 | 1.1 | 6.8 | 0.27 | 79 | 3,693 | 1.5 | 0.00068 | 6.2 | 1.0 | 51 | 4,539 | 4.6 | 529 | 0.0044 | 102,665 | 255 | 0.0044 | 0.044 | 2.0 | 0.68 | 1.4 | 1,333 | 169 | 31 | 136,575 |
| 2045 | 187,181 | 52,658 | 3,172 | 3.9 | 0.33 | 0.2 | 0.32 | 145 | 0.0067 | 1,574 | 0.13 | 0.37 | 1.1 | 6.7 | 0.27 | 79 | 3,765 | 1.6 | 0.00067 | 6.3 | 1.1 | 51 | 4,539 | 4.9 | 529 | 0.0045 | 104,596 | 255 | 0.0045 | 0.045 | 2.0 | 0.67 | 1.3 | 1,614 | 204 | 37 | 133,758 |
| 2046 | 186,758 | 51,405 | 3,172 | 3.8 | 0.33 | 0.2 | 0.3 | 145 | 0.0064 | 1,506 | 0.13 | 0.39 | 1.1 | 6.4 | 0.3 | 79 | 3,749 | 1.7 | 0.00064 | 6.3 | 1.1 | 51 | 4,540 | 5.1 | 529 | 0.0045 | 103,927 | 255 | 0.0045 | 0.045 | 2.0 | 0.64 | 1.3 | 1,560 | 197 | 36 | 128,763 |
| 2047 | 201,983 | 52,505 | 3,173 | 3.8 | 0.36 | 0.22 | 0.29 | 145 | 0.0064 | 1,495 | 0.13 | 0.44 | 1.1 | 6.4 | 0.37 | 80 | 4,017 | 1.9 | 0.00064 | 6.8 | 1.4 | 51 | 4,541 | 5.6 | 529 | 0.0048 | 111,227 | 255 | 0.0049 | 0.049 | 2.2 | 0.64 | 1.3 | 1,157 | 146 | 27 | 128,089 |
| 2048 | 222,440 | 55,777 | 3,173 | 3.9 | 0.39 | 0.25 | 0.28 | 145 | 0.0065 | 1,455 | 0.13 | 0.52 | 1.1 | 6.5 | 0.45 | 80 | 4,406 | 2.2 | 0.00065 | 7.5 | 1.6 | 51 | 4,542 | 6.5 | 529 | 0.0053 | 121,828 | 255 | 0.0054 | 0.053 | 2.4 | 0.65 | 1.3 | 1,115 | 141 | 26 | 129,793 |
| 2049 | 232,908 | 58,594 | 3,174 | 4.1 | 0.41 | 0.27 | 0.28 | 145 | 0.0066 | 1,399 | 0.13 | 0.59 | 1.2 | 6.6 | 0.5 | 80 | 4,623 | 2.5 | 0.00066 | 7.8 | 1.9 | 51 | 4,542 | 7.3 | 529 | 0.0056 | 127,787 | 255 | 0.0056 | 0.056 | 2.5 | 0.66 | 1.3 | 1,209 | 153 | 28 | 131,172 |
| 2050 | 239,498 | 59,850 | 3,174 | 4.2 | 0.42 | 0.29 | 0.28 | 145 | 0.0066 | 1,406 | 0.13 | 0.63 | 1.2 | 6.6 | 0.55 | 80 | 4,749 | 2.6 | 0.00066 | 8.1 | 2.0 | 51 | 4,543 | 7.7 | 529 | 0.0057 | 131,275 | 255 | 0.0058 | 0.058 | 2.6 | 0.66 | 1.3 | 1,052 | 133 | 24 | 132,811 |
| 2051 | 243,292 | 60,490 | 3,174 | 4.2 | 0.43 | 0.3 | 0.28 | 145 | 0.0067 | 1,419 | 0.13 | 0.64 | 1.2 | 6.7 | 0.58 | 80 | 4,816 | 2.7 | 0.00067 | 8.2 | 2.1 | 51 | 4,543 | 7.8 | 529 | 0.0058 | 133,239 | 255 | 0.0058 | 0.059 | 2.6 | 0.67 | 1.3 | 814 | 103 | 19 | 133,964 |
| 2052 | 246,757 | 61,046 | 3,174 | 4.3 | 0.44 | 0.3 | 0.28 | 145 | 0.0068 | 1,433 | 0.14 | 0.65 | 1.2 | 6.8 | 0.61 | 80 | 4,878 | 2.7 | 0.00068 | 8.3 | 2.2 | 51 | 4,543 | 7.7 | 529 | 0.0059 | 135,022 | 255 | 0.0059 | 0.059 | 2.6 | 0.68 | 1.4 | 510 | 64 | 12 | 135,076 |
| 2053 | 248,235 | 61,113 | 3,174 | 4.3 | 0.44 | 0.31 | 0.28 | 145 | 0.0068 | 1,436 | 0.14 | 0.66 | 1.2 | 6.8 | 0.62 | 80 | 4,900 | 2.7 | 0.00068 | 8.4 | 2.2 | 51 | 4,543 | 7.7 | 529 | 0.0059 | 135,713 | 255 | 0.006 | 0.06 | 2.7 | 0.68 | 1.4 | 262 | 33 | 6.0 | 135,145 |
| 2054 | 249,944 | 61,330 | 3,174 | 4.3 | 0.44 | 0.31 | 0.28 | 145 | 0.0068 | 1,448 | 0.14 | 0.66 | 1.2 | 6.8 | 0.63 | 80 | 4,930 | 2.7 | 0.00068 | 8.4 | 2.2 | 51 | 4,543 | 7.7 | 529 | 0.006 | 136,555 | 255 | 0.006 | 0.06 | 2.7 | 0.68 | 1.4 | 185 | 23 | 4.2 | 135,795 |
| 2055 | 252,972 | 61,615 | 3,174 | 4.3 | 0.45 | 0.32 | 0.29 | 145 | 0.0068 | 1,465 | 0.14 | 0.68 | 1.2 | 6.8 | 0.65 | 80 | 4,984 | 2.7 | 0.00068 | 8.5 | 2.3 | 51 | 4,543 | 8.0 | 529 | 0.0061 | 138,022 | 255 | 0.0061 | 0.061 | 2.7 | 0.68 | 1.5 | 191 | 24 | 4.4 | 136,601 |
| 2056 | 248,809 | 75,807 | 3,175 | 5.3 | 0.44 | 0.31 | 0.3 | 145 | 0.0069 | 1,019 | 0.14 | 0.67 | 1.4 | 6.9 | 0.63 | 80 | 5,234 | 2.7 | 0.00069 | 8.4 | 2.2 | 51 | 4,544 | 7.8 | 529 | 0.006 | 142,580 | 255 | 0.006 | 0.06 | 2.7 | 0.69 | 1.4 | 224 | 28 | 5.2 | 137,639 |
| 2057 | 238,664 | 97,994 | 3,175 | 7.1 | 0.42 | 0.3 | 0.32 | 145 | 0.0069 | 642 | 0.14 | 0.61 | 1.8 | 6.9 | 0.58 | 80 | 5,609 | 2.5 | 0.00069 | 8.0 | 2.1 | 51 | 4,544 | 7.2 | 530 | 0.0057 | 147,637 | 255 | 0.0057 | 0.057 | 2.5 | 0.69 | 1.4 | 265 | 34 | 6.1 | 137,940 |
| 2058 | 232,800 | 110,780 | 3,176 | 8.2 | 0.41 | 0.28 | 0.33 | 145 | 0.0069 | 519 | 0.14 | 0.58 | 2.0 | 6.9 | 0.54 | 80 | 5,859 | 2.3 | 0.00069 | 7.8 | 1.9 | 51 | 4,545 | 6.7 | 530 | 0.0056 | 150,367 | 255 | 0.0056 | 0.056 | 2.5 | 0.69 | 1.4 | 314 | 40 | 7.2 | 138,218 |
| 2059 | 231,450 | 115,170 | 3,176 | 8.6 | 0.41 | 0.28 | 0.34 | 145 | 0.0069 | 487 | 0.14 | 0.57 | 2.0 | 6.9 | 0.53 | 80 | 5,973 | 2.3 | 0.00069 | 7.8 | 1.9 | 51 | 4,545 | 6.6 | 530 | 0.0055 | 151,559 | 255 | 0.0056 | 0.056 | 2.5 | 0.69 | 1.4 | 370 | 47 | 8.5 | 138,460 |
| 2060 | 233,135 | 116,900 | 3,176 | 8.7 | 0.41 | 0.28 | 0.34 | 145 | 0.007 | 485 | 0.14 | 0.57 | 2.0 | 7.0 | 0.53 | 80 | 6,057 | 2.3 | 0.0007 | 7.8 | 1.9 | 51 | 4,545 | 6.7 | 530 | 0.0056 | 153,010 | 255 | 0.0056 | 0.056 | 2.5 | 0.7 | 1.4 | 436 | 55 | 10 | 139,518 |
| 2061 | 234,102 | 116,981 | 3,176 | 8.7 | 0.41 | 0.28 | 0.34 | 145 | 0.007 | 488 | 0.14 | 0.58 | 2.0 | 7.0 | 0.53 | 80 | 6,083 | 2.4 | 0.0007 | 7.9 | 1.9 | 51 | 4,545 | 6.9 | 530 | 0.0056 | 153,444 | 255 | 0.0056 | 0.056 | 2.5 | 0.7 | 1.4 | 509 | 64 | 12 | 139,838 |
| 2062 | 233,986 | 122,647 | 3,176 | 9.2 | 0.41 | 0.28 | 0.35 | 145 | 0.007 | 457 | 0.14 | 0.58 | 2.0 | 7.0 | 0.53 | 80 | 6,200 | 2.4 | 0.0007 | 7.9 | 1.9 | 51 | 4,546 | 6.9 | 530 | 0.0056 | 155,812 | 255 | 0.0056 | 0.056 | 2.5 | 0.7 | 1.4 | 590 | 75 | 14 | 140,676 |
| 2063 | 232,497 | 128,575 | 3,176 | 9.9 | 0.41 | 0.28 | 0.36 | 145 | 0.0071 | 422 | 0.14 | 0.57 | 2.0 | 7.1 | 0.51 | 80 | 6,344 | 2.3 | 0.00071 | 7.8 | 1.8 | 51 | 4,546 | 6.8 | 530 | 0.0056 | 157,594 | 255 | 0.0056 | 0.056 | 2.5 | 0.71 | 1.4 | 678 | 86 | 16 | 141,568 |
| 2064 | 233,632 | 130,611 | 3,176 | 9.9 | 0.41 | 0.28 | 0.36 | 145 | 0.0071 | 426 | 0.14 | 0.57 | 2.0 | 7.1 | 0.51 | 80 | 6,427 | 2.4 | 0.00071 | 7.9 | 1.8 | 51 | 4,546 | 6.9 | 530 | 0.0056 | 158,910 | 255 | 0.0056 | 0.056 | 2.5 | 0.71 | 1.4 | 773 | 98 | 18 | 142,789 |
| 2065 | 234,589 | 136,385 | 3,176 | 13 | 0.41 | 0.28 | 0.37 | 145 | 0.0072 | 343 | 0.14 | 0.57 | 2.0 | 7.2 | 0.5 | 80 | 6,581 | 2.4 | 0.00072 | 7.9 | 1.8 | 51 | 4,546 | 6.9 | 530 | 0.0056 | 161,808 | 255 | 0.0056 | 0.056 | 2.5 | 0.72 | 1.4 | 871 | 110 | 20 | 143,409 |
| 2066 | 232,604 | 143,755 | 3,176 | 15 | 0.41 | 0.28 | 0.38 | 145 | 0.0072 | 307 | 0.14 | 0.56 | 2.0 | 7.2 | 0.49 | 80 | 6,736 | 2.3 | 0.00072 | 7.8 | 1.8 | 51 | 4,546 | 6.9 | 530 | 0.0056 | 163,990 | 255 | 0.0056 | 0.056 | 2.5 | 0.72 | 1.4 | 976 | 123 | 22 | 144,573 |
| 2067 | 231,421 | 149,117 | 3,177 | 16 | 0.41 | 0.27 | 0.39 | 145 | 0.0073 | 293 | 0.15 | 0.56 | 2.0 | 7.3 | 0.49 | 80 | 6,873 | 2.3 | 0.00073 | 7.8 | 1.8 | 51 | 4,546 | 6.9 | 530 | 0.0055 | 165,642 | 255 | 0.0056 | 0.056 | 2.5 | 0.73 | 1.5 | 1,086 | 137 | 25 | 145,722 |
| 2068 | 232,959 | 152,880 | 3,177 | 16 | 0.41 | 0.28 | 0.39 | 145 | 0.0074 | 294 | 0.15 | 0.56 | 2.0 | 7.4 | 0.48 | 80 | 7,026 | 2.4 | 0.00074 | 7.8 | 1.8 | 51 | 4,546 | 7.0 | 530 | 0.0056 | 167,815 | 255 | 0.0056 | 0.056 | 2.5 | 0.74 | 1.5 | 1,196 | 151 | 27 | 147,284 |
| 2069 | 233,639 | 155,103 | 3,177 | 16 | 0.41 | 0.27 | 0.4 | 145 | 0.0074 | 299 | 0.15 | 0.56 | 2.0 | 7.4 | 0.48 | 80 | 7,131 | 2.4 | 0.00074 | 7.9 | 1.8 | 51 | 4,546 | 7.0 | 530 | 0.0056 | 168,960 | 255 | 0.0056 | 0.056 | 2.5 | 0.74 | 1.5 | 1,287 | 163 | 30 | 148,041 |
| 2070 | 236,312 | 156,526 | 3,177 | 15 | 0.42 | 0.28 | 0.4 | 145 | 0.0075 | 311 | 0.15 | 0.57 | 2.0 | 7.5 | 0.48 | 80 | 7,234 | 2.4 | 0.00075 | 8.0 | 1.8 | 51 | 4,547 | 7.1 | 530 | 0.0057 | 170,682 | 255 | 0.0057 | 0.057 | 2.5 | 0.75 | 1.5 | 1,328 | 168 | 31 | 149,328 |
| 2071 | 238,190 | 157,850 | 3,177 | 14 | 0.42 | 0.28 | 0.4 | 145 | 0.0075 | 323 | 0.15 | 0.57 | 2.0 | 7.5 | 0.49 | 80 | 7,324 | 2.4 | 0.00075 | 8.0 | 1.8 | 51 | 4,547 | 7.1 | 530 | 0.0057 | 172,012 | 255 | 0.0057 | 0.057 | 2.5 | 0.75 | 1.5 | 1,269 | 160 | 29 | 150,505 |
| 2072 | 242,807 | 159,755 | 3,177 | 16 | 0.43 | 0.29 | 0.41 | 145 | 0.0076 | 307 | 0.15 | 0.58 | 2.0 | 7.6 | 0.5 | 80 | 7,442 | 2.4 | 0.00076 | 8.2 | 1.8 | 51 | 4,547 | 7.1 | 530 | 0.0058 | 174,885 | 255 | 0.0058 | 0.058 | 2.6 | 0.76 | 1.5 | 1,151 | 146 | 26 | 151,916 |
| 2073 | 244,657 | 159,770 | 3,177 | 15 | 0.43 | 0.29 | 0.4 | 145 | 0.0076 | 315 | 0.15 | 0.59 | 2.1 | 7.6 | 0.51 | 80 | 7,481 | 2.5 | 0.00076 | 8.2 | 1.9 | 51 | 4,547 | 7.2 | 530 | 0.0059 | 175,699 | 255 | 0.0059 | 0.059 | 2.6 | 0.76 | 1.5 | 1,061 | 134 | 24 | 152,292 |
| 2074 | 247,171 | 160,010 | 3,177 | 15 | 0.44 | 0.29 | 0.41 | 145 | 0.0077 | 327 | 0.15 | 0.6 | 2.1 | 7.7 | 0.53 | 80 | 7,527 | 2.5 | 0.00077 | 8.3 | 1.9 | 51 | 4,547 | 7.3 | 530 | 0.0059 | 176,912 | 255 | 0.0059 | 0.059 | 2.6 | 0.77 | 1.5 | 1,038 | 131 | 24 | 153,237 |
| 2075 | 249,872 | 159,970 | 3,177 | 14 | 0.44 | 0.3 | 0.4 | 145 | 0.0077 | 340 | 0.15 | 0.62 | 2.1 | 7.7 | 0.54 | 80 | 7,572 | 2.6 | 0.00077 | 8.4 | 2.0 | 51 | 4,547 | 7.5 | 530 | 0.006 | 178,095 | 255 | 0.006 | 0.06 | 2.7 | 0.77 | 1.5 | 1,018 | 129 | 23 | 153,995 |
| 2076 | 255,542 | 161,841 | 3,177 | 17 | 0.45 | 0.31 | 0.41 | 145 | 0.0078 | 305 | 0.16 | 0.64 | 2.1 | 7.8 | 0.56 | 80 | 7,693 | 2.7 | 0.00078 | 8.6 | 2.0 | 51 | 4,547 | 7.8 | 530 | 0.0061 | 181,465 | 255 | 0.0062 | 0.061 | 2.7 | 0.78 | 1.6 | 1,053 | 133 | 24 | 155,005 |
| 2077 | 258,637 | 161,819 | 3,177 | 17 | 0.46 | 0.32 | 0.4 | 145 | 0.0078 | 309 | 0.16 | 0.66 | 2.2 | 7.8 | 0.58 | 80 | 7,740 | 2.8 | 0.00078 | 8.7 | 2.1 | 51 | 4,547 | 8.1 | 530 | 0.0062 | 182,839 | 255 | 0.0062 | 0.062 | 2.8 | 0.78 | 1.6 | 1,091 | 138 | 25 | 155,356 |
| 2078 | 262,179 | 162,204 | 3,177 | 17 | 0.46 | 0.32 | 0.4 | 145 | 0.0078 | 316 | 0.16 | 0.69 | 2.2 | 7.8 | 0.61 | 80 | 7,803 | 2.9 | 0.00078 | 8.8 | 2.2 | 51 | 4,547 | 8.4 | 530 | 0.0062 | 184,593 | 255 | 0.0063 | 0.063 | 2.8 | 0.78 | 1.6 | 1,141 | 144 | 26 | 156,236 |
| 2079 | 265,408 | 163,840 | 3,177 | 17 | 0.47 | 0.33 | 0.41 | 145 | 0.0079 | 317 | 0.16 | 0.71 | 2.2 | 7.9 | 0.63 | 80 | 7,891 | 3.0 | 0.00079 | 8.9 | 2.3 | 51 | 4,547 | 8.7 | 530 | 0.0063 | 186,720 | 255 | 0.0064 | 0.064 | 2.8 | 0.79 | 1.6 | 1,172 | 148 | 27 | 157,251 |
| 2080 | 268,368 | 166,029 | 3,177 | 17 | 0.47 | 0.34 | 0.41 | 145 | 0.0079 | 319 | 0.16 | 0.74 | 2.3 | 7.9 | 0.65 | 80 | 7,996 | 3.1 | 0.00079 | 9.0 | 2.4 | 51 | 4,547 | 9.0 | 530 | 0.0064 | 188,943 | 255 | 0.0064 | 0.065 | 2.9 | 0.79 | 1.6 | 1,173 | 148 | 27 | 158,470 |
| 2081 | 270,820 | 166,272 | 3,177 | 17 | 0.48 | 0.35 | 0.41 | 145 | 0.0079 | 325 | 0.16 | 0.76 | 2.3 | 7.9 | 0.67 | 80 | 8,048 | 3.1 | 0.00079 | 9.1 | 2.4 | 51 | 4,548 | 9.2 | 530 | 0.0064 | 190,130 | 255 | 0.0065 | 0.065 | 2.9 | 0.79 | 1.6 | 1,193 | 151 | 27 | 158,838 |
| 2082 | 271,220 | 170,249 | 3,177 | 18 | 0.48 | 0.35 | 0.41 | 145 | 0.008 | 314 | 0.16 | 0.77 | 2.3 | 8.0 | 0.68 | 80 | 8,156 | 3.2 | 0.0008 | 9.1 | 2.5 | 51 | 4,548 | 9.3 | 530 | 0.0064 | 191,952 | 255 | 0.0065 | 0.065 | 2.9 | 0.8 | 1.6 | 1,162 | 147 | 27 | 159,814 |
| 2083 | 270,326 | 173,983 | 3,178 | 18 | 0.48 | 0.35 | 0.42 | 145 | 0.008 | 306 | 0.16 | 0.78 | 2.3 | 8.0 | 0.69 | 80 | 8,253 | 3.2 | 0.0008 | 9.1 | 2.5 | 51 | 4,548 | 9.4 | 530 | 0.0064 | 193,053 | 255 | 0.0065 | 0.065 | 2.9 | 0.8 | 1.6 | 1,183 | 150 | 27 | 160,383 |
| 2084 | 272,779 | 176,556 | 3,178 | 18 | 0.48 | 0.36 | 0.42 | 145 | 0.0081 | 310 | 0.16 | 0.79 | 2.3 | 8.1 | 0.7 | 80 | 8,381 | 3.3 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 9.6 | 530 | 0.0065 | 195,161 | 255 | 0.0066 | 0.066 | 2.9 | 0.81 | 1.6 | 1,171 | 148 | 27 | 161,637 |
| 2085 | 272,007 | 178,451 | 3,178 | 18 | 0.48 | 0.36 | 0.42 | 145 | 0.0081 | 310 | 0.16 | 0.79 | 2.3 | 8.1 | 0.7 | 80 | 8,453 | 3.3 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 9.7 | 530 | 0.0064 | 195,547 | 255 | 0.0065 | 0.065 | 2.9 | 0.81 | 1.6 | 1,198 | 151 | 28 | 161,890 |
| 2086 | 274,151 | 180,017 | 3,178 | 18 | 0.48 | 0.37 | 0.43 | 145 | 0.0081 | 317 | 0.16 | 0.81 | 2.4 | 8.1 | 0.72 | 80 | 8,558 | 3.3 | 0.00081 | 9.2 | 2.6 | 51 | 4,548 | 9.8 | 530 | 0.0065 | 197,076 | 255 | 0.0066 | 0.066 | 2.9 | 0.81 | 1.6 | 1,170 | 148 | 27 | 162,778 |
| 2087 | 274,417 | 181,762 | 3,178 | 17 | 0.48 | 0.37 | 0.43 | 145 | 0.0082 | 322 | 0.16 | 0.8 | 2.4 | 8.2 | 0.72 | 80 | 8,648 | 3.3 | 0.00082 | 9.2 | 2.6 | 51 | 4,548 | 9.8 | 530 | 0.0065 | 197,831 | 255 | 0.0066 | 0.066 | 2.9 | 0.82 | 1.6 | 1,182 | 149 | 27 | 163,470 |
| 2088 | 278,238 | 184,154 | 3,178 | 19 | 0.49 | 0.37 | 0.43 | 145 | 0.0082 | 308 | 0.16 | 0.81 | 2.4 | 8.2 | 0.73 | 80 | 8,795 | 3.4 | 0.00082 | 9.4 | 2.6 | 51 | 4,548 | 9.9 | 530 | 0.0066 | 200,479 | 255 | 0.0067 | 0.067 | 3.0 | 0.82 | 1.7 | 1,114 | 141 | 26 | 164,570 |
| 2089 | 278,070 | 188,038 | 3,178 | 22 | 0.49 | 0.37 | 0.44 | 145 | 0.0082 | 278 | 0.16 | 0.81 | 2.4 | 8.2 | 0.72 | 80 | 8,919 | 3.3 | 0.00082 | 9.4 | 2.6 | 51 | 4,548 | 9.8 | 530 | 0.0066 | 201,978 | 255 | 0.0067 | 0.067 | 3.0 | 0.82 | 1.7 | 1,110 | 140 | 26 | 164,772 |
| 2090 | 277,778 | 191,572 | 3,178 | 22 | 0.49 | 0.37 | 0.44 | 145 | 0.0083 | 272 | 0.17 | 0.81 | 2.4 | 8.3 | 0.73 | 80 | 9,044 | 3.3 | 0.00083 | 9.3 | 2.6 | 51 | 4,549 | 9.7 | 530 | 0.0066 | 203,237 | 255 | 0.0067 | 0.067 | 3.0 | 0.83 | 1.7 | 1,042 | 132 | 24 | 165,462 |
| 2091 | 278,395 | 193,905 | 3,178 | 22 | 0.49 | 0.37 | 0.45 | 145 | 0.0083 | 273 | 0.17 | 0.81 | 2.4 | 8.3 | 0.72 | 80 | 9,165 | 3.3 | 0.00083 | 9.4 | 2.6 | 51 | 4,549 | 9.7 | 530 | 0.0066 | 204,381 | 255 | 0.0067 | 0.067 | 3.0 | 0.83 | 1.7 | 1,058 | 134 | 24 | 166,285 |
| 2092 | 280,457 | 196,798 | 3,178 | 22 | 0.49 | 0.37 | 0.45 | 145 | 0.0084 | 275 | 0.17 | 0.81 | 2.4 | 8.4 | 0.73 | 80 | 9,323 | 3.3 | 0.00084 | 9.4 | 2.6 | 51 | 4,549 | 9.8 | 530 | 0.0067 | 206,401 | 255 | 0.0067 | 0.067 | 3.0 | 0.84 | 1.7 | 1,046 | 132 | 24 | 167,587 |
| 2093 | 278,867 | 200,885 | 3,178 | 23 | 0.49 | 0.37 | 0.46 | 145 | 0.0084 | 266 | 0.17 | 0.8 | 2.4 | 8.4 | 0.72 | 80 | 9,445 | 3.3 | 0.00084 | 9.4 | 2.6 | 51 | 4,549 | 9.7 | 530 | 0.0066 | 207,275 | 256 | 0.0067 | 0.067 | 3.0 | 0.84 | 1.7 | 1,091 | 138 | 25 | 168,175 |
| 2094 | 276,697 | 206,272 | 3,178 | 24 | 0.49 | 0.37 | 0.47 | 145 | 0.0085 | 259 | 0.17 | 0.8 | 2.4 | 8.5 | 0.71 | 80 | 9,605 | 3.3 | 0.00085 | 9.3 | 2.6 | 51 | 4,549 | 9.7 | 530 | 0.0066 | 208,419 | 256 | 0.0066 | 0.067 | 3.0 | 0.85 | 1.7 | 1,132 | 143 | 26 | 169,130 |
| 2095 | 275,374 | 208,602 | 3,178 | 24 | 0.49 | 0.36 | 0.47 | 145 | 0.0085 | 259 | 0.17 | 0.79 | 2.4 | 8.5 | 0.7 | 80 | 9,692 | 3.3 | 0.00085 | 9.3 | 2.5 | 51 | 4,549 | 9.6 | 530 | 0.0066 | 208,687 | 256 | 0.0066 | 0.066 | 2.9 | 0.85 | 1.7 | 1,202 | 152 | 28 | 169,816 |
| 2096 | 273,397 | 212,401 | 3,178 | 24 | 0.48 | 0.36 | 0.48 | 145 | 0.0085 | 258 | 0.17 | 0.77 | 2.4 | 8.5 | 0.68 | 80 | 9,823 | 3.2 | 0.00085 | 9.2 | 2.5 | 51 | 4,549 | 9.4 | 530 | 0.0066 | 209,256 | 256 | 0.0066 | 0.066 | 2.9 | 0.85 | 1.7 | 1,274 | 161 | 29 | 170,905 |
| 2097 | 273,610 | 213,221 | 3,178 | 23 | 0.48 | 0.36 | 0.48 | 145 | 0.0086 | 262 | 0.17 | 0.78 | 2.4 | 8.6 | 0.68 | 80 | 9,888 | 3.2 | 0.00086 | 9.2 | 2.5 | 51 | 4,549 | 9.5 | 530 | 0.0066 | 209,610 | 256 | 0.0066 | 0.066 | 2.9 | 0.86 | 1.7 | 1,350 | 171 | 31 | 171,124 |
| 2098 | 273,650 | 215,552 | 3,179 | 23 | 0.48 | 0.36 | 0.49 | 145 | 0.0086 | 266 | 0.17 | 0.78 | 2.4 | 8.6 | 0.68 | 80 | 10,014 | 3.3 | 0.00086 | 9.2 | 2.5 | 51 | 4,549 | 9.6 | 530 | 0.0066 | 210,449 | 256 | 0.0066 | 0.066 | 2.9 | 0.86 | 1.7 | 1,427 | 180 | 33 | 171,837 |
| 2099 | 275,011 | 216,411 | 3,179 | 22 | 0.48 | 0.36 | 0.49 | 145 | 0.0086 | 272 | 0.17 | 0.79 | 2.4 | 8.6 | 0.68 | 80 | 10,094 | 3.3 | 0.00086 | 9.3 | 2.5 | 51 | 4,549 | 9.7 | 530 | 0.0066 | 211,341 | 256 | 0.0066 | 0.066 | 2.9 | 0.86 | 1.7 | 1,506 | 190 | 35 | 172,453 |
| 2100 | 278,058 | 219,736 | 3,179 | 25 | 0.49 | 0.36 | 0.49 | 145 | 0.0087 | 255 | 0.17 | 0.79 | 2.4 | 8.7 | 0.68 | 80 | 10,279 | 3.3 | 0.00087 | 9.4 | 2.5 | 51 | 4,549 | 9.8 | 530 | 0.0067 | 213,995 | 256 | 0.0067 | 0.067 | 3.0 | 0.87 | 1.7 | 1,584 | 200 | 36 | 173,472 |
| 2101 | 280,722 | 220,996 | 3,179 | 24 | 0.49 | 0.37 | 0.49 | 145 | 0.0087 | 260 | 0.17 | 0.81 | 2.4 | 8.7 | 0.69 | 80 | 10,385 | 3.4 | 0.00087 | 9.4 | 2.6 | 51 | 4,549 | 10.0 | 530 | 0.0068 | 215,642 | 256 | 0.0067 | 0.068 | 3.0 | 0.87 | 1.7 | 1,664 | 210 | 38 | 174,383 |
| 2102 | 282,312 | 222,686 | 3,179 | 24 | 0.5 | 0.37 | 0.49 | 145 | 0.0088 | 264 | 0.18 | 0.81 | 2.4 | 8.8 | 0.69 | 80 | 10,518 | 3.4 | 0.00088 | 9.5 | 2.6 | 51 | 4,550 | 10.1 | 530 | 0.0068 | 216,923 | 256 | 0.0068 | 0.068 | 3.0 | 0.88 | 1.8 | 1,745 | 221 | 40 | 175,164 |
| 2103 | 287,641 | 225,051 | 3,179 | 28 | 0.51 | 0.38 | 0.49 | 145 | 0.0088 | 242 | 0.18 | 0.84 | 2.4 | 8.8 | 0.71 | 80 | 10,678 | 3.5 | 0.00088 | 9.7 | 2.6 | 51 | 4,550 | 10 | 530 | 0.0069 | 220,268 | 256 | 0.0069 | 0.069 | 3.1 | 0.88 | 1.8 | 1,826 | 231 | 42 | 175,863 |
| 2104 | 291,827 | 227,479 | 3,179 | 28 | 0.51 | 0.38 | 0.5 | 145 | 0.0089 | 244 | 0.18 | 0.85 | 2.5 | 8.9 | 0.72 | 80 | 10,865 | 3.6 | 0.00089 | 9.8 | 2.7 | 51 | 4,550 | 11 | 530 | 0.007 | 223,031 | 256 | 0.007 | 0.07 | 3.1 | 0.89 | 1.8 | 1,912 | 242 | 44 | 177,220 |
| 2105 | 290,604 | 229,372 | 3,179 | 29 | 0.51 | 0.38 | 0.5 | 145 | 0.0089 | 240 | 0.18 | 0.85 | 2.4 | 8.9 | 0.71 | 80 | 10,911 | 3.6 | 0.00089 | 9.8 | 2.6 | 51 | 4,550 | 11 | 530 | 0.007 | 223,230 | 256 | 0.007 | 0.07 | 3.1 | 0.89 | 1.8 | 1,983 | 251 | 46 | 177,533 |
| 2106 | 286,118 | 234,384 | 3,179 | 31 | 0.5 | 0.37 | 0.51 | 145 | 0.0089 | 230 | 0.18 | 0.82 | 2.4 | 8.9 | 0.68 | 80 | 11,011 | 3.5 | 0.00089 | 9.6 | 2.5 | 51 | 4,550 | 10 | 530 | 0.0069 | 223,210 | 256 | 0.0069 | 0.069 | 3.1 | 0.89 | 1.8 | 2,053 | 260 | 47 | 178,211 |
| 2107 | 286,285 | 238,141 | 3,179 | 31 | 0.5 | 0.37 | 0.52 | 145 | 0.009 | 226 | 0.18 | 0.83 | 2.4 | 9.0 | 0.69 | 80 | 11,144 | 3.5 | 0.0009 | 9.6 | 2.6 | 51 | 4,550 | 10 | 530 | 0.0069 | 224,767 | 256 | 0.0069 | 0.069 | 3.1 | 0.9 | 1.8 | 2,117 | 268 | 49 | 179,040 |
| 2108 | 288,736 | 241,745 | 3,179 | 32 | 0.51 | 0.38 | 0.52 | 145 | 0.009 | 226 | 0.18 | 0.84 | 2.4 | 9.0 | 0.7 | 80 | 11,343 | 3.6 | 0.0009 | 9.7 | 2.6 | 51 | 4,550 | 11 | 530 | 0.0069 | 227,205 | 256 | 0.0069 | 0.069 | 3.1 | 0.9 | 1.8 | 2,183 | 276 | 50 | 180,178 |
| 2109 | 289,478 | 243,424 | 3,180 | 32 | 0.51 | 0.38 | 0.52 | 145 | 0.009 | 224 | 0.18 | 0.85 | 2.4 | 9.0 | 0.7 | 80 | 11,444 | 3.6 | 0.0009 | 9.7 | 2.6 | 51 | 4,551 | 11 | 530 | 0.0069 | 228,157 | 256 | 0.007 | 0.07 | 3.1 | 0.9 | 1.8 | 2,233 | 282 | 51 | 180,248 |
| 2110 | 291,896 | 245,531 | 3,180 | 32 | 0.51 | 0.38 | 0.52 | 145 | 0.009 | 225 | 0.18 | 0.87 | 2.5 | 9.0 | 0.72 | 80 | 11,602 | 3.7 | 0.0009 | 9.8 | 2.7 | 51 | 4,551 | 11 | 530 | 0.0069 | 229,980 | 256 | 0.007 | 0.07 | 3.1 | 0.9 | 1.8 | 2,287 | 289 | 53 | 180,830 |
| 2111 | 293,813 | 247,161 | 3,180 | 32 | 0.52 | 0.39 | 0.52 | 145 | 0.0091 | 226 | 0.18 | 0.88 | 2.5 | 9.1 | 0.73 | 80 | 11,723 | 3.8 | 0.00091 | 9.9 | 2.7 | 51 | 4,551 | 11 | 530 | 0.007 | 231,411 | 256 | 0.0071 | 0.071 | 3.1 | 0.91 | 1.8 | 2,338 | 296 | 54 | 181,243 |
| 2112 | 297,475 | 249,052 | 3,180 | 32 | 0.52 | 0.4 | 0.52 | 145 | 0.0091 | 228 | 0.18 | 0.91 | 2.5 | 9.1 | 0.75 | 80 | 11,891 | 3.9 | 0.00091 | 10.0 | 2.8 | 51 | 4,551 | 11 | 530 | 0.0071 | 233,711 | 256 | 0.0072 | 0.072 | 3.2 | 0.91 | 1.8 | 2,389 | 302 | 55 | 181,975 |
| 2113 | 298,394 | 249,580 | 3,180 | 31 | 0.53 | 0.4 | 0.52 | 145 | 0.0091 | 229 | 0.18 | 0.92 | 2.5 | 9.1 | 0.76 | 80 | 11,962 | 3.9 | 0.00091 | 10.0 | 2.8 | 51 | 4,551 | 12 | 530 | 0.0071 | 234,267 | 256 | 0.0072 | 0.072 | 3.2 | 0.91 | 1.8 | 2,417 | 306 | 56 | 181,870 |
| 2114 | 301,579 | 250,399 | 3,180 | 31 | 0.53 | 0.41 | 0.52 | 145 | 0.0091 | 232 | 0.18 | 0.94 | 2.5 | 9.1 | 0.78 | 80 | 12,076 | 4.0 | 0.00091 | 10 | 2.9 | 51 | 4,551 | 12 | 530 | 0.0071 | 235,938 | 256 | 0.0073 | 0.073 | 3.2 | 0.91 | 1.8 | 2,432 | 307 | 56 | 182,135 |
| 2115 | 303,001 | 251,216 | 3,180 | 30 | 0.53 | 0.41 | 0.52 | 145 | 0.0091 | 233 | 0.18 | 0.95 | 2.5 | 9.1 | 0.79 | 80 | 12,166 | 4.0 | 0.00091 | 10 | 3.0 | 51 | 4,551 | 12 | 530 | 0.0072 | 236,829 | 256 | 0.0073 | 0.073 | 3.2 | 0.91 | 1.9 | 2,429 | 307 | 56 | 182,344 |
| 2116 | 307,438 | 252,720 | 3,180 | 30 | 0.54 | 0.42 | 0.52 | 145 | 0.0092 | 238 | 0.18 | 0.98 | 2.6 | 9.2 | 0.82 | 80 | 12,316 | 4.1 | 0.00092 | 10 | 3.0 | 51 | 4,552 | 12 | 530 | 0.0073 | 239,352 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 2,403 | 304 | 55 | 183,370 |
| 2117 | 306,315 | 255,073 | 3,180 | 31 | 0.54 | 0.42 | 0.52 | 145 | 0.0092 | 234 | 0.18 | 0.98 | 2.6 | 9.2 | 0.82 | 80 | 12,388 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0073 | 239,759 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 2,342 | 296 | 54 | 183,400 |
| 2118 | 305,880 | 258,295 | 3,180 | 31 | 0.54 | 0.42 | 0.53 | 145 | 0.0092 | 230 | 0.18 | 0.98 | 2.6 | 9.2 | 0.83 | 80 | 12,508 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0073 | 240,810 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 1.9 | 2,269 | 287 | 52 | 183,657 |
| 2119 | 305,409 | 259,693 | 3,180 | 31 | 0.54 | 0.43 | 0.53 | 145 | 0.0092 | 229 | 0.18 | 0.98 | 2.6 | 9.2 | 0.83 | 80 | 12,582 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0073 | 241,087 | 256 | 0.0074 | 0.073 | 3.3 | 0.92 | 1.9 | 2,180 | 276 | 50 | 183,671 |
| 2120 | 306,242 | 262,372 | 3,181 | 31 | 0.54 | 0.43 | 0.53 | 145 | 0.0092 | 229 | 0.18 | 0.99 | 2.6 | 9.2 | 0.85 | 80 | 12,724 | 4.2 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0073 | 242,454 | 256 | 0.0074 | 0.074 | 3.3 | 0.92 | 2.0 | 2,102 | 266 | 48 | 184,250 |
| 2121 | 304,685 | 267,104 | 3,181 | 37 | 0.54 | 0.43 | 0.54 | 145 | 0.0092 | 206 | 0.18 | 0.99 | 2.6 | 9.2 | 0.85 | 80 | 12,842 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 530 | 0.0073 | 243,656 | 256 | 0.0073 | 0.073 | 3.3 | 0.92 | 2.0 | 2,011 | 254 | 46 | 184,044 |
| 2122 | 301,081 | 272,882 | 3,181 | 39 | 0.53 | 0.43 | 0.55 | 145 | 0.0092 | 197 | 0.18 | 0.98 | 2.7 | 9.2 | 0.85 | 80 | 12,999 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,552 | 12 | 531 | 0.0072 | 244,314 | 256 | 0.0072 | 0.072 | 3.2 | 0.92 | 2.0 | 1,921 | 243 | 44 | 184,430 |
| 2123 | 299,555 | 275,531 | 3,181 | 40 | 0.53 | 0.43 | 0.55 | 145 | 0.0092 | 195 | 0.18 | 0.98 | 2.7 | 9.2 | 0.85 | 80 | 13,100 | 4.1 | 0.00092 | 10 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0072 | 244,600 | 256 | 0.0072 | 0.072 | 3.2 | 0.92 | 2.0 | 1,846 | 233 | 42 | 184,660 |
| 2124 | 297,758 | 280,129 | 3,181 | 41 | 0.52 | 0.43 | 0.56 | 145 | 0.0093 | 191 | 0.19 | 0.97 | 2.7 | 9.3 | 0.85 | 80 | 13,279 | 4.1 | 0.00093 | 10 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 | 245,518 | 256 | 0.0072 | 0.072 | 3.2 | 0.93 | 2.0 | 1,720 | 217 | 40 | 185,381 |
| 2125 | 296,664 | 281,630 | 3,181 | 41 | 0.52 | 0.43 | 0.57 | 145 | 0.0093 | 190 | 0.19 | 0.97 | 2.7 | 9.3 | 0.85 | 80 | 13,361 | 4.0 | 0.00093 | 10.0 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 | 245,536 | 256 | 0.0071 | 0.071 | 3.2 | 0.93 | 1.9 | 1,629 | 206 | 37 | 185,380 |
| 2126 | 295,249 | 284,933 | 3,181 | 42 | 0.52 | 0.43 | 0.57 | 145 | 0.0093 | 188 | 0.19 | 0.96 | 2.7 | 9.3 | 0.85 | 80 | 13,503 | 4.0 | 0.00093 | 9.9 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 | 246,100 | 256 | 0.0071 | 0.071 | 3.2 | 0.93 | 1.9 | 1,447 | 183 | 33 | 185,890 |
| 2127 | 294,686 | 286,522 | 3,181 | 42 | 0.52 | 0.43 | 0.57 | 145 | 0.0093 | 186 | 0.19 | 0.95 | 2.7 | 9.3 | 0.85 | 80 | 13,601 | 3.9 | 0.00093 | 9.9 | 3.1 | 51 | 4,553 | 12 | 531 | 0.0071 | 246,374 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 1,350 | 171 | 31 | 185,957 |
| 2128 | 293,522 | 289,647 | 3,181 | 43 | 0.52 | 0.43 | 0.58 | 145 | 0.0093 | 184 | 0.19 | 0.94 | 2.8 | 9.3 | 0.84 | 80 | 13,769 | 3.9 | 0.00093 | 9.9 | 3.1 | 51 | 4,553 | 11 | 531 | 0.007 | 246,940 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 1,155 | 146 | 27 | 186,328 |
| 2129 | 292,933 | 290,125 | 3,181 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 183 | 0.19 | 0.93 | 2.8 | 9.3 | 0.84 | 80 | 13,832 | 3.8 | 0.00093 | 9.9 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 | 246,766 | 256 | 0.0071 | 0.07 | 3.1 | 0.93 | 1.9 | 1,070 | 135 | 25 | 185,930 |
| 2130 | 291,760 | 292,356 | 3,182 | 43 | 0.51 | 0.42 | 0.58 | 145 | 0.0093 | 182 | 0.19 | 0.91 | 2.8 | 9.3 | 0.83 | 80 | 13,970 | 3.7 | 0.00093 | 9.8 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 | 246,964 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 921 | 117 | 21 | 186,107 |
| 2131 | 292,139 | 293,237 | 3,182 | 43 | 0.52 | 0.42 | 0.58 | 145 | 0.0093 | 182 | 0.19 | 0.91 | 2.8 | 9.3 | 0.83 | 80 | 14,059 | 3.7 | 0.00093 | 9.8 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 | 247,391 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 872 | 110 | 20 | 186,064 |
| 2132 | 292,174 | 295,795 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 181 | 0.19 | 0.9 | 2.8 | 9.3 | 0.83 | 80 | 14,224 | 3.7 | 0.00093 | 9.8 | 3.0 | 51 | 4,553 | 11 | 531 | 0.007 | 248,254 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 791 | 100 | 18 | 186,657 |
| 2133 | 292,141 | 295,678 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 180 | 0.19 | 0.9 | 2.8 | 9.3 | 0.83 | 80 | 14,267 | 3.7 | 0.00093 | 9.8 | 3.0 | 51 | 4,554 | 11 | 531 | 0.007 | 248,104 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 768 | 97 | 18 | 186,125 |
| 2134 | 291,991 | 297,209 | 3,182 | 43 | 0.51 | 0.42 | 0.59 | 145 | 0.0093 | 180 | 0.19 | 0.89 | 2.8 | 9.3 | 0.82 | 80 | 14,389 | 3.6 | 0.00093 | 9.8 | 2.9 | 51 | 4,554 | 11 | 531 | 0.007 | 248,519 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 733 | 93 | 17 | 186,338 |

**Table A10.** Annual loads of the NAG backfill for the high nitrogen scenario.

| Model Year | SO4 | Alkalinity | Cl | Al | Sb | As | Ba | B | Cd | Ca | Cr | Co | Cu | Fe | Pb | Li | Mg | Mn | Hg | Mo | Ni | P | K | Se | Si | Ag | Na | Sr | Tl | Sn | U | V | Zn | NO3 | NH3 | NO2 | Seepage Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kg/year | kg/year as CaCO3 | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | kg/year | $m^3$/year |
| 2135 | 293,380 | 298,007 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 180 | 0.19 | 0.89 | 2.8 | 9.3 | 0.82 | 80 | 14,476 | 3.6 | 0.00093 | 9.9 | 2.9 | 51 | 4,554 | 11 | 531 | 0.0071 | 249,369 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 729 | 92 | 17 | 186,569 |
| 2136 | 294,116 | 300,087 | 3,182 | 44 | 0.52 | 0.42 | 0.59 | 145 | 0.0094 | 180 | 0.19 | 0.88 | 2.8 | 9.4 | 0.82 | 80 | 14,627 | 3.6 | 0.00094 | 9.9 | 2.9 | 51 | 4,554 | 10 | 531 | 0.0071 | 250,409 | 256 | 0.0071 | 0.071 | 3.1 | 0.94 | 1.9 | 720 | 91 | 17 | 187,180 |
| 2137 | 294,526 | 299,791 | 3,182 | 43 | 0.52 | 0.42 | 0.59 | 145 | 0.0093 | 180 | 0.19 | 0.89 | 2.8 | 9.3 | 0.82 | 80 | 14,660 | 3.6 | 0.00093 | 9.9 | 2.9 | 51 | 4,554 | 11 | 531 | 0.0071 | 250,386 | 256 | 0.0071 | 0.071 | 3.1 | 0.93 | 1.9 | 719 | 91 | 17 | 186,716 |
| 2138 | 292,307 | 302,917 | 3,182 | 45 | 0.52 | 0.41 | 0.59 | 145 | 0.0093 | 175 | 0.19 | 0.88 | 2.8 | 9.3 | 0.81 | 80 | 14,758 | 3.6 | 0.00093 | 9.8 | 2.9 | 51 | 4,554 | 10 | 531 | 0.007 | 250,579 | 256 | 0.007 | 0.07 | 3.1 | 0.93 | 1.9 | 718 | 91 | 17 | 186,790 |
| 2139 | 289,713 | 306,716 | 3,182 | 46 | 0.51 | 0.41 | 0.6 | 145 | 0.0094 | 171 | 0.19 | 0.87 | 2.8 | 9.4 | 0.8 | 80 | 14,875 | 3.5 | 0.00094 | 9.7 | 2.9 | 51 | 4,554 | 10 | 531 | 0.007 | 250,880 | 256 | 0.007 | 0.07 | 3.1 | 0.94 | 1.9 | 719 | 91 | 17 | 187,056 |
| 2140 | 288,790 | 309,416 | 3,182 | 47 | 0.51 | 0.41 | 0.61 | 145 | 0.0094 | 170 | 0.19 | 0.86 | 2.8 | 9.4 | 0.79 | 80 | 15,004 | 3.5 | 0.00094 | 9.7 | 2.8 | 51 | 4,554 | 10 | 531 | 0.007 | 251,418 | 256 | 0.0069 | 0.069 | 3.1 | 0.94 | 1.9 | 722 | 91 | 17 | 187,514 |
| 2141 | 285,594 | 310,955 | 3,182 | 48 | 0.5 | 0.4 | 0.61 | 145 | 0.0093 | 167 | 0.19 | 0.84 | 2.7 | 9.3 | 0.78 | 80 | 15,062 | 3.4 | 0.00093 | 9.6 | 2.8 | 51 | 4,554 | 10 | 531 | 0.0069 | 250,495 | 256 | 0.0069 | 0.069 | 3.0 | 0.93 | 1.9 | 721 | 91 | 17 | 186,895 |
| 2142 | 284,497 | 312,138 | 3,182 | 48 | 0.5 | 0.4 | 0.61 | 145 | 0.0093 | 166 | 0.19 | 0.84 | 2.7 | 9.3 | 0.77 | 80 | 15,125 | 3.4 | 0.00093 | 9.6 | 2.8 | 51 | 4,555 | 10 | 531 | 0.0068 | 250,391 | 256 | 0.0068 | 0.068 | 3.0 | 0.93 | 1.9 | 722 | 91 | 17 | 186,886 |
| 2143 | 282,701 | 314,516 | 3,182 | 48 | 0.5 | 0.39 | 0.62 | 145 | 0.0094 | 164 | 0.19 | 0.82 | 2.7 | 9.4 | 0.75 | 80 | 15,260 | 3.3 | 0.00094 | 9.5 | 2.7 | 51 | 4,555 | 10 | 531 | 0.0068 | 250,382 | 256 | 0.0068 | 0.068 | 3.0 | 0.94 | 1.9 | 724 | 91 | 17 | 187,034 |
| 2144 | 282,564 | 316,417 | 3,182 | 49 | 0.5 | 0.39 | 0.62 | 145 | 0.0094 | 164 | 0.19 | 0.81 | 2.7 | 9.4 | 0.75 | 80 | 15,365 | 3.3 | 0.00094 | 9.5 | 2.7 | 51 | 4,555 | 10 | 531 | 0.0068 | 250,980 | 256 | 0.0068 | 0.068 | 3.0 | 0.94 | 1.9 | 726 | 92 | 17 | 187,551 |
| 2145 | 280,098 | 317,409 | 3,183 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0094 | 162 | 0.19 | 0.79 | 2.7 | 9.4 | 0.72 | 80 | 15,447 | 3.2 | 0.00094 | 9.4 | 2.6 | 51 | 4,555 | 9 | 531 | 0.0067 | 250,100 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 724 | 91 | 17 | 187,019 |
| 2146 | 279,425 | 318,300 | 3,183 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0094 | 162 | 0.19 | 0.78 | 2.7 | 9.4 | 0.72 | 80 | 15,509 | 3.2 | 0.00094 | 9.4 | 2.6 | 51 | 4,555 | 9.2 | 531 | 0.0067 | 250,071 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 723 | 91 | 17 | 187,081 |
| 2147 | 278,254 | 320,021 | 3,183 | 49 | 0.49 | 0.38 | 0.63 | 145 | 0.0094 | 161 | 0.19 | 0.76 | 2.7 | 9.4 | 0.7 | 80 | 15,631 | 3.1 | 0.00094 | 9.4 | 2.5 | 51 | 4,555 | 9.0 | 531 | 0.0067 | 250,059 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 716 | 91 | 16 | 187,212 |
| 2148 | 278,291 | 321,567 | 3,183 | 50 | 0.49 | 0.37 | 0.64 | 145 | 0.0094 | 161 | 0.19 | 0.75 | 2.7 | 9.4 | 0.69 | 80 | 15,727 | 3.1 | 0.00094 | 9.4 | 2.5 | 51 | 4,555 | 8.9 | 531 | 0.0067 | 250,610 | 256 | 0.0067 | 0.067 | 3.0 | 0.94 | 1.9 | 712 | 90 | 16 | 187,667 |
| 2149 | 276,225 | 321,860 | 3,183 | 50 | 0.49 | 0.37 | 0.64 | 145 | 0.0094 | 159 | 0.19 | 0.73 | 2.6 | 9.4 | 0.67 | 80 | 15,781 | 3.0 | 0.00094 | 9.3 | 2.4 | 51 | 4,555 | 8.7 | 531 | 0.0066 | 249,667 | 256 | 0.0066 | 0.066 | 2.9 | 0.94 | 1.9 | 687 | 87 | 16 | 187,030 |
| 2150 | 275,653 | 322,343 | 3,183 | 50 | 0.49 | 0.36 | 0.64 | 145 | 0.0093 | 159 | 0.19 | 0.72 | 2.6 | 9.3 | 0.66 | 80 | 15,824 | 2.9 | 0.00093 | 9.3 | 2.4 | 51 | 4,555 | 8.6 | 531 | 0.0066 | 249,532 | 256 | 0.0066 | 0.066 | 2.9 | 0.93 | 1.9 | 669 | 85 | 15 | 186,985 |

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# Appendix C Tenas Project – Hydrometeorological Baseline and Model Development Report (update 2024)

Prepared for : Telkwa Mining Ltd. Project number: CAPR0002055. Issued December. 2024. (SRK Consulting (Canada) Inc.

# Tenas Project – Hydrometeorological Baseline and Model Development Report (update 2024)

**Prepared for**

Telkwa Mining Ltd

**Prepared by**

SRK Consulting (Canada) Inc.
CAPR002055
December 2024

# Tenas Project – Hydrometeorological Baseline and Model Development Report (update 2024)

December 2024


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# Attachments

Attachment A AGRA 1999 Report
Attachment B Baseflow Separation Results
Attachment C AGRA Data

# Executive Summary

As part of the Tenas Project Environmental Assessment, SRK Consulting (Canada) Inc. was retained by Telkwa Mining Ltd (TCM) to complete a hydrometeorological analysis for the Tenas Project (the Project).

The Project is located approximately 25 km southwest of the town of Smithers, BC within the Telkwa River watershed and is composed of an open pit, backfill, external stockpiles, water management ponds, control ponds, process plant and rail load out.

This report presents the hydrometeorological baseline of the Project. The key objective of this report is to to develop inputs to the Project water management plan and water and load balance model.

Site hydrometeorological conditions are monitored via a site weather station and five (5) hydrometric stations located on each of the major watercourses (Goathorn-Hydro, Telkwa-Hydro, Tenas-Hydro/Tenas-Hydro B, and Four-Hydro). The weather station was operated from 2017 to 2022. Hydrometric stations have two to three complete hydrologic years of data recorded within the 2017 to 2022 period. For this assessment, the relatively short site datasets are supplemented with regional datasets and climate re-analysis models.

Synthetic long-term Project climate datasets were developed based on transposing the regional datasets at Smithers Airport to the site and adjusting for observed orographic effects. These datasets were used to derive Project design parameters and water and load balance inputs, as well as to support development of a rainfall-runoff model. This model was developed and calibrated for each of the local hydrometric stations. A combination of the calibrated models from Goathorn Creek and Tenas Creek were applied to the Tenas Project area.

Selected climate parameters are summarized in Table 1-1 to Table 1-3.

**Table 1-1: Derived Monthly and Annual Project Climate Normals**

| Parameter | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Temperature (°C) | -9.2 | -6.1 | -2.7 | 2.1 | 6.8 | 10.7 | 13.0 | 12.5 | 8.4 | 2.6 | -3.8 | -7.9 | 2.2 |
| Rainfall (mm) | 8.0 | 9.7 | 10.4 | 21.5 | 35.9 | 45.7 | 48.1 | 43.1 | 50.8 | 58.6 | 20.0 | 8.0 | 359.9 |
| Snowfall (mm) | 61.8 | 35.9 | 22.0 | 4.9 | 0.7 | 0.0 | 0.0 | 0.0 | 0.3 | 13.6 | 49.4 | 59.7 | 248.1 |
| Total Precipitation (mm) | 69.7 | 45.6 | 32.4 | 26.4 | 36.6 | 45.7 | 48.1 | 43.1 | 51.1 | 72.2 | 69.4 | 67.7 | 608.0 |
| Evaporation (mm) | 0 | 0 | 0 | 60 | 97 | 108 | 116 | 99 | 50 | 0 | 0 | 0 | 529 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Evaporation_rev02.Rmd

**Table 1-2: Extreme Precipitation**

| Return Period | 24-hour Precipitation [mm] | 72-hour Precipitation [mm] |
|---|---|---|
| 2 | 42.0 | 56.7 |
| 5 | 56.1 | 75.6 |
| 10 | 66.3 | 89.3 |
| 25 | 80.2 | 108.1 |
| 50 | 91.3 | 123.0 |
| 100 | 103.1 | 138.9 |
| 200 | 115.6 | 155.7 |
| 500 | 133.3 | 179.6 |
| 1000 | 147.7 | 199.1 |
| PMP (Spring) | 234.0 | - |
| PMP (Summer/Autumn) | 283.0 | - |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Precipitation_1CT027.003_rev01.Rmd

**Table 1-3: Extreme Snowmelt**

| Return Period | 24-hour Snowmelt [mm SWE] | 72-hour Snowmelt [mm SWE] |
|---|---|---|
| 2 | 34.0 | 57.5 |
| 5 | 43.3 | 73.3 |
| 10 | 50.9 | 86.1 |
| 25 | 62.8 | 106.4 |
| 50 | 74.0 | 125.4 |
| 100 | 87.7 | 148.5 |
| 200 | 104.4 | 176.8 |
| 500 | 132.4 | 224.3 |
| 1000 | 159.4 | 269.9 |

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\ \Telkwa Coal\1CT027.003_2020 EA Water Management\500_Water_Balance\Model\SnowmeltModel\SWE_ModelledOutput_09172020.xlsx

Mean annual runoff for the Project was determined to be 219 mm/year with an annual runoff coefficient of 0.36 with the highest flows occurring in May and June due to freshet, and low flows occurring during the winter.

Climate change scenarios for RCP4.5, RCP6.5 and RCP8.5 were evaluated for the Project Area. The effects of the RCP4.5 scenario were used to generate mean annual and monthly temperature and precipitation correction factors, which also affect runoff and evaporation rates, as summarized in Table 1-4.

**Table 1-4: Projected Climate Change Impacts on Selected Climate Parameters**

| Timeframe | Mean Annual Temperature (°C) | Mean Annual Precipitation (mm) | Mean Annual Evaporation (mm) |
|---|---|---|---|
| 2011-2040 | 1.2°C | +5% | +2% |
| 2041-2070 | 2.4°C | +12% | +4% |
| 2071-2100 | 3.0°C | +15% | +5% |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Climate_Change_rev03.Rmd

Extreme precipitation magnitudes are expected to increase. Monthly streamflow is expected to experience an overall increase in flow magnitude and a shift to an earlier spring freshet. No significant trend in peak flows is projected.

The short duration of the Project meteorological and hydrometric datasets is a limitation of this hydrometeorological baseline report. SRK recommends ongoing monitoring of Project meteorologic conditions, and continued hydrometric station monitoring at Four-Hydro and Tenas-Hydro B as a minimum.This report should be updated when additional data become available. In particular, the Four-Hydro discharge record requires additional flow measurements to characterize baseline conditions for effects assessments and to support predictive modelling.

# 1 Introduction

SRK Consulting (Canada) Inc. has been tasked with updating the meteorological and hydrological characterization to develop inputs required for the Tenas Project (the Project) in support of the Environmental Assessment (EA). The EA has been prepared in accordance with the BC Environmental Assessment Office (BC EAO) Guidelines for Preparing Environmental Assessments (BC EAO 2016).

The following report provides an updated summary of baseline meteorology and hydrology data collected between 2017 and 2022. Regional records were used to extend the local records in order to develop statistical climate and hydrologic parameters that will be used to support various technical studies for the EA, including water management designs, groundwater modeling, and the water and load balance model. The main changes pertain to the updating of the synthetic climate record based on additional data from the local station since the development of the EA baseline report (SRK 2022a) and the hydrological parameters based on new calibration to the available data.

## 1.1 Project Setting

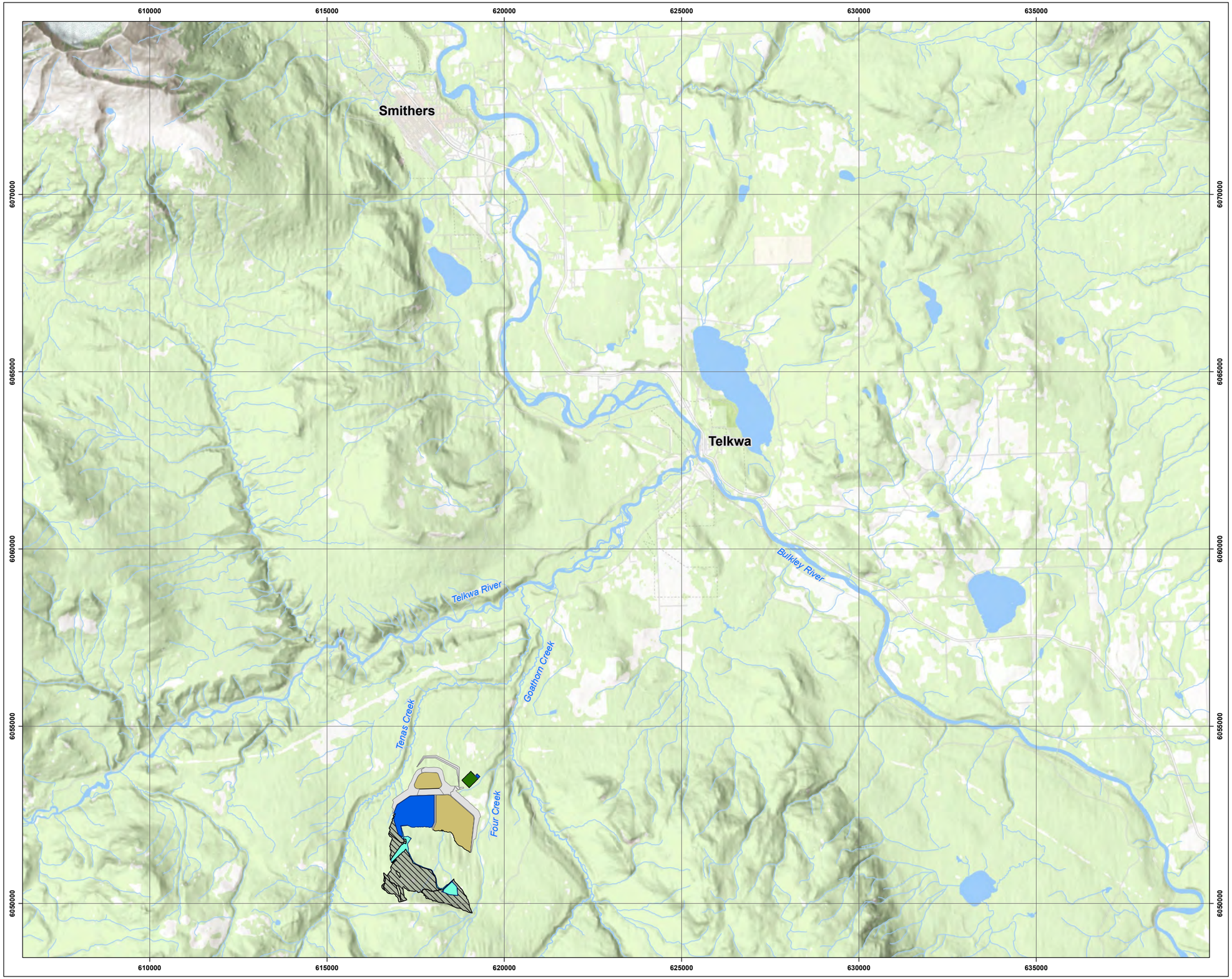
The Tenas Coal Project is a proposed coal mine located in the Coast Mountains of the Cordilleran Region near the Town of Telkwa approximately 25 km southwest of Smithers, British Columbia. The coal preparation plant, maintenance facilities and service facilities would be located approximately 6 km southwest of Telkwa. The Project footprint elevation ranges from 750 to 1050 meters above sea level (masl) with a median elevation of 800 masl. The Ministry of Environment and Climate Change Strategy (MECCS) have published hydrological zones that represent areas of homogeneous hydrologic and geomorphic characteristics. The Tenas Project is within Zone 8 – Nechako Plateau.

The Project encompasses the lower reaches of the Telkwa River, Tenas Creek, Goathorn Creek and Four Creek. The Telkwa River is a major tributary to the Bulkley River near the village of Telkwa, British Columbia, which ultimately flows into the Skeena River. Four Creek is a tributary of Goathorn Creek, and Goathorn Creek and Tenas Creek are tributaries of the Telkwa River.

Figure 1-1 shows the Project location.

# Tenas Project

## Site Location




### Legend

- Backfill
- Core Footprint
- Pit Lake
- Plant and Maintenance Area
- Pond
- Rock Cover
- Watercourse

### Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a “stand-alone” document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

### Sources

- Project Features: Allegiance Coal, 2020
- Basedata: Government of British Columbia
- Basemap: World Topo Base

N

1:105,000

0 1 2 3 4 5

Kilometers

NAD 1983 UTM Zone 9N

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srk consulting

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## 1.2 Scope of Report

Meteorology and hydrology studies conducted as part of the Telkwa Coal Project Prefeasibility studies (SRK 2017a, 2017b) identified gaps in the existing meteorological and hydrological datasets. Site specific hydrometeorological data started being collected in 2017. The first years of records (2017-2019) wereused by SRK to develop a hydrometeorological baseline for the site (SRK, 2022). Project data collection continued between 2020 and 2022. These new records were incorporated into the hydrometeorological analysis to support Project advancement in 2022 and are documented in this report.

This report is an update to the the baseline Project climate and hydrology previously developed by SRK (SRK, 2022) and generates projections of future climate conditions. This update includes available data up to October 2023.

- Section 2 presents the available meteorological datasets (2017-2022)
- Section 3 presents the available hydrometric datasets (2017-2022)
- Section 4 describes how available datasets were used to develop the Project Area meteorology and hydrometric synthetic time series
- Section 5 outlines how climate change impacts on Project air temperature, precipitation, lake evaporation and streamflow were evaluated from 2022 onwards.

# 2 Baseline Meteorology

## 2.1 Section Overview

Meteorological characteristics are typically assessed by integrating Project-specific and regional meteorology records as well as comparing previous studies related to the Project and regional indices. Placing the Project-specific parameters in context using regional analyses is important to be able to provide meteorological inputs to the Project based on extended periods of record.

## 2.2 Available Meteorological Data

Baseline meteorological monitoring was initiated at the Telkwa Coal Project site in September 2017 by ERM Consultants.

This section summarizes the available monitoring data for the Telkwa Coal Project. Regional climate data from the surrounding area has also been assessed to place the Telkwa Coal Project climate into context.

### 2.2.1 Project Data

Baseline climate data for the Project Area was collected at the Tenas Deposit automatic weather station (54.59° N, 127.19° W), installed on 29 September 2017 and operated through September

2022. Figure 2-1 illustrates the location of the Tenas Deposit Station and Table 2-1 provides the metadata.

The monitoring record from the Tenas Deposit Station was compiled, reviewed, and validated by ERM (ERM 2019). The following data is recorded at the weather station:

- Hourly average wind speed
- Hourly wind direction and standard deviation of wind direction for 2017
- Hourly average air temperature
- Hourly average relative humidity
- Hourly average solar radiation
- Hourly average barometric pressure
- Hourly sampled snow depth
- 5-minute and hourly accumulated total precipitation

Details concerning the meteorological station configuration, data collection and preliminary gap-filling procedures are outlined in Section 4 of The Tenas Project 2017 to 2019 Baseline Report (ERM 2019).

### 2.2.2 Regional Data

Regional meteorological data for British Columbia is available from private as well as provincial and federal government sources. Regional re-analysis products for historical climate and future scenarios are available as gridded products developed by third parties based on government datasets. Within the Nechako Plateau hydrological zone, there are over 90 regional meteorological stations monitored by the Meteorological Service of Canada (MSC). This division of Environment and Climate Change Canada provides public historical meteorological data and information.

Figure 2-1 illustrates the locations of selected regional meteorological stations with respect to the Project. Three stations have historically operated in the town of Smithers. Smithers Airport Auto and Smithers A are understood to be the same station, after an upgrade in 2018. Table 2-1 presents the metadata for the selected regional stations.

**Table 2-1: Regional Meteorological Station Selections**

| Station Name | Climate Identifier | Latitude [° N] | Longitude [° W] | Elevation [masl] | Record Start | Record End | Distance from Project [km] |
|---|---|---|---|---|---|---|---|
| QUICK | 1076638 | 54.62 | 126.90 | 533 | 1962 | 1995 | 19.1 |
| SMITHERS AIRPORT AUTO | 1077501 | 54.82 | 127.19 | 518 | 2013 | 2023 | 25.2 |
| SMITHERS A | 1077500 | 54.82 | 127.18 | 522 | 1942 | 2018 | 25.2 |
| SMITHERS | 1077499 | 54.83 | 127.18 | 523 | 2010 | 2023 | 26.3 |
| HOUSTON | 1073615 | 54.40 | 126.67 | 610 | 1957 | 2023 | 40.0 |
| TOPLEY LANDING | 1078209 | 54.82 | 126.16 | 722 | 1962 | 2017 | 71.0 |
| EQUITY SILVER | 1072692 | 54.2 | 126.28 | 1280 | 1981 | 2021 | 73.6 |
| SUSKWA VALLEY | 107G879 | 55.29 | 127.17 | 534 | 1982 | 2023 | 77.5 |
| BURNS LAKE DECKER LAKE | 1091174 | 54.38 | 125.96 | 713 | 1990 | 2023 | 83.1 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Temperature_1CT027.003_rev01.html

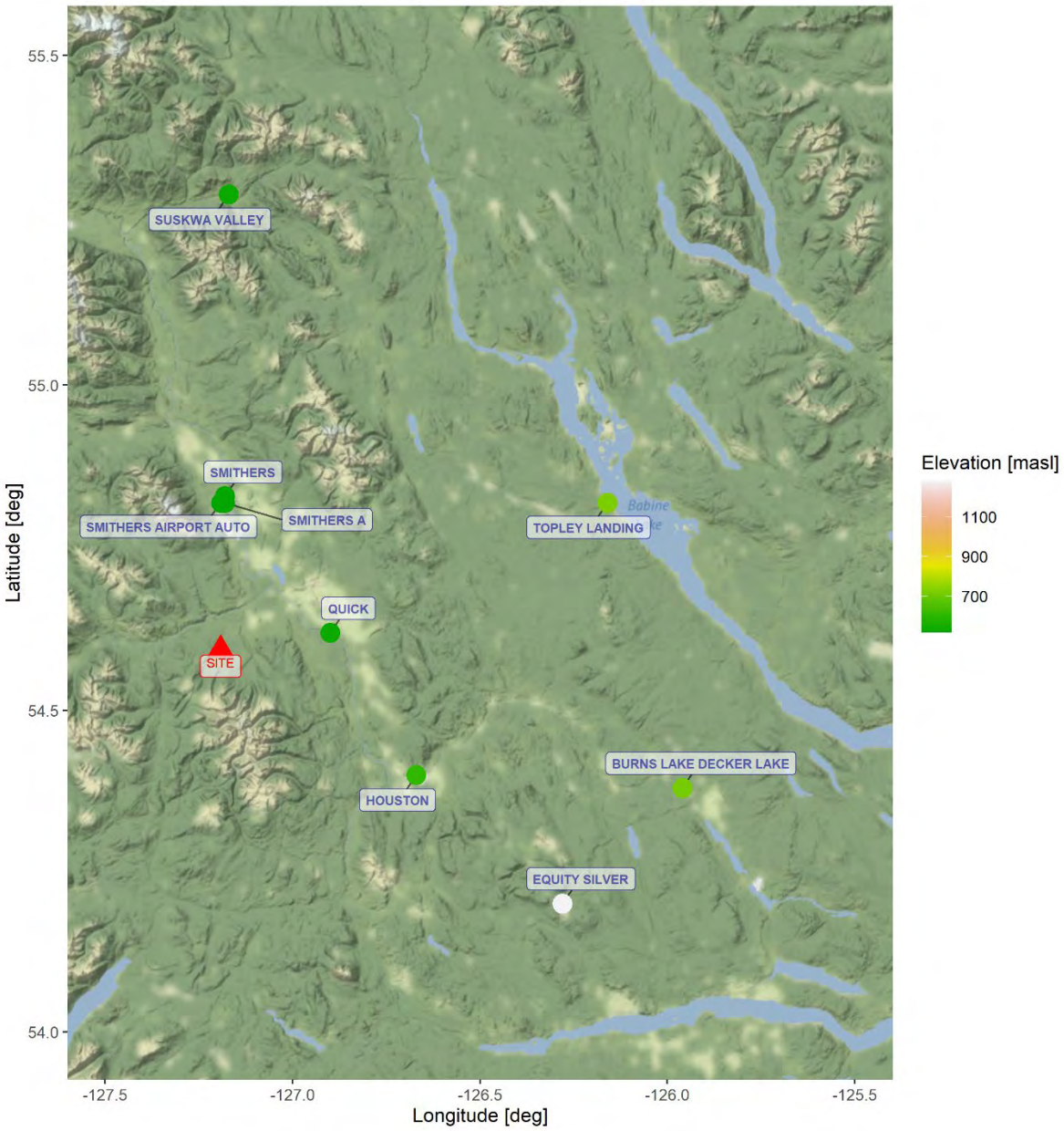



**Figure 2-1: Meteorological Stations Used in Project ("Site") and Regional Assessment**

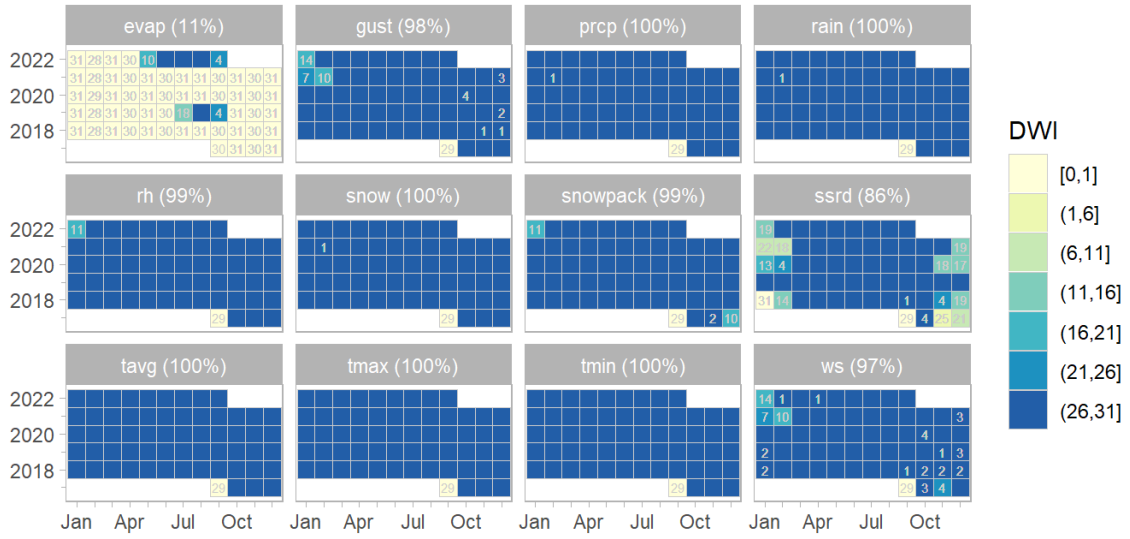
**Note:** Smithers A and Smithers Airport Auto are located at the same geographic location.

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Temperature_1CT027.003_rev01.html

### 2.2.3 Missing Data

The meteorological records from the Tenas Deposit Station have low amount of absent records with practicaly 100% of records available for precipitation and air temperature (maximum, minimum, and daily averages). Higher quantity of missing records were found for solar radiation -

mostly during the winter, presumably because of snow cover – and pan evaporation. The missing records and data availability are provided in Figure 2-2 for all measured variables.

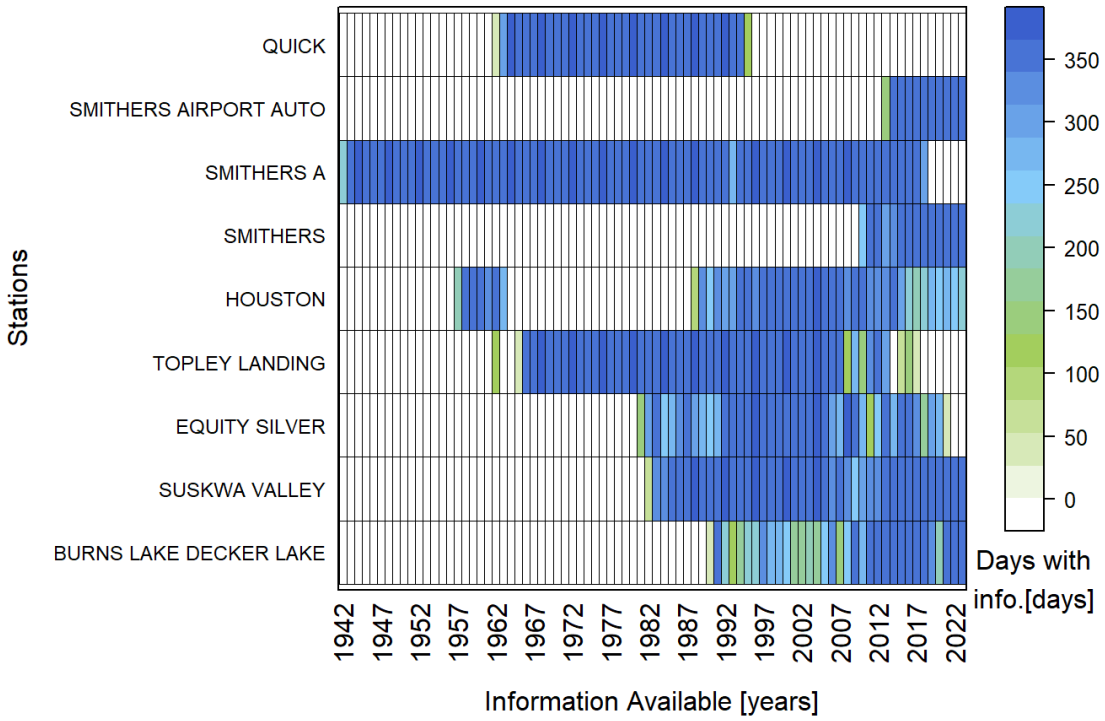



Source: compiled from R code SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

Note: Total data availability is presented after the variable name in parenthesis. Abbreviations have the following measing, ir row-wise order: evap = Pan Evaporation, gust = Wind Gust, prcp = Precipitation, rain = Rainfall, rh = Relative Humidity, snow = Snowfall, snowpack = Snowpack, ssrd = Shortwave Solar Radiation, tavg = Average Daily Temperature, tmax = Maximum Daily Temperature, tmin = Minimum Daily Temperature, ws = Wind Speed.

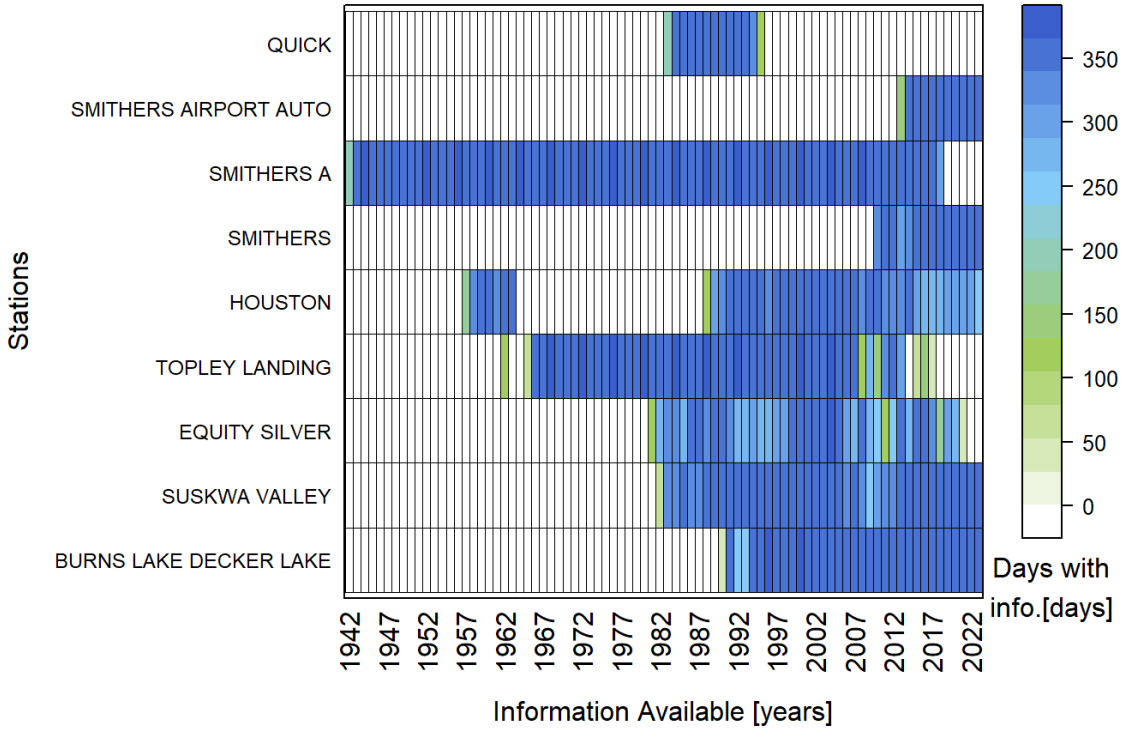
**Figure 2-2: Site meteorological records availability**

In terms of regional datasets, most stations also present some gaps in their records. Based on the correlations between stations these gaps could be patched appropriately as described in the sections below. Figure 2-3 and Figure 2-4 present the number of days with mean temperature and precipitation records respectively available at each regional station from 1942 to 2023. The color ramp on the right-hand side indicates 0 days of data (white) to a full 366 days (dark blue).




Source: compiled in text from R code SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-3: Number of Days with Mean Temperature Data Available Every Year from Regional Stations**




Source: compiled in text from R code SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-4: Number of Days with Precipitation Data Available Every Year from Regional Stations**

### 2.2.4 Regional Snow Datasets

The British Columbia Snow Survey Data includes datasets from two regional networks:

The Automated Snow Weather Station (ASWS) network is comprised of stations operated by the Ministry of Environment, BC Hydro and others. These stations collect hourly snow water equivalent, snow depth, air temperature, and precipitation. Data is available in near-real-time. Tsai Creek Station is the closest station of this type to the Project and is published by the Ministry of Environment and Climate Change Strategy (MECCS).

The Manual Snow Survey Sites network is operated by the province of British Columbia and manually measures snow depth and snow water equivalent. Measurements are taken monthly when snow is present, providing a record of snowpack across the province. Hudson Bay is the closest manual survey site to the Project. This data is also published by MECCS.

Figure 2-5 illustrates the locations of Tsai Creek and Hudson Bay snow survey stations, and Table 2-2 presents details pertaining to these stations.

**Table 2-2: Regional Snow Survey Stations**

| Station Name | Station Identifier | Latitude [°] | Longitude [°] | Elevation [masl] | Record Start | Record End | Distance from Project [km] |
|---|---|---|---|---|---|---|---|
| Tsai Creek | 4B17P | 54.64 | -127.68 | 1360 | 2003 | Current | 31.8 |
| Hudson Bay | 4B03A | 54.76 | -127.27 | 1480 | 1972 | Current | 19.4 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects:\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork Snowpack_rev02.Rmd

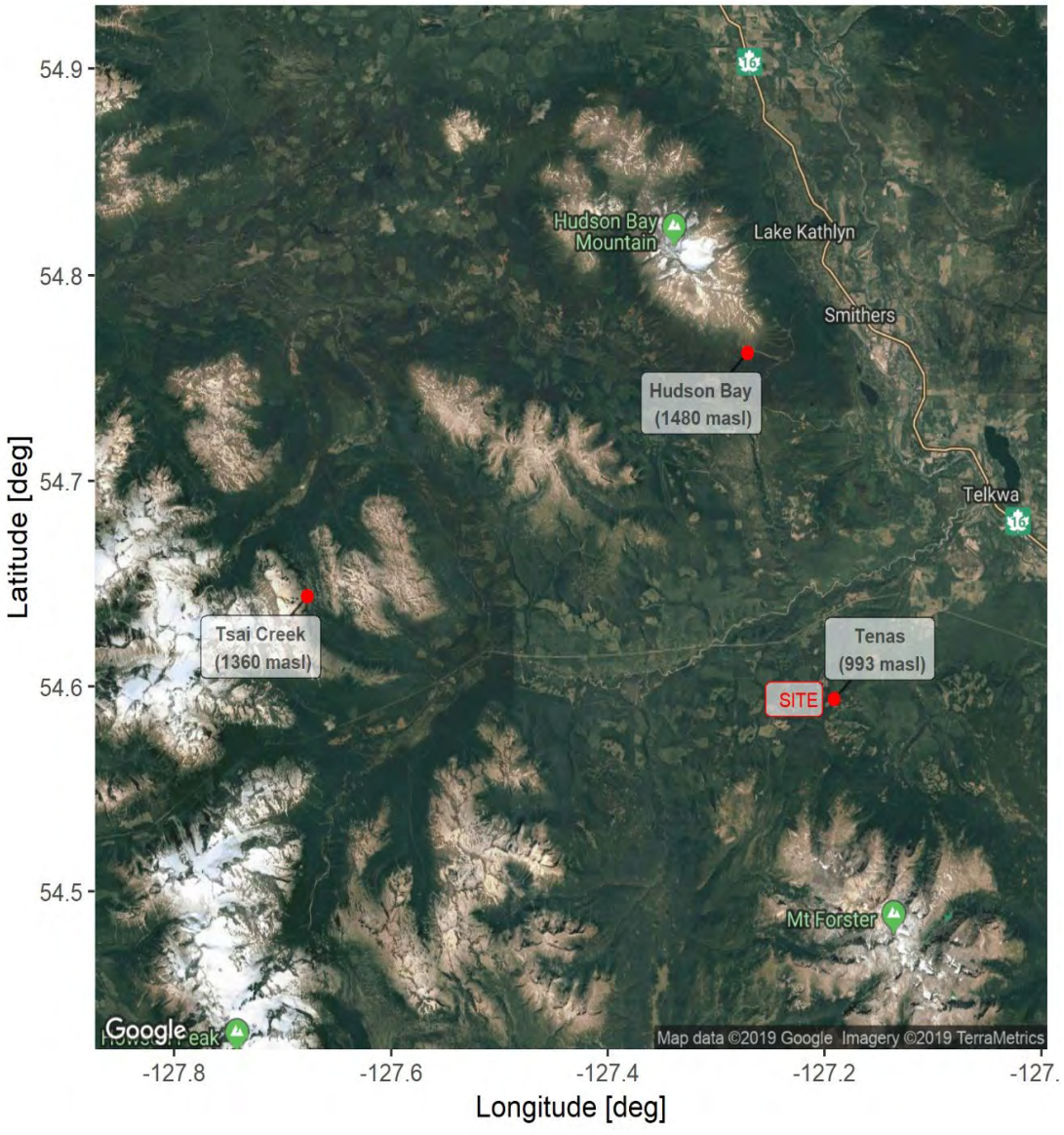



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**Figure 2-5: Regional Snow Pillow Stations Hudson Bay and Tsai Creek Shown in Relation to Tenas Deposit Station**

### 2.2.5 Reanalysis Meteorological Datasets

Reanalysis products were used to calculate regional orographic trends for precipitation and temperature. The regional stations could not account for these orographic trends, particularly in winter due to inversions present at some stations, and Project data did not produce a meaningful relationship to regional stations due to its relatively short duration of record.

Climate reanalysis combines gridded global models with observed historical data to produce historical climate and to incorporate adjustments based on developed relationships. Multiple reanalysis datasets are available in different spatiotemporal resolutions. Table 2-3 presents the three reanalysis datasets examined for this study.

**Table 2-3: Overview of Reanalysis Datasets Examined in this Study**

| Reanalysis | Institution | Period of Record |
|---|---|---|
| ERA-5 | European Centre for Medium-Range Weather Forecast (ECMWF) | 1979-current |
| MERRA-2<br>Modern-Era Retrospective Analysis for research and applications | US National Aeronautics and Space Administration (NASA) | 1980- current |
| PRISM | Pacific Climate Impact Consortium (PCIC) | 1950-2007 |

Source: Compiled in text.

ERA-5 and MERRA-2 are global datasets that provide sub-daily values for multiple meteorological parameters. PRISM is a climate-elevation regression model, used to generate a reanalysis dataset that provides precipitation and maximum and minimum temperature averages on a monthly timestep for the Pacific Region of Canada and the northwestern USA.

## 2.3 Summary of Available Data

This section presents a summary of the Project Area and regional meteorological datasets.

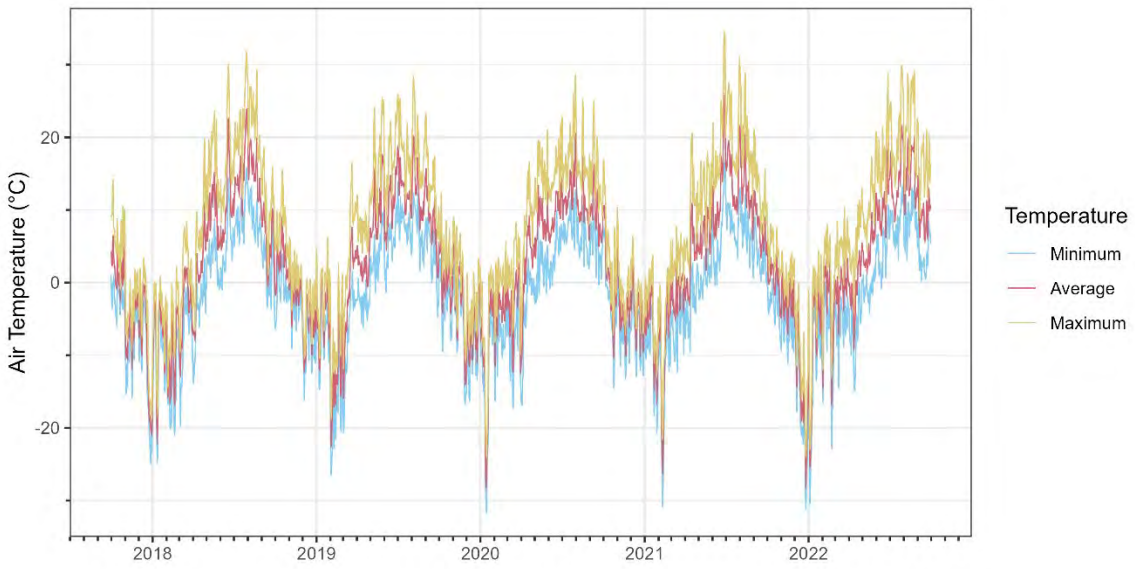
Meteorological parameters were summarized for the three years of Project data using monthly averages of daily minimum, mean and maximum air temperatures. Monthly average sums of the minimum, mean and maximum total precipitation were calculated. Annual maximum snow water equivalent (SWE) was computed for the Project based on regional snow survey data, transposed to the Project Area.

Other parameters measured at the Tenas Deposit Station include: Wind speed and direction, solar radiation, relative humidity, and barometric/atmospheric pressure. Evaporation rates were calculated based on thes parameters. Measured and calculated parameters are summarized for the Project Area and the long-term regional records in the following sections.

### 2.3.1 Air Temperature

#### Project

Temperature is used to estimate snowmelt, evaporation, evapotranspiration, and other inputs such as pond freeze depths. Air temperatures recorded at the Tenas Deposit Station ranged from -31.7°C (January 15, 2020) to 34.5°C (June 27, 2021). Figure 2-6 presents the daily maximum, average and minimum temperature at the Tenas Deposit Station. During the period of record, the coldest month was the month of December 2021 with a mean temperature of -14.0°C, and the hottest month was the month of July 2018 at 15.5°C. The summary of monthly maximum, average and minimum daily temperatures is presented in Table 2-4.




Source: SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\graphs\ts_site_airtemp.png

**Figure 2-6: Tenas Deposit Meteorological Station Temperature Record**

**Table 2-4: Tenas Deposit Meteorological Station Daily Air Temperature (°C) for October 2017-2022**

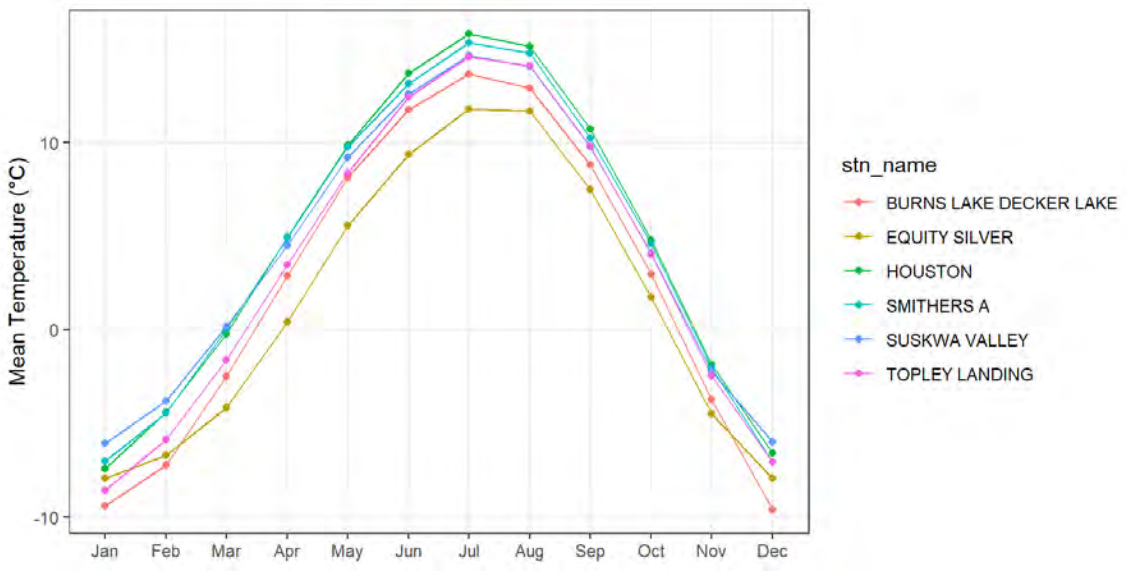
| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | Max. | | | | | | | | | | 14.2 | 2.5 | 3.4 | 14.2 |
| | Mean | | | | | | | | | | 1.9 | -5.6 | -8.9 | -4.2 |
| | Min. | | | | | | | | | | -5.9 | -15.9 | -24.9 | -24.9 |
| 2018 | Max. | 0.8 | 2.2 | 8.3 | 19.8 | 23.7 | 30.1 | 31.8 | 29.3 | 18.5 | 15.5 | 6.2 | 0.6 | 31.8 |
| | Mean | -7.6 | -9.8 | -3.3 | 1.1 | 9.4 | 10.6 | 15.5 | 15.3 | 5.9 | 3.0 | -1.0 | -6.1 | 2.8 |
| | Min. | -24.7 | -21.0 | -19.7 | -13.9 | -1.1 | -1.0 | 5.0 | 4.9 | -5.2 | -6.3 | -9.1 | -16.1 | -24.7 |
| 2019 | Max. | 6.2 | 2.7 | 16.5 | 12.7 | 25.6 | 24.8 | 25.9 | 28.4 | 23.2 | 12.3 | 9.1 | 1.3 | 28.4 |
| | Mean | -3.8 | -12.7 | -1.3 | 2.4 | 10.5 | 10.9 | 12.9 | 12.9 | 8.2 | 0.7 | -1.9 | -7.9 | 2.6 |
| | Min. | -14.7 | -26.5 | -20.7 | -6.2 | -1.4 | -1.3 | 3.8 | 1.7 | -4.8 | -9.5 | -16.8 | -16.3 | -26.5 |
| 2020 | Max. | 2.4 | 5.7 | 8.3 | 16.6 | 21.0 | 21.9 | 28.6 | 25.3 | 25.1 | 17.0 | 10.4 | 6.4 | 28.6 |
| | Mean | −9.8 | −3.5 | −3.2 | 2.0 | 8.3 | 9.3 | 12.6 | 10.7 | 9.4 | 0.7 | −3.4 | −3.8 | 2.4 |
| | Min. | −31.7 | −16.3 | −17.3 | −16.8 | −3.0 | −0.8 | 4.6 | 1.9 | −0.3 | −14.5 | −13.2 | −12.9 | -31.7 |
| 2021 | Max. | 3.7 | 5.8 | 7.7 | 20.6 | 18.0 | 34.5 | 31.1 | 29.4 | 21.1 | 8.1 | 4.4 | 0.6 | 34.5 |
| | Mean | −6.4 | −8.9 | −1.5 | 3.1 | 6.5 | 13.0 | 14.4 | 13.1 | 7.7 | 0.6 | −2.4 | −14.0 | 2.1 |
| | Min. | −20.7 | −30.9 | −12.3 | −9.6 | −2.3 | −0.4 | 3.3 | 0.7 | 0.0 | −8.8 | −11.2 | −31.1 | -31.1 |
| 2022 | Max. | 4.4 | 8.0 | 10.3 | 13.1 | 20.8 | 28.8 | 29.9 | 29.1 | 22.0 | | | | 29.9 |
| | Mean | −7.6 | −3.5 | −0.6 | −0.7 | 4.9 | 11.0 | 14.3 | 15.0 | 9.4 | | | | 4.7 |
| | Min. | −30.4 | −22.9 | −14.5 | −14.9 | −4.2 | −0.8 | 3.1 | 3.0 | 0.3 | | | | -30.4 |

*Light grey denotes no measurements.

Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### Regional

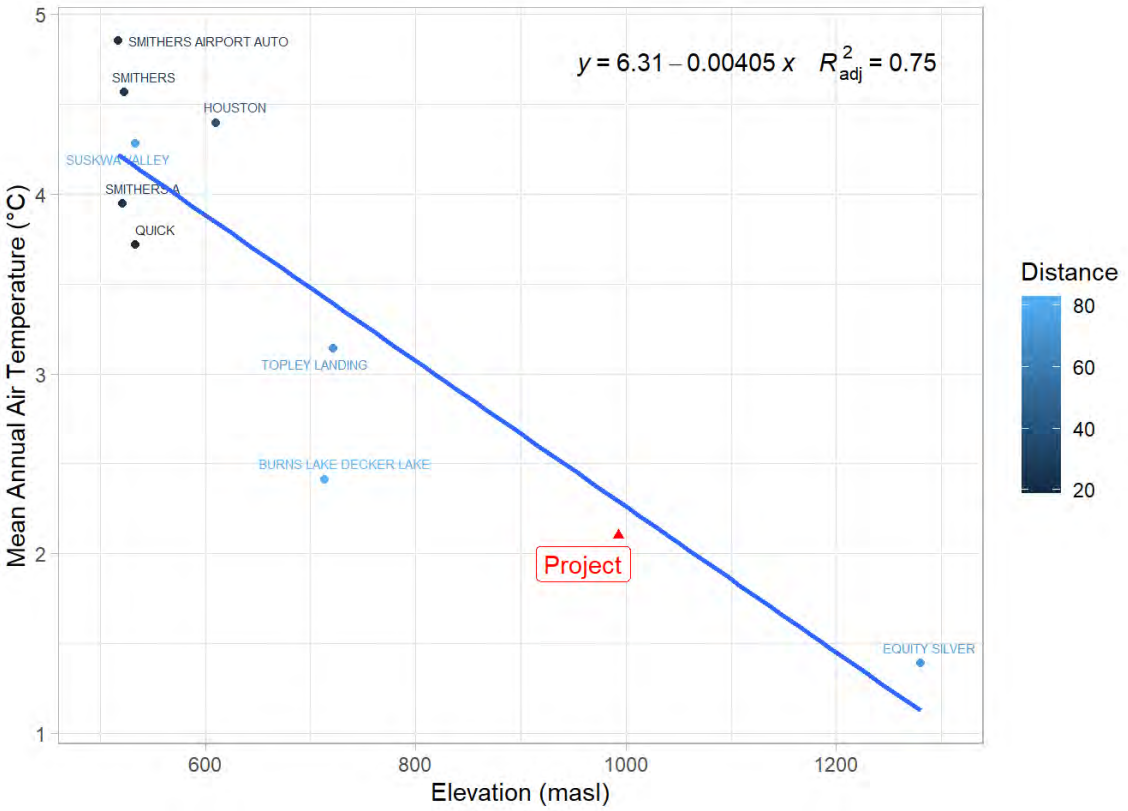
Temperature records for the Smithers Airport station were extended and patched using data from the Houston station. Figure 2-7 shows the annual distribution of regional temperatures, where the coldest and warmest months are typically January and July, respectively. Regional stations show similar temperature behaviour throughout the year except for Tsai Creek and Equity Silver. These two regional stations appear to show milder winters suggesting a temperature inversion for higher elevations. This suggests monthly correction factors are more appropriate to account for the potential of temperature inversions during the winter months.




Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-7: Monthly Average Temperatures at Regional Meteorological Stations**

Regionally, mean annual temperature decreases with increasing elevation. For a Project site elevation of 993 m (corresponding to the location of the Tenas Deposit Station), the mean annual temperature is approximately 2.5°C colder than temperatures recorded at the Smithers Airport Station (Figure 2-8).




Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

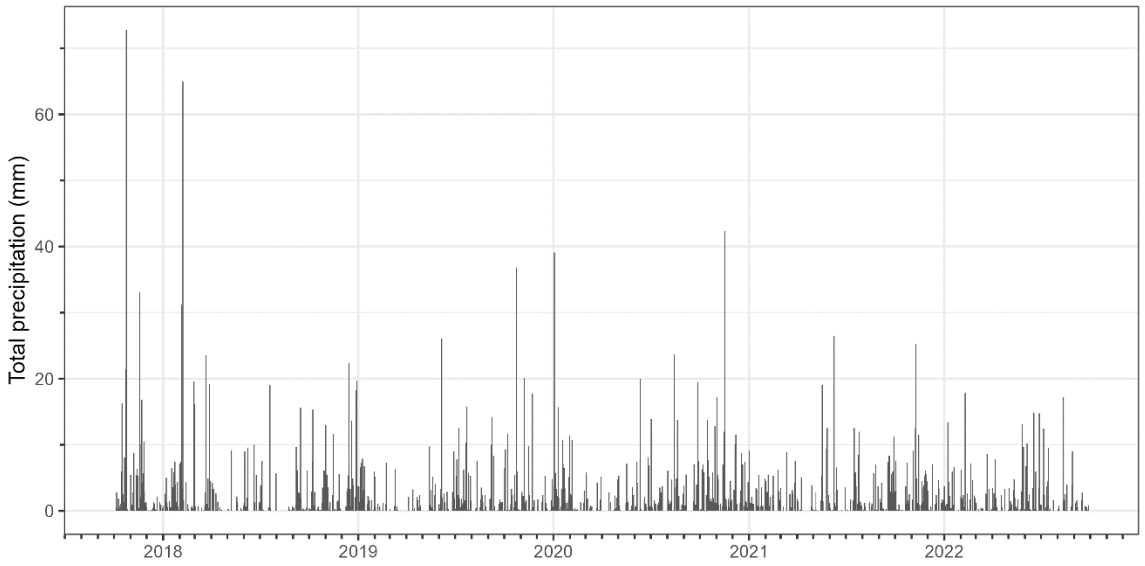
**Figure 2-8: Regional Mean Annual Temperature – Elevation Trend**

### 2.3.2 Precipitation

#### Project

The Tenas Deposit Station recorded from 502 mm to 719 mm in 2018 – 2021. Figure 2-9 presents the recorded daily precipitation from October 2017 to September 2022. The largest single-day precipitation events occurred on 24 October 2017 for rainfall (73 mm) and on 7 February 2018 for snowfall (65 mm). The 24 October 2017 event corresponds to an exceptional runoff event that exceeded historical streamflow records for regional stations in the area (ERM 2019).

The recorded total precipitation at the Tenas Deposit Station (Figure 2-9) was divided into rainfall (mm) and snowfall (mm SWE) components if the Project air temperature record was less than 0 degrees Celsius. Using this estimation, snow ranged from 34% to 71% of total annual precipitation (see Table 2-8 for regional comparison). Monthly cumulative values of measured total precipitation and estimated rainfall and snowfall are summarized in Table 2-5.




Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-9: Tenas Deposit Meteorological Station Measured Total Precipitation for October 2017-2019**

**Table 2-5: Tenas Deposit Meteorological Station Total Precipitation (measured), Rain (estimated), Snow (estimated)**

| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | Total Precipitation [mm] | | | | | | | | | | 147 | 134 | 10 | -- |
| | Rainfall [mm] | | | | | | | | | | 114 | 0 | 0 | -- |
| | Snowfall [mm SWE] | | | | | | | | | | 33 | 134 | 10 | -- |
| 2018 | Total Precipitation [mm] | 50 | 150 | 81 | 14 | 14 | 42 | 50 | 2 | 50 | 54 | 51 | 113 | 672 |
| | Rainfall [mm] | 0 | 0 | 1 | 3 | 14 | 42 | 50 | 2 | 30 | 42 | 9 | 0 | 195 |
| | Snowfall [mm SWE] | 50 | 150 | 80 | 10 | 0 | 0 | 0 | 0 | 20 | 11 | 42 | 113 | 477 |
| 2019 | Total Precipitation [mm] | 60 | 19 | 8 | 13 | 26 | 57 | 83 | 21 | 47 | 93 | 73 | 22 | 522 |
| | Rainfall [mm] | 5 | 0 | 0 | 7 | 26 | 57 | 83 | 21 | 46.5 | 69 | 32 | 0 | 346 |
| | Snowfall [mm SWE] | 55 | 19 | 8 | 6 | 0 | 0 | 0 | 0 | 0.5 | 24 | 41 | 22 | 176 |
| 2020 | Total Precipitation [mm] | 126 | 26 | 30 | 14 | 25 | 63 | 35 | 84 | 55 | 84 | 107 | 70 | 719 |
| | Rainfall [mm] | 0 | 1 | 1 | 14 | 25 | 63 | 35 | 84 | 55 | 20 | 23 | 18 | 339 |
| | Snowfall [mm SWE] | 126 | 25 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 84 | 51 | 380 |

| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2021 | Total Precipitation [mm] | 43 | 40 | 36 | 14 | 56 | 52 | 61 | 24 | 75 | 32 | 107 | 29 | 568 |
| | Rainfall [mm] | 0 | 1 | 4 | 5 | 53 | 52 | 61 | 24 | 75 | 16 | 13 | 0 | 305 |
| | Snowfall [mm SWE] | 43 | 39 | 32 | 9 | 3 | 0 | 0 | 0 | 0 | 15 | 94 | 29 | 263 |
| 2022 | Total Precipitation [mm] | 43 | 55 | 21 | 28 | 48 | 75 | 41 | 41 | 11 | | | | -- |
| | Rainfall [mm] | 0 | 23 | 9 | 3 | 47 | 75 | 41 | 41 | 11 | | | | -- |
| | Snowfall [mm SWE] | 43 | 31 | 12 | 25 | 1 | 0 | 0 | 0 | 0 | | | | -- |

*Light grey denotes no measurements.

Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### Regional

A regional precipitation analysis was carried out to identify trends and elevation correlations. The Smithers Airport Auto and Smithers A stations (10775001 and 1077500) were merged to generate a long-term record. Remaining gaps in this record were patched with Quick as well as ERA-5, using quantile mapping methods. The resulting patched Smithers A record provides 73 years of complete data.

Average yearly precipitation, rainfall and snowfall for regional stations are presented in Table 2-6 for their corresponding period of record. Regional stations present varying mean annual precipitation (MAP) in the range of 415 mm to 760 mm with precipitation occurring mainly as rainfall except for Equity Silver where almost half of the precipitation falls as snow due to its higher elevation.

**Table 2-6: Regional Stations Annual Precipitation, Rain, Snow and Corresponding Proportions**

| Station | Mean Annual Precipitation [mm] | Mean Annual Rainfall [mm] | Mean Annual Rainfall [%] | Mean Annual Snowfall [SWE mm] | Mean Annual Snowfall [%] |
|---|---|---|---|---|---|
| SMITHERS A (patched) | 511 | 344 | 67% | 166 | 33% |
| QUICK | 469 | 308 | 66% | 161 | 34% |
| HOUSTON | 425 | 293 | 69% | 132 | 31% |
| TOPLEY LANDING | 539 | 310 | 58% | 229 | 42% |
| EQUITY SILVER | 661 | 348 | 53% | 314 | 47% |
| SUSKWA VALLEY | 756 | 552 | 73% | 204 | 27% |
| BURNS LAKE DECKER LAKE | 415 | 249 | 60% | 166 | 40% |

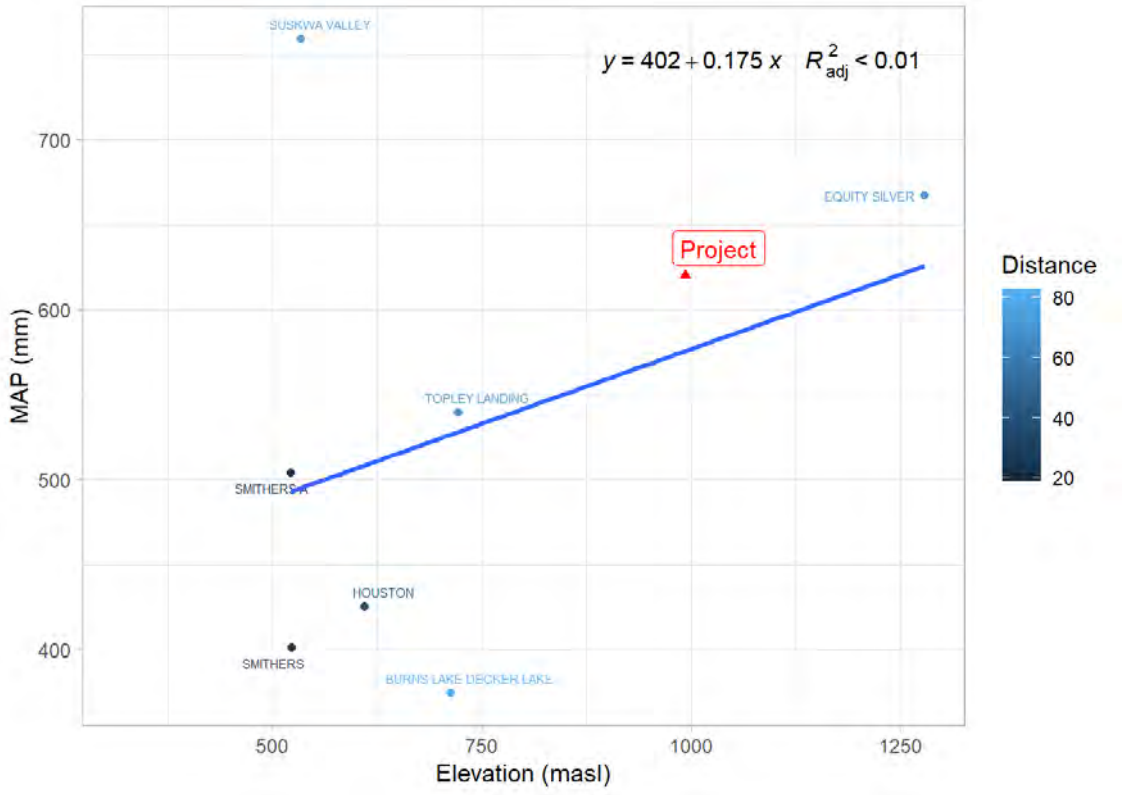
**Notes:**

1. Rainfall and snowfall proportions as percentages of the mean annual precipitation.
2. Smithers A patched with Smithers Airport Auto, Quick and ERA-5.
3. Mean annual values calculated based only on years with snow and rain measurements

Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html and Canadian Climate Normals https://climate.weather.gc.ca/climate_normals/index_e.html

Figure 2-10 illustrates the regional correlation between MAP and elevation. A negative value for the determination coefficient ($R^2$ presented in Figure 2-10) indicates the correlation between elevation and MAP using only the regional meteorological datasets is poor.

The relationship between MAP and elevation is likely less significant at this location due to the more dominant effects of topography and the Pacific Ocean as a moisture source. The west-east gradient and proximity to mountain range with rain shadow effects are the most important factors affecting precipitation in this area. Orographic gradients were further evaluated using Reanalysis datasets and are discussed in Section 4.1.2.




Note: Quick station data not included due to differing timelines
Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-10: Regional Mean Annual Precipitation – Elevation Trend**

Monthly precipitation was also reviewed and compared to site data over the concurrent period of record. Monthly precipitation data for the regional stations is presented in Table 2-7.

**Table 2-7: Regional Stations Monthly Precipitation Records**

| Year | Station | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | SMITHERS A (patched) | 45 | 11 | 7 | 17 | 86 | 46 | 255 | 21 | 89 | 143 | 68 | 3 | 579 |
| | HOUSTON | 0[1] | 10[1] | 1[1] | 6[1] | 83[1] | 34[1] | 7[1] | 1[1] | 3[1] | 81[1] | 17 [1] | 4[1] | 245 |
| | TOPLEY LANDING | | | 0[1] | 24[1] | 62[1] | | | | | | | | -- |
| | EQUITY SILVER | 52 | 50 | 44 | | 116 | 74 | 30 | 26 | 50 | 133 | 95 | 23 | 692 |
| | SUSKWA VALLEY | 38 | 17 | 36 | 32 | 120 | 69[1] | 75 | 55 | 104 | 149 | 83 | 26 | 804 |
| | BURNS LAKE DECKER LAKE | 21 | 12 | 13 | 23 | 68 | 38 | 30 | 11 | 48 | 70 | 48 | 4 | 385 |
| 2018 | SMITHERS A (patched) | 21 | 24 | 33 | 10 | 21 | 69 | 17 | 0 | 23 | 38 | 68 | 28 | 404 |
| | HOUSTON | 8[1] | 39[1] | 33[1] | 2[1] | 12[1] | 23[1] | 41[1] | 0[1] | 31[1] | 24[1] | 40[1] | 20[1] | 245 |
| | TOPLEY LANDING | | | | | | | | | | | | | -- |
| | EQUITY SILVER | 77 | 130 | 64 | 21 | 29 | 24[1] | | | | | | | -- |
| | SUSKWA VALLEY | 53 | 46[1] | 67 | 22 | 20 | 49 | 46 | 7 | 58 | 55 | 76 | 78 | 575 |
| | BURNS LAKE DECKER LAKE | 37 | 54 | 25 | 6 | 15 | 36 | 37 | 3 | 40 | 44 | 48 | 0[1] | 346 |
| 2019 | SMITHERS A (patched) | 55 | 6 | 7 | 21 | 21 | 41 | 68 | 28 | 26 | 79 | 85 | 19 | 381 |
| | HOUSTON | 23[1] | 1[1] | 0[1] | 0[1] | 16.8[1] | 40[1] | 42[1] | 26 | 49.4 | 73[1] | 12[1] | 13[1] | 297 |
| | TOPLEY LANDING | | | | | | | | | | | | | -- |
| | EQUITY SILVER | 0[1] | 5[1] | 10 | 24 | 37.6 | 68 | 121 | 40 | 41[1] | 24[1] | 44[1] | 38 | 451 |
| | SUSKWA VALLEY | 94 | 22 | 12 | 42 | 31 | 43 | 99 | 70 | 51 | 105 | 88 | 28 | 685 |
| | BURNS LAKE DECKER LAKE | 8[1] | 11 | 2 | 14 | 34 | 39 | 72 | 20 | 26 | 58 | 34 | 16 | 334 |
| 2020 | SMITHERS A (patched) | 32 | 21 | 12 | 10 | 31 | 66 | 59 | 115 | 19 | 2 | 1 | 0 | 498 |
| | HOUSTON | 54[1] | 17[1] | 5[1] | 11[1] | 14[1] | 56 | 59[1] | 55[1] | 16[1] | 63[1] | 41[1] | 10[1] | 402 |
| | TOPLEY LANDING | | | | | | | | | | | | | -- |
| | EQUITY SILVER | | 16[1] | 22[1] | 22 | 34 | 93 | 68 | 111 | 64 | 67 | 65[1] | 34[1] | -- |
| | SUSKWA VALLEY | 83 | 39 | 60 | 24 | 45 | 94 | 100 | 174 | 102 | 94 | 68 | 71 | 954 |
| | BURNS LAKE DECKER LAKE | 66 | 12 | 10 | 14 | 3[1] | | | | | 0[1] | 63 | 36 | -- |
| 2021 | SMITHERS A (patched) | 2 | 21 | 27 | 5 | 22 | 24 | 38 | 31 | 91 | 21 | 79 | 6 | 369 |
| | HOUSTON | 3[1] | 18[1] | 6[1] | 2[1] | 52[1] | 19[1] | 27[1] | 19 | 40[1] | 14[1] | 21[1] | 19[1] | 250 |
| | TOPLEY LANDING | | | | | | | | | | | | | -- |
| | EQUITY SILVER | 42 | | | | | | | | | | | | -- |

| Year | Station | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SUSKWA VALLEY | 47 | 36 | 61 | 25 | 53 | 47 | 50 | 54 | 128 | 46 | 118 | 53 | 717 |
| | BURNS LAKE DECKER LAKE | 30 | 28 | 11 | 9 | 63 | 23 | 52 | 37 | 60 | 21 | 41 | 26 | 402 |
| 2022 | SMITHERS A (patched) | 47 | 43 | 8 | 28 | 45 | 49 | 17 | 35 | 9 | 49 | 39 | 29 | 388 |
| | HOUSTON | 27[1] | 4[1] | 1[1] | 2[1] | 49[1] | 70 | 49[1] | 34[1] | 4[1] | 30[1] | 15[1] | 19[1] | 304 |
| | TOPLEY LANDING | | | | | | | | | | | | | -- |
| | EQUITY SILVER | | | | | | | | | | | | | -- |
| | SUSKWA VALLEY | 50 | 71 | 20 | 42 | 63 | 79 | 70 | 62 | 37 | 80 | 63 | 52 | 690 |
| | BURNS LAKE DECKER LAKE | 42 | 17 | 10 | 12 | 47 | 75 | 62 | 65 | 5 | 11 | 32 | | 415 |
| 2023 | SMITHERS A (patched) | 16 | 40 | 9 | 25 | 7 | 12 | 26 | 23 | 18 | 32 | 28[1] | | -- |
| | HOUSTON | 7[1] | 13[1] | 3[1] | 0[1] | 0[1] | 6[1] | 79 | 8[1] | 17[1] | 11[1] | 0[1] | | -- |
| | TOPLEY LANDING | | | | | | | | | | | | | -- |
| | EQUITY SILVER | | | | | | | | | | | | | -- |
| | SUSKWA VALLEY | 64 | 85 | 18 | 72 | 32 | 21 | 60 | 44 | 48 | 47 | 85 | | -- |
| | BURNS LAKE DECKER LAKE | 23 | 42 | 9 | 25 | 9 | 105 | 106 | 25 | 22 | 41 | 16 | | -- |

[1]Incomplete month. More than 5 days missing from record.

*Light grey denotes no measurements.

Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### 2.3.3 Snow Depth

#### Project

The winter snowpack in 2017-2018 began accumulating at the Tenas Deposit October 16, 2017 and finished melting in May 2018. During this period, the snow depth peaked at 149 cm on March 30, 2018. Table 2-8 presents the daily mean snow depth data recorded at the Tenas Deposit Station. Snowpack at the Project does not have a large potential of being redistributed by wind as the general surrounding area is heavily forested and recorded wind speeds are low (see Section 2.3.4). Snow depth measurements recorded at the Tenas Deposit Station are believed to be representative of the Project (ERM 2019). Snow depths are measured continuously at the Project while snowpack snow water equivalent measurements are not available.

**Table 2-8: Snow Depth Summary at Tenas Deposit Station for October 2017 to 2019**

| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | Maximum Snow Depth [cm] | | | | | | | | | | 16 | 60 | 51 |
| | Average Snow Depth [cm] | | | | | | | | | | 4 | 28 | 47 |
| | Minimum Snow Depth [cm] | | | | | | | | | | 0 | 3 | 44 |
| 2018 | Maximum Snow Depth [cm] | 78 | 122 | 149 | 140 | 64 | 0 | 0 | 0 | 8 | 4 | 16 | 75 |
| | Average Snow Depth [cm] | 63 | 101 | 119 | 110 | 12 | 0 | 0 | 0 | 1 | 0 | 9 | 38 |
| | Minimum Snow Depth [cm] | 51 | 76 | 97 | 68 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 13 |
| 2019 | Maximum Snow Depth [cm] | 76 | 83 | 83 | 55 | 6 | 0 | 0 | 0 | 0 | 29 | 19 | 15 |
| | Average Snow Depth [cm] | 66 | 75 | 74 | 32 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 14 |
| | Minimum Snow Depth [cm] | 56 | 72 | 56 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 |
| 2020 | Maximum Snow Depth [cm] | 72 | 83 | 80 | 73 | 1 | 0 | 0 | 0 | 0 | 23 | 45 | 60 |
| | Average Snow Depth [cm] | 58 | 70 | 73 | 45 | 0 | 0 | 0 | 0 | 0 | 9 | 23 | 46 |
| | Minimum Snow Depth [cm] | 27 | 65 | 66 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 32 |
| 2021 | Maximum Snow Depth [cm] | 78 | 100 | 100 | 93 | 20 | 0 | 0 | 0 | 0 | 2 | 40 | 60 |
| | Average Snow Depth [cm] | 68 | 91 | 94 | 70 | 2 | 0 | 0 | 0 | 0 | 0 | 27 | 50 |
| | Minimum Snow Depth [cm] | 63 | 77 | 89 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 40 |
| 2022 | Maximum Snow Depth [cm] | 74 | 88 | 86 | 80 | 50 | 0 | 0 | 0 | 0 | | | |
| | Average Snow Depth [cm] | 71 | 78 | 79 | 73 | 15 | 0 | 0 | 0 | 0 | | | |
| | Minimum Snow Depth [cm] | 63 | 71 | 72 | 53 | 0 | 0 | 0 | 0 | 0 | | | |

*Light grey denotes no measurements.

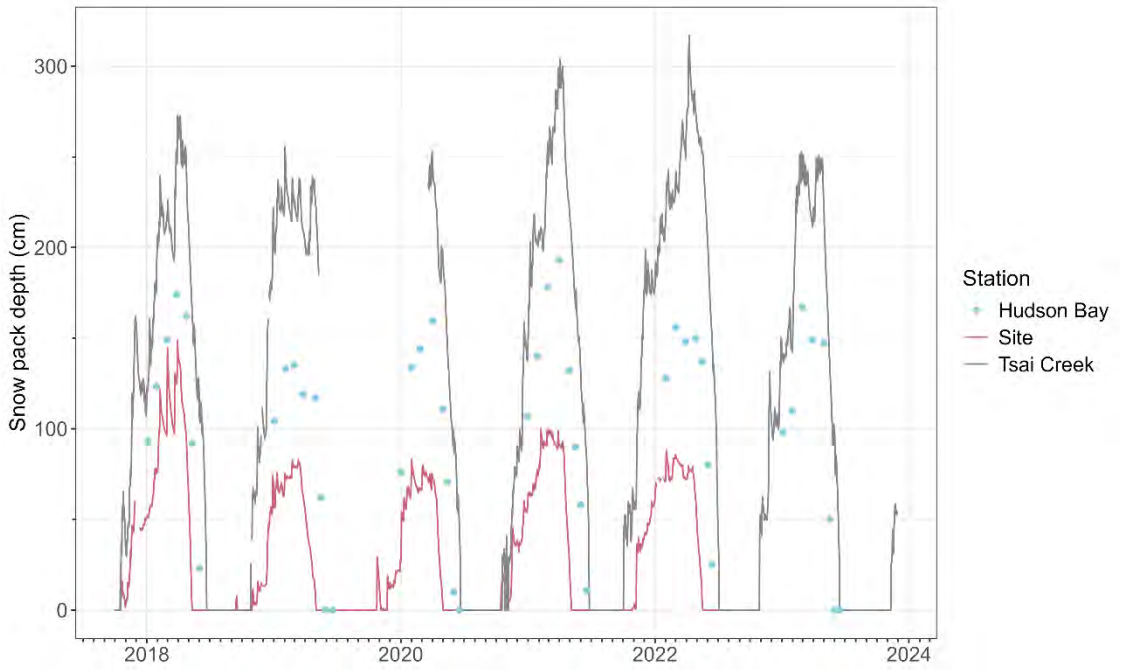
Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### Regional

The Tenas Deposit Station records total precipitation and snow depth but does not measure the snow water equivalent. The automated regional snow pillow station operated by environment Canada at Tsai Creek measures precipitation, temperature, snow depth and hourly snow water equivalent. The snow depth record at Tsai Creek is much higher than the snow depth record at the Tenas Deposit Station although the accumulation pattern is similar. However, melt timing occurs later at Tsai Creek due to the elevation difference between the two stations as well as

other physiographic characteristics such as aspect. At Tsai Creek, snowmelt typically begins in April, peaks in May and then is finished by early June.

Hudson Bay manual survey station also offers records near the Project. Figure 2-11 illustrates snow depth records at these regional stations compared to the project records, and Table 2-9 presents monthly average snow depth at Tsai Creek together with monthly survey results carried out at Hudson Bay.




Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-11: Snow Depth Records at Tsai Creek, Hudson Bay and Tenas Deposit**

**Table 2-9: Average Snow Depth at Tsai Creek and Hudson Bay Stations for October 2017 to 2024**

| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | Average Snow Depth at Tsai Creek [cm] | | | | | | | | | 0 | 23 | 85 | 126 |
| | Hudson Bay monthly Snow Depth Survey [cm] | 105 | | 127 | | 126 | 25 | | | | | | |
| 2018 | Average Snow Depth at Tsai Creek [cm] | 155 | 215 | 219 | 249 | 155 | 60 | 0 | 0 | 0 | 4 | 80 | 148 |
| | Hudson Bay monthly Snow Depth Survey [cm] | 108 | 149 | 174 | 162 | 92 | 23 | | | | | | 108 |
| 2019 | Average Snow Depth at Tsai Creek [cm] | 219 | 229 | 220 | 215 | 197 | 0 | 0 | | | | | |
| | Hudson Bay monthly Snow Depth Survey [cm] | 104 | 134 | 119 | | 60 | 0 | | | | | | |
| 2020 | Average Snow Depth at Tsai Creek [cm] | | | 240 | 211 | 140 | 45 | 0 | 0 | 0 | 10 | 47 | 117 |
| | Hudson Bay monthly Snow Depth Survey [cm] | 105 | 144 | | 135 | 70 | 5 | | | | | | 107 |
| 2021 | Average Snow Depth at Tsai Creek [cm] | 195 | 218 | 269 | 264 | 177 | 78 | 0 | 0 | 0 | 47 | 109 | 181 |
| | Hudson Bay monthly Snow Depth Survey [cm] | 140 | 178 | 193 | 132 | 90 | 34 | | | | | | |
| 2022 | Average Snow Depth at Tsai Creek [cm] | 202 | 228 | 248 | 285 | 247 | 141 | 4 | 0 | 0 | 5 | 67 | 110 |
| | Hudson Bay monthly Snow Depth Survey [cm] | 128 | | 152 | 150 | 137 | 52 | | | | | | |
| 2023 | Average Snow Depth at Tsai Creek [cm] | 147 | 218 | 231 | 238 | 149 | 34 | 0 | 0 | 0 | 0 | 30 | |
| | Hudson Bay monthly Snow Depth Survey [cm] | 104 | 167 | 149 | | 98 | 0 | | | | | | |

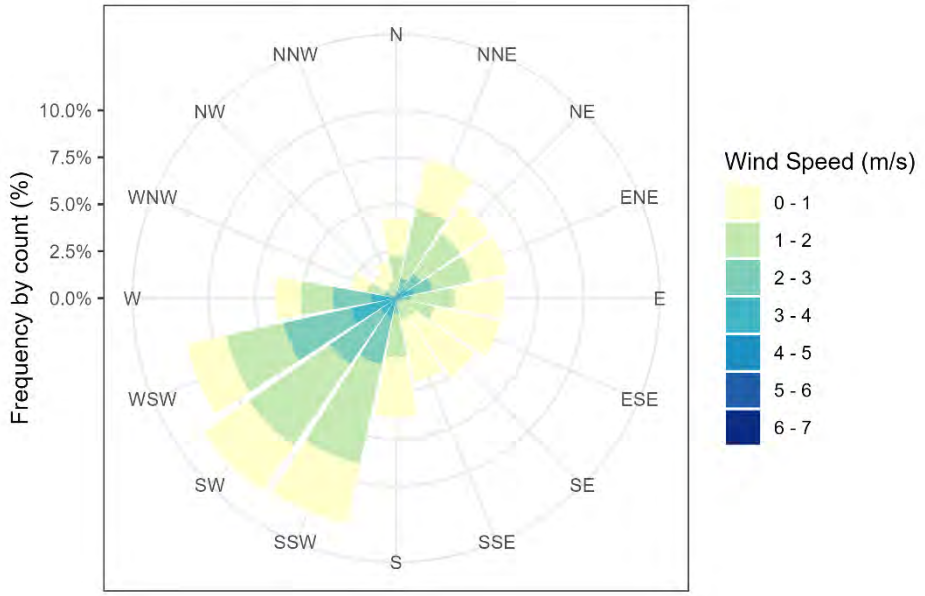
*Light grey denotes no measurements.

Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### 2.3.4 Wind

#### Project

Wind speeds at the Project are generally low (less than 2 m/s) and are predominantly from the southwest (i.e., travelling down the Tenas Creek watershed). Figure 2-12 illustrates the wind rose representing wind speed data for the hydrologic year from October 2017 to September 2022. Table 2-10 presents the monthly average wind speed for each year of record from the Project station. The maximum hourly mean wind speed recorded at the Tenas Deposit Station between October 2017 to September 2022 was 6.7 m/s and the maximum wind gust speed was 15.9 m/s.




Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-12: Wind Rose at Project for 2017-2022 Hydrologic Year**

**Table 2-10: Project Daily Average Wind Speed Summary [m/s]**

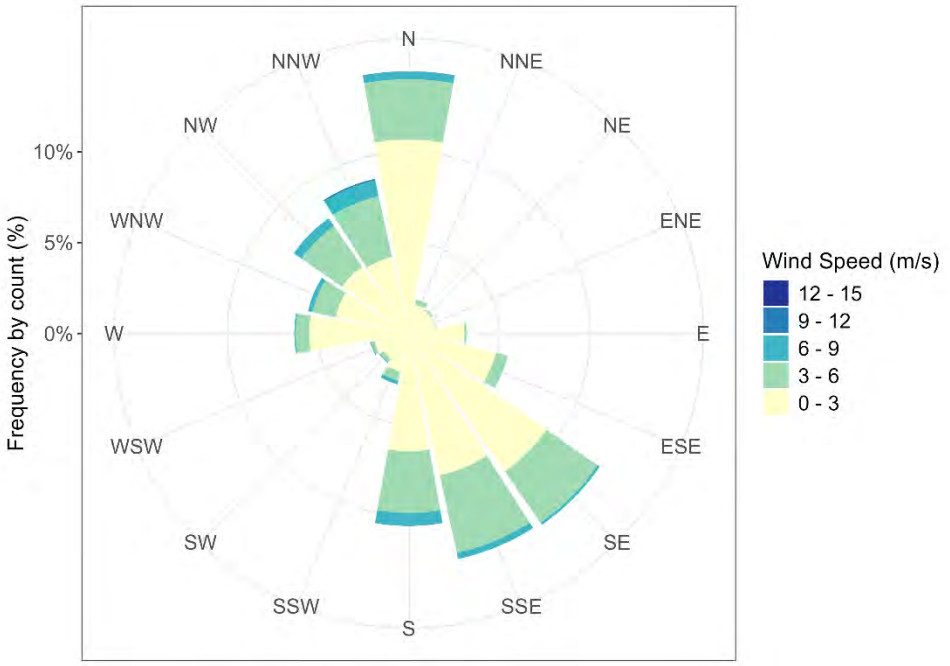
| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | | | | | | | | | | 1.2 | 1.1 | 0.9 |
| 2018 | 0.7 | 1.2 | 1.5 | 2.0 | 2.5 | 2.9 | 3.3 | 2.3 | 1.4 | 1.1 | 0.9 | 1.1 |
| 2019 | 1.0 | 1.4 | 1.3 | 1.6 | 1.8 | 1.7 | 1.4 | 1.5 | 1.3 | 1.1 | 1.2 | 0.7 |
| 2020 | 1.2 | 1.5 | 1.8 | 1.7 | 1.9 | 1.8 | 1.7 | 1.6 | 1.1 | 1.2 | 1.2 | 1.0 |
| 2021 | 1.2 | 1.6 | 1.7 | 1.7 | 1.5 | 1.6 | 1.5 | 1.6 | 1.4 | 1.3 | 1.3 | 1.0 |
| 2022 | 1.5 | 1.6 | 1.3 | 1.6 | 1.5 | 1.5 | 1.6 | 1.4 | 1.2 | | | |

Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

## Regional

Winds at the Smithers Airport station were found to be predominantly from the southeast and slightly higher than the Project Area. Wind speeds are typically used to evaluate evaporation and wave run-up and setup for freeboard estimates. Given the short period of record overlap, it was determined that higher wind speed measured at the Smithers Airport station is conservative and appropriate for application to the Project.

Figure 2-13 illustrates the wind roses based on wind speeds recorded from October 2017 to November 2023 at Smithers Airport station.




Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-13: Wind Rose for Smithers A – October 2017 to November 2023**

Smithers A values have been adapted to the Project for design purposes but should be replaced with Project-specific data when it becomes available. Wind speeds are typically not transposable across large distances and due to physiographic characteristics unique to each location. Table 2-11 summarizes the monthly average wind speeds and Table 2-12 presents the frequency analysis for sustained wind speeds adopted for the Project.

**Table 2-11: Average Monthly Wind Speed [m/s] at Smithers A Regional Station**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average (m/s) | 2.0 | 1.9 | 2.0 | 2.2 | 2.0 | 1.8 | 1.6 | 1.5 | 1.4 | 1.9 | 1.9 | 2.0 | 1.9 |

Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Table 2-12: Sustained Wind Speed Frequency Analysis for Smithers Airport Station**

| Return Period | Wind Speed [m/s] |
|---|---|
| 2 | 12.6 |
| 5 | 14.8 |
| 10 | 16.3 |
| 25 | 18.2 |
| 50 | 19.5 |
| 100 | 20.9 |
| 200 | 22.3 |

| Return Period | Wind Speed [m/s] |
|---|---|
| 500 | 24.1 |
| 1000 | 25.5 |

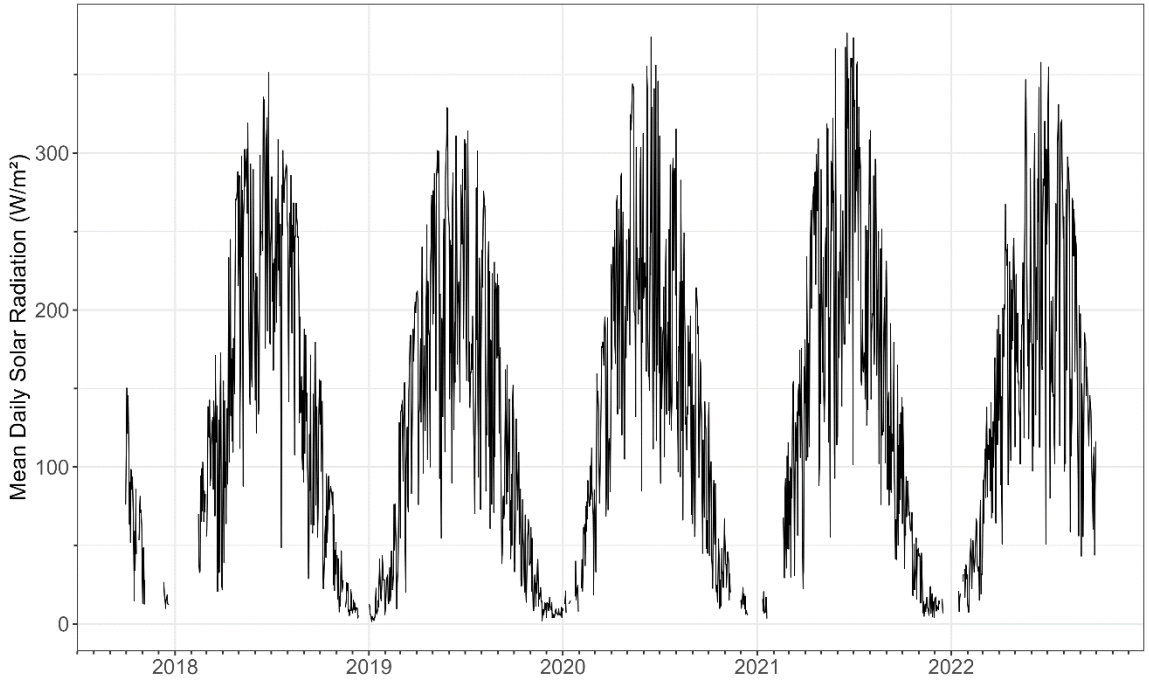
Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\ Wind_and_Freeboard_EA_rev00.Rmd

### 2.3.5 Solar Radiation

#### Project

The amount and intensity of solar radiation is a function of elevation, latitude, catchment orientation (slope and aspect) and shadows cast by topographic features and the atmosphere (i.e., cloud cover). Solar radiation at the Tenas Deposit Station is measured in power density units of W/m$^2$. Many periods of erroneous data were removed from the dataset due to snow accumulation on top of the sensor. Figure 2-14 illustrates daily solar radiation measured at the Tenas Deposit Station from October 2017 to September 2022.

Average daily solar radiation ranged from 1.5 W/m$^2$ to 376 W/m$^2$. As illustrated, incoming solar radiation has both seasonal and annual cycles. Diurnal variation in the sub-daily record (not shown) demonstrate typically higher values at midday and during summer while lower values typically occur between late evening to morning, and in winter. Table 2-13 presents the average monthly solar radiation at the Tenas Deposit Station.




Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-14: Average Daily Solar Radiation at the Tenas Deposit Station for October 2017 to 2019**

**Table 2-13: Average Monthly Solar Radiation at the Tenas Deposit Station for October 2017 to 2019 [W/m$^2$]**

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | | | | | | | | | | 79.8 | 30.2 | 15.7 | |
| 2018 | | 72.0 | 99.3 | 165.2 | 233.0 | 237.6 | 242.2 | 202.3 | 112.5 | 73.1 | 20.1 | 9.2 | |
| 2019 | 18.4 | 40.8 | 137.3 | 181.4 | 230.5 | 219.5 | 182.3 | 183.6 | 108.5 | 58.4 | 20.9 | 11.1 | 115.5 |
| 2020 | 16.8 | 66.4 | 126.8 | 206.2 | 245.4 | 228.2 | 196.0 | 165.5 | 120.2 | 51.3 | 34.3 | 12.3 | 122.4 |
| 2021 | 11.6 | 67.4 | 105.1 | 214.3 | 213.0 | 249.1 | 242.4 | 196.5 | 112.1 | 59.1 | 17.1 | 12.4 | 125.0 |
| 2022 | 25.8 | 38.7 | 109.9 | 176.2 | 192.7 | 221.1 | 229.4 | 194.4 | 125.0 | | | | |

*Light grey denotes no measurements.

Source: compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### Regional

The Smithers Airport Station does not record solar radiation. The Canadian Weather Energy and Engineering Dataset (CWEEDS) dataset is available for the location of Smithers Airport and was compared to incoming solar radiation recorded at the Tenas Deposit Station. Table 2-14 presents the average monthly solar radiation at the Smithers Airport station from the CWEEDS dataset.

**Table 2-14: Average Monthly Solar Radiation [W/m$^2$] at Smithers Airport Location**

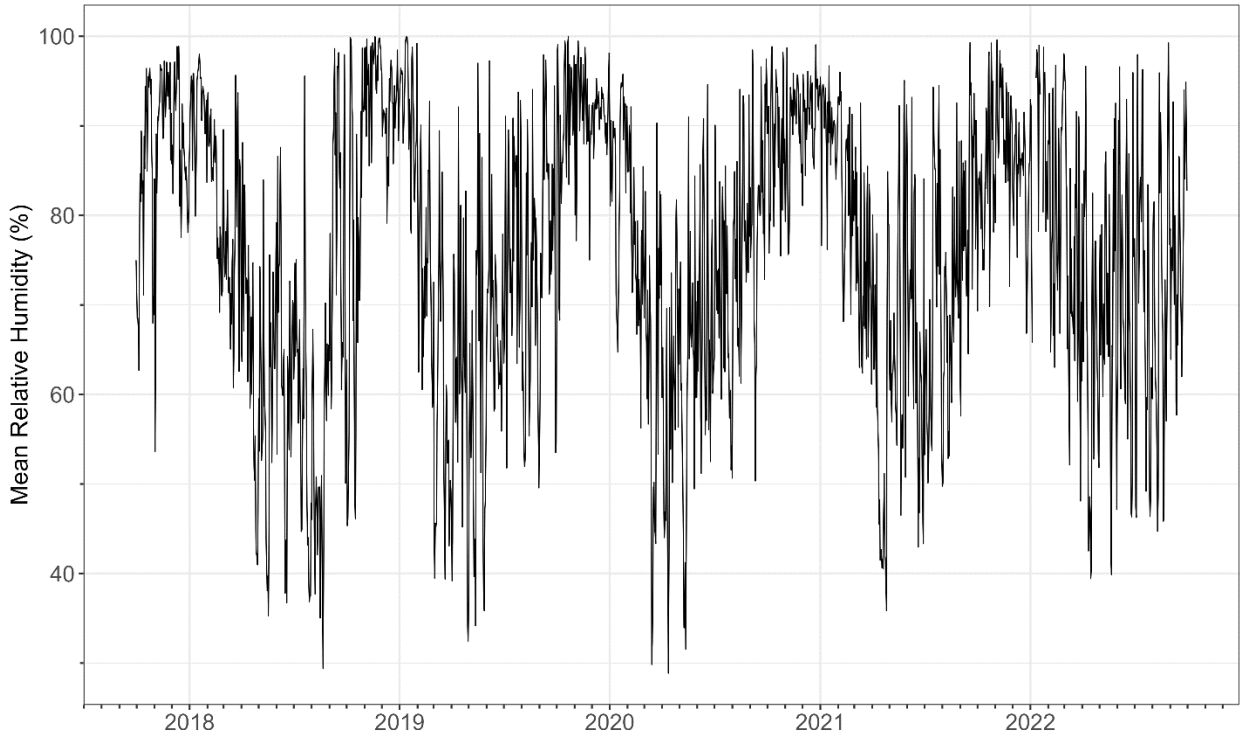
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average | 67 | 133 | 249 | 366 | 465 | 485 | 425 | 327 | 232 | 147 | 77 | 48 | 196 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Telkwa_EA_Evaporation_1CT027.003_rev01.Rmd

Based on available data, incoming solar radiation at the Project was found to be lower than the solar radiation from the CWEEDS dataset for the Smithers Airport location, understood to be due to the former being located in the north face of a mountain while the latter is located in an open, flat location and receives greater insolation.

### 2.3.6 Relative Humidity

Relative humidity refers to the ratio of the amount of moisture in the air to the relative maximum potential amount that air could hold at a given temperature and atmospheric pressure. As relative humidity approaches 100%, the likelihood of precipitation increases. On a monthly basis, the average relative humidity was typically greatest from November to January, remaining consistently above 85%, and was the lowest overall during the months of July and August (Figure 2-16). The monthly maximum, average and minimum daily relative humidity values are summarized in Table 2-15.




Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-15: Average Daily Relative Humidity at the Tenas Deposit Station for October 2017 to September 2022**

**Table 2-15: Tenas Deposit Monthly Average Relative Humidity [%]**

| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | Max | | | | | | | | | | 94.9 | 95.4 | 93.1 | 95.4 |
| | Avg | | | | | | | | | | 80.8 | 83.2 | 90.0 | 88.3 |
| | Min | | | | | | | | | | 72.0 | 65.6 | 83.5 | 65.6 |
| 2018 | Max | 95.5 | 91.5 | 91.4 | 85.9 | 82.9 | 84.7 | 78.9 | 72.5 | 94.2 | 89.5 | 99.6 | 96.1 | 99.6 |
| | Avg | 92.0 | 83.2 | 76.8 | 63.9 | 59.6 | 63.2 | 58.2 | 51.6 | 78.3 | 75.5 | 96.0 | 91.3 | 74.1 |
| | Min | 87.5 | 72.3 | 59.9 | 42.9 | 37.9 | 42.8 | 38.8 | 32.0 | 59.2 | 59.6 | 89.7 | 84.9 | 32.0 |
| 2019 | Max | 96.7 | 86.8 | 77.7 | 84.9 | 82.4 | 90.3 | 93.9 | 90.7 | 93.9 | 98.1 | 97.4 | 94.8 | 98.1 |
| | Avg | 96.7 | 86.8 | 77.7 | 84.9 | 82.4 | 90.3 | 93.9 | 90.7 | 93.9 | 98.1 | 97.4 | 94.8 | 98.1 |
| | Min | 86.3 | 59.1 | 40.0 | 38.6 | 36.8 | 47.1 | 56.9 | 48.9 | 59.8 | 75.1 | 81.7 | 86.9 | 36.8 |
| 2020 | Max | 90.3 | 90.8 | 81.7 | 82.3 | 86.0 | 89.2 | 88.5 | 93.3 | 94.6 | 97.4 | 95.5 | 97.0 | 97.4 |
| | Avg | 85.6 | 76.9 | 62.9 | 58.3 | 60.4 | 68.9 | 70.4 | 76.4 | 81.1 | 88.5 | 89.2 | 91.6 | 75.9 |
| | Min | 79.3 | 61.3 | 43.8 | 36.9 | 36.5 | 47.4 | 51.8 | 56.9 | 63.6 | 75.4 | 80.0 | 83.6 | 36.5 |
| 2021 | Max | 95.0 | 90.5 | 92.3 | 78.6 | 90.6 | 88.6 | 91.3 | 91.4 | 95.9 | 96.3 | 97.4 | 89.0 | 97.4 |
| | Avg | 89.6 | 83.7 | 74.1 | 56.8 | 67.4 | 66.2 | 69.7 | 68.8 | 81.7 | 83.7 | 90.3 | 83.5 | 76.3 |
| | Min | 82.4 | 75.0 | 53.7 | 35.5 | 45.6 | 43.2 | 48.6 | 46.6 | 61.7 | 66.8 | 78.6 | 77.4 | 35.5 |
| 2022 | Max | 92.4 | 94.1 | 94.8 | 88.7 | 93.6 | 94.3 | 92.3 | 91.8 | 96.9 | | | | 96.9 |
| | Avg | 84.9 | 82.0 | 74.1 | 64.8 | 69.8 | 71.2 | 70.4 | 70.6 | 76.7 | | | | 73.8 |
| | Min | 75.8 | 67.9 | 49.6 | 41.1 | 44.3 | 48.2 | 48.7 | 49.8 | 52.1 | | | | 44.1 |

*Light grey denotes no measurements.

Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### Regional

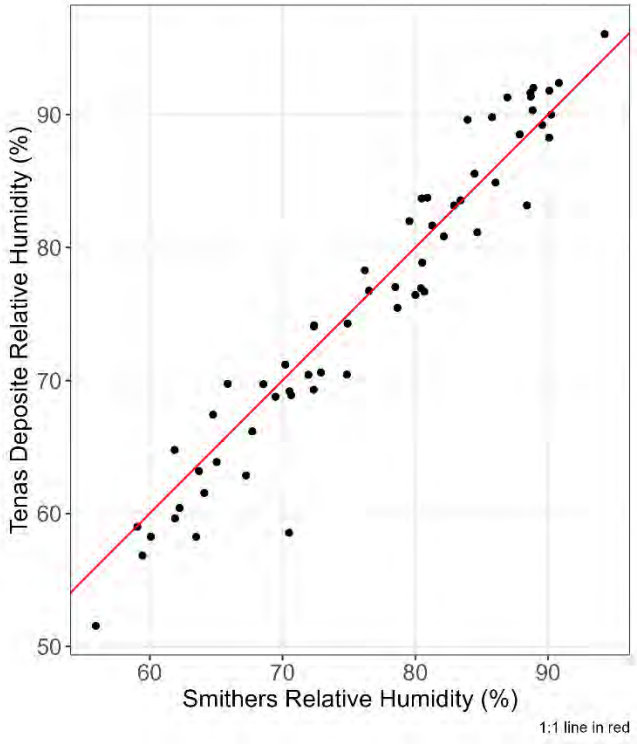
Hourly relative humidity recorded at the Smithers Airport station was evaluated for the period of record (1953-2023) and the monthly average values are presented in Table 2-16. Patterns in relative humidity were similar to what was observed at the Tenas Deposit Station.

**Table 2-16: Average Monthly Relative Humidity [%] at Smithers A Location**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average (%) | 83.3 | 79.3 | 71.6 | 63.8 | 62.2 | 66.4 | 69.8 | 73.4 | 80.2 | 82.2 | 85.8 | 85.0 | 75.2 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Evaporation_1CT027.003_rev01.Rmd

Monthly relative humidity values were compared between October 2017 and September 2022 and are shown in Figure 2-16, where the red line represents the identity function. Based on these records, the Smithers Airport station relative humidity is generally lower than at the Tenas Deposit Station.



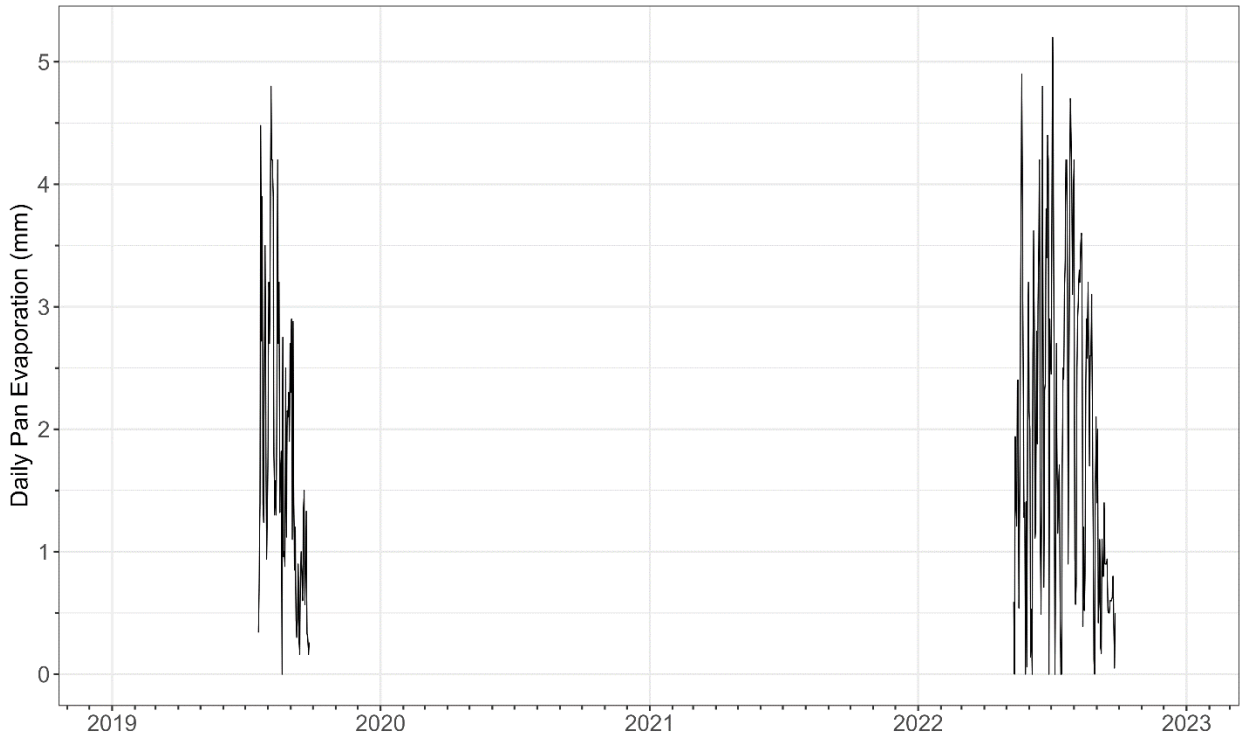

Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-16: Monthly Average Relative Humidity at Smithers Airport Station and Tenas Deposit Station for October 2017 to September 2022**

### 2.3.7 Evaporation

#### Project

Open water evaporation is an important component of the water balance for the Project area. Since the EAC Project Case (Aug 2022), new pan evaporation data from site has become available from 2019 and 2022 readings. Daily records are illustrated in Figure 2-17. The monthly total evaporation values are summarized in Table 2-17 showing only complete months of data (August 2019 and June-September 2022)..




Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 2-17: Daily Pan Evaporation at the Tenas Deposit Station for July 2019 to September 2022**

**Table 2-17: Monthly Pan Evaporation at the Tenas Deposit Station for July 2019 to 2022 [mm]**

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2019 | | | | | | | | 72.0 | | | | |
| 2022 | | | | | | 68.9 | 79.4 | 65.2 | | | | |

*Light grey denotes no measurements.

Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### Regional

Two approaches were used in order to evaluate open water evaporation: (1) Penman (Penman, 1948) and (2) Morton CRWE (Morton, 1983b) approaches. The Penman and Morton CRWE approaches were applied to three datasets to estimate mean daily potential evaporation and then subsequently compared to the Topley Landing pan evaporation measurements (adjusted to represent lake evaporation). The three datasets are: (1) patched regional data (Smithers Airport Station), (2) patched Project data (Tenas Deposit Station) and (3) derived Project data based on reanalysis and regional datasets. Monthly average lake evaporation results are presented in Figure 2-18.

The Penman formula is a semi-empirical equation that incorporates energy budget and mass transfer approaches to estimate daily potential evapotranspiration or open water evaporation. Open water evaporation $E_0$ (in mm/day) is calculated according to the formula:

$$E_o = \frac{\left(\frac{\Delta}{\gamma} H + E_a\right)}{\frac{\Delta}{\gamma} + 1}$$

Where $\frac{\Delta}{\gamma}$ is an empirical parameter dependent on temperature, H is calculated based on incoming solar radiation, outgoing radiation, albedo of the open water surface and the proportion of cloudiness.

$E_a$ is calculated semi-empirically as well using windspeed, and vapour pressure.

The Morton CRWE formula generates an estimate of monthly potential evaporation using the input parameters in Table 2-18.

**Table 2-18: Morton CRWE Evaporation Formulation Input Parameters**

| Parameter | Description | Value |
|---|---|---|
| $T_{max}$, $T_{min}$ | Timeseries of daily maximum and minimum project temperatures | See Section 2.3.1, 4.2.2 |
| $RH_{max}$, $RH_{min}$ | Timeseries of daily maximum and minimum project relative humidity | See Section 2.3.6, 4.1.5 |
| $T_{dew}$ | Timeseries of daily project dew point temperature. | Computed with the Magnus Formula (Magnus, 1844) |
| Rs | Timeseries of daily project solar irradiance | See Section 2.3.5, 4.2.5 |
| epsilon | Surface emissivity (Morton, 1986) | 0.92 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Evaporation_1CT027.003_rev01.Rmd

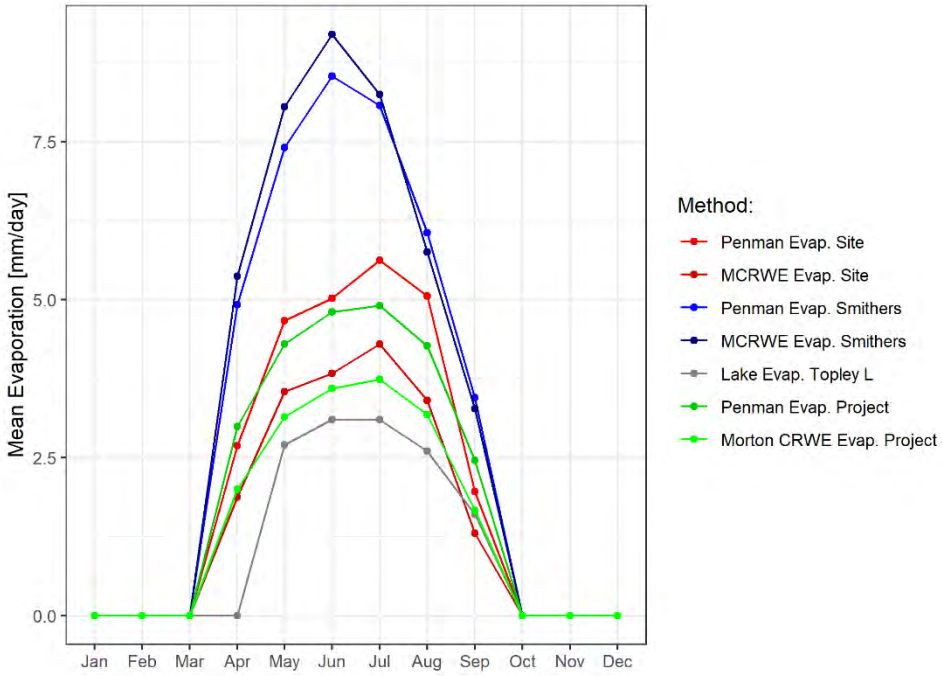



**Figure 2-18: Estimated Monthly Average Lake Evaporation**

The only regional station with evaporation measurements is Topley Landing, located 71 km northeast of the Project at an elevation of 722 masl. Mean annual lake evaporation at Topley Landing was 401 mm based on the 1981-2010 Canadian Climate Normals published by Environment Canada. Note that relative humidity and solar radiation are not measured at Topley Landing so the methods listed above could not be directly compared for Topley Landing.

# 3 Baseline Hydrology

## 3.1 Section Overview

The baseline characterization incorporates historical flow records from selected long-term Water Survey of Canada (WSC) stations as well as available data from local Project hydrometric stations.

Local data has been collected as part of the Tenas Project baseline monitoring program. Information from September 2017 to September 2018 is synthesized in the Tenas Project 2017 to 2018 Baseline Report (ERM 2019) with more recent information provided by ERM in the form of field reports. New hydrologic data has also been collected at Tenas-Hydro, and Four-Hydro stations between 2021 and 2022. Additional data collected by AGRA Earth and Environmental Ltd in 1997-1998 is presented in Attachment C.

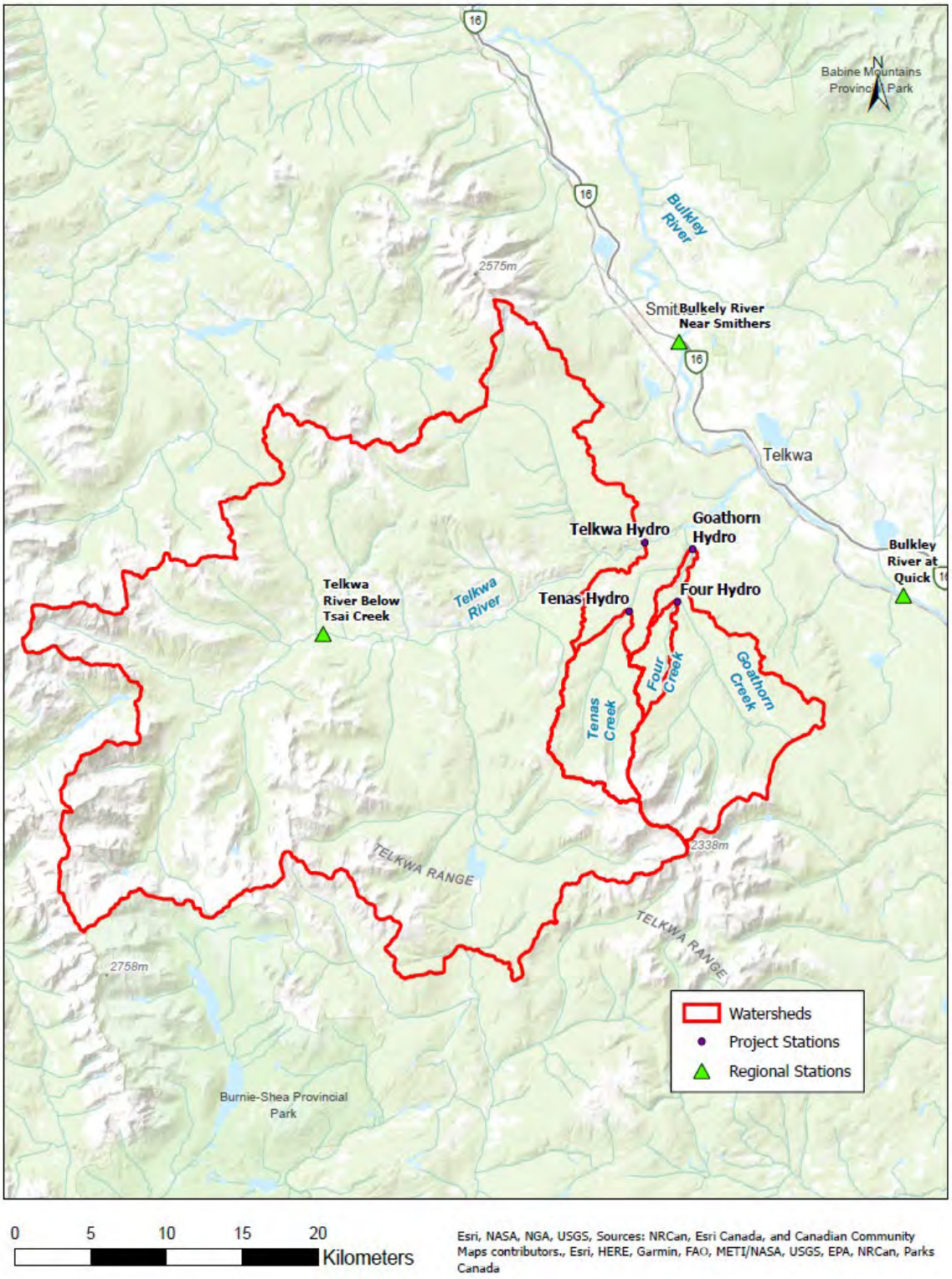
Hydrometric records generated for the Project Area spanning 2017 to 2022 are shown in Section 3.2 for the open water period. Regional data for each Water Survey of Canada station are discussed in Section 3.2 and summarized in Section 3.3.

## 3.2 Available Hydrometric Data

### 3.2.1 Project Data

#### Catchment Delineations

Catchment areas were defined by ERM (ERM 2019) and verified by SRK. Project Area hydrometric stations as well as regional Water Survey of Canada stations are shown in Figure 3-1.




Source: \\srk.ad\dfs\na\van\Projects \01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\!080_Deliverables\Hydromet Baseline Update\040_Figures\ Figure3.1_Hydrometric_Stations_20201023.jpg

**Figure 3-1: Map of Project Area With Project Hydrometric Station Catchments Delineated**

### Hydrometric Data

Historical hydrometric data was collected in 1997-1998 by AGRA Earth and Environmental Ltd for development of the Project Area by Luscar Ltd. Hydrometric spot measurements were collected at Four Creek and Tenas Creek and converted to continuous discharge for a subset of each open-water season. Four Creek data from this period was assessed in more detail than Tenas Creek records due to the short duration of data collect in 2020 by ERM.

Table 3-1 summarizes relevant information for each Project hydrometric station.

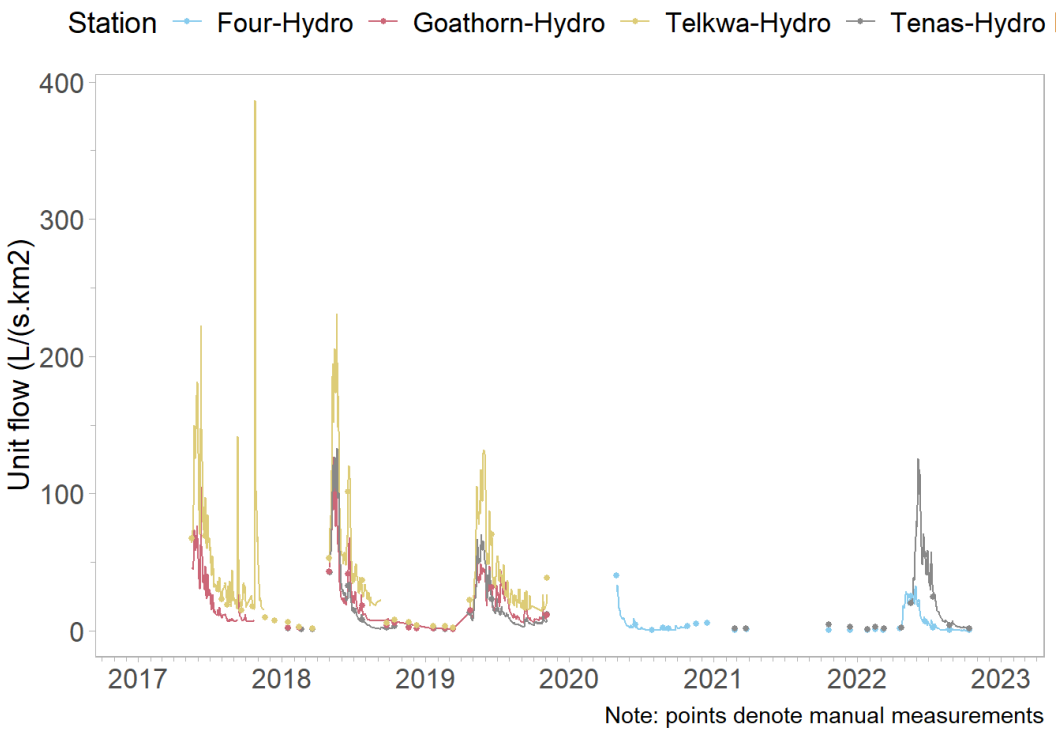
Recent rating curves and continuous discharge were developed for each hydrometric station by ERM (Figure 3-2). Additional details on the instrumentation and rating curve development is summarized in the 2017-2018 Baseline Report (ERM 2019). The Tenas-Hydro station was moved approximately 200 m upstream in 2018. Additional monitoring, rating curve development and analysis for 2019 hydrometric data was completed by ERM.

The Four-Hydro station was installed in April 2020 and a rating curve was developed based on six discharge measurements with two additional measurements completed in late 2020. Monitoring of other local hydrometric stations in 2020 was not completed. A discharge measurement was completed at Four-Hydro in February 2021 to obtain some understanding of winter low flows in Four Creek.

**Table 3-1: Summary of Project Area Hydrometric Stations Location and Measurement Information**

| Station Name | Longitude | Latitude | Average Catchment Elevation (masl) | Area ($km^2$) | Period of Measurement | Rating Curve Equation $Q = C(h-a)b$ (developed at) | # of Manual Measurements |
|---|---|---|---|---|---|---|---|
| Telkwa-Hydro | 54.65 | -127.17 | 1,243 | 997.2 | May 2017 – November 2019 | C: 56.634<br>a: 97.955<br>b: 2.113<br>(March 2020) | 8 (2017)<br>10 (2018)<br>6 (2019) |
| Tenas-Hydro & Tenas-Hydro B | 54.62 | -127.19 | 1,181 | 47.6<br>46.8 | May 2017 – November 2022 | C: 13.233<br>a: 97.21<br>b: 2.278<br>(October 2022) | 5 (2017)<br>10 (2018)<br>6 (2019)<br>4 (2021)<br>9 (2022) |
| Goathorn-Hydro | 54.65 | -127.12 | 1,243 | 123.5 | May 2017 – November 2019 | C: 9.383<br>a: 98.18<br>b: 2.361<br>(March 2020) | 9 (2017)<br>10 (2018)<br>6 (2019) |
| Four-Hydro | 54.62 | -127.14 | 985 | 11.0 | Established 30 April 2020 | breakpoint at h = 99.330<br>for h ≤ 99.330<br>C: 36.987<br>a: 99.311<br>b: 1.964<br>for h > 99.330<br>C: 18.379<br>a: 99.246<br>b: 2.860<br>(October 2022) | 8 (2020)<br>4 (2021)<br>9 (2022) |

Source: Compiled in text. \\srk.ad\dfs\na\van\Projects \01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\!020_Project_Data\020_Client\20200312_HydrologyData_DFarmer\2.0 Rating Curves and Hydrographs




Source: Compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Figure 3-2: Available Streamflow Data Recorded at the Project Hydrometric Stations**

### 3.2.2 Regional Data

Water Survey of Canada (WSC) is the national authority responsible for the collection, interpretation and dissemination of standardized water resource data in Canada. Stations within the same BC hydrological zone were evaluated and additional selection criteria were subsequently applied.

Figure 3-1 illustrates the four regional WSC stations selected based on proximity to the Project hydrometric stations as well as for having similar flow regimes. These stations have more than 10 years of data and catchment areas ranging between 125 km$^2$ to 8,940 km$^2$. Table 3-2 summaries the metadata for these stations and the length of published historical record. Additional provisional data was downloaded from the WSC website where the archived record did not extend to 2020. The provisional data records may change slightly as Water Survey of Canada evaluates data and adjusts rating curves to account for any changes that may have occurred between years.

**Table 3-2: Summary of Regional Hydrometric Stations**

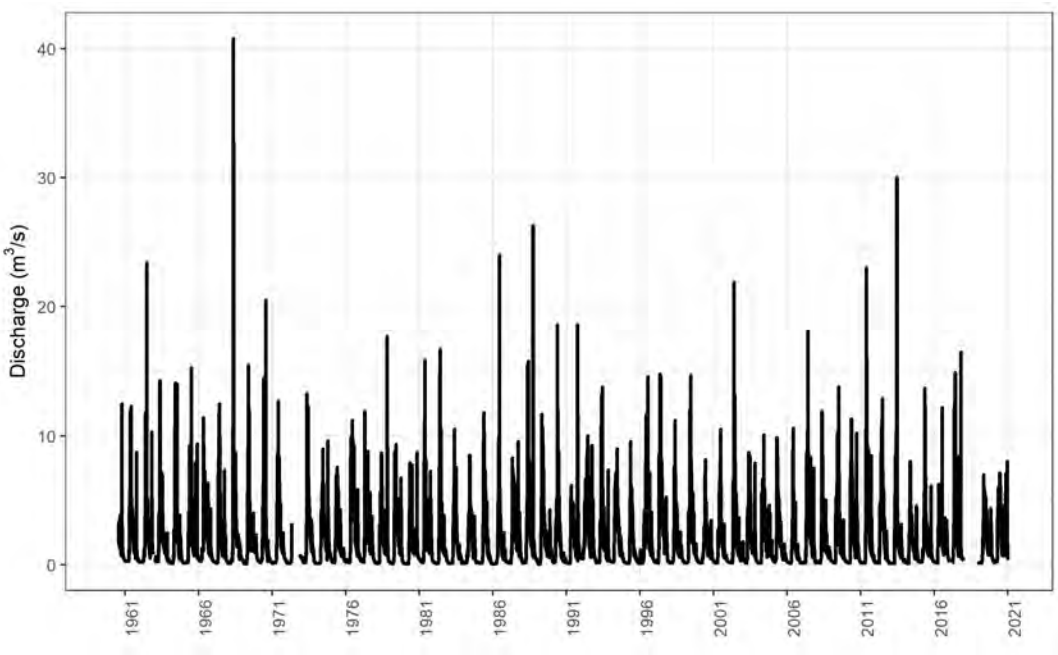
| Station ID | Station Name | Longitude [°] | Latitude [°] | Area [km$^2$] | First Year | Last Year |
|---|---|---|---|---|---|---|
| 08EE008 | Goathorn Creek near Telkwa | 54.65 | -127.12 | 125 | 1960 | 2020[1] |
| 08EE020 | Telkwa River below Tsai Creek | 54.61 | -127.50 | 367 | 1975 | 2020 |
| 08EE004 | Bulkley River at Quick | 54.62 | -126.90 | 7,340 | 1930 | 2020 |
| 08EE005 | Bulkley River near Smithers | 54.77 | -127.13 | 8,940 | 1945 | 2020 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.002 2017-18 permitting Support (Phase 2)\0200_SurfaceWater\Hydrology\R files\Flows_update_rev02.Rmd

**Notes:**

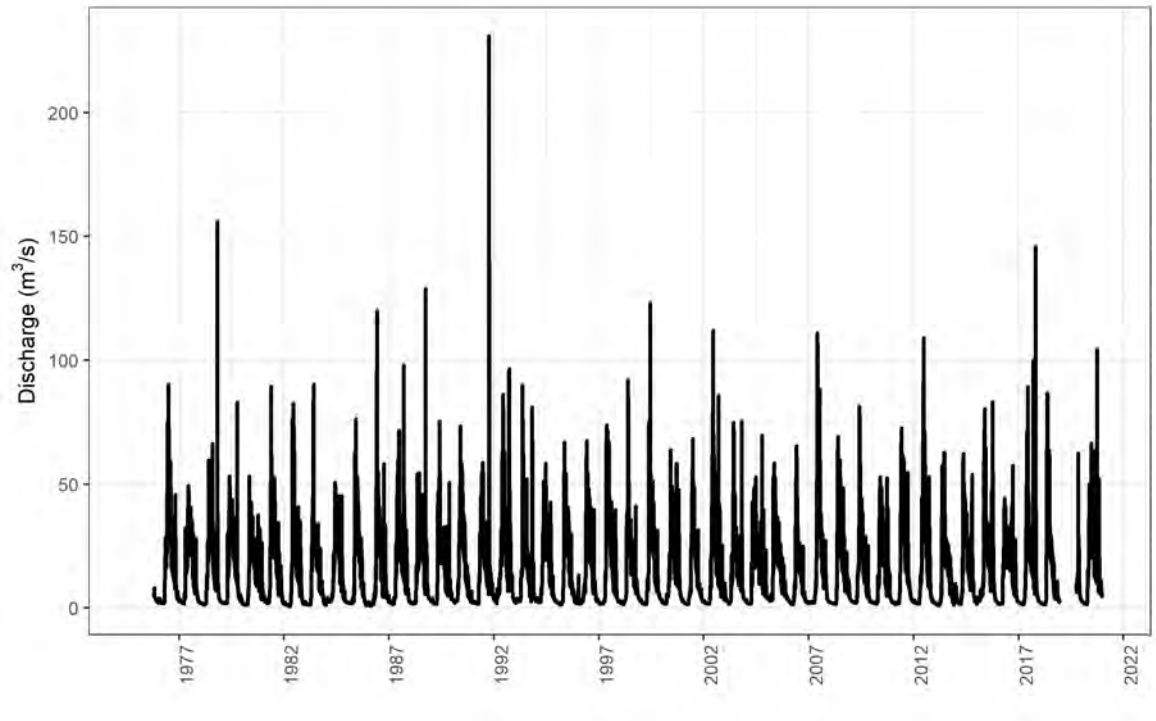
1. Goathorn Creek near Telkwa (08EE008) was decommissioned in January 2018 and re-installed in October 2019.

Discharge from all four Water Survey of Canada regional stations (Table 3-2) followed a nival regime with an initial increase in discharge observed in April followed by annual maximum in response to snowmelt during May. Discharge responded to rainfall events throughout the summer and a recession to annual low flows was observable in the late fall and winter. The time series of each regional hydrometric station are shown in Figure 3-3, Figure 3-4 , Figure 3-5, Figure 3-6.



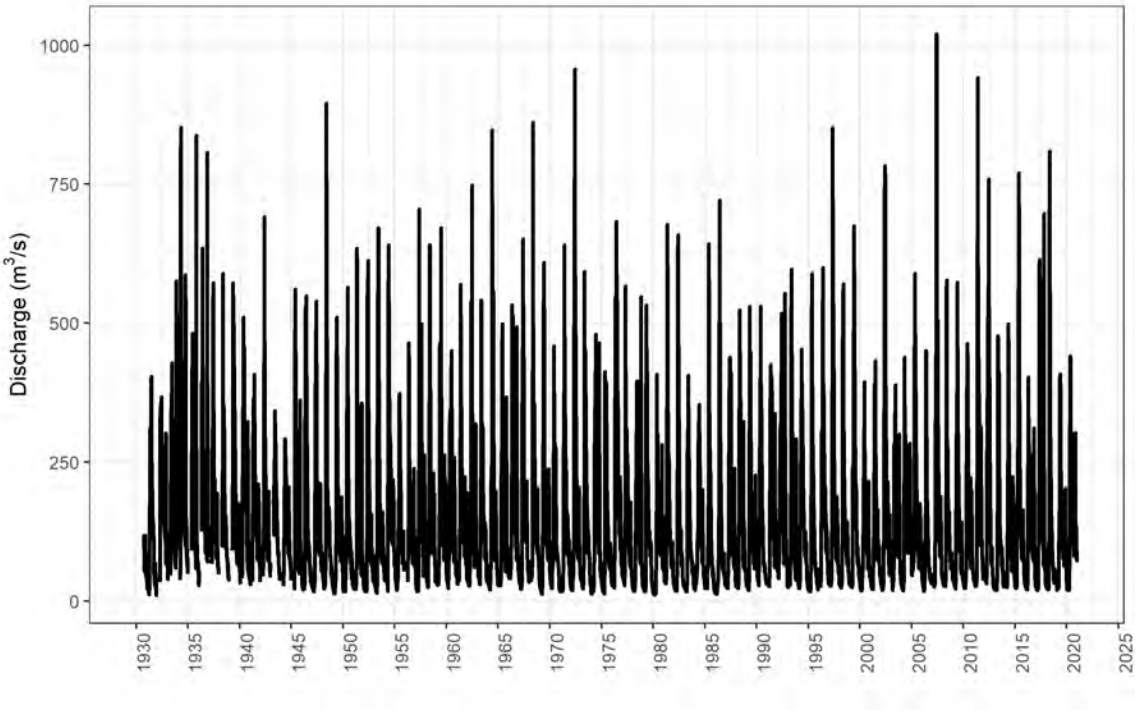

Source: Compiled in R \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\RegionalFlows\Telkwa_flows_1CT027003_Plots_njs.R

**Figure 3-3: Goathorn Creek Near Telkwa (08EE008) Discharge data from 1960-2020.**



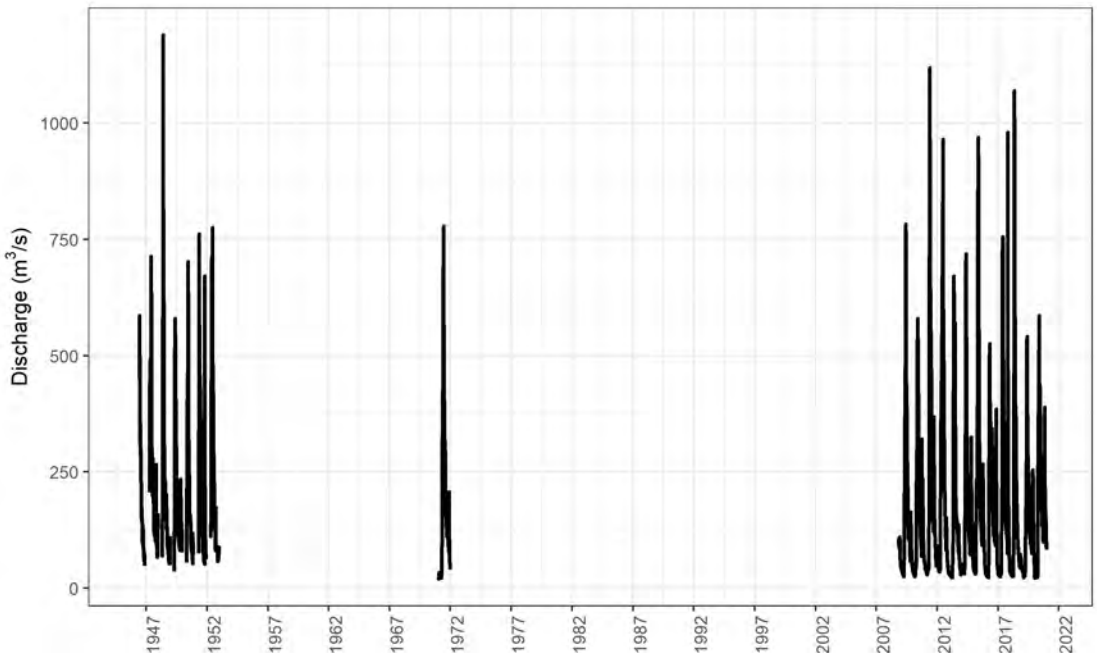

Source: Compiled in R \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\RegionalFlows\Telkwa_flows_1CT027003_Plots_njs.R

**Figure 3-4: Telkwa River Below Tsai Creek (08EE020) Discharge from 1975-2020**




Source: Compiled in R \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\RegionalFlows\Telkwa_flows_1CT027003_Plots_njs.R

**Figure 3-5: Bulkley River At Quick (08EE004) Discharge for 1930-2020**




Source: Compiled in R \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\RegionalFlows\Telkwa_flows_1CT027003_Plots_njs.R

**Figure 3-6: Bulkley River Near Smithers (08EE005) Discharge for 1945-2020**

## 3.3 Summary of Available Data

### 3.3.1 Project Hydrometric Monitoring Data

#### Discharge

Historical discharge data for 1997-1998 will not be presented in this section but is summarized in Attachment C. Continuous discharge was generated from water level measurements and rating curves developed for each Project Area hydrometric station for the open water period. Unit discharge values are presented for each station in Table 3-4 and were calculated by dividing monthly average flow by the associated catchment area (Table 3-1).

**Table 3-3: Average Monthly Discharge for the Open-Water Period ($m^3/s$)**

| Station Name | Year | April [1] | May[1] | June | July | Aug | Sept | October | November[1] |
|---|---|---|---|---|---|---|---|---|---|
| Telkwa-Hydro | 2017 | | 121.0* | 93.9 | 37.6 | 28.3 | 32.2 | 51.5 | 25.3* |
| | 2018 | | 135.5 | 66.1 | 34.7 | 22.3 | 21.7* | | |
| | 2019 | 16.1* | 84.9 | 56.1 | 36.3 | 23.2 | 18.8 | 16.5 | 20.5* |
| Tenas-Hydro | 2017 | | 4.0 | 2.4 | 0.5 | 0.2 | | | |
| Tenas-Hydro B | 2018 | | 4.2 | 1.2 | 0.5 | 0.1 | 0.1 | 0.1* | |
| | 2019 | 0.4* | 2.2 | 1.3 | 0.6 | 0.3 | 0.3 | 0.3 | 0.3* |
| | 2020 | | | | | | | | |
| | 2021 | | | | | | | | |
| | 2022 | | 2.0* | 3.3 | 1.2 | 0.3 | 0.1 | 0.1* | |
| Goathorn-Hydro | 2017 | | 7.3 | 5.1 | 2.0 | 1.1 | 1.6 | 6.0 | |
| | 2018 | | 8.7 | 3.7 | 2.2 | 1.1 | 1.0 | | |
| | 2019 | 1.3 | 4.6 | 3.3 | 3.4 | 1.3 | 1.3 | 1.1 | 1.2 |
| Four-Hydro | 2020 | 0.321* | 0.122 | 0.030 | 0.009 | 0.008 | 0.011 | 0.025 | |
| | 2021 | | | | | | | | |
| | 2022 | 0.129* | 0.261 | 0.122 | 0.039 | 0.006 | 0.003 | 0.002* | |

Source: \\srk.ad\dfs\na\van\Projects \01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_summaries\Telkwa_1CT027.003_FlowSummaries_Collated_njs_cog.xlsx

**Notes:**

1. Measurements in April, May and November were conducted on differing days per month between years and stations.
2. Light grey denotes no measurements.
3. Months with less than 20 measurements are marked with *

**Table 3-4: Average Monthly Unit Discharge (L/s/km$^2$) for the Open-Water Period**

| Station Name | Catchment Area (km$^2$) | Year | April | May | June | July | Aug | Sept | October | November |
|---|---|---|---|---|---|---|---|---|---|---|
| Telkwa-Hydro | 966.9 | 2017 | | 121.4* | 94.2 | 37.8 | 28.4 | 32.3 | 51.6 | 25.4* |
| | | 2018 | | 135.9 | 66.3 | 34.8 | 22.4 | 21.7* | | |
| | | 2019 | 16.1* | 85.1 | 56.3 | 36.4 | 23.3 | 18.8 | 16.5 | 20.5* |
| Tenas-Hydro | 47.6 | 2017 | | 84.2 | 49.7 | 11.3 | 5.2 | | | |
| Tenas-Hydro B | 46.75 | 2018 | | 89.7 | 25.7 | 10.0 | 2.9 | 1.9 | 2.7* | |
| | | 2019 | 8.8* | 46.5 | 26.9 | 13.1 | 5.5 | 5.3 | 6.1 | 7.1* |
| | | 2020 | | | | | | | | |
| | | 2021 | | | | | | | | |
| | | 2022 | | 43.6* | 71.5 | 26.5 | 6.4 | 3.1 | 2.1* | |
| Goathorn-Hydro | 123.5 | 2017 | | 59.0 | 41.3 | 16.3 | 8.5 | 12.6 | 48.4 | |
| | | 2018 | | 70.4 | 30.0 | 17.5 | 8.7 | 8.0 | | |
| | | 2019 | 10.8 | 37.2 | 26.9 | 27.3 | 10.5 | 10.3 | 9.0 | 9.9 |
| Four-Hydro | 11.0 | 2020 | 29.2* | 11.1 | 2.7 | 0.8 | 0.7 | 1.0 | 2.3 | |
| | | 2021 | | | | | | | | |
| | | 2022 | 11.7* | 23.7 | 11.1 | 3.6 | 0.6 | 0.3 | 0.2* | |

*Light grey denotes no measurements.

Source: \\srk.ad\dfs\na\van\Projects \01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_summaries\Telkwa_1CT027.003_FlowSummaries_Collated_njs_cog.xlsx

**Notes:**
1. Light grey denotes no measurements.
2. Months with less than 20 measurements are marked with *

### Low Flows

Low flows are critically important parameters due to their low dilution capacity as well the implications for biological organisms. Low flow statistics are based on available records to estimate the lowest flow within a watercourse over some period of time. Low flow statistics are expressed as an averaging period (e.g., 7 day average) over a recurrence interval where 10 years is common for hydrologically-based flows (7Q10). A low flow calculation requires several years of record as a distribution model (i.e, Log Pearson Type III) is applied to the collected lowest flow event from each year of record. The short length of the Project Area hydrometric records does not allow for a 7Q10 calculation. Low flows were therefore conservatively estimated as the minimum daily average flow for each month for each station (Table 3-5).

Low flow data for Four-Hydro was limited to the open water season in 2020 with additional low flow measurements captured on 24-25 February 2021 at three locations along Four Creek. The low flows measurements were 0.008 m$^3$/s at Four-Hydro with 0.006 m$^3$/s (E 619344, N 6052005) and 0.007 m$^3$/s (E 619269, N 6051447) at separate locations. Historical spot measurements and continuous discharge records were consulted and revealed no reliable low flow measurements of as stated in AGRA (1999) in Attachment A.

**Table 3-5: Minimum Instantaneous Discharge ($m^3/s$)**

| Station Name | Year | Jan | Feb | Mar | April | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Telkwa-Hydro | 2017 | | | | | 61.8 | 56.1 | 21.8 | 16.6 | 14.6 | 14.8 | 9.8 | 7.5 | 7.5 |
| | 2018 | 6.5 | 2.5 | 1.7 | | 45.0 | 32.5 | 22.4 | 15.3 | 5.6 | 7.7 | 5.9 | 4.1 | 1.7 |
| | 2019 | 3.2 | 3.4 | 2.4 | 13.1 | 14.6 | 29.3 | 18.9 | 14.2 | 12.7 | 12.8 | 13.0 | | 2.4 |
| Tenas-Hydro | 2017 | | | | | 2.4 | 0.8 | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 |
| Tenas-Hydro B | 2018 | 0.1 | 0.1 | 0.1 | 1.4 | 0.6 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | 2019 | 0.1 | 0.0 | 0.0 | 0.3 | 0.5 | 0.6 | 0.4 | 0.1 | 0.1 | 0.2 | 0.3 | | 0.0 |
| | 2020 | | | | | | | | | | | | | |
| | 2021 | | | | | | | | | | | | | |
| | 2022 | | | | 1.0 | 1.9 | 0.5 | 0.2 | 0.1 | 0.1 | | | | |
| Goathorn-Hydro | 2017 | | | | | 4.7 | 2.7 | 1.2 | 0.8 | 0.8 | 0.7 | 0.7 | 0.5 | 0.5 |
| | 2018 | | | | | 2.7 | 2.1 | 1.3 | 0.9 | 0.9 | 0.7 | 0.3 | 0.2 | 0.2 |
| | 2019 | 0.2 | 0.2 | 0.1 | 1.1 | 1.2 | 1.7 | 1.9 | 0.7 | 0.6 | 0.7 | 1.0 | | 0.1 |
| Four-Hydro | 2020 | | | | | 0.03 | 0.01 | 0.002 | 0.002 | 0.004 | 0.02[1] | 0.06[2] | 0.06[2] | |
| | 2021 | | 0.008[2] | | | | | | | | | | | |
| | 2022 | | | | 0.035[1] | 0.207 | 0.042 | 0.008 | 0.002 | 0.002 | 0.001[1] | | | |

Source: \\srk.ad\dfs\na\van\Projects \01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_summaries\Telkwa_1CT027.003_FlowSummaries_Collated_njs_cog.xlsx

**Notes:**
[1]Incomplete month.

[2]Single measurement.

*Light grey denotes no measurements.

### 3.3.2 Regional Hydrometric Records

#### Discharge

Discharge data from Water Survey of Canada compiled for each station was summarized as average monthly and annual discharge for the four regional hydrometric stations (Table 3-6).

**Table 3-6: Average Monthly and Mean Annual Discharge ($m^3/s$)**

| Station Name | Year | Jan | Feb | Mar | April | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goathorn Creek near Telkwa (08EE008) | 1960-2020 | 0.2 | 0.2 | 0.2 | 1.2 | 5.0 | 5.3 | 3.2 | 1.7 | 1.3 | 1.4 | 0.9 | 0.4 | 1.8 |
| Telkwa River below Tsai Creek (08EE020) | 1975-2020 | 2.6 | 2.1 | 2.1 | 5.3 | 27.2 | 40.7 | 30.9 | 21.4 | 15.6 | 12.8 | 7.2 | 3.5 | 14.3 |
| Bulkley River at Quick (08EE004) | 1930-2020 | 38.3 | 31.1 | 29.2 | 87.6 | 315.5 | 365.1 | 230.2 | 142.4 | 101.4 | 110.0 | 102.7 | 59.3 | 139.2 |
| Bulkley River near Smithers (08EE005) | 1946-2020 | 37.3 | 31.2 | 35.7 | 134.7 | 447.4 | 455.2 | 265.5 | 158.1 | 118.7 | 126.9 | 115.5 | 64.8 | 179.8 |

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\RegionalFlows\Telkwa_1CT027.003_WSC_FlowSummaries_20201130_njs.xlsx

### Unit Discharge

The monthly average discharge for each regional station was converted to unit discharge, which normalizes discharge per unit area of the catchment (Table 3-7).

**Table 3-7: Average Monthly and Annual Unit Discharge ($L/s/km^2$)**

| Station Name | Years of Record | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goathorn Creek near Telkwa (08EE008) | 1960-2020 | 1.8 | 1.5 | 1.6 | 9.3 | 40.3 | 42.0 | 25.9 | 13.9 | 10.3 | 11.2 | 7.5 | 3.1 | 14.1 |
| Telkwa River below Tsai Creek (08EE020) | 1975-2020 | 7.1 | 5.8 | 5.7 | 14.5 | 74.0 | 110.8 | 84.3 | 58.2 | 42.5 | 35.0 | 19.7 | 9.4 | 38.9 |
| Bulkley River at Quick (08EE004) | 1930-2020 | 5.2 | 4.2 | 4.0 | 11.9 | 43.0 | 49.7 | 31.4 | 19.4 | 13.8 | 15.0 | 14.0 | 8.1 | 19.0 |
| Bulkley River near Smithers (08EE005) | 1946-2020 | 4.2 | 3.5 | 4.0 | 15.1 | 50.0 | 50.9 | 29.7 | 17.7 | 13.3 | 14.2 | 12.9 | 7.2 | 20.1 |

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\RegionalFlows\Telkwa_1CT027.003_WSC_FlowSummaries_20201130_njs.xlsx

### Lowest 7-Day Average Flow (7Q10)

For the regional records, the 7-day average flow that occurred (on average) once every 10 years was calculated for each regional hydrometric station (Table 3-8).

**Table 3-8: 7Q10 Values for Regional Stations ($m^3/s$)**

| Station Name | Jan | Feb | Mar | April | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goathorn Creek near Telkwa (08EE008) | 0.1 | 0.1 | 0.1 | 0.1 | 1.0 | 2.1 | 1.2 | 0.7 | 0.5 | 0.4 | 0.2 | 0.1 | 0.1 |
| Telkwa River below Tsai Creek (08EE020) | 1.6 | 1.4 | 1.2 | 1.4 | 4.9 | 19.7 | 17.4 | 11.6 | 5.9 | 4.2 | 2.3 | 1.7 | 1.2 |
| Bulkley River at Quick (08EE004) | 19.1 | 17.2 | 16.2 | 18.2 | 77.0 | 196.9 | 127.9 | 84.6 | 59.3 | 48.8 | 36.4 | 24.7 | 15.1 |
| Bulkley River near Smithers (08EE005) | 26.1 | 23.5 | 22.4 | 23.7 | 129.8 | 214.2 | 141.4 | 90.0 | 65.2 | 50.2 | 39.5 | 30.5 | 22.9 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Flows_update_rev09.Rmd

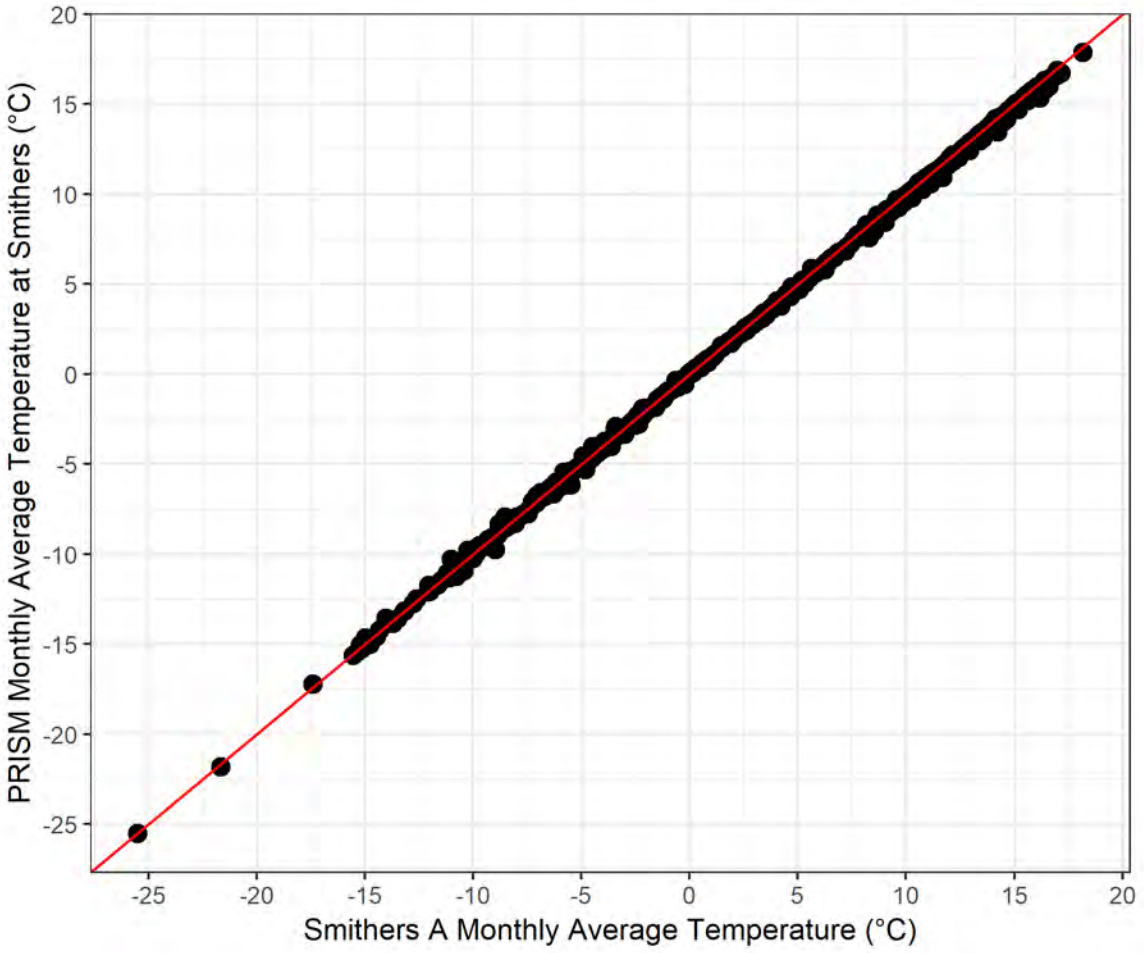
# 4 Derived Project Parameters

## 4.1 Derived Meteorological Parameters

Due the the relatively short record of Tenas Deposit Station data, meteorological parameters for the Project are derived by adjusting the patched long-term datasets at Stewart Airport to the site, based on spatial and orographic gradients. Adjustment factors are derived based on trends in regional stations, or when these are not adequate, reanalysis datasets, as described in the following sections.

### 4.1.1 Air Temperature

Historical Smithers Airport monthly temperatures were compared to the reanalysis datasets for the same location. Of the reanalysis datasets investigated, the PRISM model was determined to provide the best fit for precipitation as described in Section 4.1.2. Figure 4-1 illustrates the monthly temperature regression between measured and modelled PRISM temperatures at the Smithers Airport Station. Given the good correlation, PRISM data for the Project at the Tenas Deposit Station was obtained and monthly correction factors relative to the Smithers Airport station were developed to account for orographic gradients and temperature inversion effects (Table 4-1).




Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Temperature_1CT027.003_rev01.Rmd

**Figure 4-1: Smithers Airport vs PRISM Reanalysis**

### Correction Factors and Expected Project Air Temperature

The correction factors presented in Table 4-1 were applied to the patched Smithers Airport Station temperature record to create a Project-adjusted long-term temperature record for design and modelling.

**Table 4-1: Temperature Correction Factors**

| Month | Minimum Temperature | | | Average Temperature | | | Maximum Temperature | | |
|---|---|---|---|---|---|---|---|---|---|
| | Smithers Airport (°C) | PRISM at Project (°C) | Absolute Temp. Ratio | Smithers Airport (°C) | PRISM at Project (°C) | Absolute Temp. Ratio | Smithers Airport (°C) | PRISM at Project (°C) | Absolute Temp. Ratio |
| January | -13.6 | -13.5 | 1.000 | -9.5 | -9.9 | 0.998 | -5.5 | -6.3 | 0.997 |
| February | -9.5 | -10.2 | 0.997 | -4.9 | -6.0 | 0.996 | -0.2 | -1.7 | 0.994 |
| March | -5.9 | -7.6 | 0.993 | -0.7 | -2.8 | 0.992 | 4.5 | 2.0 | 0.991 |
| April | -1.6 | -3.3 | 0.994 | 4.3 | 1.9 | 0.991 | 10.1 | 7.1 | 0.989 |
| May | 2.5 | 0.3 | 0.992 | 8.9 | 6.3 | 0.991 | 15.4 | 12.3 | 0.989 |
| June | 6.0 | 4.4 | 0.994 | 12.5 | 10.4 | 0.992 | 19.0 | 16.3 | 0.991 |
| July | 8.1 | 6.5 | 0.994 | 14.7 | 12.6 | 0.993 | 21.1 | 18.6 | 0.991 |
| August | 7.5 | 6.1 | 0.995 | 14.1 | 12.1 | 0.993 | 20.6 | 18.1 | 0.991 |
| September | 3.9 | 2.9 | 0.996 | 9.8 | 8.1 | 0.994 | 15.7 | 13.4 | 0.992 |
| October | 0.1 | -1.6 | 0.994 | 4.4 | 2.4 | 0.993 | 8.7 | 6.4 | 0.992 |
| November | -5.6 | -7.2 | 0.994 | -2.5 | -4.1 | 0.994 | 0.7 | -1.1 | 0.994 |
| December | -10.8 | -11.2 | 0.998 | -7.2 | -7.9 | 0.998 | -3.7 | -4.5 | 0.997 |

Source compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Temperature_1CT027.003_rev01.Rmd

Table 4-2 summarizes the expected monthly air temperatures at the Project and Figure 4-2 illustrates the modelled average monthly temperature compared to measured temperature at the Tenas Deposit Station.

**Table 4-2: Expected Project Temperature Summary [°C] From Derived Long-term Time Series**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | -5.8 | -1.8 | 2.2 | 7.4 | 12.9 | 16.5 | 19.0 | 18.6 | 13.7 | 6.5 | -0.8 | -4.6 | 7.0 |
| Average | -9.2 | -6.1 | -2.7 | 2.1 | 6.8 | 10.7 | 13.0 | 12.5 | 8.4 | 2.6 | -3.8 | -7.9 | 2.2 |
| Minimum | -12.6 | -10.4 | -7.5 | -3.1 | 0.8 | 4.7 | 6.9 | 6.4 | 3.1 | -1.4 | -6.8 | -11.2 | -2.6 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Temperature_1CT027.003_rev01.Rmd

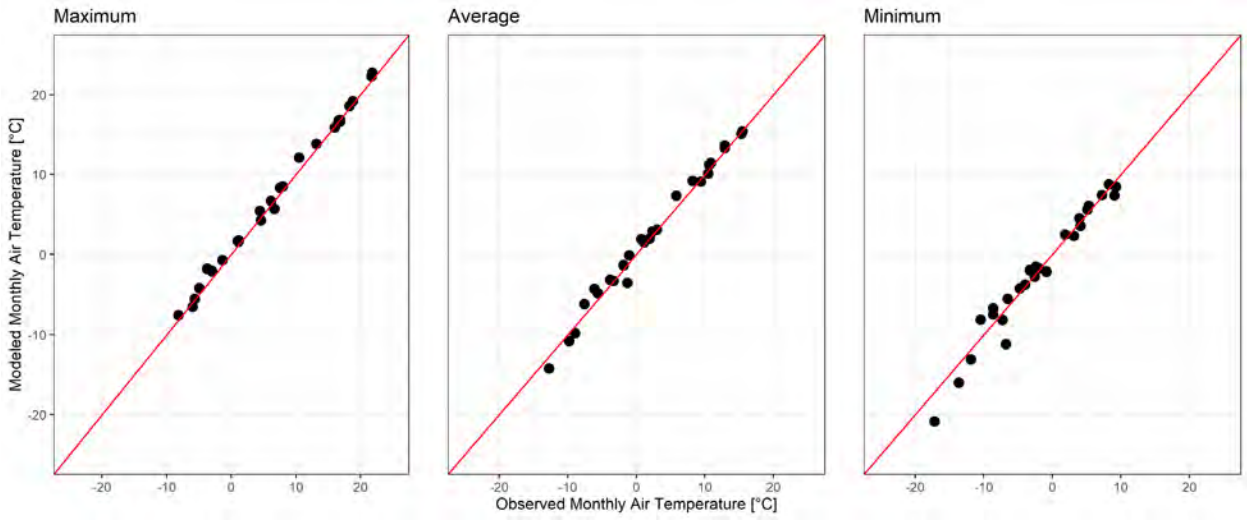



**Figure 4-2: Comparison between Observed and Modelled Monthly Average Temperatures for October 2017 to December 2019**

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Temperature_1CT027.003_rev01.Rmd

### 4.1.2 Precipitation

Figure 4-3 illustrates the monthly precipitation correlation between the 26 months of measured Project precipitation and patched precipitation records at Smithers for the overlapping period from September 2017 to December 2019. The total measured precipitation at the Tenas Deposit Station was approximately 34% greater than that at Stewart A over this period. The monthly precipitation difference ranged between -15 mm to +91 mm for Project data over the 59 months and suggests monthly correction factors are more appropriate to account for seasonality.

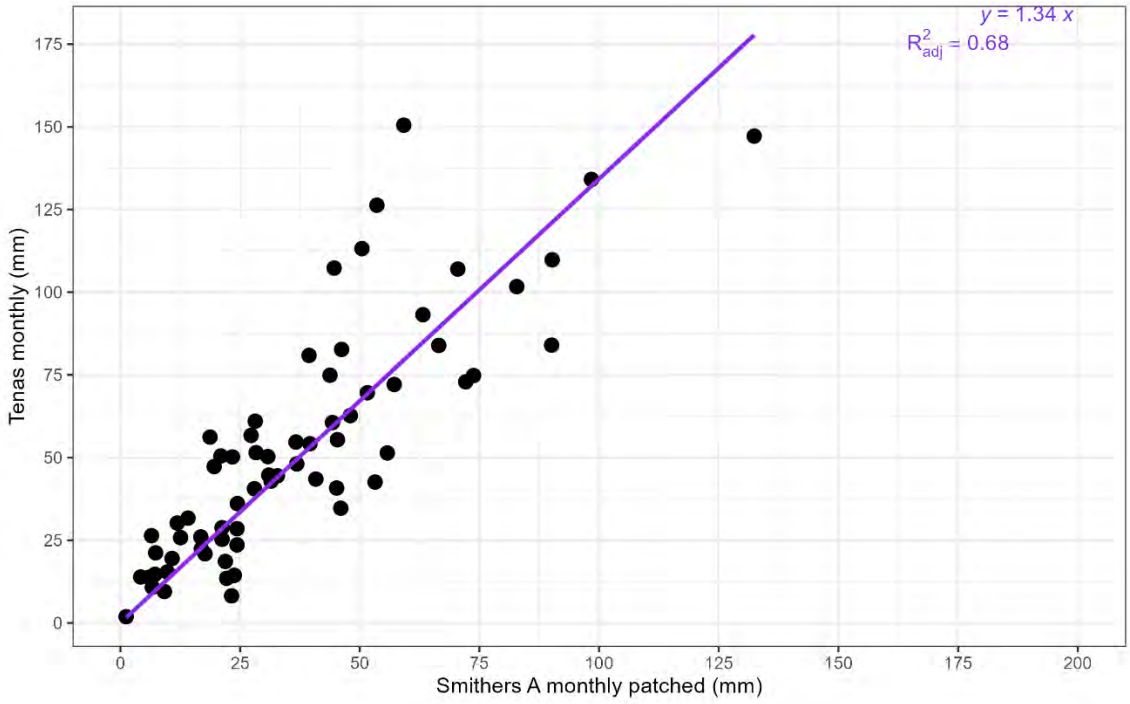



**Figure 4-3: Comparison between Observed Total Precipitation at Tenas Deposit Station and Smithers A**

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\graphs\Site_Smithers_Precipitation.png

Typically, precipitation depths are expected to be greater at higher elevations. However, as previously demonstrated in Figure 2-10, there is a poor regional correlation between mean annual precipitation and elevation at the regional stations. Therefore, Reanalysis datasets were evaluated against the patched Smithers A record to develop transposition factors to adjust the longer-term dataset to site (Table 4-3).

**Table 4-3: Smithers A and Reanalysis Mean Monthly and Annual Precipitation Comparison [mm]**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Smithers A (patched) | 51 | 28 | 22 | 22 | 35 | 46 | 45 | 41 | 51 | 62 | 54 | 50 | 508 |
| ERA 5 | 62 | 41 | 45 | 45 | 59 | 79 | 70 | 65 | 69 | 86 | 79 | 59 | 760 |
| Merra 2 | 92 | 60 | 76 | 60 | 72 | 101 | 97 | 94 | 94 | 117 | 105 | 92 | 1059 |
| PRISM | 48 | 23 | 24 | 24 | 34 | 55 | 46 | 46 | 49 | 66 | 54 | 49 | 517 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Precipitation_1CT027.003_rev01.Rmd

The PRISM reanalysis data was found to best represent the spatial precipitation distribution across elevations. The PRISM mean annual precipitation for the region surrounding the Project, shown in Figure 4-4, demonstrates the spatial and orographic variability of precipitation in the region.

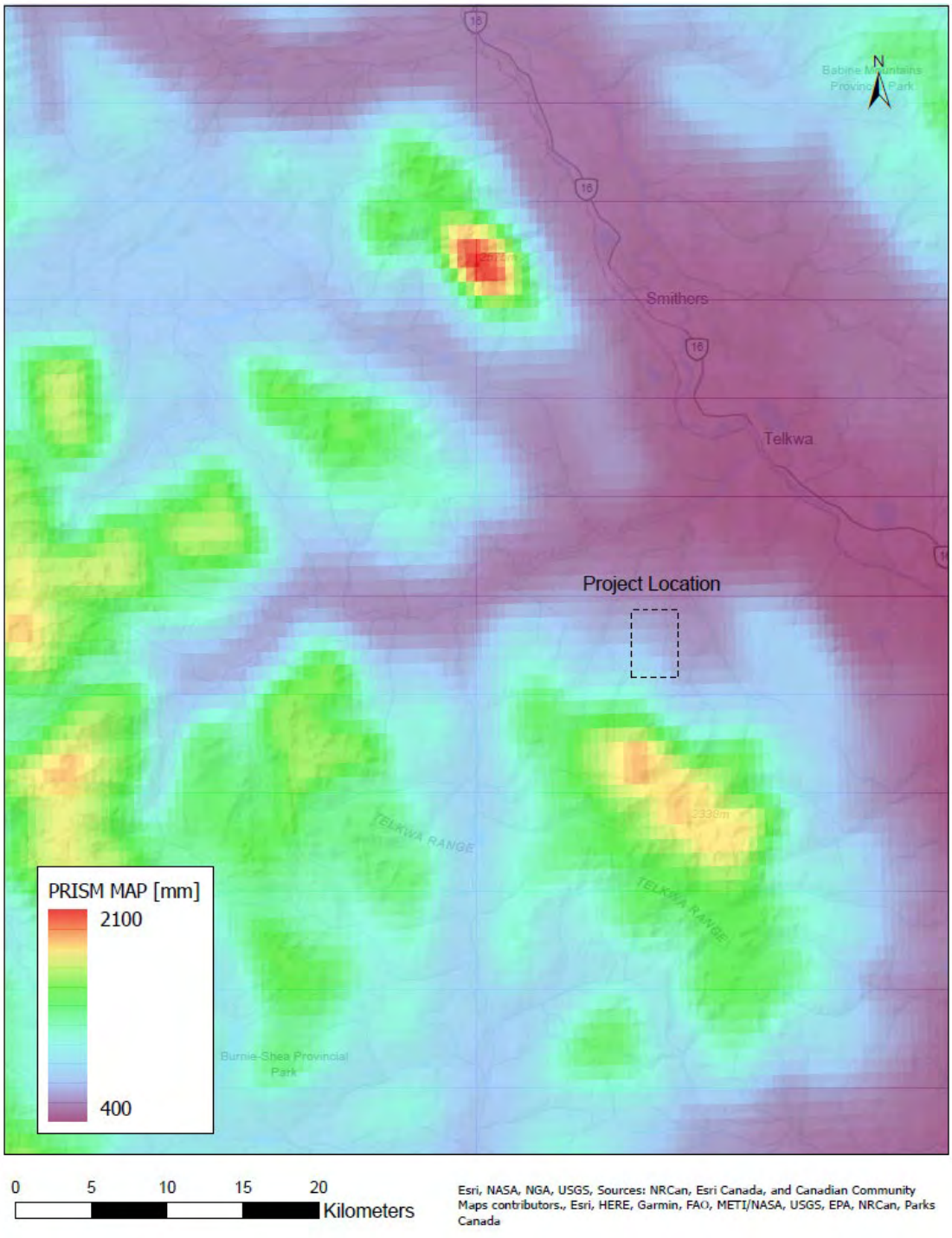



**Figure 4-4: PRISM Mean Annual Precipitation in the project Area**

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\!080_Deliverables\Hydromet Baseline Update\040_Figures\Figure4.4_PRISM_MAP.pdf

#### 4.1.2.1 Correction Factors and Expected Project Precipitation

The Smithers A station record was gap-filled using the Smithers Airport Auto station. The Smithers A station was subsequently gap-filled using the Quick station and then a quantile-

mapped ERA5 reanalysis product for the Smithers A location to generate a complete time series spanning 1946-2023. The 2017-2022 Tenas Deposit station records were assessed in relation to regional station records on a monthly and daily basis. This assessment was done for hourly, daily, and monthly precipitation totals as well as seasonally by lumping multiple months together. Ultimately, the gap-filled regional time series at Smithers A was adjusted to the Project area using the linear regression provided in Figure 4-3 developed from the monthly precipitation totals (R2 of 0.71). No bias correction was undertaken to avoid overfitting the data due to the length of the overlapping period.

Table 4-6 summarizes expected average monthly precipitation at the Project based on the modelled time series. The mean annual precipitation (MAP) is estimated to be 608 mm which is approximately 19% greater than average precipitation recorded in the valley at the Smithers Airport station.

**Table 4-4: Total Precipitation Measured at Tenas Deposit Station and Final EAC Project Case (2024) Synthetic Precipitation Time Series**

| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | Total Measured Precipitation [mm] | M | M | M | M | M | M | M | M | M | 147 | 134 | 10 | 291[1] |
| | Total Modelled Precipitation [mm] | - | - | - | - | - | - | - | - | - | 178 | 132 | 12 | 321[1] |
| 2018 | Total Measured Precipitation [mm] | 50 | 150 | 81 | 14 | 14 | 42 | 50 | 2 | 50 | 54 | 51 | 113 | 672 |
| | Total Modelled Precipitation [mm] | 41 | 79 | 53 | 7 | 32 | 71 | 28 | 2 | 31 | 53 | 75 | 67 | 540 |
| 2019 | Total Measured Precipitation [mm] | 60 | 19 | 8 | 13 | 26 | 57 | 83 | 21 | 47 | 93 | 73 | 22 | 522 |
| | Total Modelled Precipitation [mm] | 59 | 29 | 31 | 30 | 19 | 37 | 62 | 24 | 26 | 85 | 96 | 23 | 520 |
| 2020 | Total Measured Precipitation [mm] | 126 | 26 | 30 | 14 | 25 | 63 | 35 | 84 | 55 | 84 | 107 | M | 647[1] |
| | Total Modelled Precipitation [mm] | 72 | 22 | 16 | 9 | 28 | 64 | 62 | 121 | 61 | 89 | 60 | - | 603[1] |
| 2021 | Total Measured Precipitation [mm] | M | M | 12 | 14 | 56 | 51 | 61 | 24 | 75 | 31 | 107 | 29 | 460[1] |
| | Total Modelled Precipitation [mm] | - | - | 33 | 6 | 25 | 38 | 38 | 33 | 99 | 23 | 94 | 28 | 416[1] |

| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2022 | Total Measured Precipitation [mm] | 17 | 55 | 21 | 28 | 48 | 75 | 41 | 41 | 11 | M | M | M | 337[1] |
| | Total Modelled Precipitation [mm] | 55 | 49 | 10 | 33 | 49 | 59 | 61 | 37 | 9 | - | - | - | 361[1] |

**Notes:**
M denotes a month with greater than 10 (typically 20-25) days of missing data. – indicates that the synthetic data was removed over this period for meaningful comparison with measured Tenas Deposit data.

[1] Indicates that calculated annual total precipitation is for a partial year as one or more months had >10 days of missing data.

Source: compiled in text from \NA CAPR002055 Telkwa Project General EA Support - Internal\Surface Water IR Responses\Updated Responses_20230906\1CT027.003_Telkwa_ITT_SW_IRs_Round2_WaterBalanceOnly_20240603_njs_ccm df.docx

Finally, PRISM correction factors were applied to account for the elevation distribution across the Project Area. The correction factors are presented in section 4.2.5.

**Table 4-5: Project Precipitation Summary [mm]**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rainfall | 8.0 | 9.7 | 10.4 | 21.5 | 35.9 | 45.7 | 48.1 | 43.1 | 50.8 | 58.6 | 20.0 | 8.0 | 359.9 |
| Snowfall | 61.8 | 35.9 | 22.0 | 4.9 | 0.7 | 0.0 | 0.0 | 0.0 | 0.3 | 13.6 | 49.4 | 59.7 | 248.1 |
| Total | 69.7 | 45.6 | 32.4 | 26.4 | 36.6 | 45.7 | 48.1 | 43.1 | 51.1 | 72.2 | 69.4 | 67.7 | 608.0 |

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_hydrology_summary.csv

Figure 4-5 illustrates the average monthly precipitation as rain and snow. Precipitation typically falls as snow during the months of November to March. Annually, the average snowfall (314 mm) is approximately 50% of mean annual precipitation.

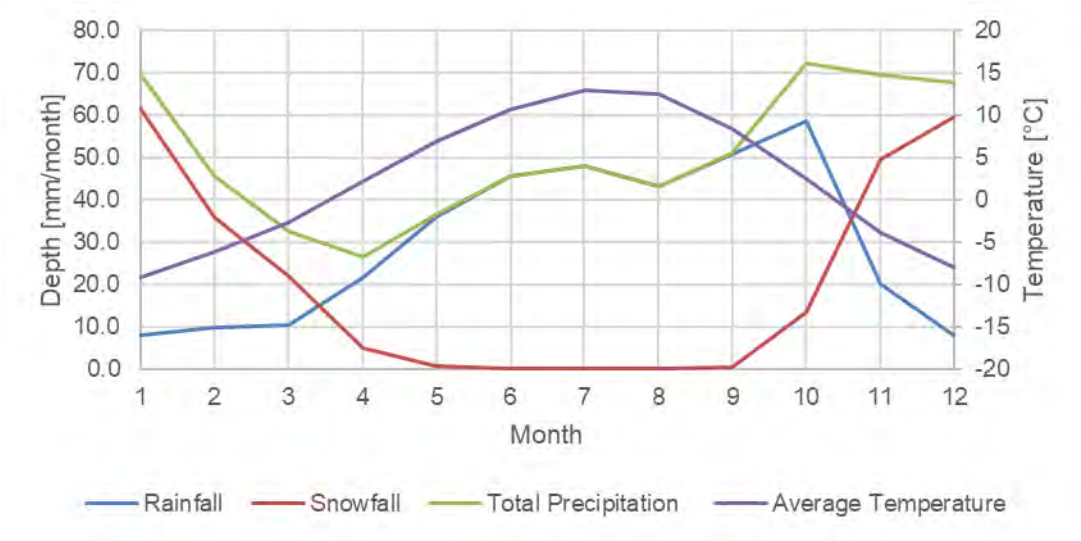



**Figure 4-5: Monthly Precipitation as Snow and Rain**

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Precipitation_1CT027.003_rev02.Rmd

#### 4.1.2.2 Extreme Precipitation

**Annual Frequency Analysis**

A frequency analysis was performed using annual precipitation estimates derived from the long-term Project precipitation time series, developed using adjustments to Smithers Airport Station. The frequency analysis tested a range of probability distributions and found that a three-parameter log normal distribution provides the best fit to the long-term annual precipitation data for the Project.

The results of the annual frequency precipitation analysis are presented in Table 4-6 for extreme conditions ranging from a 1,000-year dry to a 1,000-year wet return periods.

**Table 4-6: Annual Precipitation Frequency Analysis**

| Hydrological Condition | Return Period [years] | Annual Precipitation [mm] |
|---|---|---|
| Wet | 1000 | 960 |
| | 500 | 937 |
| | 200 | 906 |
| | 100 | 880 |
| | 50 | 852 |
| | 25 | 823 |
| | 20 | 813 |
| | 10 | 780 |
| | 5 | 742 |
| Mean Annual Precipitation (MAP) | | 664 |
| Dry | 5 | 592 |
| | 10 | 542 |
| | 20 | 493 |
| | 25 | 477 |
| | 50 | 427 |
| | 100 | 375 |
| | 200 | 320 |
| | 500 | 243 |
| | 1000 | 181 |

Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### Extreme Precipitation

The annual maximum daily and 3-day precipitation depths were calculated following the Regional Frequency Analysis framework proposed by Hosking & Wallis (1997). This is a refined approach compared to local frequency analysis (one station) aimed to increase the accuracy of low probability events (e.g., 1,000-year precipitation), fundamental for engineering design and risk assessment. The RFA considered as homogeneous group the following stations:

Within the RFA framework, a range of probability distributions were tested and it was found that a Generalized Extreme Value distribution provided the best fit to both the 24-hour and 72-hour datasets.

Annual maximum 1-day and 3-day precipitations were converted to maximum 24-hour and 72-hour precipitation using a factor of 1.13 and 1.04, respectively (WMO, 2009).

Table 4-7 presents the 24-hour and 72-hour precipitation depths for a range of return periods based on the RFA of the long-term Project precipitation record.

**Table 4-7: Extreme Project Precipitation for 24-hour and 72-hour Events**

| Return Period | 24-hour Precipitation [mm] | 72-hour Precipitation [mm] |
|---|---|---|
| 2 | 42.0 | 56.7 |
| 5 | 56.1 | 75.6 |
| 10 | 66.3 | 89.3 |
| 25 | 80.2 | 108.1 |
| 50 | 91.3 | 123.0 |
| 100 | 103.1 | 138.9 |
| 200 | 115.6 | 155.7 |
| 500 | 133.3 | 179.6 |
| 1000 | 147.7 | 199.1 |

Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

For durations less than 24-hours, the depth-duration-frequency curve data from the Smithers Airport station were obtained and modified to account for the 24-hour results presented in Table 4-7. Sub-daily annual maximum records from Smithers A stations were obtained from the IDF_CC Tool (Version 7.5). An IDF based on GEV distribution (Koutsoyiannis, Kozonis, & Manetas, 1998) was fitted to these records with the same shape parameter estimated in the regional approach described above for consistency. Frequency and duration factors were calculated based on the 24-hour precipitation depths for Smithers Airport, and were applied to the Project 24-hour depths presented in Table 4-7. Table 4-8 summarizes the baseline depth-duration-frequency curve for the Project.

**Table 4-8: Project Baseline Precipitation-Duration-Frequency Curve**

| Storm Duration | | Precipitation (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Return Period (years) | | | | | | |
| min | hours | 2 | 5 | 10 | 25 | 50 | 100 | 200 |
| 5 | 0.08 | 3.6 | 4.9 | 5.8 | 7 | 7.9 | 8.9 | 10 |
| 10 | 0.17 | 4.9 | 6.6 | 7.8 | 9.4 | 10.7 | 12.1 | 13.5 |
| 15 | 0.25 | 5.9 | 7.8 | 9.2 | 11.2 | 12.7 | 14.4 | 16.1 |
| 30 | 0.5 | 7.9 | 10.6 | 12.5 | 15.1 | 17.2 | 19.4 | 21.7 |
| 60 | 1 | 10.7 | 14.2 | 16.8 | 20.3 | 23.2 | 26.1 | 29.3 |
| 120 | 2 | 14.4 | 19.2 | 22.7 | 27.4 | 31.2 | 35.3 | 39.5 |
| 360 | 6 | 23.1 | 30.9 | 36.4 | 44.1 | 50.2 | 56.7 | 63.5 |
| 720 | 12 | 31.2 | 41.6 | 49.2 | 59.5 | 67.7 | 76.4 | 85.7 |
| 1440 | 24 | 42 | 56.1 | 66.3 | 80.2 | 91.3 | 103.1 | 115.6 |
| 4320 | 72 | 56.7 | 75.6 | 89.3 | 108.1 | 123 | 138.9 | 155.7 |

Source: compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Probable Maximum Precipitation**

The probable maximum precipitation (PMP) was calculated using the Hershfield methodology (Hershfield 1965; WMO 2009), and the Project-adjusted precipitation record. The Canadian Dam Association Guidelines (2013) recommends evaluating two Probable Maximum Floods (PMF):

Summer/autumn PMF, which is generated by the summer/autumn PMP

Spring PMF is defined as the maximum of two cases:

1. PMF computed with Spring PMP and snow accumulation with frequency of 100 year (Rainfall Dominated)
2. PMF computed with the Probable Maximum Snow Accumulation (PMSA) and a rainstorm with a frequency of 100 year (Snowmelt Dominated)

Two separate PMFs are estimated for the Spring season as it is not reasonable to assume that the PMSA and a Spring PMP, which are two independent phenomena, would occur simultaneously.

Based on the typical hydrograph for the Project (see Section 3, snow at the Project is expected to be present until as late as June.

Table 4-9 presents the Spring and Summer/Autumn PMPs for the Project where Spring was defined as April to June and summer was defined as July through October.

**Table 4-9: Project 24-hour Probable Maximum Precipitation**

| Season | PMP (mm) |
|---|---|
| Spring | 234 |
| Summer/Autumn | 283 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\Rwork\Telkwa_EA_Precipitation_1CT027.003_rev01.Rmd

Results were verified using the British Columbia MetStorm Probable Maximum Precipitation webtool (DTN, 2020), which was developed in support of the BC Extreme Flood Project. This web-based tool provides an indication of potential precipititaion depths based on regionally available datasets at select points across the province. The maximum point PMP estimated from the webtool within the Project vicinity is 218 mm. The results in Table 4-9 are based on Project-specific precipitation datasets and present a more conservative PMP estimate. For this reason, the Project data were used for the purpose of infrastructure design.

### 4.1.3 Snow Depth and Snowmelt

The SNOW-17 snow accumulation and ablation model developed by the National Weather Service River Forecast System (NWSRFS) was implemented to model snowmelt for the Project. The main processes included in this model are dividing precipitation into rain or snow, accumulation of snowpack, energy exchange, heat deficit in the snowpack, ground melt and

snowmelt as a snow water equivalent (Anderson 2006). Model inputs are average temperature and precipitation and input parameters to model a column of snow. The Project weather station recorded an accumulated depth of snow. Data collection at the Project did not include snow courses or snow density to convert snow depth to snow water equivalent (SWE) but regional estimates were used to check the SNOW-17 model accuracy.

Table 4-10 summarizes the model input parameters based on guidelines of initial estimates (Anderson 2002) and validation against the snow water equivalent records at Tsai Creek. Temperature and precipitation time series for the Tsai Creek elevation were developed using PRISM corrections, similarly to the Project records. Figure 4-7 illustrates the measured and modelled snow water equivalent snow depths at Tsai Creek.

**Table 4-10: SNOW-17 Model Input Parameters**

| Parameter | Description | Value |
|---|---|---|
| PXTEMP | Temperature threshold | 1.5 °C |
| SCF | Loss coefficient during period of snow (i.e. sublimation) | 1 |
| UADJ | Average wind function during rain-on-snow events | 0.04 mm/mbar/hr |
| MBASE | Temperature above which melt occurs | 0 °C |
| MFMAX | Maximum melt factor | 0.51 $mm \cdot °C \cdot 6hr^{-1}$ |
| MFMIN | Minimum melt factor | 0.10 $mm \cdot °C \cdot 6hr^{-1}$ |
| TIPM | Antecedent temperature index factor | 0.1 |
| NMF | Maximum negative maximum factor | 0.25 $mm \cdot °C \cdot 6hr^{-1}$ |
| PLWHC | Percent liquid water holding capacity. Maximum amount of liquid water as a fraction of the ice portion of the snow | 4% |

Source: from snowmelt calibration model for Tsai Creek. \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\500_Water_Balance\Model\SnowmeltModel \ TsaiCreek_Snow17.gsm

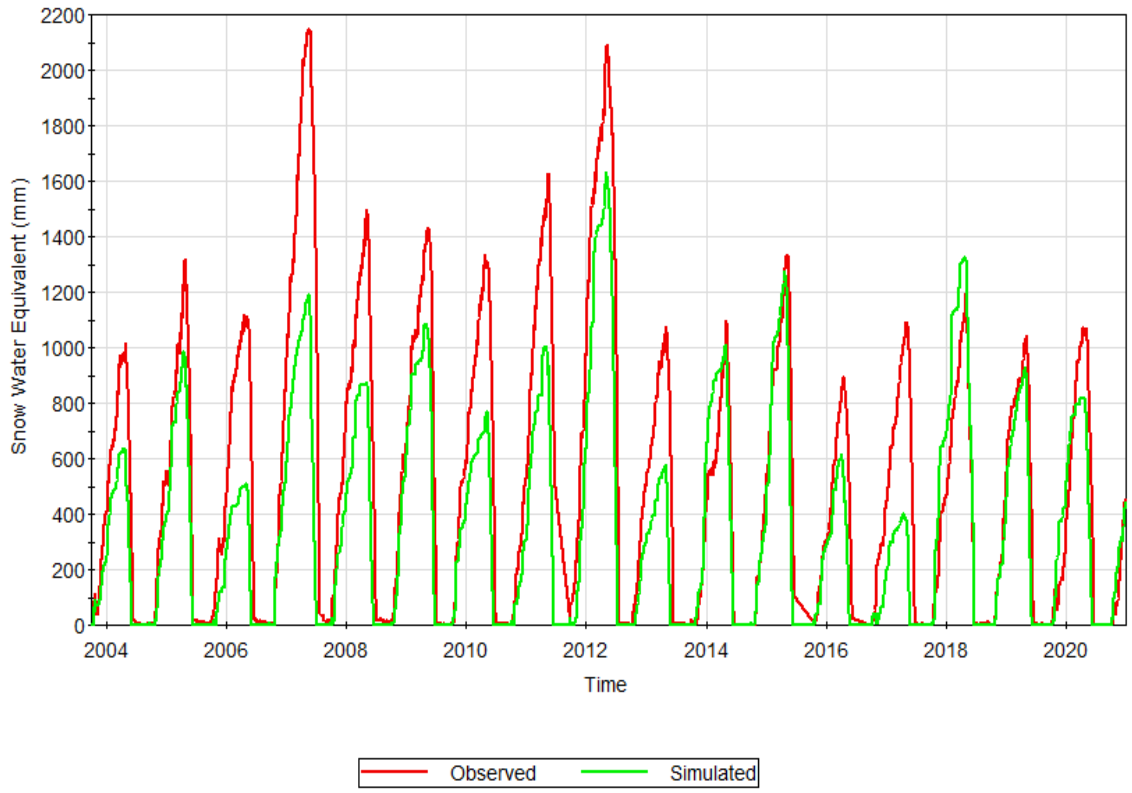



**Figure 4-6: Tsai Creek Snowmelt Snow Water Equivalent Calibration**

Source: from snowmelt calibration model for Tsai Creek. Z:\01_SITES\Telkwa Coal\1CT027.002 2017-18 permitting Support (Phase 2)\0200_SurfaceWater\Snowmelt Model\ TsaiCreek_Snow17.gsm

The validation with Tsai Creek suggests the snowmelt timing is well captured, with some understimations of maximum snowpack. This may be a result of inaccuracies in the precipitation record estimated for Tsai Creek. For the purpose of water management planning and design and water balance modeling, the SNOW-17 model and inputs were applied to the Project. Figure 4-7 illustrates the average snow water equivalent depths for the Project based on the adjusted precipitation and temperature records from 1942 to 2020.

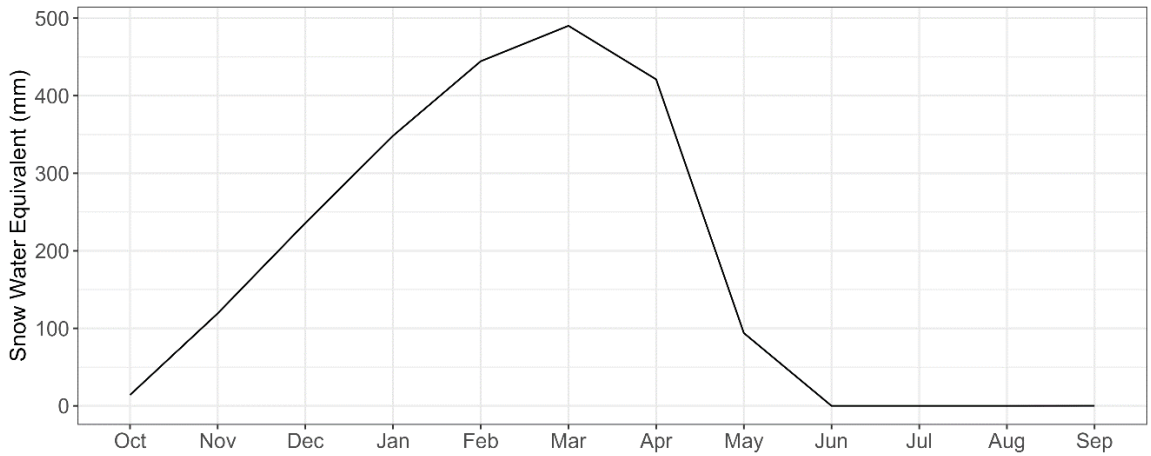



**Figure 4-7: Project Snow Water Equivalent**

Source: Compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

In addition to snow-water-equivalent, the snowmelt model produces a daily excess water term, which represents the sum of rainfall and snowmelt and can be interpreted as the daily depth of water available to generate runoff. Table 4-11 presents the monthly average excess water results for the Project, along with the monthly average distribution.

**Table 4-11: Project Excess Water Monthly Average Summary [mm]**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Excess Water | 2 | 3 | 18 | 145 | 184 | 70 | 58 | 54 | 67 | 60 | 9 | 2 | 672 |
| Monthly Excess Water Distribution | 0% | 0% | 3% | 22% | 27% | 10% | 9% | 8% | 10% | 9% | 1% | 0% | 100% |

Source: Compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

A frequency analysis was performed on the maximum 1-day and 3-day (72-hour) snow water equivalent results from the Project snowmelt model based on the adjusted record from 1981 to 2023. Results for return periods up to the 1000-year snowmelt event are presented in Table 4-12.

**Table 4-12: Project Snowmelt Frequency Analysis**

| Return Period | 24-hour Snowmelt [mm SWE] | 72-hour Snowmelt [mm SWE] |
|---|---|---|
| 2 | 34.0 | 57.5 |
| 5 | 43.3 | 73.3 |
| 10 | 50.9 | 86.1 |
| 25 | 62.8 | 106.4 |
| 50 | 74.0 | 125.4 |
| 100 | 87.7 | 148.5 |
| 200 | 104.4 | 176.8 |
| 500 | 132.4 | 224.3 |
| 1000 | 159.4 | 269.9 |

Source: Compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### 4.1.4 Solar Radiation

Given the short period of record at the Tenas Deposit Station and large differences to Smithers Airport Station, the FAO model (Allen et al. 1998) was adopted to calculate historical baseline averages of solar radiation using the corrected temperature timeseries developed for the Project (Table 4-13). The appropriateness of the FAO model to approximate incoming solar radiation at the Tenas Deposit Station was illustrated from October 2017 to September 2022 in Figure 4-8.

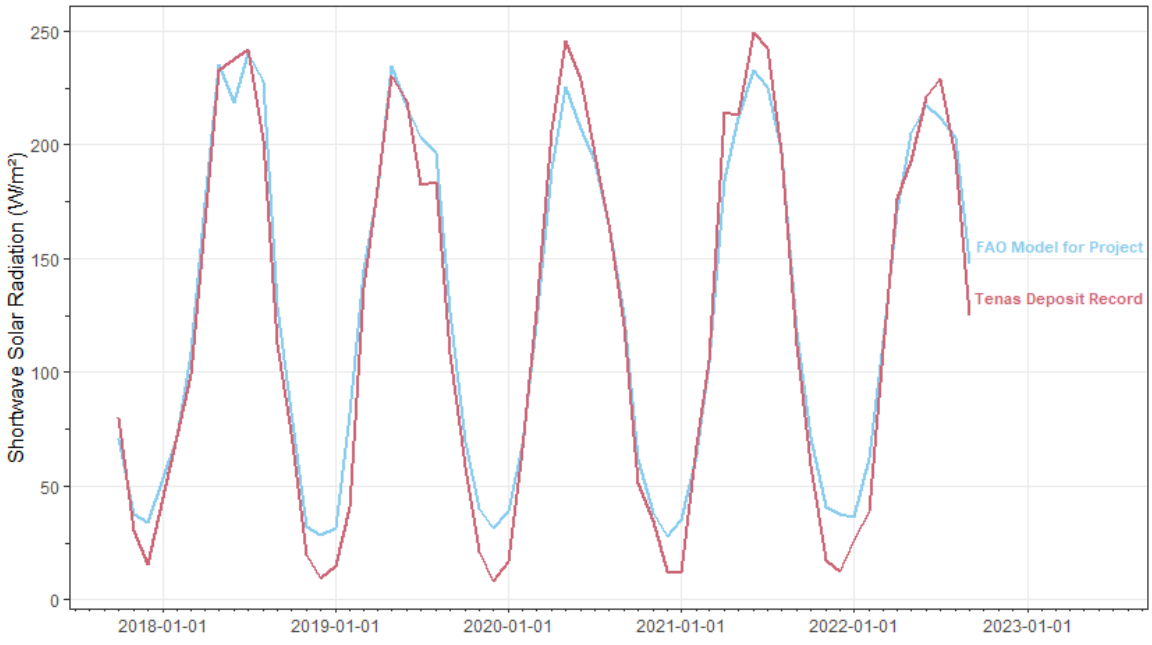



**Figure 4-8: Solar Radiation – Modelled versus Measured (October 2017 to September 2022)**

Source: Compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Table 4-13: Average Monthly Solar Radiation [W/m$^2$] at Project**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average | 38 | 64 | 114 | 173 | 220 | 224 | 224 | 201 | 134 | 73 | 40 | 34 | 128 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Telkwa_EA_Evaporation_1CT027.003_rev01.Rmd

### 4.1.5 Relative Humidity

Given the short period of record at the Tenas Deposit Station and the similarities observed between Smithers Airport Station records presented in Section 2.3.6, Smithers Airport station relative humidity was applied to the Project. Table 4-14 presents the monthly average relative humidity for the Project.

**Table 4-14: Average Monthly Relative Humidity [%] at Project**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average (%) | 83.6 | 79.3 | 71.2 | 63.3 | 61.3 | 65.7 | 68.8 | 72.1 | 79.5 | 82.1 | 85.9 | 85.4 | 74.8 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Telkwa_EA_Evaporation_1CT027.003_rev01.Rmd

### 4.1.6 Evaporation

Large and shallow water bodies can experience direct water losses from evaporation. Lake surface evaporation for the Project was estimated using the Morton CRWE shallow lake evaporation method (Morton 1983). Table 2-18 summarizes the input parameters required for this method including the Project-specific solar radiation generated using the FAO model.

Based on the adjusted temperature record, modelled solar radiation and relative humidity and wind speeds from the Smithers Airport station, the estimated mean annual evaporation for the Project is 529 mm. Table 4-15 and Figure 4-9 demonstrate the mean open water evaporation rates for the Project. The potential evaporation estimates generated using the Morton CRWE results for the derived Project timeseries were closest to the Topley Landing Normals.

**Table 4-15: Project Monthly Total Lake Evaporation [mm]**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Evaporation | 0 | 0 | 0 | 60 | 97 | 108 | 116 | 99 | 50 | 0 | 0 | 0 | 529 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Evaporation_rev02.Rmd

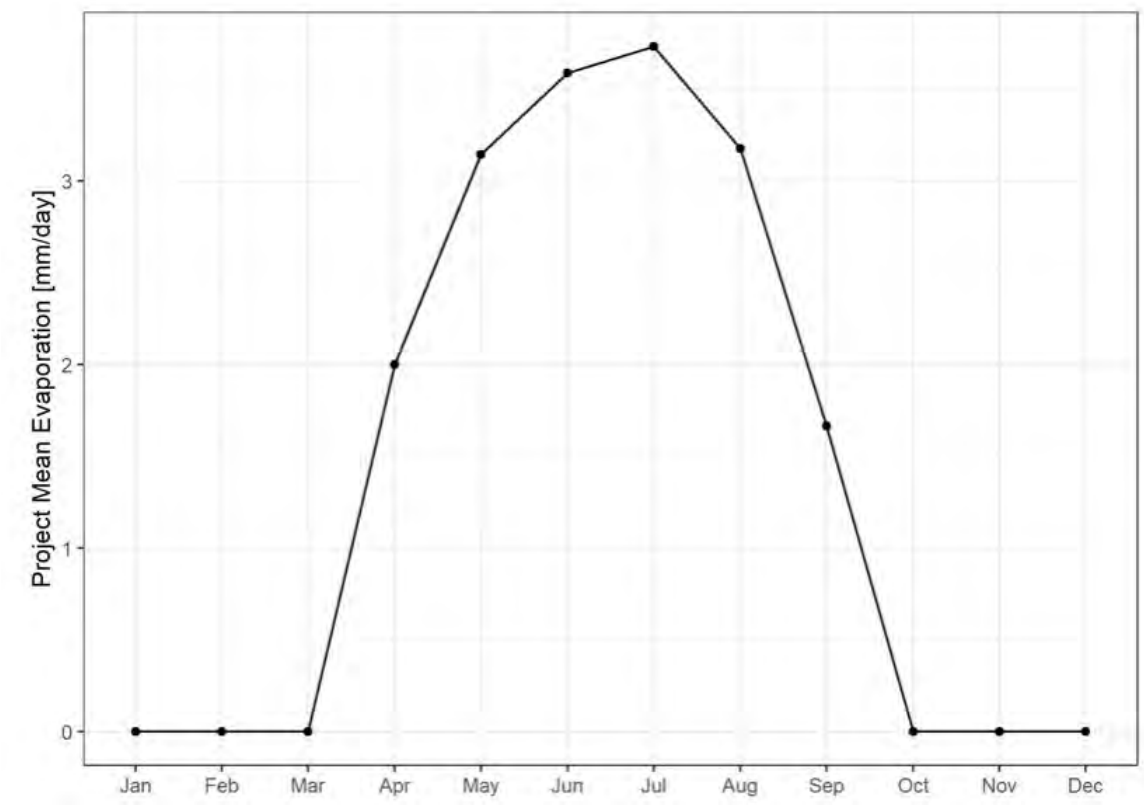


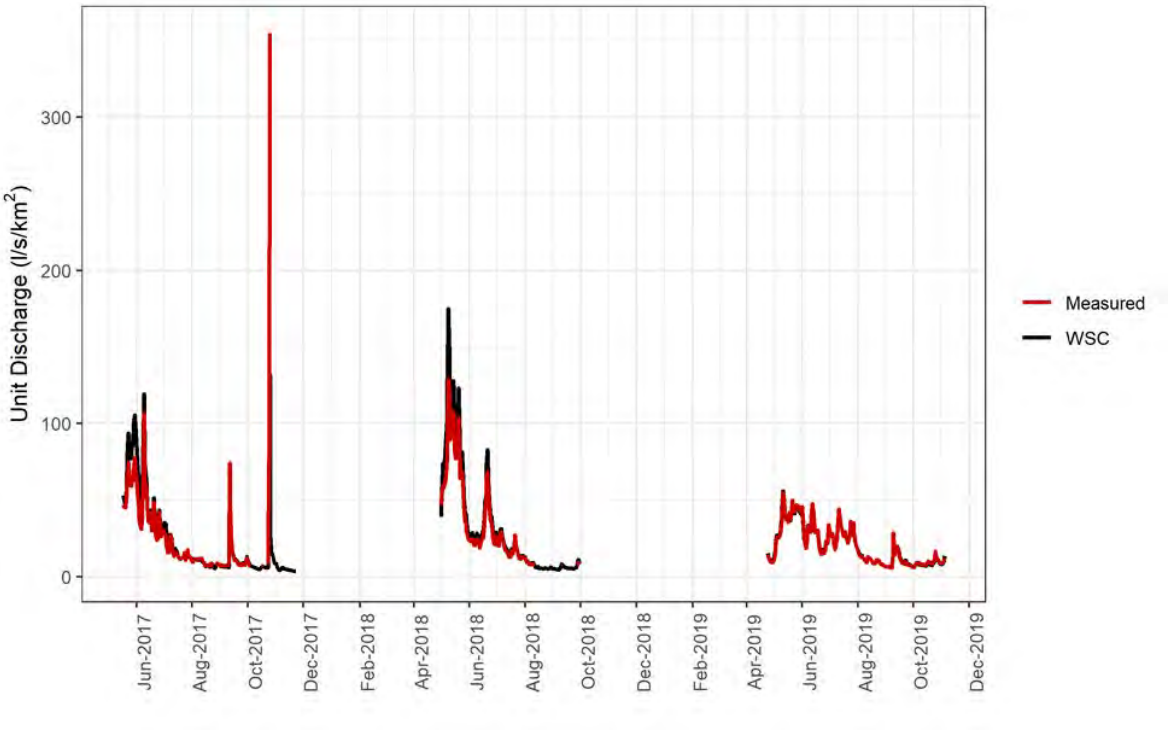

**Figure 4-9: Mean Daily Open Water Evaporation Rates**

Source: from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Evaporation_rev02.Rmd

## 4.2 Derived Hydrological Parameters

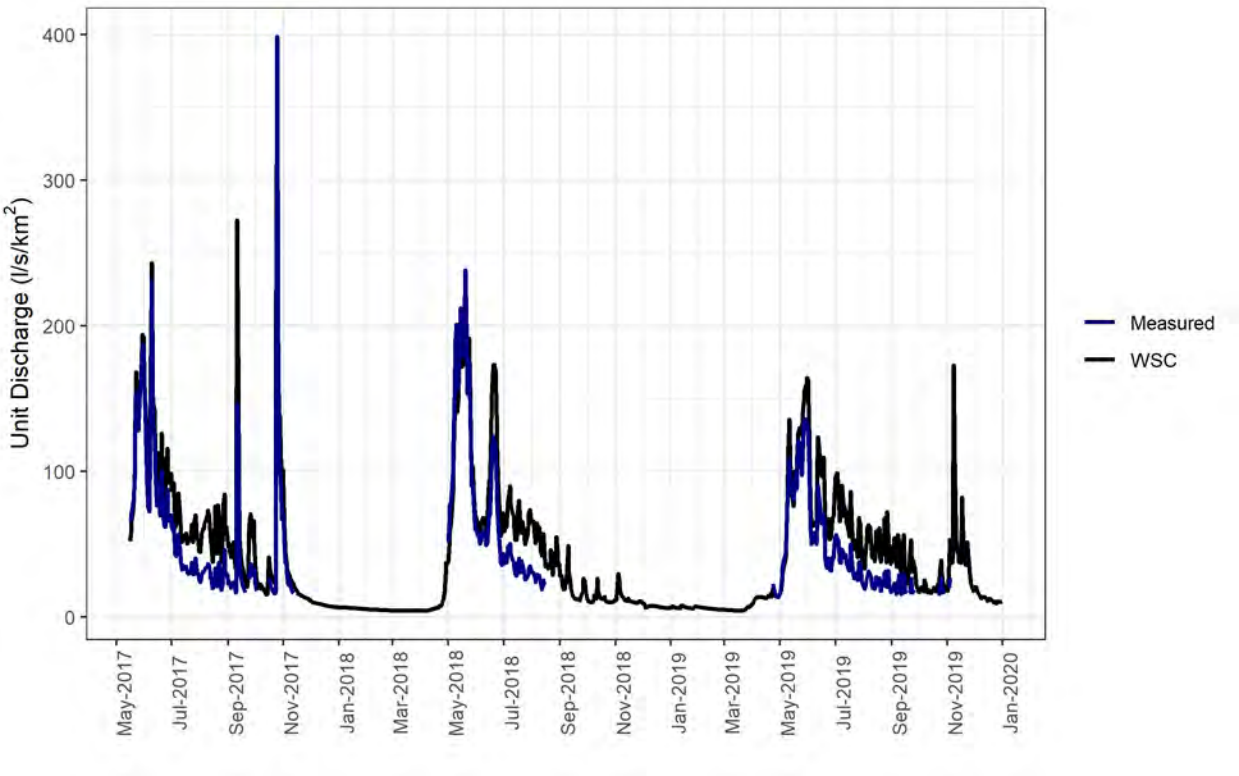
### 4.2.1 Time Series Comparison

Comparisons of the unit discharge at each Project hydrometric station with regional station data records led to pairing of the Project record with the most appropriate regional analogue (Table 4-18). Regression approaches were used for the periods of overlap between each of the Project hydrometric stations and their respective regional analogue. Time series of Project Area and regional station unit discharge records for Goathorn-Hydro and Goathorn Creek (08EE008), Telkwa-Hydro and Telkwa River (08EE020) Tenas-Hydro B and Goathorn Creek (08EE008), and Four-Hydro and Goathorn Creek (08EE008) are shown in Figure 4-10, Figure 4-11, Figure 4-12, and Figure 4-13, respectively. Additional comparisons for Four Creek based on 1999 baseline data are also described.




Source: Compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\Telkwa_flows.R

**Figure 4-10: Project Hydrometric Station Goathorn-Hydro (red-Measured) and Water Survey of Canada Goathorn Creek Near Telkwa (08EE008) (black-WSC)**




Source: Compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\Telkwa_flows.R

**Figure 4-11: Project Hydrometric Station Telkwa-Hydro (blue-Measured) and Water Survey of Canada Telkwa River Below Tsai Creek (08EE020) (black-WSC)**

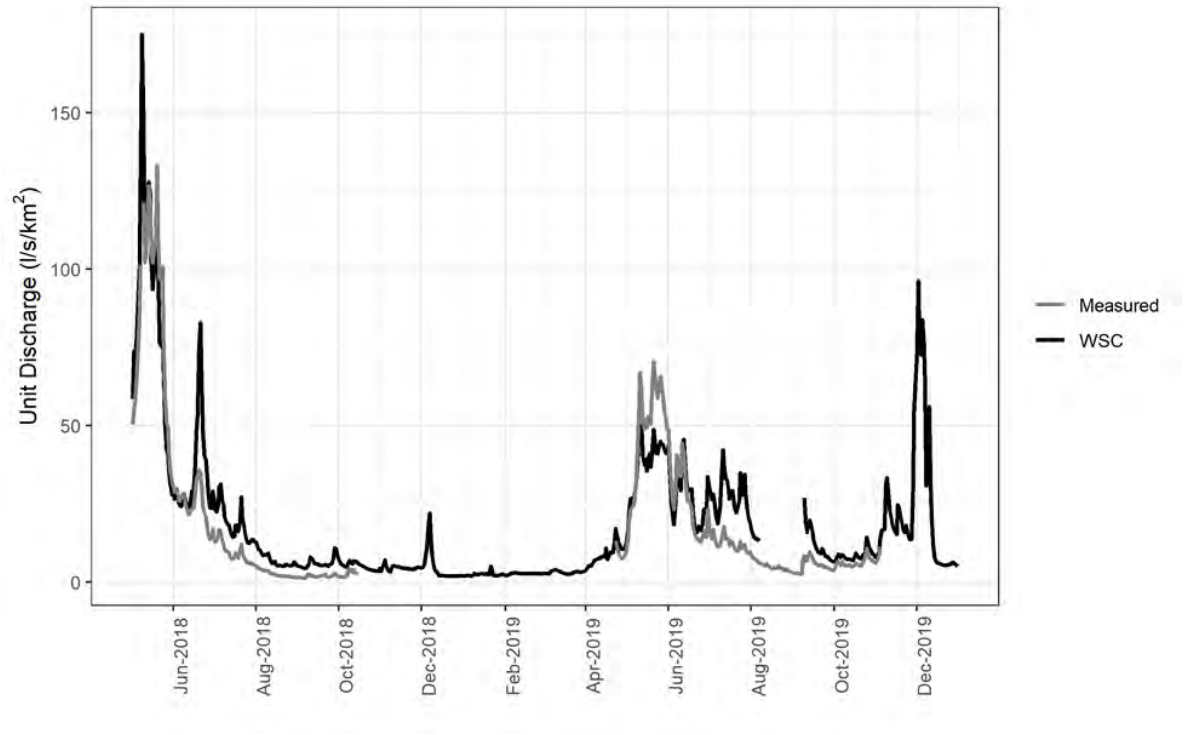



**Figure 4-12: Project Hydrometric Station Tenas-Hydro B (grey-Measured) and Water Survey of Canada Goathorn Creek Near Telkwa (08EE008) (black-WSC)**

Source: Compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\Telkwa_flows.R

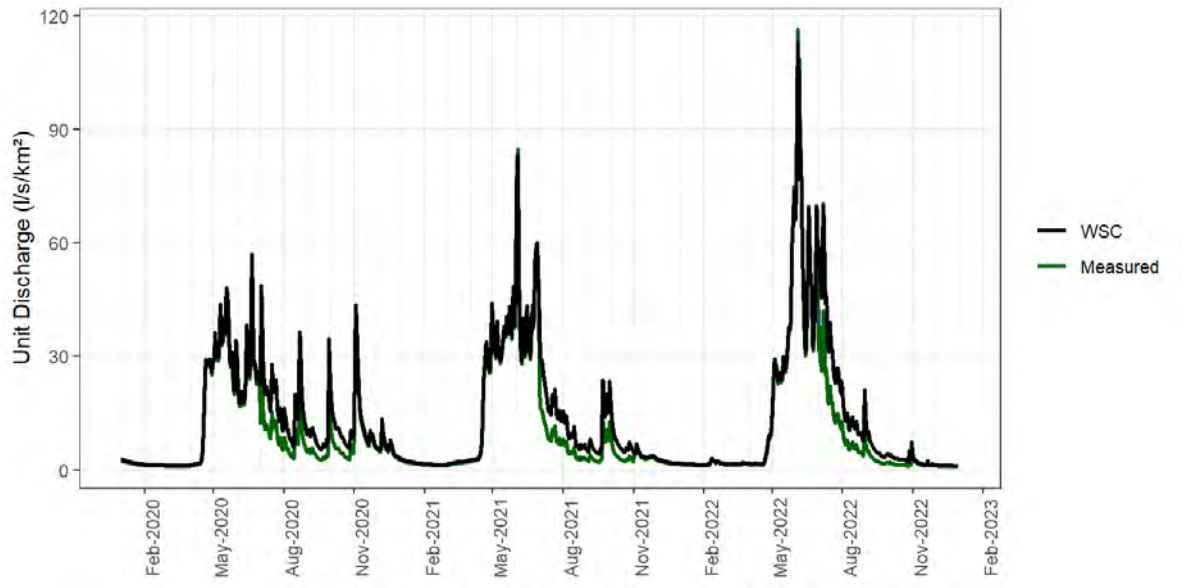



**Figure 4-13: Project Hydrometric Station Four-Hydro (green-Measured) and Water Survey of Canada Goathorn Creek Near Telkwa (08EE008) (black-WSC)**

Source: Compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\Telkwa_flows.R

A previous investigation into the hydrology of Four Creek was completed in 1997 (October to November) to 1998 (June to November) to support the Telkwa Coal Project 1999 Baseline Surface Flow and Water Quality Final Data Report (AGRA, 1999; Attachment A). The precise location of the AGRA hydrometric stations are not known, which limits the transferability of analyses using historical data. Based on the station descriptions in AGRA 1999, approximate locations were estimated and catchment areas were calculated.

Unit flows and monthly runoff rates were calculated based on assumed catchment areas and compared between Tenas, Four and Goathorn creeks, presented in Table 4-16 and Figure 4-15 and described in Attachment A and in tabular form in Attachment C. Runoff rates by month show a lower yield in Four Creek than in Tenas Creek, and higher rates in Goathorn Creek than in Tenas Creek during summer months of August and September. Unit flows in October 1997 show a storm response peak flow in all three streams, while 1998 records show a consistently lower yield in Four Creek than in Goathorn Creek.

**Table 4-16: Comparison of Monthly Runoff Rates based on Hydrometric Data from AGRA 1999 at Goathorn, Tenas and Four Creeks (Attachment A, C)**

| Stream | Year | Runoff (mm/month) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| **Tenas Creek** | 1997 | ND | ND | ND | ND | ND | ND | ND | 22 | 12 | 47 | ND | ND |
| | 1998 | ND | ND | ND | ND | 40 | ND | ND | 5 | 8 | 11 | ND | ND |
| **Four Creek** | 1997 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 9 | 4 | ND |
| | 1998 | ND | ND | ND | ND | ND | ND | 3 | 1 | 1 | 2 | ND | ND |
| **Goathorn Creek** | 1997 | 4 | 5 | 5 | 49 | 166 | 142 | 88 | 54 | 32 | 46 | 16 | 6 |
| | 1998 | 3 | 3 | 4 | 28 | 145 | 68 | 50 | 25 | 16 | 27 | 12 | 6 |

**Notes:**

1. Monthly runoff is calculated for months containing greater than 25 days of runoff data
2. ND: No Data or less than 25 days with data in a month

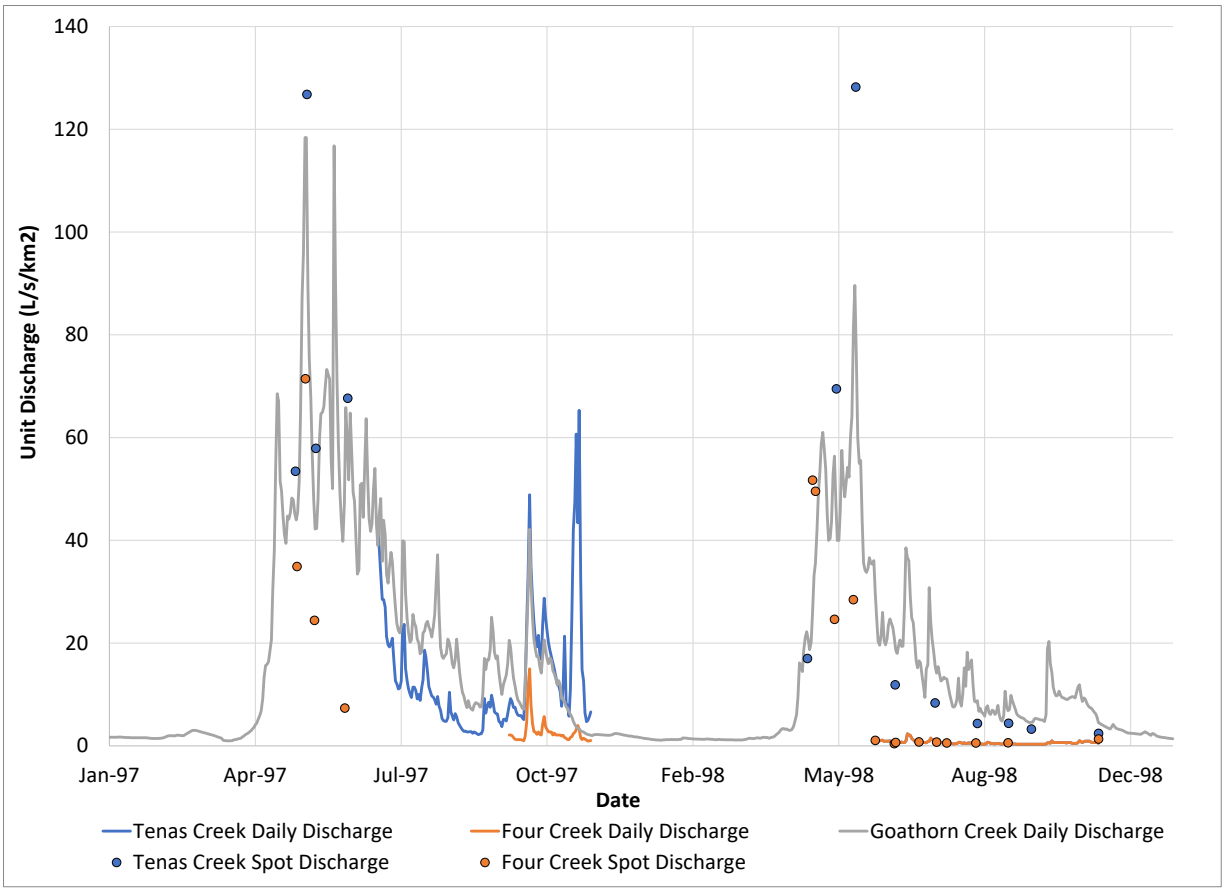



**Figure 4-14: Comparison of Unit Flows based on Hydrometric Data from AGRA 1999 at Goathorn, Tenas and Four Creeks (Attachment A, C)**

AGRA 1999 describes runoff ratios, based on annual runoff yield and annual precipitation data from Smithers Airport. The runoff ratios for WSC's Goathorn Creek station were calculated as 0.65 and 0.83 in 1997 and 1998, respectively, and 0.28 in both years for Four Creek. Note that results from Section 4.1.2 show that precipitation data from Smithers Airport is expected to be distinct from precipitation that falls near the Telkwa Project Area or within each stream's catchment, limiting the applicability of these ratios. This discrepancy is also noted in AGRA 1999. AGRA 1999 stated that the difference in runoff ratios between Goathorn and Four Creek could be attributed to potential orographic gradients in precipitation and the difference in the altitude range between Goathorn Creek (1745 m, from 550 to 2295 masl) versus Four Creek (670 m from 700 to 1370 masl). The Four Creek basin generally faces the northeast, where as the Goathorn Creek basin faces northeast and northwest, which is expected to cause differences in snowpack accumulation and ablation (AGRA 1999). AGRA also concluded that groundwater baseflows would be more pronounced in Goathorn Creek as it extends lower in the basin than Four Creek, which may result in an increased occurrence of springs surfacing from fractures.

### 4.2.2 Regression Equation Development

The regression approach ultimately selected to develop regressions between measured, Project hydrometric records and regional analogues was chosen based on: (1) The simplicity of the

regression, (2) the Nash-Sutcliffe Efficiency (NSE) between the estimated flows and the measured flows for the period of overlap and (3) the ability of the regression to approximate both high and low flows based on flow duration curves. The regressions were then used to generate synthetic flow records for each Project hydrometric stations using the long-term, regional records from Water Survey of Canada as a foundation. The time series generated from the developed regression equations for each hydrometric station were compared to the measured unit discharges at each station using tables.

Table 4-18 summarizes the pairings between Project hydrometric stations and the most suitable regional analogue, catchment areas for each station and the NSE from the regression. Three equations were developed using linear regression and provisional WSC Goathorn flow data that has not been approved by WSC. The 2020 WSC Goathorn flows show a jump in February that is likely erroneous and will require correction by WSC. Given the provisional WSC data and the short period of record at Four-Hydro, it was unsurprising that neither equation adequately captured the correct magnitude for freshet. Additional regression options were explored but were not successful.

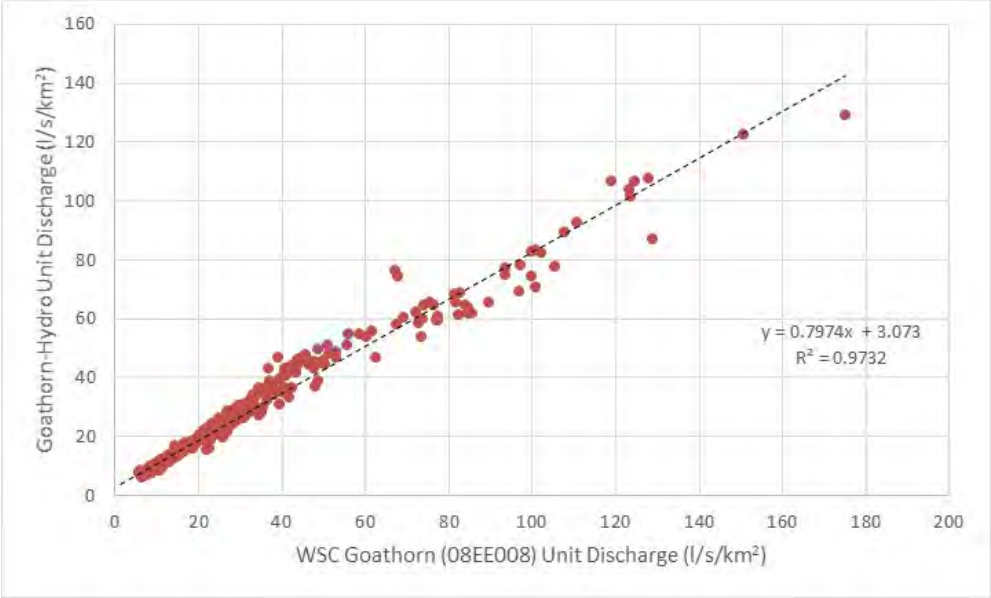
**Table 4-17: Project and WSC Regional Regression Type and Fit Parameter**

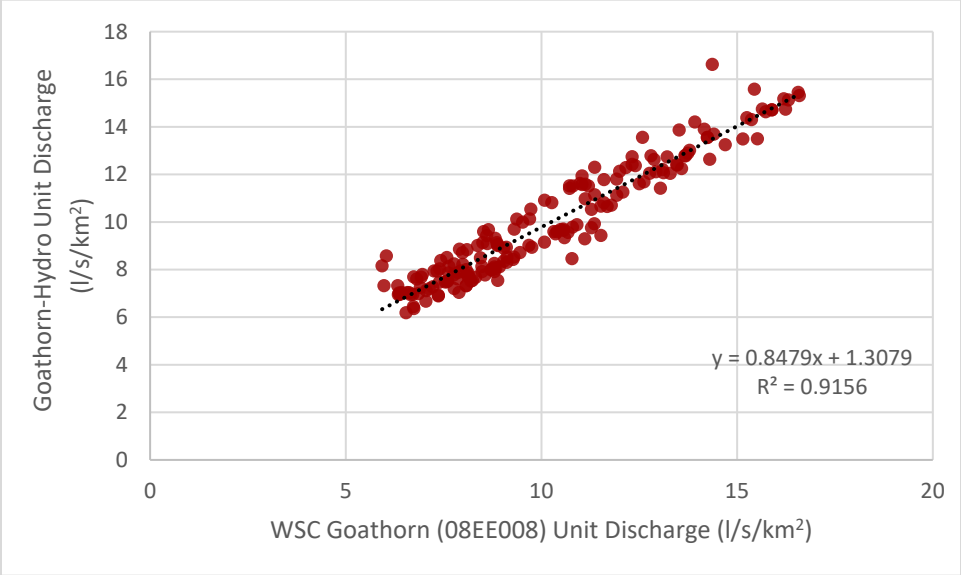
| Project Station ID | Project Station Catchment Area ($km^2$) | Regional Station ID | Regional Catchment Area ($km^2$) | Regression Type | Regression NSE |
|---|---|---|---|---|---|
| Goathorn-Hydro | 123.5 | Goathorn (08EE008) | 125 | Linear, Chronological Pairing | 0.96 |
| Tenas-Hydro B | 46.8 | Goathorn (08EE008) | 125 | Linear, Chronological Pairing | 0.85 |
| Telkwa-Hydro | 997.2 | TelkwaBTC (08EE020) | 367 | Ranked Regression, Time-independent | 0.96 |
| Four-Hydro | 11.0 | Goathorn (08EE008) | 46.8 | Ranked Regression, Time-independent | 0.54 |

Source: Compiled in text.

### Goathorn-Hydro

The linear regression for Goathorn-Hydro was developed for moderate to high flows while a separate linear regression was developed to generate low flows. The low flow regression was developed from low flows in November. The linear regression developed excluded a high flow event recorded at Goathorn-Hydro on 25 October 2017 (Table 4-18). This event was removed from the dataset as its occurrence was not supported by any similarly large discharge event recorded at the Water Survey of Canada Goathorn station. The recorded daily average unit flow at Goathorn-Hydro was 354 L/s/$km^2$ while the WSC Goathorn station recorded 132 L/s/$km^2$.




Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\ 01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\Goathorn_regression_rev00_20200421_njs.xlsx

**Figure 4-15: Linear regressions developed for WSC Goathorn Creek Near Telkwa (08EE008) and Goathorn-Hydro stations for moderate to high flows (upper panel) and low flows (lower panel)**

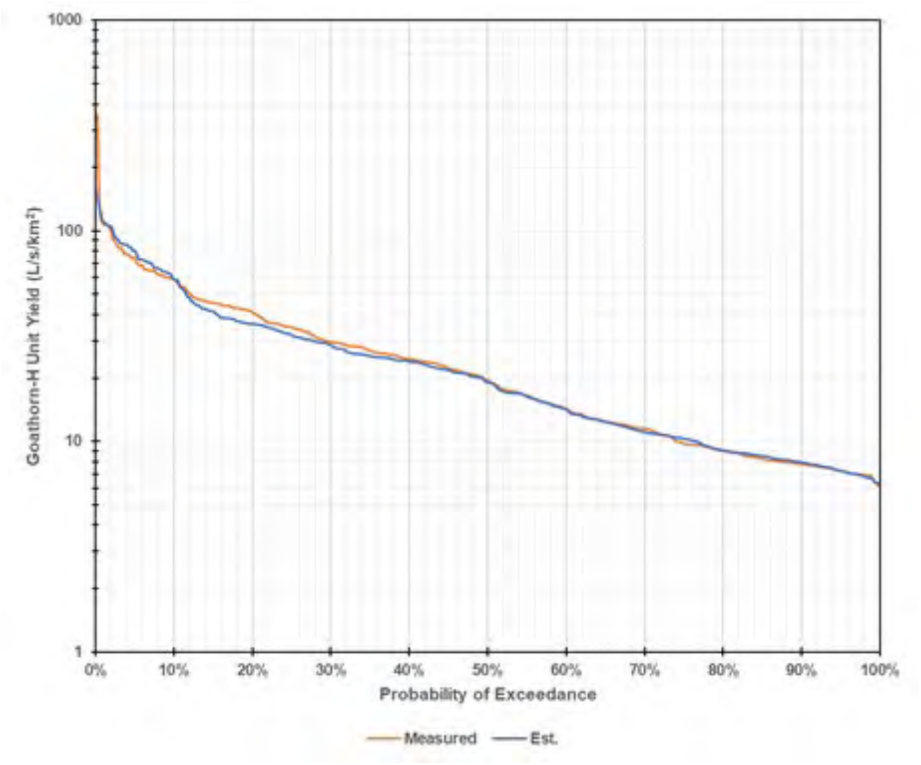
Table 4-18 shows the unit discharge measured at Goathorn Hydro compared to the unit discharge calculated from the regression equations for the same time period each year. The measured unit discharge and the regressed values are very similar with slight overestimation in 2017 and 2018 and some underestimation in 2019.

Exceedance probabilities of the measured and regressed unit discharge are presented in Figure 4-16, which shows that estimate flows are very similar in magnitude for low and high flows.

**Table 4-18: Measured and Regressed Unit Discharge Values at Goathorn-Hydro**

| Year | Month | Goathorn-Hydro Unit Discharge (L/s/km$^2$) | Annual Average (L/s/km$^2$) | Regression Unit Discharge (L/s/km$^2$) | Annual Average (L/s/km$^2$) |
|---|---|---|---|---|---|
| 2017 | May | 59.9 | 24 | 65.7 | 25 |
| | Jun | 41.9 | | 42.6 | |
| | Jul | 16.5 | | 16.8 | |
| | Aug | 9.3 | | 9.0 | |
| | Sep | 12.8 | | 11.9 | |
| | Oct | 15.2 | | 13.3 | |
| 2018 | May | 71.5 | 35 | 75.3 | 36 |
| | Jun | 30.4 | | 30.8 | |
| | Jul | 17.7 | | 17.6 | |
| | Aug | 8.9 | | 9.3 | |
| | Sep | 8.1 | | 9.0 | |
| 2019 | Apr | 11.0 | 20 | 11.5 | 17 |
| | May | 37.8 | | 33.4 | |
| | Jun | 27.4 | | 24.4 | |
| | Jul | 27.7 | | 24.7 | |
| | Aug | 10.6 | | 4.1 | |
| | Sep | 10.5 | | 9.0 | |
| | Oct | 9.2 | | 8.6 | |
| | Nov | 10.0 | | 9.7 | |

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\Goathorn_regression_rev00_20200421_njs.xlsx




Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\Goathorn_regression_rev00_20200421_njs.xlsx

**Figure 4-16: Probability Exceedance of Goathorn-Hydro Unit Discharge**

### Tenas-Hydro B

The Tenas-Hydro B station was paired with Goathorn Creek Near Telkwa (08EE008) for developing a regression to develop a synthetic time series. The linear regression was separated into two periods, based on the month, as shown in Figure 4-17.

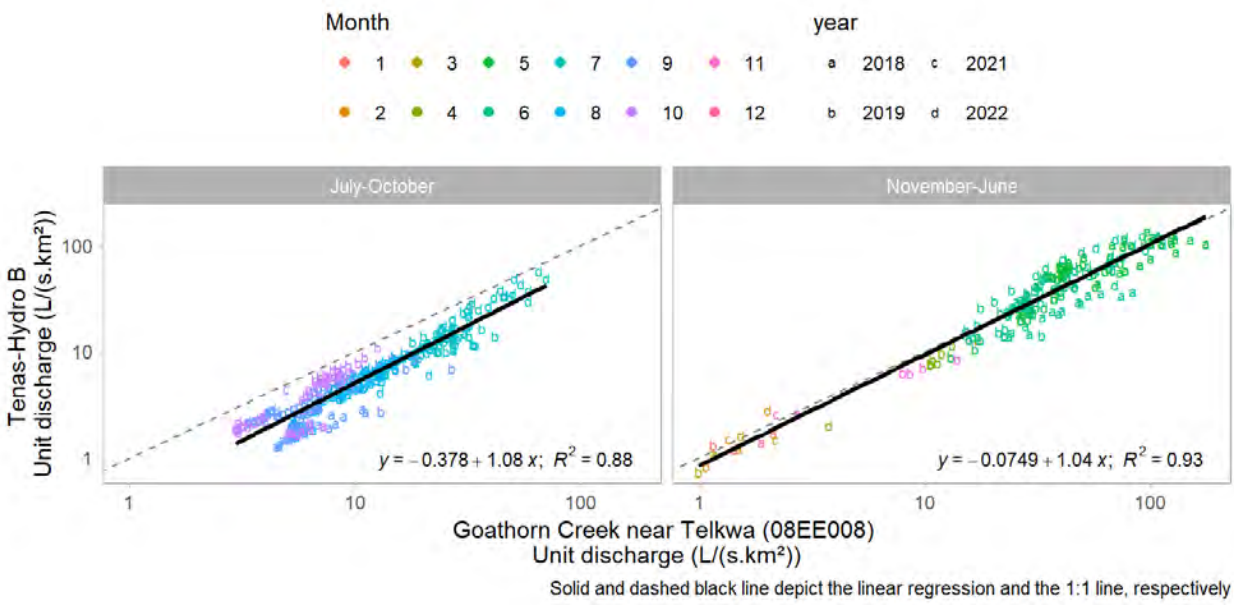
Table 4-19 shows the unit discharge measured at Tenas Hydro compared to the unit discharge calculated from the regression equations for the same time period each year. Both years present very similar annual average flows.

Exceedance probabilities of the measured and regressed unit discharge are presented in Figure 4-19 which shows that estimate flows are very similar in magnitude for low and high flows, with extreme low flows being slightly overestimated in the synthetic dataset.

**Table 4-19: Measured and Regressed Unit Discharge Values at Tenas-Hydro B**

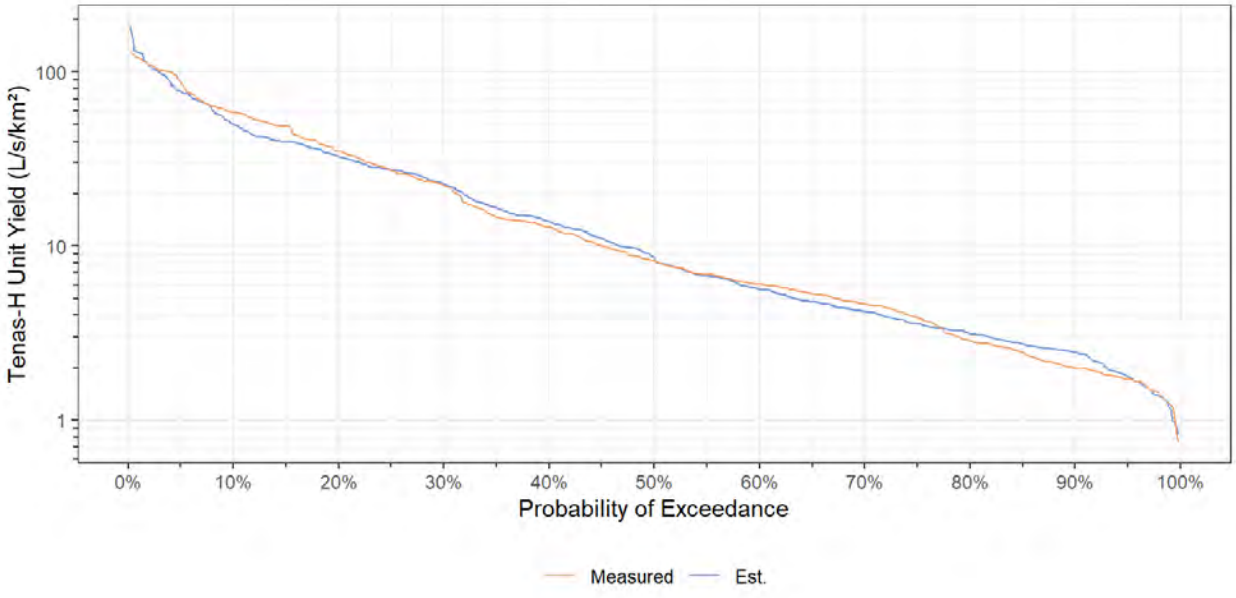
| Year | Month | Tenas-Hydro B Unit Discharge (L/s/km$^2$) | Annual Average (L/s/km$^2$) | Regression Unit Discharge (L/s/km$^2$) | Annual Average (L/s/km$^2$) |
|---|---|---|---|---|---|
| 2018 | May | 88.1 | 22.3 | 91.7 | 24.8 |
| | Jun | 25.7 | | 34.2 | |
| | Jul | 10.0 | | 10.3 | |
| | Aug | 2.9 | | 3.5 | |
| | Sep | 1.9 | | 3.0 | |
| | Oct | 2.7 | | 3.0 | |
| 2019 | Apr | 9.4 | 16.5 | 11.5 | 14.9 |
| | May | 46.5 | | 36.7 | |
| | Jun | 26.9 | | 25.6 | |
| | Jul | 13.1 | | 14.7 | |
| | Aug | 5.5 | | 5.6 | |
| | Sep | 5.3 | | 5.4 | |
| | Oct | 6.1 | | 4..2 | |
| | Nov | 7.1 | | 9.4 | |
| 2022 | May | 41.7 | 25.4 | 45.7 | 22.2 |
| | Jun | 71.5 | | 60.0 | |
| | Jul | 26.4 | | 21.2 | |
| | Aug | 6.4 | | 6.4 | |
| | Sep | 3.1 | | 2.7 | |
| | Oct | 2.1 | | 1.5 | |

Source: Compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html




Source: Compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

**Figure 4-17: Linear regression between WSC Goathorn Creek Near Telkwa (08EE008) station and Tenas-Hydro B for the months of April, May, June, October and November (top) and July to September (bottom)**




Source: Compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html elkwa-Hydro

**Figure 4-18: Probability Exceedance of Tenas-Hydro Unit Discharge**

### Telkwa-Hydro

The Telkwa-Hydro hydrometric data was regressed against Water Survey of Canada Telkwa River Below Tsai Creek (08EE020) using ranked regressions, which uses paired discharge records independent of chronological order. Monthly ranked regression results are presented in Figure 4-19, and regression equations with goodness of fit indicators are presented in Table 4-20.

Table 4-21 presents the unit discharge measured at Telkwa Hydro compared to the unit discharge calculated from the monthly regressions with Telkwa River Below Tsai Creek for the same time period each year. The regressed values underestimated flow in 2017 but provided similar results for 2018 and 2019.

Exceedance probabilities of the measured and regressed unit discharge are presented in Figure 4-19 which shows that estimated flows are very similar in magnitude for average and high flows, but less accurate for low flows (higher exceedance probability results), where the estimated results are lower than the measured values.

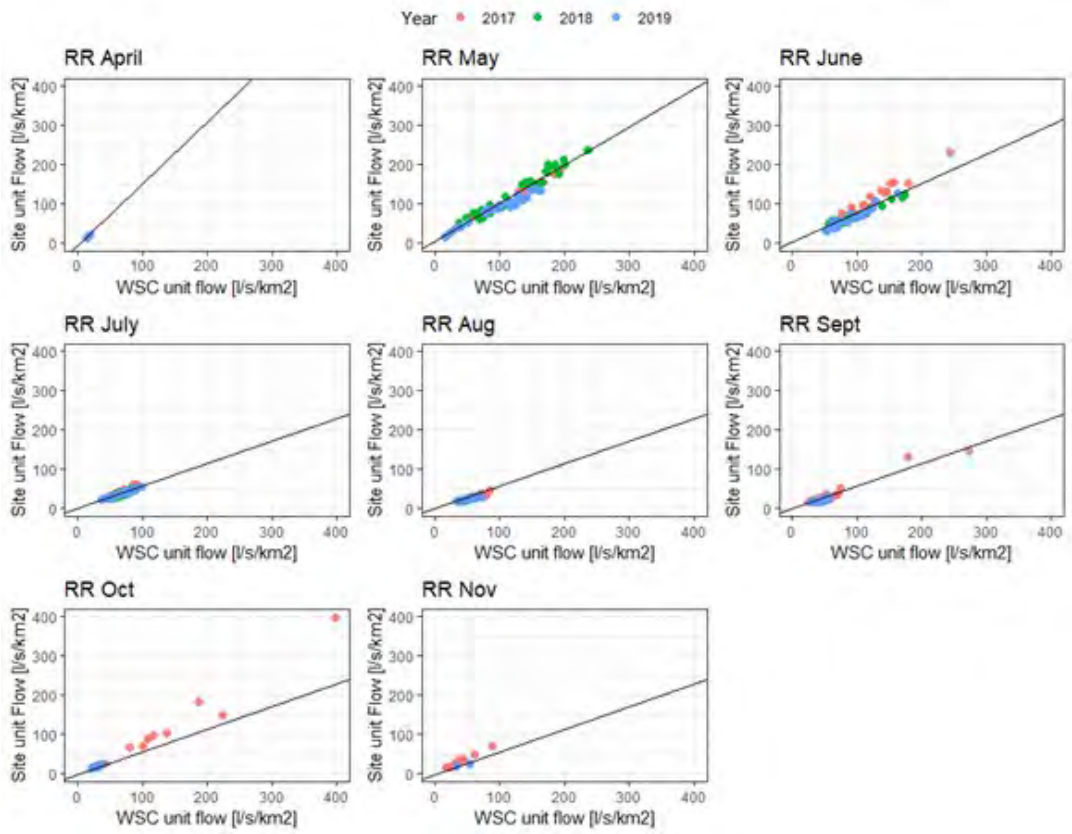



**Figure 4-19: Monthly ranked regression between WSC Telkwa River Below Tsai Creek (08EE020) and Telkwa-Hydro stations**

Source: Compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\ Flows_update_rev12_monthlyregr.Rmd

**Table 4-20: Monthly Ranked Regression Equations and R-squared Value**

| Month | April | May | June | July | Aug | Sept | Oct | Nov |
|---|---|---|---|---|---|---|---|---|
| Equation | 1.58x-7.29 | 0.97x+4.69 | 0.75x+2.12 | 0.57x -0.73 | 0.43x+2.49 | 0.55x-1.95 | 0.96x-8.93 | 0.79x+0.93 |
| $R^2$ | 0.84 | 0.88 | 0.81 | 0.75 | 0.76 | 0.83 | 0.95 | 0.85 |

Source: Compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\ Flows_update_rev12_monthlyregr.Rmd

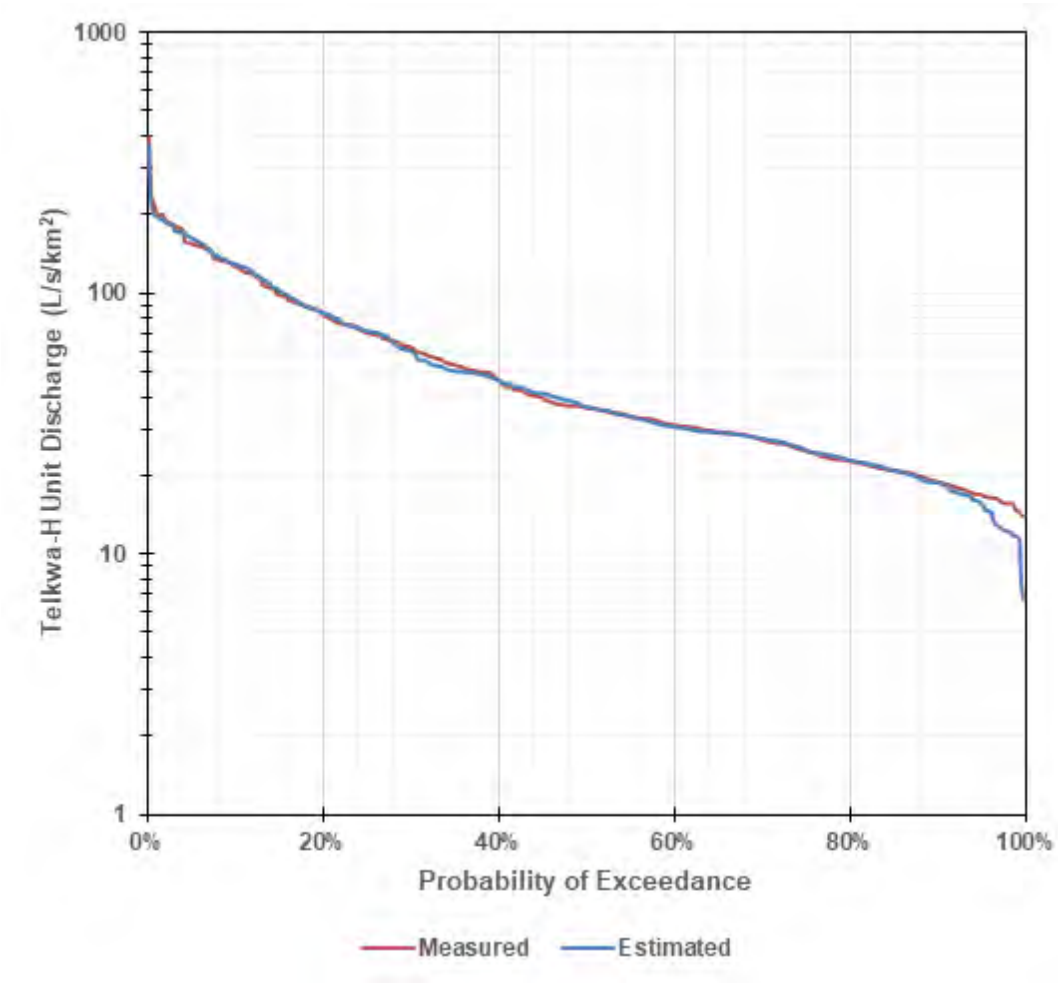



**Figure 4-20: Probability Exceedance of Unit Discharge (L/s/km2) at Telkwa-Hydro**

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_regressions\Telkwa_regression_rev00_20200423_njs.xlsx

**Table 4-21: Measured and Regressed Unit Discharge Values at Telkwa-Hydro**

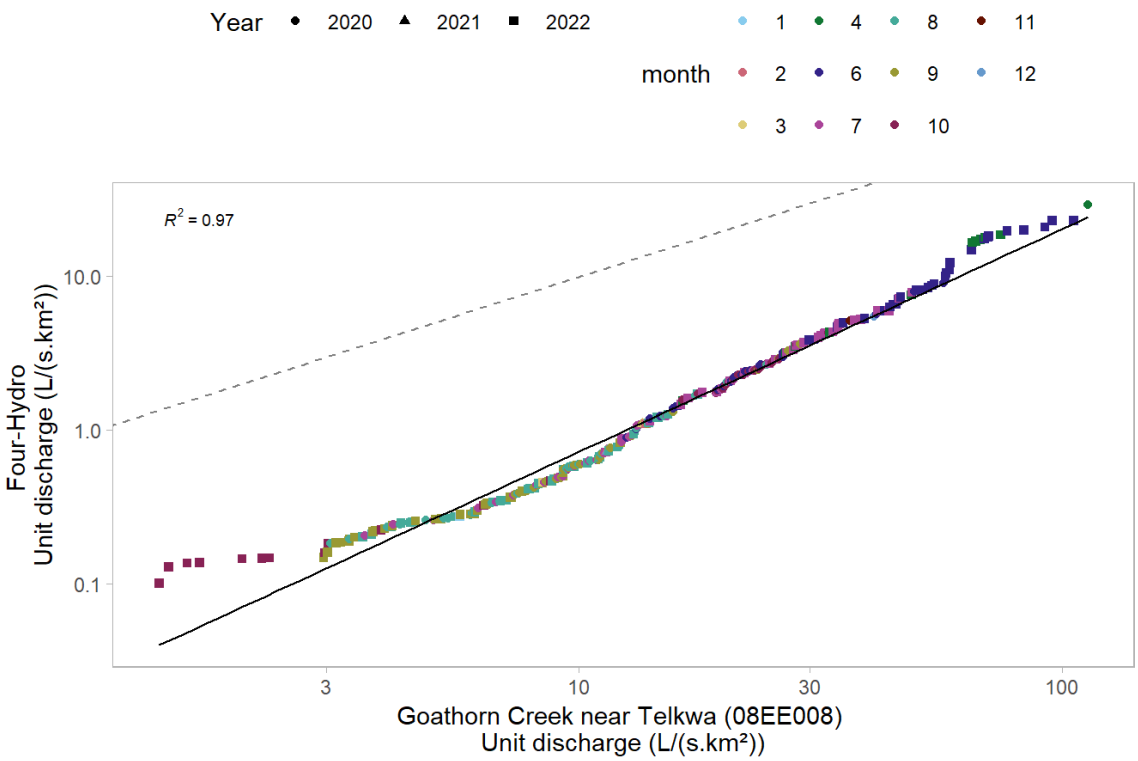
| Year | Month | Telkwa-Hydro Unit Discharge (L/s/km$^2$) | Annual Average (L/s/km$^2$) | Regression Unit Discharge (L/s/km$^2$) | Annual Average (L/s/km$^2$) |
|---|---|---|---|---|---|
| 2017 | May | 125.2 | 61 | 88.9 | 48 |
| | Jun | 97.1 | | 86 | |
| | Jul | 38.9 | | 35.2 | |
| | Aug | 29.3 | | 28.1 | |
| | Sep | 34.7 | | 29.5 | |
| | Oct | 75.6 | | 50.3 | |
| | Nov | 28.3 | | 16.7 | |
| 2018 | May | 140.1 | 58.5 | 135.3 | 55 |
| | Jun | 68.4 | | 69.9 | |
| | Jul | 35.9 | | 37.2 | |
| | Aug | 25 | | 23 | |
| | Sep | 23.1 | | 9.3 | |
| 2019 | Apr | 16.6 | 36 | 12.3 | 38 |
| | May | 87.8 | | 98.1 | |
| | Jun | 58 | | 63.4 | |
| | Jul | 37.6 | | 37.2 | |
| | Aug | 24 | | 23.6 | |
| | Sep | 20 | | 18.2 | |
| | Oct | 19.3 | | 11 | |
| | Nov | 23.5 | | 35.9 | |

Source: Compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### Four-Hydro

The Four-Hydro hydrometric data was regressed against Water Survey of Canada Goathorn Creek Near Telkwa (08EE008) flows using ranked regressions (Figure 4-21), which uses paired discharge records independent of chronological order.

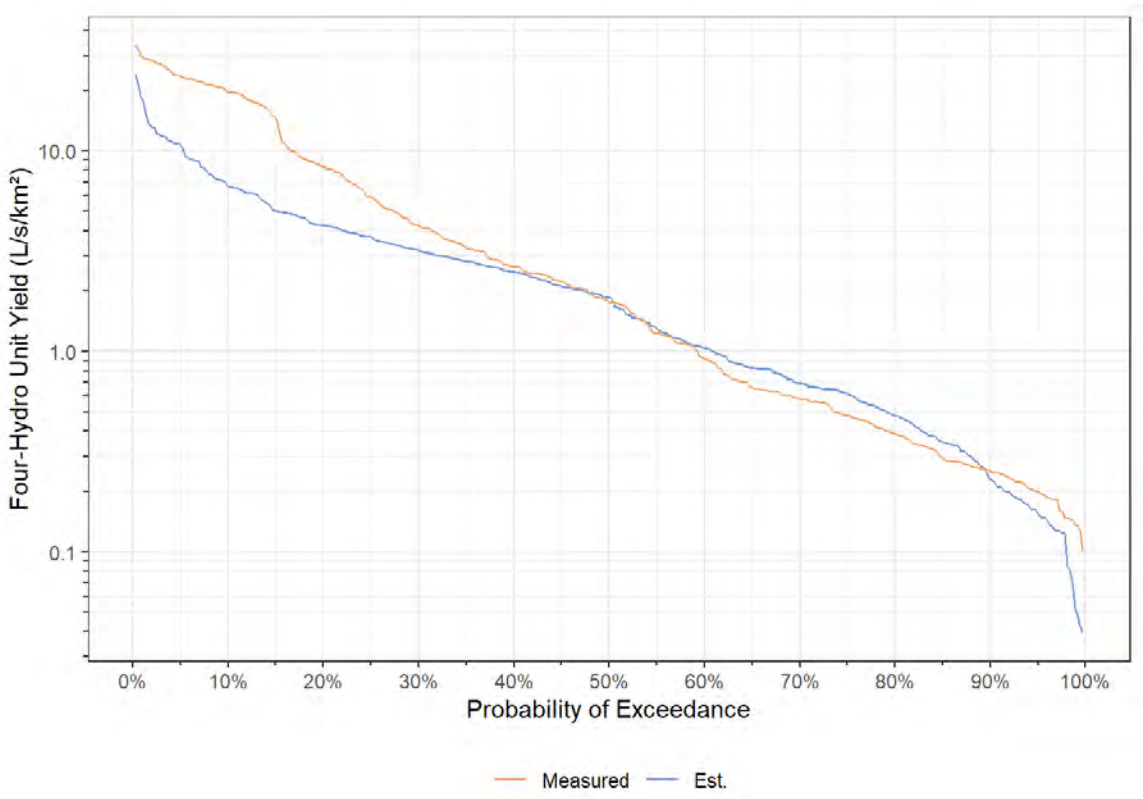
Linear chronological pairing was assessed, but a good relationship with regional stations was not obtained. A ranked regression was then developed without grouping the data by month, as done for Telkwa-Hydro. In fact, the low availability of flow records in some months hindered this more refined type of regression for Four-Hydro station. Despite this, the regression undertaken provides valuable insight that the unit flows measured in Four-Hydro are smaller than the other stations, so assuming other station as analog without a bias correction may impose an overestimation of flows in Four-Hydro.




Source: Compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Figure 4-21: Ranked regression between WSC Goathorn Creek Near Telkwa (08EE008) station and Four-Hydro station**

Exceedance probabilities of the measured and regressed unit discharge are presented in Figure 4-22, which shows that estimated flows are representing well medium flows, but underpredicting high and low flows.




Source: Compiled from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Figure 4-22: Probability Exceedance of Unit Discharge (L/s/km²) at Four-Hydro**

Table 4-22 presents the unit discharge measured at Telkwa Hydro compared to the unit discharge calculated from the regression with Tenas creek for the same time period each year. The regressed values underestimated average and high flows, but remained close to the measured low flows.

**Table 4-22: Measured and Regressed Unit Discharge Values at Four-Hydro**

| Year | Month | Telkwa- Four Unit Discharge (L/s/km²) | Annual Average (L/s/km²) | Regression Unit Discharge (L/s/km²) | Annual Average (L/s/km²) |
|---|---|---|---|---|---|
| 2020 | May | 11.1 | 3.3 | 4.3 | 2.1 |
| | Jun | 2.7 | | 3.1 | |
| | Jul | 0.8 | | 2.2 | |
| | Aug | 0.7 | | 1.3 | |
| | Sep | 1.0 | | 0.8 | |
| | Oct | 2.4 | | 0.8 | |
| 2022 | Apr | 10.7 | 7.4 | 0.5 | 3.6 |
| | May | 23.7 | | 4.5 | |
| | Jun | 11.1 | | 10.0 | |

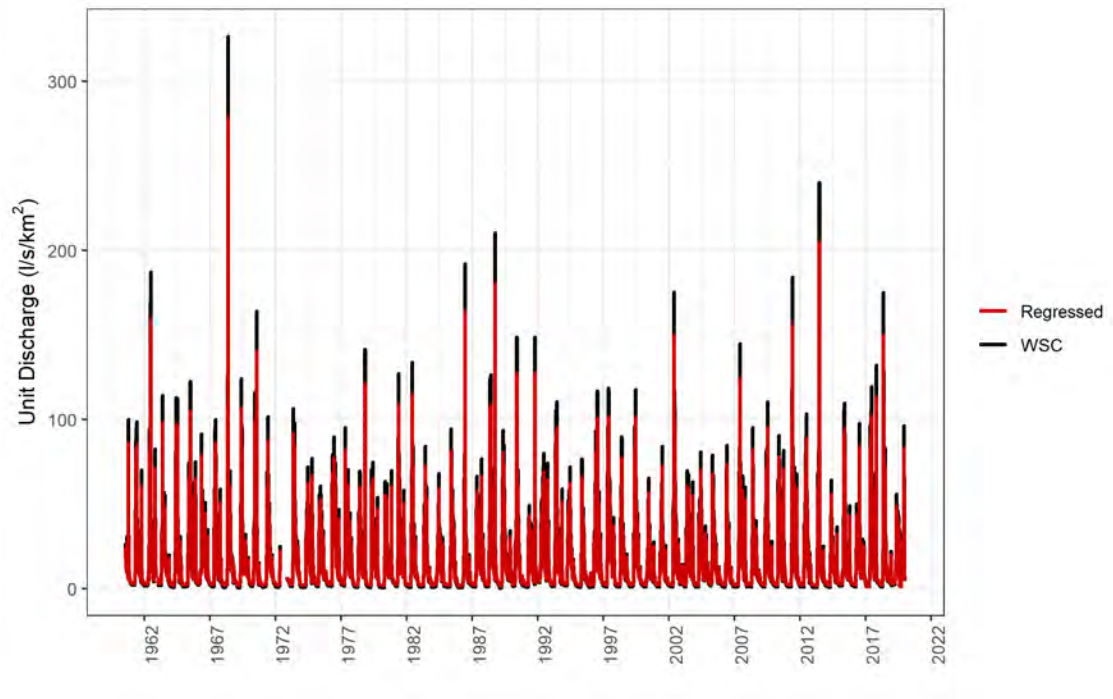
| Year | Month | Telkwa- Four Unit Discharge (L/s/km$^2$) | Annual Average (L/s/km$^2$) | Regression Unit Discharge (L/s/km$^2$) | Annual Average (L/s/km$^2$) |
|---|---|---|---|---|---|
| | Jul | 3.6 | | 5.1 | |
| | Aug | 0.6 | | 1.0 | |
| | Sep | 0.3 | | 0.3 | |
| | Oct | 0.2 | | 0.1 | |

Source: Compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

### 4.2.3 Extended (Synthetic) Time Series for Project Hydrometric Stations

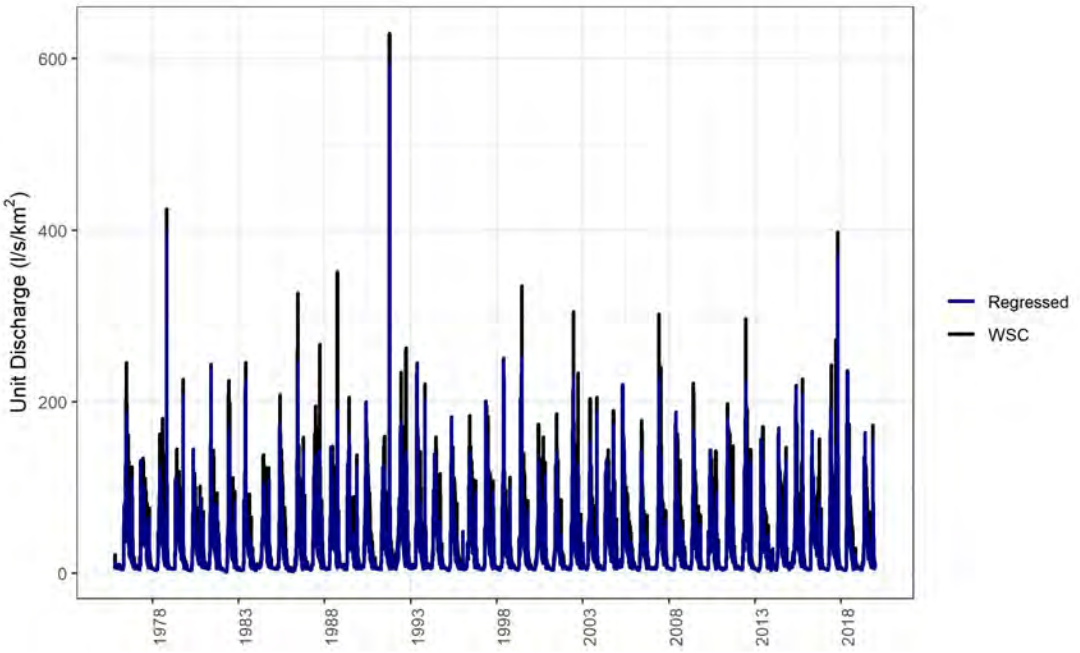
The regressions developed for Goathorn-Hydro, Telkwa-Hydro, Tenas-Hydro and Four-Hydro were used to generate a long-term, extended or synthetic time series based on the Water Survey of Canada regional records. The synthetic unit discharge time series are shown in Figure 4-23 for Goathorn-Hydro, Figure 4-24 for Telkwa-Hydro, Figure 4-25 for Tenas-Hydro B and Figure 4-26 for Four-Hydro.

Table 4-23, Table 4-24, and Table 4-25 present the monthly average streamflow, unit flow, and runoff yield for each hydrometric station based on the extended time series results, and Table 4-35 presents the monthly 7Q10.



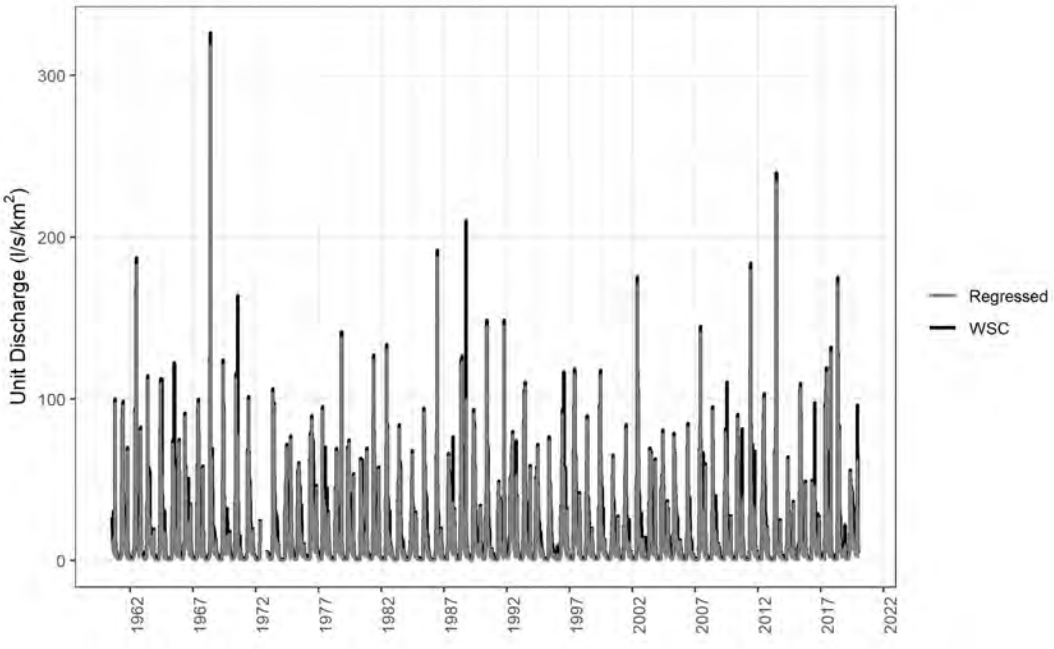

Source: Compiled in R \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\RegionalFlows\Telkwa_flows_1CT027003_Plots_njs.R

**Figure 4-23: Synthetic time series for Goathorn Hydro (red – regressed) and Water Survey of Canada Goathorn Creek Near Telkwa stations**



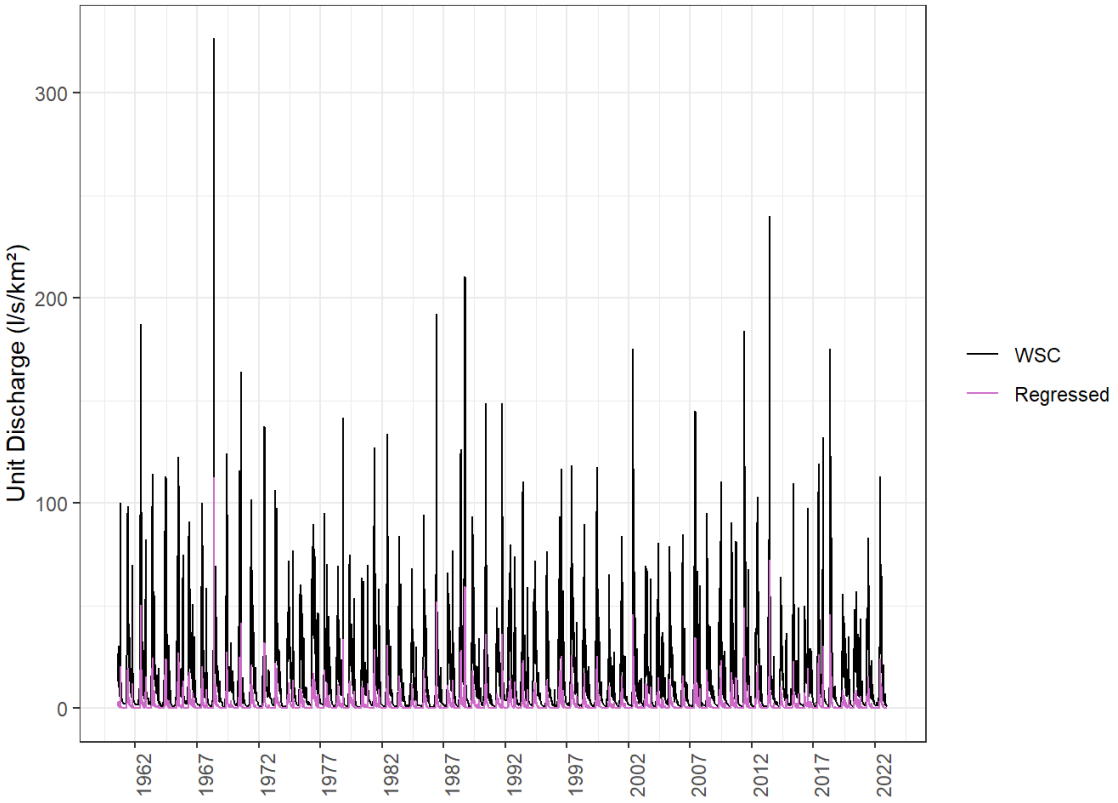

Source: Compiled in R \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\RegionalFlows\Telkwa_flows_1CT027003_Plots_njs.R

**Figure 4-24: Synthetic time series for Telkwa-Hydro (blue-regressed) and Water Survey of Canada Telkwa Below Tsai Creek stations**




Source: Compiled in R \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\RegionalFlows\Telkwa_flows_1CT027003_Plots_njs.R

**Figure 4-25: Synthetic time series for Tenas-Hydro B (grey-regressed) and Water Survey of Canada Goathorn Creek Near Telkwa stations**




Source: Compiled in R \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Figure 4-26: Synthetic time series for Four-Hydro (purple-regressed) and Water Survey of Canada Goathorn Creek Near Telkwa stations**

**Table 4-23: Average Monthly and Mean Annual Discharge ($m^3/s$)**

| Station Name | Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Ann. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goathorn-Hydro (Synthetic) | 0.4 | 0.3 | 0.3 | 1.1 | 4.5 | 4.6 | 2.9 | 1.6 | 1.2 | 1.3 | 0.9 | 0.5 | 1.7 |
| Telkwa-Hydro (Synthetic) | 6.4 | 5.3 | 5.4 | 16.2 | 74.1 | 81.9 | 45.7 | 26.5 | 20.3 | 24.5 | 13.2 | 7.5 | 27.3 |
| Tenas-Hydro B (Synthetic) | 0.075 | 0.058 | 0.065 | 0.411 | 1.907 | 1.960 | 0.670 | 0.335 | 0.245 | 0.266 | 0.310 | 0.119 | 0.537 |
| Four-Hydro (Synthetic) | 0.0007 | 0.0005 | 0.0007 | 0.0100 | 0.0684 | 0.0689 | 0.0339 | 0.0135 | 0.0094 | 0.0110 | 0.0063 | 0.0015 | 0.0188 |

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_summaries\Telkwa_1CT027.003_FlowSummaries_Collated_njs.xlsx

**Table 4-24: Average Monthly and Annual Unit Discharge (L/s/km$^2$)**

| Station Name | Area (km$^2$) | Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Ann. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goathorn-Hydro (Synthetic) | 123.5 | 2.87 | 2.6 | 2.67 | 9.12 | 36.2 | 37.1 | 23.2 | 12.9 | 10.0 | 10.7 | 7.43 | 4.1 | 13.2 |
| Telkwa-Hydro (Synthetic) | 966.9 | 6.7 | 5.5 | 5.56 | 16.8 | 76.6 | 84.7 | 47.3 | 27.4 | 20.9 | 25.3 | 13.6 | 7.7 | 28.2 |
| Tenas-Hydro B (Synthetic) | 46.75 | 1.6 | 1.2 | 1.4 | 8.8 | 40.8 | 41.9 | 14.3 | 7.2 | 5.2 | 5.7 | 6.6 | 2.5 | 11.5 |
| Four-Hydro (Synthetic) | 11 | 0.07 | 0.05 | 0.06 | 0.91 | 6.22 | 6.26 | 3.08 | 1.22 | 0.85 | 1.00 | 0.58 | 0.13 | 1.71 |

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_summaries\Telkwa_1CT027.003_FlowSummaries_Collated_njs.xlsx

**Table 4-25: Average Monthly and Annual Runoff Yield (mm)**

| Station Name | Area (km$^2$) | Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Ann. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goathorn-Hydro (Synthetic) | 123.5 | 7.7 | 6.3 | 7.2 | 23.9 | 97.0 | 95.7 | 63.0 | 34.3 | 25.7 | 28.5 | 19.3 | 10.9 | 413 |
| Telkwa-Hydro (Synthetic) | 966.9 | 17.9 | 13.4 | 14.9 | 43.5 | 205.2 | 219.5 | 126.7 | 73.4 | 54.2 | 67.8 | 35.3 | 20.6 | 892 |
| Tenas-Hydro B (Synthetic) | 46.75 | 4.3 | 3.0 | 3.7 | 22.8 | 109.2 | 108.6 | 38.3 | 19.2 | 13.6 | 15.2 | 17.2 | 6.8 | 361.8 |
| Four-Hydro (Synthetic) | 11 | 0.2 | 0.1 | 0.2 | 2.4 | 16.7 | 16.2 | 8.3 | 3.3 | 2.2 | 2.7 | 1.5 | 0.4 | 54.0 |

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\Streamflow_summaries\Telkwa_1CT027.003_FlowSummaries_Collated_njs.xlsx

### 4.2.4 Baseflow separation

The rate at which groundwater discharges into surface streams was characterized using a recursive digital filter to separate baseflow from surface runoff. A single filter parameter, typically ranging from 0.9 to 0.99 based on visual observations was incorporated (Nathan and McMahon 1990) to separate total streamflow into a baseflow component and surface runoff component for each of the local and regional hydrometric stations. In this method, the filter is passed over the data 1 to 3 times, where the more passes processed results in a more consistent seasonal baseflow value. Flow records from 2000 to 2019 were used in the separation model, and an upper range of filter parameters were incorporated to simulate a uniform baseflow regime with reduced peaks. A series of parameter combinations were tested, and select results are presented

in Attachment B, showing baseflow and total flow from 2010 to 2015. A filter parameter of 0.99 was selected with three passes (n=3).

Monthly average baseflows were calculated over the 19-year modelled period for Four-Hydro, Tenas Hydro, Telkwa Hydro, Goathorn Hydro and Bulkley River at Quick (WSC) based on the selected filter parameter inputs. Unit baseflows were calculated by dividing by respective catchment areas and are presented in Table 4-26.

**Table 4-26: Unit Baseflows (L/s/km$^2$) for Each Major Stream within Project Area**

| Month | Bulkley | Telkwa | Goathorn | Tenas | Four |
|---|---|---|---|---|---|
| 1 | 3.24 | 4.65 | 2.03 | 1.50 | 0.051 |
| 2 | 3.02 | 4.43 | 1.96 | 1.20 | 0.038 |
| 3 | 2.95 | 4.38 | 1.93 | 1.10 | 0.031 |
| 4 | 3.06 | 4.52 | 1.98 | 1.90 | 0.046 |
| 5 | 3.94 | 5.85 | 2.60 | 3.10 | 1.187 |
| 6 | 6.22 | 9.41 | 4.05 | 4.70 | 2.469 |
| 7 | 7.94 | 11.57 | 4.91 | 5.00 | 1.260 |
| 8 | 7.95 | 10.01 | 4.49 | 4.10 | 0.597 |
| 9 | 6.78 | 7.49 | 3.76 | 3.50 | 0.433 |
| 10 | 5.78 | 6.24 | 3.17 | 3.30 | 0.342 |
| 11 | 4.62 | 5.38 | 2.51 | 3.20 | 0.148 |
| 12 | 3.57 | 4.97 | 2.09 | 2.10 | 0.068 |

Source: Compiled in text from Z:\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\300_Hydrology_Update\BaseflowSeparation\UpdatedBaseflows_07212020_sab.xlsx and \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\02 - Climate Review.html

### 4.2.5 Rainfall-Runoff Model Configuration

Surface runoff is defined as the total amount of surface water discharged from a watershed and is frequently presented as the depth of water distributed evenly throughout the watershed area. The Project is located within the Goathorn Creek, Tenas Creek and Four Creek watersheds.

A daily rainfall-runoff model was generated to support streamflow estimations in the water and load balance model and to provide Project-specific runoff rates. The runoff model for the Project Area was developed using a snowmelt model (see Section 4.2.4), a minimum baseflow function, a lag time, recession coefficient and monthly runoff coefficients for each of the main catchments. Monthly runoff coefficients were calibrated automatically within GoldSim by optimizing the Nash Sutcliffe Efficiency, based on the difference between observed and modelled daily flow.

The model required long-term precipitation and temperature inputs for the same period as the synthetic streamflow datasets. The long-term Project temperature and precipitation records were adjusted using PRISM datasets to estimate climate parameters for each of the hydrometric stations. An average monthly precipitation for each hydrometric station watershed was derived from the gridded PRISM monthly precipitation model. These monthly precipitation values were compared against the monthly precipitation estimates for the Project, and a ratio was calculated for each month and each station (Table 4-27).

**Table 4-27: Monthly Precipitation Correction Factors applied to Project Precipitation based on PRISM**

| Month | Tenas Hydro | Four-Hydro | Goathorn Hydro | Telkwa Hydro | Bulkley Hydro |
|---|---|---|---|---|---|
| Jan | 2.26 | 1.30 | 1.92 | 2.07 | 1.71 |
| Feb | 2.05 | 1.19 | 1.74 | 1.89 | 1.81 |
| Mar | 2.45 | 1.42 | 2.07 | 2.29 | 2.06 |
| Apr | 2.15 | 1.39 | 1.93 | 2.05 | 1.81 |
| May | 1.42 | 1.04 | 1.25 | 1.31 | 1.12 |
| Jun | 1.25 | 1.15 | 1.27 | 1.19 | 1.08 |
| Jul | 1.15 | 1.13 | 1.20 | 1.10 | 1.02 |
| Aug | 1.45 | 1.03 | 1.29 | 1.31 | 1.14 |
| Sep | 1.83 | 1.09 | 1.55 | 1.60 | 1.30 |
| Oct | 1.85 | 1.09 | 1.59 | 1.79 | 1.70 |
| Nov | 2.34 | 1.37 | 1.97 | 2.20 | 1.93 |
| Dec | 2.35 | 1.36 | 2.00 | 2.22 | 1.90 |

Source: SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\Runoff Models\Rev2_Nov 2023\Summary_Models_20241105_rev0_jls.xlsx

A similar process was employed for temperature. A monthly average temperature for each hydrometric station watershed was derived from the gridded PRISM monthly temperature model. These monthly temperature values were compared against the monthly temperature estimates for the Project, and a correction addend was calculated for each month and each station (Table 4-28).

**Table 4-28: Monthly Average Temperature Correction Addends (in degrees Celsius) applied to Project Average Temperature based on PRISM**

| Month | Tenas Hydro | Four-Hydro | Goathorn Hydro | Telkwa Hydro | Bulkley Hydro |
|---|---|---|---|---|---|
| Jan | -0.45 | -0.24 | -0.57 | -0.45 | -0.13 |
| Feb | -0.88 | -0.37 | -1.07 | -1.03 | -0.69 |
| Mar | -1.27 | -0.43 | -1.75 | -1.66 | -0.90 |
| Apr | -1.64 | -0.68 | -2.21 | -2.14 | -1.32 |
| May | -1.74 | -0.78 | -2.25 | -2.30 | -1.55 |
| Jun | -1.81 | -0.74 | -2.26 | -2.46 | -1.41 |
| Jul | -1.77 | -0.80 | -2.19 | -2.34 | -1.25 |
| Aug | -1.48 | -0.51 | -1.89 | -2.01 | -1.06 |
| Sep | -1.28 | -0.43 | -1.68 | -1.73 | -0.62 |
| Oct | -1.17 | -0.55 | -1.68 | -1.50 | -0.76 |
| Nov | -0.93 | -0.30 | -1.21 | -1.16 | -0.43 |
| Dec | -0.32 | -0.04 | -0.40 | -0.37 | -0.28 |

Source: SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\Runoff Models\Rev2_Nov 2023\Summary_Models_20241105_rev0_jls.xlsx

Using the daily temperature and precipitation time series adjusted for each streamflow station, the remaining runoff model inputs were calibrated in order to mimic the long-term synthetic streamflow records. Calibrated inputs included monthly runoff coefficients, baseflow, lag time and recession value.

Figure 4-27 illustrates the observed and modelled flows at the Goathorn-Hydro station from August 1990 to December 2021. Results produced an average Nash Sutcliffe Efficiency (NSE) of approximately 0.42 . The modelled flow resembles the synthetic record derived from the Water Survey of Canada station flows, however, peaks in modelled flows occasionally exceed the peaks observed in the synthetic and Water Survey of Canada observed flow record.

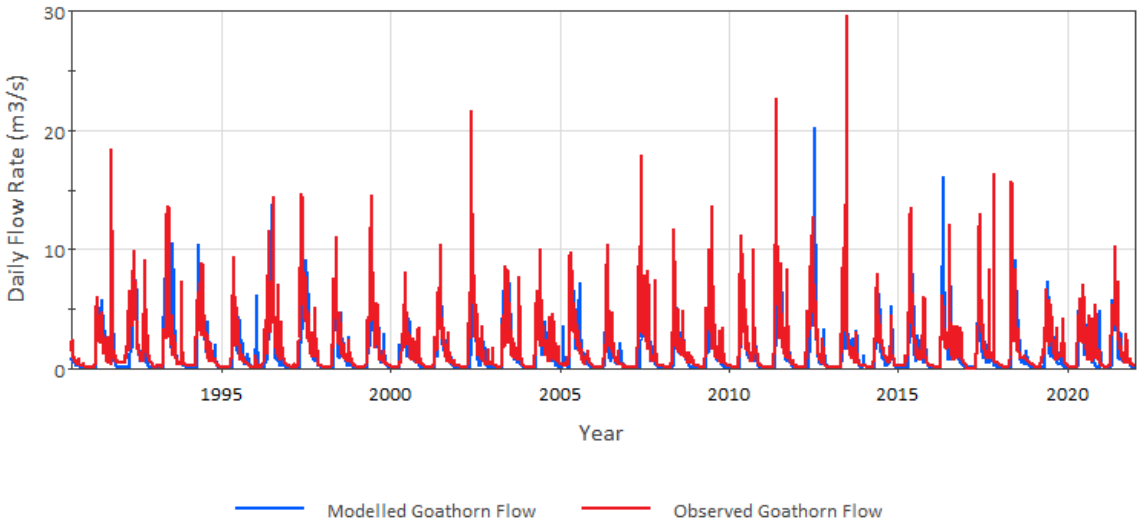



**Figure 4-27: Rainfall-Runoff Model Calibration for Goathorn Creek**

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\Runoff Models\Rev2_Nov 2023\Telkwa_FlowCalibrationModel_Goathorn_v6_20231124

This process was repeated for Tenas Creek. Monthly runoff coefficients were calibrated automatically within GoldSim by optimizing the Nash Sutcliffe Efficiency, based on the difference between observed and modelled daily flow. Figure 4-28 illustrates the measured and modelled flows at the Tenas-Hydro B station from 2017 to November 2022. Results produced an average Nash Sutcliffe Efficiency (NSE) of approximately 0.47. At this location, observed data is superimposed atop modelled flow with records from Tenas-Hydro and Tenas-Hydro B. The modelled flow record shows an underestimation of synthetic and measured flow at the Tenas-Hydro B location along Tenas Creek. Derivation of runoff coefficients was tested over multiple periods to ensure that the rainfall-runoff model flow results were as representative as possible. The rainfall-runoff model currently underestimates flows and should be revisited once more flow data is available from the Tenas-Hydro station.

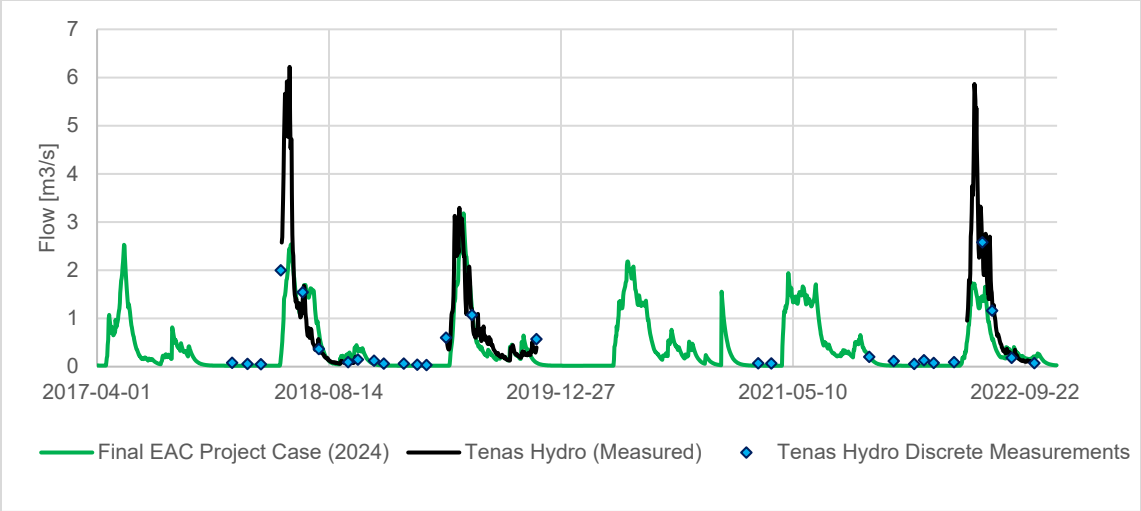



**Figure 4-28: Rainfall-Runoff Model Calibration for Tenas-Hydro B**

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\Runoff Models\Rev2_Nov 2023\Updated RainfallRunoff Results_20231124_rev01_njs.xlsx

The Bulkley River rainfall-runoff model for 2000 to 2018 resulted in a NSE value of 0.74 (Figure 4-29). The flows produced by the Bulkley River rainfall-runoff model show good correspondence with the observed flows at the Water Survey of Canada hydrometric station. For most of the observed flow record spanning 2000 to 2018, the modelled flows match or exceed peak flows. In some years, the model underestimates peak flows although the hydrograph shape remains similar despite the difference in magnitudes.

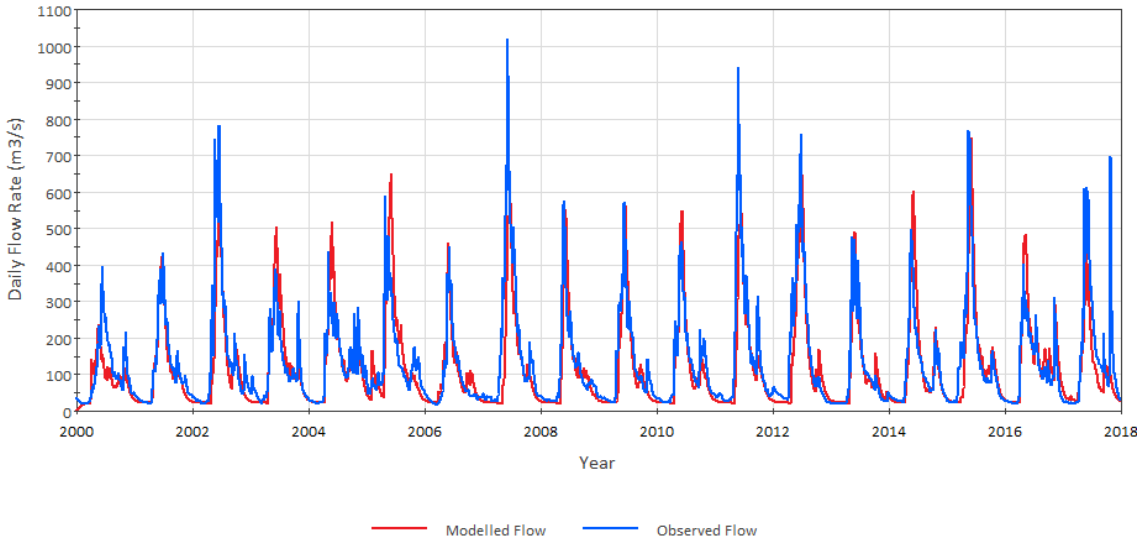



**Figure 4-29: Rainfall-Runoff Model Calibration for Bulkley River**

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\Runoff Models\Rev2_Nov 2023\Telkwa_FlowCalibrationModel_Bulkley_v2_2000-2018_20200421.gsm

The Telkwa-Hydro rainfall-runoff model is shown in Figure 4-30 for 2016 to 2022 with a NSE of 0.55. The modelled flows correspond well with the observed flow record generated for the Telkwa-Hydro station. The observed and modelled flows are typically similar in both magnitude

and shape although the modelled flow can recede more quickly post-freshet than the synthetic record leading to lower flows in early summer.

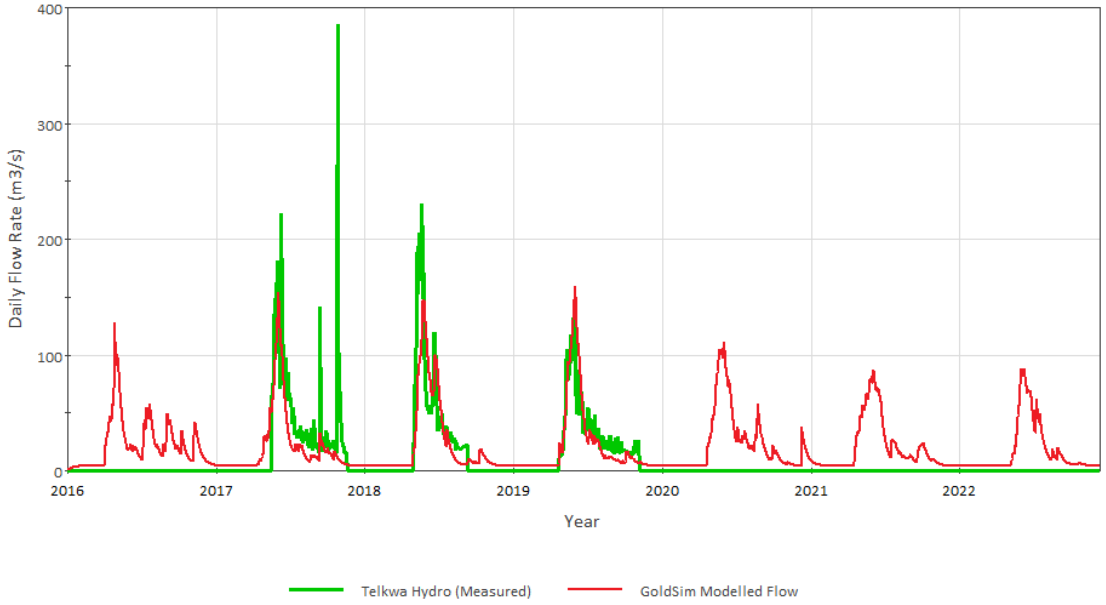



**Figure 4-30: Rainfall-Runoff Model Calibration for Telkwa River**

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\Runoff Models\Rev2_Nov 2023\Telkwa_FlowCalibrationModel_Telkwa-Hydro_v3_20200430_20240211.gsm

Calibration of Four-Hydro was conducted using the available 2020 and 2022 records. The continuous flow record in Four Creek from 1997 and 1998 did not include spring freshet (October and November 1997 and July through October 1998). For this reason, the data was not used in the model calibration. With only few flow records available, the monthly runoff coefficients are specific to the period used for calibration. Figure 4-31 presents the modelled and measured Four-Hydro flows. The calibration resulted in a NSE value of 0.64.

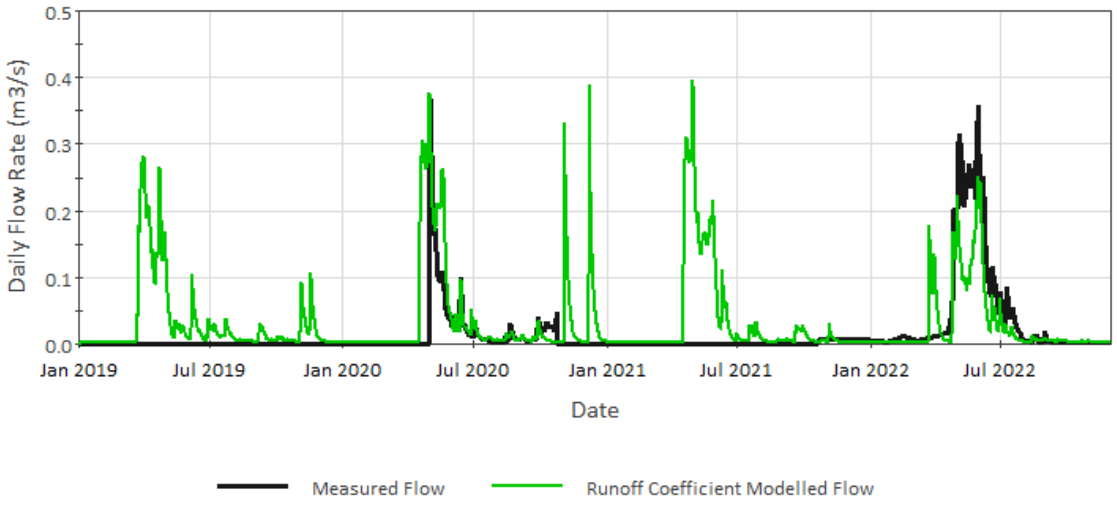



**Figure 4-31: Rainfall-Runoff Model Calibration for Four Creek**

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\Runoff Models\Rev2_Nov 2023\Telkwa_FlowCalibrationModel_Four_v3_20231212.gsm

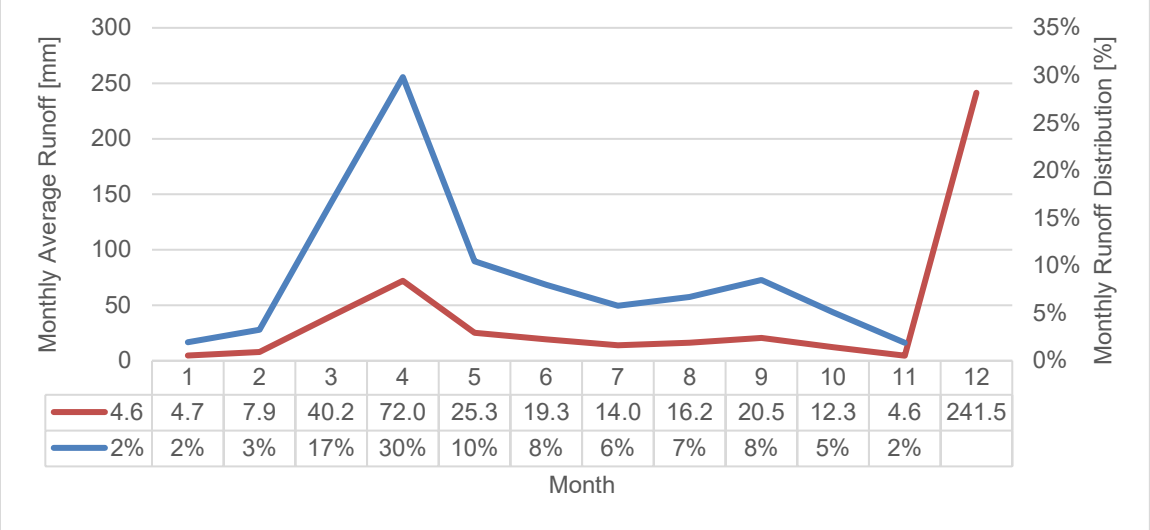
Table 4-29 presents the calibrated parameters for each catchment with the average of Tenas and Goathorn results for runoff coefficients, recession value and baseflow parameters applied to the Project Area. Four Creek parameters were developed based on the 2020 and 2022 monitoring dataset only and should be reviewed when additional data become available.

**Table 4-29: Rainfall-Runoff Model Inputs**

| Location | | Goathorn | Telkwa | Tenas | Bulkley | Four | Project |
|---|---|---|---|---|---|---|---|
| Minimum Unit Baseflow [L/s/km$^2$] | | 1.4 | 4.1 | 0.43 | 3.0 | 0.27 | 0.92 |
| Lag Time [days] | | 1 | 1 | 1 | 1 | 1 | 1 |
| Recession | | 0.90 | 0.92 | 0.91 | 0.96 | 0.77 | 0.91 |
| Runoff Coefficient | January | 1 | 1 | 1 | 1 | 1 | 1 |
| | February | 1 | 1 | 1 | 1 | 1 | 1 |
| | March | 0.45 | 1 | 1 | 1 | 0.73 | 1 |
| | April | 0.91 | 1 | 1 | 0.67 | 0.96 | 0.43 |
| | May | 0.26 | 0.78 | 0.31 | 0.54 | 0.29 | 0.30 |
| | June | 0.21 | 0.28 | 0.11 | 0.34 | 0.16 | 0.18 |
| | July | 0.76 | 0.92 | 0.12 | 0.53 | 0.44 | 0.28 |
| | August | 0.28 | 0.54 | 0.20 | 0.26 | 0.24 | 0.18 |
| | September | 0.14 | 0.28 | 0.10 | 0.35 | 0.12 | 0.24 |
| | October | 0.37 | 0.49 | 0.15 | 0.39 | 0.26 | 0.28 |
| | November | 0.14 | 0.98 | 0.88 | 0.9 | 0.51 | 0.72 |
| | December | 1 | 1 | 1 | 1 | 1 | 1 |

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\500_Water_Balance\Model\RunoffCalibration\Project_RunoffModel.gsm

The synthetic long-term Project precipitation and temperature records were incorporated to the snowmelt and runoff model to generate Project-specific runoff rates using the calibrated values from Tenas and Goathorn Creek. Figure 4-32 presents the monthly average runoff distribution based on the 41-year synthetic record (1981-2021), which produced a mean annual runoff (MAR) of 242 mm. Based on the mean annual precipitation calculated for the Project, the annual runoff coefficient is equal to 0.36.




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.6 | 4.7 | 7.9 | 40.2 | 72.0 | 25.3 | 19.3 | 14.0 | 16.2 | 20.5 | 12.3 | 4.6 | 241.5 |
| 2% | 2% | 3% | 17% | 30% | 10% | 8% | 6% | 7% | 8% | 5% | 2% | |

**Figure 4-32: Project Area Monthly Average Runoff Depth [mm] and Distribution**

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\Runoff Models\Rev2_Nov 2023\Summary_Models_20241105_rev0_jls.xlsx

A frequency analysis was performed using the time series of annual runoff rates generated from the model, producing annual runoff rates associated with a range of exceedance probabilities. Multiple distributions were tested against the historical data, including the Normal, Log Normal, Gumbel, Gamma, Pearson III, Log Pearson III, and GEV distributions, and the Gamma distribution was selected as the best statistical fit to observed data. Results of annual runoff for a range of return periods are presented in Table 4-29.

**Table 4-30: Return Periods Calculated for Mean Annual Runoff**

| Hydrological Condition | Return Period [years] | Annual Runoff [mm] |
|---|---|---|
| Wet | 1000 | 361 |
| | 500 | 351 |
| | 200 | 338 |
| | 100 | 328 |
| | 50 | 316 |
| | 25 | 304 |
| | 20 | 300 |
| | 10 | 286 |
| | 5 | 270 |
| Mean Annual Runoff (MAR) | | 240 |
| Dry | 5 | 212 |
| | 10 | 199 |
| | 20 | 188 |
| | 25 | 185 |
| | 50 | 177 |
| | 100 | 169 |
| | 200 | 163 |
| | 500 | 155 |
| | 1000 | 150 |

Source: Compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

### 4.2.6 Baseflow Review

The calibrated rainfall-runoff model incorporates a constant baseflow value for each stream. Results of the calibration were compared against the monthly baseflow estimates calculated from the baseflow separation technique described in Section 4.2.4 and are presented in Figure 4-33.

Points on the plot represent the constant and calibrated unit baseflow estimates for each stream, while lines show the monthly results from the baseflow separation model.

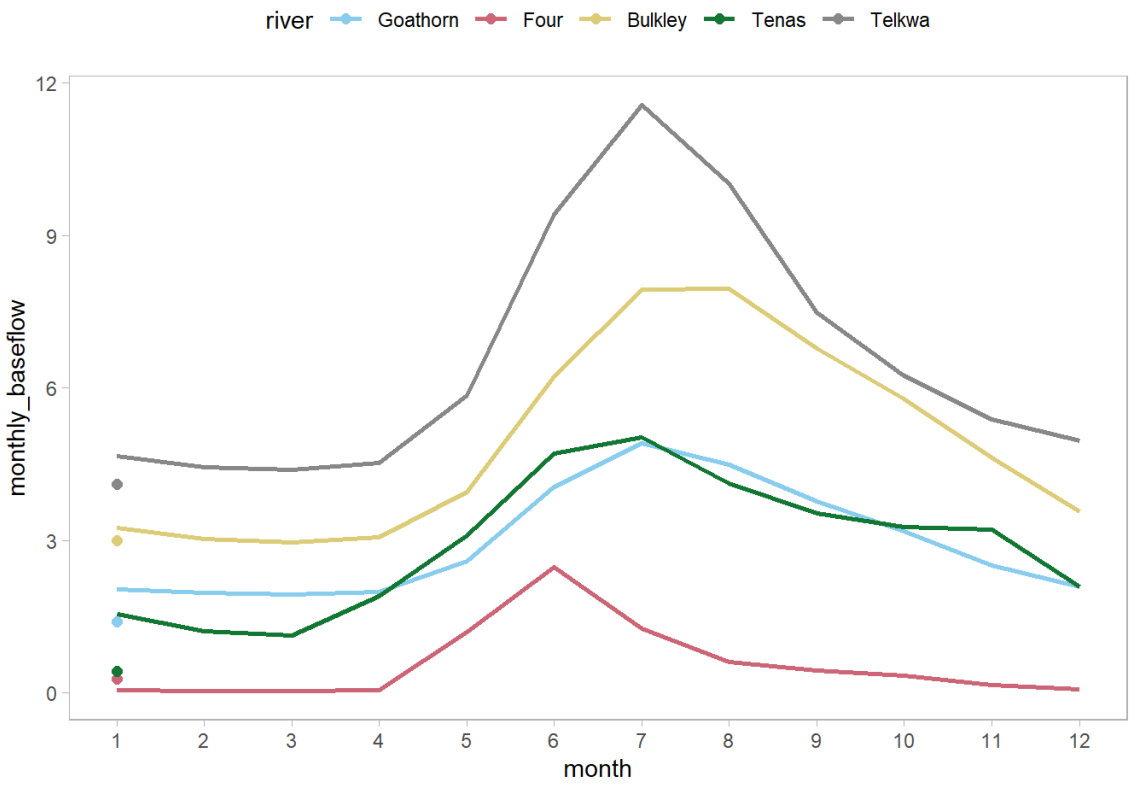



**Figure 4-33: Comparison of Calibrated Unit Baseflows and Monthly Baseflow Separation Results**

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

The constant calibrated baseflow estimates are representative of the winter and low flow monthly baseflow results from the baseflow separation. Based on the rainfall-runoff model used, the only time of year where the constant baseflow input is used is during winter months without rainfall or snowmelt. This is reasonable since the monthly runoff coefficients are calibrated to match flows in the open water season, and therefore account for baseflow contributions in their development.

The calibrated constant baseflow selected for Four-Hydro was compared against the available low-flow manual measurements collected since 2020 and presented in AGRA 1999, in the development of station rating cures. Measurement statistics are presented in Table 4-31 and show that the selected model baseflow for Four Creek, selected as 0.0030 m3/s, is approximately the mean of minimum baseflow measurements collected from Four Creek in 2020-2022.

**Table 4-31: Four Creek Baseflow and Available Measurements Comparison**

| Type | Date | Statistic | Unit Flow [L/s/km$^2$] |
|---|---|---|---|
| Manual Measurement | All year | Minimum | 0.18 |
| Manual Measurement | All year | 25th percentile | 0.59 |
| Manual Measurement | All year | 50th percentile | 1.08 |
| Manual Measurement | All year | Average | 1.71 |
| Manual Measurement | Winter | Minimum | 0.27 |
| Manual Measurement | Winter | 25th percentile | 0.73 |
| Manual Measurement | Winter | 50th percentile | 1.18 |
| Manual Measurement | Winter | Average | 1.94 |
| SRK Rainfall-Runoff Model | n.a | n.a | **0.27** |

Source: Compile in text from \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\2024_FourCreek-GW\data\Telkwa_NACAPR002055_FourCreek_flow_rev02_njs.xlsx

The calibrated constant unit baseflows were used in groundwater modeling calibration to develop base case estimates of baseflow.

### 4.2.7 Peak Flows

A peak flow analysis was performed for Tenas Creek, Goathorn Creek, Telkwa River and Four Creek based on the synthetic records detailed in section 4.2.3. The Bulkley River peak flow analysis was based on the extended records from WSC Bulkley River at Quick 08EE004 hydrometric station. Table 4-32 presents the unit peak-flows for each identified stream.

**Table 4-32: Unit Peak Flows from Extended Records [L/s/km$^2$]**

| Return Period [years] | Goathorn-Hydro (Synthetic) | Telkwa-Hydro (Synthetic) | Tenas-Hydro B (Synthetic) | Four-Hydro (Synthetic) | WSC Bulkley River at Quick 08EE004 |
|---|---|---|---|---|---|
| 1000 | 388 | 620 | 506 | 173 | 165 |
| 500 | 356 | 516 | 441 | 147 | 160 |
| 200 | 313 | 404 | 363 | 117 | 153 |
| 100 | 280 | 336 | 311 | 97 | 147 |
| 50 | 248 | 278 | 264 | 79 | 140 |
| 25 | 215 | 230 | 221 | 63 | 133 |
| 20 | 205 | 216 | 208 | 59 | 130 |
| 10 | 172 | 178 | 171 | 46 | 122 |
| 5 | 140 | 144 | 137 | 34 | 111 |
| 2 | 98 | 105 | 96 | 21 | 91 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Flows_update_rev11.Rmd and \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

### 4.2.8 Low Flows

A low flow analysis was performed for Tenas Creek, Goathorn Creek, Telkwa River and Four Creek based on the synthetic records detailed in section 4.2.8. The Bulkley River low flow analysis was based on the extended records from WSC Bulkley River at Quick 08EE004 station. Table 4-33 presents the day low-flows for each identified stream.

**Table 4-33: 7-Day Low Flows from Extended Records [L/s]**

| Return Period [years] | Goathorn-Hydro (Synthetic) | Tenas-Hydro B (Synthetic) | Telkwa-Hydro (Synthetic) | Four-Hydro (Synthetic) | WSC Bulkley River at Quick 08EE004 |
|---|---|---|---|---|---|
| 2 | 269 | 10.0 | 4,220 | 0.302 | 22,743 |
| 5 | 234 | 5.1 | 3,655 | 0.192 | 17,373 |
| 10 | 218 | 3.7 | 3,381 | 0.145 | 15,090 |
| 20 | 206 | 3.0 | 3,166 | 0.110 | 13,413 |
| 25 | 202 | 2.8 | 3,105 | 0.101 | 12,955 |
| 50 | 193 | 2.5 | 2,934 | 0.075 | 11,711 |
| 100 | 186 | 2.3 | 2,785 | 0.054 | 10,671 |
| 200 | 179 | 2.1 | 2,653 | 0.036 | 9,778 |
| 500 | 172 | 2.1 | 2,499 | 0.015 | 8,761 |
| 1000 | 167 | 2.0 | 2,393 | 0.001 | 8,087 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Flows_update_rev11.Rmd and \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

Seven-day low flows for a 10 year return period (7Q10) were also computed for Tenas Creek, Goathorn Creek,Telkwa River and Four Creek during each month of the synthetic records. Table 4-34 and Table 4-35 present the 7Q10 results for these series as low flows and unit low flows respectively.

**Table 4-34: 7-day Low Flows for 10-year Return Period for Synthetic Records**

| Station Name | Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Ann. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goathorn-Hydro (Synthetic) ($m^3/s$) | 0.24 | 0.24 | 0.23 | 0.26 | 0.99 | 1.9 | 1.2 | 0.70 | 0.51 | 0.49 | 0.32 | 0.27 | 0.22 |
| Telkwa-Hydro (Synthetic) ($m^3/s$) | 4.2 | 3.7 | 3.4 | 3.7 | 15 | 40 | 25 | 15 | 6.7 | 6.8 | 5.6 | 3.4 | 3.4 |
| Tenas-Hydro B (Synthetic) ($m^3/s$) | 0.032 | 0.028 | 0.025 | 0.037 | 0.354 | 0.665 | 0.232 | 0.125 | 0.082 | 0.070 | 0.058 | 0.038 | 0.025 |
| Four-Hydro (Synthetic) (L/s) | 0.21 | 0.18 | 0.17 | 0.25 | 6.04 | 16.40 | 6.70 | 3.18 | 1.96 | 1.40 | 0.50 | 0.27 | 0.14 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Flows_update_rev11.Rmd and \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Table 4-35: 7-day Unit Low Flows for 10-year Return Period Flows for Synthetic Records (L/s/km$^2$)**

| Station Name | Area (km$^2$) | Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Ann. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goathorn-Hydro (Synthetic) | 123.5 | 1.94 | 1.94 | 1.86 | 2.11 | 8.02 | 15.4 | 9.72 | 5.67 | 4.13 | 4.00 | 2.59 | 2.19 | 1.78 |
| Telkwa-Hydro (Synthetic) | 966.9 | 4.34 | 3.83 | 3.52 | 3.83 | 15.5 | 41.4 | 25.9 | 15.5 | 6.93 | 7.03 | 5.79 | 3.52 | 3.52 |
| Tenas-Hydro B (Synthetic) | 46.75 | 0.69 | 0.60 | 0.52 | 0.80 | 7.56 | 14.21 | 4.96 | 2.67 | 1.76 | 1.51 | 1.25 | 0.81 | 0.52 |
| Four-Hydro (Synthetic) | 11 | 0.82 | 0.72 | 0.64 | 0.95 | 1.59 | 0.87 | 0.1 | 0.08 | 0.19 | 0.24 | 1.43 | 0.96 | 0.04 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Flows_update_rev11.Rmd and \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

# 5 Climate Change

Climate change is considered one of human civilization's many challenges as it has the potential to impact current social and ecological systems. Estimating potential variation in future climate conditions to identify vulnerability, assess risk and develop adaptive management strategies is in the best interest of mine developers and operators.

The section below discusses climate change trends and effects that may impact the Project. This analysis was completed for temperature and precipitation, and incorporated into the evaporation and streamflow models discussed in Section 4.

## 5.1 Contextual Framework

While observed historical datasets have traditionally been used to investigate climate patterns and trends, global circulation models (GCMs, aka climate change models) are better suited to generate synthetic datasets with which to investigate the potential range of impacts of climate change into the future on a global or continental scale. GCM results can be scaled to local weather station datasets or gridded climate datasets to provide localized, site-specific projections.

The Coupled Model Intercomparison Project (CMIP) is organized under the support of the World Climate Research Program's (WCRP) working group on coupled modelling. It coordinates experiments on coupling computer-based models of the Earth's climate such as GCMs. The objective of CMIP is to better understand past, present, and future climate change arising from natural unforced variability or in response to changes in radiative forcing in a multi-model context (Eyring 2016). The CMIP is currently in its sixth phase (CMIP6) and its outcomes contribute to the most recent assessments and reports from the International Panel on Climate Change (IPCC).

CMIP6 includes the most up to date and peer-reviewed models for the simulation and projection of various aspects of climate change. The CMIP6 models include new and better representations of physical, chemical, and biological processes at higher resolution than its previous phases. This has improved the simulation of the recent mean state of most large-scale indicators of climate change and many other aspects across the climate system.

This climate change assessment was based on results from GCMs included in CMIP6 and the corresponding IPCC Sixth Assessment Report (AR6) (Masson-Delmotte, 2021). The data compilation and subsequent analysis was conducted in the R Software (R Core Team, 2023) environment.

## 5.2 Climate Change Methodology

Climate change scenarios were evaluated considering Shared Socioeconomic Pathways (SSP). SSPs are a set of scenarios that describe potential future developments in the absence of climate policy intervention. These pathways are used to explore the possible impacts of different socioeconomic trends on climate change and to assess the challenges associated with mitigation and adaptation strategies. Figure 5-1 shows possible combinations of SSPs with different radiative forcing levels. Four scenarios (Tier 1) are generally recommended for climate change assessments - SSP 1-2.6, SSP 2-4.5, SSP 3-7.0 and SSP 5-8.5 (O'Neill, et al., 2016)-, which span the range of radiative forcing levels and SSPs.

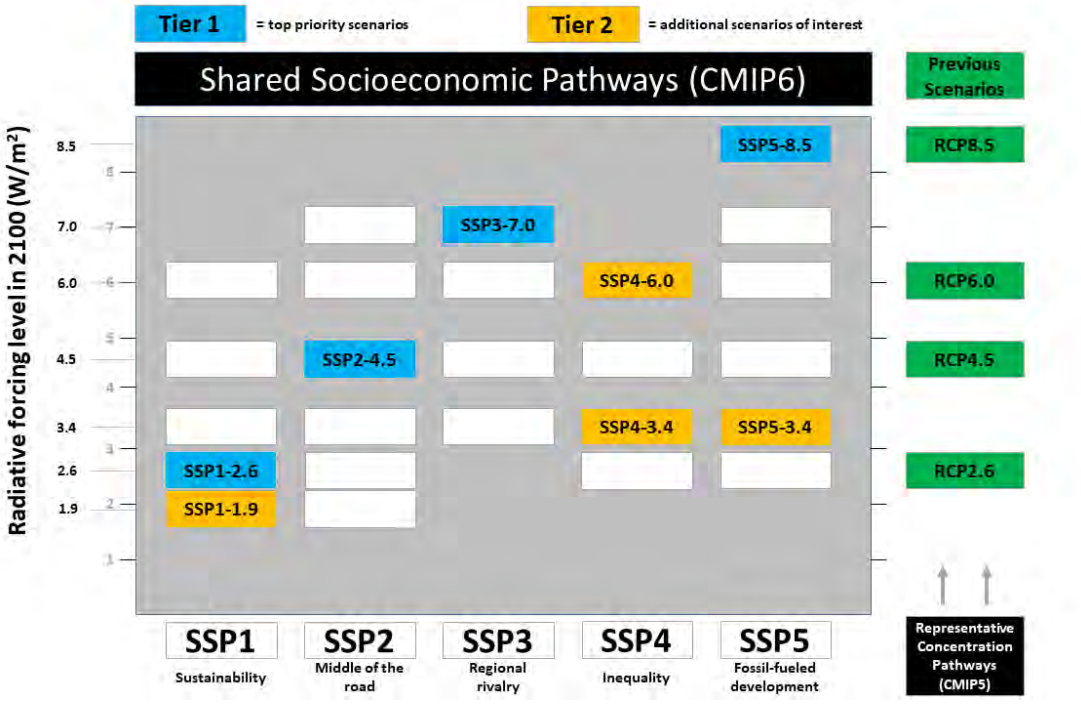



**Figure 5-1: Shared Socio-economic Pathways and year 2100 radiative forcing combinations**

Source: https://climate-scenarios.canada.ca/?page=cmip6-overview-notes

A short description of these scenarios is provided below.

- SSP5-8.5: With an additional radiative forcing of 8.5 W/m² by the year 2100, this scenario represents the upper boundary of the range of scenarios described in the literature. It can be understood as an update of the CMIP5 scenario RCP8.5, now combined with socioeconomic reasons.
- SSP3-7.0: With 7 W/m² by the year 2100, this scenario is in the upper-middle part of the full range of scenarios. It was newly introduced after the RCP scenarios, closing the gap between RCP6.0 and RCP8.5.
- SSP2-4.5: As an update to scenario RCP4.5, SSP245 with an additional radiative forcing of 4.5 W/m² by the year 2100 represents the medium pathway of future greenhouse gas emissions. This scenario assumes that climate protection measures are being taken.
- SSP1-2.6: This scenario with 2.6 W/m² by the year 2100 is a remake of the optimistic scenario RCP2.6 and was designed with the aim of simulating a development that is compatible with the 2°C target. This scenario, too, assumes climate protection measures being taken.

National Aeronautics and Space Administration (NASA) provides access to gridded global climate data NEX-GDDP-CMIP6 (Thrasher, et al., 2022), which comprises 26 CMIP6 models for the period of 1950 – 2100, with historical results from 1950 to 2014 and forecast results from 2015 to 2100. Data for the Tenas Project location were obtained and processed by SRK to evaluate predicted trends up to year 2100, deemed the maximum reasonable prediction range (IPCC, 2023).

Once the Global Circulation Models (GCM) are developed in a coarse spatial resolution, a bias correction procedure is required to adjust their estimates to represent local climate conditions of a specific site considering its microclimate. In this work, GCM historical and forecasted data are bias corrected with Quantile Delta Mapping (QDM) (Cannon, Sobie, & Murdock, 2015) referencing the derived historical timeseries introduced in Section 4 as the observed variables. QDM is applied to the meteorological variables grouped by month – i.e., the bias correction preserves month-specific variability.

Each model under each different SSP represents one possible future climate scenario. Summarizing the models' results by the median or average may facilitate the interpretation and provide insights into agreement among models, but it may hinder extreme conditions that are usually of interest to stakeholders for risk assessment. Thus, SRK chose to show the results for four conditions that will encompass extreme cases of high and low water availability, as well as an average case that will represent the midpoint trend of the GCMs.

Projected climate change effects were evaluated relative to a defined baseline period for three consecutive 30-year forecast periods, defined as follows:

- Baseline period from 1985 to 2014 (CMIP6)
- First forecast period from 2015 to 2040 (CMIP6)
- Second forecast period from 2041 to 2070 (CMIP6)

- Third forecast period from 2071 to 2100 (CMIP6)

One model within the GCM/SSP ensamble was selected to represent each of the following four conditions for each forecast period:

- Minimum long term net water balance (precipitation - evaporation) – $min_{(P-E)}$
- Maximum long term net water balance – $max_{(P-E)}$
- Midpoint condition (median precipitation with median evaporation) – $med_P med_E$
- Lowest long term Precipitation – $min_P$

These conditions were selected based on the critical components of the Project, and aim to cover climate change related uncertainty during the life of the Project.

The following sections present the climate change analysis for mean annual and monthly air temperature as well as mean annual and monthly precipitation. Changes to lake evaporation and streamflow were also assessed based on the climate change forecasts.

## 5.3 Model Selection

For each time period, the models were assessed by comparing rates of change for precipitation and evaporation in order to identify extreme and average conditions. Figure 5.2 showcases these rates of change envelope for modelled climate outcomes from the GCM's for all scenarios. Models selected by SRK to illustrate the range of climate change outcomes are highlighted (thick circle lines). The selected models are also presented in Table 5-1.

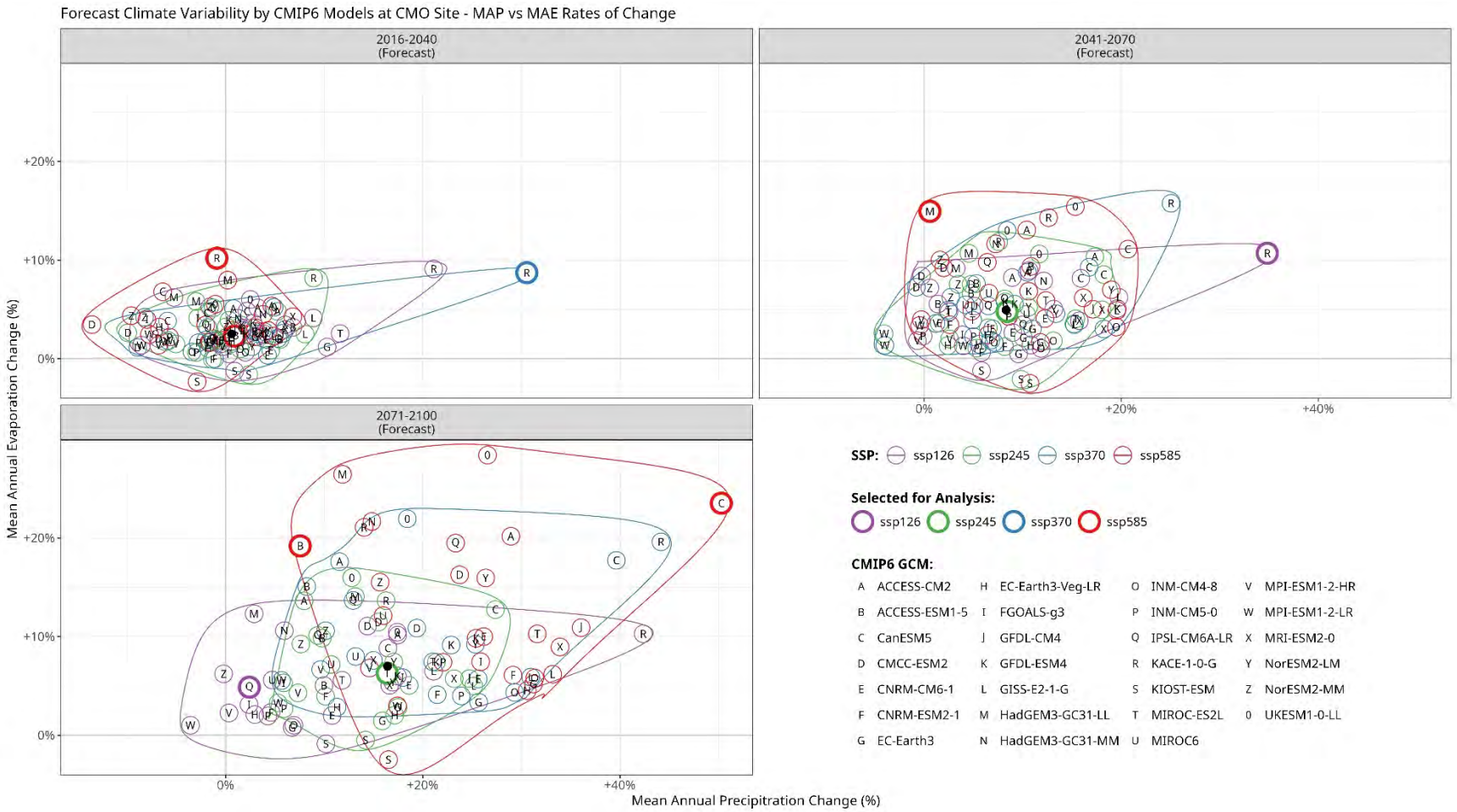



**Figure 5.2: Model selection per forecast period**

Source: SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\Climate Change Update\figures\cc_model_prcp_evap.tif

**Table 5-1: Adopted models for each forecast period**

| Forecast Period | Condition | Model (SSP) |
|---|---|---|
| 2015 – 2040 | $med_P med_E$ | MIROC-ES2L (SSP5-8.5) |
| | $max_{(P-E)}$ | KACE-1-0-G (SSP3-7.0) |
| | $min_{(P-E)}$ | KACE-1-0-G (SSP5-8.5) |
| | $min_P$ | CMCC-CM2-SR5 (SSP2-4.5) |
| 2051 – 2070 | $med_P med_E$ | GISS-E2-1-G(SSP2-4.5) |
| | $max_{(P-E)}$ | KACE-1-0-G(SSP1-2.6) |
| | $min_{(P-E)}$ | HadGEM3-GC31-LL(SSP5-8.5) |
| | $min_P$ | IITM-ESM(SSP3-7.0) |
| 2071 – 2100 | $med_P med_E$ | MIROC-ES2L(SSP2-4.5) |
| | $max_{(P-E)}$ | CanESM5(SSP5-8.5) |
| | $min_{(P-E)}$ | ACCESS-ESM1-5(SSP5-8.5) |
| | $min_P$ | IPSL-CM6A-LR(SSP1-2.6) |

## 5.4 Climate Change Effects to Temperature

### 5.4.1 Annual Temperature Trends

Figure 5-3 presents the mean annual air temperature (MAAT) from the Project record during the baseline period, as well as the historical CMIP6 ensemble results over the same period and the forecasted MAAT for the four different SSPs.

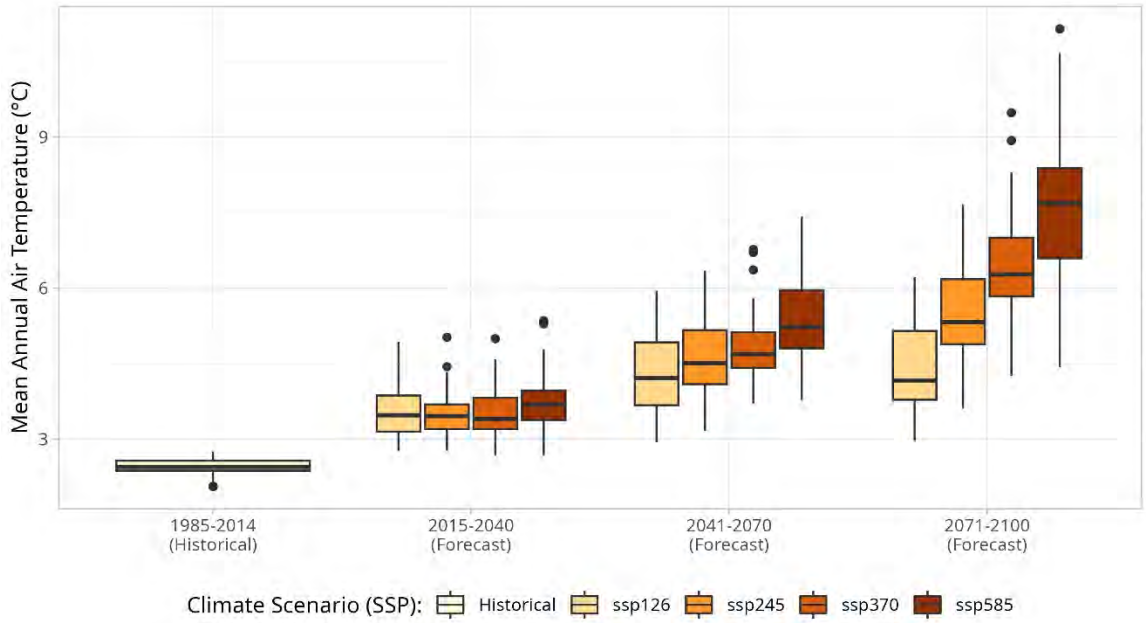



**Figure 5-3: Forecast of Climate Change Effect on Mean Annual Air Temperature**

Source: SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\Climate Change Update\figures\cc_periods_tavg.tiff

Table 5-2 presents the rates of change relative to the historical results for the four conditions up to year 2100 using CIMP6 data.

**Table 5-2: MAAT Increase from Baseline (in °C)**

| Timeframe | $med_P med_E$ | $max_{(P-E)}$ | $min_{(P-E)}$ | $min_P$ |
|---|---|---|---|---|
| 2015-2040 | 1.0 | 2.5 | 2.8 | 0.4 |
| 2041-2070 | 2.2 | 3.1 | 4.1 | 1.3 |
| 2071-2100 | 2.3 | 8.2 | 5.7 | 1.7 |

Source: compiled in text from R code SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\Climate Change Update\report\climate_change_rev0.html

Based on the selected scenarios, the mean annual temperature for the Project is expected to increase by 2°C to 8°C by year 2100.

### 5.4.2 Monthly Temperature Rates of Change

Monthly impacts to temperature as a result of climate change were evaluated using the same methodology as described above. The projections are shown below in Table 5-3 for the four conditions and three time periods.

**Table 5-3: Monthly Average Temperature Increase from Baseline (in °C)**

| Period | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **$med_P med_E$** | | | | | | | | | | | | | |
| 2015-2040 | 0.9 | 1.0 | 1.0 | 1.2 | 1.0 | 1.5 | 1.0 | 0.9 | 1.0 | 0.9 | 1.3 | 0.1 | 1 |
| 2041-2070 | 4.0 | -0.4 | 2.4 | 1.6 | 1.2 | 1.6 | 2.5 | 3.6 | 2.4 | 2.0 | 2.7 | 2.3 | 2.2 |
| 2071-2100 | 2.6 | 1.9 | 1.5 | 2.1 | 2.0 | 2.2 | 2.4 | 2.4 | 2.5 | 1.6 | 3.3 | 2.5 | 2.3 |
| **$max_{(P-E)}$** | | | | | | | | | | | | | |
| 2015-2040 | 1.7 | 2.1 | 2.4 | 1.4 | 1.3 | 3.3 | 3.7 | 3.2 | 2.3 | 1.3 | 3.0 | 4.8 | 2.5 |
| 2041-2070 | 3.1 | 2.5 | 2.1 | 1.9 | 2.4 | 3.8 | 4.5 | 3.8 | 3.0 | 2.1 | 3.5 | 4.7 | 3.1 |
| 2071-2100 | 10.8 | 8.8 | 6.3 | 7.1 | 9.4 | 8.0 | 7.6 | 8.8 | 8.2 | 7.8 | 8.2 | 7.8 | 8.2 |
| **$min_{(P-E)}$** | | | | | | | | | | | | | |
| 2015-2040 | 1.6 | 2.5 | 3.2 | 2.1 | 2.2 | 3.6 | 3.6 | 3.4 | 2.5 | 1.5 | 3.3 | 4.5 | 2.8 |
| 2041-2070 | 4.4 | 3.8 | 3.5 | 3.4 | 4.7 | 4.6 | 4.9 | 4.4 | 3.4 | 3.9 | 4.7 | 3.0 | 4.1 |
| 2071-2100 | 5.3 | 5.2 | 3.9 | 5.1 | 6.2 | 4.6 | 7.6 | 7.1 | 6.4 | 6.0 | 4.9 | 5.5 | 5.7 |
| **$min_P$** | | | | | | | | | | | | | |
| 2015-2040 | -1.4 | -0.1 | -0.4 | 0.2 | 0.8 | 1.2 | 2.3 | 1.3 | 1 | 0.3 | 0.8 | -1.3 | 0.4 |
| 2041-2070 | -0.4 | 1.4 | 1.1 | 1.5 | 1.3 | 1.5 | 1.3 | 1.2 | 1.3 | 1.2 | 2.0 | 1.8 | 1.3 |
| 2071-2100 | 0.4 | 2.9 | 1.6 | 1.5 | 2.3 | 2.3 | 1.6 | 1.8 | 1.9 | 1.6 | 1.4 | 1.5 | 1.7 |

Source: compiled in text from R code SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\Climate Change Update\report\climate_change_rev0.html

## 5.5 Climate Change Effects to Precipitation

### 5.5.1 Annual Precipitation Trends

Figure 5-4 illustrates the mean annual precipitation (MAP) from the Project record during the baseline period, as well as the historical CMIP6 ensemble results over the same period, and the forecasted forecast MAP for the four different SSPs.

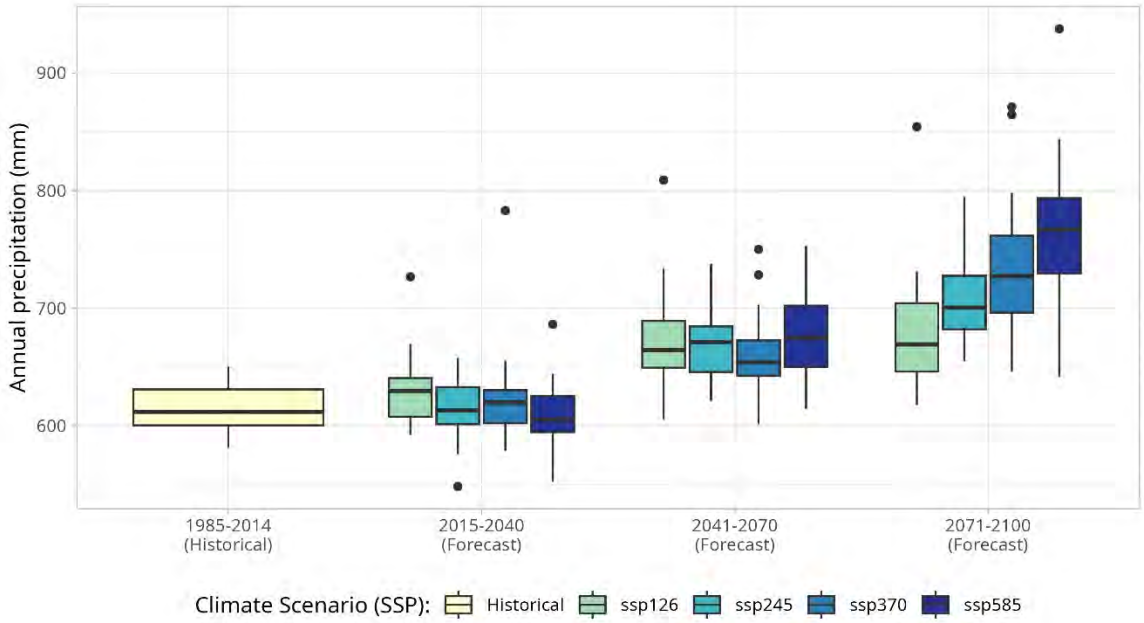



**Figure 5-4: Forecast of Climate Change Effect on Mean Annual Precipitation**

Source: R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\Climate Change Update\report\climate_change_rev0.html

Table 5-4 presents the percent increase of mean annual precipitation for the three RCPs up to 2100.

**Table 5-4: Mean Annual Precipitation Percent Increase from Historical Baseline Average**

| Timeframe | $med_P med_E$ | $max_{(P-E)}$ | $min_{(P-E)}$ | $min_P$ |
|---|---|---|---|---|
| 2015-2040 | 1% | 31% | -1% | -13% |
| 2041-2070 | 8% | 35% | 1% | -5% |
| 2071-2100 | 16% | 50% | 8% | 2% |

Source: R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\Climate Change Update\report\climate_change_rev0.html

### 5.5.2 Monthly Precipitation Rates of Change

Monthly impacts to precipitation as a result of climate change were evaluated using the same methodology as described above. The projections are shown below in Table 5-5 for the four conditions and three time periods.

**Table 5-5: Monthly Average Precipitation Percent Increase from Baseline**

| Period | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **$med_P med_E$** | | | | | | | | | | | | | |
| 2015-2040 | 14% | -29% | 10% | -21% | 3% | 13% | -2% | -5% | 17% | -2% | -8% | 15% | 1 |
| 2041-2070 | 18% | -15% | 5% | -2% | 16% | 13% | 3% | -15% | 30% | 19% | 5% | 10% | 2.2 |
| 2071-2100 | 46% | -36% | 28% | -8% | 29% | 28% | 17% | 4% | 33% | 2% | 16% | 30% | 2.3 |
| **$max_{(P-E)}$** | | | | | | | | | | | | | |
| 2015-2040 | 83% | 1% | 34% | 9% | 35% | 92% | 38% | -13% | 87% | 5% | -5% | 4% | 2.5 |
| 2041-2070 | 69% | 18% | 69% | 17% | 80% | 103% | 38% | -13% | 69% | 4% | 8% | -5% | 3.1 |
| 2071-2100 | 63% | 49% | 66% | 51% | 61% | 14% | 6% | -8% | 49% | 75% | 85% | 62% | 8.2 |
| **$min_{(P-E)}$** | | | | | | | | | | | | | |
| 2015-2040 | 19% | -3% | 26% | -26% | -18% | -19% | -15% | -28% | -6% | -6% | 22% | 15% | 2.8 |
| 2041-2070 | 0% | 15% | -19% | -2% | 27% | 6% | -18% | -31% | 5% | 27% | 3% | -15% | 4.1 |
| 2071-2100 | -4% | -17% | 36% | 58% | 26% | -18% | -47% | 1% | 32% | 1% | 49% | 8% | 5.7 |
| **$min_P$** | | | | | | | | | | | | | |
| 2015-2040 | -8% | -19% | -17% | -5% | -17% | -30% | -6% | 1% | -6% | -16% | -5% | -19% | 0.4 |
| 2041-2070 | -17% | -22% | -14% | -5% | -10% | -15% | -2% | 7% | 9% | 12% | -13% | 6% | 1.3 |
| 2071-2100 | -6% | 21% | 9% | -10% | 23% | 32% | 17% | 1% | -18% | 8% | -20% | 4% | 1.7 |

Source: compiled in text from R code SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\Climate Change Update\report\climate_change_rev0.html

### 5.5.3 Extreme Precipitation with Climate Change

Rates of change for extreme precipitation under climate change conditions were estimated for each time period. Rates of change are expressed by the ratio between future and historical precipitation for a set of return periods. For this, the Generalized Extreme Value (GEV) distribution was fitted using L-moments method (Hosking, 2023) to bias corrected historical and future annual maximum daily rainfall to represent extreme precipitation frequency under historical and projected future conditions. The rates of change are provided in Table 5-6. Depth-Duration-Frequency can be obtained by multiplying the historical quantiles (Table 4-8) by the rates of change presented in this section.

**Table 5-6: Rates of change for Project Depth-Duration-Frequency Curves with Climate Change**

| Percentile | Return Period | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 1000 |
| Period 2015 – 2040 | | | | | | | | |
| 10 | −9% | −12% | −12% | −15% | −18% | −21% | −24% | −30% |
| 25 | −4% | −2% | −3% | −6% | −7% | −10% | −12% | −15% |
| 50 | 4% | 5% | 4% | 6% | 7% | 6% | 4% | 4% |
| 75 | 11% | 13% | 15% | 18% | 22% | 25% | 29% | 34% |
| 90 | 18% | 23% | 25% | 32% | 39% | 50% | 57% | 66% |

| Percentile | Return Period | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 1000 |
| Period 2041 – 2070 | | | | | | | | |
| 10 | −3% | −5% | −5% | −8% | −10% | −14% | −18% | −24% |
| 25 | 3% | 2% | 1% | −1% | −5% | −8% | −10% | −12% |
| 50 | 11% | 10% | 10% | 9% | 12% | 14% | 14% | 15% |
| 75 | 18% | 21% | 21% | 26% | 29% | 31% | 36% | 43% |
| 90 | 28% | 33% | 35% | 40% | 46% | 56% | 62% | 82% |
| Period 2071 – 2100 | | | | | | | | |
| 10 | 2% | 2% | 2% | −1% | −4% | −5% | −9% | −14% |
| 25 | 11% | 9% | 10% | 10% | 9% | 8% | 6% | 3% |
| 50 | 20% | 20% | 21% | 23% | 24% | 25% | 26% | 28% |
| 75 | 29% | 32% | 32% | 38% | 46% | 54% | 64% | 75% |
| 90 | 38% | 43% | 47% | 56% | 65% | 74% | 87% | 118% |

Source: Compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\Climate Change Update\report\climate_change_rev0.html

## 5.6 Climate Change Effects to Lake Evaporation

Changes to lake evaporation were assessed by updating the Morton CRWE methodology described in Section 2.3.7 with the temperature changes obtained for RCP 4.5 and presented in Table 5-6. The maximum temperature, minimum temperature and dew temperature Project time series were updated using the same net increase rates. Note that the model did not apply a climate change adjustment to solar radiation. Table 5-7 presents the monthly rates of change relative to the baseline lake evaporation.

**Table 5-7: Monthly Lake Evaporation Percentual Variation from Baseline**

| Period | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **$med_P med_E$** | | | | | | | | | | | | | |
| 2015-2040 | 0% | 2% | -1% | 3% | 2% | 5% | 3% | 2% | 3% | 1% | 2% | -0% | **2%** |
| 2041-2070 | 2% | -0% | 2% | 4% | 1% | 3% | 6% | 13% | 6% | 1% | 1% | 1% | **5%** |
| 2071-2100 | 2% | 3% | 3% | 7% | 5% | 6% | 8% | 9% | 5% | 2% | 2% | 2% | **6%** |
| **$max_{(P-E)}$** | | | | | | | | | | | | | |
| 2015-2040 | 2% | 3% | 1% | -1% | 2% | 14% | 16% | 15% | 6% | 0% | 4% | 4% | **9%** |
| 2041-2070 | 3% | 3% | -0% | 1% | 3% | 15% | 21% | 15% | 12% | 3% | 4% | 4% | **11%** |
| 2071-2100 | 9% | 13% | 4% | 9% | 22% | 25% | 30% | 34% | 30% | 39% | 4% | 6% | **24%** |
| **$min_{(P-E)}$** | | | | | | | | | | | | | |
| 2015-2040 | 2% | 4% | -1% | 2% | 1% | 18% | 19% | 15% | 9% | 2% | 5% | 4% | **10%** |
| 2041-2070 | 3% | 6% | 10% | 7% | 8% | 18% | 24% | 22% | 14% | 3% | 7% | 3% | **15%** |
| 2071-2100 | 10% | 13% | 6% | 10% | 14% | 18% | 32% | 25% | 24% | 9% | 4% | 9% | **19%** |
| **$min_P$** | | | | | | | | | | | | | |
| 2015-2040 | 1% | 2% | 6% | 1% | 4% | 2% | 4% | 5% | 6% | 3% | 2% | 2% | **3%** |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2041-2070[2] | 3% | 3% | 4% | 2% | 5% | 6% | 8% | 7% | 9% | 0% | 2% | 3% | **6%** |
| 2071-2100 | 1% | 3% | 1% | 1% | 4% | 7% | 5% | 7% | 9% | 1% | 2% | 2% | **5%** |

Source: Compiled in text from R code \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\Climate Change Update\report\climate_change_rev0.html

**Notes:**

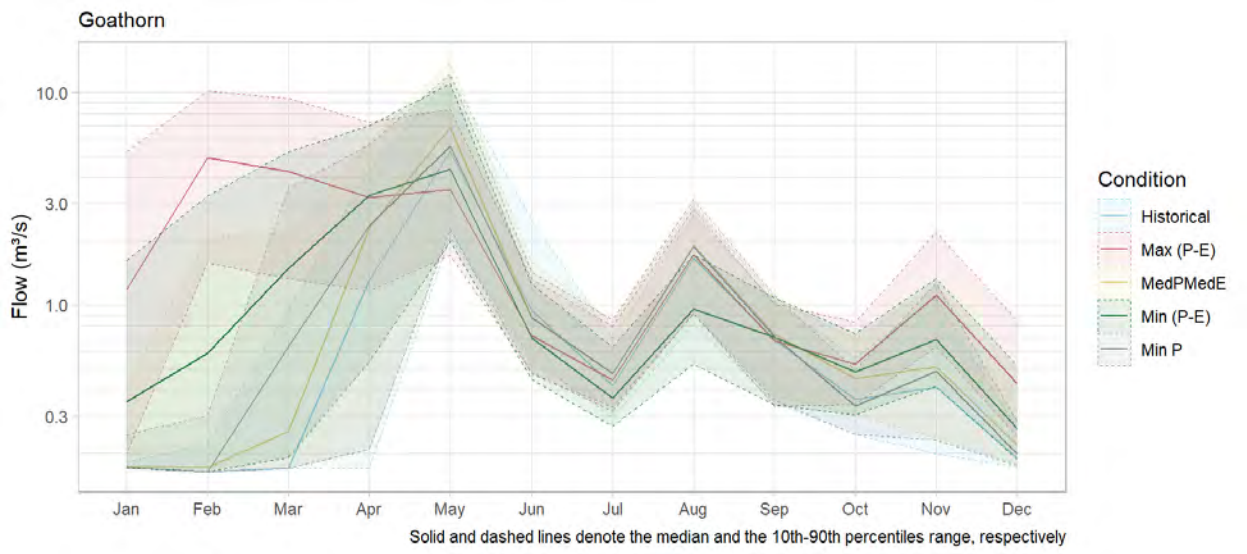
1. Not able to calculate lake evaporation with the selected model. Replaced by the model with second lowest precipitation – CMCC-ESM2 (SSP5-8.5)
2. Not able to calculate lake evaporation with the selected model. Replaced by the model with second lowest precipitation – ACCESS-ESM1-5 (SSP126)

## 5.7 Climate Change Effects to Streamflow

The calibrated rainfall-runoff model was updated to include the projected rates of change to temperature and precipitation. Calibrated monthly runoff coefficients and baseflow values were incorporated for each major stream. Monthly flows from historic climate were compared against monthly flows projected in 2100 based on the monthly climate change variability.

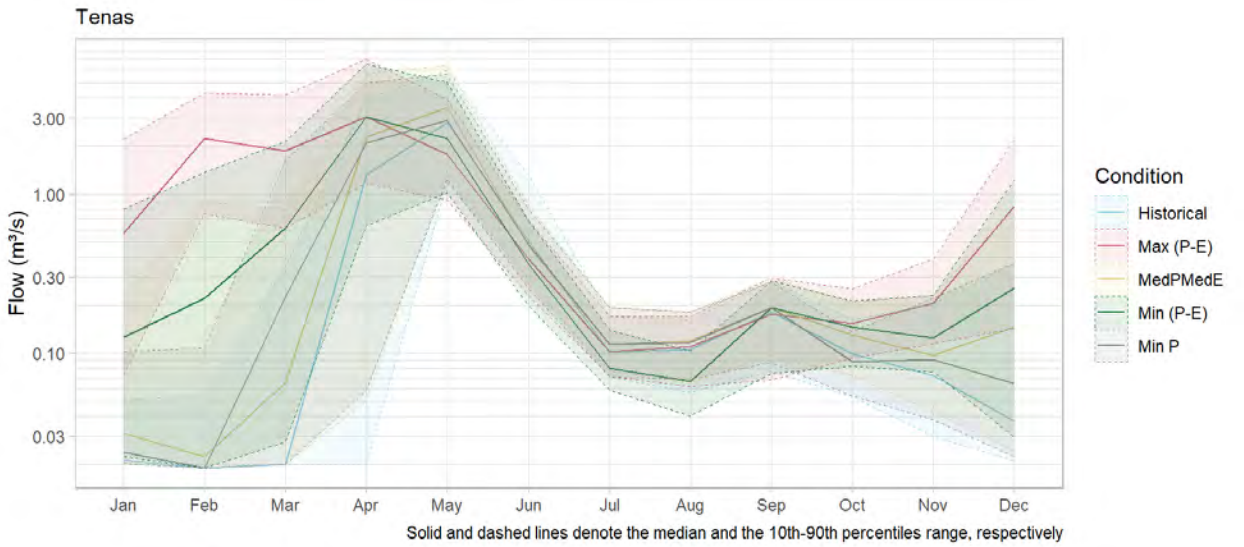
The runoff model was simulated for 100 realizations under historic conditions and projected climate change conditions (year 2100). The 50$^{th}$ percentile (median), 10$^{th}$ percentile (low flow) and 90$^{th}$ percentile (high flow) statistics were extracted from the realization record, and are compared in each creek for historic conditions versus 2100 climate change conditions.

Historic monthly streamflow for each percentile and both historic and climate change conditions are presented in Figure 5-5 for Goathorn Creek, Figure 5-6 for Tenas Creek, Figure 5-7 for Telkwa River, Figure 5-8 for Bulkley River and Figure 5-9 for Four Creek, where the solid lines represent the median results and dashed lines the 10$^{th}$ and 90$^{th}$ percentiles.



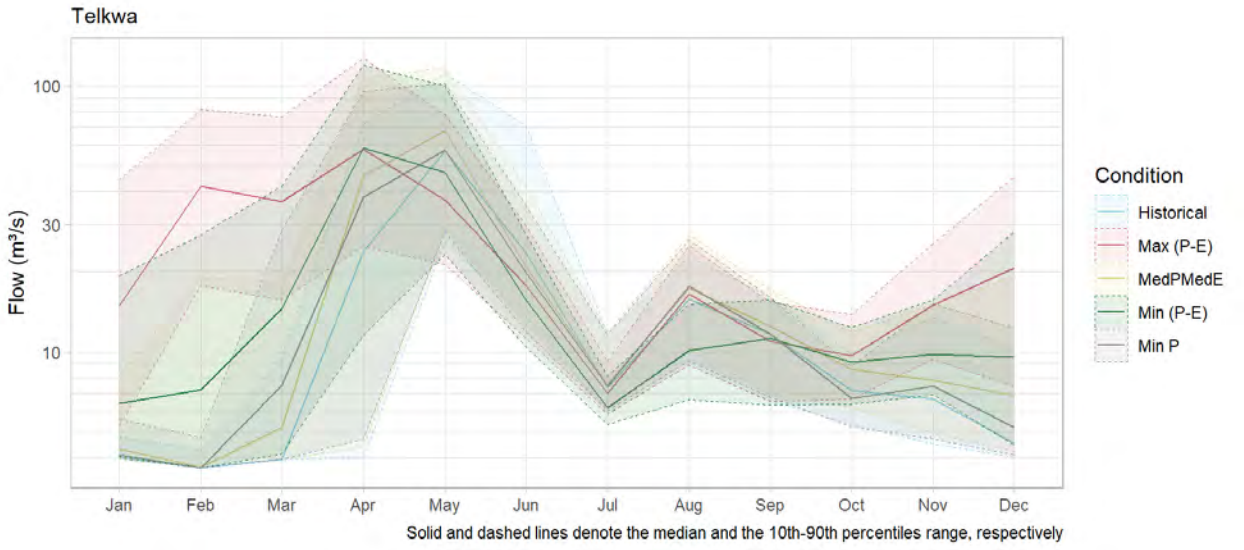

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Figure 5-5: Goathorn Creek Monthly Streamflow Summary for Historical Conditions and Climate Change Conditions in 2100**



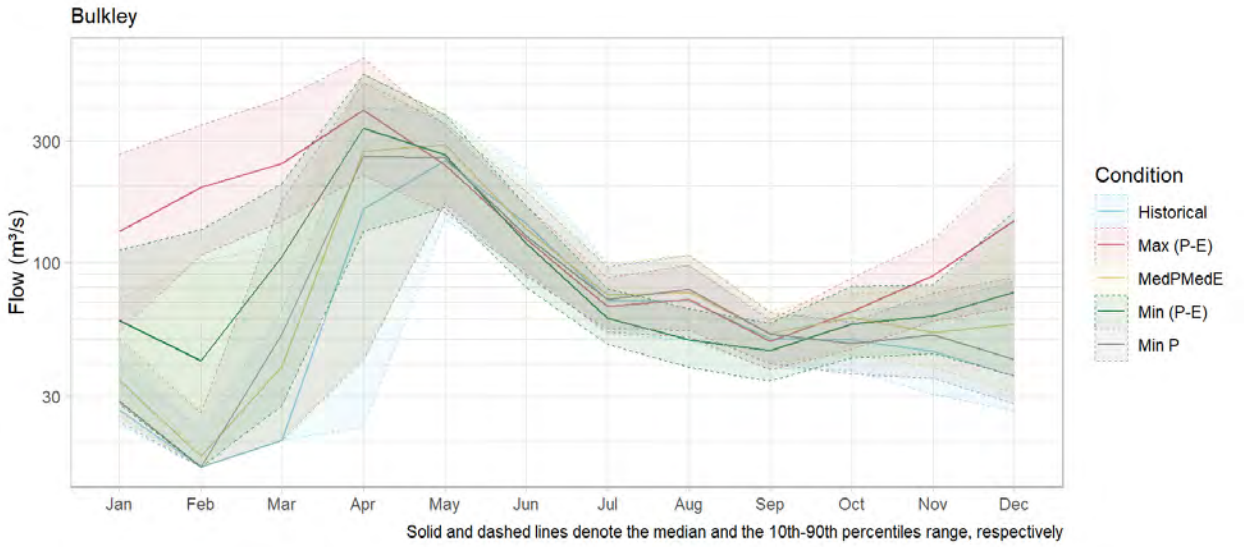

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Figure 5-6: Tenas Creek Monthly Streamflow Summary for Historical Conditions and Climate Change Conditions in 2100**



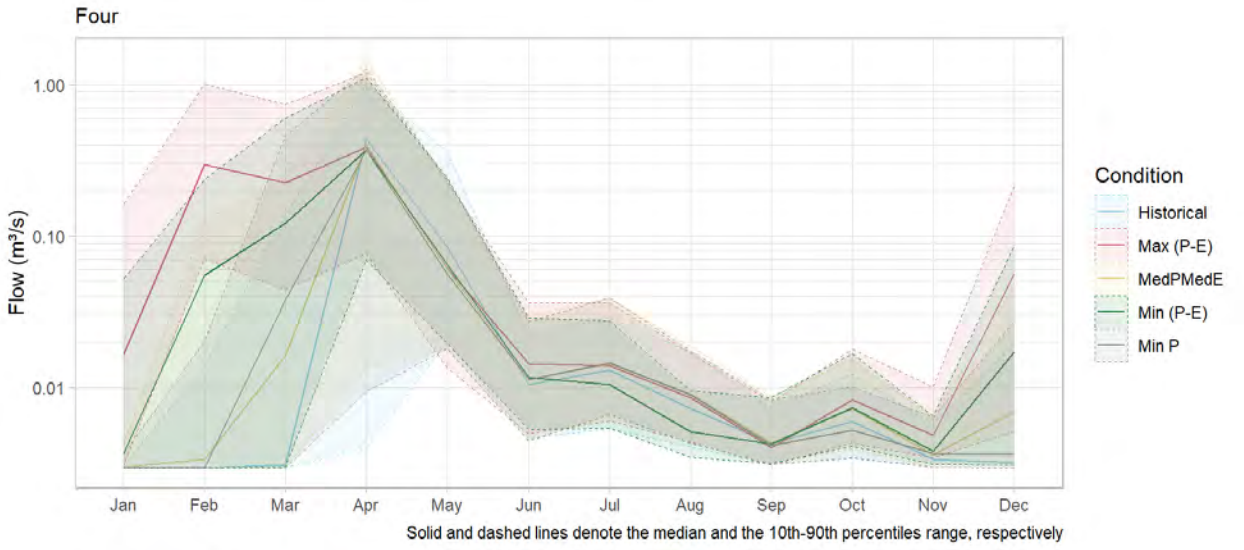

Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Figure 5-7: Telkwa River Monthly Streamflow Summary for Historical Conditions and Climate Change Conditions in 2100**




Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Figure 5-8: Bulkley River Monthly Streamflow Summary for Historical Conditions and Climate Change Conditions in 2100**




Source: \SRK Consulting\NA CAPR002055 Telkwa Project General EA Support - Internal\200_Review New Climate and Streamflow Data\R_work\reports\01 - Flow Review.html

**Figure 5-9: Four Creek Monthly Streamflow Summary for Historical Conditions and Climate Change Conditions in 2100**

The general tendency when comparing historic and climate change monthly streamflow is an overall increase in flow magnitude and a shift to an earlier spring freshet. These observations coincide with the climate change projections in Table 5-5, showing even a 2% in annual precipitation by 2100, and a 23% increase in precipitation in May under the model with lowest precipitation increase.

Note that the runoff model relies on a constant unit baseflow value for each river, which was not adjusted for climate change in these predictions. Precipitation is anticipated to decrease during the drier summer months (namely July), which, in combination with the higher evaporation rates in Table 5-7, would be expected to decrease streamflow during the low-flow summer period.

In addition, the changes to seasonality and snowmelt timing would also affect the runoff coefficients. The calibrated runoff coefficients were based on the historical flow regime, which coincides with a spring freshet in May, or April in the case of the Four Creek model for 2020 data. The monthly runoff coefficients could also be affected by climate change and are an additional limitation of this evaluation approach.

### 5.7.1 Peak Flow Trends

A trend analysis was carried out by SRK to identify trends and significance of trends for the peak flows from historical records. Ordinary least squares method, and quantile regression method were employed for statistical evaluation of the data. The non-parametric Mann-Kendall (MK) (1945) and Theil-Sen (Thiel 1950, Sen 1968) methods, the Prewhitening MK (Zhang 2001) method, and the Prewhitening MK (Yue et al. 2002) method were used for trend analysis. Where a trend was observed (upward or downward), its significance was evaluated. Trends with a significance greater than 95% are accepted as significant.

#### Goathorn Creek Peak Flow Historical Trend Analysis

Figure 5-10 represents yearly peak flows at the Goathorn WSC station from the extended timeseries, and its linear approximation equation obtained with the ordinary least squares method. Table 5-8 summarizes the results of the Goathorn peak flow trend statistical significance Mann-Kendall tests. No significant trend is observed for all three tests.

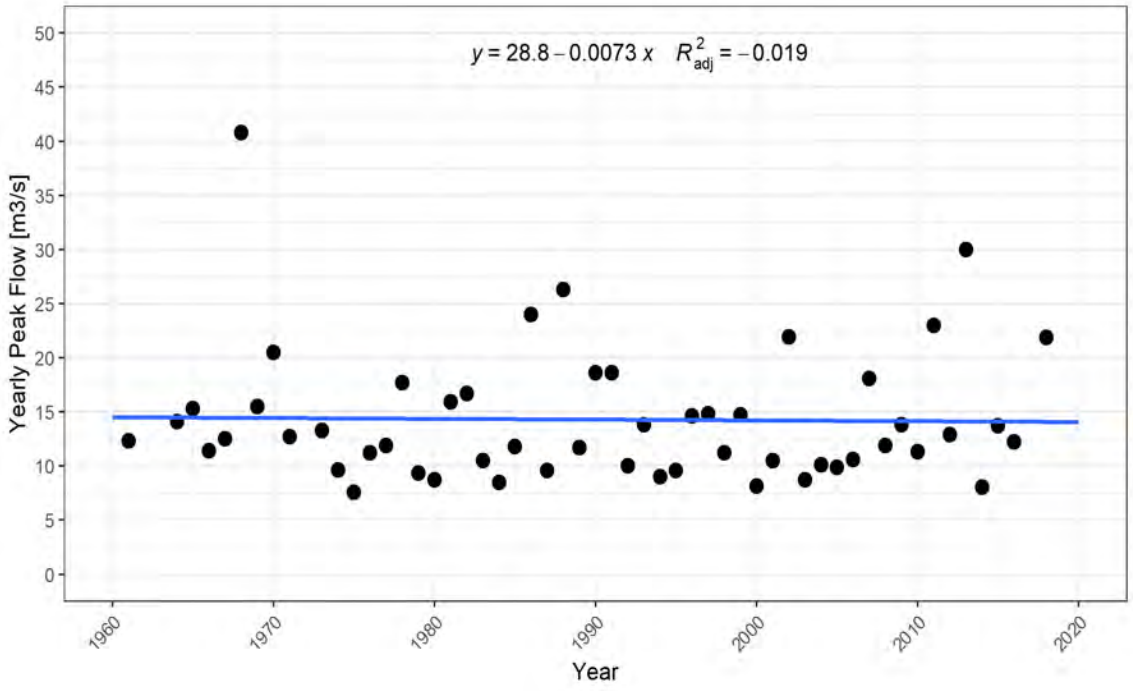



**Figure 5-10: Goathorn Peak Flows Trend from 1960 to 2018**

Source: from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Telkwa_EA_Flows_Climate_Change.html"

**Table 5-8: Mann-Kendall Significance test results for Goathorn Peak Flows**

| Method | Comment | Significance (%) |
|---|---|---|
| MK & Theil-Sen | No Significant Trend | 53.3 |
| Prewhit. MK, Zhang | No Significant Trend | 53.3 |
| Prewhit. MK, Yue & Pilon | No Significant Trend | 59.9 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Telkwa_EA_Flows_Climate_Change.html"

### Telkwa River Peak Flow Historical Trend Analysis

Figure 5-10 represents yearly peak flows at the Telkwa WSC station from the extended timeseries, and its linear approximation equation obtained with the ordinary least squares method. Table 5-9 summarizes the results of the Telkwa peak flow trend statistical significance Mann-Kendall tests. No significant trend is observed for all three tests.

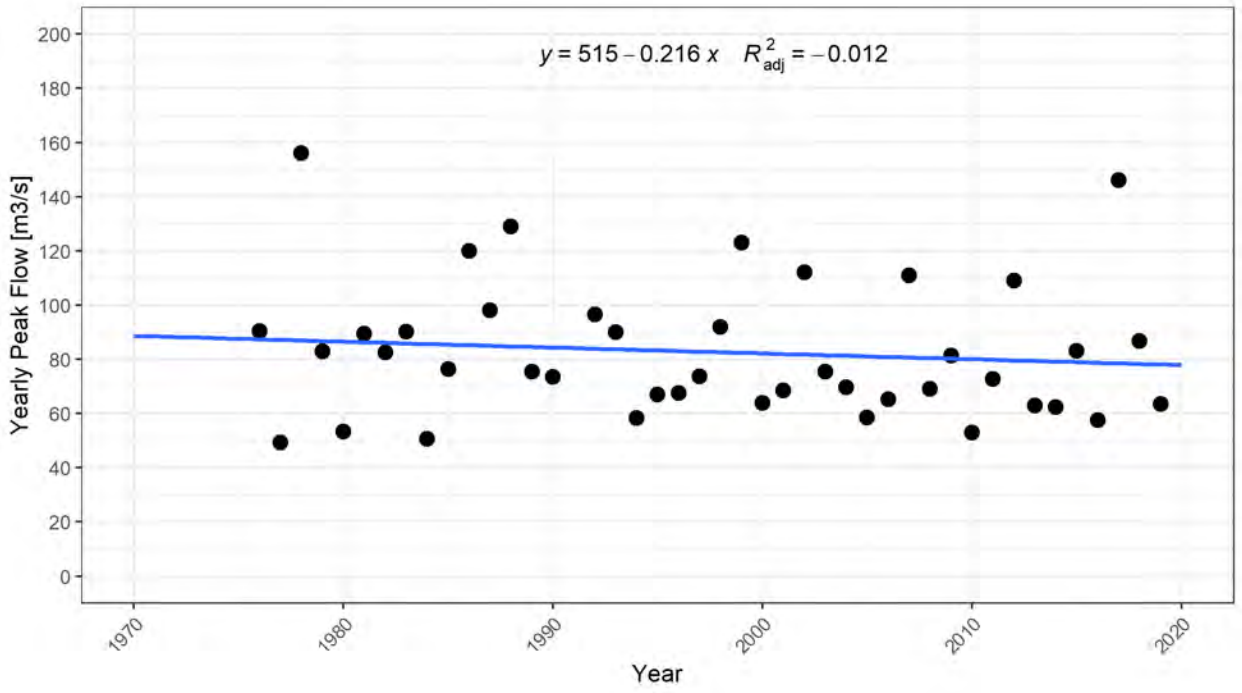



**Figure 5-11: Telkwa Peak Flows Trend from 1976 to 2019**

Source: from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Telkwa_EA_Flows_Climate_Change.html"

**Table 5-9: Mann-Kendall Significance test results for Telkwa Peak Flows**

| Method | Comment | Significance (%) |
|---|---|---|
| MK & Theil-Sen | No Significant Trend | 88.4 |
| Prewhit. MK, Zhang | No Significant Trend | 88.4 |
| Prewhit. MK, Yue & Pilon | No Significant Trend | 83.7 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Telkwa_EA_Flows_Climate_Change.html"

### Bulkley River Creek Peak Flow Historical Trend Analysis

Figure 5-10 represents yearly peak flows at the Bulkley River at Quick WSC station from the extended timeseries, and its linear approximation equation obtained with the ordinary least squares method. Table 5-10 summarizes the results of the Bulkley River peak flow trend statistical significance Mann-Kendall tests. No significant trend is observed for all three tests.

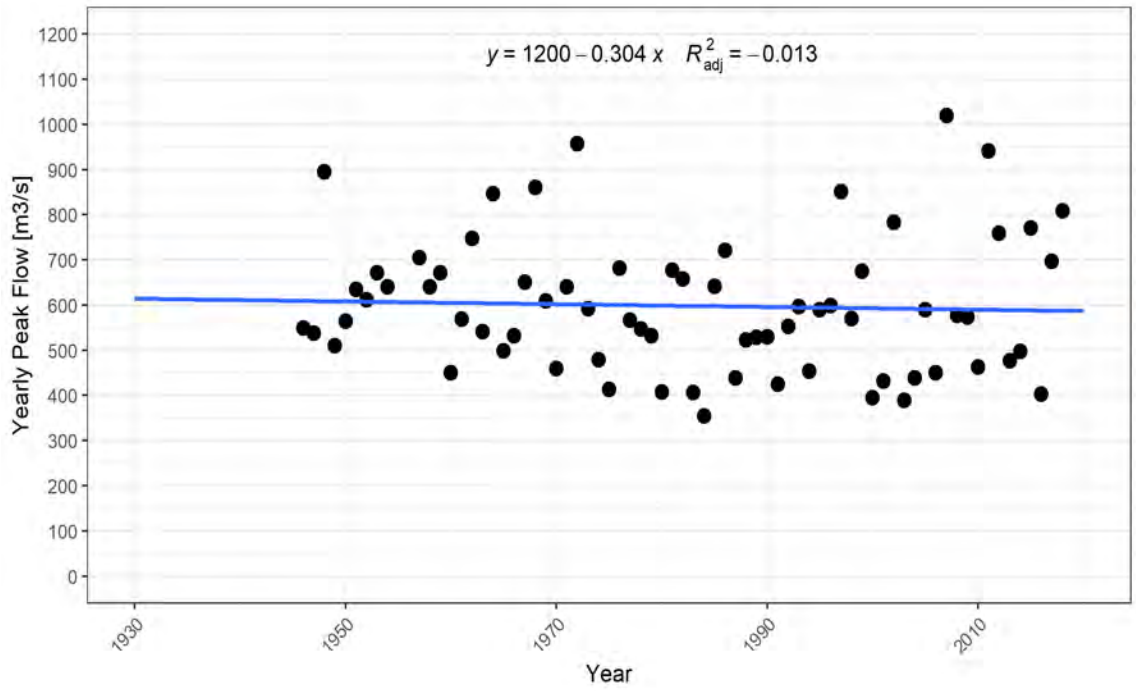



**Figure 5-12: Bulkley River Peak Flows Trend from 1976 to 2019**

Source: from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Telkwa_EA_Flows_Climate_Change.html"

**Table 5-10: Mann-Kendall Significance test results for Bulkley River Peak Flows**

| Method | Comment | Significance (%) |
|---|---|---|
| MK & Theil-Sen | No Significant Trend | 77.5 |
| Prewhit. MK, Zhang | No Significant Trend | 77.5 |
| Prewhit. MK, Yue & Pilon | No Significant Trend | 78.6 |

Source: compiled in text from R code \\srk.ad\dfs\na\van\Projects\01_SITES\Telkwa Coal\1CT027.003_2020 EA Water Management\200_Meteorology_Update\R work\Telkwa_EA_Flows_Climate_Change.html"

In all streams evaluated, no significant change in peak flow magnitude has been observed historically. This is not to say that a change in peak flows may not occur with projected climate change. Variations with respect to snowmelt timing and rainfall depth may result in higher peaks in the future, however the effects of a thinner snowpack should also be considered. Peak flow models for the purpose of engineering design should incorporate both snowmelt events and climate change depth-duration-frequency rainfall tables presented in Table 5-6.

# 6 Conclusions and Limitations

Regional analyses coupled with a compilation of Project-specific meteorological and hydrometric datasets were used to develop Project specific hydrometeorological baseline parameters, including long-term temperature and precipitation records. Climate change analysis was updated with CMIP6 data. Climate change effects on temperature, precipitation, evaporation and streamflow are presented as monthly and annual rates of change for three future periods. Results from this study may be used to further advance Project designs and update EA modeling, including the water and load balance model, groundwater model, and design of water management infrastructure.

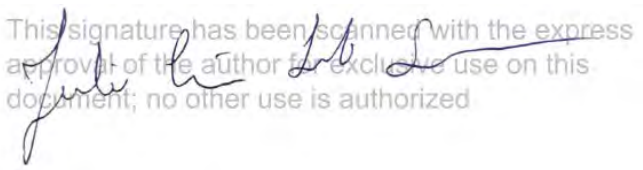
Provisional Water Survey of Canada flow records were used for Goathorn Creek, Telkwa River and Bulkley River in the development of calibrated rainfall-runoff models. Provisional records may change when officially published.

Available Four Hydro data for 2020 were analysed, along with data collected as part of baseline monitoring in 1997 and 1998. Due to the limited period of record, there is still significant uncertainty regarding Four Creek hydrology. Ongoing monitoring and validation of presented hydrologic indices is required.

The calibrated rainfall runoff model established to support the water and load balance model and runoff estimates for the hydrometric stations underestimates flows in Tenas Creek. This model should be revisited once more flow data is available at Tenas Hydro. However for the purpose of the EA, an underestimated runoff result is more conservative in terms of dilution capacity. Review of the Four-Hydro regressions with Goathorn Creek (08EE008) and calibration model should be performed after an additional year of monitoring data become available.

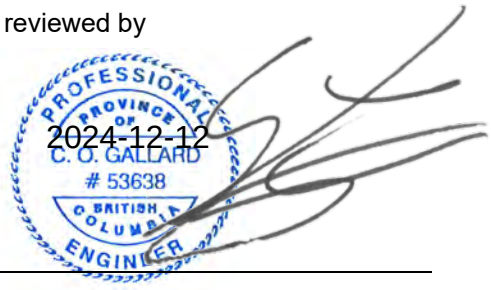
It is strongly suggested that this study be revisited and that the model be recalibrated when longer Project data records are available from the meteorological station as well as the hydrometric stations, and when all WSC flow data are published (*i.e.,* not provisional). The correlations between meteorological parameters measured at the Tenas Deposit Station and the regional stations should be improved by assessing a longer period of Project record from the Tenas Deposit Station. An initial analysis of the precipitation record showed that recent years (2017 to 2019) were drier than average, which may create bias in the extended Project precipitation record. Complete water years (from October to September of the following year) are critical in any assessment of the hydrological regime and longer flow data series will improve streamflow regressions and provde a robust calibration dataset.

This report, Tenas Project – Hydrometeorological Baseline and Model Development Report (update 2024), was prepared by




Julio Lobo,
Consultant

and reviewed by




Camilo Gallard, PEng
Senior Consultant

EGBC Permit to Practice Reg. No.: EGBC 1003655

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

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Attachment A AGRA 1999 Report

received April 5/2000

**AGRA** Earth & Environmental
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March 28, 2000
KS00076

Luscar Ltd.
1600 Oxford Tower
10235 – 101 Street
Edmonton, A.B. T2P 3V4

**Attention: Mr. Allan Flemming**

Dear Mr. Flemming:

**RE: TELKWA COAL PROJECT 1999 BASELINE SURFACE FLOW AND WATER QUALITY FINAL DATA REPORT**

AGRA Earth & Environmental Limited (AGRA) is pleased to submit two copies of the *Telkwa Coal Project 1999 Baseline Surface Flow and Water Quality Final Data Report*. The report presents the results of the 1999 field monitoring program conducted by AGRA for Luscar Ltd. on the proposed Telkwa Coal Project.

AGRA understands that the recent state of the coal industry has put the proposed Telkwa Coal Project on hold. AGRA looks forward to working with Luscar Ltd. on the proposed Telkwa Coal Project when the decision to proceed with the project is made. Should you have any questions or comments regarding this report, or require any support on this, or other projects, please do not hesitate to contact the undersigned at (250) 847-8783.

Respectfully submitted,

**AGRA Earth & Environmental Limited**

Scott Davidson, P.Geo., M.Sc.
Geomorphologist

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March 27, 2000
KS00076

Luscar Ltd.
1600 Oxford Tower
10235 - 101 Street
Edmonton, Alberta T2P 3V4

**Attention: Mr. Allan Flemming, P.Eng.** Fax: (780) 420-5875

Dear Mr. Flemming:

**RE: TELKWA COAL PROJECT 1999 BASELINE DATA REPORT**

## 1.0 INTRODUCTION

AGRA Earth & Environmental Limited is pleased to present the 1999 Baseline Surface Water Flow and Water Quality Monitoring Report for the Telkwa Coal Project (TCP). The TCP is a proposed open pit coal mine located near Telkwa, B.C. and owned by Luscar Inc. (Luscar). The location of the mine is illustrated on Figure 1. This report contains the data collected during the 1999 baseline monitoring program and updates the rating curves for sites where discharge measurements were conducted.

## 2.0 SCHEDULE OF 1999 SITE VISITS

The schedule of site visits for the 1999 field monitoring program is contained in the March 3, 1999 AGRA proposal to conduct the TCP baseline monitoring. A copy of the AGRA proposal is contained in Appendix A for reference. The dates of actual site visits and a listing of the work conducted during the site visits is contained in Table 1.

TABLE 1: 1999 MONITORING SITE VISITS

| Week of: | Feb 1 | Aug 1 | Sept 19 | Nov 14 |
|---|---|---|---|---|
| Telkwa River | WQ | | WQ | |
| Upper Tenas Creek | No site access | | SM, WQ, Q | S |
| Lower Tenas Creek | WQ, Q | S | SM, WQ, Q | S |
| Bulkley River | WQ | | WQ | |
| Hubert Creek | WQ, S | S | WQ, S | S |
| Four Creek | WQ | S | WQ, Q | S |
| Upper Goathorn Creek | WQ, Q | | SM, WQ, Q | S |
| Lower Goathorn Creek | WQ | | WQ | |

Q = Discharge and stage measurements conducted
S = Stage measurements conducted
WQ = Water quality sampling conducted
SM = Site Maintenance Visit

The purpose of the August field trips was to collect peak flow information from the crest gauges at each site.

## 3.0 SURFACE WATER MONITORING RESULTS

This section contains a summary of the five sites where surface water monitoring was conducted during the 1999 field season. Summary field data for the site visits is contained in Appendix B.

### 3.1 LOWER TENAS CREEK SITE

The Lower Tenas Creek site was visited four times as part of the 1999 monitoring program. The station was operated as a manual sampling with no installation of the automated equipment used in previous years.

The two low flow discharge measurements conducted during February and September yielded discharges of 0.041 $m^3/s$ and 0.163 $m^3/s$ respectively. These discharge measurements have been added to the rating curve and a revised rating curve for this site is shown in Figure 2.

An initial crest gauge installed in late 1998 at the site was replaced during the 1999 sampling season. Level surveys conducted at the site during the 1999 field season did not show significant shift of the benchmarks or the staff gauge. There was evidence of sand deposition noted near the gauge during the November 1999 field visit.

### 3.2 UPPER TENAS CREEK SITE

The upper Tenas Creek was visited twice during the 1999 monitoring program. There was no site access during the February 1999 field trip. As the crest gauge for this site was not checked and reset during February, this site was not visited during the August field trip.

The crest gauge was checked during September and the maximum stage was observed to be 0.70 m. This value would translate to a discharge of 8.43 $m^3/s$ and is expected to be due to the spring freshet which consistently produces greater discharges than the fall peak flows. The low flow measurement from September 20$^{th}$ was 0.134 $m^3/s$. An updated rating curve for this site is shown in Figure 3.

The September field visit to this site showed that the braces for the staff gauge had snapped but that the staff gauge did not appear to have shifted (based on a review of previous site photographs). Braces at the site were replaced and a third benchmark was added on the right bank side of the stream. Levelling checks showed that there was no significant shift of the benchmarks or the staff gauge during 1999. The breakage of the braces resulted in slight downstream leaning of the staff gauge mounting but this was corrected during the site maintenance visit.

### 3.3 UPPER GOATHORN CREEK SITE

The Upper Goathorn Creek site was visited four times during the 1999 monitoring program. The station was monitored as a manual station with a staff gauge and crest gauge.

The two low flow discharge measurements conducted during February and September yielded discharges of 0.097 $m^3/s$ and 0.337 $m^3/s$ respectively. These discharge measurements have been added to the rating curve and a revised rating curve for this site is shown in Figure 4.

Maintenance of the gauge equipment was conducted during the September visit. The bracing for the staff gauge was reinforced and the staff gauge was lowered by a distance of 0.19 m. A second staff gauge was added to the top of the first staff gauge to allow for visual measurement of peak flow levels during the freshet period. The level check of benchmarks showed that there were no changes in the elevations of the benchmarks. The staff gauge did not show any significant shift during the 1999 season.

### 3.4 FOUR CREEK SITES

Two sampling locations were operated on Four Creek during the 1999 field season. The low flow discharge measurements were made at the lowest culvert crossing of Four Creek on the 120 Road. Other stage measurements and water quality sampling were conducted at the original stream flow sampling site located approximately 1,800 m upstream of the culvert crossing on Four Creek.

Discharges for the low flow periods were determined by calculation of the discharge through the culvert based on the known inlet water levels and the culvert characteristics. The February low flow measurement revealed that there was only a small quantity of baseflow (< 1L/min) during the sampling trip. The culvert was almost completely iced up. The September low flow discharge for the culvert was calculated to be 0.077 $m^3/s$.

### 3.5 HUBERT CREEK SITE

The Hubert Creek site was visited four times during the 1999 monitoring program. Readings for the staff gauge are available from two of the site visits. Visits conducted during September and November did not yield useful data on flow levels due to numerous partial blockages of the culvert inlet by debris.

The crest gauge at the site indicated that there was a recorded stage greater than 1.23 m during the spring 1999 freshet period. This high stage is believed to be partially due to beaver debris blockage of the inlet of the Hubert Creek culvert.

## 4.0 WATER QUALITY MONITORING RESULTS

In 1999, baseline water chemistry was sampled during the two low flow periods at ten sites in the proposed Telkwa Coal Project area. The data for the February 1999 water quality monitoring was forwarded directly to Luscar as previously arranged. The laboratory results for

the September water quality trip are included in Appendix C of this report. No analysis of the testing data, other than to identify specific stations where the BC Water Quality Criteria (Nagpal, 1995) were exceeded. A summary of metals and stations where exceedances occurred are summarized in Table 2. Due to operator error, no replicate sampling was conducted during the September water quality monitoring trip.

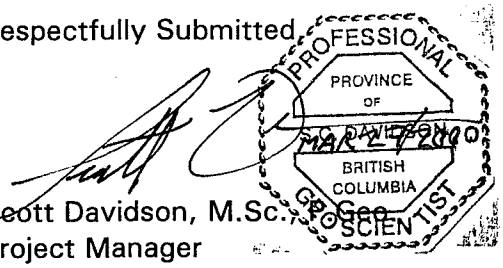
**TABLE 2: B.C. WATER QUALITY CRITERIA EXCEEDANCE INFORMATION FOR THE SEPTEMBER 20, 1999 SAMPLING TRIP**

| METAL | B.C. WATER QUALITY CRITERIA | STATIONS WITH TOTAL METALS CONCENTRATIONS GREATER THAN THE B.C. CRITERIA | STATIONS WITH TOTAL METALS CONCENTRATIONS EQUAL TO THE B.C. CRITERIA |
|---|---|---|---|
| Cr | 2.0 ug/L | Telkwa River (2.5) | Upper Goathorn Creek, Lower Goathorn Creek, Bulkley River, Hubert Creek, Lower Tenas, Four Creek |
| Cu | 2.0 ug/L | Telkwa River (2.4) | |
| Fe | 0.3 mg/L | Telkwa River (0.8), Hubert Creek (1.03), Bulkley River (0.33) | |
| Zn | 3.0 ug/L | Telkwa River (3.5) | |

## 5.0 CLOSURE

AGRA Earth Environmental Limited is pleased to present this 1999 data summary to Luscar Ltd. AGRA looks forward to continuing to work with Luscar on the Telkwa Coal project over the 2000 season. Should you have any questions concerning this project please do not hesitate to contact the undersigned at (250) 847-8783.

Respectfully Submitted,




Scott Davidson, M.Sc., Geo.
Project Manager

Reviewed by,

Gary R.E. Beckstead, M.Sc., P.Eng.
Senior Water Resource Engineer

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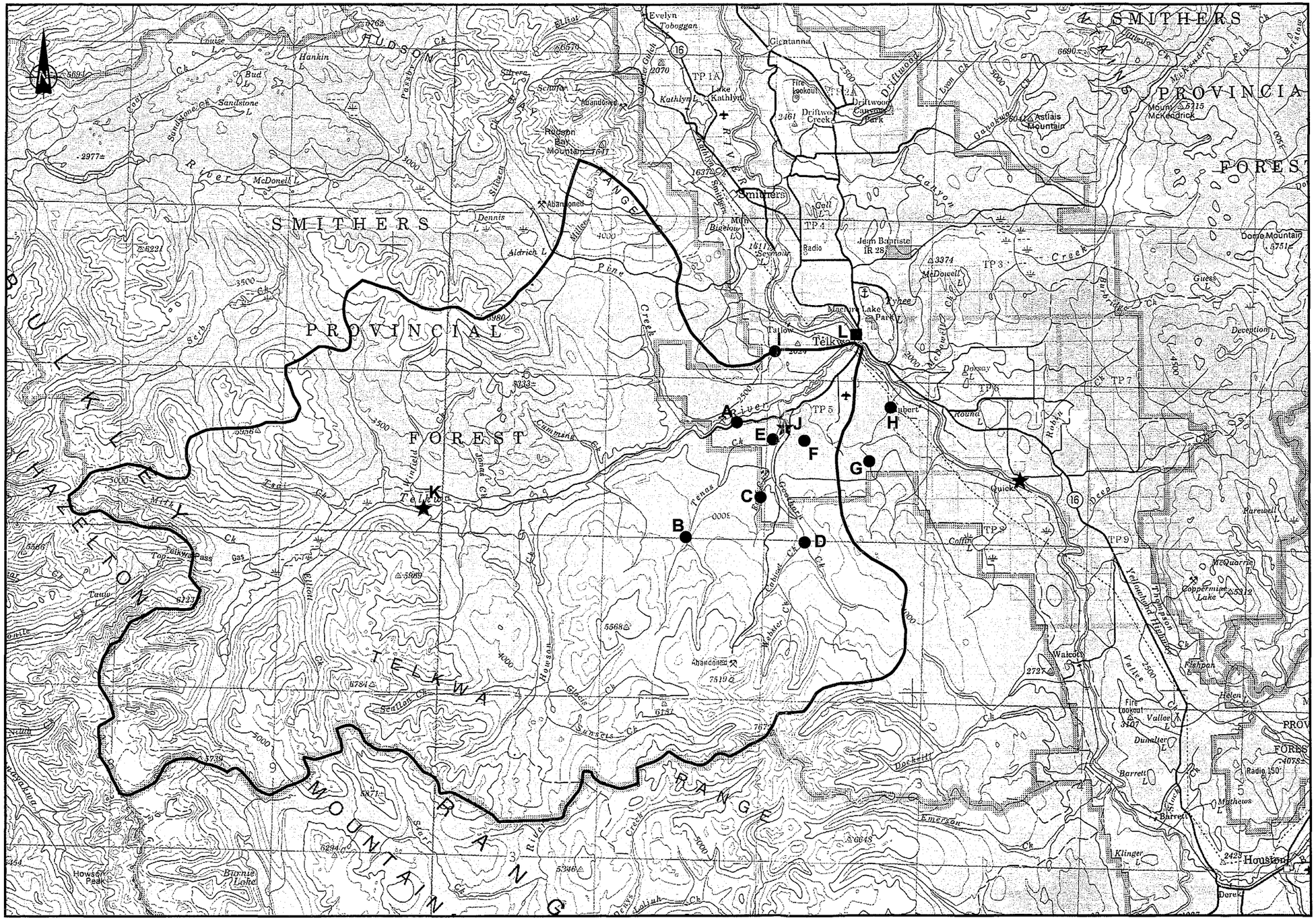


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Scale 1 : 250 000

LEGEND

- Telkwa River Watershed
- ★ Existing WSC Station
- ■ Water Quality Station
- ● Hydrometric & Water Quality Site
  - A Lower Telkwa River
  - B Upper Tenas Creek
  - C Four Creek
  - D Upper Goathorn Creek
  - E Lower Tenas Creek
  - F Tailings Pond Drainage
  - G Helps Creek
  - H Hubert Creek
  - I North Site
  - J Lower Goathorn Creek
  - K Upper Telkwa River
  - L Bulkley River

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| | |
|---|---|
| CLIENT: | LUSCAR LTD. |
| PROJECT: | TELKWA COAL PROJECT |

**APPROXIMATE LOCATIONS HYDROMETRIC AND WATER QUALITY SITES**

| | |
|---|---|
| DATE: | MAR. 2000 |
| JOB No.: | KS00076 |
| COREL FILE: | N/A |
| FIGURE 1 | REV. - |

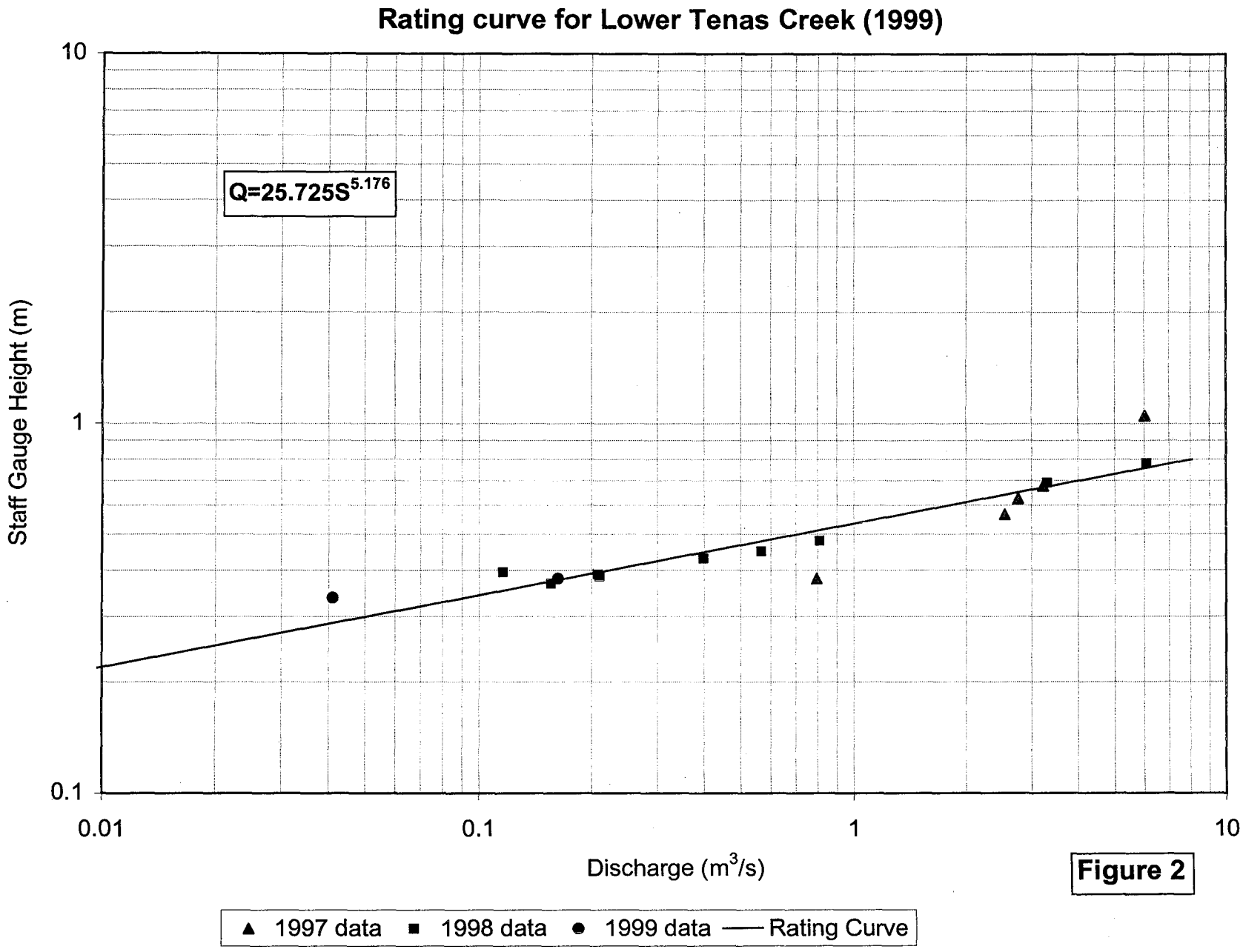
Rating curve for Lower Tenas Creek (1999)
Q=25.725S^5.176
Staff Gauge Height (m)
10
1
0.1
0.01
0.1
1
10
Discharge (m3/s)
1997 data
1998 data
1999 data
Rating Curve

**Figure 2**

## Rating Curve for Upper Tenas Creek (1999)

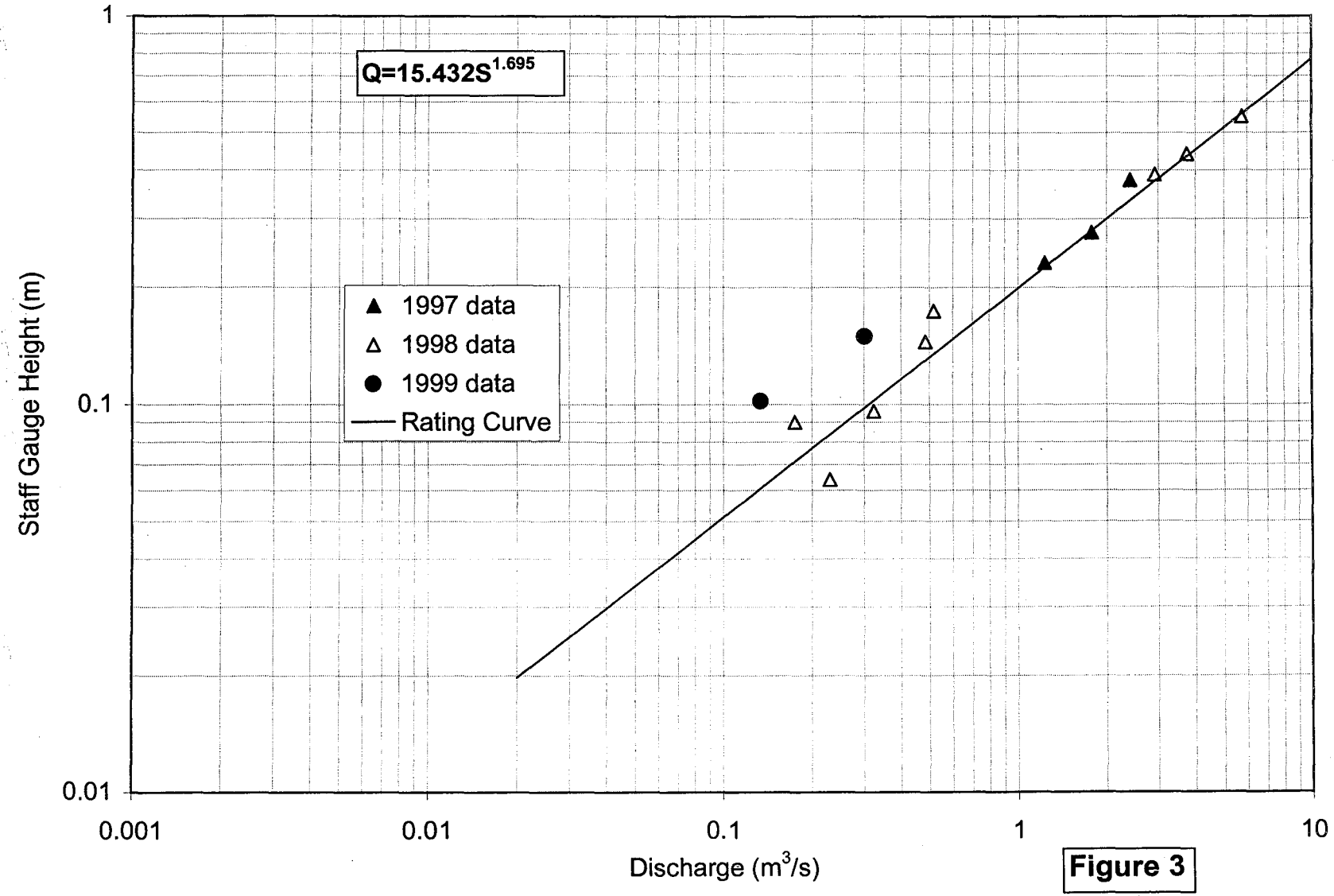


**Figure 3**

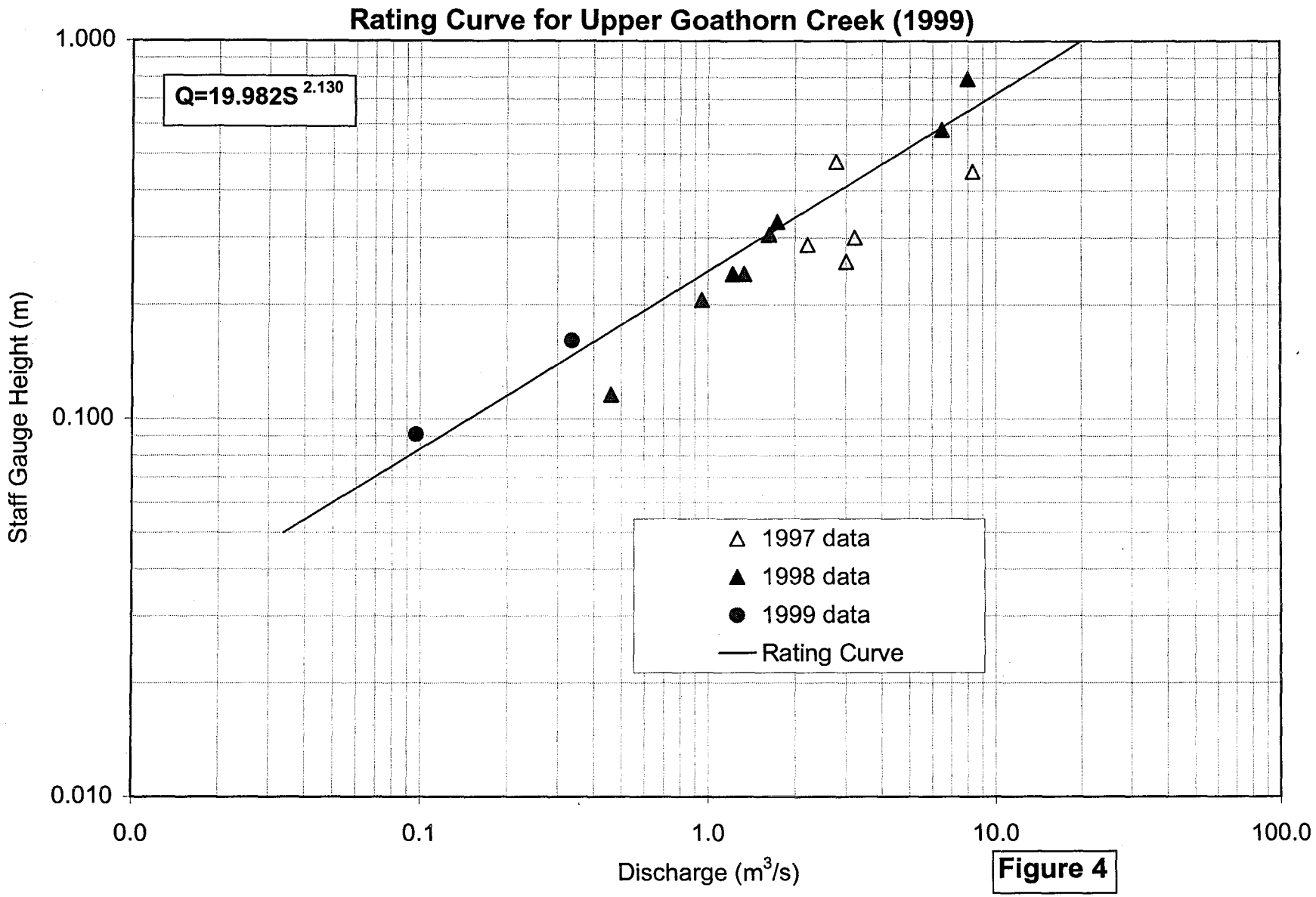


**Figure 4**

AGRA ENGINEERING GLOBAL SOLUTIONS

# APPENDIX A

# AGRA PROPOSAL FOR 1999
# TELKWA COAL MONITORING PROGRAM

AGRA
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March 2, 1999
CW1537.1

Luscar Ltd.
1600 Oxford Tower
10235 - 101 Street
Edmonton, Alberta T2P 3V4

**Attention: Mr. Allan Flemming, P.Eng.** Fax: (403) 420-5875

Dear Mr. Flemming:

**RE: TELKWA COAL PROJECT 1999 BASELINE DATA REPORT**

## 1.0 INTRODUCTION

AGRA Earth & Environmental Limited is pleased to present this proposal to conduct the 1999 Baseline Surface Water Flow and Water Quality Monitoring Report for the Telkwa Coal Project (TCP). The TCP is a proposed open pit coal mine located near Telkwa, B.C. and owned by Luscar Inc. (Luscar). This report contains the data collected during the 1999 baseline monitoring program and updates the rating curves for sites where discharge measurements were conducted.

## 2.0 SCHEDULE

### SURFACE WATER MONITORING

AEE is pleased to present this revised budget for the 1999 baseline water flow and water quality program for the proposed Telkwa Coal Project. It is the understanding of AEE that during 1999 Luscar should be submitting the Final Project Report to the B.C. Environmental Assessment Office. Following certification of the project, it is the understanding of AEE that the entire surface water and water quality program may need to be revised to meet the construction plan for the mine.

## 2.0 WORK PROGRAM AND BUDGET

The work program proposed for 1999 is as follows:

**Surface Water Flow**

- Concentration of the base program on the winter and summer low flow periods.
- Monitoring of low flows on Four Creek, Hubert Creek, Tenas Creek, Upper Goathorn Creek and Lower Goathorn Creek. No monitoring will be conducted on Helps Creek, Telkwa River, and the Bulkley River. Low flow monitoring will result in two site visits. To reduce cost to Luscar, AEE has scheduled the summer low flow period measurement trip to

coincide with site visit #3 described below.

- Monitoring of peak flows at the streams using crest gauges already installed at all of the existing sites. To conduct this portion of the required work, AEE will conduct a total of four sites visits planned as follows:

1. Pre-freshet to set up crest and staff gauges and survey to local bench marks (April),
2. Post freshet to record peak flow during period and survey to local bench marks (June),
3. Pre fall high flow period to re-survey benchmarks and survey to local bench marks (late August to early September),
4. Post fall high flow to record peak flow and survey to local bench marks (November).

**Water Quality**

- Sampling of baseline parameters for the two low flow periods only.

**Data Analysis**

AEE proposes to conduct data analysis and reporting for the 1999 sampling program following each monitoring trip. A data analysis period has been allowed following each of the five surface flow site visits (one low flow and four peak flow visits) described above. The information reports from each trip will assist Luscar in public meetings by providing the most up to date information on the project.

**Project Management**

Project management involves dealing with items such as cost control, client liaison, and interfacing with other consultants working for Luscar on the proposed Telkwa Coal Mine. For the 1999 sampling program, AEE proposes to conduct project management on a cost plus basis. The totals for this item in the attached Table 1 represent estimates of the total budget required for project management. AEE will make every effort to ensure that it conducts stringent cost control on the project management for Luscar. Project management for the 1999 program will be conducted by Mr. Scott Davidson, M.Sc., P.Geo. of the Smithers office. Mr. Gary Beckstead, M.Sc., P.Eng. and Mr. Dennis Trotter will provide technical input and review to the project as required.

## 3.0 CLOSURE

We thank you for the opportunity to provide engineering and environmental services to this project and look forward to continuing to work with Luscar on the proposed Telkwa Coal Mine during 1999. If you have any questions or require further information concerning this project, please call Scott Davidson at (250) 847-8783 or Gary Beckstead at (403)235-8118.

Yours sincerely,

**AGRA Earth & Environmental Limited**

Reviewed by

Scott Davidson, M.Sc., P.Geo.
Project Manager

Gary R.E. Beckstead, M.Sc., P.Eng.
Senior Water Resource Engineer

C:\files\working\Luscar\1999\revised budget99.wpd
cc. Gary R.E. Beckstead, AEE - Calgary

# APPENDIX B

# SUMMARY OF 1999 FIELD DATA

Telkwa Coal Project Field Note Summary for 1999 Sampling Season

## Hubert Creek

| | | | | | |
|---|---|---|---|---|---|
| Date | Aug 3/99 | 12:47 | Sept 21/99 | | Nov 18/99 |
| SG | 0.1 | | 0.945 | | |
| Crest | >1.23 | | | | |
| | | Diff to SG | | | |
| HI | 1.65 | | | | |
| Top SG | 2.463 | | Culvert Blocked by Beaver Debris | | Culvert Blocked by Beaver Debris |
| Top Crest | 2.464 | | | | |
| Telephone Pole | 1.221 | -1.242 | | | |
| Top Box | 0.5 | -1.963 | | | |

## Four Creek

| | | | Site | | | | | |
|---|---|---|---|---|---|---|---|---|
| Date | Aug 3/99 | 13:25 | Sep-20 | 11:40 | Nov 18/99 | 12:15 | | |
| SG | 0.18 | | 0.182 | | 0.185 | | | |
| Crest | 0.4 | | 0.55 | | 0.2 | | | |
| | | Diff to SG | | | | | Diff to SG | |
| HI | 1.63 | | | | 1.5621 | 1.5367 | | |
| Top SG | 0.754 | | | | 0.687 | 0.692 | | |
| Top Crest | 0.506 | | | Set up 1 | | 0.444 | Set up 2 | |
| BM1 | 0.005 | -0.749 | | -0.72 | -0.033 | 0.038 | -0.654 | |
| BM2 | 0.215 | -0.539 | | -0.54 | 0.147 | 0.151 | -0.541 | |
| | | | | | | | | |
| | | | Culvert depth | 0.08 | Culvert depth | 0.1 | | |
| | | | Sept 21/99 | 10:15 | Nov 18/99 | 11:45 | | |

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## Lower Tenas Creek

| | Aug 3/99 | 14:30 | Sept 20/99 | 15:15 | | Nov 18/99 | 13:15 | |
|---|---|---|---|---|---|---|---|---|
| SG | 0.43 | | 0.38 | | | 0.37 | | |
| Crest | | | | | | 0.25 | | |
| | | Diff to SG | | Diff to SG | | | | Diff to SG |
| HI | 1.6 | | | | | 1.6129 | | |
| Top SG | 3.778 | | 3.765 | | | 3.78 | 3.815 | |
| Top Crest | | | 3.275 | | Set up 1 | | 3.325 | Set up 2 |
| BM1 | 1.18 | -2.598 | 1.162 | -2.603 | -2.613 | 1.167 | 1.203 | -2.612 |
| BM2 | 1.227 | -2.551 | 1.215 | -2.55 | -2.559 | 1.221 | 1.255 | -2.56 |

Comments: Sand deposition near gauge

## Upper Goathorn Cr.

| | Sept 20/99 | Sept 21/99 | 14:35 | | Nov 18/99 | 10:15 | |
|---|---|---|---|---|---|---|---|
| SG | -0.03 | 0.12 | | | 0.075 | | |
| Crest | | | | | frozen shut | | |
| | | | Diff to SG | | | | Diff to SG |
| HI | | | | | 1.6891 | 1.65735 | |
| SG (to 1 m mark) | | 0.843 | | | 0.916 | 0.881 | |
| Top Crest | | 1.546 | | Set up 1 | | 1.585 | Set up 2 |
| BM1 | | 0.185 | -0.658 | -0.659 | 0.257 | 0.221 | -0.66 |
| BM2 | | 1.399 | 0.556 | 0.553 | 1.469 | 1.433 | 0.552 |

Comments: SG lowered 0.191 m
CG lowered 0.11 m

4" snow on ground
SG surveyed to 2 m mark

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**Upper Tenas Cr.**

| | | Sept 20/99 | | | | Nov 18/99 | | 11:30 | |
|---|---|---|---|---|---|---|---|---|---|
| SG | | 0.15 | | | | 0.08 | | | |
| Crest | | 0.18 | 0.7 read previous day | | | 0.25 | | | |
| | | | Diff to SG | | | | | | Diff to SG |
| HI | | 1.71 | | | | 1.651 | | | |
| Top SG | | 1.035 | 1.035 | | | 0.972 | | 1.022 | |
| Top Crest | Set up 1 | 0.821 | | Set up 2 | Set up 1 | | | 0.823 | Set up 2 |
| BM1 | -0.969 | 0.066 | 0.066 | -0.969 | -0.967 | 0.005 | | 0.071 | -0.951 |
| BM2 | -0.97 | 0.065 | 0.065 | -0.97 | -0.967 | 0.005 | | 0.07 | -0.952 |
| BM3 | -0.755 | 0.28 | 0.28 | -0.755 | -0.737 | 0.235 | | 0.285 | -0.737 |

Site Maintenance Trip
Values for SG and Crest arer post-fix
BM3 added ~ 12m downstream of BM1 and BM2

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Discharge MeasurementDeterminations

Site: Lower Tenas 21-Sep-99 15:15
Staff Gauge: 0.38

| LOC | REVS | SEC | VEL | DEPTH | Q |
|---|---|---|---|---|---|
| 3.300 | 0 | 0 | | 0.000 | 0.000 |
| 3.600 | 0 | 0 | | 0.060 | 0.000 |
| 3.900 | 2 | 36.1 | | 0.140 | 0.000 |
| 4.200 | 3 | 41.9 | 0.048 | 0.200 | 0.003 |
| 4.500 | 7 | 44.5 | 0.106 | 0.220 | 0.007 |
| 4.800 | 9 | 41.7 | 0.145 | 0.260 | 0.011 |
| 5.100 | 13 | 38.9 | 0.224 | 0.280 | 0.019 |
| 5.400 | 12 | 42 | 0.192 | 0.320 | 0.018 |
| 5.700 | 17 | 41.2 | 0.277 | 0.330 | 0.027 |
| 6.000 | 21 | 43.1 | 0.327 | 0.340 | 0.033 |
| 6.300 | 21 | 44.5 | 0.317 | 0.260 | 0.025 |
| 6.600 | 18 | 41.9 | 0.288 | 0.220 | 0.019 |
| 6.900 | 20 | 41.4 | 0.324 | 0.18 | 0.018 |
| 7.200 | 17 | 42.4 | 0.269 | 0.140 | 0.011 |
| 7.500 | 16 | 42.2 | 0.255 | 0.12 | 0.009 |
| 7.8 | 14 | 40.1 | 0.234 | 0.1 | 0.007 |
| 8.1 | 0 | 0 | | 0.04 | 0 |
| 8.4 | 0 | 0 | | 0.04 | 0 |
| 8.7 | 0 | 0 | | 0.08 | 0 |
| 9 | 0 | 0 | | 0.08 | 0 |
| 9.3 | 0 | 0 | | 0.03 | 0 |
| 9.6 | 0 | 0 | | 0 | 0 |
| | | | | Sum Q: | 0.163 |

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Site: Upper Goathorn Cree 20-Sep-99 13:05
Staff Gaug -0.03

| LOC | REVS | SEC | VEL | DEPTH | Q |
|---|---|---|---|---|---|
| 8.700 | 0 | 0 | | 0.000 | 0.000 |
| 9.000 | 0 | 0 | | 0.030 | 0.000 |
| 9.300 | 0 | 0 | | 0.070 | 0.000 |
| 9.600 | 0 | 0 | | 0.100 | 0.000 |
| 9.900 | 12 | 40 | 0.201 | 0.190 | 0.011 |
| 10.200 | 27 | 42 | 0.432 | 0.220 | 0.028 |
| 10.500 | 23 | 45 | 0.343 | 0.280 | 0.029 |
| 10.800 | 35 | 45 | 0.522 | 0.380 | 0.060 |
| 11.100 | 32 | 40 | 0.537 | 0.320 | 0.052 |
| 11.400 | 19 | 42 | 0.304 | 0.420 | 0.038 |
| 11.700 | 29 | 40 | 0.487 | 0.370 | 0.054 |
| 12.000 | 33 | 40 | 0.554 | 0.390 | 0.065 |
| 12.300 | 21 | 41 | 0.344 | 0.39 | 0.040 |
| 12.600 | 38 | 40 | 0.638 | 0.330 | 0.063 |
| 12.900 | 35 | 40 | 0.588 | 0.35 | 0.062 |
| 13.2 | 52 | 41 | 0.852 | 0.31 | 0.079 |
| 13.5 | 48 | 40 | 0.806 | 0.29 | 0.070 |
| 13.8 | 40 | 40 | 0.672 | 0.24 | 0.048 |
| 14.1 | 26 | 42 | 0.416 | 0.26 | 0.032 |
| 14.4 | 23 | 40 | 0.386 | 0.3 | 0.035 |
| 14.7 | 49 | 40 | 0.823 | 0.24 | 0.059 |
| 15 | 12 | 40 | 0.201 | 0.26 | 0.016 |
| 15.3 | 0 | 0 | | 0 | 0.000 |
| 15.6 | 0 | 0 | | 0.07 | 0.000 |
| 15.9 | 11 | 40 | 0.185 | 0.09 | 0.005 |
| 16 | 0 | 0 | | 0 | 0.000 |
| | | | | Sum Q: | 0.337 |

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Site: Upper Tenas 20-Sep-99 11:30
Staff Gauge: 0.102

| LOC | REVS | SEC | VEL | DEPTH | Q | |
|---|---|---|---|---|---|---|
| 0.400 | 0 | 0 | | 0.000 | 0.000 | WW R/B |
| 0.800 | 0 | 0 | | 0.000 | 0.000 | behind big rock |
| 1.200 | 26 | 42 | 0.416 | 0.080 | 0.013 | |
| 1.600 | 21 | 42 | 0.336 | 0.100 | 0.013 | |
| 2.000 | 21 | 41 | 0.344 | 0.100 | 0.014 | |
| 2.400 | 22 | 42 | 0.352 | 0.120 | 0.017 | |
| 2.800 | 0 | 0 | | 0.050 | 0.000 | behind big rock |
| 3.200 | 23 | 45 | 0.343 | 0.090 | 0.012 | |
| 3.600 | 0 | 0 | | 0.140 | 0.000 | back eddy behind roc |
| 4.000 | 14 | 43 | 0.219 | 0.120 | 0.010 | |
| 4.400 | 41 | 40 | 0.688 | 0.120 | 0.033 | |
| 4.800 | 27 | 45 | 0.403 | 0.130 | 0.021 | |
| 5.200 | 28 | 44 | 0.427 | 0.15 | 0.026 | |
| 5.600 | 15 | 41 | 0.246 | 0.180 | 0.018 | |
| 6.000 | 16 | 40 | 0.269 | 0.18 | 0.019 | |
| 6.4 | 30 | 45 | 0.448 | 0.18 | 0.032 | |
| 6.8 | 22.5 | 43 | 0.351 | 0.14 | 0.020 | |
| 7.2 | 0 | 0 | | 0.1 | 0.000 | |
| 7.6 | 0 | 0 | | 0.02 | 0.000 | |
| 8 | 0 | 0 | | 0 | | |
| 8.1 | 0 | 0 | | 0 | | L/B |
| | | | | Sum Q: | 0.134 | |

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Upper Tenas 21-Sep-99 11:30
0.15

| LOC | REVS | SEC | VEL | DEPTH | Q | |
|---|---|---|---|---|---|---|
| 3.500 | 0 | 0 | | 0.000 | 0.000 | WW L/B |
| 3.900 | 0 | 0 | | 0.070 | 0.000 | Too Shallow to Measure |
| 4.300 | 17 | 41 | | 0.080 | 0.000 | |
| 4.700 | 24 | 43.9 | 0.367 | 0.130 | 0.019 | |
| 5.100 | 30 | 43 | 0.468 | 0.170 | 0.032 | |
| 5.500 | 24 | 40.2 | 0.401 | 0.190 | 0.030 | |
| 5.900 | 34 | 45.1 | 0.506 | 0.220 | 0.045 | |
| 6.300 | 30 | 43.4 | 0.464 | 0.170 | 0.032 | |
| 6.700 | 35 | 38.8 | 0.606 | 0.180 | 0.044 | |
| 7.100 | 35 | 36.6 | 0.642 | 0.180 | 0.046 | |
| 7.500 | 30 | 37.1 | 0.543 | 0.200 | 0.043 | |
| 7.900 | 12 | 41.5 | 0.194 | 0.140 | 0.011 | |
| 8.300 | 15 | 38.8 | 0.260 | 0.14 | 0.015 | |
| 8.700 | 0 | 0 | | 0.070 | 0.000 | Too Shallow to Measure |
| 9.100 | 45 | 40.6 | 0.744 | 0.13 | 0.039 | |
| 9.5 | 31 | 41.7 | 0.499 | 0.14 | 0.028 | |
| 9.9 | 20 | 42.5 | | 0.12 | 0.000 | |
| 10.3 | 0 | 0 | | 0.08 | 0.000 | |
| 10.7 | 0 | 0 | | 0 | 0.000 | WW R/B |
| | | | | Sum Q: | 0.302 | |

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# APPENDIX C

# SEPTEMBER WATER QUALITY MONITORING TRIP RESULTS

# Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers

212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221 FAX: 604-984-0218


To: AGRA EARTH & ENVIRONMENTAL LIMITED ~*

BOX 3966, #3 - 3167 TATLOW ROAD
SMITHERS, BC
V0J 2N0

Project : KS00076
Comments: ATTN: SCOTT DAVIDSON


Certificate Date: 05-OCT-1999
Invoice No. : I9929585
P.O. Number :
Account : OXF

* PLEASE NOTE

## CERTIFICATE OF ANALYSIS A9929585

| PARAMETER DESCRIPTIONS | SAMPLE LOWER TENAS | SAMPLE TRIP BLANK | SAMPLE UPPER TENAS | SAMPLE FOUR CREEK | SAMPLE UPPER GOATHORN | SAMPLE LOWER GOATHORN | SAMPLE TELKWA RIVER | SAMPLE HUBERT CREEK | SAMPLE BULKLEY RIVER | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample preparation code | 221 | 221 | 221 | 221 | 221 | 221 | 221 | 221 | 221 | |
| Sample preparation code | --- | --- | --- | --- | --- | --- | --- | --- | --- | |
| pH | 8.0 | 7.9 | 7.7 | 8.0 | 7.9 | 7.8 | 7.8 | 7.3 | 7.7 | |
| Conductivity (umhos/cm) | 147 | 2 | 138 | 230 | 124 | 132 | 63 | 215 | 62 | |
| Total Susp Solids (mg/L) | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | 14 | < 5 | 6 | |
| SO4 mg/L - Ion Chrom. | 2.9 | < 0.1 | 2.5 | 1.5 | 27.4 | 26.6 | 4.8 | 0.5 | 4.6 | |
| Alkalinity (mg/L CaCO3) | 78 | < 1 | 72 | 130 | 33 | 41 | 29 | 117 | 28 | |
| Ammonia (mg/L N) | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | |
| Nitrates (mg/L N) | < 0.05 | < 0.05 | < 0.05 | < 0.05 | 0.06 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | |
| Nitrites (mg/L N) | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | |
| Tot Organic Carbon(mg/L) | 2.0 | < 1.0 | 2.0 | 7.0 | < 1.0 | 1.0 | < 1.0 | 15.0 | 1.0 | |
| Tot Hardness(mg/L CaCO3) | 74.3 | 0.4 | 67.7 | 121.0 | 57.8 | 62.8 | 31.6 | 119.0 | 30.4 | |
| Tot phosphates (mg/L P) | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.05 | 0.04 | 0.03 | |
| Chloride (mg/L) | 0.2 | < 0.1 | 0.1 | 0.4 | 0.1 | 0.2 | 0.1 | 0.7 | 0.2 | |

CERTIFICATION:

* pH ANALYSED SEPTEMBER 23, 1999, @ 14:15 HRS.

# Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers

212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221 FAX: 604-984-0218

To: AGRA EARTH & ENVIRONMENTAL LIMITED ~*

BOX 3966, #3 - 3167 TATLOW ROAD
SMITHERS, BC
V0J 2N0

Project : KS00076
Comments: ATTN: SCOTT DAVIDSON

Page Number : 1-A
Total Pages : 1
Certificate Date: 11-OCT-1999
Invoice No. : I9929588
P.O. Number :
Account : OXF

## CERTIFICATE OF ANALYSIS A9929588

| SAMPLE | PREP CODE | Ag ug/L | Al mg/L | As ug/L | Ba ug/L | Be ug/L | Bi ug/L | Ca mg/L | Cd ug/L | Co ug/L | Cr ug/L | Cu ug/L | Fe mg/L | Hg ug/L | K mg/L | Mg mg/L | Mn ug/L | Mo ug/L | Na mg/L | Ni ug/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOWER TENAS-TOT | 221 2393 | < 0.05 | 0.029 | < 1 | 28.2 | < 0.5 | < 0.05 | 21.9 | < 0.1 | 0.08 | 2.0 | 1.8 | 0.14 | < 1 | 0.25 | 4.09 | 5.75 | < 0.1 | 3.15 | < 0.2 |
| LOWER TENAS-DIS | 221 -- | < 0.05 | 0.006 | < 1 | 27.2 | < 0.5 | < 0.05 | 21.7 | < 0.1 | 0.08 | 3.0 | 2.0 | 0.10 | < 1 | 0.25 | 4.04 | 3.65 | < 0.1 | 3.10 | < 0.2 |
| TRIP BLANK-TOT | 221 2393 | < 0.05 | 0.027 | < 1 | < 0.05 | < 0.5 | < 0.05 | 0.05 | < 0.1 | < 0.02 | 2.0 | 0.6 | 0.04 | < 1 | < 0.05 | < 0.001 | 0.15 | < 0.1 | < 0.05 | < 0.2 |
| TRIP BLANK-DIS | 221 -- | < 0.05 | 0.001 | < 1 | < 0.05 | < 0.5 | < 0.05 | < 0.05 | < 0.1 | < 0.02 | < 0.5 | 0.3 | < 0.01 | < 1 | < 0.05 | 0.005 | < 0.05 | < 0.1 | < 0.05 | < 0.2 |
| UPPER TENAS-TOT | 221 2393 | < 0.05 | 0.018 | < 1 | 25.0 | < 0.5 | < 0.05 | 21.1 | < 0.1 | 0.06 | 0.5 | 0.8 | 0.11 | < 1 | 0.20 | 3.52 | 0.95 | < 0.1 | 2.95 | < 0.2 |
| UPPER TENAS-DISS | 221 -- | < 0.05 | 0.009 | < 1 | 23.4 | < 0.5 | < 0.05 | 19.45 | < 0.1 | 0.06 | 0.5 | 2.0 | 0.11 | < 1 | 0.20 | 3.25 | 0.80 | 0.1 | 2.95 | < 0.2 |
| FOUR CREEK-TOT | 221 2393 | < 0.05 | 0.061 | < 1 | 79.5 | < 0.5 | < 0.05 | 25.6 | < 0.1 | 0.10 | 2.0 | 1.2 | 0.16 | < 1 | 0.50 | 11.85 | 0.95 | 0.1 | 5.95 | 0.4 |
| FOUR CREEK-DISS | 221 -- | < 0.05 | 0.041 | < 1 | 78.7 | < 0.5 | < 0.05 | 25.2 | < 0.1 | 0.08 | 4.5 | 1.3 | 0.13 | < 1 | 0.50 | 11.75 | 0.60 | 0.2 | 6.45 | 0.2 |
| UPPER GOATHORN-T | 221 2393 | < 0.05 | 0.019 | < 1 | 24.5 | < 0.5 | < 0.05 | 18.40 | < 0.1 | 0.08 | 2.0 | 1.7 | 0.12 | < 1 | 0.40 | 2.03 | 1.35 | 0.7 | 1.40 | < 0.2 |
| UPPER GOATHORN-D | 221 -- | < 0.05 | 0.010 | < 1 | 23.5 | < 0.5 | < 0.05 | 17.80 | < 0.1 | 0.06 | 0.5 | 1.8 | 0.10 | < 1 | 0.35 | 2.01 | 1.10 | 0.7 | 1.40 | 0.2 |
| LOWER GOATHORN-T | 221 2393 | < 0.05 | 0.018 | < 1 | 50.3 | < 0.5 | < 0.05 | 17.75 | < 0.1 | 0.18 | 2.0 | 1.1 | 0.13 | < 1 | 0.40 | 2.83 | 2.85 | 0.5 | 1.65 | < 0.2 |
| LOWER GOATHORN-D | 221 -- | < 0.05 | 0.029 | < 1 | 50.1 | < 0.5 | < 0.05 | 18.50 | < 0.1 | 0.06 | 0.5 | 1.3 | 0.09 | < 1 | 0.40 | 3.03 | 2.00 | 0.5 | 2.00 | 0.2 |
| TELKWA RIVER-TOT | 221 2393 | < 0.05 | 0.583 | < 1 | 41.2 | < 0.5 | < 0.05 | 9.50 | < 0.1 | 0.40 | 2.5 | 2.4 | 0.80 | < 1 | 0.40 | 1.490 | 35.7 | 0.5 | 1.00 | 0.6 |
| TELKWA RIVER-DIS | 221 -- | < 0.05 | 0.048 | < 1 | 26.9 | < 0.5 | < 0.05 | 9.35 | < 0.1 | 0.04 | < 0.5 | 0.9 | 0.08 | < 1 | 0.30 | 1.215 | 11.60 | 0.5 | 0.95 | < 0.2 |
| HUBERT CREEK-TOT | 221 2393 | < 0.05 | 0.049 | < 1 | 49.6 | < 0.5 | < 0.05 | 30.2 | < 0.1 | 0.26 | 2.0 | 0.7 | 1.03 | < 1 | 0.85 | 7.79 | 290 | 0.1 | 3.25 | 0.6 |
| HUBERT CREEK-DIS | 221 -- | < 0.05 | 0.030 | < 1 | 48.1 | < 0.5 | < 0.05 | 30.9 | < 0.1 | 0.22 | 1.5 | 1.1 | 0.69 | < 1 | 0.90 | 8.11 | 267 | 0.3 | 3.70 | 0.6 |
| BULKLEY R.-TOT | 221 2393 | < 0.05 | 0.217 | < 1 | 27.7 | < 0.5 | < 0.05 | 9.10 | < 0.1 | 0.16 | 2.0 | 1.6 | 0.33 | < 1 | 0.35 | 1.270 | 14.10 | 0.4 | 1.00 | < 0.2 |
| BULKLEY R.-DIS | 221 -- | < 0.05 | 0.048 | < 1 | 22.7 | < 0.5 | < 0.05 | 9.50 | < 0.1 | 0.02 | < 0.5 | 1.6 | 0.08 | < 1 | 0.35 | 1.300 | 5.55 | 0.6 | 1.70 | < 0.2 |

CERTIFICATION:

# Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers

212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221 FAX: 604-984-0218


To: AGRA EARTH & ENVIRONMENTAL LIMITED ~*

BOX 3966, #3 - 3167 TATLOW ROAD
SMITHERS, BC
V0J 2N0

Project : KS00076
Comments: ATTN: SCOTT DAVIDSON


Certificate Date: 11-OCT-1999
Invoice No. :I9929588
P.O. Number :
Account :OXF

## CERTIFICATE OF ANALYSIS A9929588

| SAMPLE | PREP CODE | P mg/L | Pb ug/L | Sb ug/L | Se ug/L | Sn ug/L | Sr ug/L | Ti ug/L | Tl ug/L | U ug/L | V ug/L | Zn ug/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOWER TENAS-TOT | 221 2393 | 0.4 | < 2 | 0.20 | < 1 | < 0.5 | 89.4 | < 1 | < 0.05 | 0.05 | < 1 | < 0.5 |
| LOWER TENAS-DIS | 221 -- | < 0.1 | 10 | 0.15 | < 1 | < 0.5 | 86.7 | < 1 | < 0.05 | 0.05 | 1 | < 0.5 |
| TRIP BLANK-TOT | 221 2393 | 0.4 | < 2 | < 0.05 | < 1 | < 0.5 | < 0.05 | < 1 | < 0.05 | < 0.05 | < 1 | < 0.5 |
| TRIP BLANK-DIS | 221 -- | < 0.1 | < 2 | < 0.05 | < 1 | < 0.5 | < 0.05 | < 1 | < 0.05 | < 0.05 | < 1 | < 0.5 |
| UPPER TENAS-TOT | 221 2393 | 0.3 | < 2 | 0.15 | < 1 | < 0.5 | 85.6 | < 1 | < 0.05 | 0.05 | 1 | < 0.5 |
| UPPER TENAS-DISS | 221 -- | < 0.1 | < 2 | 0.15 | < 1 | < 0.5 | 80.7 | < 1 | < 0.05 | 0.05 | < 1 | 0.5 |
| FOUR CREEK-TOT | 221 2393 | 0.4 | < 2 | < 0.05 | < 1 | < 0.5 | 147.5 | < 1 | < 0.05 | 0.05 | < 1 | < 0.5 |
| FOUR CREEK-DISS | 221 -- | < 0.1 | < 2 | < 0.05 | < 1 | < 0.5 | 141.5 | < 1 | < 0.05 | 0.05 | 1 | 1.5 |
| UPPER GOATHORN-T | 221 2393 | 0.5 | < 2 | 0.05 | < 1 | < 0.5 | 52.8 | 1 | < 0.05 | < 0.05 | < 1 | 0.5 |
| UPPER GOATHORN-D | 221 -- | < 0.1 | < 2 | 0.05 | < 1 | < 0.5 | 51.4 | < 1 | < 0.05 | < 0.05 | < 1 | 1.0 |
| LOWER GOATHORN-T | 221 2393 | 0.4 | < 2 | 0.05 | < 1 | < 0.5 | 56.4 | 1 | < 0.05 | < 0.05 | < 1 | < 0.5 |
| LOWER GOATHORN-D | 221 -- | < 0.1 | < 2 | 0.05 | < 1 | < 0.5 | 57.0 | < 1 | < 0.05 | < 0.05 | < 1 | 0.5 |
| TELKWA RIVER-TOT | 221 2393 | 0.5 | < 2 | < 0.05 | < 1 | < 0.5 | 44.2 | 20 | < 0.05 | 0.05 | < 1 | 3.5 |
| TELKWA RIVER-DIS | 221 -- | < 0.1 | < 2 | < 0.05 | < 1 | < 0.5 | 41.3 | < 1 | < 0.05 | < 0.05 | < 1 | < 0.5 |
| HUBERT CREEK-TOT | 221 2393 | 0.4 | < 2 | < 0.05 | < 1 | < 0.5 | 108.0 | 2 | < 0.05 | 0.05 | < 1 | < 0.5 |
| HUBERT CREEK-DIS | 221 -- | < 0.1 | < 2 | < 0.05 | < 1 | < 0.5 | 106.5 | < 1 | < 0.05 | 0.05 | < 1 | 1.0 |
| BULKLEY R.-TOT | 221 2393 | 0.5 | < 2 | < 0.05 | < 1 | < 0.5 | 37.9 | 8 | < 0.05 | < 0.05 | < 1 | < 0.5 |
| BULKLEY R.-DIS | 221 -- | < 0.1 | < 2 | < 0.05 | < 1 | < 0.5 | 37.5 | < 1 | < 0.05 | < 0.05 | < 1 | 1.0 |

CERTIFICATION:

I called Scott and requested edits. He will forward final copies + email electronic. No work in 2000.
ALLAN, 7 PAGES Feb 29/00. .ab
DRAFT 1999 REPORT
SORRY FOR THE DELAYS.
APP. A + FIELD DATA SUMMARY APPENDIX TO BE ADDED

February 15, 2000
CW1537.1

Luscar Ltd.
1600 Oxford Tower
10235 - 101 Street
Edmonton, Alberta T2P 3V4

780
**Attention:** **Mr. Allan Flemming, P.Eng.** Fax: ~~403~~ 420-5875

Dear Mr. Flemming:

**RE: TELKWA COAL PROJECT 1999 BASELINE DATA REPORT**

## 1.0 INTRODUCTION

AGRA Earth & Environmental Limited is pleased to present the 1999 Baseline Surface Water Flow and Water Quality Monitoring Report for the Telkwa Coal Project (TCP). The TCP is a proposed open pit coal mine located near Telkwa, B.C. and owned by Luscar Inc. (Luscar). The location of the mine is illustrated on Figure 1. This report contains the data collected during the 1999 baseline monitoring program and updates the rating curves for sites where discharge measurements were conducted.

## 2.0 SCHEDULE OF 1999 SITE VISITS

The schedule of site visits for the 1999 field monitoring program is contained in the March 3, 1999 AGRA proposal to conduct the TCP baseline monitoring. A copy of the AGRA proposal is contained in Appendix A for reference. The dates of actual site visits and a listing of the work conducted during the site visits is contained in Table 1. The discharge measurement focus was on the low flow periods.

TABLE 1
1999 Monitoring Site Visits

| Week of: | Feb 1 | Aug 1 | Sept 19 | Nov 14 |
|---|---|---|---|---|
| Telkwa River | WQ | | WQ | |
| Upper Tenas Creek | No site access | | SM, WQ, Q | S |
| Lower Tenas Creek | WQ, Q | S | SM, WQ, Q | S |
| Bulkley River | WQ | | WQ | |
| Hubert Creek | WQ, S | S | WQ, S | S |
| Four Creek | WQ | S | WQ, Q | S |
| Upper Goathorn Creek | WQ, Q | | SM, WQ, Q | S |
| Lower Goathorn Creek | WQ | | WQ | |

Q = Discharge and stage measurements conducted
S = Stage measurements conducted
WQ = Water quality sampling conducted
SM = Site Maintenance Visit

The purpose of the August field trips was to collect peak flow information from the crest gauges at each site and to survey the equipment and benchmarks at each site for the low flow period.

## 3.0 SURFACE WATER MONITORING RESULTS

This section contains a summary of the five sites where surface water monitoring was conducted during the 1999 field season. Summary field data for the site visits is contained in Appendix B.

### 3.1 LOWER TENAS CREEK SITE

The lower Tenas Creek site was visited four times as part of the 1999 monitoring program. The station was operated as a manual sampling with no installation of the automated equipment used in previous years.

The two low flow discharge measurements conducted during February and September yielded discharges of 0.041 $m^3/s$ and 0.163 $m^3/s$ respectively. These discharge measurements have been added to the rating curve and a revised rating curve for this site is shown in Figure 2.

An initial crest gauge installed in late 1998 at the site was replaced during the 1999 sampling season. Level surveys conducted at the site during the 1999 field season did not show significant shift of the benchmarks or the staff gauge. There was evidence of sand deposition noted near the gauge during the November 1999 field visit.

### 3.2 UPPER TENAS CREEK SITE

The upper Tenas Creek was visited twice during the 1999 monitoring program. There was no site access during the February 1999 field trip. As the crest gauge for this site was not checked and reset during February, this site was not visited during the August field trip.

The crest gauge was checked during September and the maximum stage was observed to be 0.70 m. This value would translate to a discharge of 8.43 $m^3/s$ and is expected to be due to the spring freshet which consistently produces greater discharges than the fall peak flows. The low flow measurement from September 20th was 0.134 $m^3/s$. An updated rating curve for this site is shown in Figure 3. The two 1999 data points plot above the current stage-discharge relation. AGRA proposes that one high flow measurement be conducted at this site during the 2000 field season to determine whether the rating curve should be shifted upwards.

The September field visit to this site showed that the braces for the staff gauge had snapped but that the staff gauge did not appear to have shifted (based on a review of previous site photographs). Braces at the site were replaced and a third benchmark was added on the right bank side of the stream. Levelling checks showed that there was no significant shift of the benchmarks or the staff gauge during 1999. The breakage of the braces resulted in slight downstream leaning of the staff gauge mounting but this was corrected during the site

maintenance visit.

### 3.3 UPPER GOATHORN CREEK SITE

The upper Goathorn Creek site was visited four times during the 1999 monitoring program. The station was monitored as a manual station with a staff gauge and crest gauge.

The two low flow discharge measurements conducted during February and September yielded discharges of 0.097 $m^3/s$ and 0.337 $m^3/s$ respectively. These discharge measurements have been added to the rating curve and a revised rating curve for this site is shown in Figure 4.

Maintenance of the gauge equipment was conducted during the September visit . The bracing for the staff gauge was reinforced and the staff gauge was lowered by a distance of 0.19 m. A second staff gauge was added to the top of the first staff gauge to allow for visual measurement of peak flow levels during the freshet period. The level check of benchmarks showed that there were no changes in the elevations of the benchmarks. The staff gauge did not show any significant shift during the 1999 season.

problem with chart

### 3.4 FOUR CREEK SITES

Two sampling locations were operated on Four Creek during the 1999 field season. The low flow discharge measurements were made at the lowest road culvert crossing of Four Creek. Other stage measurements and water quality sampling were conducted at the original stream flow sampling site located approximately 1,800 m upstream of the culvert crossing on Four Creek.

Discharges for the low flow periods were determined by calculation of the discharge through the culvert based on the known inlet water levels and the culvert characteristics. The February low flow measurement revealed that there was only a small quantity of baseflow (< 1L/min) during the sampling trip. The culvert was almost completely iced up. The September low flow discharge for the culvert was calculated to be 0.077 $m^3/s$.

### 3.5 HUBERT CREEK SITE

The Hubert Creek site was visited four times during the 1999 monitoring program. Readings for the staff gauge are available from two of the site visits. Visits conducted during September and November did not yield useful data on flow levels due to numerous partial blockages of the culvert inlet by debris.

The crest gauge at the site indicated that there was a recorded stage greater than 1.23 m during the spring 1999 freshet period. This high stage is believed to be partially due to beaver debris blockage of the inlet of the Hubert Creek culvert.

## 4.0 WATER QUALITY MONITORING RESULTS

In 1999, baseline water chemistry was sampled during the two low flow periods at ten sites in the proposed Telkwa Coal Project area. The data for the February 1999 water quality monitoring was forwarded directly to Luscar as previously arranged. The laboratory results for the September water quality trip are included in Appendix C of this report. No analysis of the testing data, other than to identify specific stations where the BC Water Quality Criteria (Nagpal, 1995) were exceeded. A summary of metals and stations where exceedances occurred are summarized in Table 2. Due to operator error during the September 1999 water quality field trip, triplicate sampling was not conducted. A blank sample obtained from Chemex did not have any exceedances.

77
↖ QA/QC not done properly

**TABLE 2: B.C. WATER QUALITY CRITERIA EXCEEDANCE INFORMATION FOR THE SEPTEMBER 20, 1999 SAMPLING TRIP**

| METAL | B.C. WATER QUALITY CRITERIA | STATIONS WITH TOTAL METALS CONCENTRATIONS GREATER THAN THE B.C. CRITERIA | STATIONS WITH TOTAL METALS CONCENTRATIONS EQUAL TO THE B.C. CRITERIA |
|---|---|---|---|
| Cr | 2.0 ug/L | Telkwa River (2.5) | Upper Goathorn Creek, Lower Goathorn Creek, Bulkley River, Hubert Creek, Lower Tenas, Four Creek |
| Cu | 2.0 ug/L | Telkwa River (2.4) | |
| Fe | 0.3 mg/L | Telkwa River (0.8), Hubert Creek (1.03), Bulkley River (0.33) | |
| Zn | 3.0 ug/L | Telkwa River (3.5) | |

## 5.0 CLOSURE

AGRA Earth Environmental Limited is pleased to present this 1999 data summary to Luscar Ltd. AGRA looks forward to continuing to work with Luscar on the Telkwa Coal project over the 2000 season. Should you have any questions concerning this project please do not hesitate to contact the undersigned at (250) 847-8783.

Respectfully Submitted,

Reviewed by,

Scott Davidson, M.Sc., P.Geo.
Project Manager

Gary R.E. Beckstead, M.Sc., P.Eng.
Senior Water Resource Engineer

Dennis Trotter
Senior Toxicologist

02/16/00 WED 11:55 FAX 250 847 9049 AGRA SMITHERS 009/009

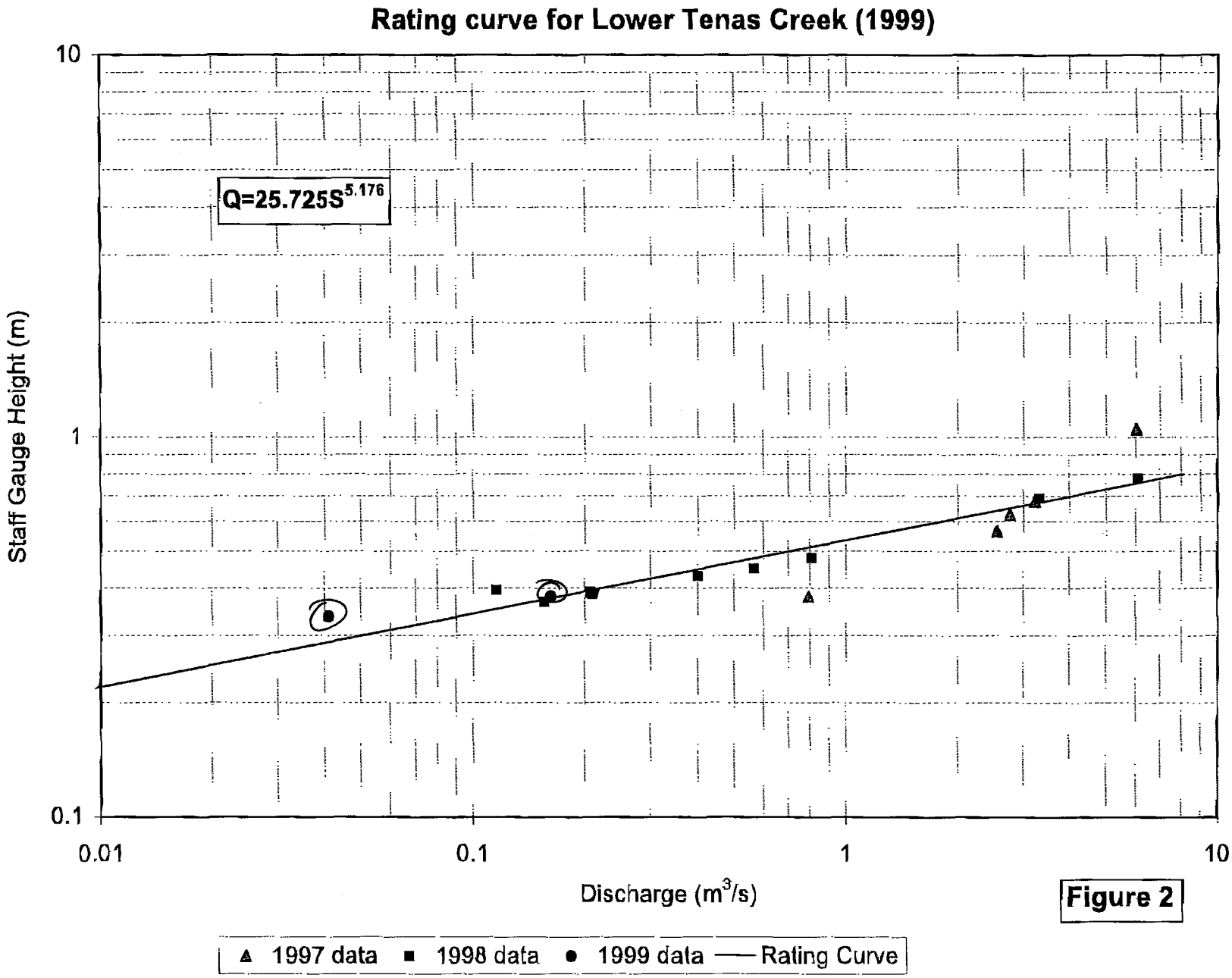


**Figure 2**

02/16/00 WED 11:55 FAX 250 847 9049 AGRA SMITHERS 005

## Rating Curve for Upper Tenas Creek (1999)

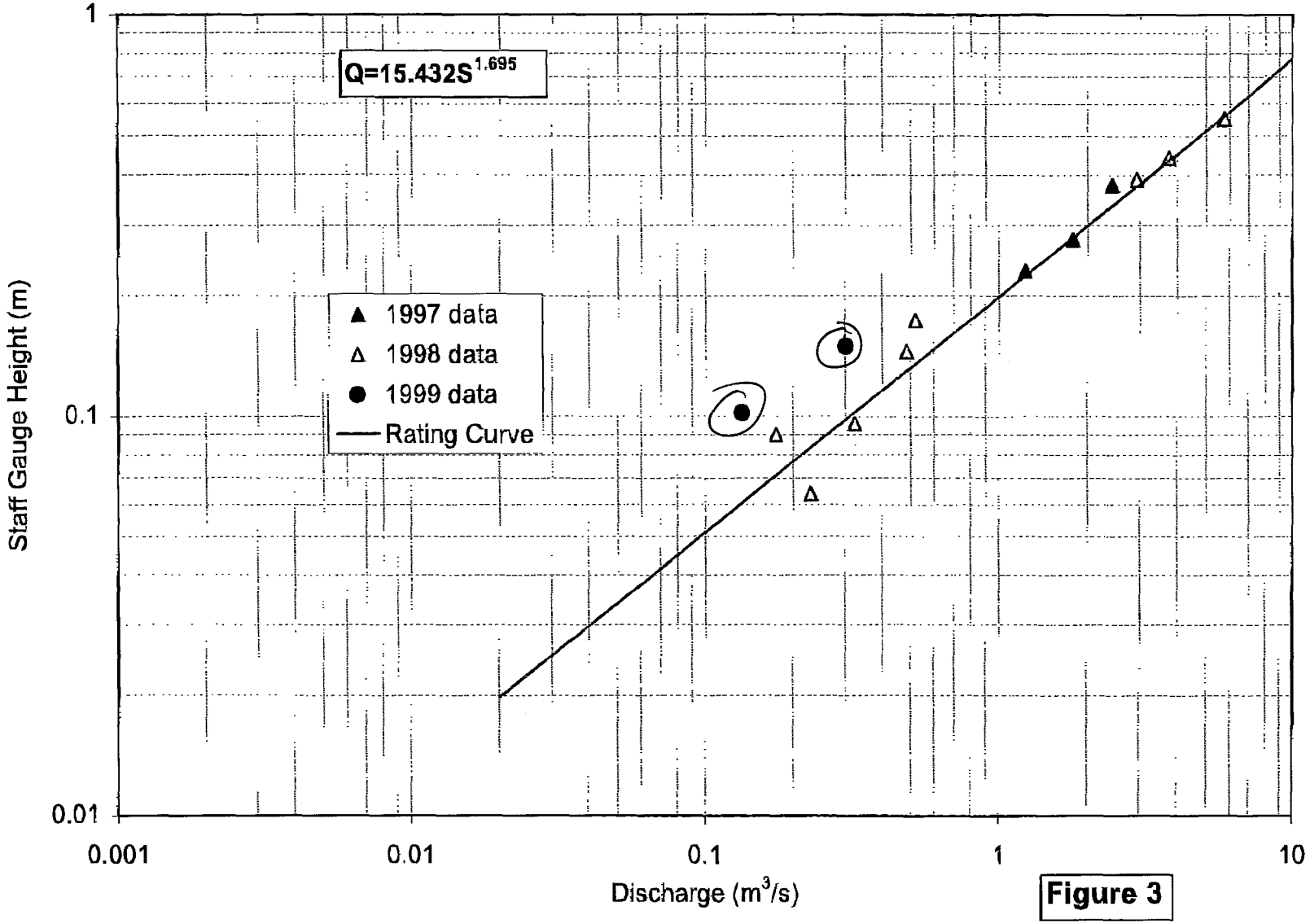


**Figure 3**

Graph. Did not change from 1998
(slope/intercept

rcurve-98.xls

15/02/2000

02/16/00 WED 11:56 FAX 250 847 9049 AGRA SMITHERS

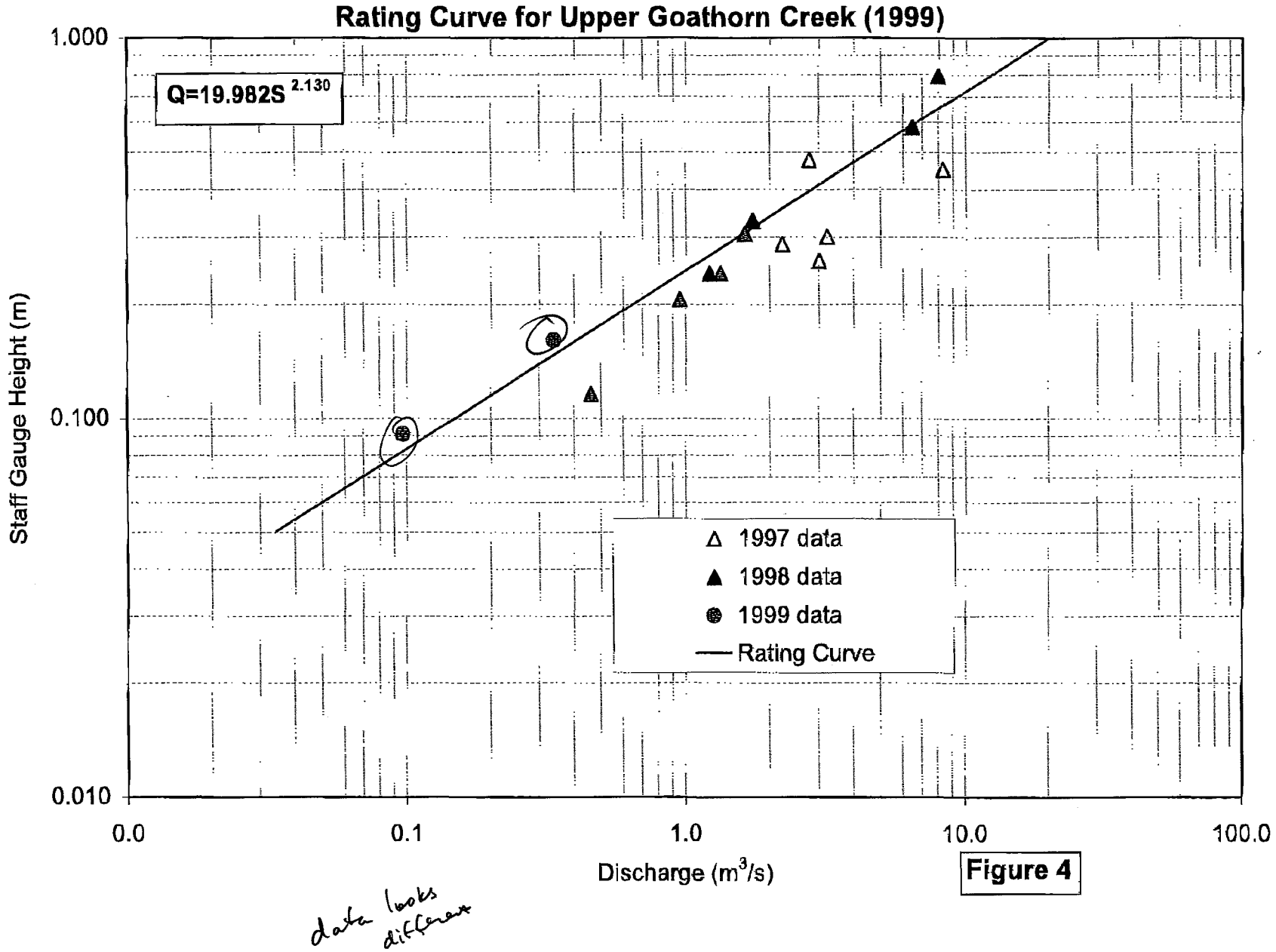


Figure 4

data looks different

AGRA
ENGINEERING GLOBAL SOLUTIONS

**AGRA Earth & Environmental Limited**
Box 3966
#3-3167 Tatlow Road
Smithers, B.C. V0J 2N0
Tel (250) 847-8783
Fax (250) 847-9049

June 8, 1999

KS00076

Luscar Ltd.
1600 Oxford Tower
10235 - 101 Street
Edmonton,AB. T5J 3G1

Attention: Allan Flemming, P.Eng.
Project Engineer

**RE: 1999 DATA REPORT UPDATE**

Dear Mr. Flemming,

AGRA Earth & Environmental Limited (AGRA) is pleased to present LuscarLtd. (Luscar) with this report containing data collected as part of the 1999 Telkwa Coal Surface Water and Water Quality Baseline Monitoring Program. The data presented in this report includes low flow data from February 1999 and the results of the site visits conducted during April and May to re-establish the crest gauges at selected sites.

## LOW FLOW MONITORING TRIP

Low flow monitoring was conducted at sites on February 16th and 17th, 1999. During this trip water quality sampling was also completed; the data was directly forwarded from Chemex Labs to Luscar. The list of sites and the sampling completed is presented in Table 1.

**Table 1. Low Flow Monitoring Trip Summary**

| SITE | FLOW CONDITIONS | WATER QUALITY SAMPLING |
|---|---|---|
| Telkwa River | Water level was 45 cm below the level of the main staff gauge located on the old bridge pilings. | Samples for total metals, dissolved metals and general nutrient analysis were collected. |
| Lower Goathorn Creek | There was some flow in the creek below approximately 30 cm of ice. | Samples for total metals, dissolved metals and general nutrient analysis were collected. |
| Four Creek | No evidence of flow at the lower culvert crossing. | No samples collected. |
| Upper Goathorn Creek | Water level was 0.1 m below the staff gauge. Discharge was measured to be 0.097 $m^3/s$. | Samples for total metals, dissolved metals and general nutrient analysis were collected. |
| Lower Tenas Creek | Staff gauge reading 0.337 m. Discharge was measured to be 0.041 $m^3/s$. | Samples for total metals, dissolved metals and general nutrient analysis were collected. |
| Hubert Creek | Staff gauge iced up; Unable to estimate water level. Discharge estimated from outlet velocity and depth to be 0.024 $m^3/s$. | Samples for total metals, dissolved metals and general nutrient analysis were collected. |

## RE-ESTABLISHMENT OF CREST GAUGES AND BENCHMARKS

The monitoring program was revised to meet Luscar's request to monitor peak flows at the study streams using only crest gauges. The crest gauges were visited at accessible sites to add cork and to check the relative elevations of staff gauges and crest gauges to site benchmarks. Table 2 contains a summary of the work completed in re-establishing the monitoring gauges.

As a result of weather conditions during April and May, the re-establishment of crest gauges required that multiple field trips be made. The two upper sites on Goathorn Creek and Tenas Creek were not accessable during May due to snow and road conditions. Therefore, AGRA did not re-establish these upper two sites, but chose instead to collect peak flow information from the lower sites on these streams. This was deemed to be the most effective use of available resources and budget given ground conditions. Peak flow levels will be determined during a field trip to be made to sites during July 1999. No crest stage readings for the Upper Goathorn and Upper Tenas sites until the july visit.

**Table 2. Site Re-establishment for Peak Flow Determination**

| SITE | DATE VISITED | WORK COMPLETED |
|---|---|---|
| Telkwa River | April 14th, 1999 | Water level was 45 cm below the level of the staff crest gauges at the site. |
| Hubert Creek | April 14th, 1999 | Cork added to the crest gauge at the site. Staff gauges and benchmarks leveled for determining offsets. |
| Tailings Pond | April 16th, 1999 | Cork added to the crest gauge at the site. Weir face, staff gauge and benchmarks leveled for determining offsets. |
| Four Creek | May 12th, 1999 | Cork added to the crest gauge at the original site. Staff gauge and benchmarks leveled for determining offsets. |
| Lower Tenas Creek | May 12th, 1999 | Cork added to the crest gauge at the site. Staff gauge and benchmarks leveled for determining offsets. |
| Lower Goathorn Creek | No work conducted at the site maintained by the WSC . | |
| Upper Tenas Creek | (May 12th, 1999) | No access to site because of snow and road conditions. |
| Upper Goathorn Creek | (May 12th, 1999) | No access to site because of snow and road conditions. |

AGRA Earth & Environmental Limited is pleased to present this summary of data collection and work completed to date on the Telkwa Coal Project. Digital copies of the collected data will be forwarded to Luscar. Should you require any further information on this project please do not hesitate to contact the undersigned at (250) 847-8783.

Respectfully submitted,

AGRA Earth & Environmental Limited

Scott Davidson, M.Sc., P.Geo.
Project Manager

Reviewed by

Gary R.E. Beckstead, Msc., P.Eng.
Senior Project Manager

AGRA Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

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Fax (250) 847-9049

March 2, 1999
CW1537.1

Luscar Ltd.
1600 Oxford Tower
10235 - 101 Street
Edmonton, Alberta T2P 3V4

**Attention: Mr. Allan Flemming, P.Eng.** Fax: (403) 420-5875

Dear Mr. Flemming:

**Re: Telkwa Coal Mine**
**Revised 1999 Budget**

## 1.0 SURFACE WATER MONITORING

AEE is pleased to present this revised budget for the 1999 baseline water flow and water quality program for the proposed Telkwa Coal Project. It is the understanding of AEE that during 1999 Luscar should be submitting the Final Project Report to the B.C. Environmental Assessment Office. Following certification of the project, it is the understanding of AEE that the entire surface water and water quality program may need to be revised to meet the construction plan for the mine.

## 2.0 WORK PROGRAM AND BUDGET

The work program proposed for 1999 is as follows:

<u>Surface Water Flow</u>

- Concentration of the base program on the winter and summer low flow periods.
- Monitoring of low flows on Four Creek, Hubert Creek, Tenas Creek, Upper Goathorn Creek and Lower Goathorn Creek. No monitoring will be conducted on Helps Creek, Telkwa River, and the Bulkley River. Low flow monitoring will result in two site visits. To reduce cost to Luscar, AEE has scheduled the summer low flow period measurement trip to coincide with site visit #3 described below.
- Monitoring of peak flows at the streams using crest gauges already installed at all of the existing sites. To conduct this portion of the required work, AEE will conduct a total of four sites visits planned as follows:

1. Pre-freshet to set up crest and staff gauges and survey to local bench marks (April),
2. Post freshet to record peak flow during period and survey to local bench marks (June),
3. Pre fall high flow period to re-survey benchmarks and survey to local bench marks (late August to early September),

4. Post fall high flow to record peak flow and survey to local bench marks (November).

**Water Quality**

- Sampling of baseline parameters for the two low flow periods only.

**Data Analysis**

AEE proposes to conduct data analysis and reporting for the 1999 sampling program following each monitoring trip. A data analysis period has been allowed following each of the five surface flow site visits (one low flow and four peak flow visits) described above. The information reports from each trip will assist Luscar in public meetings by providing the most up to date information on the project.

**Project Management**

Project management involves dealing with items such as cost control, client liaison, and interfacing with other consultants working for Luscar on the proposed Telkwa Coal Mine. For the 1999 sampling program, AEE proposes to conduct project management on a cost plus basis. The totals for this item in the attached Table 1 represent estimates of the total budget required for project management. AEE will make every effort to ensure that it conducts stringent cost control on the project management for Luscar. Project management for the 1999 program will be conducted by Mr. Scott Davidson, M.Sc., P.Geo. of the Smithers office. Mr. Gary Beckstead, M.Sc., P.Eng. and Mr. Dennis Trotter will provide technical input and review to the project as required.

## 3.0 CLOSURE

We thank you for the opportunity to provide engineering and environmental services to this project and look forward to continuing to work with Luscar on the proposed Telkwa Coal Mine during 1999. If you have any questions or require further information concerning this project, please call Scott Davidson at (250) 847-8783 or Gary Beckstead at (403)235-8118.

Yours sincerely,

**AGRA Earth & Environmental Limited**

Reviewed by

Scott Davidson, M.Sc., P.Geo.
Project Manager
C:\files\working\Luscar\1999\revised budget99.wpd
cc. Gary R.E. Beckstead, AEE - Calgary

Gary R.E. Beckstead, M.Sc., P.Eng.
Senior Water Resource Engineer

**Table 1**
**Budget Estimate for 1999 Hydrometric Monitoring and Water Quality Sampling**
**Telkwa Coal Project**

| Task | Assumptions | Month | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | Feb | Mar. | Apr. | May | June | Jul. | Aug | Sept. | Oct | Nov. | Dec. | |
| Surface Flow Monitoring | 1,3,4,6 | | | | | | | | | | | | | |
| Labour | | $ - | $ 3,240.00 | $ - | $1,350.00 | $ - | $ 1,284.00 | $ - | $1,284.00 | $ - | $ - | $1,080.00 | $ - | $ 6,238.00 |
| Disbursements | | $ - | $ 378.00 | $ - | $ 189.00 | $ - | $ 189.00 | $ - | $ 189.00 | $ - | $ - | $ 189.00 | $ - | $ 1,134.00 |
| Water Quality | 1,5,6,7 | | | | | | | | | | | | | |
| Sampling | | $1,115.00 | $ 2,838.00 | $ - | $ - | $ - | $ - | $ - | $ 428.00 | $ - | $ - | $ - | $ - | $ 4,381.00 |
| Disbursements | | $ 310.20 | $ 645.00 | $ - | $ - | $ - | $ - | $ - | $ 100.00 | $ - | $ - | $ - | $ - | $ 1,055.20 |
| Data Analysis | 1 | | | | | | | | | | | | | |
| Labour | | $ - | $ - | $ 970.00 | $ 970.00 | $ - | $ 970.00 | $ - | $ - | $ 970.00 | $ - | $ 970.00 | $ - | $ 4,850.00 |
| Disbursements | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Project Management | 1,2 | | | | | | | | | | | | | |
| Labour | | $ 150.00 | $ 150.00 | $ 150.00 | $ 150.00 | $ 150.00 | $ 150.00 | $ 150.00 | $ 150.00 | $ 150.00 | $ 150.00 | $ 150.00 | $ 150.00 | $ 1,800.00 |
| Disbursements | | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 300.00 |
| Total (Required Work) | | $1,600.20 | $ 7,276.00 | $ 1,145.00 | $2,684.00 | $ 175.00 | $ 2,616.00 | $ 175.00 | $2,176.00 | $ 1,145.00 | $ 175.00 | $2,414.00 | $ 175.00 | $ 21,758.20 |

Assumptions:
1 The above budget is based on the Fw rate schedule
2 Project Management is quoted as an estimated maximum budget and will be billed on a cost plus basis.
3 The summer low flow period extends over August and September
4 The winter low flow period extends over February and March
5 The January water quality sampling costs represent the Selenium sampling
6 Disbursements listed under Water Flow and Water Quality are estimates for sampling equipment and vehicle expenses and do not include 10% handling charge
7 All Laboratory Analysis is to be directly billed to Luscar Ltd.

AGRA Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

Faxed to JED at NDM.
For your comment
al J.

**AGRA** Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

**AGRA Earth & Environmental Limited**
Box 3966
#3, 3167 Tatlow Road
Smithers, BC
Canada V0J 2N0
Tel (250) 847-8783
Fax (250) 847-9049

January 29, 1999
CW1537.1

Luscar Ltd.
1600 Oxford Tower
10235 - 101 Street
Edmonton, Alberta T2P 3V4

**Attention: Mr. Allan Flemming, P.Eng.** Fax: (403) 420-5875

Dear Mr. Flemming:

**Re: Telkwa Coal Mine**
**Revised 1999 Budget**

## 1.0 SURFACE WATER MONITORING

As per the January 26th, 1999 discussion between Gary Beckstead of AGRA Earth & Environmental Limited (AEE) and Allan Flemming of Luscar Ltd. (Luscar), AEE is pleased to present this revised budget for the 1999 baseline water flow and water quality program for the proposed Telkwa Coal Project. It is the understanding of AEE that during 1999 Luscar should be submitting the Final Project Report to the B.C. Environmental Assessment Office. Following certification of the project, it is the understanding of AEE that the entire surface water and water quality program may need to be revised to meet the construction plan for the mine.

## 2.0 WORK PROGRAM AND BUDGET

The revised budget presented in Table 1 is based on the scope of services requested by Luscar at the January 26th, 1999 meeting. The work program proposed for 1999 is as follows:

**Surface Water Flow**

- Concentration of the base program on the winter and summer low flow periods.
- Monitoring of low flows on Four Creek, Hubert Creek, ~~Holps Creek~~, Upper Goathorn Creek and Lower Goathorn Creek. No monitoring will be conducted on Tenas Creek, Telkwa River, and the Bulkley River.
- Monitoring of peak flows at the streams using crest gauges already installed at all of the existing sites. To conduct this portion of the required work, AEE must visit all sites during April to ensure that the sites are ready for the peak flow period (i.e. Checking of staff gauges and crest gauges). During November time has been allocated for conducting a final site visit to all sites to determine their condition prior to winter.
- A cost option has been prepared to operate the data loggers and pressure transducers at the continuous monitoring sites and to conduct a single high flow discharge measurement.

**Water Quality**

- Sampling of baseline parameters for the two low flow periods only.
- Sampling of metals for the two low flow periods.

Selenium sampling was requested to be deleted from the scope of work for 1999, however, the sampling for this was completed prior to receiving notification from Luscar. It is the expectation of AEE that the costs of this sampling will be paid by Luscar as the work was conducted at the request of Mr. Jerry Demchuck, the environmental coordinator for the Telkwa Coal Project. All future requests for increased sampling will not be initiated by AEE until a signed order to proceed with the work has been received from Luscar.

Not true.

**Reporting**

AEE proposes to conduct reporting for the 1999 sampling program following each monitoring trip. A data memo will be issued to Luscar presenting the results of the monitoring trip. This information will assist Luscar in public meetings by providing the most up to date information on the project. The costs of reporting for the optional water flow monitoring program are included in Table 1 as an additional cost of approximately $530.00 per monthly report.

**Project Management**

Project management involves dealing with items such as cost control, client liaison, responding to requests for extra work, and interfacing with other consultants working for Luscar on the proposed Telkwa Coal Mine. For the 1999 sampling program, AEE proposes to conduct each portion of the project as separate tasks. On receiving a request for extra work, AEE will issue to Luscar for approval, a change of work order along with an expected budget to complete the extra work. Project management for the 1999 program will be conducted by Mr. Scott Davidson, M.Sc., P.Geo. of the Smithers office. Mr. Gary Beckstead and Mr. Dennis Trotter will provide technical input and review to the project as required.

## 3.0 CLOSURE

We thank you for the opportunity to provide engineering and environmental services to this project and look forward to continuing to work with Luscar on the proposed Telkwa Coal Mine during 1999. If you have any questions or require further information concerning this project, please call Scott Davidson at (250) 847-8783 or Gary Beckstead at (403)235-8118.

Yours sincerely,

**AGRA Earth & Environmental Limited**

Scott Davidson, M.Sc., P.Geo.
Project Manager
C:\files\working\Luscar\1999\revised budget99.wpd

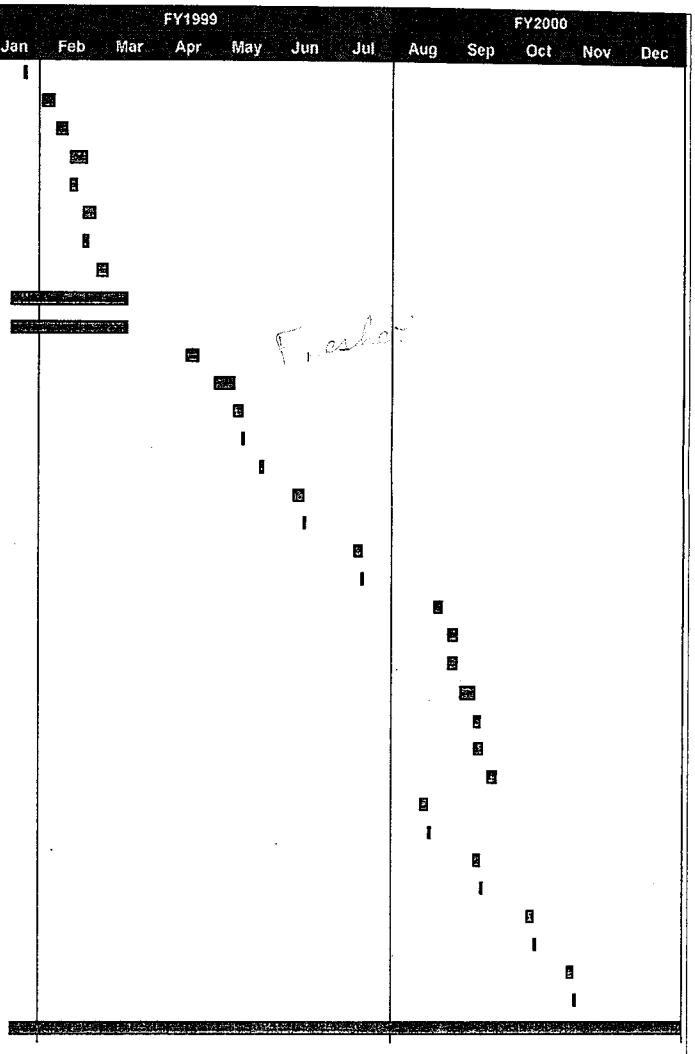
Reviewed by

Gary R.E. Beckstead, M.Sc., P.Eng.
Senior Water Resource Engineer

cc. Gary R.E. Beckstead, AEE - Calgary
Jerry Schmidt, AEE - Prince George

# CW1537.00 Task 1999 Luscar Ltd.

| Task Name | Start Date | Effort | End Date |
|---|---|---|---|
| Selenium Sampling Trip | 1/21/99 | 2.00d | 1/21/99 |
| Winter Water Quality Trip | 1/31/99 | 3.00d | 2/5/99 |
| Winter Revised Metals Sampling Trip | 2/7/99 | 1.13d | 2/12/99 |
| Winter Revised Metals Sampling Trip | 2/14/99 | 1.13d | 2/22/99 |
| Winter Low Flow Discharge Measurement | 2/14/99 | 3.00d | 2/17/99 |
| Winter Revised Metals Sampling Trip | 2/21/99 | 1.13d | 2/26/99 |
| Winter Low Flow Discharge Measurement | 2/21/99 | 3.00d | 2/23/99 |
| Winter Revised Metals Sampling Trip | 2/28/99 | 1.13d | 3/5/99 |
| Lab Calibration of Pressure Transducers | 1/15/99 | 2.00d | 3/15/99 |
| Other Lab Prep Time Associated with Equipment Preparation | 1/15/99 | 4.00d | 3/15/99 |
| All Sites Visit | 4/15/99 | 4.00d | 4/21/99 |
| Installation of Automated Sites | 4/30/99 | 2.00d | 5/10/99 |
| All Sites Visit, Data Download | 5/10/99 | 3.00d | 5/14/99 |
| Data Analysis | 5/14/99 | 1.00d | 5/14/99 |
| High Flow Discharge Measurement | 5/24/99 | 4.00d | 5/25/99 |
| All Sites Visit and Data Download | 6/10/99 | 3.00d | 6/15/99 |
| Data Analysis | 6/15/99 | 1.00d | 6/15/99 |
| All Sites Visit and Data Download | 7/12/99 | 3.00d | 7/15/99 |
| Data Analysis | 7/16/99 | 1.00d | 7/16/99 |
| Summer Water Quality Trip | 8/23/99 | 3.00d | 8/26/99 |
| Summer Revised Metals Sampling Trip | 8/30/99 | 0.75d | 9/3/99 |
| Low Flow Discharge Measurement | 8/30/99 | 3.00d | 9/3/99 |
| Summer Revised Metals Sampling Trip | 9/6/99 | 0.75d | 9/13/99 |
| Summer Revised Metals Sampling Trip | 9/13/99 | 0.75d | 9/16/99 |
| Low Flow Discharge Measurement | 9/13/99 | 3.00d | 9/17/99 |
| Summer Revised Metals Sampling Trip | 9/20/99 | 0.75d | 9/24/99 |
| All Sites Visit and Data Download | 8/16/99 | 3.00d | 8/19/99 |
| Data Analysis | 8/20/99 | 1.00d | 8/20/99 |
| All Sites Visit and Data Download | 9/13/99 | 3.00d | 9/16/99 |
| Data Analysis | 9/17/99 | 1.00d | 9/17/99 |
| All Sites Visit, Data Download | 10/11/99 | 5.00d | 10/14/99 |
| Data Analysis | 10/15/99 | 1.00d | 10/15/99 |
| Decommissioning of Sites/All Sites Visit | 11/1/99 | 2.00d | 11/4/99 |
| Data Analysis | 11/5/99 | 1.00d | 11/5/99 |
| Project Management | 1/15/99 | 5.75d | 12/31/99 |




Hobart
Four Creek (contd)
LT
UG
LG quality (WSC) did



AGRA Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

## Table 1
## Budget Estimate for 1999 Hydrometric Monitoring and Water Quality Sampling
## Telkwa Coal Project

| Task | Assumptions | Month | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | Feb | Mar. | Apr. | May | June | Jul. | Aug | Sept. | Oct | Nov. | Dec. | |
| **Required Flow Monitoring** | 1,2,3,4,8,9 | | | | | | | | | | | | | |
| Labour | | $ - | $ 3,240.00 | $ - | $2,160.00 | $ - | $ - | $ - | $1,284.00 | $ 1,284.00 | $ - | $ 856.00 | | $ 8,824.00 |
| Disbursements | | $ - | $ 378.00 | $ - | $ 189.00 | $ - | $ - | $ - | $ 189.00 | $ 189.00 | $ - | $ 69.30 | | $ 1,014.30 |
| **Optional Flow Monitoring** | 1,4,7,8,9 | | | | | | | | | | | | | |
| Labour | | $ - | $ - | $ - | $1,560.00 | $ 3,974.00 | $ 1,814.00 | $ 1,814.00 | $1,814.00 | $ 1,814.00 | $1,814.00 | $1,376.00 | | $ 15,980.00 |
| Disbursements | | $ - | $ - | $ - | $ 300.00 | $ 249.00 | $ 249.00 | $ 249.00 | $ 249.00 | $ 249.00 | $ 249.00 | $ 249.00 | | $ 2,043.00 |
| **Water Quality** | 1,2,3,5,8,9,10 | | | | | | | | | | | | | |
| Sampling | | $1,115.00 | $ 2,838.00 | $ 493.00 | $ - | $ - | $ - | $ - | $1,674.00 | $ 1,545.00 | $ - | $ - | $ - | $ 7,665.00 |
| Disbursements | | $ 310.20 | $ 645.00 | $ 169.00 | $ - | $ - | $ - | $ - | $ 407.00 | $ 407.00 | $ - | $ - | $ - | $ 1,938.20 |
| **Reporting** | 1,6,7 | | | | | | | | | | | | | |
| Labour | | $ - | $ 785.00 | $ 635.00 | $ 472.50 | $ - | $ - | $ - | $ 597.50 | $ 1,232.50 | $ - | $ 472.50 | $ - | $ 4,195.00 |
| Disbursements | | $ - | $ 100.00 | $ 100.00 | $ 100.00 | $ - | $ - | $ - | $ 100.00 | $ 100.00 | $ - | $ 100.00 | $ - | $ 600.00 |
| **Project Management** | 1,8 | | | | | | | | | | | | | |
| Labour | | $ 780.00 | $ 405.00 | $ 405.00 | $ 405.00 | $ 405.00 | $ 405.00 | $ 405.00 | $ 405.00 | $ 405.00 | $ 405.00 | $ 405.00 | $ 405.00 | $ 5,235.00 |
| Disbursements | | $ 100.00 | $ 100.00 | $ 100.00 | $ 100.00 | $ 100.00 | $ 100.00 | $ 100.00 | $ 100.00 | $ 100.00 | $ 100.00 | $ 100.00 | $ 100.00 | $ 1,200.00 |
| **Total (Required Work)** | | $2,305.20 | $ 8,491.00 | $ 1,902.00 | $3,426.50 | $ 505.00 | $ 505.00 | $ 505.00 | $4,756.50 | $ 5,262.50 | $ 505.00 | $2,002.80 | $ 505.00 | $ 30,671.50 |
| **Total (Optional Work)** | | $ - | $ - | $ - | $1,860.00 | $ 4,223.00 | $ 2,063.00 | $ 2,063.00 | $2,063.00 | $ 2,063.00 | $2,063.00 | $1,625.00 | $ - | $ 18,023.00 |

Assumptions:

1 The above budget are based on the Fw rate schedule
2 The summer low flow period extends over August and September
3 The winter low flow period extends over February and March
4 The Optional Water Flow Sampling would result in 1 monthly monitoring visit per month and 1 discharge measurement during May 1999
5 The January water quality sampling costs represent the Selenium sampling
6 Reporting costs are for the preparation of summary reports following completion of required project tasks
7 Reporting Costs from the Optional Water Flow program would be approximately $530.00 per monthly update report
8 Internal Disbursements are to be billed at Cost Plus 10% with information on these disbursements provided to Luscar Ltd..
9 Disbursements listed under Water Flow and Water Quality are estimates for sampling equipment and vehicle expenses and do not include 10% handling charge.
10 All Laboratory Analysis is to be directly billed to Luscar Ltd.

AGRA Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

CC: JED for comment

**AGRA** Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

**AGRA Earth & Environmental Limited**
221 - 18th Street S.E.
Calgary, Alberta
Canada T2E 6J5
Tel (403) 248-4331
Fax (403) 248-1590

January 21, 1999
CW1537.901.1

# DRAFT

Way, way too much.

Luscar Ltd.
1600 Oxford Tower
10235 - 101 Street
Edmonton, Alberta T2P 3V4

**Attention: Mr. Allan Flemming, P.Eng.** Fax: (403) 420-4089

Dear Mr. Flemming:

**Re: Telkwa Coal Mine**
**1999 Budget**

## 1.0 SURFACE WATER MONITORING

As per the January 19th, 1999 discussion between Gary Beckstead of AGRA Earth & Environmental Limited (AEE) and Allan Flemming of Luscar Ltd. (Luscar), AEE is pleased to present this "**draft**" budget for the 1999 baseline water flow and water quality program for the proposed Telkwa Coal Project. This draft will be discussed with you at your office on January 26th, 1999. It is the understanding of AEE that during 1999 Luscar should be submitting the Final Project Report to the B.C. Environmental Assessment Office. Following certification of the project, it is the understanding of AEE that the entire surface water and water quality program will need to be revised.

## 2.0 WORK PROGRAM AND BUDGET

AEE's proposed 1999 work program is intended to allow for revision of the program during the year. Table 1 presents the monthly budget breakdown for 1999.

The work program proposed for 1999 is as follows:

**Surface Water Flow**

- Three winter low flow discharge measurements on the Telkwa River;
- Five free flow period discharge measurements at all sites[1];
- An initial site visit during spring followed by an installation trip to sites; and
- Seven trips to perform routine maintenance and downloading of continuous sites.

---

[1] The Telkwa River will only be measured during three of the five free flow discharge measurement trips

**Water Quality**

- Four trips are scheduled for seasonal baseline water quality sampling;
- One sediment collection trip is included with the seasonal baseline trips; and
- High frequency revised metals sampling program started in 1998 is currently scheduled for continuation in 1999[2].

**Reporting**

AEE proposes to conduct reporting for the 1999 sampling program at approximately four month intervals. By separating the reporting into smaller pieces, AEE expects to be able to realize cost savings over the previous annual report preparation costs. The issuing of three data reports during 1999 will also allow for easier revision of the sampling program following submittal of the Final Project Report and project certification.

**Project Management**

Project management involves dealing with items such as cost control, client liaison, responding to requests for extra work, and interfacing with other consultants working for Luscar on the proposed Telkwa Coal Mine. AEE has found that the project management required for the proposed Telkwa Coal Mine exceeded the original budget estimate. Based on an analysis of previous work, AEE has revised its method of project management for the 1999 sampling program. AEE feels that the revisions made to project management will simplify tracking of costs for each phase of the project.

Previous requests for extra work conducted by AEE on the Telkwa Coal project were often accompanied by a directive to bill the work to the existing sampling program budget. For the 1999 sampling program, AEE proposes to conduct each portion of the project as separate tasks. On receiving a request for extra work, AEE will issue to Luscar for approval, a change of work order along with an expected budget to complete the extra work.

## 3.0 CLOSURE

We thank you for the opportunity to provide engineering and environmental services to this project and look forward to continuing to work with Luscar on the proposed Telkwa Coal Mine during 1999. It is the understanding that AEE and Luscar will discuss this draft budget during

---

[2] The revised sampling program is intended to determine the optimum sampling frequency for project. Following the winter and spring sampling trips, AEE should have sufficient data to determine the optimum sampling frequency allowing for modification of the water quality program.

a meeting scheduled for Tuesday, January 26th, 1999. Other items which I would like to discuss with you on Tuesday include:

- miscellaneous disbursement charge (% of fees); and
- possible shift of Project Manager to Scott Davidson in Smithers.

If you have any questions or require further information prior to this meeting, please call Gary Beckstead at (403)235-8118.

Yours sincerely,

**AGRA Earth & Environmental Limited**

Scott Davidson, M.Sc., P.Geo.
Smithers Office Manager

Gary R.E. Beckstead, M.Sc., P.Eng.
Senior Project Manager

GREB/km

attach.

P:\PROJECT\Cw\1537.1\Proj_Mgt\Budget\L_AF0120_budget98.wpd

(Low (2)
① Four
② Hubert/Helps
③ Goathorn (2)

Staff guages for high flow
+ option for datalogger

low flow (2 times)
high flow (2 times)

Quality winter low flow

data reports after low flow
Not big reports

Purchase Order

Tenas
Telkwa
Bulkley

— no % of disbursements
itemize

**DRAFT**

**Table 1**
**Budget Estimate for 1999 Hydrometric Monitoring and Water Quality Sampling**
**Telkwa Coal Project**

| Task | Personnel | Month | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | Feb | Mar. | Apr. | May | June | Jul. | Aug | Sept | Oct | Nov. | Dec. | |
| **Flow Monitoring** | | | | | | | | | | | | | | |
| Labour | | $ - | $ 4,425.00 | $ 3,160.00 | $ 2,160.00 | $ 3,546.00 | $ 4,036.00 | $ 3,088.00 | $ 3,088.00 | $ 1,802.00 | $ 2,660.00 | $ 1,376.00 | | $ 29,341.00 |
| Disbursements | | $ - | $ 501.60 | $ 165.00 | $ 69.30 | $ 396.00 | $ 522.50 | $ 737.00 | $ 440.00 | $ 69.30 | $ 289.30 | $ 69.30 | | $ 3,259.30 |
| **Water Quality** | | | | | | | | | | | | | | |
| Sampling | | $ 1,115.00 | $ 3,013.00 | $ 743.00 | $ - | $ 1,265.00 | $ 2,160.00 | $ 2,332.00 | $ 835.00 | $ 1,940.00 | $ - | $ - | $ - | $ 13,403.00 |
| Disbursements | | $ 310.20 | $ 4,442.90 | $ 675.40 | $ - | $ 5,183.20 | $ 1,350.80 | $ 4,901.60 | $ 1,350.80 | $ 5,989.50 | $ - | $ - | $ - | $ 24,204.40 |
| **Reporting** | | | | | | | | | | | | | | |
| Labour | | $ - | $ - | $ - | $ - | $ 1,350.00 | $ - | $ - | $ - | $ 2,600.00 | $ - | $ - | $ 3,620.00 | $ 7,570.00 |
| Disbursements | | $ - | $ - | $ - | $ - | $ 120.00 | $ - | $ - | $ - | $ 120.00 | $ - | $ - | $ 120.00 | $ 360.00 |
| **Project Management** | | | | | | | | | | | | | | |
| Labour | | $ 780.00 | $ 780.00 | $ 780.00 | $ 780.00 | $ 780.00 | $ 780.00 | $ 780.00 | $ 780.00 | $ 780.00 | $ 780.00 | $ 780.00 | $ 780.00 | $ 9,360.00 |
| Disbursements | | $ - | $60.00 | $60.00 | $60.00 | $60.00 | $60.00 | $60.00 | $60.00 | $60.00 | $60.00 | $60.00 | $60.00 | $ 660.00 |
| Total | | $ 2,205.20 | $ 13,222.50 | $ 5,583.40 | $ 3,089.30 | $ 12,700.20 | $ 8,909.30 | $ 11,898.60 | $ 6,553.80 | $ 13,360.80 | $ 3,789.30 | $ 2,285.30 | $ 4,580.00 | $ 88,157.70 |
| Personnel | | $ 1,895.00 | $ 8,218.00 | $ 4,683.00 | $ 2,940.00 | $ 6,941.00 | $ 6,976.00 | $ 6,200.00 | $ 4,703.00 | $ 7,122.00 | $ 3,440.00 | $ 2,156.00 | $ 4,400.00 | $ 59,674.00 |
| Disbursements | | $ 310.20 | $ 5,004.50 | $ 900.40 | $ 129.30 | $ 5,759.20 | $ 1,933.30 | $ 5,698.60 | $ 1,850.80 | $ 6,238.80 | $ 349.30 | $ 129.30 | $ 180.00 | $ 28,483.70 |

Assumptions:
The above budget is based on the Fw rate schedule
$60.00/month Unit 1292 taptop computer charge will be applied to this project from February to December
Project Management is based on an average of 3 hours per month for each of Scott Davidson, Jessy Harper, & Gary Beckstead
Water quality analysis costs following the Revised Metals Sampling Analysis are expected to drop in total costs to ~15K/year

Allan: For Your Info.:

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Incidental Disbursements | | | | | | | | | | | | | |
| If 5% of fees | 94.75 | 410.9 | 234.15 | 147 | 347.05 | 348.8 | 310 | 235.15 | 356.1 | 172 | 107.8 | 220 | $ 2,983.70 |
| If 3% of fees | 56.85 | 246.54 | 140.49 | 88.2 | 208.23 | 209.28 | 186 | 141.09 | 213.66 | 103.2 | 64.68 | 132 | $ 1,790.22 |

NOTE:
No. : OPERATION NUMBER 48 : 4800BPS SELECTED EC : ERROR CORRECT G2 : G2 COMMUNICATION
PD : POLLED BY REMOTE SF : STORE & FORWARD RI : RELAY INITIATE RS : RELAY STATION
MB : SEND TO MAILBOX PG : POLLING A REMOTE MP : MULTI-POLLING RM : RECEIVE TO MEMORY

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| No. | REMOTE STATION | START TIME | DURATION | #PAGES | MODE | RESULTS |
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| 1 | 403 777 4150 | 1-26-99 8:59 | 1'58" | 4/ 4 | | COMPLETED 9600 |

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TOTAL PAGES CONFIRMED : 4
TOTAL PAGES SCANNED : 4
** COUNT **

THIS DOCUMENT WAS CONFIRMED
(REDUCED SAMPLE ABOVE - SEE DETAILS BELOW)

TRANSMISSION REPORT

cc: Jerry

**AGRA** Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

AGRA Earth & Environmental Limited
221 - 18th Street S.E.
Calgary, Alberta
Canada T2E 6J5
Tel (403) 248-4331
Fax (403) 248-1590

January 21, 1999
CW1537.901.1

**DRAFT**

Way, way too much.

To: Jerry Demchuk

For Comment

Allan Z

Luscar Ltd.
1600 Oxford Tower
10235 - 101 Street
Edmonton, Alberta T2P 3V4

**Attention: Mr. Allan Flemming, P.Eng.**

Dear Mr. Flemming:

**Re: Telkwa Coal Mine**
**1999 Budget**

## 1.0 SURFACE WATER MONITORING

As per the January 19th, 1999 discussion between Gary Beckstead of AGRA Earth & Environmental Limited (AEE) and Allan Flemming of Luscar Ltd. (Luscar), AEE is pleased to present this "draft" budget for the 1999 baseline water flow and water quality program for the proposed Telkwa Coal Project. This draft will be discussed with you at your office on January 26th, 1999. It is the understanding of AEE that during 1999 Luscar should be submitting the Final Project Report to the B.C. Environmental Assessment Office. Following certification of the project, it is the understanding of AEE that the entire surface water and water quality program will need to be revised.

## 2.0 WORK PROGRAM AND BUDGET

AEE's proposed 1999 work program is intended to allow for revision of the program during the year. Table 1 presents the monthly budget breakdown for 1999.

The work program proposed for 1999 is as follows:

**Surface Water Flow**

- Three winter low flow discharge measurements on the Telkwa River;
- Five free flow period discharge measurements at all sites[1];
- An initial site visit during spring followed by an installation trip to sites; and
- Seven trips to perform routine maintenance and downloading of continuous sites.

---

[1] The Telkwa River will only be measured during three of the five free flow discharge measurement trips

cc: JED at Norecol, (403) 777-4150 FYI

6 pages

**AGRA** Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

**AGRA Earth & Environmental Limited**
221 - 18th Street S.E.
Calgary, Alberta
Canada T2E 6J5
Tel (403) 248-4331
Fax (403) 248-1590

January 29, 1999
CW1537.101

FAXED 1/29/99

Luscar Ltd.
1600 Oxford Tower
Edmonton, AB T5J 3G1

**Attention:** **Mr. Allan Flemming, P.Eng.**
**Manager, Special Projects**

Dear Mr. Flemming:

**Re:** **Lakewood and Geneq Dataloggers in Relation to the Y2K Problem** (Telkwa)

We have recently been in contact with Lakewood Systems Ltd. and Geneq Inc. with regard to the problems which may occur as a result of the operation of their dataloggers into the year 2000. The status of each datalogger make is discussed below.

Lakewood has indicated that there will be no hardware modifications required. However, new software will be required to run the Lakewood dataloggers. The current LS-4 software will not allow the datalogger to be programmed correctly, nor will it allow the datalogger's time clock to be set correctly. All users must update their software to LS-4 Version 4.5 prior to the year 2000. This software will be posted on the Lakewood website (http://www.lakewood.com) in the near future and can be downloaded free of charge.

The Unidata Starloggers supplied by Geneq will not have a date problem with the year 2000 as the Starloggers calculate dates based on the number of scans from 1980. Therefore, the year will be calculated correctly. More specific information is available from the Unidata web site (http://www.unidata.com.au). Version 2 and 3 of the Starlog software are Y2K compliant. These programs are updated on a continual basis and are available on the website.

AEE will continue to monitor the progress made with the Y2K software at Lakewood. We will also ensure that the most current software is downloaded from each of these websites and used in future flow monitoring at Telkwa.

Should additional information be required with regard to this problem, you can contact Doug Calvert at Lakewood ((403)462-9110) or via e-mail at mail@lakewood.com or Steve Biduk at Geneq ((604)739-0889).

Sincerely,

**AGRA Earth & Environmental Limited**

Kristi McKay, M.Sc., P.Eng.
Water Resources Engineer

Reviewed by:

Gary R.E. Beckstead, M.Sc., P.Eng.
Reviewer

cc. Scott Davidson, AEE - Smithers

P:\PROJECT\Cw\1537\PROJ_MGT\L_af0115.WPD

**AGRA** Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

**AGRA Earth & Environmental Limited**
221 - 18th Street S.E.
Calgary, Alberta
Canada T2E 6J5
Tel (403) 248-4331
Fax (403) 248-1590

January 19, 1999
CW1537.901

Luscar Ltd.
1600, Oxford Tower
10235 - 101 Street
Edmonton, Alberta T2P 3V4

**Attention: Mr. Allan Flemming, P.Eng.**

Dear Mr. Flemming:

**Re: Telkwa Coal Mine**
**Hydrological Analyses**

Further to our letter of October 6, 1998, and our discussions, some additional costs have appeared which were not included in that letter. These costs are as follows:

1. Chemex Labs water quality analyses ($4,788.30, as per the subsequent October 30, 1998 invoice).

2. Fees for Westmacott, McKay, Dick, Beckstead ($823.75) for completion of the 200 year flood assessment that Jerry Demchuk had commissioned. This report was finalized on September 28, 1998, immediately prior to the October 6 letter.

3. A significant portion of the 36 hours of Dennis Trotter's time in the October 30, 1998 invoice concerned ongoing discussions and data analysis in response to requests from Steve Day.

These subsequent costs of $9,212.05 plus GST had not been included in the forecast total. We should not require the entire amount to complete the outstanding deliverable, namely the 1998 monitoring report. For preliminary budgeting purposes, let us say that the total budget be increased to $210,000 from $203,853.64.

The 1998 monitoring report is nearing completion. It will be ready for internal technical review by January 20. It should be ready for final issue by January 29, 1999.

Scott Davidson and I are preparing an outline of tasks and associated costs for the 1999 program, as discussed with you earlier. We hope to have a draft ready by January 22, 1999. We can discuss the draft when we meet in your office on January 26, 1999.

We thank you for the opportunity to provide engineering and environmental services to this project. If you have any questions or require further information, please call the undersigned at 235-8118.

Yours sincerely,

**AGRA Earth & Environmental Limited**

Gary R.E. Beckstead, M.Sc., P.Eng.
Senior Project Manager

GREB/km

cc: Scott Davidson, AEE - Smithers

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# AGRA Earth & Environmental

## FACSIMILE TRANSMITTAL

#221 - 18 Street S.E.
CALGARY, ALBERTA, CANADA T2E 6J5
Phone NO. (403) 248-4331
FAX NO. (403) 248-1590
DIRECT 235-8118

TO: AL FLEMING
COMPANY: LUSCAR LTD.
FAX NO.: 1-403-420-5875
SENDER: GARY BECKSTEAD FILE NO.: 1537.101-3
FAX OPERATOR: GREB DATE: 98 1125
NO. OF PAGES: 5 (including this page)

This transmission is intended only for the Addressee. It may contain privileged or confidential information. Any unauthorized disclosure is strictly prohibited. If you have received this transmission in error, please notify us immediately (collect) so that we may correct our transmission. Please then destroy the original. Thank you.

AL:

(1) DRAFT RESPONSE LETTER TO OBEDKOFF re: 1997 MONITORING PROGRAM IS ATTACHED, FOR YOUR REVIEW & COMMENT.

(2) STATUS REPORT FROM OUR SMITHERS OFFICE ATTACHED, FYI.

(3) THAT INVOICE WAS PAID NOV. 23/98 THANKS!

REGARDS,

Gary

November 9, 1998
CW1537.101

DRAFT

Luscar Ltd./Manalta Coal Ltd.
7th Floor, 700 - 9th Avenue SW
Calgary, Alberta T2P 3V4

**Attention: Mr. Al Fleming, P.Eng.**

Dear Mr. Fleming:

**Re: Response to BC Ministry of Environment Lands and Parks letter**
**July 23, 1998**
**Telkwa Coal Mine Surface Water Monitoring Program 1997**

Further to our discussions with Jerry Demchuk, Environmental Advisor to Luscar/Manalta on November 5, 1998, AGRA Earth & Environmental Limited (AEE) is pleased to respond to the comments presented in the above-noted letter. We appreciate Mr. Obedkoff's comments and suggestions in the spirit of improving the quality of the surface water monitoring program where it is required. Many of his concerns relate to the volume of data available following the first year of the program. Where possible these comments will be considered in the analysis and assessment of the year 2 monitoring report, which will be prepared soon.

AEE has tried to purchase the Manual of Standard Operating Procedures for Hydrometric Surveys in British Columbia through our contacts in Prince George and Smiths over the past year; however the document has not been available until recently. We have now ordered copies and will use this publication for reference. Thanks to Mr. Obedkoff for the "heads up" that the publication is now available.

The responses to each of the individual comments for specific sections of the 1997 Surface Water Monitoring Report are presented below.

1.2 *Federal Water Survey of Canada (WSC) and Resources Inventory Branch (RIB) personnel should also be consulted for advice on hydrometric data collection procedures.*

AEE has established communications Ed Link of the WSC office in Terrace. We have discussed procedures with him and will continue to use him as a resource, when and if required.

It is our understanding that the RIB is located only in Victoria. Subject to your consent AEE will make contact with Mr. Obedkoff of the RIB.

2.1 *Include the WSC hydrometric station on Simpson Creek (08EE012). Is site C below the Tenas North Pit? If not, it should be below its outflow.*

DRAFT

AEE used data for Simpson Creek in the derivation of a regional flood frequency relationship. Otherwise, to date the data for this stream has not been used extensively as the Simpson Creek drainage basin lies outside the basin draining the Telkwa Project area. However, we will consider the use of the data further should the need arise.

Site C is located on Four Creek east of north tip of North Tenas pit. The location of the outflow point from the pit is unknown at this time. (get pit design from Al/Jerry and find out where outflow is.) Gaugung site locations will be reviewed critically to ensure location provides useful/reliable information once the project reaches the Certificate level.

3.1.3 *Stage-discharge curves must be based on measured points only.*

Only 7 months duration of data were available at the time the year one data report was prepared. IN the preparation of the 2nd year monitoring report, additional measurements from the 1998 field season will be available and used to confirm the results from the previous year. AS such it may prove necessary to evaluate and revise some of the data from the previous year based on the results from 1998. We appreciate the comment on this particular data plot, and will check the data again.

3.1.4 *The datalogger record is not coincident with staff gauge readings, except for three points; the calculated discharges are thus questionable. The datalogger must be calibrated at the site with hydrometric levelling of staff gauges and benchmarks. The datalogger and staff gauge level readings must be coincident, if not, an error must be applied to form corrected gauge heights before discharges are calculated.*

The data logger was tied in to local benchmarks. These surveys were conducted in 1997 and 1998. At this site there is a possibility that some stage readings may be relative to one staff gauge and some to another staff gauge. (Two staff gauges were established att he site to cover low and high stages. The data will be reviewed to ensure that the proper staff gauge was referenced and so that the transducer and staff gauge records correlate properly.

3.1.5 *Consult WSC or RIB personnel for a cost estimate of a cableway.*

WSC staff in Terrace have been consulted regarding the construction of a cableway across the Telkwa River. Cost estimates have been prepared, and were provided to MCL/LL on date. Long term site location needs to be determined relative to planned discharge (outfalll) points at which time a cableway will be considered. In the meantime the discharge data from the Telkwa River gauge can be added to the WSC Gaothorn Creek gauge data to give estimates of river discharges in the lower reach of the river.

3.3.4 *As per comments for 3.1.4*

DRAFT

AEE will take a second look at the data for Four Creek.

3.9.1 *What is the hydrologic purpose of an ephemeral stream hydrometric station for this project? If the gauge is for mines operations or water management, then it has a purpose.*

The Tailings Pond gauge was established on the ephemeral stream (called Tailings Pond Creek) below the proposed pond outlet and approximately 500 m downstream of present tailings disposal area. The intent of the data gathering for this station was to provide discharge data to facilitate the derivation of a water balance. for the proposed tailings pond. It should be noted that as the design of the facility has progressed, the size of the proposed tailings pond has shrunk from 100 ha to 30 ha

5.0 *Delete the last sentence of the third paragraph. The stage data collected may not lead to good quality discharge data.*

AEE will take under advisement the comments provided relative to sections 3.1.4 and 3.3.4. These items will be reviewed as discussed above. Also, as more discharge data is obtained, the rating curves will be improved. This will provide an opportunity to review previous estimates of discharge from the historical stream gauge height records.

We thank you for the opportunity to provide engineering and environmental services to this project. If you have any questions or require further information, please call the undersigned at 235-8118.

Yours sincerely,

**AGRA Earth & Environmental Limited**

Gary R.E. Beckstead, M.Sc., P.Eng.
Senior Project Manager

Scott Davidson, M.Sc., P.Geo.
Geomorphologist

DRAFT

SCD/GREB/km

Attach.

cc: Jerry Demchuk, Norecol Dames & Moore

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Manalta Coal / Luscar mine site Fall 1998

Upper Goathorn - XS Nov 10. Staff gauge @ site

Upper Tenas - XS Nov 10 Staff gauge @ site

Four Creek - automated depth logger removed Nov 9
Staff gauge at site
no XS, waters level too low.

Lower Tenas - XS Nov 10. Staff gauge @ site
- automated depth logger removed Nov 10

Helps Cr - automated depth logger removed Nov 24
- Staff gauge @ site

Telkwa R - automated depth logger removed Nov 24
- staff gauge at site

North Site - logger downloaded Nov 9. Plans to remove Nov 25.

Tailings Pond - logger not re-installed after June 10 (dry).
Little/No fall flows at site

Water Chemistry at all sites Nov 9/10

Metals sampling at Lower Goathorn Lower Tenas + Telkwa R on Nov 9, Nov 16, Nov 24 with two weeks of metals sampling remaining.

Please call Jessy Harper 847-8783 (area code 250) if you have any questions.

**AGRA**
**Earth & Environmental Limited**
Box 3966
#3, 3167 Tatlow Road
Smithers, B.C. V0J 2N0

**AGRA** Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

**AGRA Earth & Environmental Limited**
221 - 18th Street S.E.
Calgary, Alberta
Canada T2E 6J5
Tel (403) 248-4331
Fax (403) 248-1590

October 6, 1998
CW1537.901

Manalta Coal Ltd./Luscar Ltd.
7th Floor, 700 - 9th Avenue SW
Calgary, Alberta T2P 3V4

**Attention: Mr. Al Fleming, P.Eng.** Fax: 269-8075

Dear Mr. Fleming:

**Re: Budget Update**
**Telkwa Coal Mine**
**Hydrological Analyses**

Further to our telephone conference call on October 2, 1998 with you and Jerry Demchuk, AGRA Earth & Environmental Limited (AEE) is pleased to provide you with a summary of the hydrological work you requested for the remainder of the calendar year. It is understood that Manalta Coal Ltd. (MCL, and/or its present owner, Luscar Ltd.) wish to have a single amendment to the existing contract for the remainder of this year's work related to the Telkwa Coal Mine Project.

A total of $25,182 is required to complete activities presently authorized by MCL for 1998. Table 1, attached, summarizes the individual tasks.

This estimate reflects the present monitoring program and does not include provision for changes to stations or station locations that may be required following granting of the Project Certificate.

The present contract value is $170,697.05, as amended by Change Order #5 (Oct. 2, 1997). Billings under this contract have totalled $178,671.64. As discussed October 2, 1998, the project is therefore over-billed $7,974.59. The outstanding work presented in Table 1 totals $25,182.00. The required adjustment to the contract is therefore $33,156.59. The resultant contract value following the revision is therefore $203,853.64.

If the program is continued to February 1999, the following additional components would be required: metals sampling ($8,720), regular monitoring and water quality sampling and analysis ($4,622 or less, depending on access and whether streams are flowing or frozen solid) , low-flow discharge measurements on the Telkwa River (potentially 2 measurements at $1,200 per

measurement) and additional data analysis and reporting ($4,000). The total for extending the program to February, 1999 is estimated at $19,742 (on top of the 1998 budget discussed above).

## 2.0 SCHEDULE

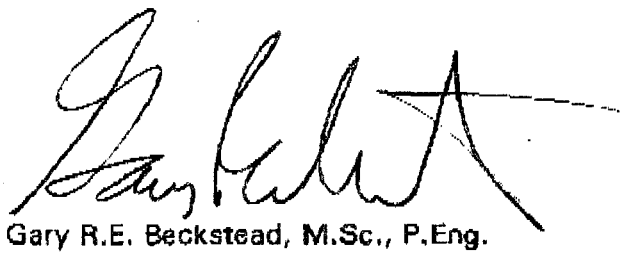
AEE will complete the work (i.e., reporting) by January 31, 1999. The actual field work will be completed by the end of November or the first week of December, 1998.

## 3.0 CLOSURE

We thank you for the opportunity to provide engineering and environmental services to this project. If you have any questions or require further information, please call the undersigned at 235-8118.

Yours sincerely,

**AGRA Earth & Environmental Limited**



Gary R.E. Beckstead, M.Sc., P.Eng.
Senior Project Manager

GREB/km

Attach.

cc: Scott Davidson, AEE - Smithers

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**TABLE 1**
**Remaining Tasks and Costs for 1998**
**Surface Water Monitoring Program**

| Task | Description | Cost |
|---|---|---|
| 1 | Metals Sampling. Additional metals sampling program, scheduled for late October and early November, 1998[1], as per the June 16, 1998 letter. | $8720 |
| 2 | Regular flow Monitoring. Flow measurement, water quality sampling and analysis and data download from dataloggers[1] at the end of October as per October 24, 1997 fax to J. Demchuk. | $4622 |
| 3 | Regular flow Monitoring. Flow measurement data download from dataloggers and removal of water level transducers and dataloggers for the winter season at the end of November or the first week of December as per October 24, 1997 fax to J. Demchuk. | $1190 |
| 4 | Reporting. Preparation of annual data report to the end of December, 1998 and incorporate the 1997 and 1998 data into a single summary report, as directed. | $10,000 |
| 5 | Project Management. QA/QC and financial management of the work, as per October 24, 1997 fax to J. Demchuk.. | $2190 |
| **Total** | | **$25,182** |

1 The work for Tasks 1 and 2 will be scheduled at the same time to reduce travel and time expenditures. Special laboratory analyses of water quality samples are included in Tasks 1 and 2.

**AGRA** Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

# NOTICE OF TRANSMITTAL

221 - 18 Street SE
Calgary, Alberta T2E 6J5
Phone: (403) 235-8118
Fax: (403) 248-1590
E-mail: gbeckstead@agraee.com

**TO:** Luscar Ltd.
1600 Oxford Tower,
10235 - 101 St.
Edmonton , AB
T2P 3V4

**DATE:** February 11, 1999
**OFFICE:** Calgary
**PROJECT NO.:** CW1537
**PROJECT NAME:** Telkwa Coal Mine

**ATTENTION:** Mr. Al Fleming **PHONE:** (780) 420-4080

THE ENCLOSED DOCUMENTS AND/OR DRAWINGS ARE SUBMITTED:

☐ FOR YOUR APPROVAL ☑ AS REQUESTED ☐ FOR YOUR REVIEW AND COMMENT
☐ FOR YOUR INFORMATION ☐ FOR YOUR SIGNATURE ☐

DELIVERED BY: ☐ MAIL ☑ COURIER ☐ HAND

| COPIES | DRAWING NO. | DESCRIPTION |
|---|---|---|
| 2 | Bound Copies | Reports entitled "Telkwa Coal Mine Surface Water Monitoring Program 1998" |
| 1 | Unbound Copy | Report entitled "Telkwa Coal Mine Surface Water Monitoring Program 1998" |
| | | |
| | | |
| | | |
| | | |
| | | |

**REMARKS:** Please find the above mentioned reports enclosed. A CD with the report and figures will be sent in tomorrow's courier. One copy of the report has been forwarded to Mr. Jerry Demchuk at his request.

SUBMITTED BY: for: Gary Beckstead, M.Sc., P.Eng.

P:\PROJECT\Cw\1537\tn021199.wpd

**AGRA** Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS

# NOTICE OF TRANSMITTAL

221 - 18 Street SE
Calgary, Alberta T2E 6J5
Phone: (403) 235-8118
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**TO:** Luscar Ltd.
1600 Oxford Tower,
10235 - 101 St.
Edmonton , AB
T2P 3V4

**DATE:** February 11, 1999
**OFFICE:** Calgary
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**PROJECT NAME:** Telkwa Coal Mine

**ATTENTION:** Mr. Al Fleming **PHONE:** (780) 420-4080

THE ENCLOSED DOCUMENTS AND/OR DRAWINGS ARE SUBMITTED:

☐ FOR YOUR APPROVAL ☑ AS REQUESTED ☐ FOR YOUR REVIEW AND COMMENT
☐ FOR YOUR INFORMATION ☐ FOR YOUR SIGNATURE ☐

DELIVERED BY: ☐ MAIL ☑ COURIER ☐ HAND

| COPIES | DRAWING NO. | DESCRIPTION |
|---|---|---|
| 1 | CD | Report and Figures for Telkwa Surface Water Monitoring 1998 |
| | | |
| | | |
| | | |
| | | |
| | | |

SUBMITTED BY: _____
for Gary Beckstead, M.Sc., P.Eng.

cc: Mr. Jerry Demchuk
1610, 734 - 7 Avenue SW
Calgary, AB T2P 3P8

P:\PROJECT\Cw\1537\tn021299.wpd

**PITEAU ENGINEERING LTD.**

*HYDROGEOLOGICAL AND GEOTECHNICAL CONSULTANTS*
**Suite 100, 4500 - 16th Avenue NW**
**Calgary, Alberta, Canada T3B 0M6**

*Telephone:* *(403) 286-2522*
*Facsimile:* *(403) 247-4811 / (403) 247-0779*
*E-mail:* *komex@komex.com*

**TO FAX #:** 269-8075
**COMPANY:** Manalta Coal Ltd.
**ATTENTION:** Al Vanderputten

Fleming

**DATE:** June 27, 1997
**PROJ. #:** 3773-13
**FROM:** Bob Clarkson
**NO. OF PAGES:** 10
(INCLUDING COVER PAGE)

Al,

Please find attached a draft copy of our proposed workplan/cost estimate for the 1997 geotechnical/hydrogeological program at Telkwa. Figure 1 has not been included, but the piezometer locations are the same as identified during the meeting.

Once you have had a chance to review, please give either Fred or myself a call to discuss.

Regards,

Bob Clarkson

J:\3773\3773-13\CORR\FAX1.DOC

**PITEAU ENGINEERING LTD.**
HYDROGEOLOGICAL AND GEOTECHNICAL CONSULTANTS

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e-mail: komex@komex.com

June 24 1997

OUR FILE: KI97-3773-13

Manalta Coal Ltd.
7th Floor, 700 - 9th Ave. SW
Calgary, Alberta
T2P 3V4

Attention: Mr. Allan Vanderputten, P.Eng.

Dear Sir:

***Re:*** ***Work Plan for Geotechnical and Hydrogeological Services 1997 Program, Tenas Creek Area, British Columbia***

---

## 1.0 INTRODUCTION

Piteau Engineering Ltd. (Piteau) is pleased to present our draft proposal and workplan for the above project. This proposal addresses the 1997 geotechnical, hydrogeologic and hydrologic workplans for the Tenas Pit and Pit 3 areas, and was developed in consultation with Manalta Coal Ltd. (Manalta) based on our meeting of June 13, 1997. These workplans fulfill the groundwater and water quality information requirements outlined on the draft project specifications for the Telkwa Coal project provided to us by Manalta.

The purpose of the 1997 geotechnical work program is to assess geotechnical conditions in the area of the Pit 3 waste dumps, the coal processing plant, and at the proposed location of the bridge crossing of the Telkwa River. The overall objective of the 1997 hydrogeological work program is to improve the level of understanding of baseline groundwater conditions in the areas of Tenas Pit and particularly Pit 3. The hydrological work will focus on development of a water balance for the post mining condition at Tenas Pit and Pit 3.

Information and data from previous investigations (Klohn Leonoff, 1985, Piteau 1994a and 1994b, Piteau 1995, Piteau 1996a and 1996b, and Piteau 1997a, 1997b, and 1997c) shall be referenced as much as possible to assist in attaining these objectives.

## 2.0 PROPOSED FIELD INVESTIGATIONS

The field investigations proposed within each facility area are briefly discussed below. As in previous geotechnical/hydrogeological investigations completed for the Telkwa coal project, the rotary drill to be used by Manalta for their coal exploration program will be adapted for the deep borehole drilling and proposed monitoring well installations. Moreover, piezometers will be installed within coal exploration boreholes. A backhoe will be utilized for the geotechnical investigations at the Pit 3 waste dumps, plant site and bridge crossing, coupled with interpretation of general overburden type and depth to bedrock from exploration holes.

Proposed hydrogeological borehole/monitoring well locations are shown in Figure 1.

### 2.1 PIT 3

#### 2.1.1 GEOTECHNICAL INVESTIGATION OF WASTE DUMPS

The objective of the geotechnical investigation is to determine the lithology and basic soil parameters of the dump foundation. The investigation shall consist of the following:

- reconnaissance of the dump sites to verify terrain conditions, map surface water and springs, and to examine soil and rock exposures;
- excavation of approximately 5 test pits, up to 5 m deep, along the existing road in the central area of the dump to log soil units and collect soil samples; and,
- laboratory testing of soil samples, including moisture content, Atterberg limits, grain size and penetrometer strengths.

Depth to bedrock will be determined from exploration drill holes.

A brief report will be prepared documenting the investigations, geotechnical conditions, overall suitability of the site, and any limitations on dump development.

#### 2.1.2 HYDROGEOLOGICAL INVESTIGATION

In view of the fairly complex hydrogeological setting at Pit 3, and in particular the potential importance of faults and fractures on groundwater flow, it is proposed that the groundwater monitoring network be expanded with the installation of six double piezometer nests (site # 3, 10, 15, 24, 28, and 52, see Figure 1). If possible, at one or two piezometer nest locations, efforts will be made to install a piezometer(s) directly within or adjacent to an identified fault zone.

The deeper piezometer will be completed in coal seam 2 while the shallow piezometer will be installed in coal seam 4. However at sites # 28 and #52, it is anticipated the deeper piezometer will be installed in seam 1. Following piezometer development, hydraulic conductivity testing will be performed. The piezometers will be sampled to determine groundwater quality, as well as to assess horizontal groundwater flow patterns, and vertical hydraulic gradients between the two coal seams.

Groundwater quality monitoring will be also be completed at the other existing piezometers (5 in total) completed within the Pit 3 area (i.e., T96R series piezometers). Groundwater samples will be analyzed for the same suite of chemical parameters previously analyzed for, and as specified by the B.C. Ministry of Environment.

Results from the 1997 hydrogeological program, together with hydrogeological information gathered from the aquifer test (discussed below) will be used to develop a better conceptual understanding of groundwater flow and groundwater quality within Pit 3.

### 2.1.3 AQUIFER TESTING PROGRAM

One of the key hydrogeological issues pertaining to the Telkwa Coal project is the potential influence of regional faults and fractures on groundwater flow. Moreover, related to this is the potential for impact of mining activities on local water wells. To address these issues, it is recommended that an aquifer test be conducted at a test well located within a suitable area of Pit 3 (location to be finalized).

Although the final design of the test well will be determined in the field, based on hydrogeological conditions, it is recommended that the pilot hole be drilled to a diameter of 200 mm (8"). This borehole diameter will permit installation of 150 mm (6") diameter water well casing and use of a submersible pump (5 or 7 hp) sufficient to adequately stress the aquifer. The decision as to whether to install well screen (compared with open hole) will be assessed during the borehole drilling. It is our understanding the test well will be drilled using a local water well contractor and that Manalta will be responsible for overseeing drilling activities. Consequently, we have not included costs for supervision of the drilling of the test hole.

It is recommended that the aquifer test consist of a 48 hour constant rate drawdown component followed by a 48 hour recovery component. In the event aquifer boundary conditions are identified, the drawdown component of the test would be extended to at least 72 hours. The constant rate test should be preceded by a 4 hour step drawdown test to evaluate well efficiency and to determine a suitable rate for the constant yield test. During the aquifer test, groundwater levels will be monitored in selected observation wells in Pit 3 and if possible, in domestic wells located within 2 km of the test well. Groundwater levels will be monitored manually using electric water level tapes as well as using pressure transducers and data loggers. A turbine and digital flow meter would be used to monitor groundwater pumping rates.

policy! require

Results from the aquifer test will permit determination of the hydraulic properties (i.e., transmissivity and storativity) of coal seam 2. This information will be used to refine estimates of the groundwater flow velocity in the coal seams and may provide insight into the role and importance of fractures and faults within the Pit 3 area. Potential effects of mining activities on nearby domestic wells will also be assessed.

### 2.1.4 GEOTECHNICAL LOGGING OF ROCK CORE

There is an opportunity for collection of geotechnical information of rock core during exploration drilling operations. It is thus proposed that a geotechnical engineer from Piteau (Vancouver)

spend one day on-site with Manalta geologists to provide training for the collection of geotechnical data (as required) during their drilling and logging operations.

Tamas ✓ missing?

### 2.1.5 HYDROLOGICAL ASSESSMENT

Sect 2.4

A preliminary water balance will be developed for Pit 3. The pit water balance methodology will be based on the procedures previously developed for Pits 7 and 8 (Piteau, 1994a). Estimates of groundwater inflows will be combined with estimates of surface water runoff to establish filling rates. As was the case for Pits 7 and 8, a sensitivity analysis will be conducted to establish the range of possible filling rates, taking into account uncertainties in groundwater inflow rates and wet/dry year scenarios.

## 2.2 COAL PROCESSING PLANT - GEOTECHNICAL INVESTIGATION

The objective of the geotechnical investigation is to provide data for confirming the feasibility of two potential sites and to develop preliminary designs. The investigation will consist of the following:

- excavation of approximately 6 test pits, 5 m deep, to be located along the perimeter of the 43 m x 16 m plant site configuration - log soil units and collect soil samples; and,
- laboratory testing of soil samples, comprising moisture content, Atterberg limits, grain size and penetrometer strengths, and if softer clay soils are found unconsolidated undrained triaxial and consolidation tests.

Depth to bedrock will be determined from exploration drill holes.

A brief report will be prepared documenting geotechnical conditions, and discussing options and providing relevant design parameters for the plant foundation.

## 2.3 BRIDGE ON TELKWA RIVER - GEOTECHNICAL INVESTIGATION

The objective of the geotechnical investigation is to confirm the geotechnical feasibility of crossing the river and to provide data for preliminary foundation design. The investigation will consist of the following:

- excavation of approximately 6 tests pits, 5 m deep, at 2 or 3 locations on each side of the river crossing to log soil units and collect soil samples;
- drilling 2 boreholes with the exploration rig: one on each bank (to bedrock or to 30 m deep in gravel, or 50 m deep in clay), logging of drill cuttings to determine soil type (gravels vs. sand vs. silt/clay); and,
- laboratory testing of soil samples, comprising moisture content, Atterberg limits, grain size and penetrometer strengths, and if softer clay soils are found, perform unconsolidated undrained triaxial and consolidation tests.

A brief report will be prepared on the investigation and geotechnical conditions encountered, and providing relevant foundation design parameters.

## 2.4 TENAS PIT

### 2.4.1 HYDROGEOLOGICAL INVESTIGATION

It is proposed that the groundwater monitoring network be expanded with the installation of two double piezometer nests near the north end of Tenas Pit (Figure 1). The deeper piezometer will be completed in coal seam 1 while the shallow piezometer will be installed in coal seam "c". Following piezometer development, hydraulic conductivity testing will be performed. The piezometers will be sampled to determine groundwater quality, and to estimate horizontal groundwater flow patterns, and vertical hydraulic gradients between the two coal seams.

Groundwater quality monitoring shall also be completed at all other existing piezometers (19 in total) completed within the Tenas Pit area (i.e., T95R, T96R, and TOB96 series piezometers).

Information garnered from the 1997 hydrogeological program will augment the existing hydrogeological database that exists for the Tenas Pit.

### 2.4.2 HYDROLOGICAL ASSESSMENT

A preliminary water balance will be developed for the Tenas Pit. The approach for the water balance will be the same as described for Pit 3 in Section 2.1.5.

## 3.0 COST ESTIMATE

The estimated cost of the investigation program is $118,405, exclusive of the GST. A detailed cost breakdown is provided on Table 1.

In developing these costs the following assumptions were made:

- all survey work (i.e., ground surface and top of piezometer casing elevation) will be arranged by Manalta;
- costs for borehole drilling, piezometer construction materials and excavation of test pits are not included;
- contractor costs for the drilling/installation of the test well and aquifer testing are not included; and,
- Piteau only charges for costs actually incurred. Any cost savings generated through more rapid program completion would be passed onto Manalta; conversely any additional costs due to unexpected or difficult subsurface conditions or down time from poor weather, would be charged at extra cost at the units rate listed in Table 1.

Additional assumptions in the cost estimate are presented in Table 1.

## 4.0 SCHEDULE AND REPORTING

The schedule of the work will coincide with Manalta's exploration program, which is presently understood to consist of a 3 week on/3 week off rotation, beginning July 15, 1997. Therefore, it

is anticipated scheduling for the geotechnical/hydrogeological field work and reporting will be as follows:

- July 21 to August 2, - Borehole drilling and piezometer installations (Pit 3 area); geotechnical investigations;
- Late-August to mid-September, - borehole drilling and piezometer installations (Tenas Pit area); aquifer testing program; groundwater sampling; and,
- October 30, - submission of draft reports summarizing results from the hydrogeological and geotechnical programs completed in 1997.

It is our understanding that results from the hydrogeological/hydrological investigations will form the basis for a stand alone report summarizing baseline hydrogeological conditions at the Tenas Pit and Pit 3. The reports will essentially augment the previous detailed baseline report prepared by Piteau (1997a). Information from the geotechnical investigations will be presented under separate cover.

## 5.0 CLOSURE

We trust this cost proposal is suitable for your present needs. If you have any questions, please do not hesitate to contact either of the undersigned or Dr. Tad Dabrowski.

Respectfully,

PITEAU ENGINEERING LTD.

Frederic B. Claridge, M.S., P.Eng.

Robert S. Clarkson, M.Sc., P.Geol.

## REFERENCES

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Piteau Engineering Ltd., 1997a. *Baseline Hydrogeological Investigations in the Tenas Pit, Waste Dumps, and Mine Pit 3, Telkwa Coal Project.* Unpublished report prepared for Manalta Coal Ltd. KI97-3773-12. January 1997.

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DRAFT

# TABLE 1
## COST ESTIMATE

| FACILITY/WORK TASK | PRINCIPAL ENGINEERS | | HYDROGEOLOGIST/ENGINEER | | | TECHNOLOGIST | DRAFTING/ CLERICAL | DISBURSEMENTS | TOTAL ($) |
|---|---|---|---|---|---|---|---|---|---|
| | F. Clarkdge $100.00/hr | T. Dabrowski $110.00/hr | B. Clarkson $80.00/hr | M. Fitch $77.50/hr | R. Armstrong $65.00/hr | $55.00/hr | $50.00/hr | | |
| **1. Pit #3 Waste Dumps** | | | | | | | | | |
| *Reconnaissance and Test Pits* | | | | | 12 | | | 350 | 1,130 |
| *Geotech. Lab Tests* | | | | | | | | 600 | 600 |
| *Stability Analysis* | | | | | 8 | | | | 520 |
| *Reporting* | 4 | | | | 15 | | 5 | 400 | 2,025 |
| *Vehicle Rental (assume 1 day)* | | | | | | | | 150 | 150 |
| *Living Expenses (assume 1 day)* | | | | | | | | 110 | 110 |
| *Travel Expense* | | | | | | | | 1,200 | 1,200 |
| *Sub-total* | 4 | | | | 35 | | 5 | 2,610 | 5,735 |
| **2. Plant Site** | | | | | | | | | |
| *Test Pits* | | | | | 12 | | | 200 | 980 |
| *Lab Tests* | | | | | | | | 600 | 600 |
| *Reporting* | 4 | | | | 25 | | 5 | 200 | 2,475 |
| *Vehicle Rental (assume 2 days)* | | | | | | | | 300 | 300 |
| *Living Expenses (assume 2 days)* | | | | | | | | 220 | 220 |
| *Sub-total* | 4 | | | | 37 | | 5 | 1,520 | 4,575 |
| **3. Bridge Crossing of Telkwa River** | | | | | | | | | |
| *Test Pits and Drilling* | | | | | 20 | | | | 1,300 |
| *Lab Tests* | | | | | | | | 600 | 600 |
| *Reporting* | 4 | | | | 30 | | 10 | 400 | 3,250 |
| *Vehicle Rental (assume 2 days)* | | | | | | | | 300 | 300 |
| *Living Expenses (assume 2 days)* | | | | | | | | 220 | 220 |
| *Sub-total* | 4 | | | | 50 | | 10 | 1,520 | 5,670 |
| **4. Geotechical Logging of Rock Core** | | | | | | | | | |
| *Training/on-site supervision* | | | | | | 14 | | | 770 |
| *Vehicle Rental (1 day)* | | | | | | | | 150 | 150 |
| *Living Expenses (1 day)* | | | | | | | | 110 | 110 |
| *Travel Expense* | | | | | | | | 1,000 | 1,000 |
| *Sub-total* | | | | | | 14 | | 1,260 | 2,030 |
| **5.1 Pit 3 - Hydrogeological/Hydrological Investigations** | | | | | | | | | |
| *Piezometer Installations (6 double piezometer nests; 12 piezometers in total)* | | | | | | | | | |
| *Supervision* | | | 72 | | | | | | 5,760 |
| *K Tests (12 piezometers)* | | | 24 | | | 24 | | 250 | 3,480 |
| *Groundwater Sampling/Analysis (1996 and 1997 piezometers; 23 in total)* | | | 20 | | | 20 | | 10,925 | 13,625 |
| *Water Balance* | | | 10 | 30 | | 6 | 4 | 100 | 1,540 |
| *Reporting* | | 6 | 50 | | | 26 | 30 | 500 | 8,035 |
| *Vehicle Rental (14 days)* | | | | | | | | 2,100 | 2,100 |
| *Living Expenses (16 man days)* | | | | | | | | 1,760 | 1,760 |
| *Travel Expense (assume 1 person mob/demob in July; assume 2 persons mob/demob in August)* | | | | | | | | 3,600 | 3,600 |
| *Sub-total* | | 6 | 176 | 30 | | 77 | 34 | 19,235 | 39,910 |
| **5.2 Pit 3 - Aquifer Test** | | | | | | | | | |
| *Stepdrawdown Test* | | | 6 | | | | | | 480 |
| *Aquifer Test (assume 48 hour drawdown and 48 hour recovery)* | | | 40 | | | 40 | | 2,000 | 7,400 |
| *Groundwater Sampling/Analysis (2 samples from test well)* | | | | | | | | 900 | 900 |
| *Equipment Rentals(Pressure transducers, data loggers, field parameter kit, water level, etc.)* | | | | | | | | | 0 |
| *Reporting* | | | 40 | | | 10 | 6 | 200 | 4,250 |
| *Vehicle Rental (5 days)* | | | | | | | | 750 | 750 |
| *Living Expenses (10 man days)* | | | | | | | | 1,100 | 1,100 |
| *Travel Expense (NC, assume mob during August program)* | | | | | | | | 2,400 | 2,400 |
| *Sub-total* | | | 84 | | | 50 | 6 | 7,350 | 17,280 |

DRAFT

# TABLE 1
## COST ESTIMATE

| FACILITY/WORK TASK | PRINCIPAL ENGINEERS | | HYDROGEOLOGIST/ENGINEER | | | TECHNOLOGIST | DRAFTING/ CLERICAL | DISBURSEMENTS | TOTAL ($) |
|---|---|---|---|---|---|---|---|---|---|
| | F. Claridge $100.00/hr | T. Dabrowski $110.00/hr | B. Clarkson $80.00/hr | M. Fitch $77.50/hr | R. Armstrong $65.00/hr | $55.00/hr | $50.00/hr | | |
| **5.3 Tenas Pit - Hydrogeological/Hydrological Investigations** | | | | | | | | | |
| *Piezometer Installations (2 double piezometer nests; 4 piezometers in total)* | | | | | | | | | |
| *Supervision* | | | 22 | | | | | | 1,760 |
| *K Tests (4 piezometers)* | | | 8 | | | 8 | | | 1,080 |
| *Groundwater Sampling/Analysis (1995, 1996 and 1997 piezometers; 19 in total)* | | | 25 | | | 25 | | 11,000 | 14,375 |
| *Water Balance* | | | 8 | 30 | | 8 | 4 | 100 | 1,380 |
| *Reporting* | | 2 | 30 | | | 10 | 12 | | 3,770 |
| *Vehicle Rental (5 days)* | | | | | | | | 750 | 750 |
| *Living Expenses (10 man days)* | | | | | | | | 1,100 | 1,100 |
| *Travel Expense (NC, assume mob during August program)* | | | | | | | | | |
| *Sub-total* | | 2 | 93 | 30 | | 51 | 16 | 12,950 | 24,215 |
| ***5. REPORTING AND MANAGEMENT*** | | | | | | | | | |
| *Reporting (Final/Review)* | 16 | 16 | 35 | | 10 | 8 | 20 | 500 | 8,750 |
| *Management/Coordination* | 16 | 4 | 16 | | | | | 200 | 3,520 |
| *Field Program Preparation* | | | 16 | | | | | | 1,280 |
| *Meetings* | 8 | 6 | 16 | | | | 4 | 300 | 3,240 |
| *Computer Usage* | | | | | | | | 2,200 | 2,200 |
| *Sub-total* | 40 | 26 | 83 | | 10 | 8 | 24 | 3,200 | 18,990 |
| ***TOTAL*** | ***52*** | ***34*** | ***438*** | ***60*** | ***132*** | ***200*** | ***100*** | ***49,845*** | ***118,405*** +GST |

Notes:
1. Vehicle Expense = $150/day
2. Living Expense (accommodation and meals) = $110/day
3. Groundwater chemical analysis (as per B.C. Environment requirements) = $475/sample.
4. Geotechnical laboratory analysis moisture content = $4/sample; Atterberg limits = $65/sample; grain size and hydrometer = $160/sample; standard proctor density = $146/sample.
5. It is assumed the drilling rig for the coal exploration program will be available for deep borehole drilling, geotechnical sampling, and monitoring well installations in the Tenas Creek Pit area; therefore drilling costs have not been included.
6. Costs for the backhoe and drill rig required for Tasks 1, 2, and 3 are not included.
7. Piezometer installation assumes the boreholes have been drilled and a drill rig is available to install construction materials. Any delays in the piezometer installation outside of Komex's control will be charged at the unit rates listed.
8. It is assumed that all survey work (i.e., ground surface elevation, top of piezometer casing elevation, and piezometer stick-up will be the responsibility of Manalta.

(403)-420-4089

Attn: Allan Flemming

**PITEAU ENGINEERING LTD.**

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*E-mail:* komex@komex.com
*Website:* www.komex.com

**TO:** Jerry Demchuk
**COMPANY:** Norecol
**FAX #:** 777-4150

**FROM:** Rob Armstrong
**DATE:** January 12, 1999
**PROJ. #:** 3773-17
**NO. OF PAGES:** 3
(Including Cover Page)

rarmstrong@calgary.komex.com

***Re: Telkwa Coal Project: Remaining Issues***

This fax is to describe the scope of work developed in our January 8, 1999, meeting. The scope of work for the three issues we discussed is as follows:

**Hydrology of Four Creek**
There is concern over diversions on the ecosystem (most importantly fish) on Four Creek. The hydrology component will examine the pre- and post-development flows in the creek. Discussions with Dave Bustard will be required to determine the sensitivity of the aquatic community to these flow changes.

The hydrology for the Telkwa project collected to date has largely ignored the hydrology data collected on-site, since this data was previously too sporadic and of insufficient duration to answer questions concerning long-term hydrology (such as 1:200 year low flow events). However, given that a question specific to Four Creek has been posed, it will be necessary to integrate the regional flow information and the Four Creek monitoring data provided by Agra. Using this information, estimated monthly average and low flows (pre- and post-development) will be calculated. ← Luscar to do stats.

If the proposed diversions are likely to cause problems for the fishery, it may be necessary to examine alternate filling scenarios for the Tenas pits. For example, a structure could be constructed which would divert water to the pit only when a minimum flow level was achieved. This will require recalculation of the filling times for the Tenas pits.

**Residual Moisture Content of Haul Road Surface** No. Cirrus consultants
An estimate of the residual moisture content of the Haul road surface (soil surface) is required for the dust fall modelling. At present the model has been performed for a moisture content range of 4 to 11%, and the predicted dust fall has proven to be sensitive within that range. A literature review is required, along with some preliminary analysis specific to the weather conditions at the Telkwa area, to refine the data input.

**Weathering Characteristics of Waste Rock**
There is empirical evidence that the waste rock that will be generated at Telkwa is susceptible to breakdown due to weathering. It has therefore been suggested that the waste rock dumps will be self sealing as the waste rock weathers, resulting in surface water running off the dumps, rather than infiltrating them. A review of all current data available on the waste rock is required, with the purpose

of predicting the breakdown of the waste rock dump faces, the resulting permeability of the dump surface, and the resistance of the dump face to erosion.

**Closure**

Since these issues are all significantly different, we suggest that three separate letter reports would be suitable. We propose to issue a draft of the reports by February 5, 1999. Final copies to be issued 1 week after comments are received back from yourself. The cost estimate to perform this work is attached. Since this scope of work is a bit loose we emphasize that it is only an estimate, and believe that the cost will range between $5,000 and $10,000.

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| PITEAU ENGINEERING LTD. | ESTIMATE OF ENGINEERING COSTS | FILE: Telkwa |
|---|---|---|
| | Residual Moisture Content of Road Material and Weathering of Waste Rock Dump<br>Desk Top Investigation | DATE: 12-Jan-99 |
| CLIENT: Luscar | | BY: RCA |
| PROJECT NO.: 3773-17 | | REV: A |
| LOCATION: Telkwa | | |

| ITEM | DESCRIPTION | ENGINEERING QTY | UNITS | RATE | EXTENSION | | |
|---|---|---|---|---|---|---|---|
| 1 | **RESIDUAL MOISUTRE CONTENT IN ROAD MATERIAL** | | | | | | |
| | Literature Review | 15 | Hours | $60 | $900 900 | | |
| | Report | 8 | Hours | $75 | $600 600 | | |
| | Sr. Review | 4 | Hours | $110 | $440 440 | | |
| | Client Support | 8 | Hours | $75 | $600 600 | | |
| | | 0 35 | | | SUB TOTAL | $2,540 | 2540 0 |
| 2 | **WASTE ROCK WEATHERING** | | | | | | |
| | Review Existing Data | 10 | Hours | $60 | $600 600 | | |
| | Review Other Mine Experience | 10 | Hours | $60 | $600 600 | | |
| | Report | 8 | Hours | $75 | $600 600 | | |
| | Sr. Review | 4 | Hours | $110 | $440 440 | | |
| | | 32 32 | | | SUB TOTAL | $2,240 | 2240 2240 |
| 3 | **HYDROLOGY OF FOUR CREEK (Junior Hydrologist: $60, Senior Hydrologist: $85, Principal Water Resources Engineer: $110)** | | | | | | |
| | Review Existing Data | 4 4 | Hours | $85 | $340 340 | | |
| | | 2 2 | Hours | $60 | $120 120 | | |
| | Integration of regional data and Agra data | 4 8 8 | Hours | $85 | $680 680 340 | | |
| | | 4 4 | Hours | $60 | $240 240 | | |
| | Examine diversion alternatives (il fisheries problems | 4 8 8 | Hours | $85 | $680 680 340 | | |
| | | 4 8 8 | Hours | $60 | $480 480 240 | | |
| | Report | 8 8 | Hours | $60 | $480 480 | | |
| | | 4 4 | Hours | $85 | $340 340 | | |
| | Sr. Review | 4 4 | Hours | $110 | $440 440 | | |
| | | 38 50 | | | SUB TOTAL | $3,800 | 3800 2880 |
| | | | | | | $293 | 293 175 |
| | COMPUTER OVERHEAD | 70 117 | Hours | $2.50 | | $429 | 429 256 |
| | SECRETARY (5%) | | | | | | 5551 |
| | Subtotals | 117 | Hours | | | $9,302 | 555 |
| | Contingency (10%) | | | | | $930 | |
| | **GRAND TOTAL** | | | | | $10,232 | 6106 |



JAN-12-1999 15:38 KOMEX INTERNATIONAL LTD. 403 247 4811 P.03/03
TOTAL P.03
1/12/99 - 11:58 AM J:\3773\3773-17\TABLES\Costest.xls - Costs

**PITEAU ENGINEERING LTD.**

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*E-mail:* *komex@komex.com*
*Website:* *www.komex.com*

780.
**TO FAX #:** (403) 420-5878
**COMPANY:** Luscar
**ATTENTION:** Allan Flemming

**DATE:** Jan 26, 1999
**PROJ. #:** 3773-17
**FROM:** Murray Fitch
**NO. OF PAGES:** 18.
(INCLUDING COVER PAGE)

⇒ JED
(403) 777-4150

***Re:*** ***Final Draft Letter - Four Creek Hydrology***

Allan,

Please find attached a final draft of the letter. It is basically complete – lacking only the unfaxable (because of size) Figure 1. If this meets your requirements, I can courier it out whenever you say the word. If not, please call me at (403)286-2522.

Murray

\\CENTRAL\DATA3\X\PROJECTS\3773\3773-17\CORR\fltr156x.doc

⇒ Jerry).

**PITEAU ENGINEERING LTD.**
HYDROGEOLOGICAL AND GEOTECHNICAL CONSULTANTS

SUITE 100, 4500 - 16TH AVENUE N.W.
CALGARY, ALBERTA
CANADA T3B 0M6
TELEPHONE (403) 286-2522
FAX (403) 247-4811 or 247-0779
e-mail: komex@komex.com

February 26, 1999

OUR FILE: 3773-17

Luscar Coal Ltd.
10235 - 101 St.
Edmonton, AB
T5J 3G1

(fax) 780.420.5878
(tel) 780.420.4080

Attention: Allan Flemming, P.Eng.

Dear Mr. Flemming:

***Re: Hydrology of Four Creek***

---

## INTRODUCTION

A previous report, *Water Management for the Telkwa Coal Project* (Piteau 1998, henceforward referred to as WMTCP), addressed the issue of hydrology in and around the proposed Telkwa Coal Project. In order to ensure the rapid filling of abandoned pits, the diversion of a number of creeks is anticipated. One of these, Four Creek, was identified by the British Columbia Ministry of Environment, Lands and Parks (MELP) as being of concern from a fisheries perspective. This letter addresses the issue of the hydrologic implications of the diversion of a portion of the upper drainage of Four Creek.

## HYDROLOGY OF FOUR CREEK

Figure 1 shows the drainage sub-basins of Four Creek[1]. For analysis purposes, flows have been considered at the following locations:

---

[1] A discrepancy exists between the drainage area used in this report and that used in the WMTCP report. Previously, a drainage area of 13 $km^2$ was calculated using 1:50,000 topographical maps - 1:20,000 scale maps used in this report suggest a 10 $km^2$ drainage area.

1: the proposed diversion location into the Tenas Main Pit
2: two thirds of the drainage area
3: the mouth of Four Creek (confluence with Goathorn Creek)

Four Creek flow data was collected in 1997 (October-November) and 1998 (June-November). Of greatest hydrologic (and fisheries) concern are the relatively rare low flow events. The data record for Four Creek is not sufficiently long to permit the calculation of low-flow statistics, and thus the record must be supplemented by longer-term precipitation data and/or regional hydrologic data. These are discussed below.

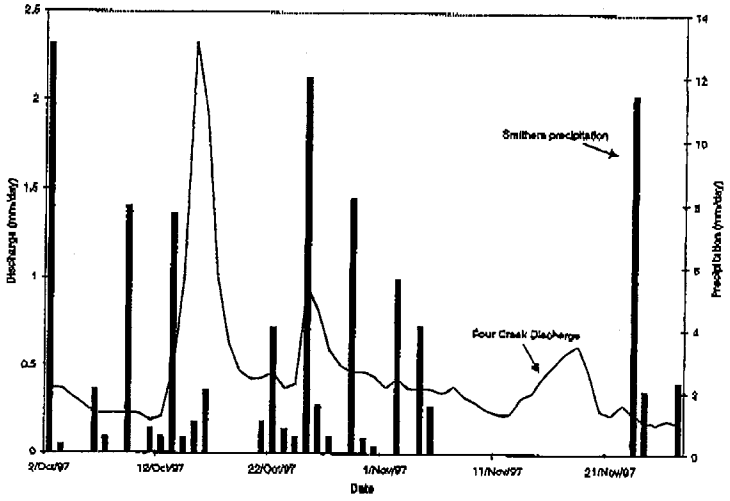


**Figure 2: Four Creek discharge and Smithers Precipitation for 1997**

## CORRELATION OF TELKWA AREA RUNOFF AND SMITHERS PRECIPITATION

In general, the correlation between precipitation recorded at Smithers Airport and discharges in Simpson, Goathorn and Four Creeks is only fair. The discrepancy is more pronounced in the 1997 record than in 1998. Figure 2 and Figure 3 show the relationship between Four Creek discharges and Smithers precipitation for 1997 and 1998. Large precipitation events are not reflected in the discharge record, particularly after October 22. In addition, discharge in Four Creek increased in mid-November when no precipitation was recorded at Smithers.

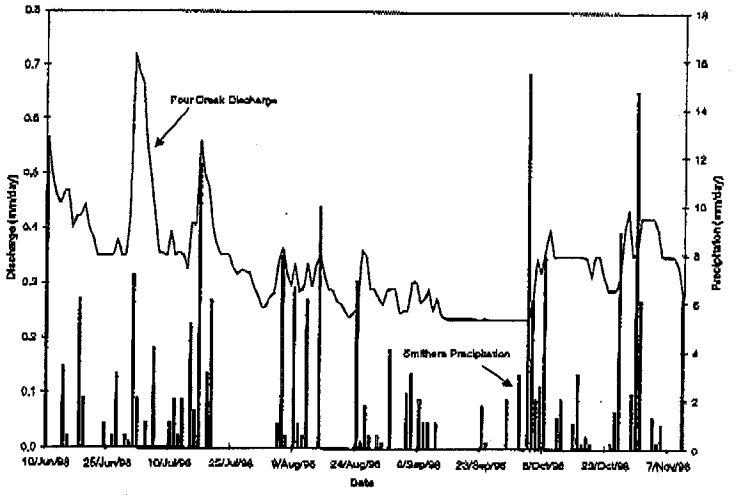


**Figure 3: Four Creek Discharge and Smithers Precipitation for 1998**

The timing of runoff and precipitation events for 1998 have a closer relationship than in 1997. Storm events in Smithers are generally reflected in the Four Creek discharge record. However, the magnitude of runoff response to precipitation is not well represented. Several large late-season precipitation events only result in minor increases in Four Creek discharge, as compared to early July where runoff is at its peak with only moderate precipitation recorded at Smithers. The record suggests that, at least on a daily time scale, precipitation recorded at Smithers is not representative of the precipitation received at Telkwa.

Over the longer-term (monthly or annually), however, the precipitation, however, the Smithers and Telkwa precipitation data appeared to correlate reasonably well. In the WMTCP report, precipitation recorded at Smithers (elevation 523 masl; 55 years of data) was compared to precipitation recorded at Telkwa (elevation 683 masl; 26 years of data) and Telkwa Coal Mine Road (elevation 670 masl; 3 years of data). Both Telkwa stations were discontinued over 10 years ago, however, the data suggests that the Telkwa area receives roughly 11% less precipitation than Smithers. Thus, the Smithers precipitation data was reduced by 11%, which was used to estimate precipitation, surface runoff and infiltration into the coal pits.

## COMPARISON OF HYDROLOGY OF FOUR AND GOATHORN CREEKS

The WMTCP report identified four key gauged drainages in the Telkwa area:

- Canyon Creek Near Smithers (Environment Canada station #08EE014)
- Kathlyn Creek above Simpson Creek ( 08EE010)
- Simpson Creek at the Mouth (08EE012)
- Goathorn Creek near Telkwa (08EE008)

Two of Environment Canada's gauging stations, Canyon Creek and Kathlyn Creek, have been discontinued. Flow data for Goathorn, Simpson, and Four Creek are presented in Figure 4 and Figure 5. The data are presented as unit runoff (in mm). Thus, flows in the creeks have been corrected for drainage basin size.

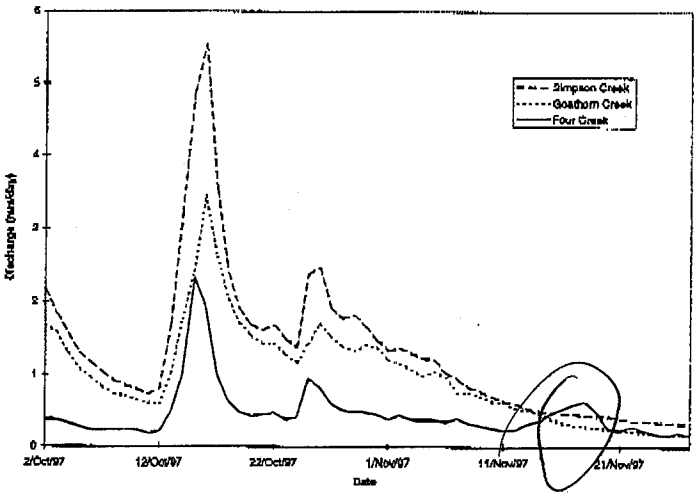


**Figure 4: Comparison of Four, Simpson and Goathorn Creek average daily discharge for 1997**

Data from Simpson Creek suggest that this basin is very "peaky" - a trait which was less marked in the Goathorn and Four Creek data. Thus, it appears that Goathorn Creek is a more appropriate comparison for Four Creek, and will be used in subsequent analyses.

Thus, to transform long-term Goathorn Creek data for use at the Four Creek site, a comparison of the 1997 data at the two sites was made[2]. The cumulative runoff at the Four Creek station was 23 mm, and at Goathorn Creek, 54 mm. This gives a ratio of 22.9/54.2 = 0.42. For 1998, the cumulative runoff for Four and Goathorn Creeks were 52 and 156 mm respectively, yielding a ratio of 0.33. The ratios for the 1997 and 1998 discharge records were averaged to produce a value of 0.38, which was applied to the Goathorn Creek data as a transformation.

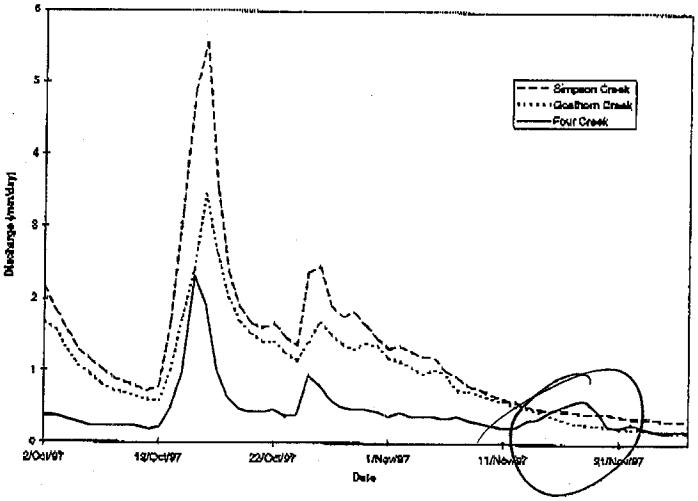


**Figure 5: Comparison of Four, Simpson and Goathorn Creek average daily discharge for 1997**

Table 1 shows the runoff coefficients for Goathorn and Four Creeks. These coefficients were calculated using Smithers precipitation data (decreased by 11% to account for differences between Smithers and Telkwa, as described previously). Runoff coefficients for Four Creek do not change from 1997 to 1998, remaining at 28%. In the WMTCP report, a runoff coefficient of 30% was adopted. This latter figure was challenged by the BC MELP, as 30% is a lower coefficient than has been determined in nearby gauged basins. However, the limited Four Creek flow data

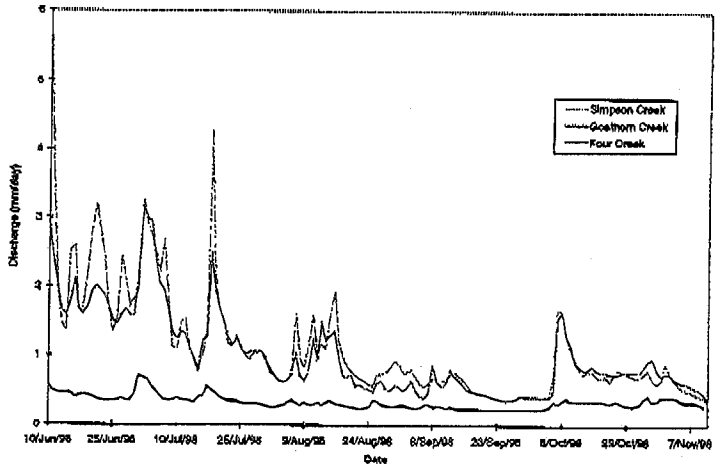


**Figure 6: Comparison of Four, Goathorn and Simpson Creek Average Daily Discharge for 1998**

**Table 1 – Runoff coefficients for Four Creek and Goathorn Creek.**

| | *1997* | | | *1998* | | |
|---|---|---|---|---|---|---|
| ***Basin*** | ****Smithers Precipitation*** | ***Runoff*** | ***Runoff Coefficient*** | ****Smithers Precipitation*** | ***Runoff*** | ***Runoff Coefficient*** |
| Four Creek | 82 mm | 23 mm | 0.28 | 187 mm | 52 mm | 0.28 |
| Goathorn Creek | 82 mm | 54 mm | 0.65 | 187 mm | 156 mm | 0.83 |

Notes: Period of record for 1997 is October 2 to November 27.
Period of record for 1998 is June 10 to November 10.
* Decreased by 11% to transform to Telkwa area.

available suggest that a 30% runoff coefficient is indeed reasonable. The runoff coefficients for Goathorn Creek (relative to Smithers rainfall data) vary from 65% in 1997 to 83% in 1998. Our experience and knowledge of the area suggests that these figures are too high, since they imply that the Goathorn basin produces almost three times as much runoff (per square kilometre) as Four Creek. There are a number of potential sources for this discrepancy.

First, both basin aspect and elevation are expected to have a significant effect on discharge. The Goathorn Creek Basin has an altitude range of 1745 m (from 550 to 2295 masl) whereas the Four Creek basin has a range of only 670 m (from 700 to 1370 masl). If an orographic precipitation enhancement factor of roughly 40% per 1000 m is assumed (an average value for the Canadian Rocky Mountains, Quick and Pipes, 1996), then the Goathorn Creek watershed should receive significantly more precipitation. In addition, the Four Creek basin generally faces the northeast, where as the Goathorn Creek Basin faces both the northeast and the northwest. This variance in aspect will cause differences in snowpack accumulation and ablation.

Secondly, the influence of groundwater may be more pronounced in Goathorn Creek as it extends lower in the basin. Springs surfacing from fractures may augment flows in Goathorn Creek at elevations below the Goathorn/Four Creek confluence (700 masl).

Another factor is that Goathorn Creek is augmented by glacial runoff where as Four Creek is non-glaciated. Although the ice melt contribution during October and November is not expected to be great, there should be some water coming from glaciers due to pressure melting and perhaps internal storage.

## TIMING OF RUNOFF

In general, the timing of the discharge record for Goathorn and Four Creeks compare favourably, as is illustrated in Figures 5 through 7. This suggests that the basins respond to meteorological events in a similar fashion, and thereby justifies the use of transformed Goathorn Creek discharge data as a surrogate for Four Creek data. Applying a time lag (at the daily scale) to the discharge does not improve this relationship.

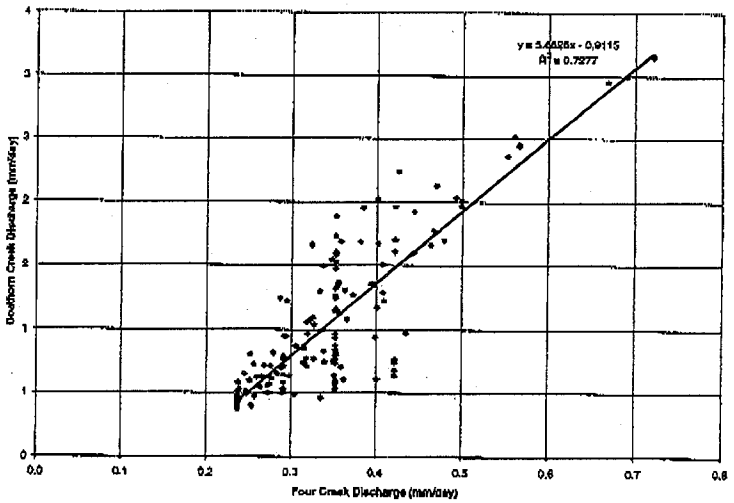


**Figure 7: Relationship between Goathorn Creek and Four Creek average daily discharge**

## LOW FLOW ANALYSIS

Figure 8 shows the probabilities of mean annual low flows in Goathorn Creek. The data plotted are the lowest mean daily flows in Goathorn Creek (one mean daily flow for each year of record). For subsequent analysis purposes, the 1 in 10 year (10% probability) mean daily runoff of 0.045 mm/day was used as the reference. The runoff ratio of 0.38 was applied to estimate the 1 in 10 year low flow for Four Creek, giving a value of 0.017 mm/day. The average daily discharge for Goathorn Creek is 1.15 mm/day. Applying the ratio gives an estimated average daily runoff of 0.43 mm/day for Four Creek.

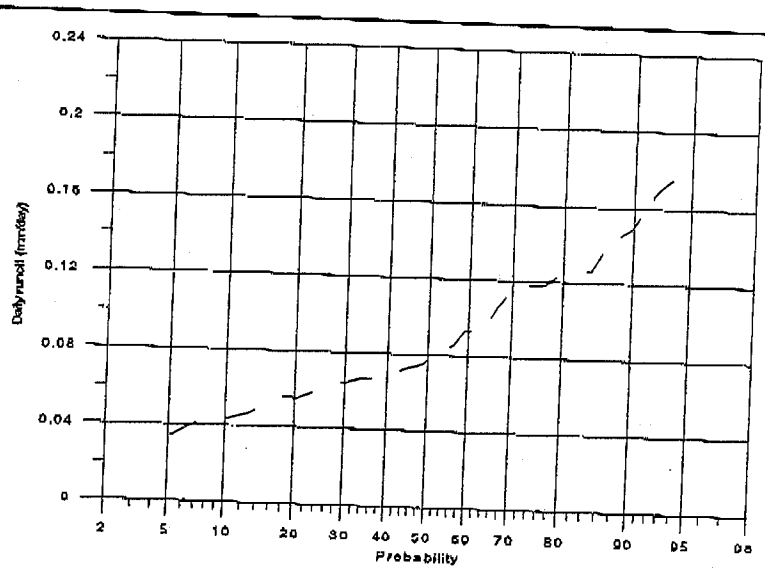


**Figure 8: Mean daily low flow distribution in Goathorn Creek**

The proposed diversion of the Four Creek tributary results in a reduction of roughly 18% of the total discharge area of Four Creek. Assuming that all areas of the basin behave in the same manner hydrologically, it can be assumed that the total discharge of Four Creek would also be reduced by 18%. Table 1 shows the estimated average daily and 1 in 10 year low flow for Four Creek at three stream locations assuming pre- and post-diversion scenarios. The influence of the proposed diversion on the flow of Four Creek is displayed graphically in the Appendix.

**Table 2 - Estimated discharges for various locations along Four Creek.**

| *Location* | *% of original drainage area* | *Estimated Minimum 1 in 10 year Discharge (L/s)* | | *Estimated Average Daily Discharge (L/s)* | |
|---|---|---|---|---|---|
| | | *with diversion* | *without diversion* | *with diversion* | *without diversion* |
| At diversion | 58 | 0.7 | 0.6 | 8.4 | 15 |
| 2/3 of basin length | 74 | 0.9 | 1.3 | 22 | 30 |
| At mouth | 82 | 1.6 | 1.9 | 40 | 49 |

## CONCLUSION

The use of Goathorn Creek data as a surrogate for Four Creek is reasonable provided that a transformation is applied (a value of 0.38 was used in this analysis). The two basins respond in a similar fashion in terms of timing, however, the Goathorn basin produces greater unit runoff. This may be a result of elevation, aspect, groundwater and/or icemelt.

The impact of the diversion on flows in Four Creek varies between the upper reaches and the mouth. At the mouth, only 18% of the original drainage is removed by diversion. At the point of diversion, however, 42% of the drainage (and hence flow) is removed. It is important to note that there is significant natural variability in the creek, ranging from a 1 in 10-year minimum of 1.9 L/s (assuming no diversion) to an average of 49 L/s.

It is possible to construct a diversion structure, which would guarantee a minimum flow in the creek. Only flows exceeding this minimum would be diverted into the pits. Withdrawals to the pits could therefore be restricted to higher flow periods, making the impact of the diversion relatively minor compared to natural creek variability.

Respectfully,

PITEAU ENGINEERING LTD.

Murray Fitch, M.A.Sc., P.Eng.
Senior Hydrologist

---

**REFERENCES**

Piteau, 1998. *Water Management for the Telkwa Coal Project.* Unpublished report prepared for Manalta Coal Ltd. Project #3773-16.

Quick, M.C, and Pipes, A.P., 1996. *U.B.C. Watershed Model Manual, Version 4.0,* Department of Civil Engineering, University of British Columbia.

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**PITEAU ENGINEERING LTD.**

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*Facsimile:* *(403) 247-4811 / (403) 247-0779*
*E-mail:* *komex@komex.com*
*Website:* *www.komex.com*

**TO FAX #:** 780.420.5878
**COMPANY:** Luscar
**ATTENTION:** Allan Flemming

**DATE:** Feb. 16, 1999
**PROJ. #:** 3773-17
**FROM:** Murray Fitch
**NO. OF PAGES:** 5
(INCLUDING COVER PAGE)

Allan,

Please find attached our first cut at a report on the effects of diversions of Four Creek. I recommend that the report be passed on to David Bustard for comments on potential fisheries impacts.

As I mentioned in our telephone conversation, there remains the issue of 1998 Four Creek monitoring data, which would give us a way to assess the relationship between low flows in Goathorn and Four Creeks. I believe that it is prudent that we wait for Agra to review this data prior to finalizing the report.

We have not included a map of the site, which is in production but was delayed due to problems in assessing drainage areas. Agra originally established the Four Creek gauge basin area using 1:50,000 topographic maps - the more recent maps provided by Manalta/Luscar have allowed us to more precisely define the drainage area. The upshot is some of the notes on the map are incorrect. I should also add that some of the numbers in the report will also change slightly, but I thought it more important to get you the report now despite the minor errors.

The major conclusion of the report should not change. In brief, the impact of the diversion will be relatively small in the lower watershed, and could be further minimized through the construction of a structure which would allow diversions only during higher flows. In the upper watershed, the effects of the diversion on flows are more substantial - it remains for the aquatics people to determine if these are changes would be significant for fish. Certainly, the natural variability of flows in the creek would appear to be a significant stressor for fish, particularly in the upper reaches.

If you have questions, please do not hesitate to call me or Alexi Zawadzki at (403)247-0200.

Murray Fitch

new release to come out by Feb 24/99

**PITEAU ENGINEERING LTD.**
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February 16, 1999

OUR FILE: 3773-17

Luscar Coal Ltd.
10235 - 101 St.
Edmonton, AB
T5J 3G1
(fax) 780.420.5878 (tel) 780.420.4080

Attention: Allan Flemming, P.Eng.

Dear Mr. Flemming:

***Re: Hydrology of Four Creek***

---

*Introduction*

We have reviewed the hydrology of Four Creek, and have reached the following preliminary findings. The following is intended for your review. We would be happy to incorporate the findings into a letter which would be suitable for dissemination to other parties such as BC MELP.

Figure 1 shows the drainage sub-basins of Four Creek. For analysis purposes, we have considered flows at the following locations:

1: the proposed diversion location into the Tenas Main Pit
2: two thirds of the drainage area
3: the mouth of Four Creek (confluence with Goathorn Creek)

*Hydrology of Four Creek*

The Telkwa Report (official name) presented a detailed analysis of the hydrology of the Telkwa region. Four key watercourses were identified in this work:

- Canyon Creek Near Smithers - 08EE014
- Kathlyn Creek above Simpson Creek - 08EE010

- Simpson Creek at the Mouth - 08EE012
- Goathorn Creek near Telkwa - 08EE008

Piteau has subsequently received flow measurement data from Agra for 1997 (Oct. 2-Nov. 27) and 1998 (Jun. 9-Oct. 19). Ideally this short-term data could be used in conjunction with regional flow data to accurately characterize the hydrology of Four Creek. However, our analysis of the Four Creek data shows that the 1997 data appears generally plausible, but the 1998 discharges are too low to be credible[1].

thurs/Fri of last week revised rating curve. re-issue 4-Creek

*Comparison of hydrology of Four and Goathorn Creeks (1997)*

Two of the Environment Canada gauging stations, Canyon Creek and Kathlyn Creek, have been discontinued. Flow data for Goathorn, Simpson, and Four Creek are presented in Figure 1. The data are presented as unit runoff (in mm). Thus, flows in the creeks have been corrected for drainage basin size. Basins with identical runoff coefficients (the percentage of precipitation which runs off into a creek) would plot as identical lines, regardless of basin size.

Data from Simpson Creek suggest that this basin is very "peaky" - a trait which was less marked in the Goathorn and Four Creek data. Thus, it appears that Goathorn Creek is a more appropriate comparison for Four Creek, and will be used in subsequent analyses.

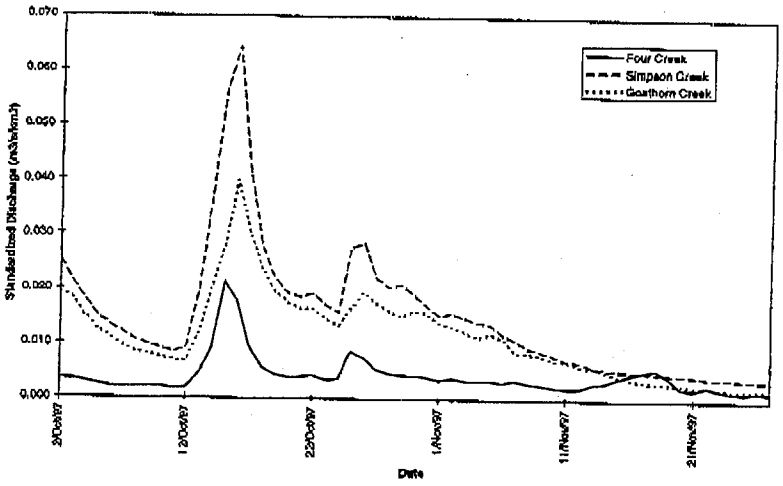


**Figure 1: Comparison of Four Creek, Goathorn Creek and Simpson Creek Average Daily Discharge**

Flow data for Goathorn Creek in 1997 was reported to be unreliable after November 15 due to ice conditions. Thus, to transform long-term Goathorn Creek data for use at the Four Creek site, a comparison of the 1997 data at the two sites was made. The cumulative runoff at the Four Creek station was 22.9 mm, and at Goathorn Creek, 54.2 mm. Thus, a ratio of 22.9/54.2 = 0.42 was applied to Goathorn data as a transformation. This implies that the Goathorn basin produces more than three times as much runoff (per square kilometre). There are a number of ~~potential sources of error~~ reasons for this discrepancy in this estimate.

First, Goathorn Creek is augmented by glacial runoff where as Four Creek is ice-free (termed *nival*). Although the ice melt contribution during October and November is not expected to be great, there will be some water coming from glaciers due to pressure melting and perhaps internal storage. A second source of error may be from the estimation of drainage area. Agra had

[1] Agra has indicated to us that the 1998 data had not been quality controlled (Kristi McKay, pers. comm.). This quality control is in process.

which is correct

estimated the drainage area of Four Creek as being 13 km$^2$ using 1:50,000 topographical maps. Komex had estimated the drainage area as being 10 km$^2$ using 1:20,000 maps provided by Manalta Coal Ltd/Luscar. The ramifications of an overestimation of drainage area are that discharge per unit area is underestimated. This may be the case as it is estimated that Four Creek produces three times less runoff than neighbouring Goat Creek. Goathorn.

Figure 2 shows the probabilities of mean annual low flows in Goathorn Creek. The data plotted are the lowest mean daily flows in Goathorn Creek (one mean daily flow for each year of record). For subsequent analysis purposes, the 1 in 10 year (10% probability) mean daily runoff of 0.045 mm/day was used as the reference. The runoff ratio of 0.32 was applied to estimate the 1 in 10 year low flow for Four Creek, giving a value of 0.012 mm/day. The average daily discharge for Goathorn Creek is 1.15 mm/day. Applying the ratio gives an estimated average daily discharge of 0.373 mm/day for Four Creek.

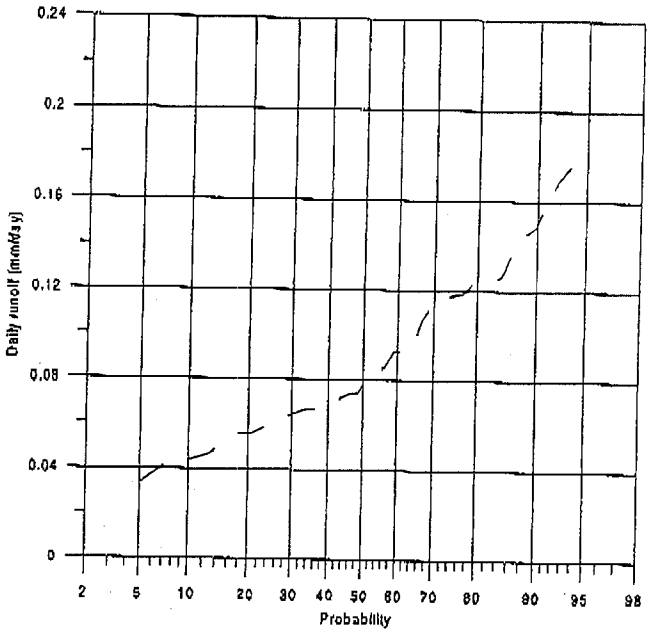


**Figure 2: Mean Daily Low Flow Distribution in Goathorn Creek**

The proposed diversion of the Four Creek tributary results in a reduction of roughly 18% of the total discharge area of Four Creek. Assuming that all areas of the basin behave in the same manner hydrologically, it can be assumed that the total discharge of Four Creek would also be reduced by 17%. Table 1 shows the estimated average daily and 1 in 10 year low flow for Four Creek at three stream locations assuming pre- and post-diversion scenarios.

or 18%

Table 1 - Estimated discharges for various locations along Four Creek.

| *Location* | *% of original drainage area* | *Estimated Minimum 1 in 10 year Discharge (L/s)* | | *Estimated Average Daily Discharge (L/s)* | |
|---|---|---|---|---|---|
| | | *with diversion* | *without diversion* | *with diversion* | *without diversion* |
| At diversion | 58 | 0.35 | 0.60 | 8.00 | 13.80 |
| 2/3 of basin length | 74 | 0.89 | 1.20 | 21.20 | 28.65 |
| At mouth | 82 | 1.48 | 1.80 | 37.76 | 46.05 |

*Conclusion*

The impact of the diversion on flows in Four Creek varies between the upper reaches and the mouth. At the mouth, only 18% of the original drainage is removed by diversion. At the point of diversion, however, 42% of the drainage (and hence flow) is removed. It is important to note that there is significant natural variability in the creek, ranging from a 1 in 10 year minimum of 1.8 L/s (assuming no diversion) to an average of 46 L/s.

It is possible to construct a diversion structure which would guarantee a minimum flow in the creek. Only flows exceeding this minimum would be diverted into the pits. Withdrawals to the pits could therefore be restricted to higher flow periods, making the impact of the diversion relatively minor compared to natural creek variability.

Respectfully,

PITEAU ENGINEERING LTD.

Murray Fitch

Murray Fitch, M.A.Sc., P.Eng.
Senior Hydrologist

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# Attachment B Baseflow Separation Results

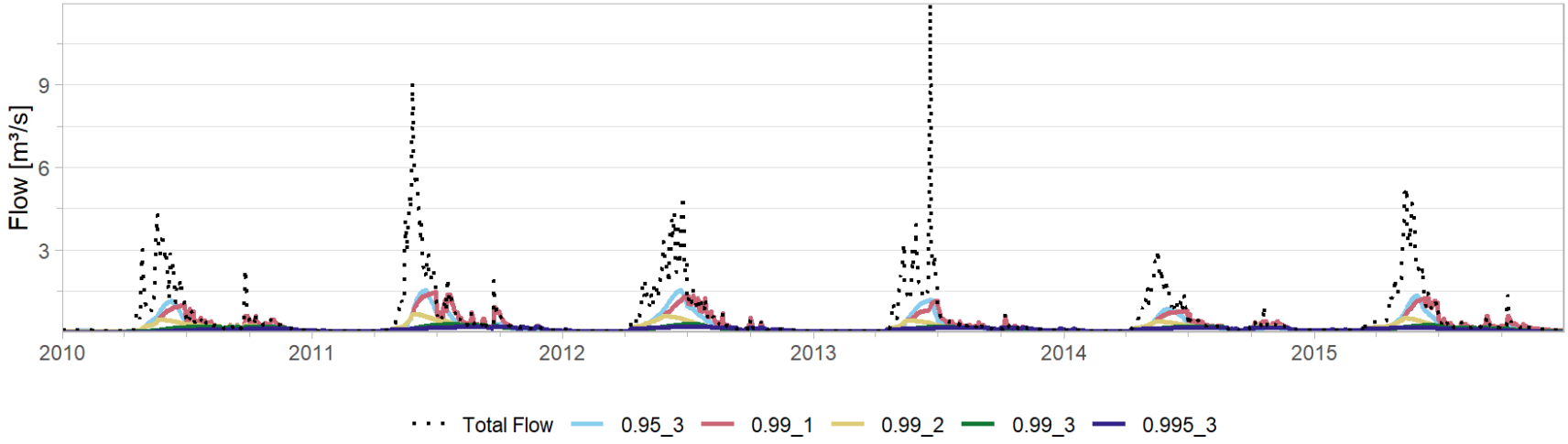



*Figure A- 1: Tenas Creek Baseflow Separation results with varied Filter Parameter and Number of Passes*

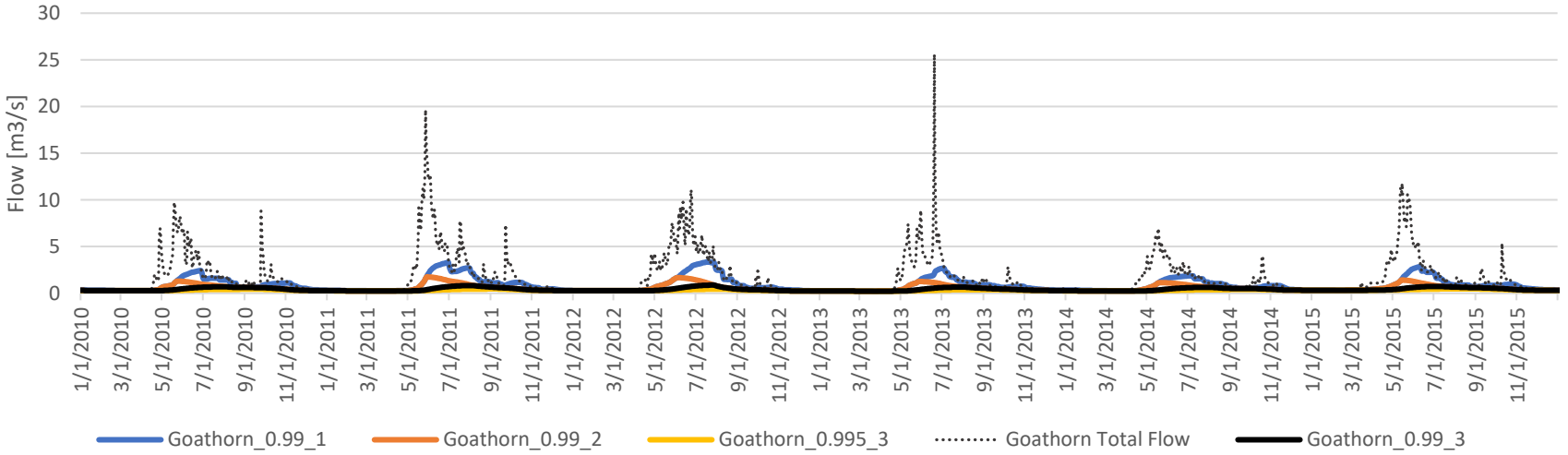



*Figure A- 2: Goathorn Creek Baseflow Separation results with varied Filter Parameter and Number of Passes*

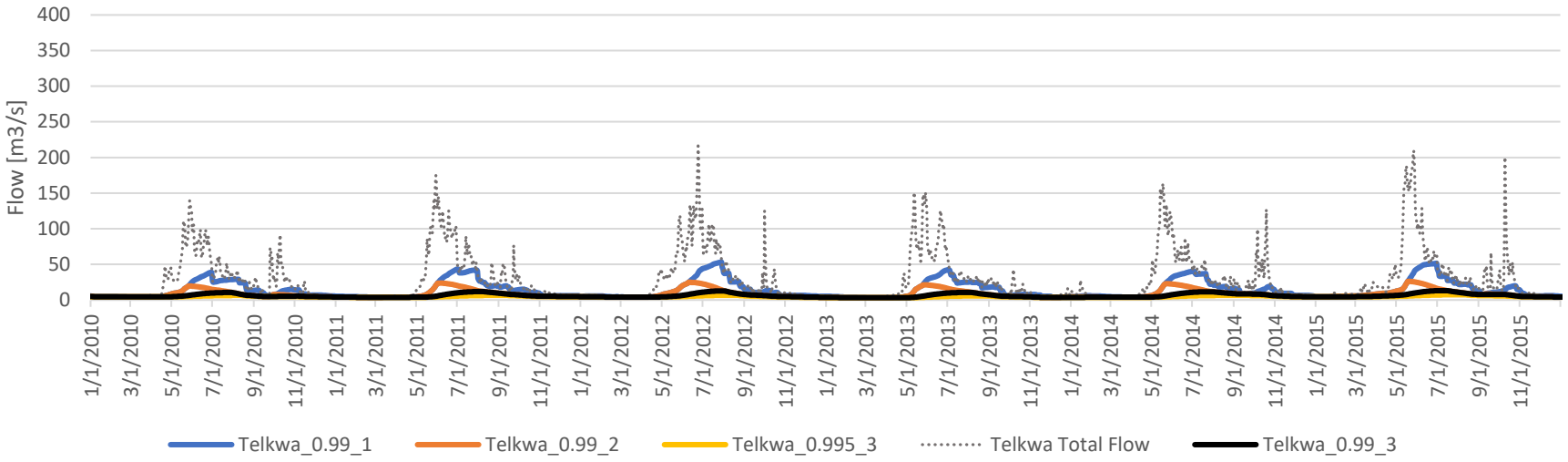



*Figure A- 3: Telkwa River Baseflow Separation results with varied Filter Parameter and Number of Passes*

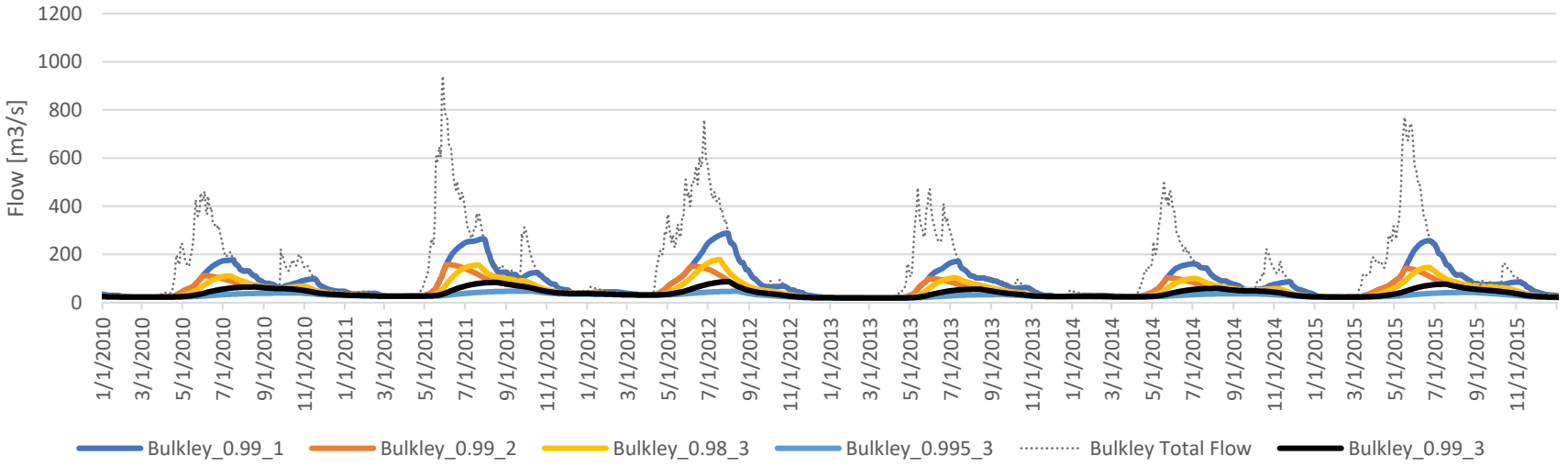



*Figure A- 4: Bulkley River Baseflow Separation results with varied Filter Parameter and Number of Passes*

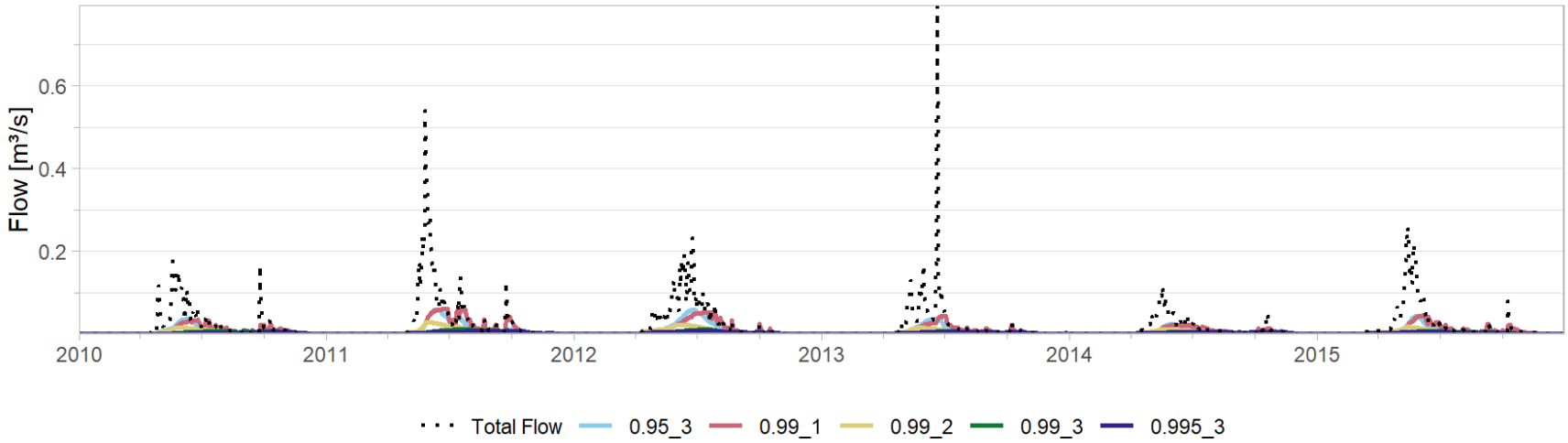



*Figure A- 5: Four River Baseflow Separation results with varied Filter Parameter and Number of Passes*

# Attachment C AGRA 1999 Data Summaries

*Table C-1. Tenas Creek Summary Sheet*

**Description:** Lower Tenas Creek downstream of the Tenas Pit

| | | | |
|---|---|---|---|
| Site ID: | Lower Tenas Ck | Start Date: | 08-May-97 |
| Operator: | TELKWA COAL | End Date: | 10-Nov-98 |
| Frequency: | DISCONTINUOUS | Discharge: | In Stream |
| Monitored: | YES | Water Level: | Level Survey |

**Comments:**

The continuous discharge times series was calculated from 1-hour interval water level recordings.

**1997 and 1998 Spot Measurement Summary**

| Date & Time | Discharge ($m^3/s$) | Staff Gauge (m) | Flow Measurement Method |
|---|---|---|---|
| 08-May-1997 | 2.55 | 0.566 | Current meter |
| 16-May-1997 | 6.04 | 1.05 | Current meter |
| 22-May-1997 | 2.76 | 0.624 | Current meter |
| 13-Jun-1997 | 3.22 | 0.676 | Current meter |
| 24-Apr-1998 | 0.810 | 0.480 | Current meter |
| 14-May-1998 | 3.31 | 0.690 | Current meter |
| 27-May-1998 | 6.10 | 0.780 | Current meter |
| 23-Jun-1998 | 0.566 | 0.450 | Current meter |
| 21-Jul-1998 | 0.399 | 0.430 | Current meter |
| 19-Aug-1998 | 0.208 | 0.390 | Current meter |
| 09-Sep-1998 | 0.210 | 0.385 | Current meter |
| 25-Sep-1998 | 0.156 | 0.368 | Current meter |
| 10-Nov-1998 | 0.116 | 0.395 | Current meter |

ND: No Data

**Figure: 1997 - 1998 Spot Discharge and Daily Discharge in Lower Tenas Creek**

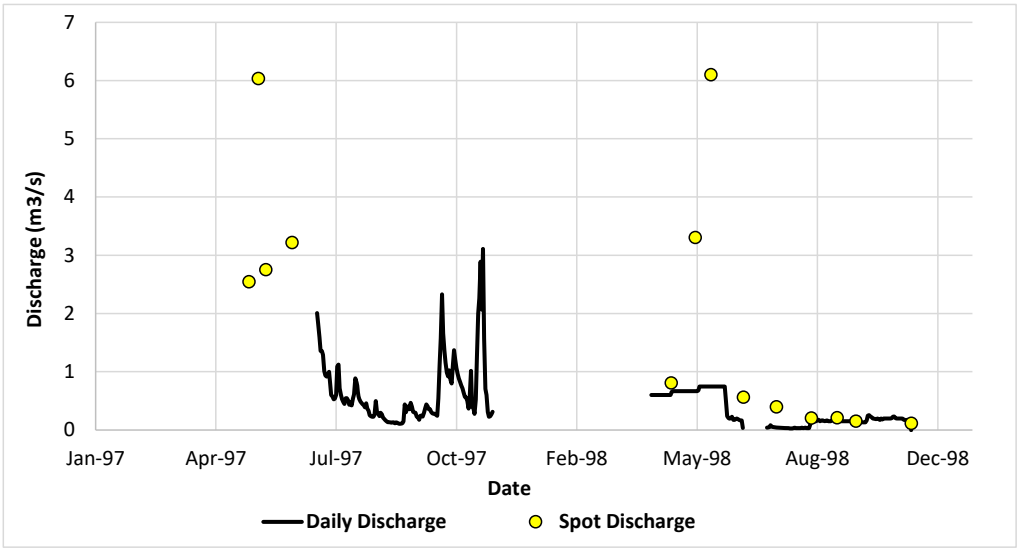


*Table C-2. Four Creek Summary Sheet*

**Description:** Four Creek above the confluence with Goathorn Creek

| | | | |
|---|---|---|---|
| Site ID: | Lower Four Ck | Start Date: | 09-May-97 |
| Operator: | TELKWA COAL | End Date: | 10-Nov-98 |
| Frequency: | DISCONTINUOUS | Discharge: | In Stream |
| Monitored: | YES | Water Level: | Level Survey |

**Comments:**

The continuous discharge times series was calculated from 1-hour interval datalogger recordings.

**1997 and 1998 Spot Measurement Summary**

| Date & Time | Discharge ($m^3/s$) | Staff Gauge (m) | Flow Measurement Method |
|---|---|---|---|
| 09-May-1997 | 0.384 | 0.336 | Current meter |
| 15-May-1997 | 0.786 | 0.421 | Current meter |
| 21-May-1997 | 0.269 | 0.268 | Current meter |
| 11-Jun-1997 | 0.0810 | 0.193 | Current meter |
| 28-Apr-1998 | 0.569 | 0.375 | Current meter |
| 30-Apr-1998 | 0.545 | 0.372 | Current meter |
| 13-May-1998 | 0.271 | 0.326 | Current meter |
| 26-May-1998 | 0.313 | 0.335 | Current meter |
| 10-Jun-1998 | 0.0117 | 0.180 | Current meter |
| 23-Jun-1998 | 0.00495 | 0.153 | Current meter |
| 24-Jun-1998 | 0.00739 | 0.165 | Current meter |
| 10-Jul-1998 | 0.00865 | 0.170 | Current meter |
| 22-Jul-1998 | 0.00813 | 0.168 | Current meter |
| 29-Jul-1998 | 0.00628 | 0.160 | Current meter |
| 18-Aug-1998 | 0.00628 | 0.160 | Current meter |
| 09-Sep-1998 | 0.00670 | 0.162 | Current meter |
| 10-Nov-1998 | 0.01474 | 0.188 | Current meter |

ND: No Data

**Figure: 1997 - 1998 Spot Discharge and Daily Discharge in Lower Four Creek**

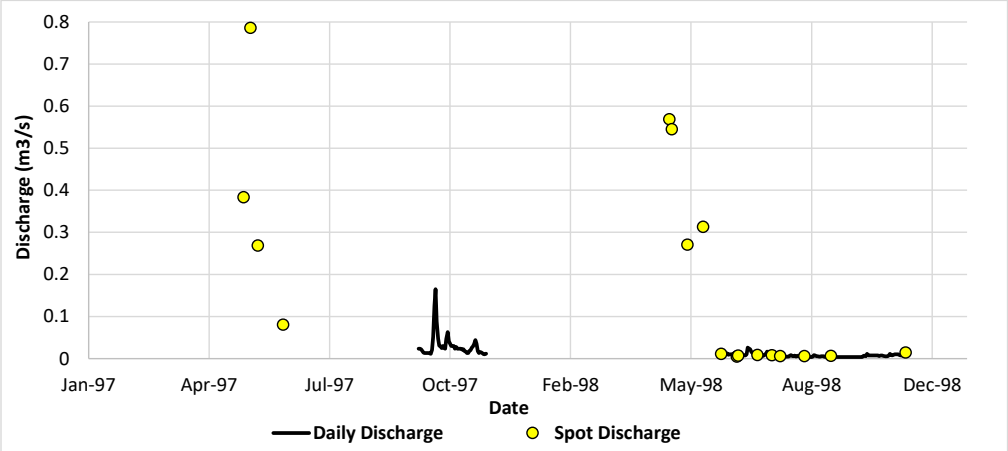


*Table C-3. Goathorn Creek Summary Sheet*

**Description:** Goathorn Creek near Telkwa

| | | | |
|---|---|---|---|
| Site ID: | WSC 08EE008 | Start Date: | 01-Jan-97 |
| Operator: | WATER SURVEY OF CANADA | End Date: | 31-Dec-98 |
| Frequency: | CONTINUOUS | Discharge: | In Stream |
| Monitored: | YES | Water Level: | Level Survey |

**Comments:**

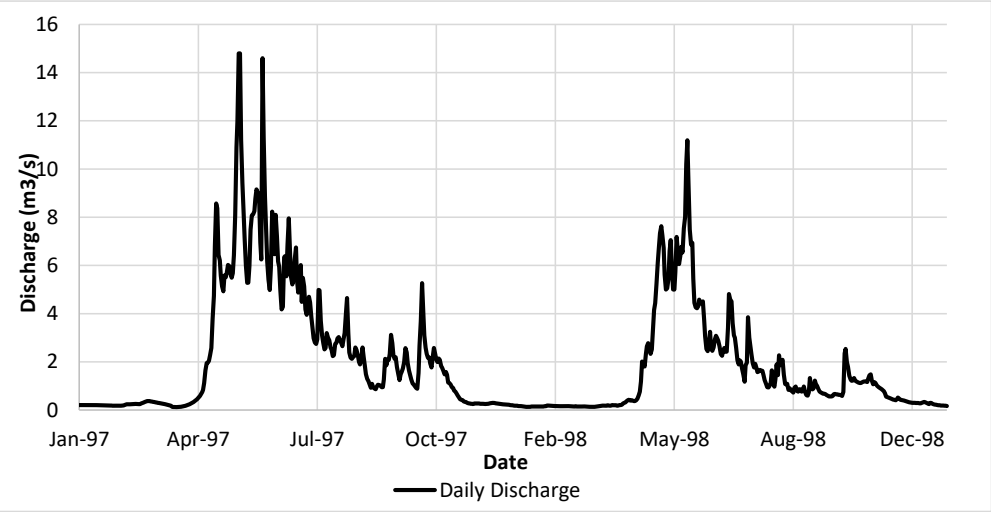
Continuous daily discharge time series generated by WSC.

**1997 and 1998 Spot Measurement Summary**

| Date & Time | Discharge ($m^3/s$) | Staff Gauge (m) | Flow Measurement Method |
|---|---|---|---|
| ND | ND | ND | ND |

ND: No Data (Data provided by Water Survey of Canada)

**Figure: 1997 - 1998 Daily Discharge in Goathorn Creek (WSC 08EE008)**



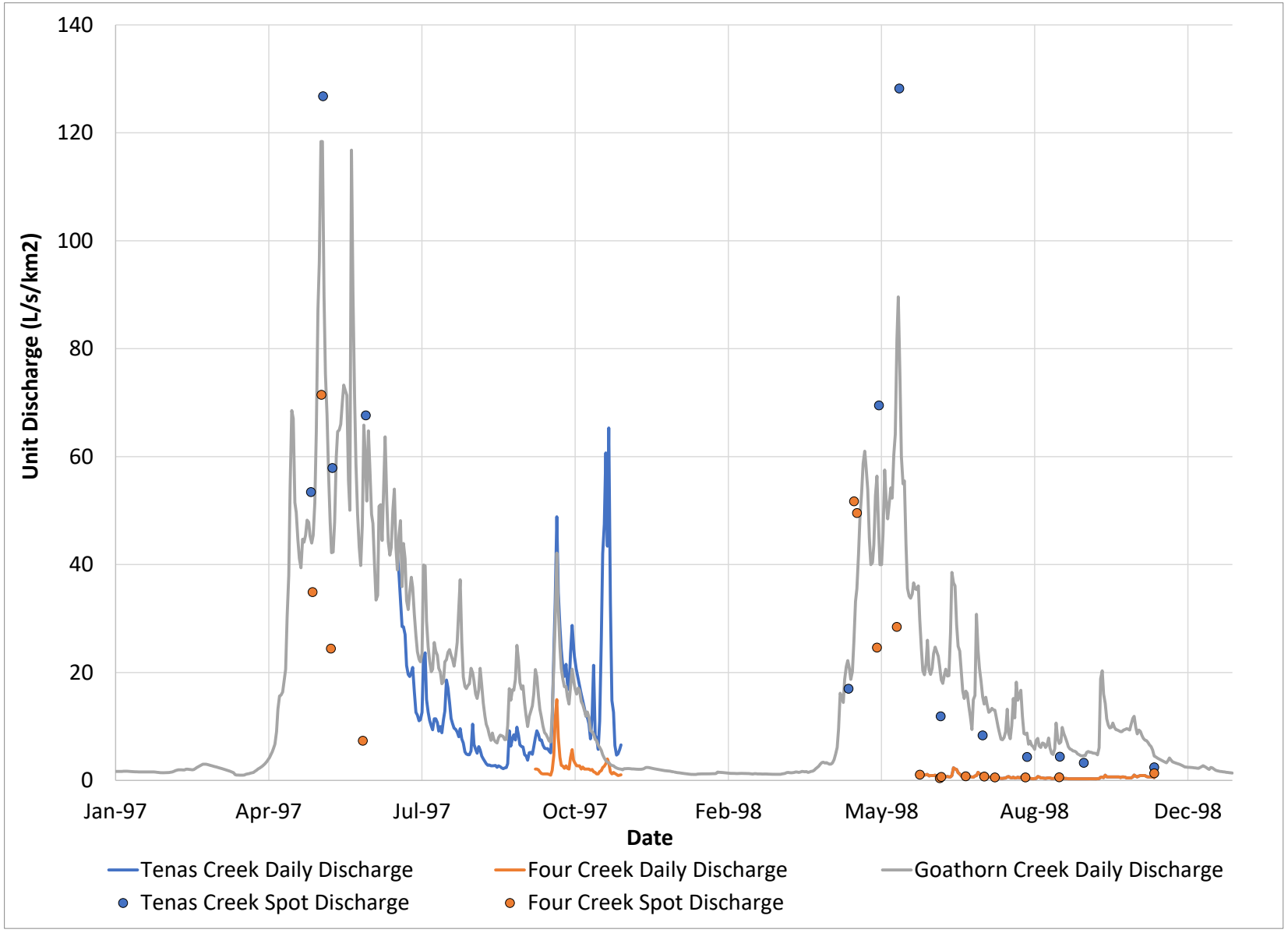



*Figure C-1. Daily and Spot Unit Discharge at Each Station*

*Table C-4. Time Series of Daily Discharge at Each Station*

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 01-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.69 |
| 02-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.69 |
| 03-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.70 |
| 04-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.70 |
| 05-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.70 |
| 06-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.70 |
| 07-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.71 |
| 08-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.22 | 1.72 |
| 09-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.22 | 1.73 |
| 10-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.69 |
| 11-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.67 |
| 12-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.66 |
| 13-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.64 |
| 14-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.62 |
| 15-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.62 |
| 16-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.61 |
| 17-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.61 |
| 18-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.60 |
| 19-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.60 |
| 20-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.60 |
| 21-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.61 |
| 22-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.61 |
| 23-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.60 |
| 24-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.59 |
| 25-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.58 |
| 26-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.58 |
| 27-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.58 |
| 28-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.54 |
| 29-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.50 |
| 30-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.46 |
| 31-Jan-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.45 |
| 01-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.44 |
| 02-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.45 |
| 03-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.46 |
| 04-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.47 |
| 05-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.50 |
| 06-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.52 |
| 07-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.58 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 08-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.70 |
| 09-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.23 | 1.84 |
| 10-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.24 | 1.92 |
| 11-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.25 | 2.00 |
| 12-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.25 | 1.99 |
| 13-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.25 | 1.98 |
| 14-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.25 | 1.98 |
| 15-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.25 | 1.97 |
| 16-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.08 |
| 17-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.08 |
| 18-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.07 |
| 19-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.04 |
| 20-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.25 | 2.00 |
| 21-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.04 |
| 22-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.24 |
| 23-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.40 |
| 24-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.32 | 2.56 |
| 25-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.34 | 2.72 |
| 26-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.36 | 2.88 |
| 27-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.38 | 3.04 |
| 28-Feb-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.38 | 3.04 |
| 01-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.38 | 3.04 |
| 02-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.37 | 2.94 |
| 03-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.36 | 2.88 |
| 04-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.35 | 2.80 |
| 05-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.34 | 2.72 |
| 06-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.33 | 2.64 |
| 07-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.32 | 2.56 |
| 08-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.31 | 2.48 |
| 09-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.40 |
| 10-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.29 | 2.32 |
| 11-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.24 |
| 12-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.16 |
| 13-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.08 |
| 14-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.25 | 1.98 |
| 15-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.24 | 1.90 |
| 16-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.22 | 1.76 |
| 17-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.68 |
| 18-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.60 |
| 19-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.46 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 20-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.14 | 1.10 |
| 21-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.13 | 1.04 |
| 22-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.13 | 1.02 |
| 23-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.12 | 0.99 |
| 24-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.13 | 1.00 |
| 25-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.13 | 1.00 |
| 26-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.13 | 1.04 |
| 27-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.16 |
| 28-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.22 |
| 29-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.26 |
| 30-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.36 |
| 31-Mar-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.44 |
| 01-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.48 |
| 02-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.22 | 1.72 |
| 03-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.24 | 1.88 |
| 04-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.16 |
| 05-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.29 | 2.32 |
| 06-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.31 | 2.48 |
| 07-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.34 | 2.72 |
| 08-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.37 | 2.96 |
| 09-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.41 | 3.28 |
| 10-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.45 | 3.60 |
| 11-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.51 | 4.08 |
| 12-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.56 | 4.48 |
| 13-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.65 | 5.20 |
| 14-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.74 | 5.92 |
| 15-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.84 | 6.74 |
| 16-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 1.13 | 9.04 |
| 17-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 1.65 | 13.20 |
| 18-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 1.96 | 15.68 |
| 19-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 1.98 | 15.84 |
| 20-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 2.05 | 16.40 |
| 21-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 2.29 | 18.32 |
| 22-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 2.58 | 20.64 |
| 23-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 3.80 | 30.40 |
| 24-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 4.75 | 38.00 |
| 25-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.81 | 54.48 |
| 26-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.57 | 68.56 |
| 27-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.38 | 67.04 |
| 28-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.44 | 51.52 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 29-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.21 | 49.68 |
| 30-Apr-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.58 | 44.64 |
| 01-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.14 | 41.12 |
| 02-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 4.93 | 39.44 |
| 03-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.59 | 44.72 |
| 04-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.52 | 44.16 |
| 05-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.68 | 45.44 |
| 06-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.03 | 48.24 |
| 07-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.98 | 47.84 |
| 08-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.66 | 45.28 |
| 09-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.50 | 44.00 |
| 10-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.68 | 45.44 |
| 11-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.43 | 51.44 |
| 12-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.09 | 64.72 |
| 13-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 10.90 | 87.20 |
| 14-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 12.00 | 96.00 |
| 15-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 14.80 | 118.40 |
| 16-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 14.80 | 118.40 |
| 17-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 11.20 | 89.60 |
| 18-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 9.42 | 75.36 |
| 19-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.46 | 67.68 |
| 20-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 7.13 | 57.04 |
| 21-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.99 | 47.92 |
| 22-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.28 | 42.24 |
| 23-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.29 | 42.32 |
| 24-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.99 | 47.92 |
| 25-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 7.49 | 59.92 |
| 26-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.08 | 64.64 |
| 27-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.12 | 64.96 |
| 28-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.25 | 66.00 |
| 29-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.77 | 70.16 |
| 30-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 9.16 | 73.28 |
| 31-May-97 | ND | ND | ND | ND | ND | ND | 0.00 | 9.03 | 72.24 |
| 01-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.92 | 71.36 |
| 02-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.95 | 55.60 |
| 03-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.26 | 50.08 |
| 04-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 14.60 | 116.80 |
| 05-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 11.30 | 90.40 |
| 06-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.87 | 70.96 |
| 07-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 7.33 | 58.64 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 08-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.17 | 49.36 |
| 09-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.41 | 43.28 |
| 10-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 4.98 | 39.84 |
| 11-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.92 | 47.36 |
| 12-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.23 | 65.84 |
| 13-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 7.43 | 59.44 |
| 14-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.47 | 51.76 |
| 15-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 8.10 | 64.80 |
| 16-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 7.20 | 57.60 |
| 17-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.17 | 49.36 |
| 18-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.95 | 47.60 |
| 19-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 4.99 | 39.92 |
| 20-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 4.18 | 33.44 |
| 21-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 4.29 | 34.32 |
| 22-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.35 | 50.80 |
| 23-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.39 | 51.12 |
| 24-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.56 | 44.48 |
| 25-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.86 | 54.88 |
| 26-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 7.96 | 63.68 |
| 27-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.51 | 52.08 |
| 28-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.53 | 44.24 |
| 29-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.22 | 41.76 |
| 30-Jun-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.40 | 43.20 |
| 01-Jul-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.26 | 50.08 |
| 02-Jul-97 | ND | ND | ND | ND | ND | ND | 0.00 | 6.75 | 54.00 |
| 03-Jul-97 | ND | ND | ND | ND | ND | ND | 0.00 | 5.39 | 43.12 |
| 04-Jul-97 | 0.58 | 2.01 | 42.22 | ND | ND | ND | 0.00 | 4.88 | 39.04 |
| 05-Jul-97 | 0.57 | 1.82 | 38.2 | ND | ND | ND | 0.00 | 5.67 | 45.36 |
| 06-Jul-97 | 0.56 | 1.59 | 33.47 | ND | ND | ND | 0.00 | 6.02 | 48.16 |
| 07-Jul-97 | 0.54 | 1.36 | 28.5 | ND | ND | ND | 0.00 | 4.49 | 35.92 |
| 08-Jul-97 | 0.54 | 1.36 | 28.49 | ND | ND | ND | 0.00 | 5.49 | 43.92 |
| 09-Jul-97 | 0.53 | 1.29 | 27.06 | ND | ND | ND | 0.00 | 5.14 | 41.12 |
| 10-Jul-97 | 0.51 | 1.01 | 21.29 | ND | ND | ND | 0.00 | 4.17 | 33.36 |
| 11-Jul-97 | 0.5 | 0.94 | 19.65 | ND | ND | ND | 0.00 | 3.96 | 31.68 |
| 12-Jul-97 | 0.5 | 0.92 | 19.25 | ND | ND | ND | 0.00 | 4.36 | 34.88 |
| 13-Jul-97 | 0.5 | 0.95 | 20 | ND | ND | ND | 0.00 | 4.71 | 37.68 |
| 14-Jul-97 | 0.51 | 1 | 20.98 | ND | ND | ND | 0.00 | 4.47 | 35.76 |
| 15-Jul-97 | 0.49 | 0.79 | 16.53 | ND | ND | ND | 0.00 | 3.86 | 30.88 |
| 16-Jul-97 | 0.46 | 0.6 | 12.63 | ND | ND | ND | 0.00 | 3.36 | 26.88 |
| 17-Jul-97 | 0.46 | 0.58 | 12.11 | ND | ND | ND | 0.00 | 2.98 | 23.84 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 18-Jul-97 | 0.45 | 0.53 | 11.08 | ND | ND | ND | 0.00 | 2.81 | 22.48 |
| 19-Jul-97 | 0.45 | 0.54 | 11.29 | ND | ND | ND | 0.00 | 2.75 | 22.00 |
| 20-Jul-97 | 0.46 | 0.6 | 12.65 | ND | ND | ND | 0.00 | 2.94 | 23.52 |
| 21-Jul-97 | 0.51 | 1.09 | 22.9 | ND | ND | ND | 0.00 | 4.99 | 39.92 |
| 22-Jul-97 | 0.52 | 1.13 | 23.65 | ND | ND | ND | 0.00 | 4.97 | 39.76 |
| 23-Jul-97 | 0.48 | 0.72 | 15.04 | ND | ND | ND | 0.00 | 3.70 | 29.60 |
| 24-Jul-97 | 0.46 | 0.6 | 12.69 | ND | ND | ND | 0.00 | 3.10 | 24.80 |
| 25-Jul-97 | 0.45 | 0.53 | 11.13 | ND | ND | ND | 0.00 | 2.77 | 22.16 |
| 26-Jul-97 | 0.44 | 0.48 | 10.1 | ND | ND | ND | 0.00 | 2.52 | 20.16 |
| 27-Jul-97 | 0.43 | 0.45 | 9.41 | ND | ND | ND | 0.00 | 2.58 | 20.64 |
| 28-Jul-97 | 0.45 | 0.55 | 11.46 | ND | ND | ND | 0.00 | 3.20 | 25.60 |
| 29-Jul-97 | 0.45 | 0.55 | 11.46 | ND | ND | ND | 0.00 | 3.00 | 24.00 |
| 30-Jul-97 | 0.45 | 0.51 | 10.74 | ND | ND | ND | 0.00 | 2.90 | 23.20 |
| 31-Jul-97 | 0.43 | 0.44 | 9.16 | ND | ND | ND | 0.00 | 2.60 | 20.80 |
| 01-Aug-97 | 0.44 | 0.48 | 10.02 | ND | ND | ND | 0.00 | 2.51 | 20.08 |
| 02-Aug-97 | 0.43 | 0.42 | 8.85 | ND | ND | ND | 0.00 | 2.24 | 17.92 |
| 03-Aug-97 | 0.45 | 0.54 | 11.3 | ND | ND | ND | 0.00 | 2.29 | 18.32 |
| 04-Aug-97 | 0.46 | 0.61 | 12.88 | ND | ND | ND | 0.00 | 2.75 | 22.00 |
| 05-Aug-97 | 0.5 | 0.89 | 18.64 | ND | ND | ND | 0.00 | 2.80 | 22.40 |
| 06-Aug-97 | 0.49 | 0.82 | 17.19 | ND | ND | ND | 0.00 | 2.97 | 23.76 |
| 07-Aug-97 | 0.47 | 0.69 | 14.4 | ND | ND | ND | 0.00 | 3.03 | 24.24 |
| 08-Aug-97 | 0.45 | 0.55 | 11.51 | ND | ND | ND | 0.00 | 2.90 | 23.20 |
| 09-Aug-97 | 0.44 | 0.5 | 10.54 | ND | ND | ND | 0.00 | 2.80 | 22.40 |
| 10-Aug-97 | 0.44 | 0.46 | 9.72 | ND | ND | ND | 0.00 | 2.65 | 21.20 |
| 11-Aug-97 | 0.43 | 0.45 | 9.49 | ND | ND | ND | 0.00 | 2.90 | 23.20 |
| 12-Aug-97 | 0.43 | 0.43 | 8.97 | ND | ND | ND | 0.00 | 3.20 | 25.60 |
| 13-Aug-97 | 0.42 | 0.39 | 8.13 | ND | ND | ND | 0.00 | 4.00 | 32.00 |
| 14-Aug-97 | 0.44 | 0.46 | 9.63 | ND | ND | ND | 0.00 | 4.65 | 37.20 |
| 15-Aug-97 | 0.42 | 0.37 | 7.7 | ND | ND | ND | 0.00 | 3.20 | 25.60 |
| 16-Aug-97 | 0.41 | 0.33 | 6.96 | ND | ND | ND | 0.00 | 2.40 | 19.20 |
| 17-Aug-97 | 0.39 | 0.25 | 5.32 | ND | ND | ND | 0.00 | 2.18 | 17.44 |
| 18-Aug-97 | 0.38 | 0.23 | 4.92 | ND | ND | ND | 0.00 | 2.13 | 17.04 |
| 19-Aug-97 | 0.38 | 0.23 | 4.8 | ND | ND | ND | 0.00 | 2.20 | 17.60 |
| 20-Aug-97 | 0.38 | 0.23 | 4.78 | ND | ND | ND | 0.00 | 2.24 | 17.92 |
| 21-Aug-97 | 0.39 | 0.26 | 5.48 | ND | ND | ND | 0.00 | 2.60 | 20.80 |
| 22-Aug-97 | 0.44 | 0.5 | 10.43 | ND | ND | ND | 0.00 | 2.50 | 20.00 |
| 23-Aug-97 | 0.41 | 0.32 | 6.69 | ND | ND | ND | 0.00 | 2.30 | 18.40 |
| 24-Aug-97 | 0.39 | 0.28 | 5.8 | ND | ND | ND | 0.00 | 2.00 | 16.00 |
| 25-Aug-97 | 0.38 | 0.24 | 5.06 | ND | ND | ND | 0.00 | 1.90 | 15.20 |
| 26-Aug-97 | 0.4 | 0.3 | 6.28 | ND | ND | ND | 0.00 | 2.10 | 16.80 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 27-Aug-97 | 0.39 | 0.27 | 5.68 | ND | ND | ND | 0.00 | 2.60 | 20.80 |
| 28-Aug-97 | 0.38 | 0.22 | 4.53 | ND | ND | ND | 0.00 | 2.20 | 17.60 |
| 29-Aug-97 | 0.37 | 0.19 | 4.02 | ND | ND | ND | 0.00 | 1.80 | 14.40 |
| 30-Aug-97 | 0.36 | 0.17 | 3.52 | ND | ND | ND | 0.00 | 1.50 | 12.00 |
| 31-Aug-97 | 0.35 | 0.15 | 3.12 | ND | ND | ND | 0.00 | 1.30 | 10.40 |
| 01-Sep-97 | 0.34 | 0.13 | 2.81 | ND | ND | ND | 0.00 | 1.20 | 9.60 |
| 02-Sep-97 | 0.34 | 0.14 | 2.88 | ND | ND | ND | 0.00 | 1.05 | 8.40 |
| 03-Sep-97 | 0.34 | 0.13 | 2.74 | ND | ND | ND | 0.00 | 0.93 | 7.44 |
| 04-Sep-97 | 0.34 | 0.13 | 2.72 | ND | ND | ND | 0.00 | 1.10 | 8.80 |
| 05-Sep-97 | 0.34 | 0.13 | 2.76 | ND | ND | ND | 0.00 | 0.95 | 7.60 |
| 06-Sep-97 | 0.34 | 0.13 | 2.78 | ND | ND | ND | 0.00 | 0.90 | 7.20 |
| 07-Sep-97 | 0.33 | 0.12 | 2.45 | ND | ND | ND | 0.00 | 0.87 | 6.96 |
| 08-Sep-97 | 0.34 | 0.13 | 2.73 | ND | ND | ND | 0.00 | 0.99 | 7.94 |
| 09-Sep-97 | 0.34 | 0.12 | 2.55 | ND | ND | ND | 0.00 | 1.05 | 8.40 |
| 10-Sep-97 | 0.33 | 0.11 | 2.36 | ND | ND | ND | 0.00 | 1.04 | 8.32 |
| 11-Sep-97 | 0.33 | 0.11 | 2.21 | ND | ND | ND | 0.00 | 1.02 | 8.16 |
| 12-Sep-97 | 0.33 | 0.11 | 2.34 | ND | ND | ND | 0.00 | 0.95 | 7.60 |
| 13-Sep-97 | 0.33 | 0.11 | 2.38 | ND | ND | ND | 0.00 | 0.95 | 7.62 |
| 14-Sep-97 | 0.35 | 0.15 | 3.14 | ND | ND | ND | 0.00 | 1.27 | 10.16 |
| 15-Sep-97 | 0.43 | 0.44 | 9.23 | ND | ND | ND | 0.00 | 2.13 | 17.04 |
| 16-Sep-97 | 0.4 | 0.3 | 6.38 | ND | ND | ND | 0.00 | 1.86 | 14.88 |
| 17-Sep-97 | 0.42 | 0.37 | 7.76 | ND | ND | ND | 0.00 | 2.10 | 16.80 |
| 18-Sep-97 | 0.43 | 0.4 | 8.48 | ND | ND | ND | 0.00 | 2.09 | 16.72 |
| 19-Sep-97 | 0.42 | 0.36 | 7.51 | ND | ND | ND | 0.00 | 2.34 | 18.72 |
| 20-Sep-97 | 0.44 | 0.47 | 9.87 | ND | ND | ND | 0.00 | 3.13 | 25.04 |
| 21-Sep-97 | 0.42 | 0.4 | 8.38 | ND | ND | ND | 0.00 | 2.78 | 22.24 |
| 22-Sep-97 | 0.4 | 0.31 | 6.6 | ND | ND | ND | 0.00 | 2.27 | 18.16 |
| 23-Sep-97 | 0.4 | 0.3 | 6.33 | ND | ND | ND | 0.00 | 2.12 | 16.96 |
| 24-Sep-97 | 0.4 | 0.3 | 6.23 | ND | ND | ND | 0.00 | 2.19 | 17.52 |
| 25-Sep-97 | 0.38 | 0.23 | 4.75 | ND | ND | ND | 0.00 | 1.78 | 14.24 |
| 26-Sep-97 | 0.38 | 0.22 | 4.6 | ND | ND | ND | 0.00 | 1.51 | 12.08 |
| 27-Sep-97 | 0.36 | 0.18 | 3.76 | ND | ND | ND | 0.00 | 1.25 | 10.00 |
| 28-Sep-97 | 0.38 | 0.24 | 5.14 | ND | ND | ND | 0.00 | 1.49 | 11.92 |
| 29-Sep-97 | 0.39 | 0.25 | 5.22 | ND | ND | ND | 0.00 | 1.60 | 12.80 |
| 30-Sep-97 | 0.38 | 0.23 | 4.86 | ND | ND | ND | 0.00 | 1.73 | 13.84 |
| 01-Oct-97 | 0.4 | 0.3 | 6.21 | ND | ND | ND | 0.00 | 2.00 | 16.00 |
| 02-Oct-97 | 0.42 | 0.38 | 7.94 | 0.21 | 0.02 | 2.12 | 0.00 | 2.57 | 20.56 |
| 03-Oct-97 | 0.43 | 0.44 | 9.21 | 0.21 | 0.02 | 2.12 | 0.00 | 2.40 | 19.20 |
| 04-Oct-97 | 0.43 | 0.41 | 8.56 | 0.2 | 0.02 | 1.99 | 0.00 | 1.96 | 15.68 |
| 05-Oct-97 | 0.41 | 0.36 | 7.48 | 0.2 | 0.02 | 1.63 | 0.00 | 1.65 | 13.20 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 06-Oct-97 | 0.42 | 0.36 | 7.51 | 0.19 | 0.01 | 1.28 | 0.00 | 1.46 | 11.68 |
| 07-Oct-97 | 0.4 | 0.31 | 6.55 | 0.19 | 0.01 | 1.23 | 0.00 | 1.26 | 10.08 |
| 08-Oct-97 | 0.4 | 0.29 | 5.99 | 0.19 | 0.01 | 1.23 | 0.00 | 1.11 | 8.88 |
| 09-Oct-97 | 0.4 | 0.28 | 5.9 | 0.19 | 0.01 | 1.23 | 0.00 | 1.07 | 8.56 |
| 10-Oct-97 | 0.4 | 0.28 | 5.92 | 0.19 | 0.01 | 1.23 | 0.00 | 0.99 | 7.92 |
| 11-Oct-97 | 0.39 | 0.26 | 5.49 | 0.18 | 0.01 | 1.11 | 0.00 | 0.92 | 7.34 |
| 12-Oct-97 | 0.38 | 0.24 | 5.12 | 0.18 | 0.01 | 1.01 | 0.00 | 0.89 | 7.15 |
| 13-Oct-97 | 0.44 | 0.54 | 11.38 | 0.2 | 0.02 | 1.89 | 0.00 | 1.55 | 12.40 |
| 14-Oct-97 | 0.52 | 1.13 | 23.72 | 0.24 | 0.05 | 4.67 | 0.00 | 2.68 | 21.44 |
| 15-Oct-97 | 0.55 | 1.57 | 33.06 | 0.28 | 0.13 | 11.39 | 0.00 | 3.69 | 29.52 |
| 16-Oct-97 | 0.6 | 2.33 | 48.89 | 0.3 | 0.16 | 14.99 | 0.00 | 5.27 | 42.16 |
| 17-Oct-97 | 0.56 | 1.66 | 34.87 | 0.26 | 0.09 | 7.99 | 0.00 | 4.00 | 32.00 |
| 18-Oct-97 | 0.54 | 1.36 | 28.52 | 0.23 | 0.05 | 4.31 | 0.00 | 3.10 | 24.80 |
| 19-Oct-97 | 0.52 | 1.15 | 24.21 | 0.22 | 0.03 | 2.82 | 0.00 | 2.59 | 20.72 |
| 20-Oct-97 | 0.51 | 0.99 | 20.74 | 0.21 | 0.03 | 2.65 | 0.00 | 2.34 | 18.72 |
| 21-Oct-97 | 0.5 | 0.92 | 19.31 | 0.21 | 0.02 | 2.27 | 0.00 | 2.17 | 17.36 |
| 22-Oct-97 | 0.51 | 1.03 | 21.54 | 0.22 | 0.03 | 2.72 | 0.00 | 2.18 | 17.44 |
| 23-Oct-97 | 0.49 | 0.86 | 18.05 | 0.21 | 0.02 | 2.27 | 0.00 | 1.94 | 15.52 |
| 24-Oct-97 | 0.49 | 0.8 | 16.85 | 0.21 | 0.02 | 2.12 | 0.00 | 1.77 | 14.16 |
| 25-Oct-97 | 0.52 | 1.12 | 23.57 | 0.23 | 0.05 | 4.26 | 0.00 | 2.17 | 17.36 |
| 26-Oct-97 | 0.54 | 1.37 | 28.73 | 0.25 | 0.06 | 5.73 | 0.00 | 2.58 | 20.64 |
| 27-Oct-97 | 0.53 | 1.19 | 25.1 | 0.23 | 0.04 | 3.76 | 0.00 | 2.33 | 18.64 |
| 28-Oct-97 | 0.52 | 1.06 | 22.33 | 0.22 | 0.04 | 3.19 | 0.00 | 2.12 | 16.96 |
| 29-Oct-97 | 0.5 | 0.96 | 20.14 | 0.22 | 0.03 | 2.72 | 0.00 | 2.00 | 16.00 |
| 30-Oct-97 | 0.5 | 0.88 | 18.52 | 0.22 | 0.03 | 2.72 | 0.00 | 2.14 | 17.12 |
| 31-Oct-97 | 0.49 | 0.83 | 17.35 | 0.22 | 0.03 | 2.72 | 0.00 | 2.08 | 16.64 |
| 01-Nov-97 | 0.48 | 0.77 | 16.14 | 0.21 | 0.02 | 2.14 | 0.00 | 1.83 | 14.64 |
| 02-Nov-97 | 0.48 | 0.71 | 14.98 | 0.21 | 0.03 | 2.5 | 0.00 | 1.76 | 14.08 |
| 03-Nov-97 | 0.47 | 0.64 | 13.46 | 0.21 | 0.02 | 2.12 | 0.00 | 1.63 | 13.04 |
| 04-Nov-97 | 0.46 | 0.57 | 11.95 | 0.21 | 0.02 | 2.12 | 0.00 | 1.49 | 11.92 |
| 05-Nov-97 | 0.45 | 0.56 | 11.73 | 0.21 | 0.02 | 2.12 | 0.00 | 1.59 | 12.72 |
| 06-Nov-97 | 0.44 | 0.5 | 10.49 | 0.21 | 0.02 | 2.12 | 0.00 | 1.47 | 11.76 |
| 07-Nov-97 | 0.42 | 0.37 | 7.72 | 0.2 | 0.02 | 1.93 | 0.00 | 1.15 | 9.20 |
| 08-Nov-97 | 0.45 | 0.57 | 11.93 | 0.2 | 0.02 | 2.06 | 0.00 | 1.13 | 9.04 |
| 09-Nov-97 | 0.51 | 1.02 | 21.37 | 0.2 | 0.02 | 1.63 | 0.00 | 1.07 | 8.56 |
| 10-Nov-97 | 0.42 | 0.4 | 8.35 | 0.19 | 0.02 | 1.51 | 0.00 | 0.95 | 7.62 |
| 11-Nov-97 | 0.42 | 0.37 | 7.87 | 0.19 | 0.01 | 1.23 | 0.00 | 0.92 | 7.39 |
| 12-Nov-97 | 0.39 | 0.28 | 5.79 | 0.19 | 0.01 | 1.23 | 0.00 | 0.82 | 6.56 |
| 13-Nov-97 | 0.44 | 0.52 | 11.01 | 0.2 | 0.02 | 1.66 | 0.00 | 0.77 | 6.16 |
| 14-Nov-97 | 0.53 | 1.25 | 26.19 | 0.2 | 0.02 | 1.81 | 0.00 | 0.70 | 5.60 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 15-Nov-97 | 0.58 | 2 | 42.02 | 0.21 | 0.03 | 2.38 | 0.00 | 0.60 | 4.80 |
| 16-Nov-97 | 0.6 | 2.26 | 47.52 | 0.21 | 0.03 | 2.67 | 0.00 | 0.52 | 4.16 |
| 17-Nov-97 | 0.63 | 2.89 | 60.68 | 0.22 | 0.03 | 3.13 | 0.00 | 0.46 | 3.68 |
| 18-Nov-97 | 0.59 | 2.07 | 43.43 | 0.23 | 0.04 | 4 | 0.00 | 0.43 | 3.44 |
| 19-Nov-97 | 0.64 | 3.11 | 65.32 | 0.22 | 0.04 | 3.26 | 0.00 | 0.42 | 3.32 |
| 20-Nov-97 | 0.55 | 1.57 | 32.98 | 0.19 | 0.02 | 1.6 | 0.00 | 0.37 | 2.96 |
| 21-Nov-97 | 0.47 | 0.71 | 14.83 | 0.19 | 0.01 | 1.23 | 0.00 | 0.35 | 2.80 |
| 22-Nov-97 | 0.46 | 0.6 | 12.66 | 0.19 | 0.02 | 1.48 | 0.00 | 0.34 | 2.72 |
| 23-Nov-97 | 0.4 | 0.31 | 6.49 | 0.19 | 0.01 | 1.31 | 0.00 | 0.31 | 2.48 |
| 24-Nov-97 | 0.38 | 0.23 | 4.73 | 0.18 | 0.01 | 1.13 | 0.00 | 0.29 | 2.32 |
| 25-Nov-97 | 0.38 | 0.24 | 4.95 | 0.18 | 0.01 | 0.92 | 0.00 | 0.28 | 2.24 |
| 26-Nov-97 | 0.39 | 0.27 | 5.71 | 0.18 | 0.01 | 1 | 0.00 | 0.27 | 2.16 |
| 27-Nov-97 | 0.96 | 0.32 | 6.63 | 0.18 | 0.01 | 1.05 | 0.00 | 0.26 | 2.08 |
| 28-Nov-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.25 | 2.00 |
| 29-Nov-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.20 |
| 30-Nov-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.20 |
| 01-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.22 |
| 02-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.24 |
| 03-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.20 |
| 04-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.16 |
| 05-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.16 |
| 06-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.14 |
| 07-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.10 |
| 08-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.08 |
| 09-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.07 |
| 10-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.10 |
| 11-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.14 |
| 12-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.24 |
| 13-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.40 |
| 14-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.31 | 2.44 |
| 15-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.40 |
| 16-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.29 | 2.34 |
| 17-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.29 | 2.30 |
| 18-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.24 |
| 19-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.17 |
| 20-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.08 |
| 21-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.06 |
| 22-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.25 | 2.00 |
| 23-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.24 | 1.94 |
| 24-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.24 | 1.92 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 25-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.24 | 1.90 |
| 26-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.23 | 1.84 |
| 27-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.22 | 1.78 |
| 28-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.22 | 1.76 |
| 29-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.22 | 1.74 |
| 30-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.66 |
| 31-Dec-97 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.62 |
| 01-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.55 |
| 02-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.50 |
| 03-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.46 |
| 04-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.42 |
| 05-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.38 |
| 06-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.35 |
| 07-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.31 |
| 08-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.26 |
| 09-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.23 |
| 10-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.19 |
| 11-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.16 |
| 12-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.14 | 1.15 |
| 13-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.14 | 1.14 |
| 14-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.14 | 1.14 |
| 15-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.14 | 1.14 |
| 16-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 17-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.21 |
| 18-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.22 |
| 19-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.23 |
| 20-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.24 |
| 21-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.25 |
| 22-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.24 |
| 23-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.25 |
| 24-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.24 |
| 25-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.24 |
| 26-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.26 |
| 27-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.26 |
| 28-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.28 |
| 29-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.58 |
| 30-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.54 |
| 31-Jan-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.52 |
| 01-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.48 |
| 02-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.44 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 03-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.42 |
| 04-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.39 |
| 05-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.38 |
| 06-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.36 |
| 07-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.34 |
| 08-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.34 |
| 09-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.32 |
| 10-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.31 |
| 11-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.30 |
| 12-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.30 |
| 13-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.31 |
| 14-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.34 |
| 15-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.36 |
| 16-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.34 |
| 17-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.30 |
| 18-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.28 |
| 19-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.26 |
| 20-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.23 |
| 21-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.21 |
| 22-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.26 |
| 23-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.25 |
| 24-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.23 |
| 25-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.22 |
| 26-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.22 |
| 27-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.21 |
| 28-Feb-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.20 |
| 01-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 02-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 03-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 04-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 05-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 06-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 07-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 08-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 09-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 10-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 11-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.18 |
| 12-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.15 | 1.22 |
| 13-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.16 | 1.26 |
| 14-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.17 | 1.33 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 15-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.47 |
| 16-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.49 |
| 17-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.47 |
| 18-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.42 |
| 19-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.46 |
| 20-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.50 |
| 21-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.60 |
| 22-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.55 |
| 23-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.48 |
| 24-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.58 |
| 25-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.69 |
| 26-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.66 |
| 27-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.63 |
| 28-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.65 |
| 29-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.49 |
| 30-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.56 |
| 31-Mar-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.68 |
| 01-Apr-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.22 | 1.74 |
| 02-Apr-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.24 | 1.89 |
| 03-Apr-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.19 |
| 04-Apr-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.41 |
| 05-Apr-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.33 | 2.65 |
| 06-Apr-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.38 | 3.02 |
| 07-Apr-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.42 | 3.33 |
| 08-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.42 | 3.39 |
| 09-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.40 | 3.22 |
| 10-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.42 | 3.32 |
| 11-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.39 | 3.15 |
| 12-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.38 | 3.03 |
| 13-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.38 | 3.05 |
| 14-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.41 | 3.27 |
| 15-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.48 | 3.86 |
| 16-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.61 | 4.87 |
| 17-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 0.77 | 6.13 |
| 18-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 1.19 | 9.52 |
| 19-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 2.02 | 16.16 |
| 20-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 1.94 | 15.52 |
| 21-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 1.81 | 14.48 |
| 22-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 2.34 | 18.72 |
| 23-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 2.64 | 21.12 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 24-Apr-98 | 0.46 | 0.6 | 12.61 | ND | ND | ND | 0.00 | 2.78 | 22.24 |
| 25-Apr-98 | 0.47 | 0.66 | 13.88 | ND | ND | ND | 0.00 | 2.59 | 20.72 |
| 26-Apr-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 2.34 | 18.72 |
| 27-Apr-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 2.52 | 20.16 |
| 28-Apr-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 3.22 | 25.76 |
| 29-Apr-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 4.15 | 33.20 |
| 30-Apr-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 4.44 | 35.52 |
| 01-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 5.23 | 41.84 |
| 02-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 6.11 | 48.88 |
| 03-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 6.66 | 53.28 |
| 04-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 7.34 | 58.72 |
| 05-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 7.63 | 61.04 |
| 06-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 7.25 | 58.00 |
| 07-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 6.74 | 53.92 |
| 08-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 5.62 | 44.96 |
| 09-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 5.00 | 40.00 |
| 10-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 5.05 | 40.40 |
| 11-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 5.46 | 43.68 |
| 12-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 6.60 | 52.80 |
| 13-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 7.05 | 56.40 |
| 14-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 5.85 | 46.80 |
| 15-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 5.00 | 40.00 |
| 16-May-98 | 0.47 | 0.67 | 14.06 | ND | ND | ND | 0.00 | 5.00 | 40.00 |
| 17-May-98 | 0.47 | 0.68 | 14.26 | ND | ND | ND | 0.00 | 5.73 | 45.84 |
| 18-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 7.19 | 57.52 |
| 19-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 6.52 | 52.16 |
| 20-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 6.06 | 48.48 |
| 21-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 6.40 | 51.20 |
| 22-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 6.78 | 54.24 |
| 23-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 6.54 | 52.32 |
| 24-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 7.54 | 60.32 |
| 25-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 8.02 | 64.16 |
| 26-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 10.20 | 81.60 |
| 27-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 11.20 | 89.60 |
| 28-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 9.42 | 75.36 |
| 29-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 7.50 | 60.00 |
| 30-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 6.87 | 54.96 |
| 31-May-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 6.94 | 55.52 |
| 01-Jun-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 5.46 | 43.68 |
| 02-Jun-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 4.45 | 35.60 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 03-Jun-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 4.27 | 34.16 |
| 04-Jun-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 4.22 | 33.76 |
| 05-Jun-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 4.32 | 34.56 |
| 06-Jun-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 4.58 | 36.64 |
| 07-Jun-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 4.44 | 35.52 |
| 08-Jun-98 | 0.48 | 0.74 | 15.64 | ND | ND | ND | 0.00 | 4.42 | 35.36 |
| 09-Jun-98 | 0.43 | 0.48 | 10.13 | ND | ND | ND | 0.00 | 4.51 | 36.08 |
| 10-Jun-98 | 0.38 | 0.24 | 5.06 | 0.19 | 0.02 | 1.54 | 0.00 | 3.74 | 29.92 |
| 11-Jun-98 | 0.37 | 0.2 | 4.3 | 0.19 | 0.01 | 1.23 | 0.00 | 3.07 | 24.56 |
| 12-Jun-98 | 0.37 | 0.19 | 4.04 | 0.18 | 0.01 | 1.09 | 0.00 | 2.54 | 20.32 |
| 13-Jun-98 | 0.37 | 0.21 | 4.33 | 0.18 | 0.01 | 1.01 | 0.00 | 2.45 | 19.60 |
| 14-Jun-98 | 0.38 | 0.23 | 4.75 | 0.18 | 0.01 | 1.1 | 0.00 | 2.71 | 21.68 |
| 15-Jun-98 | 0.36 | 0.18 | 3.75 | 0.18 | 0.01 | 1.11 | 0.00 | 3.25 | 26.00 |
| 16-Jun-98 | 0.36 | 0.17 | 3.66 | 0.17 | 0.01 | 0.85 | 0.00 | 2.56 | 20.48 |
| 17-Jun-98 | 0.36 | 0.18 | 3.88 | 0.18 | 0.01 | 0.92 | 0.00 | 2.46 | 19.68 |
| 18-Jun-98 | 0.37 | 0.2 | 4.2 | 0.18 | 0.01 | 0.92 | 0.00 | 2.60 | 20.80 |
| 19-Jun-98 | 0.36 | 0.19 | 3.91 | 0.18 | 0.01 | 0.92 | 0.00 | 2.94 | 23.52 |
| 20-Jun-98 | 0.36 | 0.17 | 3.66 | 0.18 | 0.01 | 1.01 | 0.00 | 3.09 | 24.72 |
| 21-Jun-98 | 0.36 | 0.16 | 3.45 | 0.17 | 0.01 | 0.85 | 0.00 | 2.99 | 23.92 |
| 22-Jun-98 | 0.36 | 0.16 | 3.45 | 0.17 | 0.01 | 0.78 | 0.00 | 2.88 | 23.04 |
| 23-Jun-98 | 0.26 | 0.04 | 0.78 | 0.17 | 0.01 | 0.67 | 0.00 | 2.64 | 21.12 |
| 24-Jun-98 | ND | ND | ND | 0.17 | 0.01 | 0.67 | 0.00 | 2.33 | 18.64 |
| 25-Jun-98 | ND | ND | ND | 0.17 | 0.01 | 0.67 | 0.00 | 2.25 | 18.00 |
| 26-Jun-98 | ND | ND | ND | 0.17 | 0.01 | 0.67 | 0.00 | 2.45 | 19.60 |
| 27-Jun-98 | ND | ND | ND | 0.17 | 0.01 | 0.67 | 0.00 | 2.58 | 20.64 |
| 28-Jun-98 | ND | ND | ND | 0.17 | 0.01 | 0.77 | 0.00 | 2.42 | 19.36 |
| 29-Jun-98 | ND | ND | ND | 0.17 | 0.01 | 0.67 | 0.00 | 2.43 | 19.44 |
| 30-Jun-98 | ND | ND | ND | 0.17 | 0.01 | 0.67 | 0.00 | 3.42 | 27.36 |
| 01-Jul-98 | ND | ND | ND | 0.18 | 0.01 | 0.95 | 0.00 | 4.82 | 38.56 |
| 02-Jul-98 | ND | ND | ND | 0.21 | 0.03 | 2.36 | 0.00 | 4.58 | 36.64 |
| 03-Jul-98 | ND | ND | ND | 0.21 | 0.02 | 2.17 | 0.00 | 4.51 | 36.08 |
| 04-Jul-98 | ND | ND | ND | 0.2 | 0.02 | 2.06 | 0.00 | 3.61 | 28.88 |
| 05-Jul-98 | ND | ND | ND | 0.19 | 0.02 | 1.48 | 0.00 | 3.11 | 24.88 |
| 06-Jul-98 | ND | ND | ND | 0.18 | 0.01 | 1.2 | 0.00 | 3.00 | 24.00 |
| 07-Jul-98 | ND | ND | ND | 0.18 | 0.01 | 0.92 | 0.00 | 2.58 | 20.64 |
| 08-Jul-98 | ND | ND | ND | 0.17 | 0.01 | 0.69 | 0.00 | 2.07 | 16.56 |
| 09-Jul-98 | ND | ND | ND | 0.17 | 0.01 | 0.68 | 0.00 | 1.90 | 15.20 |
| 10-Jul-98 | ND | ND | ND | 0.17 | 0.01 | 0.67 | 0.00 | 2.07 | 16.56 |
| 11-Jul-98 | ND | ND | ND | 0.17 | 0.01 | 0.82 | 0.00 | 2.02 | 16.16 |
| 12-Jul-98 | ND | ND | ND | 0.16 | 0.01 | 0.67 | 0.00 | 1.72 | 13.76 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 13-Jul-98 | 0.27 | 0.04 | 0.86 | 0.17 | 0.01 | 0.69 | 0.00 | 1.48 | 11.84 |
| 14-Jul-98 | 0.28 | 0.04 | 0.94 | 0.16 | 0.01 | 0.67 | 0.00 | 1.18 | 9.44 |
| 15-Jul-98 | 0.28 | 0.05 | 0.98 | 0.16 | 0.01 | 0.59 | 0.00 | 1.87 | 14.96 |
| 16-Jul-98 | 0.31 | 0.08 | 1.72 | 0.17 | 0.01 | 0.87 | 0.00 | 1.97 | 15.76 |
| 17-Jul-98 | 0.29 | 0.06 | 1.21 | 0.17 | 0.01 | 0.89 | 0.00 | 3.85 | 30.80 |
| 18-Jul-98 | 0.28 | 0.05 | 1.08 | 0.19 | 0.02 | 1.52 | 0.00 | 3.01 | 24.08 |
| 19-Jul-98 | 0.28 | 0.05 | 1.01 | 0.19 | 0.01 | 1.23 | 0.00 | 2.60 | 20.80 |
| 20-Jul-98 | 0.27 | 0.04 | 0.91 | 0.18 | 0.01 | 1.15 | 0.00 | 2.30 | 18.40 |
| 21-Jul-98 | 0.27 | 0.04 | 0.86 | 0.17 | 0.01 | 0.86 | 0.00 | 1.94 | 15.52 |
| 22-Jul-98 | 0.27 | 0.04 | 0.87 | 0.17 | 0.01 | 0.74 | 0.00 | 1.77 | 14.16 |
| 23-Jul-98 | 0.27 | 0.04 | 0.84 | 0.17 | 0.01 | 0.67 | 0.00 | 1.93 | 15.44 |
| 24-Jul-98 | 0.27 | 0.04 | 0.81 | 0.16 | 0.01 | 0.67 | 0.00 | 1.75 | 14.00 |
| 25-Jul-98 | 0.27 | 0.04 | 0.79 | 0.16 | 0.01 | 0.67 | 0.00 | 1.58 | 12.64 |
| 26-Jul-98 | 0.26 | 0.04 | 0.76 | 0.16 | 0.01 | 0.59 | 0.00 | 1.61 | 12.88 |
| 27-Jul-98 | 0.26 | 0.03 | 0.72 | 0.16 | 0.01 | 0.57 | 0.00 | 1.67 | 13.36 |
| 28-Jul-98 | 0.26 | 0.03 | 0.71 | 0.16 | 0.01 | 0.59 | 0.00 | 1.64 | 13.12 |
| 29-Jul-98 | 0.26 | 0.03 | 0.7 | 0.16 | 0.01 | 0.58 | 0.00 | 1.63 | 13.04 |
| 30-Jul-98 | 0.26 | 0.03 | 0.66 | 0.16 | 0.01 | 0.57 | 0.00 | 1.45 | 11.60 |
| 31-Jul-98 | 0.26 | 0.03 | 0.65 | 0.16 | 0.01 | 0.49 | 0.00 | 1.25 | 10.00 |
| 01-Aug-98 | 0.25 | 0.03 | 0.62 | 0.15 | 0 | 0.45 | 0.00 | 1.11 | 8.88 |
| 02-Aug-98 | 0.25 | 0.03 | 0.62 | 0.15 | 0 | 0.39 | 0.00 | 0.96 | 7.66 |
| 03-Aug-98 | 0.25 | 0.03 | 0.6 | 0.15 | 0 | 0.4 | 0.00 | 0.94 | 7.55 |
| 04-Aug-98 | 0.26 | 0.03 | 0.64 | 0.15 | 0 | 0.45 | 0.00 | 1.00 | 7.99 |
| 05-Aug-98 | 0.27 | 0.04 | 0.82 | 0.15 | 0.01 | 0.46 | 0.00 | 1.14 | 9.12 |
| 06-Aug-98 | 0.26 | 0.03 | 0.7 | 0.16 | 0.01 | 0.65 | 0.00 | 1.65 | 13.20 |
| 07-Aug-98 | 0.26 | 0.03 | 0.69 | 0.17 | 0.01 | 0.72 | 0.00 | 1.09 | 8.72 |
| 08-Aug-98 | 0.26 | 0.03 | 0.71 | 0.16 | 0.01 | 0.57 | 0.00 | 0.97 | 7.75 |
| 09-Aug-98 | 0.26 | 0.03 | 0.69 | 0.16 | 0.01 | 0.5 | 0.00 | 1.27 | 10.16 |
| 10-Aug-98 | 0.25 | 0.03 | 0.64 | 0.16 | 0.01 | 0.63 | 0.00 | 1.90 | 15.20 |
| 11-Aug-98 | 0.27 | 0.04 | 0.84 | 0.15 | 0.01 | 0.47 | 0.00 | 1.45 | 11.60 |
| 12-Aug-98 | 0.26 | 0.03 | 0.71 | 0.15 | 0.01 | 0.49 | 0.00 | 2.28 | 18.24 |
| 13-Aug-98 | 0.26 | 0.04 | 0.77 | 0.16 | 0.01 | 0.62 | 0.00 | 1.86 | 14.88 |
| 14-Aug-98 | 0.27 | 0.04 | 0.8 | 0.16 | 0.01 | 0.49 | 0.00 | 1.98 | 15.84 |
| 15-Aug-98 | 0.26 | 0.03 | 0.71 | 0.16 | 0.01 | 0.62 | 0.00 | 2.09 | 16.72 |
| 16-Aug-98 | 0.26 | 0.03 | 0.71 | 0.17 | 0.01 | 0.68 | 0.00 | 1.48 | 11.84 |
| 17-Aug-98 | 0.26 | 0.03 | 0.7 | 0.16 | 0.01 | 0.57 | 0.00 | 1.09 | 8.72 |
| 18-Aug-98 | 0.31 | 0.1 | 2.13 | 0.16 | 0.01 | 0.48 | 0.00 | 1.07 | 8.56 |
| 19-Aug-98 | 0.35 | 0.15 | 3.23 | 0.15 | 0.01 | 0.48 | 0.00 | 1.10 | 8.80 |
| 20-Aug-98 | 0.35 | 0.16 | 3.29 | 0.15 | 0 | 0.42 | 0.00 | 0.84 | 6.72 |
| 21-Aug-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.41 | 0.00 | 0.92 | 7.33 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 22-Aug-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.37 | 0.00 | 0.81 | 6.50 |
| 23-Aug-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.34 | 0.00 | 0.79 | 6.31 |
| 24-Aug-98 | 0.36 | 0.17 | 3.62 | 0.15 | 0 | 0.36 | 0.00 | 0.73 | 5.80 |
| 25-Aug-98 | 0.36 | 0.18 | 3.73 | 0.15 | 0 | 0.39 | 0.00 | 0.93 | 7.43 |
| 26-Aug-98 | 0.35 | 0.15 | 3.17 | 0.17 | 0.01 | 0.72 | 0.00 | 0.98 | 7.82 |
| 27-Aug-98 | 0.35 | 0.16 | 3.37 | 0.16 | 0.01 | 0.67 | 0.00 | 0.80 | 6.42 |
| 28-Aug-98 | 0.36 | 0.17 | 3.54 | 0.16 | 0.01 | 0.48 | 0.00 | 0.77 | 6.14 |
| 29-Aug-98 | 0.35 | 0.16 | 3.33 | 0.16 | 0.01 | 0.48 | 0.00 | 0.87 | 6.96 |
| 30-Aug-98 | 0.35 | 0.15 | 3.23 | 0.15 | 0 | 0.44 | 0.00 | 0.86 | 6.86 |
| 31-Aug-98 | 0.35 | 0.16 | 3.35 | 0.15 | 0 | 0.41 | 0.00 | 0.76 | 6.11 |
| 01-Sep-98 | 0.36 | 0.17 | 3.47 | 0.15 | 0.01 | 0.48 | 0.00 | 0.82 | 6.56 |
| 02-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0.01 | 0.48 | 0.00 | 0.99 | 7.90 |
| 03-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0.01 | 0.48 | 0.00 | 0.75 | 6.02 |
| 04-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.37 | 0.00 | 0.63 | 5.02 |
| 05-Sep-98 | 0.36 | 0.16 | 3.47 | 0.15 | 0 | 0.38 | 0.00 | 0.60 | 4.82 |
| 06-Sep-98 | 0.36 | 0.18 | 3.69 | 0.15 | 0 | 0.42 | 0.00 | 0.74 | 5.90 |
| 07-Sep-98 | 0.36 | 0.16 | 3.43 | 0.16 | 0.01 | 0.57 | 0.00 | 1.33 | 10.64 |
| 08-Sep-98 | 0.35 | 0.15 | 3.19 | 0.15 | 0 | 0.42 | 0.00 | 0.97 | 7.73 |
| 09-Sep-98 | 0.36 | 0.17 | 3.66 | 0.15 | 0 | 0.43 | 0.00 | 0.86 | 6.84 |
| 10-Sep-98 | 0.36 | 0.18 | 3.72 | 0.15 | 0.01 | 0.48 | 0.00 | 0.90 | 7.17 |
| 11-Sep-98 | 0.36 | 0.17 | 3.66 | 0.15 | 0 | 0.45 | 0.00 | 1.23 | 9.84 |
| 12-Sep-98 | 0.36 | 0.17 | 3.6 | 0.15 | 0 | 0.38 | 0.00 | 1.09 | 8.72 |
| 13-Sep-98 | 0.35 | 0.15 | 3.23 | 0.15 | 0 | 0.4 | 0.00 | 1.00 | 8.00 |
| 14-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.36 | 0.00 | 0.89 | 7.12 |
| 15-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.34 | 0.00 | 0.78 | 6.26 |
| 16-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.34 | 0.00 | 0.73 | 5.86 |
| 17-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.34 | 0.00 | 0.72 | 5.72 |
| 18-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.34 | 0.00 | 0.69 | 5.50 |
| 19-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.34 | 0.00 | 0.68 | 5.46 |
| 20-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.34 | 0.00 | 0.66 | 5.30 |
| 21-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.34 | 0.00 | 0.62 | 4.97 |
| 22-Sep-98 | 0.35 | 0.15 | 3.17 | 0.15 | 0 | 0.34 | 0.00 | 0.60 | 4.79 |
| 23-Sep-98 | 0.35 | 0.15 | 3.17 | 0.14 | 0 | 0.34 | 0.00 | 0.58 | 4.61 |
| 24-Sep-98 | 0.35 | 0.14 | 2.96 | 0.15 | 0 | 0.34 | 0.00 | 0.57 | 4.56 |
| 25-Sep-98 | 0.34 | 0.13 | 2.74 | 0.15 | 0 | 0.34 | 0.00 | 0.58 | 4.62 |
| 26-Sep-98 | 0.34 | 0.14 | 2.85 | 0.15 | 0 | 0.34 | 0.00 | 0.58 | 4.63 |
| 27-Sep-98 | 0.34 | 0.13 | 2.74 | 0.15 | 0 | 0.34 | 0.00 | 0.65 | 5.21 |
| 28-Sep-98 | 0.34 | 0.13 | 2.74 | 0.15 | 0 | 0.34 | 0.00 | 0.68 | 5.40 |
| 29-Sep-98 | 0.34 | 0.13 | 2.74 | 0.15 | 0 | 0.34 | 0.00 | 0.66 | 5.27 |
| 30-Sep-98 | 0.34 | 0.14 | 2.87 | 0.15 | 0 | 0.34 | 0.00 | 0.65 | 5.21 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 01-Oct-98 | 0.34 | 0.13 | 2.74 | 0.15 | 0 | 0.34 | 0.00 | 0.64 | 5.08 |
| 02-Oct-98 | 0.34 | 0.13 | 2.74 | 0.15 | 0 | 0.34 | 0.00 | 0.63 | 5.06 |
| 03-Oct-98 | 0.34 | 0.13 | 2.74 | 0.15 | 0 | 0.34 | 0.00 | 0.63 | 5.02 |
| 04-Oct-98 | 0.36 | 0.17 | 3.48 | 0.15 | 0 | 0.34 | 0.00 | 0.59 | 4.75 |
| 05-Oct-98 | 0.39 | 0.25 | 5.2 | 0.15 | 0 | 0.36 | 0.00 | 0.76 | 6.09 |
| 06-Oct-98 | 0.39 | 0.26 | 5.38 | 0.16 | 0.01 | 0.58 | 0.00 | 2.36 | 18.88 |
| 07-Oct-98 | 0.38 | 0.23 | 4.92 | 0.16 | 0.01 | 0.63 | 0.00 | 2.54 | 20.32 |
| 08-Oct-98 | 0.38 | 0.22 | 4.65 | 0.16 | 0.01 | 0.52 | 0.00 | 2.00 | 16.00 |
| 09-Oct-98 | 0.37 | 0.2 | 4.2 | 0.18 | 0.01 | 1 | 0.00 | 1.79 | 14.32 |
| 10-Oct-98 | 0.37 | 0.2 | 4.18 | 0.16 | 0.01 | 0.67 | 0.00 | 1.43 | 11.44 |
| 11-Oct-98 | 0.37 | 0.19 | 3.97 | 0.16 | 0.01 | 0.67 | 0.00 | 1.28 | 10.24 |
| 12-Oct-98 | 0.37 | 0.19 | 3.93 | 0.16 | 0.01 | 0.67 | 0.00 | 1.22 | 9.76 |
| 13-Oct-98 | 0.37 | 0.2 | 4.2 | 0.16 | 0.01 | 0.67 | 0.00 | 1.23 | 9.84 |
| 14-Oct-98 | 0.36 | 0.18 | 3.86 | 0.16 | 0.01 | 0.67 | 0.00 | 1.33 | 10.64 |
| 15-Oct-98 | 0.36 | 0.17 | 3.66 | 0.16 | 0.01 | 0.67 | 0.00 | 1.23 | 9.84 |
| 16-Oct-98 | 0.37 | 0.2 | 4.2 | 0.16 | 0.01 | 0.67 | 0.00 | 1.18 | 9.44 |
| 17-Oct-98 | 0.36 | 0.18 | 3.84 | 0.16 | 0.01 | 0.67 | 0.00 | 1.17 | 9.36 |
| 18-Oct-98 | 0.37 | 0.2 | 4.13 | 0.16 | 0.01 | 0.67 | 0.00 | 1.15 | 9.20 |
| 19-Oct-98 | 0.37 | 0.2 | 4.2 | 0.16 | 0.01 | 0.57 | 0.00 | 1.13 | 9.04 |
| 20-Oct-98 | 0.37 | 0.2 | 4.2 | 0.16 | 0.01 | 0.65 | 0.00 | 1.13 | 9.04 |
| 21-Oct-98 | 0.37 | 0.2 | 4.2 | 0.16 | 0.01 | 0.67 | 0.00 | 1.17 | 9.36 |
| 22-Oct-98 | 0.37 | 0.2 | 4.2 | 0.16 | 0.01 | 0.64 | 0.00 | 1.18 | 9.44 |
| 23-Oct-98 | 0.37 | 0.2 | 4.2 | 0.16 | 0.01 | 0.5 | 0.00 | 1.20 | 9.60 |
| 24-Oct-98 | 0.37 | 0.2 | 4.2 | 0.16 | 0.01 | 0.48 | 0.00 | 1.19 | 9.52 |
| 25-Oct-98 | 0.37 | 0.21 | 4.35 | 0.16 | 0.01 | 0.48 | 0.00 | 1.17 | 9.36 |
| 26-Oct-98 | 0.38 | 0.23 | 4.87 | 0.16 | 0.01 | 0.48 | 0.00 | 1.30 | 10.40 |
| 27-Oct-98 | 0.38 | 0.23 | 4.89 | 0.16 | 0.01 | 0.65 | 0.00 | 1.44 | 11.52 |
| 28-Oct-98 | 0.37 | 0.2 | 4.22 | 0.18 | 0.01 | 1.03 | 0.00 | 1.49 | 11.92 |
| 29-Oct-98 | 0.37 | 0.2 | 4.2 | 0.17 | 0.01 | 0.79 | 0.00 | 1.23 | 9.84 |
| 30-Oct-98 | 0.37 | 0.2 | 4.2 | 0.16 | 0.01 | 0.67 | 0.00 | 1.08 | 8.64 |
| 31-Oct-98 | 0.37 | 0.2 | 4.2 | 0.17 | 0.01 | 0.82 | 0.00 | 1.17 | 9.36 |
| 01-Nov-98 | 0.37 | 0.2 | 4.2 | 0.18 | 0.01 | 0.92 | 0.00 | 1.14 | 9.12 |
| 02-Nov-98 | 0.37 | 0.2 | 4.2 | 0.18 | 0.01 | 0.92 | 0.00 | 1.04 | 8.32 |
| 03-Nov-98 | 0.37 | 0.19 | 4.09 | 0.18 | 0.01 | 0.92 | 0.00 | 0.98 | 7.82 |
| 04-Nov-98 | 0.36 | 0.17 | 3.66 | 0.18 | 0.01 | 0.92 | 0.00 | 0.94 | 7.50 |
| 05-Nov-98 | 0.36 | 0.17 | 3.66 | 0.17 | 0.01 | 0.72 | 0.00 | 0.92 | 7.38 |
| 06-Nov-98 | 0.36 | 0.17 | 3.66 | 0.16 | 0.01 | 0.67 | 0.00 | 0.88 | 7.03 |
| 07-Nov-98 | 0.36 | 0.17 | 3.66 | 0.16 | 0.01 | 0.67 | 0.00 | 0.83 | 6.62 |
| 08-Nov-98 | 0.36 | 0.16 | 3.45 | 0.16 | 0.01 | 0.67 | 0.00 | 0.79 | 6.29 |
| 09-Nov-98 | 0.35 | 0.18 | 3.79 | 0.16 | 0.01 | 0.67 | 0.00 | 0.71 | 5.66 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 10-Nov-98 | ND | ND | ND | 0.16 | 0.01 | 0.52 | 0.00 | 0.57 | 4.52 |
| 11-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.55 | 4.36 |
| 12-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.52 | 4.19 |
| 13-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.50 | 4.02 |
| 14-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.48 | 3.86 |
| 15-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.46 | 3.71 |
| 16-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.44 | 3.55 |
| 17-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.43 | 3.42 |
| 18-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.41 | 3.29 |
| 19-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.46 | 3.70 |
| 20-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.52 | 4.18 |
| 21-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.48 | 3.81 |
| 22-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.43 | 3.46 |
| 23-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.42 | 3.32 |
| 24-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.41 | 3.24 |
| 25-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.40 | 3.17 |
| 26-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.39 | 3.10 |
| 27-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.37 | 2.96 |
| 28-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.35 | 2.80 |
| 29-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.33 | 2.66 |
| 30-Nov-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.32 | 2.52 |
| 01-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.31 | 2.50 |
| 02-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.31 | 2.47 |
| 03-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.31 | 2.45 |
| 04-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.42 |
| 05-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.40 |
| 06-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.38 |
| 07-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.29 | 2.34 |
| 08-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.29 | 2.30 |
| 09-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.28 | 2.27 |
| 10-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.42 |
| 11-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.32 | 2.58 |
| 12-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.34 | 2.75 |
| 13-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.32 | 2.58 |
| 14-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.42 |
| 15-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.18 |
| 16-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.26 | 2.06 |
| 17-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.30 | 2.43 |
| 18-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.29 | 2.34 |
| 19-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.27 | 2.12 |

**Attachment C**: AGRA Data Analysis
Tenas Hydrometeorological Baseline Report

| Date | Tenas Creek | | | Four Creek | | | Goathorn Creek | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] | Water Level [m] | Discharge [m3/s] | Discharge [L/s/km2] |
| 20-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.24 | 1.92 |
| 21-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.23 | 1.84 |
| 22-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.22 | 1.77 |
| 23-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.70 |
| 24-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.21 | 1.66 |
| 25-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.62 |
| 26-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.20 | 1.58 |
| 27-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.54 |
| 28-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.19 | 1.51 |
| 29-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.47 |
| 30-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.44 |
| 31-Dec-98 | ND | ND | ND | ND | ND | ND | 0.00 | 0.18 | 1.41 |

# Appendix D Stream Water Quality Exceedances for the Updated EAC Project Case (2024)

TELKWA COAL
LIMITED

# Tenas Project, Hydrogeology Technical Report

**Prepared for**

Telkwa Mining Ltd

**Prepared by**

srk consulting

SRK Consulting (Canada) Inc.
CAPR002055
October 2024

# Tenas Project, Hydrogeology Technical Report

October 2024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Project No: CAPR002055
File Name: Telkwa_HydrogeolTechnicalReport_CAPR002055_20241021.docx



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srk consulting

# Executive Summary

Telkwa Mining Ltd (TML) is proposing to develop the Tenas Project (the Project), a surface coal mine designed to produce metallurgical coal. The proposed mine site is in northwestern British Columbia (BC), approximately 25 kilometres south of Smithers and seven kilometres southwest of Telkwa, within the Wet'suwet'en Nation's traditional territory. This report presents the results of a groundwater study prepared by SRK Consulting (Canada) Inc. (SRK) on behalf of TML in support of a Joint Application for a Mines Act permit, and an effluent discharge permit. The objectives were to establish baseline conditions and to quantify the potential changes to the groundwater system that could occur because of the Project.

**Project Background**

The climate and hydrological conditions were characterized by SRK (2020). The average total precipitation between 2018 and 2019 was 587 mm/y, with snow comprising 71% and 31% in 2018 and 2019, respectively. The streamflow regime is nival (snowmelt) with the majority of runoff (MAR 367 mm/year) occurring in the spring and early summer.

The deposit is hosted in a coal-bearing sedimentary rock sequence, associated with the Lower Cretaceous age Skeena Group (marine and continental sediments interbedded with coal seams), and overlies unconformably the Jurassic-age Hazelton volcanic group (andesite, trachyte, and basalt with associated tuffs and breccias). The sedimentary sequence in the open pit area is folded into a syncline. Faulting is generally near-vertical, and can be subdivided into two main groups, one which strikes approximately northwest/southeast, and the other northeast/southwest.

The surficial geology consists of glacial clay- silt-rich till, and glaciofluvial sand-gravel-rich till. South of the proposed open pit, the bedrock outcrops are close to ground surface; North of the proposed open pit and towards Tenas Creek and Goathorn Creek, the till deepens and exceed 100 m. Other deposits are present locally; patches of glaciolacustrine deposits scattered throughout the morainal landscape in low ridges and depressions; and fluvial deposits found in the narrow-incised floodplains of Goathorn and Tenas Creek, and the wide floodplains of the Telkwa and Bulkley River.

The estimated total area disturbed by the Project is 840 ha, including the open pit (289 ha), the coal processing plant (10 ha), material storage facilities (137 ha), sediment ponds (40 ha), and management ponds (227 ha). The Projected mine life is approximately 25 years, including construction, operations, and reclamation phases.

In terms of materials at the Project Site, TML identified several types of material that will need to be managed. Surface Soils (i.e., top organic soil,) will be salvaged and stockpiled for future reclamation requirements. The overburden will be placed into the compaction zones and/or buttress components of the dams for the management and control ponds, or otherwise placed as backfill within the open pit. The low sulfur rock will be placed within the buttress region of the dams for the management ponds, or otherwise backfilled within the open pit. The high sulfur and processed rocks will be placed into external flooded management ponds or within flooded portions of the open pit.

In terms of water management, the facilities will include ditches, sedimentation ponds, control ponds, and management ponds. Three storage management ponds will collect the groundwater and surface water pumped from the open pit during operation. These ponds are designed for underwater permanent storage of potentially acid generating material. A fourth pond(Tenas Control Pond) will collect surface runoff from the mine infrastructure and overflows from the management ponds. This pond is designed to ensure that no water discharge occurs during operations between October 31 and March 31 period and to control the sedimentation for the overall site. It also provides contingency water to ensure PAG material is submerged, and a location for water displaced during management pond operations. All the ponds will be lined with the management ponds lined with an engineered soil-bentonite compacted layer, and the Tenas Control Pond with a bituminous geomembrane or equivalent.

Make-up water for the Coal Processing Plant and make-up water for the mine infrastructure complex will be sourced from precipitation and melting snow collected onsite. Potable water for domestic facilities will be sourced from surface runoff and/or groundwater. A potable water treatment plant will be onsite to ensure that drinking water standards are met. Another 1.5 million $m^3$/year of make-up water is assumed for additional contingency and robustness to the water balance. This water would be sourced from Goathorn Creek (i.e., approx. 2.5% of Goathorn's Creek and less than 1% of the Telkwa River's annual flow respectively) via water supply wells located along the edge of Goathorn Creek.

**Groundwater Baseline Studies**

To assess the potential effects of the Project to groundwater, two spatial boundaries were considered: The Local Study Area (LSA) and the Regional Study Area (RSA). The LSA was defined where the Project may have a direct influence on the groundwater system and/or groundwater users, and the RSA by the fish habitat present in the Telkwa River watershed and in the tributaries to the Bulkley River. The time-steps considered for the evaluation included 2020 (construction), 2023 (End-of-Year 1, End of North Management Pond), 2029 (End-of-Year 7, End of East Management Pond), End of Mining, and post-closure (post-2043).

SRK consulted the BC regulations and guidelines relevant to groundwater and reviewed the Project desktop information and the groundwater site data collected between 1983 and 2016. The level of details, methods, and quality of the information were considered adequate for a Joint Application for a Mines Act permit, and for an effluent discharge permit.

**Groundwater Baseline Data**

The bedrock is characterized by a low to moderate hydraulic conductivity (i.e., K geomean of $2x10^{-7}$m/s). K geomean values sorted by lithological types, from the least permeable to the most permeable, are conglomerate ($2x10^{-8}$ m/s), mudstone/siltstone ($7x10^{-8}$ m/s), volcanic rock ($1x10^{-7}$ m/s), sandstone ($2x10^{-7}$ m/s), and coal ($5x10^{-7}$ m/s). For the overburden, K in the clay-silt-rich till is relatively low ($9x10^{-9}$ m/s), and in the sand-gravel-rich till moderately high ($1x10^{-6}$ m/s). There is no site measurement for specific storage or specific yield.

The groundwater in both systems flows towards the valleys, moving away from the Tenas open pit towards Tenas Creek, the Telkwa River, and Goathorn Creek. Static water levels are generally less than 2 mbgs (meters below ground surface) in the south Tenas Area, to more than 20 mbgs in the north, where overburden changes to a thick sequence of sand-gravel-rich till deposits. The overburden well showed water level highs in spring following freshet and lows in winter. The seasonal observations in bedrock wells were divided in two groups. One group showed seasonal variations like overburden, with highs in spring, lows in fall/winter, suggesting it has a connection with overburden. The other group showed highs in winter, lows in summer/fall, implying recharge is delayed by several months, potentially by the low permeability of the silt-clay-rich till.

The groundwater chemistry in overburden wells is classified as a calcium-magnesium-bicarbonate type; while groundwater in bedrock wells is sodium-bicarbonate type. The groundwater quality statistics, the exceedances, and the baseline average groundwater quality are presented in the report. Exceedances above the BC water quality guidelines for freshwater aquatic life (approved or working) were observed for fluoride, ammonia, total arsenic, total copper, total chromium, total and dissolved iron, total zinc, and selenium. The differences observed in historical wells over time, and the correlations between turbidity and total/dissolved metals concentrations suggest exceedances of total metals were likely caused by suspended particles generated by disturbances (i.e., drilling and well installation). Exceedances above the BC water quality guidelines for drinking water sources were observed for fluoride, and dissolved metals (i.e., arsenic, iron, cobalt, manganese, antimony, mercury, lead, and uranium – the last four parameters exceeded the guideline values only once).

The aquifer database of the ministry of Environment reports six aquifers of limited extent with low to moderate productivity, all located near the town of Telkwa, where the Telkwa River joins the Bulkley River, about 8 to 10 km northeast from the Project. The closest private wells, located along the expected flow paths between the Project and the Telkwa River, are about 3.8 km north of the Project. In terms of human activities, small-scale underground and surface mining occurred sporadically about 3.6 km north and northeast from the Project between 1918 and 1985; nowadays there are no significant human activities other than mining exploration and forestry.

**Conceptual Groundwater Model**

Conceptually, the groundwater system is divided into two sub-systems: deep bedrock and shallow overburden. The deep bedrock is composed of the Skeena sedimentary rock group, the volcanic group, fractures, and faults. At the scale of the Telkwa watershed, the fractured rock is assumed to act as an equivalent porous medium, a hydrogeological term that refers to a simplified representation of a heterogeneous aquifer as if it were a homogeneous material. In this approach, the complex variations in the properties of fractured rock are averaged out, treating it as a single, uniform medium with consistent properties. The hydrogeology of the bedrock is assumed to be represented as a single unit characterized by an anisotropy ratio perpendicular to sedimentary bedding planes (i.e. K parallel to beddings higher than K perpendicular to beddings). Data collected does not indicate influences from known faults (i.e., preferential flow pathways and/or barriers), and there is no mapped structure directly connecting the Project and the private well locations.

The lateral extent of bedrock is characterized by confined flow, relatively long residence times in the subsurface, and higher concentrations of dissolved solids. Groundwater levels indicate generally north-oriented flow lines, from upland areas to streams, namely the Telkwa River and its tributaries, Tenas Creek, and Goathorn Creek.

Shallow overburden is composed of two units: silt-clay–rich glacial till and glaciofluvial sand-gravel-rich till. Its hydraulic characteristics are controlled by the distribution of fine materials, with silt-clay-rich till acting as an aquitard, and impeding flow between the higher permeability sand-gravel-rich layers. The 3D geometries of the hydrostratigraphic units were generated from the analyses of drillhole intercepts (TML's database), geological maps (surface and bedrock geology, regional and local maps, 2D cross sections; Clague 1984, MEMPR 1993, BCGS 2005, TML 2018), and considerations on the ability of a unit to convey groundwater.

The shallow overburden is characterized as a local unconfined system with relatively short residence times and low concentrations of dissolved solids. Groundwater flows in a north-easterly direction towards Four Creek and in a north-westerly direction towards Tenas Creek, moving from topographic highs to adjacent lows. Discharge from overburden is expected to occur in the valleys of Tenas, Four and Goathorn Creeks.

**Groundwater Effect Predictions**

Numerical groundwater modeling was completed to predict open pit inflows and evaluate the potential groundwater effects from the Project. This included potential changes to baseflows, and contributions/travel times of mine-affected groundwater to creeks and private wells. The calibrated achieved the best fit to field data, with a final Normalized Root Mean Square Error (NRMSE) of 3.2% for hydraulic heads and 3.6% for baseflows.

Modeling was based on pseudo steady-state conditions for both calibration and forward predictions. Model uncertainties were assessed through a sensitivity analysis. Details on the modeling assumptions, model designs, and calibration are included in the report.

The model may be classified as moderate complexity (Wels et al., 2012), defined as follows: "These (…) are based on a reasonable, though limited, dataset and having limited calibration. These models may be used to determine the potential range of change or to "bracket" potential effects that may occur due to a given stress." The model is based on a unique conceptualisation of the 3D geology; detailed characterization of aquitards or aquicludes are not well characterized; baseflows are estimated from historical stream flow records; the model was calibrated to steady state conditions, and the results have highest confidence in the vicinity of the mine area where there are relatively more data.

The key conclusions for EOM conditions were as follows:

- The open pit inflows ranged between 320 and 890 $m^3/d$. Under groundwater conditions alone, inflows of these magnitudes are typically managed with open pit sumps and do not require active dewatering systems.
- The seepage rate underneath the Tenas Control Pond was 140 $m^3/d$.
- The total seepage rate underneath the management ponds at end-of mine was 1,490 $m^3/d$.
- Neither the drawdown cone nor groundwater mound are predicted to reach private well locations.
  - The drawdown induced by dewatering extended up to a maximum of extent of 18 $km^2$.
  - The management ponds and the control pond influence the progression of the drawdown to the north; in this area the model predicted a groundwater mound of about 14 $km^2$.
  - Sensitivity analysis evaluated the worst-case drawdown extents (i.e., open pit fully excavated, dewatering active, but no ponds). The predicted drawdown extended to a surface of approximately 34 $km^2$ but did not reach private well locations.
- The maximum reductions in baseflows are expected to occur before the construction and completion of the management ponds. Predicted reductions to the entire creeks are approximately 6% for Tenas Creek, 5% for Four Creek, and 2% for both Goathorn Creek and the Telkwa River.
- The first particle of mine-affected groundwater was predicted to discharge into Tenas Creek after 16 years. No particles were predicted to discharge in the first 25 years into Four Creek, Goathorn Creek, Telkwa River, or near private wells.
- The forecasts of potential contributions of mine affected groundwater to baseflows, after 25 years of operations, were 0.8% for Tenas Creek, less than 0.3% for Goathorn Creek, and less than 0.2% for the Telkwa River. The model predicted no contribution to Four Creek.

The key conclusions based on the modeling of post-closure conditions were as follows:

- The seepage rate (i.e., outflow) underneath the saturated mine rock and open pit lake was 10 $m^3/d$; these features predominantly act as a sink, with an inflow of 380 $m^3/d$.
- The total seepage rate underneath the management ponds was 1,480 $m^3/d$ at the end of mining.
- The long-term drawdown induced by the Project is projected to extend up to a maximum of 15 $km^2$ and the mound to about 13 $km^2$. Neither the drawdown nor mounding is predicted to reach the private wells.
- Modeling suggests that baseflows to the entire creeks will either remain unchanged or slightly increase due to the influence of the management ponds on groundwater levels, with a 3% increase at Tenas Creek, 4% at Four Creek, 2% at the Goathorn Creek, and 1% at the Telkwa River.

- In terms of effect to private groundwater users, the model predicted particles would travel for more than 400 years before reaching the private wells.
- The predicted long-term contributions of mine affected groundwater to baseflows were less than 9.3% for Tenas Creek, less than 4.6% for Goathorn Creek, and less than 0.8% for the Telkwa River.
- The average time for a particle to reach the creeks was predicted to be 65 years for Tenas creek, 320 years for Goathorn Creek, and over 400 years for the Telkwa River.
  - The WBLM assumed conservatively that 100% of the potential waste and water management pond loads discharged into creeks via groundwater paths after 25 years.
- Three private wells (Goalder, Mapletoft, and Baker) located in the Telkwa River valley are potentially within the path of mine affected groundwater. No constituent is predicted to exceed the BC-DWG. The processes of diffusion, dispersion, or natural attenuation and the predicted travel times (i.e., > 400 years) between the Project and the Telkwa alluvial floodplain were not considered in the analysis. These are expected to reduce constituent levels below what has been modelled.
- The sensitivity analysis showed that the model was most sensitive to recharge and the hydraulic conductivity of the tills and Skeena group units. The parameters impacted the predictions as follow:
  - The highest sensitivity open pit inflow was 1,550 $m^3/d$.
  - None of the sensitivity models predicted drawdown or mounding to reach the private wells.
  - The maximum sensitivity reduction to baseflows was about 14% for the Tenas Creek, and 3% for the Goathorn Creek.
  - The travel time in all sensitivity runs to private wells was more than 170 years.
  - The maximum sensitivity contribution of mine affected groundwater to baseflows was 11% in Tenas Creek, and 1% in the Goathorn Creek.

The modeling presented herein provides forecasts of the expected Project behavior, derived from the available hydrogeological information. Upgrades to the model should be considered as additional information becomes available. Additional modeling should be completed if there are changes to the design basis or if any new information alters the parameters used in the modeling.

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Appendix B – Hydraulic Conductivity Measurements

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Appendix E - Liner Seepage Assessment and Preliminary Cost Estimate for Tenas Management Ponds

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Appendix H – Analysis of the Potential Groundwater Quality at Post-closure in the Private Wells Area

# List of Abbreviations

| | |
|---|---|
| ° | Degree |
| °C | Degree Celsius |
| 3D | Three dimensional |
| ARD | Acid Rock Drainage |
| BC | British Columbia |
| BDR | Bedrock |
| CPP | Coal preparation plant |
| CUB | Calibrated unit baseflow |
| d | Day |
| DEM | Digital Elevation Model |
| DWS | Drinking water sources |
| EA | Environmental Assessment |
| EMP | East management pond |
| EOM | End-of-mine |
| EoY | End-of-year |
| FAL | Freshwater aquatic life |
| Ha | Hectare |
| K | Hydraulic conductivity |
| km | Kilometer |
| $km^2$ | Kilometer square |
| kV | Kilovolt |
| LIDAR | Light detection and ranging |
| LSA | Local study area |
| L/s | Litre per second |
| m | Meter |
| $m^2$ | meter square |
| $m^3$/day | meter cube per day |
| m/s | meter per second |
| MAP | Mean annual precipitation |
| MAR | Mean annual runoff |
| masl | Meters above sea level |
| mbgs | Meters below ground surface |
| MEMPR | Ministry of Energy, Mines and Petroleum Resources |
| mg/l | milligram per litre |
| ML/ARD | Metal leaching / acid rock drainage |
| mm/yr | Millimetre per year |
| Mt | Million tons |
| MW | Monitoring well |
| Non-PAG | Non-Potentially acid generating |
| NMP | North management pond |
| NRMSE | Normalized root mean square error |
| NTU | Nephelometric turbidity unit |
| OVB | Overburden |
| PAG | Potentially Acid-Generating |
| Project | Tenas Project |
| PSD | Particle size distribution |
| QA | Quality assurance |
| QC | Quality control |
| R | Recharge |
| ROM | Run-of-mine |
| RPD | Relative Percent Difference |
| RSA | Regional study area |
| s | Second |
| SRK | SRK Consulting (Canada) Inc. |
| $S_s$ | Specific storage |
| $S_y$ | Specific yield |
| TML | Telkwa Mining Ltd |
| TDS | Total dissolved solids |
| TSS | Total suspended solids |
| WBLM | Water balance and load model |
| WMP | West management pond |
| WQG | Water quality guidelines |
| WSC | Water survey of Canada |

# 1 Introduction

Telkwa Mining Ltd (TML) is proposing to develop the Tenas Coal Project (the Project), a surface coal mine designed to produce metallurgical coal at a planned annual production rate of between 775,000 and 825,000 tonnes. The mine life of the Project will be approximately 25 years, including construction, operations, decommissioning, and reclamation phases.

This report presents the results of hydrogeological studies in support of a Joint Application for a Mines Act permit issued by the Ministry of Energy, Mines and Petroleum Resources, and an effluent discharge permit issued under the Environmental Management Act by the Ministry of Environment. It was prepared by SRK Consulting (Canada) Inc. (SRK), on behalf of TML.

## 1.1 Objectives

The objectives of the work presented here are to establish the baseline groundwater conditions and to quantify the potential changes to the groundwater system that could occur because of the Project. The baseline information was used to construct and calibrate a three-dimensional (3D) numerical model, which was then utilized to predict the Project's potential effect on groundwater during mining and long-term closure (post-closure) phases, and to inform the waste and water management system designs (Part A, Section 1 of the EAC Application) and the surface water and load balance model (WBLM, Section 4, Chapter 3 of the EAC Application). The WBLM was used to evaluate the overall effects of the Project on the hydrology and surface water quality at both local and regional scales.

## 1.2 Report Layout

The report is organized as follows:

- Section 2 presents background information relevant to hydrogeological studies.
- Section 3 defines the groundwater assessment boundaries, and presents the regulatory guidelines relevant to the study, the sources of desktop and field information, and the methodologies for the field data collection, data management, and QA/QC methods.
- Section 4 reviews the hydrogeological data supporting the characterization of the groundwater flow system and groundwater quality.
- Section 5 presents the groundwater conceptual model of the Project area for baseline, mining, and post-closure conditions.
- Section 6 describes a numerical groundwater modelling assessment and presents the predictions of the potential changes to the groundwater system.
- Section 7 presents the conclusions of the study.

# 2 Project Background

## 2.1 Location

The proposed mine site is in the Regional District of Bulkley-Nechako in northwestern British Columbia (BC), approximately 25 kilometres south of Smithers and seven kilometres southwest of Telkwa, within the Wet'suwet'en Nation's traditional territory, which includes the majority of the Bulkley River drainage. The Telkwa River, the Tenas Creek and the Goathorn Creek run through the coalfield, dissecting it into three coal exploration areas known locally as Tenas, Goathorn, and North. The proposed open pit and the waste and water management facilities are in the Tenas Area, approximately 54°36'48" north latitude and 127°09'32" west longitude. Figure 1 and Figure 2 shows the Project locations.

## 2.2 Topography

The Project is located within the Coast Mountains (Bulkley Ranges) of the Cordillera Region. The Project is centered on a remnant glacial terrace; upland areas are characterized by moderate to steeply incised valleys separated by moderately undulating terrain; and lowland areas are characterized by relatively flat to moderately rolling topography.

## 2.3 Climate

The climate conditions were characterized in the Hydrometeorological Baseline and Model Development Report (SRK 2020). Observations for years 2017, 2018, and 2019 are compiled in Table 2-1 and shown in Figure 3. The average total precipitation was 587 mm/y between 2018 and 2019, with snow comprising 71% and 31% in 2018 and 2019, respectively.

**Table 2-1: Mean and Annual Precipitation, and Temperature at the Telkwa Project**

| Year | Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | Total Precipitation [mm] | | | | | | | | | | 147 | 134 | 10 | - |
| | Rainfall [mm] | | | | | | | | | | 114 | 0 | 0 | - |
| | Snowfall [mm SWE] | | | | | | | | | | 33 | 134 | 10 | - |
| | Average Snow Depth [cm] | | | | | | | | | | 4 | 28 | 47 | - |
| | Mean temperature [°C] | | | | | | | | | | 1.9 | -5.6 | -8.9 | - |
| 2018 | Total Precipitation [mm] | 50 | 150 | 81 | 14 | 14 | 42 | 50 | 2 | 50 | 54 | 51 | 113 | 672 |
| | Rainfall [mm] | 0 | 0 | 1 | 3 | 14 | 42 | 50 | 2 | 30 | 42 | 9 | 0 | 195 |
| | Snowfall [mm SWE] | 50 | 150 | 80 | 10 | 0 | 0 | 0 | 0 | 20 | 11 | 42 | 113 | 477 |
| | Average Snow Depth [cm] | 63 | 101 | 119 | 110 | 12 | 0 | 0 | 0 | 1 | 0 | 9 | 38 | - |
| | Mean temperature [°C] | -7.6 | -9.8 | -3.3 | 1.1 | 9.4 | 10.6 | 15.5 | 15.3 | 5.9 | 3.0 | -1.0 | -6.1 | - |
| 2019 | Total Precipitation [mm] | 60 | 19 | 8 | 13 | 26 | 57 | 83 | 21 | 47 | 93 | 73 | 2 | 502 |
| | Rainfall [mm] | 5 | 0 | 0 | 7 | 26 | 57 | 83 | 21 | 46.5 | 69 | 32 | 0 | 346 |
| | Snowfall [mm SWE] | 55 | 19 | 8 | 6 | 0 | 0 | 0 | 0 | 0.5 | 24 | 41 | 2 | 156 |
| | Average Snow Depth [cm] | 66 | 75 | 74 | 32 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 14 | - |
| | Mean temperature [°C] | -3.8 | -12.7 | -1.3 | 2.4 | 10.5 | 10.9 | 12.9 | 12.9 | 8.2 | 0.7 | -1.9 | -7.9 | - |

Source: SRK report Oct 2020: Tenas Project – Hydrometeorological Baseline and Model Development Report.

**Note**:

Na, not available

## 2.4 Hydrology

The main drainages in the Project area are the Bulkley River, the Telkwa River, Goathorn Creek, Tenas Creek, Cabinet Creek, and Four Creek. Figure 4 shows a map of the drainages, surface water monitoring stations, and watershed boundaries. Table 2-2 provides a short description of the main drainages.

The streamflow regime in the Project area is nival (snowmelt) with the majority of runoff (MAR 367 mm/year) occurring in the spring and early summer due to the melting winter snowpack. After the snowmelt-driven high flow, there is typically a period of low flow throughout the late summer and early fall, although high intensity rain during the fall period can produce substantial peak events. Annual low flows occur during the winter when the air temperatures remain below freezing; precipitations fall as snow and are stored in the snowpack. During the winter low flow period, the streams are mostly supplied by groundwater discharge; some streams in the region have glacial inputs but this is less prominent in the Project area.

**Table 2-2: Description of the Main Rivers and Creeks**

| River/Creek Name | Description |
|---|---|
| Bulkley River | The Bulkley River is a tributary of the Skeena River. It originates southeast of the project and flows in a north-south trending valley approximately 6 km east of the Project area. Discharge into the Skeena is approximately 100 km downstream from its confluence with the Telkwa River. The size of the watershed is about 12,400 km$^2$. The Bulkley River is a known fish-bearing stream. |
| Telkwa River | The Telkwa River is a substantial tributary to the Bulkley River. It originates west of the Project and flows east, discharging into the Bulkley River approximately 6 km east of the confluence with Goathorn Creek. The size of the watershed is about 830 km$^2$. The Telkwa River is a known fish-bearing stream. |
| Goathorn Creek | Goathorn Creek is a tributary to the Telkwa River. It is a moderately wide and extensively braided creek, with a floodplain approximately 20 to 100 m wide. It flows north along the east side of the Project then discharges into the Telkwa River approximately 8 km downstream of the proposed open pit. The size of the watershed is about 130 km$^2$. The Goathorn Creek is a known fish-bearing stream. |
| Tenas Creek | Tenas Creek is a tributary to Goathorn Creek. It is a small watercourse that flows north and northwest, along the northwest side of the Project, then discharges into Goathorn Creek approximately 8 km downstream of the proposed open pit. The size of the watershed is about 60 km$^2$. The Tenas Creek is a known fish-bearing stream. |
| Cabinet Creek | Cabinet Creek is a small tributary to Goathorn Creek. It is a small watercourse that flows north of the Project, then discharges into Goathorn Creek approximately 6 km east of the proposed open pit. The size of the watershed is about 54 km$^2$ |
| Four Creek | Four Creek is a small tributary to Goathorn Creek. It drains northeast, bordering the Project to the east before discharging into Goathorn Creek in the immediate vicinity of the Project. The size of the watershed is about 14 km$^2$ |

Baseflow is defined as the groundwater discharges into surface streams (i.e., water seeping into the creeks and rivers from groundwater). The rate at which groundwater discharges into surface streams was characterized based on the historical data recorded at the WSC Goathorn station using a recursive digital filter to separate baseflow from surface runoff (SRK 2020). A single filter parameter, typically ranging from 0.90 to 0.99, is used to separate total streamflow into a baseflow and surface runoff component (Nathan and McMahon 1990). The filter parameter was selected based on parsing flow records from 2000 to 2019. A filter parameter of 0.99 was found to best fit the data after three passes (n=3). The unit baseflows and monthly baseflows estimated are provided Table 2-3 and plotted in Figure 5.

**Table 2-3: Estimated average unit and monthly baseflows**

| Month | Unit Baseflow (L/s/km$^2$) | Baseflows (L/s) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Cabinet Ck at Goathorn (54 km$^2$) | Four Ck at Goathorn (14.2 km$^2$) | Goathorn Ck at Cabinet (50.3 km$^2$) | Goathorn Ck at Four (116.7 km$^2$) | Goathorn Ck at 08EE008 (133.5 km$^2$) | Tenas Ck at Goathorn (58.6 km$^2$) |
| Jan | 2.03 | 109.9 | 28.7 | 102.2 | 237 | 271 | 119 |
| Feb | 1.96 | 106 | 27.7 | 98.6 | 228.6 | 261 | 114.8 |
| Mar | 1.93 | 104.3 | 27.3 | 97.1 | 225 | 257 | 113 |
| Apr | 1.98 | 106.9 | 28 | 99.5 | 230.6 | 264 | 115.8 |
| May | 2.60 | 140.5 | 36.7 | 130.7 | 303 | 347 | 152.1 |
| Jun | 4.05 | 219.1 | 57.3 | 203.9 | 472.7 | 541 | 237.3 |
| Jul | 4.91 | 265.5 | 69.4 | 247 | 572.7 | 655 | 287.5 |
| Aug | 4.49 | 243.2 | 63.6 | 226.2 | 524.5 | 600 | 263.4 |
| Sep | 3.76 | 203.3 | 53.2 | 189.1 | 438.5 | 502 | 220.2 |
| Oct | 3.17 | 171.7 | 44.9 | 159.7 | 370.3 | 424 | 185.9 |
| Nov | 2.51 | 135.8 | 35.5 | 126.3 | 292.9 | 335 | 147.1 |
| Dec | 2.09 | 113 | 29.5 | 105.1 | 243.6 | 279 | 122.3 |

Source: SRK report Oct 2020: Tenas Project – Hydrometeorological Baseline and Model Development Report.

**Note**:

Calibrated Unit Baseflow (CUB) = 1.81 L/s/km$^2$

## 2.5 Bedrock Geology

The project is located within the northeast/southwest trending Skeena Arch, which separates Jurassic-age sedimentary rocks of the Bowser Basin in the north from the Jurassic to Cretaceous-age sedimentary rocks of the Nechako Basin to the south. The coal-bearing sedimentary rock sequence is associated with the Lower Cretaceous age Skeena Group and overlies unconformably the Jurassic-age Hazelton volcanic group. Figure 6 presents a simplified stratigraphic column of the Tenas, Goathorn, and North regions.

Figure 7 shows the geological map of the Telkwa Coal field based on the MEMPR geological map (B.D. Ryan, 1993-21) and modified by TML (2018), and Figure 8 three cross-sections associated with the MEMPR geological map. Figure 9 presents the local geological map of the Tenas Area from TML, and Figure 10 to 13 four cross sections associated with the local geology map.

### 2.5.1 Jurassic Hazelton Volcanic Group

The volcanic rocks (i.e., Figure 7: Telkwa formation - volcanic rocks) include andesite, trachyte, and basalt with associated tuffs and breccias. Figure 14 shows samples of the volcanic rock collected from a diamond core drilling rig in the Tenas Area.

### 2.5.2 Lower Cretaceous Skeena Group

The Lower Cretaceous Skeena Group includes marine and continental sediments interbedded with coal seams, often correlated over long lateral distances. It is subdivided into four units (Units I through IV) and a unit of undivided sediments overlying the four units (Figure 6). The economic coal seams in the Tenas Area (coal zone 1, Lower and Upper) are located within Unit I; Unit III is absent from the Tenas Area but present in the Goathorn and North areas.

- Unit I consist of more than 100 m of fine to coarse-grained cross-bedded sandstone, conglomerate, siltstone, mudstone and coal (coal zone 1). Overall, Unit I fines upward, from primarily conglomerate and sandstone to almost entirely carbonaceous mudstone, seatearth and coal (1A to 1G). The conglomerate and sandstone were deposited in braided channels and bars, and mudstone accumulated in floodplains. Thin coal seams formed in poorly drained, peat-forming backswamps, and seatearths formed under leaching conditions in less submerged areas. With denudation of the volcanic source area, braid plains were abandoned and extensive low-energy, peat-forming swamps were established, resulting in the formation of thick coal seams in the upper part of the Unit.
- Unit II separates coal zone 1 and coal zone 2. It consists of up to 140 m of primarily of a monotonous silty mudstone, occasionally interbedded with beds of chert-rich, micaceous, bioturbated or cross-bedded sandstone. The sediments were deposited in a deltaic/shallow marine environment following a regional marine transgression. The mudstone accumulated in bays, and the sandstones in distributary channels and mouthbars. Locally, thin discontinuous peat beds formed in salt marshes.
- Unit III comprises about 90 m of chert-rich, micaceous sandstone, siltstone and mudstone, and up to nine coal zones (coal zones 2 through 10). The sandstone and mudstone were deposited and biogenically reworked in a tidal flat environment; siltstone accumulated in a restricted, nearshore marine environment. Peat accumulated in freshwater coastal marshes which periodically prograded over tidal flats.
- Unit IV consists of approximately 150 m of a laterally extensive, bright green, chert-rich, chloritic sandstone or siltstone bed at the base, overlain by massive grey silty mudstone like that of Unit II. The basal sandstone is a transgressive lag deposit, and silty mudstone, the predominant lithofacies, was deposited in a quiet, nearshore, shallow marine environment.

Figure 15 shows samples of the Skeena Group sediment rocks collected from a diamond core drilling rig in the Tenas Area.

### 2.5.3 Intrusions

Tertiary and Cretaceous-age porphyritic dykes and sills (i.e., Figure 7: Bulkley plutonic suite – intrusive rocks) are present, the most notable of which includes a large Tertiary granodiorite plug located on the north side of the Telkwa River.

### 2.5.4 Geological Structures

Figure 7 and Figure 9 show the geological structures at the scale of the Telkwa Coal Field and Tenas Area respectively.

The sedimentary sequence in the Tenas Area is folded into an upright syncline in which the gently (typically 10 to 20°) northeast-dipping western limb of the syncline subcrops on the western side of the open pit area, while the moderately (40 to 45°) southwest-dipping eastern limb subcrops on the eastern side of the open pit. Faulting is generally near-vertical, and can be subdivided into two main groups, one which strikes approximately northwest/southeast and the other northeast/southwest. A few east/west striking faults have also been interpreted.

The Goathorn area is located within an outlier of the Lower Cretaceous Skeena Group. The structural geology is somewhat more complex than the Tenas Area and is characterized by a complex series of sub-parallel north-south trending reverse faults, and to a lesser extent east-west, trending normal faults.

Northeast striking faults are related to emplacement of the Bulkley intrusions in the Late Cretaceous.

## 2.6 Surficial Geology

The surficial geology consists primarily of glacial clay- silt-rich till, and glaciofluvial sand-gravel-rich till (Figure 16). The 2018 and 2019 drilling investigations showed the till was generally a sandy lean clay with gravel. The clay-silt-rich till typically contained silt and fine sand with some gravel, was commonly very-stiff to hard in consistency with low to medium plasticity, and well graded. Sand, silt and gravel lenses were commonly encountered within the till at depth across the north of the project site. The sand-gravel rich till was dense to very dense as assessed by standard penetration testing during the sonic drilling. Figure 17 shows typical samples of overburden collected with a diamond core or a sonic core drilling rig, and Figure 18 shows particle distribution curves (PSD) of samples classified as clay-silt-rich tills, and sand-gravel-rich tills. At upper elevations and south of the proposed open pit, the bedrock outcrops are close to ground surface, with mantles of clay-silt-rich tills between 3 m and 10 m thick. North of the proposed open pit and towards Tenas Creek and Goathorn Creek, drillholes report thin mantles of clay- silt-rich tills deposits, between 3 m and 10 m thick, underlain by a thick sand-gravel-rich till that can exceed 100 m.

Other deposits are present locally. Patches of glaciolacustrine deposits are scattered throughout the morainal landscape in low ridges and in depressions, comprising bedded and laminated mud, and minor sand and gravel (Clague 1984). Recent fluvial deposits are present in the narrow floodplains of Goathorn Creek and Tenas Creek, which are 40 m to 80 m deep incised into the

subdued morainal landscape, and the wide floodplains of the two-wandering gravel-bed rivers, the Telkwa River and the Bulkley River. The fluvial deposits range from extremely coarse, poorly sorted gravel on steep alluvial fans to moderately to well-sorted sand and mud on low-gradient floodplains (Clague 1984).

## 2.7 Project Description

The following description consists of an overview of the proposed mine components, adapted from Section 1 of the main EA document.

### 2.7.1 Mine Plan

The Project configuration is shown on Figure 19. It will consist of a conventional shovel and truck coal extraction operation, like other rock quarry and surface mine operations in the region. The estimated total area disturbed by the Project is 840 ha, including the open pit (289 ha), the coal processing plant (10 ha), material storage facilities (137 ha), sediment ponds (40 ha), and management ponds (227 ha).

The Project will include the following major components:

- Open pit.
- Coal Processing Plant (CPP).
- Coal handling systems for run-of-mine (ROM) coal, processed rock, and processed coal (including plant conveyors, storage bins, and stockpiles).
- Storage piles and stockpiles for rock (non-PAG), overburden, growth media, and processed coal.
- Three management ponds for storage of potentially acid generating (PAG) rock: the North (NMP), the East (EMP), and the West Management Ponds (WMP).
- One control pond.
- Four sedimentation ponds: The Plant Sedimentation Pond, Rail Infrastructure Sedimentation Pond, Explosives Site Sedimentation Pond, and Explosives Magazine Sedimentation Pond.
- Surface water ditches.
- Water supply wells, storage, and distribution network.
- Fuel and lubricant storage facilities and distribution network.
- Explosive’s magazine, storage silos, and vehicle wash and maintenance facilities.
- Propane storage facilities and distribution network (no longer required).
- Solid waste management systems including landfill, recycling and composting facilities.

- Administration, first aid, maintenance/warehouse, mine dry, laboratory, light vehicle, mine rescue, and warehouse buildings.
- Haul roads and access roads within the minesite.
- Tenas Access Corridor which encompasses a 11 km newly constructed Bypass Road and improvements to approximately 5.0 km of an existing forestry service road.
- A 3.5 km long 25 kV powerline and a 25 to 600 kV substation adjacent to the CPP.
- A rail infrastructure consisting of processed coal stockpiles, scales, dust control facilities and a 2.5 km rail loop connected to the Canadian National Railway track.
- A permanent bridge over Goathorn Creek.

### 2.7.2 Material Management

TML has identified several types of material associated with coal extraction that will need to be managed:

- **Surface Soils (topsoil) (Non-PAG)** is the top 0.20 to 0.50 m of material and contains the bulk of organic material and material acceptable for the growth of vegetation. There is approximately 1.75 million $m^3$ of this material. This material will be stockpiled in designated locations for reclamation activities or direct placed on areas available for growth media placement.
- **Overburden (Non-PAG)** is the non-rock material between growth media material unit and the rock unit that consists of primarily till material with almost no organic material. There is approximately 24 million $m^3$ of this material. This material will be placed into the critical compaction zones and/or buttress components of the dams required for the management ponds, otherwise it will be placed as backfill within the open pit.
- **Low sulfur rock (Non-PAG)** is the rock present in the Project's open pit area that has sulfur levels with little potential to cause ARD. This material is also known as non-acid-generating (Non-PAG) rock. There is approximately 29 million $m^3$ of this material. This material will be placed within the buttress region of the dams for the management ponds otherwise it will be backfilled within the open pit.
- **High sulfur rock (PAG)** is the rock present in the Project's open pit area that has sulfur levels that are elevated and will have the potential to cause ARD. This material is also known as PAG rock. There is approximately 31 million $m^3$ of this material. All PAG material will be placed into external flooded management ponds or within flooded portions of the open pit.
- **Processed rock (PAG)** is the rock produced during coal processing to produce a processed coal suitable for the marketplace that will be separated from the coal through gravity separation methods, such as cyclones. This material is classified as PAG material. There is approximately 3.3 million $m^3$ of this material. All PAG material will be placed into external flooded management ponds or within flooded portions of the open pit.

- **Run-of-mine (ROM) coal (PAG)** is the coal that is recovered in the open pit from mining operations and then hauled to the CPP to be placed into one of two stockpiles. These stockpiles are expected to be constantly changing in response to open pit production sequence, marketing requirements, and plant production requirements. There is approximately 22.0 Mt of ROM coal recovered during the life of this Project.
- **Processed coal (PAG)** is the coal after it has been washed in the CPP removing unwanted rock from the coal so that it is suitable for the marketplace. Based on the work completed, there is approximately 16.0 Mt of processed coal.

### 2.7.3 Water Management

Surface water management features (i.e., ditches, sedimentation ponds, control ponds and management ponds) are illustrated in Figure 19.

Upslope diversion ditches will divert non-contact water away from the material storage piles and surface mine areas into existing natural watercourses. Downslope collection ditches will collect runoff from the material storage areas and divert it into sedimentation/control ponds for treatment with approved flocculants to reduce total suspended solid levels if required.

The management ponds (i.e., NMP, EMP, and WMP) will collect the groundwater and surface pumped from the open pit during operation. These ponds are designed for underwater long-term storage of potentially acid generating (PAG) material to limit its potential exposure to oxygen. The Tenas Control Pond will collect surface runoff from the mine infrastructure complex, run off from the management pond dams, contact water ditches, and overflows from the management ponds. It is designed to ensure that no water discharge will occur during operations between the October 31 and March 31 period and to control the sedimentation for the overall site. It provides contingency water to ensure PAG material is submerged, and a location for water displaced during management pond operations. The storage management ponds, EMP, NMP, and WMP will be lined with engineered soil-bentonite (S/B) compacted layers (i.e., 0.30 m thick), and the Tenas Control Pond with a bituminous geomembrane or equivalent. Only parts of the WMP will be lined: the portions outside the open pit (WMP Ex pit), and the portions inside the open pit (WMP In pit) that intercept overburden. The design details of the management ponds and control pond are documented in Part A, Section 1 of the EAC Application.

Water is required for CPP make-up water and for the mine infrastructure complex, i.e., heavy vehicle and explosive facility wash bays, workshop hoses, potable water requirements, and non-potable water requirements. Raw water is estimated at approximately 15,000 $m^3$ per month (180,000 $m^3$ per year) or about 20 $m^3/h$) and will be sourced from precipitation and melting snow collected onsite. Potable water for domestic facilities will be sourced from surface runoff and/or groundwater; a potable water treatment plant will be onsite to ensure that potable water standards are met.

Another 1.5 million $m^3$/year of make-up water is assumed for additional contingency and robustness to the water balance. This water would be sourced from Goathorn Creek (i.e., approx. 2.5% of Goathorn's Creek yearly flow and less than 1% of the Telkwa River's annual flow respectively) via water supply wells located along the edge of Goathorn Creek.

### 2.7.4 Project Phases and Scheduling

The Projected mine life is approximately 26.5 years, including approximately 1.5 years of construction, 21 years of operations, and 4 years of decommissioning and reclamation.

Major activities during construction will include site clearing, pre-stripping, building construction, road development, rail loop construction, bridge construction, and development of onsite utilities and services.

Mining operations are scheduled to commence in the north portion of the open pit to excavate overburden, and to construct the initial embankment structures for the Tenas Control Pond and the NMP. The Tenas Control Pond will be constructed first along with the Coal Processing Plant Sedimentation Pond, then the NMP will follow. Once the NMP reaches approximately 50% of its planned capacity, excavation of PAG rock will start to expose the first coal. Between 2023 and 2025 mining will continue west to produce overburden for the management ponds while for coal release, mining will move towards the south. In 2025 and continuing through to 2031 mining will start to construct the EMP and the initial phases of the open pit will be available for backfill. Mining will also continue working west producing overburden for the embankments associated with the management ponds. In 2032, mining will move to the far southern tip of the open pit and proceed towards the central area of the open pit through to the completion of mining in 2043.

Once mining is complete, decommissioning and reclamation activities will commence with the removal of all buildings and structures. Any material storage piles or open pit walls that have not been sloped will be sloped and have topsoil placed on them. Vegetation and monitoring activities will then complete the reclamation phase. Once water encountering the mine and flowing through the Tenas Control Pond meets acceptable turbidity values for several years, this structure will be allowed to drain, and a wetland will be established in the former bottom of this pond.

# 3 Groundwater Baseline Studies

This section summarizes important information for understanding how the baseline groundwater conditions were evaluated.

## 3.1 Spatial Boundaries

The spatial boundaries define the limits within which changes to the groundwater system will be evaluated. Two spatial boundaries were considered for the groundwater assessment: the Local Study Area (LSA) and the Regional Study Area (RSA).

The LSA is defined as where the Project may have a direct influence on the groundwater system and/or groundwater users. The area was delimited based on watersheds and to include the project footprint, and the private domestic wells located downgradient of the Project. The RSA is a larger area defined by the fish habitats in the Telkwa River watershed and in the tributaries to the Bulkley River crossed by the haul road; it is used to provide context for the assessment of potential Project effects and represents the cumulative effects assessment study area. The extent of the LSA and RSA are shown on Figure 20.

## 3.2 Temporal Boundaries

The temporal boundaries encompass the periods during which the Project is expected to have potential effects on the Hydrogeology. The relevant time-steps used for the assessment are presented in Table 3-1.

**Table 3-1: Temporal Boundaries for Hydrogeology**

| Phase | Project Year | Description of Activities |
|---|---|---|
| Construction | 2021 | Site clearing, pre-stripping, construction of the buildings, roads, rail loop, bridge, and onsite utilities and services |
| End-of-Year 1 (EoY1) | 2023 | Excavation of the open pit and development of material storage piles. Coal processing. Dewatering of the open pit. The Control Pond and NMP are constructed. |
| End-of-Year 7 (EoY7) | 2029 | Excavation of the open pit and development of material storage piles. Coal processing. Dewatering of the open pit. The Control Pond, NMP, and EMP are constructed. |
| End-of-Mine (EOM) | 2043 | The mine is fully excavated. Dewatering of the open pit. The Control Pond and all the management ponds are constructed, and water levels are at their maximum. |
| Post-closure | To be determined from monitoring | No activities. All infrastructures removed and reclaimed except the storage ponds. |

## 3.3 Regulations and Guidelines

The groundwater baseline studies for the Project were designed to meet the requirements of a Joint Application for *Mines Act and Environmental Management Act Permits* (BC MEM & BC MOE, 2016). Groundwater is a valued component of the biological and physical environment and is protected under the Groundwater Protection Regulation of the British Columbia (BC) *Water Sustainability Act* (2016).

The environmental guidelines listed below were consulted to help with the characterization of the groundwater baseline conditions and the assessment of potential Project influences on the groundwater system:

- *Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities*, prepared by BC MOE (2012).
- *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators,* prepared by the BC MOE (Version 2, 2016).
- *Draft Guidelines for the Preparation of an Environmental Impact Statement, December 2015*. Prepared by the Canadian Environmental Assessment Agency.

- Framework for a Hydrogeologic Study in support of an Application for an Environmental Assessment Certificate under the Environmental Assessment Act and Regulations (BC Ministry of Environment, Water Stewardship Division 2019).
- Information Sources
- SRK reviewed the information listed in the next two sections. The level of details, methods, and quality of the information were adequate for a Joint Application for a Mines Act permit, and for an effluent discharge permit.

### 3.3.1 Desktop Information

- TML 2018 drillhole database (dated 27 Nov. 2018)
- Technical reports from Klohn Leonoff Consulting Engineers (Klohn, 1985), Piteau Engineering Ltd (Piteau 1990, 1994, 1995, 1996a, 1996b, 1997a, 1997b, 1998), Stantec (Stantec 2016) and field and technical baseline memo/reports produced ERM (2017, 2020), Cassiar (2020ab), or SRK (2018, 2019) between 2018 and 2020.
- Groundwater baseline data – Hydrogeology and groundwater quality (ERM 2020).
- Digital Elevation Model (DEM) from a LIDAR survey conducted in August 2017 on behalf of TML.
- Geological publications and maps (Clague 1984, Plasgrove 1991, Massey 2005, BC Gov 2018).
- Digital maps and databases of aquifers, domestic and private wells, and water licences (BC Government 2018, BC MOE 2018abc).
- Monthly precipitation grids for Alaska, British Columbia, and Yukon (Stavros 2016).
- Raster grid of a global estimation of groundwater recharge (Jasechko 2014).

### 3.3.2 Field Investigations

Baseline studies were initiated between 1983 and 1998 by the former owners of the Project property, Crowsnest Resources and Manalta Coal Ltd. TML continued and expanded on these studies since 2016, after acquiring the property. Table 3-2 lists all the field programs related to groundwater and Table 3-3 compiles a summary of the available groundwater field data.

**Table 3-2: List of the hydrogeological field investigation conducted for the project**

| Author | Date | Area | Description |
|---|---|---|---|
| Klohn Leonoff (1) | 1982-1984 | Open pit 3 (4) | Borehole drilling and installation of 20 piezometers within bedrock. Falling head permeability tests and packer tests in selected coal horizons. Groundwater sampling. |
| Piteau (2) | 1989 | Open pit 7&8 (4) | Borehole drilling and installation of 5 piezometers within bedrock. Rising head permeability tests. Measurements of groundwater levels in piezometers and open boreholes. Groundwater sampling. |
| | 1993 | Open pit 7&8 (4) | Borehole drilling and installation of 5 monitoring wells within bedrock and 1 within surficial till. Rising head permeability tests. Groundwater sampling. |
| | 1995 | Tenas Open pit | Borehole drilling and installation of 5 monitoring wells within bedrock. Rising head permeability tests. Groundwater sampling. |
| | 1996 | Tenas Open pit | Preliminary assessment of potential groundwater inflows and dewatering requirements for the Tenas Open pit. Borehole drilling and installation of 5 monitoring wells within bedrock and 6 within surficial sediments. Rising head permeability tests. Groundwater sampling. |
| | 1996 | Open pit 3 (4) | Borehole drilling and installation of 5 monitoring wells within bedrock and 6 within surficial sediments. Rising head permeability tests. Groundwater sampling. |
| | 1996 | Former Tailings Pond | Borehole drilling and installation of 6 monitoring wells within surficial sediments. Rising head permeability tests. Groundwater sampling.<br>Mapping of the surficial geology based on air-photo interpretations. |
| | 1997 | Open pit 3, Tenas Open pit, Open pit 7 & 8 (4) | A 7h aquifer test in the northern portion of Open pit 3. Domestic well survey in area extending three to five km north of Open pit 3. Borehole drilling and installation of 27 piezometers in Reclamation Open pit (test open pit originally excavated in 1983). Groundwater sampling from nearby domestic wells and from all piezometers, where possible |
| Stantec (3) | 2016 | Tenas Area | Inspection of 6 monitoring wells around the northern portion of the Tenas Open pit. Of the 6 wells inspected, only 1 was not dry or damaged. Groundwater samples were taken from 3 wells. |
| ERM, Cassiar Geoscience, and SRK | 2017-2019 | Tenas Area, Access Road, Rail loadout | Hydrogeology baseline monitoring program:<br>Inspection of 22 existing monitoring wells to determine their usability for the baseline program on July 25 and 26, 2017;<br>Field reconnaissance of seeps along Tenas and Four Creek;<br>Drilling of 26 boreholes, and installation of one pumping test well, 18 single screen and 2 nested monitoring wells (8 screens in bedrock and 15 in surficial sediments), and three vibrating wire piezometers. Development of all the new wells;<br>One pumping test, 13 packer injection tests performed in 3 boreholes, 12 rising or falling head permeability tests completed in 11 monitoring wells, and 19 K values inferred from PSD analyses in overburden at 17 locations.<br>Automatic measurements of continuous groundwater levels at 5 monitoring wells since Sep.2017, and 16 campaigns of manual measurements at the monitoring wells between Jul.2017 and Nov. 2019.<br>Quarterly groundwater quality monitoring at 13 monitoring wells initiated in July 2017. |

**Notes**:

1. Klohn Leonoff Consulting Engineers (1985).

   This original report could not be found, but the associated data is included in Piteau's technical report (1998).

2. Piteau (1990, 1994, 1995a, 1996a, 1996b, 1997a, 1997b).

3. Stantec (2016).

4. Open pit names have changed compared to the EA mine plan described by Manalta Coal Ltd. in 1998. The Tenas Area englobes the Tenas North Open pit and the Tenas West Open pit, the Goathorn Area englobes the Open pit 3 and Open pit 6, and the North Area englobes the Open pit 7 and Open pit 8.

**Table 3-3: Summary of the available groundwater data**

| Parameter | Method/Type | Tenas Area (1) | Goathorn Area | North Area |
|---|---|---|---|---|
| Hydraulic conductivity tests (K) | Grain size analyses | 19 (ovb) | - | - |
| | Rising head tests | 10 (ovb), 19 (bdr) | 2 (ovb), 19 (bdr) | 8 (bdr) |
| | Packer injection tests | 13 (bdr) | - | - |
| | Pumping tests | 1 (bdr) | 1 (bdr) | - |
| Monitoring wells (MW) | Screen within ovb. | 26 | 6 | 1 |
| | Screen within bdr. | 19 | 22 | 7 |
| | Multiple screen MW | 6 | 7 | 2 |
| Groundwater level observations | Manual | Up to 28 levels measured in ovb in a single event and 26 in bdr (i.e., Mar/Apr 2019). Period of records: Aug.94 to Nov.19. | 6 levels measured in ovb, and 28 in bdr. Period of records: Sep.96 to Sep.97. | 2 levels measured in ovb, and 22 in bdr. Period of records: Nov.89 to Sep.97. |
| | Automated | 5 loggers (2 in ovb, 3 in bdr). Period of records: Sep.17 to Aug.20. | - | - |
| Groundwater samples (2) | 3 in Oct.1995 (bedrock).<br>7 in Sep./Oct.1996 (4 bedrock / 3 overburden).<br>8 in Aug./Sep.1997 (4 bedrock / 4 overburden).<br>99 between Nov.2016 to Nov.2019 (50 from bedrock and 49 from overburden). | | | |

**Notes:**
Ovb, Overburden; Bdr, Bedrock
1. Tenas Area includes the Tenas, access road, and rail loadout areas.
2. Samples collected in the Tena area.

## 3.4 Field Data Collection Methodology, QAQC, and Data Management

The methodologies, QA/QC procedures, and observations of the groundwater baseline monitoring program are detailed in Section 17 of the EAC Application. SRK reviewed the information and compiled the data into excel spreadsheets, and GIS databases (ArcMap and Leapfrog) for analyses and mapping. All monitoring locations (hydraulic conductivity (K) tests intervals, groundwater levels, and seep locations) were plotted in 3D space based on the high-resolution LIDAR or surveyed collar elevation, and Telkwa database of drillhole surveys.

# 4 Groundwater Baseline Data

This section summarizes the groundwater data collected to date, as of August 2020, that supports the characterization and understanding of the groundwater system at the Project.

## 4.1 Monitoring Network

Figures 21 to 23 shows the monitoring well locations. Table 1A in 7Appendix A provides detailed information on each well.

## 4.2 Hydraulic Conductivity

A total of 92 values of hydraulic conductivity (K) values were obtained since the exploration of the Telkwa coal field started. Table 4-1 compiles a statistical summary of the test results. Figure 25 shows a 3D perspective views of the K tests, Figure 26 and Figure 27 box plots and histograms of K frequencies by lithological unit, Figure 28 a plot of K values versus elevation, and Figure 29 a plot of K values versus depth. Additional details are provided for the individual tests in Table 1B, Appendix B.

**Table 4-1: K statistics**

| SUB-CLASS | | TENAS AREA | | | | | | GOATHORN AREA | | | | | | NORTH AREA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n | K min | K harm | K geo | K arith | K max | n | K min | K harm | K geo | K arith | K max | n | K min | K harm | K geo | K arith | K max |
| | | # | m/s | m/s | m/s | m/s | m/s | # | m/s | m/s | m/s | m/s | m/s | # | m/s | m/s | m/s | m/s | m/s |
| ALL TESTS | | 62 | $7x10^{-11}$ | $2x10^{-9}$ | $1x10^{-7}$ | $2x10^{-6}$ | $5x10^{-5}$ | 22 | $8x10^{-12}$ | $2x10^{-10}$ | $1x10^{-8}$ | $3x10^{-7}$ | $4x10^{-6}$ | 8 | $3x10^{-9}$ | $1x10^{-8}$ | $4x10^{-8}$ | $1x10^{-7}$ | $4x10^{-7}$ |
| BEDROCK | | 33 | $3x10^{-9}$ | $3x10^{-8}$ | $2x10^{-7}$ | $7x10^{-7}$ | $6x10^{-6}$ | 20 | $8x10^{-12}$ | $1x10^{-10}$ | $1x10^{-8}$ | $3x10^{-7}$ | $4x10^{-6}$ | 8 | $3x10^{-9}$ | $1x10^{-8}$ | $4x10^{-8}$ | $1x10^{-7}$ | $4x10^{-7}$ |
| Bedrock Lithologies | Coal seams | 12 | $2x10^{-8}$ | $1x10^{-7}$ | $5x10^{-7}$ | $1x10^{-6}$ | $6x10^{-6}$ | 16 | $2x10^{-10}$ | $1x10^{-9}$ | $2x10^{-8}$ | $4X10^{-7}$ | $4x10^{-6}$ | 8 | $3x10^{-9}$ | $1x10^{-8}$ | $4x10^{-8}$ | $1x10^{-7}$ | $4x10^{-7}$ |
| | Sandstone | 3 | $4x10^{-8}$ | $9x10^{-8}$ | $2x10^{-7}$ | $3x10^{-7}$ | $5x10^{-7}$ | 1 | $1x10^{-6}$ | | | | | 0 | n/a | | | | |
| | Mudstone, Siltstone | 9 | $8x10^{-9}$ | $3x10^{-8}$ | $7x10^{-8}$ | $7x10^{-7}$ | $5x10^{-6}$ | 2 | $8x10^{-12}$ | $2x10^{-11}$ | $1x10^{-10}$ | $1x10^{-9}$ | $3x10^{-9}$ | 0 | n/a | | | | |
| | Conglomerate | 2 | $7x10^{-9}$ | $2x10^{-8}$ | $2x10^{-8}$ | $3x10^{-7}$ | $6x10^{-8}$ | 0 | n/a | | | | | 0 | n/a | | | | |
| | Volcanic rock | 7 | $3x10^{-9}$ | $1x10^{-8}$ | $1x10^{-7}$ | $4x10^{-8}$ | $9x10^{-7}$ | 0 | n/a | | | | | 0 | n/a | | | | |
| | Not defined | 0 | n/a | | | | | 1 | $2x10^{-9}$ | | | | | 0 | n/a | | | | |
| OVERBURDEN | | 29 | $7x10^{-11}$ | $1x10^{-9}$ | $6x10^{-8}$ | $3x10^{-6}$ | $5x10^{-5}$ | 2 | $8x10^{-9}$ | $1x10^{-8}$ | $1x10^{-8}$ | $1x10^{-8}$ | $1x10^{-8}$ | 0 | n/a | | | | |
| Overburden Lithologies | Clay/Silt | 17 | $7x10^{-11}$ | $7x10^{-10}$ | $9x10^{-9}$ | $1x10^{-7}$ | $7x10^{-7}$ | 2 | $8x10^{-9}$ | $1x10^{-8}$ | $1x10^{-8}$ | $1x10^{-8}$ | $1x10^{-8}$ | 0 | n/a | | | | |
| | Sand/Gravel | 5 | $6x10^{-8}$ | $2x10^{-7}$ | $1x10^{-6}$ | $3x10^{-6}$ | $1x10^{-5}$ | 0 | n/a | | | | | 0 | n/a | | | | |
| | Mixed grains | 7 | $7x10^{-9}$ | $4x10^{-8}$ | $7x10^{-7}$ | $8x10^{-6}$ | $5x10^{-5}$ | 0 | n/a | | | | | 0 | n/a | | | | |

**Note:**

| | |
|---|---|
| n | Number of tests. |
| K min | Minimum K value. |
| K harm | Harmonic mean |
| K geo | K geomean. |
| K arith | Arithmetic mean |
| K max | Maximum K value. |
| n/a | Not applicable. |

### 4.2.1 Bedrock

- Bedrock has a low to moderate hydraulic conductivity. K values in the Tenas Area are generally higher than in the Goathorn and North areas, with a geomean of $2x10^{-7}$m/s, $1x10^{-8}$ m/s and $4x10^{-8}$ m/s respectively. The differences between Tenas, Goathorn, and North may result from the heterogeneity of the overall sedimentary sequence; the tested unit in the Tenas Area is the Unit I of the Skeena group, and in the Goathorn and North areas it is Unit III.
- Geomean K values sorted by lithology for the Tenas Area, from the least permeable to the most permeable, are conglomerate ($2x10^{-8}$ m/s), mudstone/siltstone ($7x10^{-8}$ m/s), volcanic rock ($1x10^{-7}$ m/s), sandstone ($2x10^{-7}$ m/s), and coal ($5x10^{-7}$ m/s).
- A progressive reduction of K values with depth (Figure 29) is interpreted to occur due to a reduction of fracture apertures with depth as lithostatic load increases.
- Piteau (1998) conducted a pump test in the Goathorn area as a mean to assess the potential role of faults. Pumping lasted seven hours at a constant rate of 15.8 $m^3$/day. The test did not conclusively confirm the hydraulic role of the faults in that area. The transmissivity of the bedrock (interval between coal seam #2 and top of bedrock) was determined to be relatively low, in the range of 0.02 and 0.24 $m^2$/day. The observations in nearby wells suggested limited lateral hydraulic connection within the coal seam #2, and between the seam and underlying mudstone. No measurable drawdown occurred in observations wells completed in coal, the closest of which was approximately 170 m away, nor in a well installed in the underlying mudstone, less than 10 m away from the pumping well.
- In March 2019, Cassiar Geoscience and SRK conducted a pump test in T18-01D (ARD2), in the Tenas Area, to estimate the physical properties of the sandstone aquifer and test if there was a hydraulic connection between the sandstone and the overlying coal seam units. Pumping lasted 20 hours at a constant average rate of 7.5 $m^3$/day. There was no drawdown observed in T95R-64, the closest well available, approximately 440 m away; therefore, the test did not confirm the hydraulic connection with the overlying coal seams. The interpretation of the drawdown and recovery curves indicated hydraulic conductivity of the sandstone was consistent with the other K measurements; Theis Recovery Analysis – $4x10^{-7}$ m/sec, and Theis Step Test (Drawdown and Recovery) – $1x10^{-7}$ m/sec. The test also showed a boundary started to influence drawdown after about five and half hours of pumping; the interpretation of the derivative drawdown curve indicated test was potentially influenced by a leaky aquifer (Cassiar 2020a).

### 4.2.2 Overburden

K in overburden varies according to lithologies. K in the clay-silt-rich till is relatively low, with a geomean of $9x10^{-9}$ m/s, and K in the sand-gravel-rich till is moderately high, with a geomean of $1x10^{-6}$ m/s.

## 4.3 Storage Properties

The specific storage ($S_x$) and specific yield ($S_y$) influence the volumetric water release in an aquifer induced per unit change of hydraulic head under saturated conditions, and the pressure response

of the material. A specific storage value of $1.2x10^{-4}$ in bedrock was estimated from the pump test analysis in T18-01D (Cassiar 2020a); however, this analysis was based on groundwater level observations from the pumping well, which are less reliable than analysis based on observation wells. According to lithology, scientific literature (Domenico 1990, Singhal 2010), and professional experience (Piteau 1997, SRK 2018), the expected ranges are:

- In Bedrock, $S_x$ between $1x10^{-7}$ and $1x10^{-4}$ $m^{-1}$ and $S_y$ between 0.01 and 0.2.
- In clay/silt deposits, $S_x$ between $1x10^{-5}$ and $1x10^{-2}$ $m^{-1}$ and $S_y$ between 0.05 and 0,15.
- In sand/gravel deposits, $S_x$ between $5x10^{-5}$ and $1x10^{-3}$ $m^{-1}$ and $S_y$ between 0.1 and 0.3.

## 4.4 Groundwater Levels

Table 1C in Appendix C reports the number of available monitored wells by area and dates; Table 2C the groundwater level statistics for each location; Table 3C vertical gradients estimated from dual/nested wells; and Table 4C the raw manual level data.

Figure 30 shows a map of the Tenas Area with the inferred water tables associated with the overburden and bedrock units. The groundwater in both systems is interpreted to flow under an average horizontal hydraulic gradient of approximately 0.04 m/m in the overburden and 0.09 m/m in the bedrock, towards the valleys, moving away from the Tenas open pit towards Tenas Creek, the Telkwa River, and Goathorn Creek. Static water levels are generally less than 2 mbgs (meters below ground surface) in the south part of the Tenas Area, to more than 20 mbgs in the north part of the Tenas Area, where overburden changes to thick sequence of sand-gravel-rich till deposits. Six wells[1] screened in bedrock indicated flowing artesian conditions, at least on a seasonal basis, and are interpreted to be controlled by topography. Six wells[2] showed small upward gradients from bedrock to overburden: and four wells[3] downward gradients from overburden to bedrock or from bedrock upper layer to lower layers.

Figure 31 shows continuous groundwater level measurements recorded from Sep. 2018 to Aug. 2019, in TOB96-02-06 and TOB96-02-20 (screened in till, and sand and gravel respectively), and T95R64, T95R-15C, and T96R-16-19 (all screened in Coal unit 1). TOB96-02-20 is dry, the water levels dropped below the well screen bottom. The records at T95R-15C have a data gap between April and June.

The overburden well (TOB96-02-06) shows highs occur in spring with freshet and lows in winter; amplitude between highs and lows is about 3 m. The 2018 and 2019 records have differences; the peaks associated with freshet are offset (i.e., mid-May 2018 and mid-July 2019), and an increase of 1 m is observed between November 2017 and January 2018 but not in 2019. These differences correlate with the differences in precipitations (i.e., high rainfall in Oct. 2017, high snowfall in Feb. 2018, and a total precipitation of 672 and 502 mm/yr in 2018 and 2019 respectively with the snow equivalent to 70% of total precipitation in 2018 versus 30% in 2019).

[1] T18-04D#2 (W01#D), T95R-15C, T95R-39C, T96R-34-67, T96R-34-87, T96R-56C-83
[2] 18-04D, 96R-16 (0.001 to 0.03)
[3] 18-08D, 96R-34, OB96-02, OB96-11 (0.006 to 0.7, and >1 where groundwater perched in overburden)

The bedrock wells can be divided in two groups: one with T96R-16-19, the other with T95R-64 and T95R 15C. T96R-16-19 shows highs in spring with freshet, and lows in fall and winter; amplitude between highs and lows is about 1 m. The variations are like those observed in TOB96-02-06 which suggest the well is connected with overburden. Differences with overburden wells are noted but difficult to interpret: The winter 2017-2018 peak occurs earlier (Nov.17 versus Jan.18); level is low in August 2018 then increases gradually by a small amplitude, and contrary to the overburden well the 2018 and 2019 peak have similar magnitudes. T95R-64 and T95R 15C show a different trend: the highs are observed in winter and lows in summer and fall; amplitude is about 0.4 m. This implies recharge from precipitation is delayed by several months, potentially by the low permeability of the silt-clay-rich till. Differences between the two wells are noted but difficult to interpret: the highs and lows are offsets by about 1 to 2 months; and in the last three months of records the trends diverge (i.e., levels decline in T95R-15C, and increase in T95R-64).

## 4.5 Groundwater Seepages

In November and December 2018, ERM searched for seeps along the Tenas and Four creeks. The survey was completed via helicopter and during winter conditions to aid visual identification of seeps from the air. One seep was located and photographed on Tenas Creek. (Easting 617555 Northing, 6055416; Plate 17). The survey line, seep location and photo of the seep are shown on Figure 32. The geological control of this resurgence is uncertain. It could be linked to a perched system on top of clay. There is no mapped geological structure aligned with the seep.

## 4.6 Groundwater Quality

The baseline groundwater quality program and data (i.e., TML's MW and residential wells) are detailed in EA Chapter 6; the locations of the monitoring well screens are shown in Figure 33.

Statistics for groundwater quality constituents in the overburden and bedrock units are provided in Table 4-2, exceedances compared the British Columbia water quality guidelines – freshwater aquatic life (BC WQG FAL, MOE 2020d) and drinking water sources (BC WQG DWS, MOE 2020e) are mapped in Figure 34, and a summary of the groundwater quality is presented in Appendix D. Piper plots of the observed groundwater quality are shown in Figure 35. The analysis of the groundwater quality shows:

- The pH value for the bedrock and the overburden wells ranges from 7 to 9 except for T18-04 (W1D, W1S) and T18-08D (W3S). This is within the range of the British Columbia water quality guidelines – freshwater aquatic life (BC WQG FAL,) for pH of 6.5 to 9.0. The pH above 9 were observed in two opposite areas, to the west and south sides of the deposit respectively in W1D (9.1 to 9.6, seven out of eight events), W1S (9.1 to 9.6, three out of eight events), and W3S (7.8 to 9.2, one out eight events). They correlated with high turbidity values, which may indicate incomplete development within the holes.
- Turbidity was below the BC WQG – FAL value of 50 NTU (Nephelometric Turbidity Unit), except for 19 samples in 8 monitoring wells (T95R-40, T95R-15C, T96R-34-87, T18-04, TOB96-02-20, TOB96-01-05, and T18-06 D). Turbidity values were generally slightly higher in the

overburden wells in comparison to the bedrock wells due to the fine-grained nature of the glacially deposited material.

- Hardness ($CaCO_3$) - The bedrock groundwater is 'considered soft' and overburden groundwater 'hard'. Hardness in the bedrock wells ranged from 3.9 to 138.0 mg/L, with an average concentration of 51.3 mg/L, and in the overburden wells from 57.9 to 423.0 mg/L, with an average concentration of 222.8 mg/L.

- Anions and nutrients - Fluoride exceeded the BC WQG – FAL guideline of 0.4 to 2.0 mg/L (hardness dependent). In bedrock wells, fluoride ranged from 0.32 to 5.55 mg/L, with an average concentration of 1.68 mg/L; in the overburden wells from 0.086 to 0.383 mg/L, with an average concentration of 0.18 mg/L. Fluoride also exceeded the BC WQG - DWS guideline of 1.5 mg/L at T95R-64, T96R-34-87, T95R-15C, and T18-04D (W1D). Nitrate concentrations were below detection limits, except for two bedrock wells (T18-04D, T18-08D) and three overburden wells (TOB96-01-05, TOB96-02-06 and TOB-11-04). Low concentrations of nitrite were detected in one bedrock well (T18-08D) and four overburden wells (TOB96-02-06, TOB96-11-04, TOB96-02-20, and T18-08S). Ammonia concentrations exceeded the BC FWQ-FAL guidelines in two overburden wells (T18-08S March 2019, T18-06D September 2018, and April, June, August and November 2019).

- Exceedances of dissolved and total metals above BC WQG – FAL approved or working guidelines are summarized below; the complete dataset is provided in Section 17 of the EAC Application:
  - Exceedances of total arsenic (>0.005 mg/L): T95R-15C, T95R-40, T96R-34-87, TOB96-02-20, T18-08S (W3S) and T18-06D (W2).
  - Exceedances of total copper (>0.002 - 0.026 mg/L [hardness dependent]): T18-04D (W1D), and -04S (W1S), T18-08D (W3D), T95R-40, T95R-64, TOB96-02-20, TOB96-01-05, and T18-06D (W2).
  - Exceedances of total chromium ($Cr^{III}$ >0.0089 mg/L; $Cr^{IV}$ >0.001mg/L): T95R-15C, T95R-40, T95R-64, T96R-34-87, TOB96-02-20, and T18-06D (W2).
  - Exceedances of total iron (>1 mg/L): T95R-15C, T95R-40, T96R-34-87, T18-04D (W1D), and -04S (W1S), TOB96-02-20, TOB96-11-04, TOB96-01-05, and T18-06D (W2).
  - Exceedances of dissolved iron (>0.35 mg/L): T95R-40, T95R-64, and T96R-34-87.
  - Exceedances of selenium (>0.002 mg/L): TOB96-02-20.
  - Exceedances of total zinc (>0.033-0.265 mg/L, [hardness dependent]): T95R-15C, T95R-40, T95R-64, T96R-34-87, T18-08D (W3D), and T18-06D (W2).

  The wells installed before 2017 reported more exceedances for total and dissolved metals before 2017 than between 2017 to 2019, which suggest the historical exceedances were caused by suspended particles derived from the formation (i.e., drilling and well installation disturbances) rather than natural dissolved metals in groundwater. This is also likely the case for the wells recently installed (i.e., 2017 to 2019) that reported exceedances of total metals; for the same metals and during the same sampling event, dissolved metal concentrations were below guideline values and generally below detection limits.

- Exceedances of dissolved and total metals above BC WQG DWS guidelines are summarized below:
  - Exceedances of dissolved antimony (>0.006 mg/L): T95R-64, T95R-40, T95R-15C (noted in only one sampling event at each location).
  - Exceedances of dissolved arsenic (>0.01 mg/L): T18-06D (W2).
  - Exceedances of dissolved iron (>0.3 mg/L): T95R-64, T95R-40, T96R-34-87, and T95R-15C.
  - Exceedances of dissolved cobalt (>0.001 mg/L): T95R-64, T95R-40, T95R-15C, T0B96-02-06, T0B96-02-20, T0B96-11-04, and T0B96-01-05.
  - Exceedances of dissolved mercury (>0.001 mg/L): T95R-64, T95R-40, T96R-34-87, T95R-15C, T0B96-01-05 (noted in only one sampling event at each location).
  - Exceedances of dissolved lead (>0.005 mg/L): T95R-64, T95R-40, T95R-15C, and T0B96-02-20 (noted in only one sampling event at each location).
  - Exceedances of dissolved manganese (>0.12 mg/L): T0B96-01-05, T18-06D (W2), and T18-08D (W3D), and noted in only one sampling event at T95R-64, T95R-40, T96R-34-87, T95R-15C, and T0B96-11-04.
  - Exceedances of dissolved uranium (>0.02 mg/L): T95R-64, T95R-40 and T95R-15C (noted in only one sampling event at each location).
- The piper plots show there are distinct hydrochemical differences between the shallow overburden wells (TOB96-11-04, TOB96-01-05, and TOB96-02-06), the deep confined overburden wells (T18-06D and T18-08D#1), the bedrock wells (T95R-15C, T95R-40, T95R-64, T94R-34-87, T18-04D#1 and #2, T18-08D#2) These differences are indicative of different residence time.
  - Groundwater from shallow overburden wells is classified as a calcium-magnesium-bicarbonate (Ca-Mg-HCO3) type. TDS range: 167 to 427 mg/L. TOB96-02-20 and TOB96-01-05 show minor cation variability between sampling events/seasons, while TOB96-11-04 and TOB96-02-06 have very consistent hydrochemistry between sampling events/seasons.
  - Groundwater from the bedrock wells, and from one of the new deeper overburden wells (T18-06D), is classified as sodium-bicarbonate type with minor calcium, magnesium, sulphate and chloride. TDS range: 365 to 1,910 mg/L. There are minor ionic differences between the Skeena Group coal seam bedrock wells and the Hazelton Group volcanic bedrock wells, with the volcanic rocks having a slightly higher percentage of sulfate than the coal seam bedrock wells. All the coal seam bedrock wells have similar chemistry. The groundwater from deep overburden is interpreted to have interactions with the underlying volcanic rock unit.
  - Groundwater in the newly installed nested well T18-08 is also classified as a sodium-bicarbonate (Na-HCO3) water type, although percentage of calcium + magnesium and sulfate are higher. The similar chemistry between upper and lower well screen may imply a hydraulic connection between the two lithologic units; a strong downward vertical hydraulic gradient is observed between the two wells.

**Table 4-2: Average groundwater quality in overburden and in bedrock**

| Parameter | Units | Overburden Water Quality | | | | Bedrock Water Quality | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Avg. | P50 | P95 | Count | Avg. | P50 | P95 | Count |
| TSS | mg/L | 840 | 15 | 2000 | 48 | 55 | 13 | 230 | 69 |
| TDS | mg/L | 330 | 340 | 410 | 48 | 920 | 820 | 1800 | 69 |
| pH (Field) | - | 7.9 | 7.7 | 8.8 | 46 | 8 | 7.7 | 9.2 | 68 |
| Alkalinity, total | mg CaCO3/L | 290 | 290 | 400 | 48 | 800 | 760 | 1700 | 69 |
| Hardness, total | mg CaCO3/L | 220 | 190 | 390 | 48 | 51 | 44 | 120 | 69 |
| Specific Conductance | µS/cm | 530 | 540 | 700 | 48 | 1400 | 1300 | 2800 | 69 |
| Bromide | mg/L | 0.061 | 0.05 | 0.1 | 39 | 0.35 | 0.25 | 1 | 57 |
| Chloride | mg/L | 1.5 | 0.52 | 3.3 | 48 | 4.2 | 2.5 | 10 | 69 |
| Fluoride | mg/L | 0.17 | 0.13 | 0.35 | 41 | 1.7 | 1.5 | 5.1 | 61 |
| Sulfate | mg/L | 18 | 11 | 42 | 48 | 24 | 6 | 75 | 69 |
| Ammonia, | mg-N/L | 0.15 | 0.025 | 0.61 | 44 | 0.32 | 0.32 | 0.69 | 69 |
| Nitrate | mg-N/L | 0.04 | 0.005 | 0.17 | 41 | 0.07 | 0.025 | 0.16 | 58 |
| Nitrite | mg-N/L | 0.0016 | 0.001 | 0.005 | 41 | 0.0072 | 0.005 | 0.02 | 58 |
| Nitrogen, total | mg/L | 1.3 | 0.54 | 5.9 | 40 | 0.81 | 0.38 | 2.2 | 64 |
| Aluminum, dissolved | mg/L | 0.032 | 0.005 | 0.034 | 44 | 0.033 | 0.0086 | 0.1 | 69 |
| Antimony, dissolved | mg/L | 0.00052 | 0.0005 | 0.00054 | 37 | 0.022 | 0.0005 | 0.00097 | 61 |
| Arsenic, dissolved | mg/L | 0.0034 | 0.00081 | 0.011 | 44 | 0.0011 | 0.0006 | 0.002 | 69 |
| Barium, dissolved | mg/L | 0.12 | 0.093 | 0.25 | 45 | 0.85 | 0.33 | 3.6 | 69 |
| Beryllium, dissolved | mg/L | 0.00034 | 0.0001 | 0.0002 | 44 | 0.00079 | 0.0001 | 0.005 | 69 |
| Boron, dissolved | mg/L | 0.084 | 0.10 | 0.10 | 44 | 0.19 | 0.16 | 0.34 | 69 |
| Cadmium, dissolved | mg/L | 0.00012 | 0.000021 | 0.00027 | 45 | 0.00022 | 0.000012 | 0.0016 | 69 |
| Calcium, dissolved | mg/L | 51 | 50 | 86 | 46 | 16 | 14 | 35 | 68 |
| Chromium, dissolved | mg/L | 0.0015 | 0.001 | 0.001 | 44 | 0.0011 | 0.001 | 0.002 | 69 |
| Cobalt, dissolved | mg/L | 0.0009 | 0.0003 | 0.0041 | 44 | 0.00057 | 0.0003 | 0.0026 | 69 |
| Copper, dissolved | mg/L | 0.0016 | 0.001 | 0.005 | 45 | 0.0019 | 0.001 | 0.0039 | 69 |
| Iron, dissolved | mg/L | 0.043 | 0.03 | 0.099 | 44 | 0.2 | 0.065 | 0.59 | 69 |
| Lead, dissolved | mg/L | 0.0021 | 0.0005 | 0.00093 | 44 | 0.0014 | 0.0005 | 0.001 | 69 |
| Lithium, dissolved | mg/L | 0.0048 | 0.0028 | 0.0067 | 45 | 0.054 | 0.05 | 0.1 | 66 |
| Magnesium, dissolved | mg/L | 21 | 14 | 51 | 46 | 3 | 1.9 | 8.6 | 68 |
| Manganese, dissolved | mg/L | 0.13 | 0.052 | 0.57 | 45 | 0.061 | 0.017 | 0.25 | 69 |
| Mercury, dissolved | mg/L | 0.0012 | 0.000005 | 0.00018 | 44 | 0.0029 | 0.000005 | 0.03 | 69 |
| Molybdenum, dissolved | mg/L | 0.0053 | 0.001 | 0.015 | 45 | 0.0044 | 0.001 | 0.015 | 69 |
| Nickel, dissolved | mg/L | 0.0027 | 0.001 | 0.017 | 44 | 0.0021 | 0.001 | 0.005 | 69 |
| Phosphorus, dissolved | mg/L | 0.18 | 0.012 | 0.89 | 40 | 0.023 | 0.016 | 0.06 | 61 |
| Potassium, dissolved | mg/L | 1.8 | 2 | 2 | 44 | 2.2 | 2 | 3.5 | 68 |
| Selenium, dissolved | mg/L | 0.00032 | 0.0002 | 0.00096 | 45 | 0.00026 | 0.00014 | 0.001 | 69 |
| Sodium, dissolved | mg/L | 46 | 20 | 110 | 45 | 350 | 320 | 720 | 68 |
| Silver, dissolved | mg/L | 0.0001 | 0.00002 | 0.00027 | 44 | 0.059 | 0.00002 | 0.0001 | 68 |
| Thallium, dissolved | mg/L | 0.00019 | 0.0002 | 0.0002 | 37 | 0.0002 | 0.0002 | 0.0002 | 58 |
| Tin, dissolved | mg/L | 0.001 | 0.0005 | 0.0049 | 36 | 0.00061 | 0.0005 | 0.00053 | 51 |
| Titanium, dissolved | mg/L | 0.012 | 0.01 | 0.024 | 44 | 0.013 | 0.01 | 0.05 | 66 |
| Uranium, dissolved | mg/L | 0.0017 | 0.0011 | 0.0032 | 45 | 0.023 | 0.0004 | 0.0071 | 69 |
| Vanadium, dissolved | mg/L | 0.0027 | 0.001 | 0.005 | 45 | 0.0039 | 0.00053 | 0.03 | 69 |
| Zinc, dissolved | mg/L | 0.011 | 0.005 | 0.012 | 44 | 0.0067 | 0.005 | 0.011 | 69 |

Source: GWQuality_Summary_Stats_rev08_smh.xlsx, (2020/11/19)

**Note:**

Avg., average

P50, 50$^{th}$ percentile

P95, 95$^{th}$ percentile

## 4.7 Groundwater Resources

The MOE Aquifer Classification Database (BC MOE 2020a) reports six aquifers located near the town of Telkwa, where the Telkwa River joins the Bulkley River, about 8 to 10 km northeast from the Project. Each aquifer is described in Table 4-3. Their outlines are mapped in Figure 36.

**Table 4-3: Description of the minor aquifers (BC MOE Well database)**

| Ref. Number | Class (1) | Rank (2) | Size ($km^2$) | Description | Productivity |
|---|---|---|---|---|---|
| 569 | IIC | 7 | 2.4 | Confined sand and gravel aquifers within undifferentiated sediment, overlain by fluvial and glaciomarine sediments (silt and clay). | Moderate. Well yields reported range between 0.23 and 3.0 L/s, median 0.95 L/s. |
| 576 | IIC | 11 | 5 | Confined sand and gravel aquifers within undifferentiated sediment, overlain by fluvial and glaciomarine sediments (silt and clay). | High. Well yields reported range between 0.30 and 1.5 L/s, median 0.83 L/s. |
| 578 | IIC | 8 | 159.8 | Confined bedrock aquifer. Predominately Middle Jurassic extrusive igneous rock. Minor sedimentary rocks are also noted (i.e., sandstone, conglomerate, and shale). | Low. Well yields reported range between 0.005 and 1.5 L/s, median 0.15 L/s. |
| 581 | IIIC | 9 | 26.7 | Confined sand and gravel aquifers within undifferentiated sediment, overlain by fluvial and glaciomarine sediments (silt and clay). | Moderate. Well yields reported range between 0.15 and 8.18 L/s, median 0.76 L/s. |
| 582 | IIB | 9 | 0.83 | Unconfined sand and gravel aquifer. | Moderate. Well yields reported range between 0.38 and 3.8 L/s, median 1.1 L/s. |
| 583 | IIA | 10 | 2.47 | Unconfined sand and gravel aquifer. | Moderate. Well yields reported range between 0.23 and 1.9 L/s, median 0.91 L/s. |

**Note:**

1 Development subclass: the level of development of an aquifer is determined by assessing demand verses the aquifer's yield or productivity - high (I), moderate (II), or low (III); Vulnerability subclass: the vulnerability of an aquifer to contamination from surface sources is assessed based on: type, thickness and extent of geologic materials overlying the aquifer, depth to water (or top of confined aquifers), and the type of aquifer materials - high (A), moderate (B), or low (C)

2 A numerical measure of an aquifer's priority is provided by the aquifer's ranking value. The ranking value is determined by summing the point values for each of the following hydrogeologic and water use criteria: productivity, size, vulnerability, demand, type of use, quality concerns (that have health risk implications), and quantity concerns. Possible ranking scores range from a low of 5 to a high of 21; the higher the ranking score, the greater the aquifer's priority.

## 4.8 Groundwater Users

Figure 36 shows known locations of private wells within the LSA (Sources: BC MOE 2020b, and TML March and July 2020). The closest private domestic wells are located:

- About 3.8 km (i.e., Goalder, Baker, and Mapletoft wells) north of the Project, to the west of Goathorn Creek, along the expected groundwater flow paths towards the Telkwa River.
- About 3.1 km (i.e., Alain's well), and 4.5 to 5.4 km (i.e., Kerr, Schmike, Shearer, Beukema wells, etc.) northwest of the Project, to the east of Goathorn Creek; there are located downgradient of the Project but not along the expected groundwater flow paths towards the Goathorn Creek or the Telkwa River.

As part of the baseline program, one residential well (Kerr well) was sampled quarterly during the groundwater sampling events from June 2018 to April 2019. Four additional residential wells (Schmike, Shearer, Ragula, and Beukema) were each sampled once during winter 2019.

The groundwater type for each of the residential wells (Figure 35) is categorized as a Ca+Mg bicarbonate type with the Schmike well containing a higher relative abundance of sulfate in relation to the other tested residential wells. Total arsenic, iron, manganese, and dissolved iron exceeded BC WQG FAL and the maximum acceptable concentration for drinking water sources in the Kerr well. Total phosphorus and TOC also exceeded the BC WQG DWS guidelines. Total copper exceeded the BC WQG FAL approved guideline in both the Schmike and Shearer wells. The Shearer well also had an exceedance of BC WQG DWS for total organic carbon. Total iron and manganese exceed the BC WQG DWS in the Ragula well. There were no exceedances in the Beukema well.

## 4.9 Past and Current Human Activities

Coal was reportedly discovered in the Telkwa area around 1900. Small-scale underground and surface mining began in 1918 and continued sporadically until 1985, resulting in the recovery of over 400,000 tonnes of coal at about 3.6 km north and northwest from the Project (Figure 36). Modern exploration of the Project to delineate further exploitable coal reserves started in 1978. Nowadays there are no significant human activities other than mining exploration and forestry; current human activities (i.e., mostly agriculture and forestry) are concentrated in the village of Telkwa and along roads, trails, and rail tracks.

# 5 Conceptual Groundwater Model

Groundwater is a key component of the biophysical environment, based on linkages to other ecosystem components, including surface water quantity, surface water quality, human health, aquatic resources, and wetlands.

This section presents conceptual models of the groundwater system for baseline, mining, and post-closure conditions. These models are simplified representations of the essential features of the groundwater system.

The development of conceptual models is an iterative process; therefore, it should be updated as new data becomes available, as the understanding of the system is improved, or as questions and modelling objectives evolve (Wels 2012).

The baseline conceptual model was developed from the data presented in Section 3. The mining, and post-closure conceptual models were developed from a scoping exercise that identified the Project components and activities having a potential to interact with the groundwater flow system; the identification was based on professional experience with other mining projects in British Columbia and through multi-disciplinary consultation with TML and external consultants working on behalf of TML.

## 5.1 Baseline Conditions

### 5.1.1 Hydrostratigraphic Units

The groundwater system is divided into two sub-systems: a deep bedrock system, and a shallow overburden system. Figure 37 shows how the Project K data generally compares to published K values.

#### Deep Bedrock System

The deep bedrock groundwater system is interpreted to be controlled by the hydraulic properties of the Skeena sedimentary rock group, the volcanic group, fractures and faults. At the scale of the Telkwa watershed the fractured rock system is assumed to be equivalent to a porous medium. Table 5-1 presents the two conceptualized hydrostratigraphic units in bedrock.

**Table 5-1: Hydrostratigraphic units conceptualized for the bedrock system**

| Unit | Type | Expected Permeability | $K_{xy}$ range (m/s) | Extent |
|---|---|---|---|---|
| Skeena Group | Confined aquifer interbedded with aquitards/aquicludes | Moderate $K_{xy} > K_z$ (1) | $K_{xy}$ $10^{-8}$ to $10^{-6}$ Anisotropy Ratio 2 to 4 | Tenas and Goathorn synclines |
| Volcanic Group | Confined aquifer | Moderate $K_{xy} \approx K_z$ | $K_{xyz}$ $10^{-8}$ to $10^{-6}$ | Entire Project area |

**Note:**

[1] $K_{xy}$, hydraulic conductivity parallel to beddings, and Kz, hydraulic conductivity perpendicular to beddings

The complex sedimentary sequence of the Skeena group is simplified and represented as a single unit characterized by an anisotropy ratio perpendicular to bedding planes (i.e., K parallel to beddings higher than K perpendicular to beddings). The rational for this simplification and the approach to estimate the ratio are described below:

- The hydraulic tests show that coal seams and sandstones tend to be characterized by a moderate K and mudstone and siltstones by a lower K; as a result, the coal seams and sandstone beds should act as preferential pathways to groundwater, and the mudstone and

siltstone beds as aquitards or aquicludes. This behavior is equivalent to a bedding-aligned anisotropy[1], with K perpendicular to bedding ($K_z$) lower than K parallel to bedding ($K_x$, $K_y$);

- The anisotropic ratio can be estimated based on TML drillhole logs and K measurements. The analysis is summarized in Table 5-2; the details of the analysis are provided in Table 2B in Appendix B.

It is also noted that the drillhole logs and the TML geological model generally indicate relatively thick layers of mudstone between the open pit floor and the top of the volcanic group, which could limit the transmission of groundwater to and from the open pit. This complexity is not accounted in the conceptual models because the current dataset does not guarantee the absence of connections between upper and lower sub-units separated by mudstone, for example along faults where displacements may have created connections between layers previously separated.

**Table 5-2: Assumptions and summary of the Skeena group equivalent K analysis**

| Lithology | $K_i$ (m/s) | $B_i$ (m) | $K_{xy}$ (m/s) | $K_z$ (m/s) | Kxy/Kz ratio |
|---|---|---|---|---|---|
| Coal seams | $5x10^{-7}$ m/s | Drillhole logs | Min=$3x10^{-8}$<br>Max=$4x10^{-7}$<br>Geomean=$1x10^{-7}$ | Min=$3x10^{-8}$<br>Max=$2x10^{-7}$<br>Geomean=$5x10^{-8}$ | Min=1.0<br>Max=4.7<br>Average=3.0 |
| Sandstone | $3x10^{-7}$ m/s | | | | |
| Mudstone/Siltstone | $3x10^{-8}$ m/s | | | | |

**Note:**

The equivalent K parallel to bedding ($K_{xy}$) and equivalent K perpendicular to bedding ($K_z$) are calculated for each drillhole using the formula:

$K_{xy} = (\sum_{i=1}^{n} B_i \times K_i) \ / \ (\sum_{i=1}^{n} B_i)$ and $K_z = (\sum_{i=1}^{n} B_i) \ / \ (\sum_{i=1}^{n} \frac{B_i}{K_i})$. (Freeze and Cherry, 1979)

Where $B_i$ and $K_i$ are respectively the thickness and hydraulic conductivity of the layer i, and $K_i$ corresponds to the K geomean of each lithology calculated from the TML K database (Section 4.2).

Two other conceptual simplifications are assumed:

1. No major geological structure is represented as preferential flow pathway and/or barrier. Data collected to date does not indicate influences on the flow system from known faults mapped in the Project area. There is no groundwater spring or seep identified along the projected interpreted fault lines, no significant change of hydraulic conductivity associated with fractures or faults, no apparent change in water levels or hydraulic gradients caused by faults, and no structure linking directly the Project and the private well locations.

2. The intrusions located at about 5 km east and 7 km northwest from the open pit are merged with the Volcanic Group. The intrusive rocks are located away from the potential flow paths where groundwater originating from the Project would potentially discharge at surface. They are not expected to influence the groundwater predictions.

[1] Based on the nature of the testing performed to date, the K data is interpreted as representative of the hydraulic conductivity parallel to bedding.

### Shallow Overburden System

The shallow overburden system is influenced by the distribution of fine material within the till, which is conceptualized and simplified to have two main units: the silt- or clay–rich glacial till, and the glaciofluvial sand-gravel-rich till or outwash. Where present, the silt-clay-rich till act as an aquitard that limits the infiltration of precipitation and promotes runoff, whereas the sand-gravel-rich till act as an aquifer that connects the groundwater system to the stream valleys. The sand-gravel-rich till unit contains fines (Figure 17) and is characterized by moderate K ($1x10^{-6}$ m/s); it is not a clean sand and gravel unit with homogeneously high K. Lenses of sand and/or gravels interbedded in silt-clay-rich till may be present locally; these are expected to have limited influence on the system because of the low permeability material surrounding them. Table 5-3 presents the three conceptualized hydrostratigraphic units in overburden.

**Table 5-3: Hydrostratigraphic units conceptualized for the overburden system**

| Unit | Type | Expected Permeability | $K_{xy}$ range (m/s) | Extent |
|---|---|---|---|---|
| Fluvial sand/gravel | Unconfined aquifer | High $K_{xy} \approx K_z$ | $K_{xyz}$ $10^{-4}$ to $10^{-2}$ | Stream beds and alluvial valleys |
| Glaciofluvial sand-gravel rich till | Unconfined aquifer | High $K_{xy} \approx K_z$ | $K_{xyz}$ $10^{-7}$ to $10^{-3}$ | Bedrock depressions north of the open pit |
| Glaciofluvial silt-clay-rich till | Aquitard or aquiclude | Low $K_{xy} \approx K_z$ | $K_{xyz}$ $10^{-9}$ to $10^{-7}$ | Cover almost all the Project area |

### 3D Geometries of the Hydrostratigraphic Units

The 3D geometries of the hydrostratigraphic units were generated with the software Leapfrog Geo v4.4.2 (i.e., a 3D geological modelling tool) from the analyses of drillhole intercepts (TML's database), geological maps (surface and bedrock geology, regional and local maps, 2D cross sections; Clague 1984, MEMPR 1993, BCGS 2005, TML 2018), and considerations on the ability of a unit to convey groundwater (i.e., permeability or hydraulic conductivity).

SRK generated the initial 3D solids of the sand-gravel-rich till and extended the 3D surface of the top Hazelton volcanic group contact based on the regional geology map (Figure 7). The fluvial sand/gravel deposits present in the creek/river valleys were not explicitly represented; they were merged with the sand-gravel-rich till on the basis that site data was not available and that groundwater flow to creeks is controlled by the lower K units (i.e., bedrock or fine-grained overburden) surrounding the fluvial deposits.

To control the quality of the interpolation, surfaces were verified visually in cross sections with respect to the reported borehole lithologies. Corrections and further interpretations of the hydrostratigraphic contacts were based on professional judgement, for example where density of borehole data is low. The extrapolation of the overburden geometries outside the Tenas Area, where drillhole information is limited or absent, was constrained by the following assumptions:

- In areas located downstream of the Project and flow paths expected to connect to the creeks, the potential connections between the mine area and the streams through thick permeable sand and gravel deposits are emphasized.
- Elsewhere overburden consists of fine textured glacial deposits with a relatively low thickness of about 5 to 10 m (i.e., based on TML drillhole database the median thickness is 7 m).

TML's chief geologist, Ron Parent, reviewed the initial SRK 3D solids and used TML's drillhole database (as of May 2019) to refine the distribution of silt-clay-rich till and sand-gravel-rich units. The update was provided to SRK as 3D surfaces (i.e., bedrock/overburden contact, upper silt-clay-rich till/sand-gravel-rich till contact, and sand-gravel-rich till/lower silt-clay-rich till contact). The distinction between upper and lower silt-clay-rich till is predicated on the presence of an intervening sand (or gravel) layer; so, although both sub-units are comprised of similar material, they are given this distinction to facilitate modeling. Figure 38 isopach thickness for the overburden, Figure 39 for the sand-gravel outwash deposits, and Figure 40 for the silt-clay-rich till cover. Figure 41 shows the isopach thickness (i.e., total thickness) map for the Skeena group.

### 5.1.2 Groundwater Flow

Conceptual cross-sections of the baseline groundwater flow system are presented in Figure 42 to 46. The deep bedrock groundwater system has a large lateral extent and is characterized by confined flow, relatively long residence times in the subsurface, and higher concentrations of dissolved solids. The bulk of recharge to the bedrock system occurs from the infiltration of precipitation and runoff in the upland area of the Tenas Creek and Goathorn Creek watersheds, where the silt-clay-rich till coverage is limited. Groundwater level measurements indicate that hydraulic gradients (and inferred groundwater flow) are from the upland areas in a northerly direction towards the major drainage features of the area, namely the Telkwa River and its tributaries, Tenas Creek and Goathorn Creek. Discharge from the bedrock system is expected to be dominant in these three drainages because of the difference of elevation between the valleys and the terraces. Infiltration from the creeks to the bedrock or overburden system may occur locally in floodplains but will be likely limited to shallow flow paths (i.e., water from the streams getting into bedrock, flowing subsurface superficially, and daylighting further downstream).

The shallow overburden system is characterized by local unconfined groundwater systems with relatively short residence times and lower concentrations of dissolved solids. Groundwater flows in a north-easterly direction towards Four Creek and in a north-westerly direction towards Tenas Creek, from topographic highs to adjacent topographic lows (Figure 30). A downward vertical gradient is observed between the upper and lower water-bearing surficial deposits, and between overburden units and bedrock units. Locally the groundwater can be disconnected (i.e., perched) above the bedrock groundwater system. Groundwater discharge from overburden is expected to occur in the valleys of Tenas Creek, in Four Creek and in Goathorn Creek, at least those portions known to be connected to the water table, as well as marshes and swamps.

Recharge from precipitation to groundwater is expected to range between 5 and 30% of MAP (Table 5-4).

**Table 5-4: Estimated recharge and baseflows for the Tenas Creek, Goathorn Creek, and Telkwa River**

| Creek/River name | Estimated range of recharge ($m^3/d$) | | Estimated baseflow [2] ($m^3/d$) |
|---|---|---|---|
| | Recharge = 5% MAP[1] | Recharge = 30% MAP [1] | |
| Tenas Creek (watershed 60 $km^2$) | 5,823 | 34,940 | 9,383 |
| Goathorn Creek (watershed 130 $km^2$) | 19,049 | 114,294 | 20,330 |
| Telkwa River (watershed 830 $km^2$) | 82,315 | 493,892 | 129,799 |

**Note:**

[1] MAP = 721 mm/y (SRK 2020)

2 Based on estimated average unit baseflows in Table 2-3 (SRK, 2020).

## 5.2 Mining and Post-closure Conditions

During the pre-construction and construction phases, activities will modify the characteristics of the subsurface but their influence on the groundwater system is anticipated to be minor and localized to the immediate footprints of the respective infrastructures.

During mining and until closure, the development and dewatering of the open pit, and the construction and operation of the material and water management facilities will change the physical properties of the ground and subsurface, site drainage patterns, and groundwater flows at and around the mine (i.e., pore pressures behind slopes, drawdown cone). Dewatering activities will result in a drawdown of the water table that will gradually expand over time, and possibly induce a seasonal reduction of baseflow in the Tenas Creek and Goathorn Creek. Mining activities may impact the groundwater quality; mine-affected water (i.e., from PAG/NAG rocks, blasting, dust, potential spillage of chemicals, oils, and fuels, etc.) will infiltrate into the ground and migrate through the groundwater system into the valleys (i.e., Tenas River, Goathorn Creek, Telkwa River) or private domestic wells. The NMP, EMP, WMP, and Tenas Control Pond are designed with low permeability liners and ditches along their peripheries to minimize the infiltration of mine-affected water and intercept water discharges downgradient of the dams. The whole footprints of the NMP, EMP, and Tenas Control Pond, and 57% of the WMP's footprint will be lined (i.e., the natural ground located outside the open pit, and the open pit walls intercepting overburden; the open pit walls and open pit floors intercepting bedrock will not be lined). The storage management will be lined with engineered soil-bentonite compacted layers, and the Tenas Control Pond with a bituminous geomembrane or equivalent. The design details of the management ponds and Control Pond are documented in Part A, Section 1 of the EAC Application.

At closure, the total footprint of the Project will correspond respectively to about 5.5% and 2.2% of the Tenas Creek and Goathorn Creek watersheds; dewatering of the open pit will stop, and the groundwater system will progressively return to steady post-closure conditions. The management ponds will remain, and the Tenas Control Pond will be eventually decommissioned. The mine affected water that entered the groundwater system during operation will continue migrating while new post mine-affected water from weathering of open pit walls, open pit lakes and management ponds will enter and migrate through the groundwater system. Conceptual cross-sections of the groundwater flow system at post-closure are presented in Figure 47 to 51.

Table 5-5 summarizes the potential effects of the Project to the groundwater system. The key potential issues are the effects on groundwater discharges into nearby creeks, and the migration of mine-affected water to private domestic wells located immediately downstream of the Project.

**Table 5-5: Potential Project Interactions with the Groundwater System**

| Project Component or Activity | Potential Effect / Pathway of Interaction with Hydrogeology |
|---|---|
| **Construction Phase** | |
| Site clearing, pre-stripping, building construction, road development, rail loop construction, bridge construction, and development of onsite utilities and services. | Changes to site drainage patterns and subsurface characteristics due to construction works. Changes to groundwater quality resulting from dust deposition or accidental spillage. |
| **Mining Phase** | |
| Excavate the open pit. | Changes to watercourses, site drainage patterns, subsurface characteristics and groundwater flow caused by mining and dewatering. Changes to groundwater quality because of metal leaching and acid rock drainage. |
| Establish and operate waste management facilities. | Changes to watercourses, site drainage patterns, subsurface characteristics and groundwater flow caused by construction, diversions, and infiltration underneath stockpiles or storage management ponds (NMP, EMP, and WMP). Changes to groundwater quality caused by infiltration of mine-affected water underneath waste management facilities. |
| Establish and operate water management facilities. | Changes to watercourses, site drainage patterns, subsurface characteristics and groundwater flow caused by construction, diversions, and infiltration underneath the Control Pond, sedimentation ponds, and ditches. Changes to groundwater quality caused by infiltration of mine-affected water underneath water management facilities. |
| Pump groundwater for domestic facilities. | Changes to groundwater flow at the vicinity of the well caused by pumping. |
| Temporarily store hazardous substances including fuel, explosives, and mine supplies | Changes to groundwater quality from the use of chemicals and fuel and the potential for spills |
| Contingency pumping of water from water supply wells along the edge of Goathorn Creek. | Changes to groundwater flows in the alluvial bed of Goathorn Creek caused by pumping. |
| **Closure and Reclamation Phase** | |
| Decommission and reclaim of all buildings and structures. Re-contour slopes and re-vegetate. | Changes to site drainage patterns due to decommissioning activities; changes to groundwater flow through changes to local scale flow or drainage pathways. Changes to groundwater quality because of erosion, sedimentation, and changes to infiltration rates. |
| Stop dewatering, open pit reflood, and formation of open pit lakes. | Changes to groundwater flows. Changes to groundwater quality caused by infiltration of mine-affected water underneath the open pit lakes. |
| Maintenance of the material management facilities. | Changes to groundwater quality caused by infiltration of mine-affected water underneath waste management facilities. |

# 6 Groundwater Effects Predictions

This section presents the 3D-numerical model developed for the EA Application to assess the effects of the Project on the groundwater. The predictions include estimates of groundwater quantities intercepted by the mine, potential changes to groundwater baseflows in creeks, and potential contributions and average travel times of mine-affected groundwater to creeks and private wells.

## 6.1 Model Software

Numerical groundwater modeling was completed using the software, FEFLOW 7.4 (DHI, 2020). FEFLOW is a professional software package for modeling fluid flow and transport of dissolved constituents and/or heat transport processes in the subsurface. This program is used extensively for groundwater mining projects around the world. The code is based on a finite element solution of the partial differential equations for flow and transport.

## 6.2 Model Assumptions

The numerical model required several simplifying assumptions. These include:

- The groundwater system can be simulated using unconfined saturated flow equations.
- Groundwater flow can be approximated by an equivalent porous media model.
- Heterogeneity in the stratigraphic layering can be approximated using anisotropic conditions.
- Faulting does not have a significant influent on the regional scale flow system, with no major structures identified that act as significant conduits and/or barriers.
- Groundwater flow states can be approximated based on steady-state flow conditions.
- Material storage piles do not significantly alter the sub-surface flow conditions.

## 6.3 Groundwater Model Setup

### 6.3.1 Model Domain

The model domain (Figure 52) covers an area of approximately 20 x 15 km, with a total area of 280 km$^2$. The domain is set to encompass the Goathorn Creek watershed, and to be bounded by the Telkwa River and the Bulkley River.

The upper surface of the model is defined based on the DEM provided by TML (Email dated May 2019). The base of the model is set at a fixed depth of 400 mbgs projected downward from the surface topography, which is 3.3 times deeper than the proposed open pit (120 mbgs).

### 6.3.2 Model Mesh

The finite element mesh (Figure 52) is constructed with 30 layers. Each model layer has a constant thickness (Table 6-1) and comprises 85,595 prismatic elements. The top elevation corresponds to

the topographical surface. Horizontal spacing is refined in the Project area and along the creeks (i.e., an element length of approximately 30 m at the Project and along creeks and increasing to a maximum of 500 m).

**Table 6-1: Thicknesses of the model layers**

| Layer # | Thickness (m) |
|---|---|
| 1 and 2 | 0.5 |
| 4 | 3 |
| 5 to 23 | 5 |
| 24 and 25 | 25 |
| 26 to 30 | 50 |

### 6.3.3 Boundary Conditions

The boundary conditions are described below and illustrated in Figure 53.

**In-Situ Boundaries**

- No flow (i.e., zero-flux) boundaries are assigned to:
  - Model edges which correspond to the upper reaches of the surface water catchment divides,
  - The top surface of the model, except where creeks/rivers or mine workings are present,
  - The base of the model.
- Constant head (i.e., Dirichlet) boundaries are assigned to:
  - Lower reaches of the creeks/rivers.
    Head values were assigned based on ground surface elevations.
- Seepage (i.e., flux constrained Dirichlet) boundaries are assigned to:
  - Upper reaches of the creeks/rivers.
    Head values were assigned based on ground surface elevations and are constrained to only allow flow out of the model. For example, flow can discharge into the creeks when heads exceed the creek levels, but the reverse is not allowed (i.e., ingress into the model if heads drop below creek levels). This represents the fact that small streams have limited capacity and do not significantly contribute to the recharge when dry.
- Source/sink (i.e., modified Neuman) boundaries are assigned to:
  - Top layer of model to simulate vertical recharge into the model.

**Mine Working Boundaries**

- Seepage (i.e., flux constrained Dirichlet) boundaries are assigned to:
  - Open pit walls (e., EoY1, EoY7, EOM, and post-closure conditions).
    Head values were assigned based on open pit wall elevations.
- Constant head (i.e., Dirichlet) boundaries are assigned to:
  - Unlined portions of the WMP, saturated waste rock, and open pit lake during post-closure. Assigned head values correspond to maximum water level at the WMP and spill point elevations (Table 6-2).

**Table 6-2: Head levels at WMP saturated waste rock, and open pit lake**

| Feature | Period | Head Elevation (masl) |
|---|---|---|
| Open pit lake | Post-closure | 909 |
| Saturated mine rock south end of open pit | Post-closure | 901 |
| WMP (not lined) | Operation, Post-closure | 851 |

- Well (point-source fluid-flux) boundaries were assigned to lined water management facilities (i.e., management ponds and Control Pond). Seepage rates for the facilities were calculated using:
  - NMP, EMP, and WMP.
    Seepage rates were calculated from 2D Seep W modelling documented in 7Appendix E Results are presented in Table 6-3.
  - Control Pond.
    Seepage rates were calculated using the analytical solution presented in Giroud (1997) for the migration of liquid through composite liners with geomembrane defects. The analysis is documented in 7Appendix F; results are presented in Table 6-3.

**Table 6-3: Estimated seepage rates through designed liners**

| **Total seepage rate under liners** ($m^3/d$) | **Control Pond** (bituminous geomembrane) | **EMP** (S/B0.30) | **NMP** (S/B0.30) | **WMP Ex pit** (S/B0.30) |
|---|---|---|---|---|
| | 140 | 458 | 198 | 568 |

Sources: Appendix E, F, and surface areas from TML 2020.

### 6.3.4 Model Properties

Each model element was assigned with the property of one of the conceptual hydrostratigraphical units (i.e., sand-gravel rich till, silt-clay-rich till, Skeena group, or volcanic Group) based on the 3D geometries illustrated in Figure 40 to 41 (Section 5.1.1). Table 6-4 compiles the properties of the calibrated numerical model.

**Table 6-4: Groundwater model properties**

| Hydrostratigraphic Unit | Parameter | Unit | Value |
|---|---|---|---|
| Sand-Gravel-rich till<br>- Homogeneous and isotropic. | $K_{xyz}$ | m/s | $2.9x10^{-6}$ |
| | $S_y$ | - | 0.23 |
| | $S_x$ | 1/m | $4x10^{-4}$ |
| Silt- clay-rich Till<br>- Homogeneous and isotropic. | $K_{xyz}$ | m/s | $2.4x10^{-7}$ |
| | $S_y$ | - | 0.11 |
| | $S_x$ | - | $2x10^{-5}$ |
| Sedimentary rocks<br>- Homogeneous and anisotropic. The highest conductivity ($K_{xy}$) is parallel to bedding dip and the lowest ($K_z$) is perpendicular; the bedding orientation matches the 3D surfaces of the Hazelton Volcanic Group contact (Section 5.1.1) | $K_{xy}$ | m/s | $3.6x10^{-7}$ |
| | $K_z$ | m/s | $1.8x10^{-8}$ |
| | $S_y$ | - | 0.09 |
| | $S_x$ | - | $5x10^{-6}$ |
| Volcanic & Intrusive rocks<br>- Homogeneous and isotropic. | $K_{xyz}$ | m/s | $2.1x10^{-8}$ |
| | $S_y$ | - | 0.05 |
| | $S_x$ | - | $5x10^{-6}$ |
| Recharge (1)<br>- Uniform and constant. | R | mm/yr | 57.62 |

**Note:**

1 The modeled annual recharge is equivalent to about 8% of MAP.

## 6.4 Model Calibration

Calibration was conducted manually and based on steady-state conditions.

The calibrated model corresponds to the best fit to head observations between the 6th and 15th of September 2018 and average annual baseflows estimated from the historical WSC Goathorn station data. The fit was adjusted by varying the hydraulic conductivities (Kxyz), and the recharge. Calibration plots and a map of the residual errors are presented in Figure 55; full details on the calibration dataset provided in Table 1F of 7Appendix G.

The overall fit is considered reasonable for both heads and baseflows, with a Normalized Root Mean Square Error (NRMSE) of 3.2% for hydraulic heads and 3.6% for baseflows (Figure 55). A minor north-south trend is observed in the residual error structure, which may reflect a minor unaccounted-for geological control. The sensitivity of the model to the calibration is addressed in Section 6.8.

## 6.5 Model Scenarios and Applications

The modeling scenarios are presented in Table 6-5. The steady state groundwater predictions are used to support the evaluation of Project effects to groundwater users, for both quantity and quality. Particle tracks are used to estimate the flow paths of mine affected groundwater and their potential contribution to creeks, rivers, and private wells. The Water Balance and Load Model (WBLM, Section 4, Chapter 3 of the EAC Application) combines the groundwater predictions (flow rates, changes to baseflows, contributions of mine affected groundwater to creeks), the direct precipitation, the runoff, the surface flows of the waste and water management systems, and the loads to evaluate the effects of the Project to surface water, for both quantity and quality.

**Table 6-5: Summary of the Model Simulations**

| Temporal Boundary | Assumptions | Objectives |
|---|---|---|
| *Current conditions:* | No mining activities. The system is driven by the recharge I at surface, and the discharges at drainages (rivers, creeks, swamps). | To estimate the calibrated properties of model and simulate the baseline conditions of the groundwater system. |
| *Pre-construction and construction phases* | These periods are not considered. The influences from site clearing; pre-stripping; construction of the buildings, road, rail loop, bridge, and onsite utilities and services on groundwater are expected to be minimal. | |
| *Mining* EoY1 | The mine has been excavated for one year. Open pit dewatering is active (1). The Control Pond and NMP are constructed, and water levels are at their maximum. | To estimate open pit inflow rates, changes to groundwater baseflow in creeks, mine-affected infiltration rates, pathways, travel times, and potential contributions to creeks and domestic wells. |
| *Mining* EoY7 | The mine has been excavated for seven years (1). Open pit dewatering is active. Rock storage piles are not explicitly modelled (2). The Control Pond, NMP, and EMP are constructed, and water levels are at their maximum. | |
| *Mining* EOM Y22 | The mine is fully excavated (1) (i.e., 22 years). Open pit dewatering is active. Rock storage piles are not explicitly modelled (2). The Control Pond and all the management ponds are constructed, and water levels are at their maximum. | |
| *Mining* EOM hypothetical worst-case drawdown | The mine is fully excavated (1). The open pit dewatering is active. Rock storage piles are not explicitly modelled (2). There are no Tenas Control Pond or management ponds impeding the progression of groundwater drawdown. | To estimate worst case drawdown extent. |

| Temporal Boundary | Assumptions | Objectives |
|---|---|---|
| *Post-closure:*<br>EoY30 | The mine is fully excavated (1). Dewatering pumps are shut off and open pit is allowed to re-flood; the groundwater systems return to equilibrium. Rock storage piles are not explicitly modelled (2). The Tenas Control Pond has been decommissioned. The NMP, WMP, and EMP are constructed, and water levels are at their maximum. | To estimate the changes to groundwater baseflow in creeks, mine-affected infiltration rates, pathways, travel times, and potential contributions to creeks and domestic wells. |

**Note:**

1 The progressive incremental excavation of the open pit is not simulated. At the start of a simulation (time, t = 0), the predictive scenarios assume excavations correspond to the open pit shell of the simulated year (EoY1, EoY7, EOM, and Post-closure). This is considered acceptable because the predictions of the effects of the Project to the groundwater flow system are expected to be overestimated because of bigger stresses.

2 The rock storage piles are expected to be characterized by hydraulic conductivities several magnitudes higher than overburden and bedrock due to high porosities between the rocks. The recharge over the rock storage piles is assumed to remain unaffected (i.e., reduced or increased compared to baseline) and transmitted quickly to the base of the piles.

## 6.6 Model Results for the Proposed Pond Designs

This section presents the model predictions for the proposed EA mine plan (i.e., EMP, NMP, and WMP lined with engineered 0.30 m thick soil-bentonite (S/B) compacted layers, and the Tenas Control Pond with a bituminous geomembrane or equivalent). Only parts of the WMP are lined: the portions outside the open pit (WMP Ex pit), and the portions inside the open pit (WMP In pit) that intercept overburden.

### 6.6.1 Current Conditions

The predictions of hydraulic heads are mapped in Figure 56.

### 6.6.2 Mining Conditions

**Open pit inflows and seepages underneath the mine facilities**

Table 6-6 compiles the groundwater inflow and outflow rates predicted at the open pit, the Tenas Control Pond, and the management ponds. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to design the water management system and evaluate the overall effects of the Project to surface water.

The open pit inflows range between 320 and 890 $m^3/d$. Under groundwater conditions alone, inflows of these magnitudes are typically managed with open pit sumps and do not require active dewatering systems. The seepage rate underneath the control pond is 140 $m^3/d$. The total seepage rate underneath the management ponds at end-of mine is 1,490 $m^3/d$.

**Table 6-6: Forecasts of open pit inflows and seepages during operations**

| Feature | | Groundwater flow rate ($m^3/d$) | | | |
|---|---|---|---|---|---|
| | | EoY1 | EoY7 | EOM | *Worst case (1)* |
| Open pit inflows | IN | 0 | 0 | 0 | 846 |
| | OUT | 0 | 0 | 0 | na |
| Control Pond | IN | 140 | 140 | 140 | na |
| | OUT | 0 | 0 | 0 | na |
| NMP | IN | 198 | 198 | 198 | na |
| | OUT | 0 | 0 | 0 | na |
| EMP | IN | 0 | 458 | 458 | na |
| | OUT | 0 | 0 | 0 | na |
| WMP | IN | 0 | 0 | 836 | na |
| | OUT | 0 | 0 | 139 | Na |
| Total: Management ponds (NMP, EMP, WMP) | IN | 198 | 656 | 1492 | na |
| | OUT | 0 | 0 | 139 | 846 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01l-lc, 08-02l-lc, 08-03l-lc, 08-04-lc.

**Notes:**

[1] Worst case drawdown scenario: no MPs (i.e., no infiltration), only open pit dewatering
IN = flow into the model (i.e., seepage or infiltration)
OUT = flow out of the model (i.e., discharges into surface)
na, not applicable

### Predicted levels and changes compared to baseline conditions

Figures 57 to 59 present the predicted hydraulic heads and changes to heads compared to baseline conditions for EoY1, EoY7, and EOM. The model predicts the drawdown induced by the open pit dewatering (i.e., long term, EOM conditions) could extend up to a maximum of 18 $km^2$. The influence of the management ponds and the control pond stop the progression of the drawdown to the north; in this area the model predicts a groundwater mound of about 14 $km^2$. Neither the drawdown cone nor the groundwater reaches private well locations.

Figure 60 shows the hypothetical worst-case drawdown extent, when the open pit is assumed to be fully excavated, open pit dewatering active, but no Control Pond or management ponds impede the progression of groundwater drawdown. These hypothetical models predicted a drawdown area of approximately 34 $km^2$; but did not reach private well locations.

### Predicted changes to surface water baseflows

Table 6-7 compiles the predicted differences of groundwater baseflow between baseline and operations at surface water stations. Figure 4, and Figure 56 to 66 show the locations of the WQS stations. The results are expressed in relative percent differences (RPD). These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-7: Forecasts of changes to creek baseflows during operations**

| Stations | Changes to net baseflows compared to baseline (%) | | | |
|---|---|---|---|---|
| | EoY1 | EoY7 | EOM | *Worst case* [(1)] |
| **Tenas Creek stations** | | | | |
| WQS01 | -0.1% | -0.2% | -0.4% | -0.4% |
| WQS02 | -1.1% | -3.9% | 1.7% | -5.2% |
| WQS22 | -1.0% | -5.9% | 3.4% | -9.2% |
| WQS04 | -0.9% | -5.6% | 3.3% | -8.7% |
| Tenas Creek U/S Goathorn Creek | -0.9% | -5.5% | 3.2% | -8.6% |
| **Four Creek stations** | | | | |
| WQS03 | -0.7% | -20.5% | -29.8% | -29.7% |
| WQS21 | -1.5% | -22.0% | -34.4% | -37.6% |
| WQS20 | -2.6% | -21.3% | -32.8% | -38.3% |
| WQS03DS | -4.2% | -5.0% | -0.3% | -33.7% |
| Four Creek U/S Goathorn Creek | -4.1% | -4.9% | -0.2% | -33.0% |
| **Goathorn Creek stations** | | | | |
| WQS13 | 0.0% | 0.0% | 0.0% | 0.0% |
| WQS06US | 0.0% | -0.2% | -0.2% | -0.1% |
| WQS06 | -0.3% | -0.5% | -0.1% | -2.6% |
| WQS05 | -0.5% | -1.9% | 0.8% | -4.3% |
| Goathorn Creek U/S Telkwa River | -0.5% | -1.9% | 0.8% | -4.2% |
| **Telkwa River stations** | | | | |
| WQS09 | -0.4% | -1.6% | 0.7% | -3.7% |
| Telkwa River U/S Bulkley River | -0.4% | -1.5% | 0.7% | -3.5% |
| **Bulkley River stations** | | | | |
| WQS11 | <0.1% | <-0.1% | <-0.1% | <0.1% |
| WQS12 | <-0.1% | <-0.1% | <0.1% | <0.1% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01l-lc, 08-02l-lc, 08-03l-lc, 08-04-lc.

**Notes:**

[1] Worst case drawdown scenario: no MPs (i.e., no infiltration), only open pit dewatering

### Potential migration of mine-affected water

Figures 62 to 66 show the predicted particle paths for EoY1 (one year of travel time), EoY7 (seven years of travel time), and EOM (25 years of travel time). No particles are predicted to discharge into creeks by the EoY1 or EOY7. The models predict mine-affected groundwater could potentially start discharging into Tenas Creek after about 16 years. In the first 25 years, no particle is predicted to discharge into Four Creek, Goathorn Creek, Telkwa River, or near the private wells downstream of the Project.

Table 6-8 compiles the EOM forecasts of the potential contributions of mine affected baseflows by sources after 25 years. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-8: Forecasts of mine affected baseflow at EOM**

| ID | Potential contributions of mine affected groundwater after 25 years in % of baseflow under EOM conditions | | | |
|---|---|---|---|---|
| | NMP | EMP | WMP | Tenas Control Pond |
| **Tenas Creek** | | | | |
| WQS02 | - | - | 0.5% | - |
| WQS22 | 0.2% | - | 0.7% | - |
| WQS04 | 0.1% | - | 0.7% | - |
| **Four Creek** | | | | |
| WQS03 | - | - | - | - |
| WQS21 | - | - | - | - |
| WQS20 | - | - | - | - |
| WQS03DS | - | - | - | - |
| **Goathorn Creek** | | | | |
| WQS06US | - | - | - | - |
| WQS06 | - | - | - | - |
| WQS05 | <0.1% | - | 0.2% | - |
| **Telkwa Creek** | | | | |
| WQS09 | <0.1% | - | <0.1% | - |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-03l-lc

**Note:**

-, no discharge predicted

### 6.6.3 Post-Closure Conditions

#### Open pit inflows and seepages underneath the mine facilities

Table 6-9 compiles the groundwater inflow and outflow rates predicted at the open pit and the management ponds. These predictions served as inputs to the Water Balance and Load Model (WBLM) to design the water management system and evaluate the overall effects of the Project to surface water.

**Table 6-9: Forecasts of open pit inflows and seepages at Post-closure**

| Feature | | Groundwater flow rate ($m^3/d$) |
|---|---|---|
| Open pit walls | IN | 0 |
| | OUT | 120 |
| Open pit Lake (909 masl) | IN | 0 |
| | OUT | 213 |
| Saturated waste rock (901 masl) | IN | 7 |
| | OUT | 51 |
| Total: open pit walls, open pit lake, and saturated waste rock | IN | 7 |
| | OUT | 384 |
| NMP | IN | 198 |
| | OUT | 0 |
| EMP | IN | 458 |
| | OUT | 0 |
| WMP | IN | 819 |
| | OUT | 137 |
| Total: Management ponds | IN | 1475 |
| | OUT | 137 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05l-lc

**Notes:**

IN = flow into the model (i.e., seepage or infiltration)
OUT = flow out of the model (i.e., discharges into surface)

### Predicted levels and changes compared to baseline conditions

Figure 61 shows the predicted hydraulic heads and changes to heads compared to baseline conditions for post-closure. The model predicts a drawdown extending up to a maximum of 15 $km^2$ and a mound of about 13 $km^2$. The models predict neither the drawdown cone nor the groundwater mound reach private well locations.

### Predicted changes to surface water baseflows

Table 6-10 compiles the predicted differences of groundwater baseflow between baseline conditions and post-closure conditions. The results are expressed in RPD. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-10: Forecasts of changes to creek baseflows Post-closure**

| Station | Changes to net baseflows compared to baseline (%) |
|---|---|
| **Tenas Creek stations** | |
| WQS01 | -0.3% |
| WQS02 | 1.9% |
| WQS22 | 3.1% |
| WQS04 | 3.0% |
| Tenas Creek U/S Goathorn Creek | 2.9% |
| **Four Creek stations** | |
| WQS03 | -22.7% |
| WQS21 | -25.0% |
| WQS20 | -22.3% |
| WQS03DS | 4.0% |
| Four Creek U/S Goathorn Creek | 4.0% |
| **Goathorn Creek stations** | |
| WQS13 | 0.0% |
| WQS06US | 0.0% |
| WQS06 | 0.3% |
| WQS05 | 1.1% |
| Goathorn Creek U/S Telkwa River | 1.1% |
| **Telkwa River stations** | |
| WQS09 | 1.0% |
| Telkwa River U/S Bulkley River | 0.9% |
| **Bulkley River stations** | |
| WQS11 | <0.1% |
| WQS12 | <0.1% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05l-lc

### Potential migration of mine-affected water

Figure 62 to 66 show the predicted post-closure particle paths at different times including long term paths; Table 6-11 and Figure 67 summarize the predicted travel times before particles discharge into creeks; and Table 6-12 compiles the predicted long term contribution of mine affected baseflows by sources. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

Three private wells (Goalder, Mapletoft, and Baker) are in the Telkwa River valley are shown to be potentially within the paths of mine affected groundwater. These wells pump groundwater from a fluvial aquifer at a relatively shallow depth (i.e., 15 to 30m deep according to MOE's database) in the Telkwa River valley bottom. The potential maximum effects from the Project on quality of the pumped well water was calculated using the following loading equation:

$$Q_w \times C_w = Q_b \times C_b + \Sigma (Q_i \times C_i)$$

$Q_w$, groundwater flow into the Telkwa River valley.
$C_w$, concentration of the groundwater into the Telkwa River valley.
$Q_b$, flow contribution from background groundwater.
$C_b$, concentration of background groundwater (baseline).
$Q_i$, flow contribution from mine feature i.
$C_i$, concentration of from mine feature I (source terms).

For a unit volume of $Q_w$, $C_w$ can be expressed using percentage contributions relative to each source, as predicted by the particle path analyses.

$$C_w = P_b \times C_b + P_m \times \Sigma (P_i \times C_i)$$

$P_b$, percentage contribution of background groundwater into the Telkwa River valley.
$P_m$, percentage contribution of mine affected groundwater into the Telkwa River valley.
$P_i$, percentage contribution of from a mine feature I to the total mine affected groundwater.

Calculations assumed:

- The loads from the mine are permanent, and constituents migrated to the Telkwa River and constantly discharging into the fluvial aquifer (i.e., post-closure, pseudo -steady state conditions). The predicted travel times (i.e., > 400 years) are not considered in the analysis.
- The private wells pumps groundwater exclusively from the southern side of the Telkwa River valley, upstream of WQS09. The potential contributions from the northern side of the Telkwa River catchment, and from upstream of the project influence (i.e., western limit of the model domain) are not accounted.
- The mass of constituents in groundwater is conserved. The mine affected groundwater is transported by advection (i.e., no diffusion, dispersion, nor natural attenuation mechanisms).
- The parameter's concentrations can be calculated based on the post-closure predictions of mine affected baseflow contributions from the southern side of the Telkwa River valley, upstream of WQS09 (i.e., groundwater numerical model predictions), the average baseline groundwater quality (see Section 4.6), and the water quality at the open pit lake, open pit backfill, NMP, EMP, WMP, and Control Pond (average winter concentrations predicted by the WBLM).

The analysis is provided in Appendix H. The results show that no constituents are predicted to exceed the BC-DWG.

**Table 6-11: Predicted travel times before discharges into creeks**

| | |
|---|---|
| Tenas Creek | First particle discharged into Tenas Creek after 15 years. 50% of particles discharged after 65 years, 72% after 400 years |
| Four Creek | First particle discharged into Four Creek after 38 years. 50% of particles discharged after 95 years, all particles discharged after 180 years. |
| Goathorn Creek | First particle discharged into Goathorn Creek after 184 years. 50% of particles discharged after 320 years, 62% after 400 years |
| Telkwa River | First particle discharged into Telkwa River after 400 years. |

**Table 6-12: Forecasts of mine affected baseflow at Post-closure**

| ID | Potential long-term contributions of mine affected groundwater under post-closure conditions | | | | |
|---|---|---|---|---|---|
| | NMP | EMP | WMP | PL | SWr |
| **Tenas Creek** | | | | | |
| WQS02 | - | - | 4.3% | - | - |
| WQS22 | 1.5% | - | 7.2% | - | <0.1% |
| WQS04 | 1.5% | 0.3% | 7.4% | - | <0.1% |
| **Four Creek** | | | | | |
| WQS03 | - | - | - | - | - |
| WQS21 | - | - | - | - | - |
| WQS20 | - | - | - | - | - |
| WQS03DS | - | 17.0% | - | - | - |
| **Goathorn Creek** | | | | | |
| WQS06US | - | - | - | - | - |
| WQS06 | - | 2.1% | 0.2% | - | - |
| WQS05 | 0.5% | 1.5% | 2.5% | - | <0.1% |
| **Telkwa River** | | | | | |
| WQS09 | 0.1% | 0.2% | 0.4% | - | <0.1% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05l-lc

**Note:**

PL, post-closure open pit lake (909 masl)

SWr, post-closure saturated waste rock (901 masl)

-, no discharge predicted

## 6.7 Model Results For Modified Designs of the Ponds

This section presents mining and post-closure model predictions for two variations of the pond designs [1]:

- Mitigation design #1:
  - S/B0.56 for EMP, NMP, and WMP (excluding WMP End Wall rock);
  - B0.15 for the Tenas Control Pond.
- Mitigation design #2:
  - B0.30 for EMP;
  - S/B0.56 for NMP and WMP (excluding WMP End Wall rock);
  - B0.15 for the Tenas Control Pond.

Table 6-13 compiles the Well (point-source fluid-flux) boundary seepage flows calculated for these designs. Seepage rates through soil-bentonite liners calculated from 2D Seep W modelling documented in 7Appendix E. Seepage rates through bituminous geomembrane on top of soil-bentonite liners were calculated using the analytical solution presented in Giroud (1997) for the migration of liquid through composite liners with geomembrane defects. The analysis is documented in 7Appendix F.

**Table 6-13: Mitigations - Estimated seepage rates through designed liners at the end of Mining**

| Case | Total seepage rate under liners ($m^3/d$) | | | |
|---|---|---|---|---|
| | **Control Pond** (B0.15) | **EMP** (S/B0.56) | **NMP** (S/B0.56) | **WMP** (S/B0.56) |
| Mitigation #1 | 8 | 277 | 87 | 373 |
| Mitigation #2 | 8 | 63 | 87 | 373 |

Sources: Appendix E, F, and surface areas from TML 2020.

### 6.7.1 Mining Conditions

#### Open pit inflows and seepages underneath the mine facilities

Table 6-14 and Table 6-15 compile the groundwater inflow and outflow rates predicted at the open pit, the Control Pond, and the management ponds. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

For the Mitigation #1 scenario, the open pit inflows range between 240 and 700 $m^3/d$. The total seepage rate underneath the management ponds at end-of mine is 740 $m^3/d$.

[1] S/B signifies this is a soil-bentonite liner.
B signifies that a bituminous liner is placed on top of a soil-bentonite liner
The value indicates the thickness in meter of the soil-bentonite liner.

For the Mitigation #2 scenario, the open pit inflows range between 240 and 670 $m^3/d$. The total seepage rate underneath the management ponds at end-of mine is 520 $m^3/d$.

**Table 6-14: Mitigation#1 - Forecasts of open pit inflows and seepages during operations**

| Feature | | Groundwater flow rate ($m^3/d$) | | |
|---|---|---|---|---|
| | | EoY1 | EoY7 | EOM |
| Open pit inflows | IN | 0 | 0 | 0 |
| | OUT | 237 | 699 | 381 |
| Tenas Control Pond | IN | 8 | 8 | 8 |
| | OUT | 0 | 0 | 0 |
| NMP | IN | 87 | 87 | 87 |
| | OUT | 0 | 0 | 0 |
| EMP | IN | 0 | 277 | 277 |
| | OUT | 0 | 0 | 0 |
| WMP | IN | 0 | 0 | 373 |
| | OUT | 0 | 0 | 0 |
| Total: Management ponds (NMP, EMP, WMP) | IN | 87 | 364 | 737 |
| | OUT | 0 | 0 | 0 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01z-lc, 08-02z-lc, 08-03z-lc

**Notes:**

IN = flow into the model (i.e., seepage or infiltration)
OUT = flow out of the model (i.e., discharges into surface)

**Table 6-15: Mitigation#2 - Forecasts of open pit inflows and seepages during operations**

| Feature | | Groundwater flow rate ($m^3/d$) | | |
|---|---|---|---|---|
| | | EoY1 | EoY7 | EOM |
| Open pit inflows | IN | 0 | 0 | 0 |
| | OUT | 237 | 675 | 377 |
| Control Pond | IN | 8 | 8 | 8 |
| | OUT | 0 | 0 | 0 |
| NMP | IN | 87 | 87 | 87 |
| | OUT | 0 | 0 | 0 |
| EMP | IN | 0 | 63 | 63 |
| | OUT | 0 | 0 | 0 |
| WMP | IN | 0 | 0 | 373 |
| | OUT | 0 | 0 | 560 |
| Total: Management ponds (NMP, EMP, WMP) | IN | 87 | 150 | 523 |
| | OUT | 0 | 0 | 560 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01zb-lc, 08-02zb-lc, 08-03zb-lc

**Notes:**

IN = flow into the model (i.e., seepage or infiltration)
OUT = flow out of the model (i.e., discharges into surface)

### Predicted levels and changes compared to baseline conditions

For the Mitigation #1 scenario, the models predict the drawdown induced by the open pit dewatering (i.e., long term, EOM conditions) could extend up to a maximum of 32 $km^2$. The models predict neither the drawdown cone nor the mound reach private well locations.

For the Mitigation #2 scenario, the models predict the drawdown induced by the open pit dewatering (i.e., long term, EOM conditions) could extend up to a maximum of 34 $km^2$. The models predict neither the drawdown cone nor the mound reach private well locations.

### Predicted changes to surface water baseflows

Table 6-16 and Table 6-17 compile the predicted differences of groundwater baseflow between baseline and operations at surface water stations. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-16: Mitigation #1 - Forecasts of changes to creek baseflows during operations**

| Stations | Changes to net baseflows compared to baseline (%) | | |
|---|---|---|---|
| | EoY1 | EoY7 | EOM |
| **Tenas Creek stations** | | | |
| WQS01 | -0.2% | -0.3% | -0.4% |
| WQS02 | -3.3% | -5.1% | -3.6% |
| WQS22 | -6.8% | -9.2% | -6.8% |
| WQS04 | -6.5% | -8.8% | -6.4% |
| Tenas Creek U/S Goathorn Creek | -6.4% | -8.6% | -6.3% |
| **Four Creek stations** | | | |
| WQS03 | -5.3% | -22.3% | -29.6% |
| WQS21 | -8.3% | -26.4% | -37.1% |
| WQS20 | -9.2% | -27.2% | -37.7% |
| WQS03DS | -20.8% | -21.5% | -26.7% |
| Four Creek U/S Goathorn Creek | -20.4% | -21.1% | -26.2% |
| **Goathorn Creek stations** | | | |
| WQS13 | 0.1% | 0.0% | 0.0% |
| WQS06US | 0.0% | -0.1% | 0.0% |
| WQS06 | -1.6% | -1.7% | -2.0% |
| WQS05 | -2.9% | -3.7% | -3.2% |
| Goathorn Creek U/S Telkwa River | -2.9% | -3.6% | -3.2% |
| **Telkwa River stations** | | | |
| WQS09 | -2.5% | -3.2% | -2.8% |
| Telkwa River U/S Bulkley River | -2.4% | -3.0% | -2.7% |
| **Bulkley River stations** | | | |
| WQS11 | 0.0% | 0.0% | 0.0% |
| WQS12 | 0.0% | 0.0% | 0.0% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01z-lc, 08-02z-lc, 08-03z-lc

**Table 6-17: Mitigation #2 - Forecasts of changes to creek baseflows during operations**

| Stations | Changes to net baseflows compared to baseline (%) | | |
|---|---|---|---|
| | EoY1 | EoY7 | EOM |
| **Tenas Creek stations** | | | |
| WQS01 | -0.2% | -0.3% | -0.4% |
| WQS02 | -3.3% | -5.2% | -3.7% |
| WQS22 | -6.8% | -9.6% | -7.1% |
| WQS04 | -6.5% | -9.1% | -6.8% |
| Tenas Creek U/S Goathorn Creek | -6.4% | -9.0% | -6.7% |
| **Four Creek stations** | | | |
| WQS03 | -5.3% | -22.4% | -29.7% |
| WQS21 | -8.3% | -27.5% | -37.8% |
| WQS20 | -9.2% | -28.3% | -38.4% |
| WQS03DS | -20.8% | -31.7% | -36.7% |
| Four Creek U/S Goathorn Creek | -20.4% | -31.1% | -36.0% |
| **Goathorn Creek stations** | | | |
| WQS13 | 0.1% | 0.0% | 0.0% |
| WQS06US | 0.0% | -0.1% | -0.1% |
| WQS06 | -1.6% | -2.4% | -2.8% |
| WQS05 | -2.9% | -4.3% | -3.9% |
| Goathorn Creek U/S Telkwa River | -2.9% | -4.3% | -3.9% |
| **Telkwa River stations** | | | |
| WQS09 | -2.5% | -3.7% | -3.4% |
| Telkwa River U/S Bulkley River | -2.4% | -3.5% | -3.2% |
| **Bulkley River stations** | | | |
| WQS11 | 0.0% | 0.0% | 0.0% |
| WQS12 | 0.0% | -0.1% | 0.0% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-01zb-lc, 08-02zb-lc, 08-03zb-lc

#### Potential migration of mine-affected water

In the first 25 years, there is no particle predicted to discharge into Tenas Creek, Goathorn Creek, Telkwa River, or private wells downstream of the project. The models predict mine-affected groundwater could potentially start discharging into Tenas Creek after about 40 years for the Mitigation #1 scenario, and after about 43 years for the Mitigation #2 scenario.

### 6.7.2 Post-Closure conditions

#### Open pit Inflows and seepages underneath the mine facilities

Table 6-18 compiles the groundwater inflow and outflow rates predicted at the open pit and the management ponds. These predictions served as inputs to the Water Balance and Load Model (WBLM) to design the water management system and evaluate the overall effects of the Project to surface water.

**Table 6-18: Mitigations - Forecasts of open pit inflows and seepages at Post-closure**

| Feature | | Groundwater flow rate ($m^3/d$) | |
|---|---|---|---|
| | | Mitigation #1 | Mitigation #2 |
| Open pit walls | IN | 0 | 0 |
| | OUT | 91 | 94 |
| Open pit Lake (909 masl) | IN | 0 | 0 |
| | OUT | 212 | 214 |
| Saturated waste rock (901 masl) | IN | 11 | 9 |
| | OUT | 47 | 48 |
| Total: open pit walls, open pit lake, and saturated waste rock | IN | 11 | 9 |
| | OUT | 350 | 356 |
| NMP | IN | 87 | 87 |
| | OUT | 0 | 0 |
| EMP | IN | 63 | 277 |
| | OUT | 0 | 0 |
| WMP | IN | 709 | 692 |
| | OUT | 119 | 129 |
| Total: Management ponds | IN | 859 | 1056 |
| | OUT | 119 | 129 |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05z-lc, 08-05zb-lc

**Notes:**

IN = flow into the model (i.e., seepage or infiltration)

OUT = flow out of the model (i.e., discharges into surface)

### Predicted levels and changes compared to baseline conditions

For the Mitigation #1 scenario, the model predicts a drawdown extending up to a maximum of 17 $km^2$ and a mound of about 5 $km^2$. The models predict neither the drawdown cone nor the groundwater mound reach private well locations.

For the Mitigation #2 scenario, the model predicts a drawdown extending up to a maximum of 26 $km^2$ and a mound of about 2 $km^2$. The models predict neither the drawdown cone nor the mound reach private well locations.

### Predicted changes to surface water baseflow

Table 6-19 compiles the predicted differences of groundwater baseflow between baseline conditions and post-closure conditions. The results are expressed in RPD. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

**Table 6-19: Mitigation #1 - Forecasts of changes to creek baseflows at Post-closure**

| Station | Changes to net baseflows compared to baseline (%) | |
|---|---|---|
| | Mitigation #1 | Mitigation #2 |
| **Tenas Creek stations** | | |
| WQS01 | -0.3% | -0.3% |
| WQS02 | 0.8% | 0.8% |
| WQS22 | 0.0% | 0.0% |
| WQS04 | 0.0% | 0.0% |
| Tenas Creek U/S Goathorn Creek | 0.0% | 0.0% |
| **Four Creek stations** | | |
| WQS03 | -22.7% | -22.7% |
| WQS21 | -25.8% | -25.8% |
| WQS20 | -26.2% | -26.2% |
| WQS03DS | -8.4% | -8.4% |
| Four Creek U/S Goathorn Creek | -8.2% | -8.2% |
| **Goathorn Creek stations** | | |
| WQS13 | 0.0% | 0.0% |
| WQS06US | 0.0% | 0.0% |
| WQS06 | -0.6% | -0.6% |
| WQS05 | -0.4% | -0.4% |
| Goathorn Creek U/S Telkwa River | -0.4% | -0.4% |
| **Telkwa River stations** | | |
| WQS09 | -0.4% | -0.4% |
| Telkwa River U/S Bulkley River | 0.0% | 0.0% |
| **Bulkley River stations** | | |
| WQS11 | 0.0% | 0.0% |
| WQS12 | 0.0% | 0.0% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05z-lc, 08-05zb-lc

### Potential migration of mine-affected water

Table 6-20 and Table 6-21 compile the predicted long-term contribution of mine affected baseflow by source. These predictions served as inputs to the WBLM (Section 4, Chapter 3 of the EAC Application) to evaluate the overall effects of the Project to surface water.

At the three private wells (Goalder, Mapletoft, and Baker), located in the Telkwa River valley and potentially within the long-term paths of mine affected groundwater, no constituents are predicted to exceed the BC-DWG.

**Table 6-20: Mitigation #1 - Forecasts of mine affected baseflow at Post-closure**

| ID | Potential long-term contributions of mine affected groundwater under post-closure conditions | | | | |
|---|---|---|---|---|---|
| | NMP | EMP | WMP | PL | SWr |
| **Tenas Creek** | | | | | |
| WQS02 | - | - | 2.6% | - | - |
| WQS22 | 0.5% | - | 7.9% | - | - |
| WQS04 | 0.5% | <0.1% | 7.8% | - | - |
| **Four Creek** | | | | | |
| WQS03 | - | - | - | - | - |
| WQS21 | - | - | - | - | - |
| WQS20 | - | - | - | - | - |
| WQS03DS | - | 2.9% | - | - | - |
| **Goathorn Creek** | | | | | |
| WQS06US | - | - | - | - | - |
| WQS06 | - | 0.3% | 0.1% | - | - |
| WQS05 | 0.1% | 0.2% | 2.3% | - | - |
| **Telkwa River** | | | | | |
| WQS09 | <0.1% | <0.1% | 0.4% | - | - |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05z-lc

**Note:**
PL, post-closure open pit lake (909 masl)
SWr, post-closure saturated waste rock (901 masl)
-, no discharge predicted

**Table 6-21: Mitigation #2 - Forecasts of mine affected baseflow at Post-closure**

| ID | Potential long-term contributions of mine affected groundwater under post-closure conditions | | | | |
|---|---|---|---|---|---|
| | NMP | EMP | WMP | PL | SWr |
| **Tenas Creek** | | | | | |
| WQS02 | - | - | 2.7% | - | - |
| WQS22 | 0.5% | - | 7.5% | - | <0.1% |
| WQS04 | 0.4% | <0.1% | 7.6% | - | <0.1% |
| **Four Creek** | | | | | |
| WQS03 | - | - | - | - | - |
| WQS21 | - | - | - | - | - |
| WQS20 | - | - | - | - | - |
| WQS03DS | - | 2.9% | - | - | - |
| **Goathorn Creek** | | | | | |
| WQS06US | - | - | - | - | - |
| WQS06 | - | 0.3% | 0.2% | - | <0.1% |
| WQS05 | 0.1% | 0.2% | 2.3% | - | <0.1% |
| **Telkwa River** | | | | | |
| WQS09 | <0.1% | <0.1% | 0.4% | - | <0.1% |

Source: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx; model: 08-05zb-lc

**Note:**
PL, post-closure open pit lake (909 masl)
SWr, post-closure saturated waste rock (901 masl)
-, no discharge predicted

## 6.8 Model Sensitivity

The sensitivity analysis consisted of a comparison between the model outputs of the calibrated model and the sensitivity models listed in Table 6-22. The outputs included, for baseline conditions, the NRMSE of observed versus predicted heads and estimated versus predicted baseflows, and for EOM and post-closure conditions, the predictions of drawdown extent, changes to creek baseflows, travel times from Project to creeks, and contributions of mine affected water to creeks. The sensitivity models corresponded to scenarios where properties were varied without recalibration of the model (i.e., sensitivity simulations do not represent alternative conceptualisations of the site). They included variations to hydraulic conductivities and specific yields; storage compressibility was excluded because this parameter influences the release of groundwater from storage, which is negligible under steady state conditions. Alike storage compressibility, specific yield controls the release of storage hence has negligible influence on steady state heads and baseflows; it influences however the predicted travel times of mine affected groundwater to creeks. Feflow uses specific yield as a proxy for the effective porosity (i.e., drainable porosity) to calculate the groundwater velocity (i.e., $q = K/n_e$ with q, velocity of groundwater, K, hydraulic conductivity, and $n_e$ effective porosity).

**Table 6-22: Sensitivity scenarios**

| Parameter | Description | ID |
|---|---|---|
| K All Units | Outlier condition where K maximized (2.7 x $K_{calibrated\ model}$) while calibration held near 10% NRMSE) | HighK |
| Recharge | R= 30% MAP (R baseline x3.50) | R+ |
| | R= 5% MAP (R baseline x0.58) | R- |
| K sand-gravel-rich till | plus one standard deviation (Kxyz baseline x11.5) | Kst+ |
| | minus one standard deviation (Kxyz baseline x0.09) | Kst- |
| | Lower effective porosity value of 0.3 | Nst+ |
| | Higher effective porosity of 0.1 | Nst- |
| K silt-clay-rich till | plus one standard deviation (Kxyz baseline x10.71) | Kct+ |
| | minus one standard deviation (Kxyz baseline x0.09) | Kct- |
| | Lower effective porosity value of 0.2 | Nct+ |
| | Higher effective porosity of 0.05 | Nct- |
| K Skeena group | plus one standard deviation (Kxyz baseline x17.26) | Ksk+ |
| | minus one standard deviation (Kxyz baseline x0.06) | Ksk- |
| | Ratio Kxy/Kz=10 | Anisk+ |
| | Ratio Kxy=Kz (no anisotropy) | Anisk- |
| | Lower effective porosity value of 0.25 | Nsk+ |
| | Higher effective porosity of 0.05 | Nsk- |
| K Volcanic rocks | plus one standard deviation (Kxyz baseline x7.1) | Kvl+ |
| | minus one standard deviation (Kxyz baseline x0.14) | Kvl- |
| | Lower effective porosity value of 0.1 | Nvl+ |
| | Higher effective porosity of 0.02 | Nvl- |

**Note:** The standard deviations of K respective to each hydrostratigraphic unit were calculated using the site-specific K measurements distributed on a log scale (i.e., Table 4-1).

The specific yield values correspond to the lower and higher ranges for sand, silt, sandstone, and basalt, as reported in *Singhal BBS, and RP Gupta. 2010. Applied hydrogeology of fractured rocks: second edition. Springer, New York, USA. 408 p.*

'xyx' refers to the principal directions of the hydraulic conductivity tensor; x and y correspond to the horizontal plane or directions parallel to beddings, and z corresponds to the vertical plane or directions perpendicular to the bedding planes.

The relative percent differences (RPD) between the calibrated model scenarios and the sensitivity scenarios were rated according to the definitions listed in Table 6-23. The ratings of the calibration outputs took into consideration that a difference of about less than 6% with the calibrated heads or baseflows NRMSE implied the calibration target would remain close to the minimum 10% threshold generally accepted in BC. The ratings for prediction outputs were based on differences of less than 10% with predicted values. A ten percent difference compared to EOM or post-closure predictions corresponds to a maximum open pit inflow of 605 $m^3$/d, a maximum drawdown and mound extent of 34 $km^2$, a maximum of 13% change to baseflow at Tenas Creek upstream of Goathorn Creek and 11% at Goathorn Creek upstream of Telkwa River, a minimum travel time of 14 years before the first particle discharges at Tenas Creek upstream of WQS04, and a maximum contribution of mine affected groundwater of 15% at Tenas Creek upstream of WQS04m and 10% at Goathorn Creek at WQS06).

**Table 6-23: Ratings of sensitivity model calibration and prediction**

| Significance | Calibration | Prediction |
|---|---|---|
| Null | <1% difference with calibrated NRMS. | <5% RPD of predicted value. |
| Low | 1 to 3% difference with calibrated NRMS. | 5–10% RPD of the predicted value. |
| Medium | 3 to 6% difference with calibrated NRMS. | 10–30% RPD to the predicted value. |
| High | >6% difference with calibrated NRMS. | >30% RPD of the predicted value. |

Parameters were classified into sensitivity types as defined by Brown (1996):

- **Type I:** There are insignificant effects for both model calibration residuals and predictive model results (relative to modelling objectives). In other words, within a reasonable range of parameter values, the model outcomes are not significantly affected. This parameter type does not need further data collection or monitoring. Type I sensitivities are of little concern because the impact on predictions is insignificant.
- **Type II:** There is a significant effect on model calibration, but an insignificant effect on predictive model results (relative to modelling objectives). The model calibration is affected (residuals increase for some part of the parameter range being tested) so the parameter influences the calibration goodness of fit. However, the results of the predictive model are still insensitive to this parameter. Type II sensitivities are of little concern because the impact on predictions is insignificant.
- **Type III:** There are significant effects on both model calibration and model prediction results (relative to modelling objectives). The parameter influences the calibration goodness of fit and a corresponding effect on the predictive model results. Type III sensitivity is of concern only for an uncalibrated model, or where a wide range of calibrations are possible, and proper calibration of this parameter is the solution. The sensitivity is important, but it is known and can be avoided by model calibration.

- **Type IV:** There is an insignificant effect on model calibration, but a significant effect on predictive model results (relative to modelling objectives). The model calibration is not affected and does not help constrain this parameter value, while the results of the predictive model are sensitive to this parameter. Type IV sensitivity is cause for concern because non-uniqueness, the model input may allow for a range of valid calibrations, but the choice of value significantly impacts model prediction. It is important to determine the actual value of this parameter and not rely on model calibration to estimate this parameter. It should be measured with robust data (model field audit) and, ideally, the data should represent the same stresses as in the predictive model simulations.

Table 6-24 to Table 6-26 compile the results of the sensitivity analysis, and Table 6-27 the sensitivity types assigned to each parameter. The analysis shows that:

- The hydraulic head calibration is sensitive to global variations of hydraulic conductivity, recharge, and to the increase only of K in the sand-gravel-rich till and Skeena group units.
- The baseflow calibration is sensitive to global variations of hydraulic conductivity, recharge, and to the increase of K in the silt-clay-rich till, sand-gravel rich till and Skeena group units.
- The maximum open pit inflow predicted by the sensitivity models was about 1,550 $m^3/d$ in the case of a higher recharge at 30%, or when the Skeena group K increased by one standard deviation. The open pit inflow predictions are found to be sensitive to all parameters except specific yield, and type IV sensitivities are found with a:
  - Decrease to the silt-clay rich till K
  - Decrease to the sand-gravel rich till K
  - Increase or decrease to the Skeena group unit K anisotropy
  - Increase or decrease to the volcanic rocks K
- None of the scenarios predicted that groundwater drawdowns our mounds would reach the areas where private wells are located, downstream of the Project. Drawdown predictions are found to be sensitive to all parameters except for the increase to the sand-gravel rich till K, decrease to Skeena group K, and Skeena group anisotropy, and variations to specific yield. Type IV sensitivities are found with a:
  - Decrease to the silt-clay rich till K
  - Decrease to the sand-gravel rich till K
  - Increase or decrease to the volcanic rocks K
- All the sensitivity scenarios show larger effects of the Project on the baseflows in Tenas Creek compared to Goathorn Creek. Significant reductions to baseflows in Tenas Creek occur only in a few cases, when the recharge is increased (-14%) or the sand-gravel rich till K is varied by one standard deviation (- 21%); the other scenarios predict low changes. In Goathorn Creek, the maximum reduction predicted by the sensitivity models is -3%. Baseflow predictions are most sensitive to variations in recharge and sand-gravel rich till K. The variations to K in volcanic rock and the decrease to K in sand-gravel rich till are categorized as Type IV, which emphasizes the importance of actual site values for these parameters.

- The predicted times to private wells are more than at least 170 years for all scenarios. The travel times predictions are sensitive to all the tested parameters. Type IV sensitivities are found with a:
  - Decrease in sand-gravel rich till K
  - Decrease in silt-clay-rich till K
  - Decrease in Skeena group K
  - Variations the anisotropy in the Skeena group
  - Variations to the specific yield for all units
- The predictions of mine affected groundwater contribution to creeks were not found to be sensitive to any of the tested parameters. The sensitivity scenarios predicted a maximum contribution of 11% in Tenas Creek in the case of the Skeena group K increased by one standard deviation, and 1% in the Goathorn Creek. In terms of travel times, the WBLM (Section 4, Chapter 3 of the EAC Application) assume conservatively that 100% of the loads from potential waste and water management ponds are discharged into creeks after 25 years.

**Table 6-24: Sensitivity of the model calibration**

| ID | RPD (%) between calibrated model and sensitivity baseline scenarios | |
|---|---|---|
| | **Sensitivity to head calibration** | **Sensitivity to baseflow calibration** |
| Calibrated model | NRMSE: 3.2% | NRMSE: 3.6% |
| HighK | **4.0%** | **7.7%** |
| R+ | **3.8%** | **233.8%** |
| R- | 1.8% | **23.2%** |
| Kst+ | **4.0%** | **20.9%** |
| Kst- | 2.0% | -0.9% |
| Nst+ | 0.0% | 0.0% |
| Nst- | 0.0% | 0.0% |
| Kct+ | 1.9% | **5.7%** |
| Kct- | 0.2% | -0.9% |
| Nct+ | 0.0% | 0.0% |
| Nct- | 0.0% | 0.0% |
| Ksk+ | **6.9%** | **8.9%** |
| Ksk- | 1.9% | -1.4% |
| Anisk+ | 0.2% | 0.2% |
| Anisk- | 0.5% | 0.7% |
| Nsk+ | 0.0% | 0.0% |
| Nsk- | 0.0% | 0.0% |
| Kvl+ | 1.9% | 1.7% |
| Kvl- | 0.1% | -0.3% |
| Nvl+ | 0.0% | 0.0% |
| Nvl- | 0.0% | 0.0% |

Sources: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx

**Note**s:

The significance of effects to the model calibration and prediction are indicated by the format of the cell, with dark grey indicating high sensitivity, light grey medium sensitivity, pale yellow low sensitivity, and white no sensitivity.

**Table 6-25: Sensitivity analysis of the EOM outputs**

| ID | RPD (%) between calibrated model and sensitivity EOM scenarios | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Open pit inflow | Total extent of drawdown and mound | Changes to baseflow rates: | | Travel time of first particle discharged to: | | Contributions of mine affected groundwater to: | |
| | | | Tenas Ck u/s Goathorn Ck | Goathorn Ck u/s Telkwa Rv. | Tenas Ck u/s WQS04 | Four Ck u/s WQS03DS | Tenas Ck u/s WQS04 | Goathorn Ck u/s WQS06 |
| Calibrated model | $Q_{open\ pit}$ = 550 $m^3/d$ | Extent = 31 $km^2$ | dQ = 3.2% | dQ = 0.8% | T = 16 years | No particle | Q = 0.4% | Q = 0% |
| HighK | **+22%** | **+41.8%** | **+27.6** | +6.1% | **-50.0%** | 0.0% | +8.4% | +8.9% |
| R+ | **+180.5%** | **-20.0%** | **-10.5%** | -3.6% | -4.0% | **Particle at 11 yr** | -0.3% | -0.2% |
| R- | **-75.8%** | **+234.8%** | **+12.0%** | +3.2% | +8.8% | 0.0% | -0.2% | -0.2% |
| Kst+ | **-12.0%** | -2.5% | **-17.7%** | +7.9% | **-66.7%** | **Particle at 18 yr** | +1.4% | -0.2% |
| Kst- | **+127.7%** | **+33.4%** | **-10.6%** | -2.9% | **-77.0%** | **Particle at 5 yr** | -0.1% | -0.1% |
| Nst+ | 0.0% | 0.0% | 0.0% | 0.0% | **+24.3%** | 0.0% | 0.0% | 0.0% |
| Nst- | 0.0% | 0.0% | 0.0% | 0.0% | **-61.6%** | **Particle at 18 yr** | 0.0% | 0.0% |
| Kct+ | **-36.8%** | **+24.1%** | +6.8% | +1.2% | **+35.5%** | 0.0% | -0.5% | -0.2% |
| Kct- | **+24.7%** | **+12.4%** | -1.1% | -0.1% | **-12.2%** | 0.0% | -0.2% | -0.2% |
| Nct+ | 0.0% | 0.0% | 0.0% | 0.0% | -3.6% | 0.0% | 0.0% | 0.0% |
| Nct- | 0.0% | 0.0% | 0.0% | 0.0% | **-11.2%** | 0.0% | 0.0% | 0.0% |
| Ksk+ | **+160.3%** | **-12.0%** | +6.4% | +2.5% | **-78.3%** | 0.0% | +2.2% | -0.2% |
| Ksk- | **-79.6%** | -7.0% | -2.1% | +0.3% | **35.3%** | 0.0% | -0.6% | -0.2% |
| Anisk+ | **+31.5%** | **+10.4%** | +1.3% | +0.1% | **-15.9%** | 0.0% | -0.3% | -0.2% |
| Anisk- | **+88.9%** | +3.7% | +0.3% | +0.1% | +4.4% | 0.0% | 0.0% | -0.2% |
| Nsk+ | 0.0% | 0.0% | 0.0% | 0.0% | **-15.6%** | 0.0% | 0.0% | 0.0% |
| Nsk- | 0.0% | 0.0% | 0.0% | 0.0% | -1.2% | 0.0% | 0.0% | 0.0% |
| Kvl+ | **-11.5%** | **+291.6%** | +1.1% | +0.6% | +0.8% | 0.0% | -0.3% | -0.2% |
| Kvl- | **-47.4%** | **-20.2%** | -1.2% | -0.9% | +6.6% | 0.0% | -0.3% | -0.2% |
| Nvl+ | 0.0% | 0.0% | 0.0% | 0.0% | +6.8% | 0.0% | 0.0% | 0.0% |
| Nvl- | 0.0% | 0.0% | 0.0% | 0.0% | **-10.4%** | 0.0% | 0.0% | 0.0% |

Sources: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx, and Telkwa_EIA_Mdl travel time analz_20210119.xlsx

**Note**s:

The significance of effects to the model calibration and prediction are indicated by the format of the cell, with dark grey indicating high sensitivity, light grey medium sensitivity, pale yellow low sensitivity, and white no sensitivity.

u/s, upstream

**Table 6-26: Sensitivity analysis of the post-closure outputs**

| ID | RPD (%) between calibrated model and sensitivity post-closure scenarios | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total extent of drawdown and mound | Changes to baseflow rates: | | Travel time to discharge 50% of all particles respectively migrating to WQS04, WQS03DS or WQS06 | | | Contributions of mine affected groundwater to: | |
| | | Tenas Ck u/s Goathorn Ck | Goathorn Ck u/s Telkwa Rv. | Tenas Ck u/s WQS04 | Four Ck u/s WQS03DS | Goathorn Ck u/s WQS06 | Tenas Ck u/s WQS04 | Goathorn Ck u/s WQS06 |
| Calibrated model | Extent = 28 km$^2$ | dQ = 2.9% | dQ = 1.1% | T = 60 years | T = 96 years | T = 125 years | Q = 6% | Q = 0.3% |
| HighK | **+39.4%** | -26.7% | -5.9% | **-61.6%** | **-53.4%** | **-40.0%** | +8.2% | +13.9% |
| R+ | **-15.0%** | -7.0% | -2.6% | **-33.3%** | **-13.1%** | **+32.4%** | -4.4% | -0.4% |
| R- | **+265.1%** | +14.2% | +4.1% | -7.9% | +7.4% | **+84.7%** | +2.2% | +1.1% |
| Kst+ | -5.2% | -14.0% | 8.7% | **-74.3%** | **-56.4%** | **-63.8%** | -1.4% | 0.6% |
| Kst- | **+33.5%** | -7.6% | -2.1% | **+190.1%** | **+90.6%** | **+343.1%** | -1.8% | +0.1% |
| Nst+ | 0.0% | 0.0% | 0.0% | +1.7% | **+32.9%** | **+20.0%** | -0.1% | 0.0% |
| Nst- | 0.0% | 0.0% | 0.0% | **-59.0%** | **-50.3%** | **-52.3%** | +0.1% | 0.0% |
| Kct+ | +4.4% | +9.7% | +2.3% | **-18.7%** | -7.6% | **+205.5%** | +1.1% | -0.4% |
| Kct- | **+12.5%** | +1.8% | +0.8% | **-20.4%** | +6.0% | **-15.1%** | -1.9% | 0.3% |
| Nct+ | 0.0% | 0.0% | 0.0% | **-11.0%** | **+10.9%** | +3.7% | -0.1% | +0.1% |
| Nct- | 0.0% | 0.0% | 0.0% | **-18.8%** | -3.8% | -9.4% | 0.0% | 0.0% |
| Ksk+ | **+19.2%** | +10.2% | +4.5% | -1.5% | -10.2% | **-19.1%** | +4.6% | -0.5% |
| Ksk- | -2.2% | +0.6% | +0.9% | -1.2% | **+19.9%** | -6.4% | -2.1% | 0.0% |
| Anisk+ | +9.3% | +3.2% | +1.1% | **-31.3%** | +2.9% | **+70.5%** | -0.9% | +0.8% |
| Anisk- | +2.1% | +4.3% | +1.3% | **-22.6%** | 2.4% | 4.5% | -0.5% | +0.4% |
| Nsk+ | 0.0% | 0.0% | 0.0% | -7.9% | +1.3% | -2.7% | -0.1% | 0.0% |
| Nsk- | 0.0% | 0.0% | 0.0% | **-20.3%** | +3.3% | +1.2% | 0.0% | 0.0% |
| Kvl+ | **+315.7%** | +4.6% | +0.7% | -7.3% | +8.0% | **+89.1%** | +0.3% | +0.1% |
| Kvl- | **-18.3%** | +3.8% | +1.8% | **-12.2%** | +4.6% | **-8.0%** | -0.4% | +0.4% |
| Nvl+ | 0.0% | 0.0% | 0.0% | **-12.1%** | +2.9% | -4.9% | -0.1% | 0.1% |
| Nvl- | 0.0% | 0.0% | 0.0% | **-21.5%** | +0.5% | -2.4% | 0.0% | 0.0% |

Sources: Telkwa_EA_Mdl Setup-Calib-AnlzResults_20240920.xlsx, and Telkwa_EIA_Mdl travel time analz_20210119.xlsx

**Notes:**

The significance of effects to the model calibration and prediction are indicated by the format of the cell, with dark grey indicating high sensitivity, light grey medium sensitivity, pale yellow low sensitivity, and white no sensitivity.

u/s, upstream

**Table 6-27: Sensitivity types related for the predictions of changes to heads**

**Change in calibration**

| **Change in prediction results** | | **Insignificant** | | | | | **Significant** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Type I** | | | | | **Type II** | | | | |
| | **Insignificant** | **Open pit inflow** | **Changes to head** | **Changes to baseflow** | **Travel times** | **Mine affected contributions to baseflows** | **Open pit inflow** | **Changes to head** | **Changes to baseflow** | **Travel times** | **Mine affected contributions to baseflows** |
| | | Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | *Ksk-*<br>*Anisk+/-*<br>Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | *Kct-*<br>*Ksk-*<br>*Anisk+/-*<br>Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | *Kvl+/-* | *Kst-*<br>*Kct-*<br>*Ksk-*<br>*Anisk+/-*<br>*Kvl+/-*<br>Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | - | *Kst+* | *HighK*<br>*Kct+*<br>*Ksk+* | - | *HighK*<br>*R+/-*<br>*Kst+*<br>*Kct+*<br>*Ksk+* |
| | | **Type IV** | | | | | **Type III** | | | | |
| | **Significant** | **Open pit inflow** | **Changes to head** | **Changes to baseflow** | **Travel times** | **Mine affected contributions to baseflows** | **Open pit inflow** | **Changes to head** | **Changes to baseflow** | **Travel times** | **Mine affected contributions to baseflows** |
| | | *Kst-*<br>*Kct-*<br>*Ksk-*<br>*Anisk+/-*<br>*Kvl+/-* | *Kst-*<br>*Kct-*<br>*Kvl+/-* | *Kst-*<br>*Kvl+/-* | *Kst-*<br>*Kct-*<br>*Ksk-*<br>*Anisk+/-*<br>Nst+/-<br>Nct+/-<br>Nsk+/-<br>Nvl+/- | - | *HighK*<br>*R+/-*<br>*Kst+*<br>*Kct+*<br>*Ksk+* | *HighK*<br>*R+/-*<br>*Kct+*<br>*Ksk+* | *R+/-*<br>*Kst+* | *HIghK*<br>*R+/-*<br>*Kst+*<br>*Kct+*<br>*Ksk+* | - |

## 6.9 Limitations of the Groundwater Model

The British Columbia Groundwater Modeling Guidelines (BC MOE 2012) defines three levels of modeling complexity based on potential impacts, modeling objectives, hydrogeological framework and data availability. The model developed here may be classified as moderate complexity, defined as follows: *"These are conceptual or numerical models based on a reasonable, though limited, dataset and having limited calibration. These models may be used to determine the potential range of change or to "bracket"* potential effects that may occur due to a given stress." Hence, while specific results are calculated during the modelling process, there always remains a degree of uncertainty associated with these estimates.

- The model is based on a unique conceptualisation of the 3D geology, constructed from the analyses of drillhole intercepts (TML's database), geological maps (surface and bedrock geology, regional and local maps, 2D cross sections; Clague 1984, MEMPR 1993, BCGS 2005, TML 2018), and considerations on the ability of a unit to convey groundwater. While geological structures have been mapped and do not appear to influence the flow system, it is not possible to confirm if other large-scale fractures and/or faults are connected and if they act as a conduit or as barrier to flows.
- The characterization of aquitards or aquicludes is uncertain because historical hydraulic conductivity measurements tended to be biased towards specific units (coal) and high permeability intervals in bedrock and overburden. The local heterogeneities that cause perched groundwater lenses in the till, and the potential influence of thick low K mudstone are not well characterized.
- The calibrated model results are deemed reasonable considering the calibrated properties are aligned with the average site observations and model integrated all the available data. However, model was only calibrated to steady state conditions and the results have highest confidence in the vicinity of the mine area, where there are relatively more data. Actual ground conditions and properties may vary locally where data are not available; additional collection of K and Sy values would increase the confidence in the model predictions, where parameters are identified as Type IV.
- The groundwater drawdowns and baseflow reductions predicted by the numerical model during mining conditions are biased high because the modelling assumes steady state conditions have been reached, when they most likely won't have by the end of operations.

# 7 Conclusions

The models developed for the Tenas Project were based on climate and hydrology data, regional and local geology, site drillholes, and site groundwater data. The level of details, methods, and quality of the information were adequate for a Joint Application for a Mines Act permit, and for an effluent discharge permit.

The hydrogeological conceptual model was used as a basis to develop a numerical model calibrated to field data, with a final NRMSE of 3.2% for hydraulic heads and 3.6% for baseflows. The models relied on steady-state conditions to predict at EoY1, EoY7, EOM, and post-closure conditions.

The conclusions of the modelling can be summarized as follows:

- Open pit inflows are expected to range between 320 and 890 $m^3$/d. Under groundwater conditions alone, inflows of these magnitudes are typically managed with open pit sumps and do not require active dewatering systems.
- Neither mining induced drawdown nor mounding are expected to reach the private well locations.
- The mining scenario shows maximum reductions of baseflows occur prior to construction of the material and water management facilities (i.e., reductions to the entire creeks of about 6% at Tenas Creek, 5% at Four Creek, 2% at the Goathorn Creek, and 2% at the Telkwa River). The potential contributions of mine affected groundwater to baseflows, after 25 years of operations, were 0.8% for Tenas Creek at WQS04, less than 0.3% for Goathorn Creek at WQS05, and less than 0.2% for the Telkwa River at WQS09.
- The post-closure scenario indicates baseflows to the entire creeks will either remain unchanged or slightly increase due to the influence of the management ponds on groundwater levels, with a 3% increase at Tenas Creek, 4% increase at Four Creek, 1% increase at the Goathorn Creek, and 1% increase at the Telkwa River. The predicted long-term contributions of mine affected groundwater to baseflows were less than 9.3% for Tenas Creek at WQS04, less than 4.6% for Goathorn Creek at WQS05, and less than 0.8% for the Telkwa River at WQS09.
- Mine affected particles are predicted to slowly migrate towards three private wells 3.8 km north of the Project and west of Goathorn Creek (Goalder, Baker, and Mapletoft); however, travel times are expected to be in excess of 400 years, and less than 170 years for sensitivities. The wells located east of Goathorn Creek are not located along particle paths.
- Three private wells (Goalder, Mapletoft, and Baker) located in the Telkwa River valley are potentially within the paths of mine affected groundwater. No constituent is predicted to exceed the BC-DWG. The processes of diffusion, dispersion, or natural attenuation, and the predicted travel times (i.e., > 400 years) between the Project and the Telkwa alluvial floodplain were not considered in the analysis which means results are conservative and will be lower when Project is developed.

The modeling presented herein provides forecasts of the expected Project behavior, derived from the available hydrogeological information. The steady state conditions were found to reasonably simulate the site observations and the regional behaviour, with the highest confidence in the vicinity of the Project. Upgrades to the model should be considered as additional information becomes available.

This report, Hydrogeology Technical Report for the Tenas Coal Project, was prepared by;

Gregory Fagerlund, MSc., P.Geo.
Associate Senior Consultant
(Permit number: 1000305)

and reviewed by

Daniel Mackie, MSc. PGeo. (BC)
Principal Consultant

SRK Consulting (Canada) Inc Engineers and Geoscientist BC Permit to Practice No: 1003655

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

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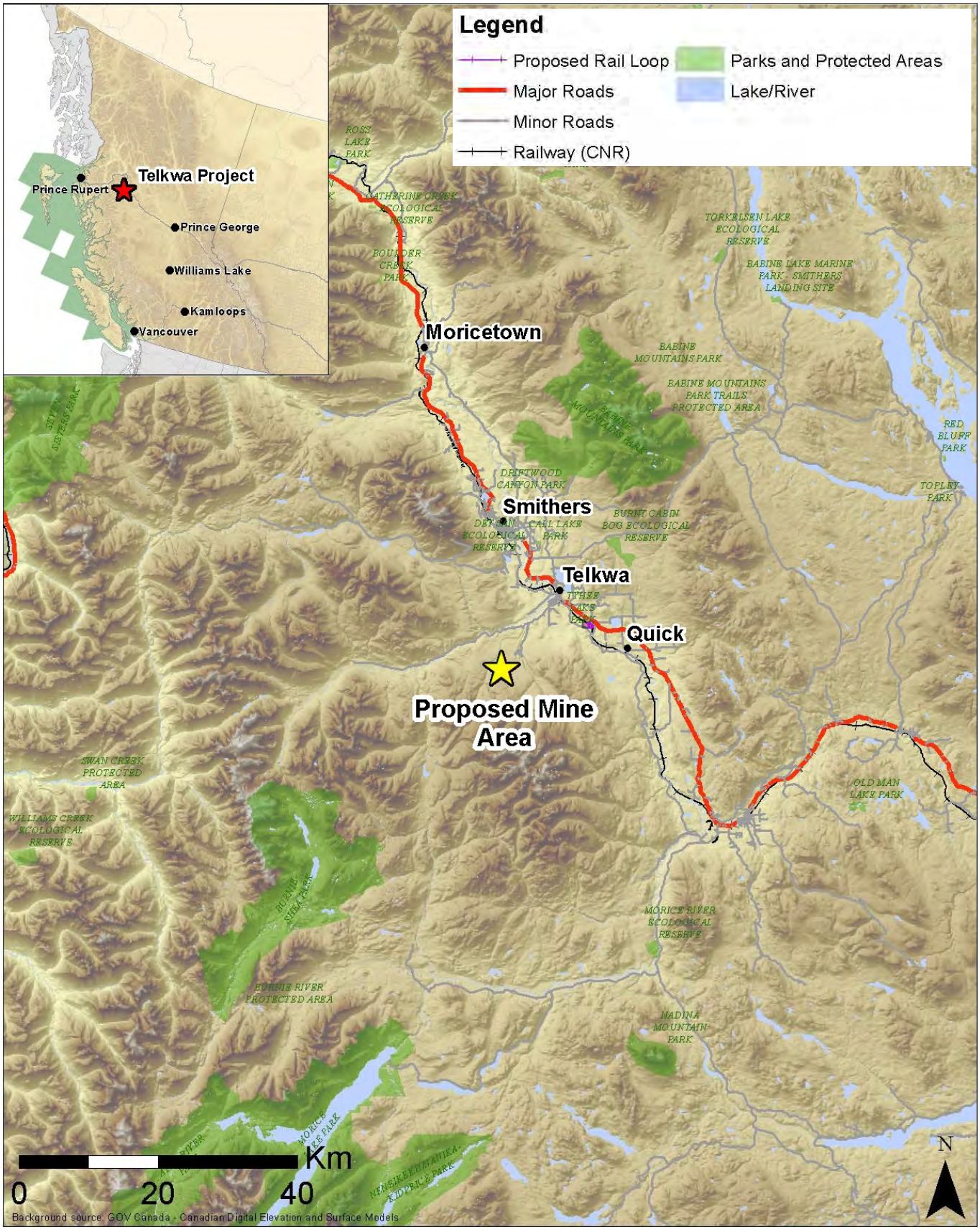
Figures

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| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
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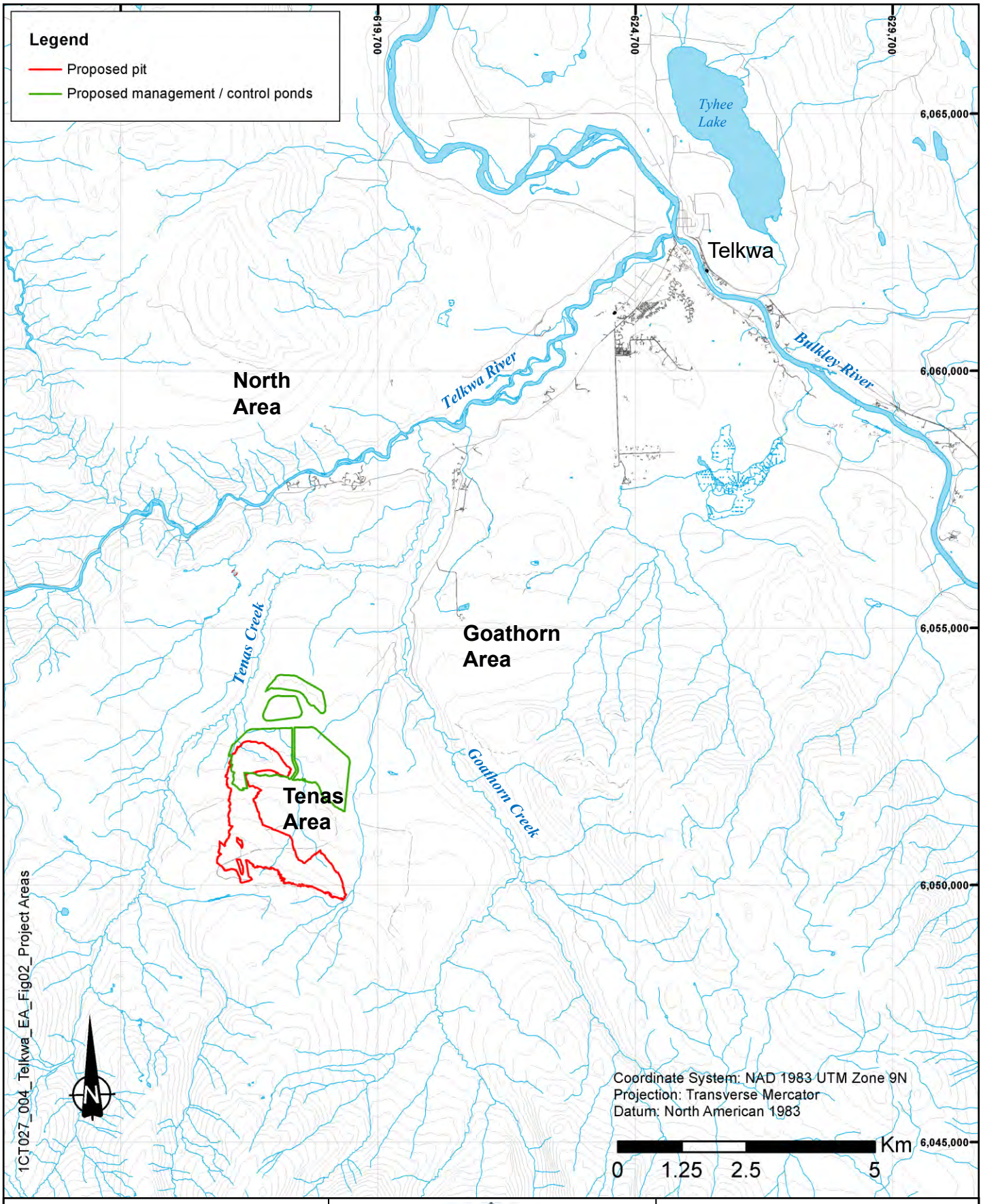


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**Project Areas**

Job No: 1CT027.004

Filename: Fig02_Project Areas.pptx

Tenas Project

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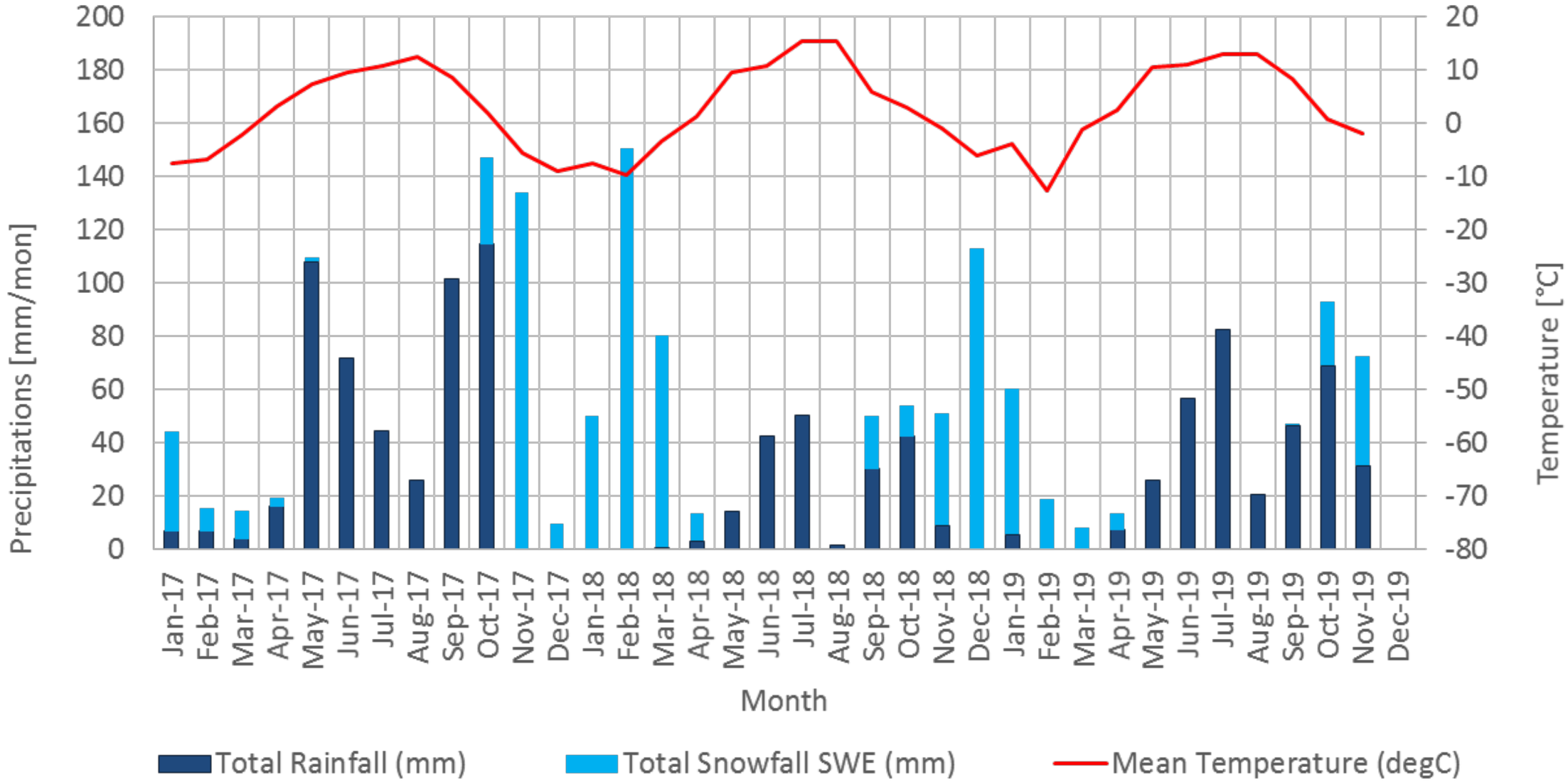
| Nov 2020 | GF | 2 |

*Source: Tenas Deposit met 2017-2019 daily comp.xlsx*

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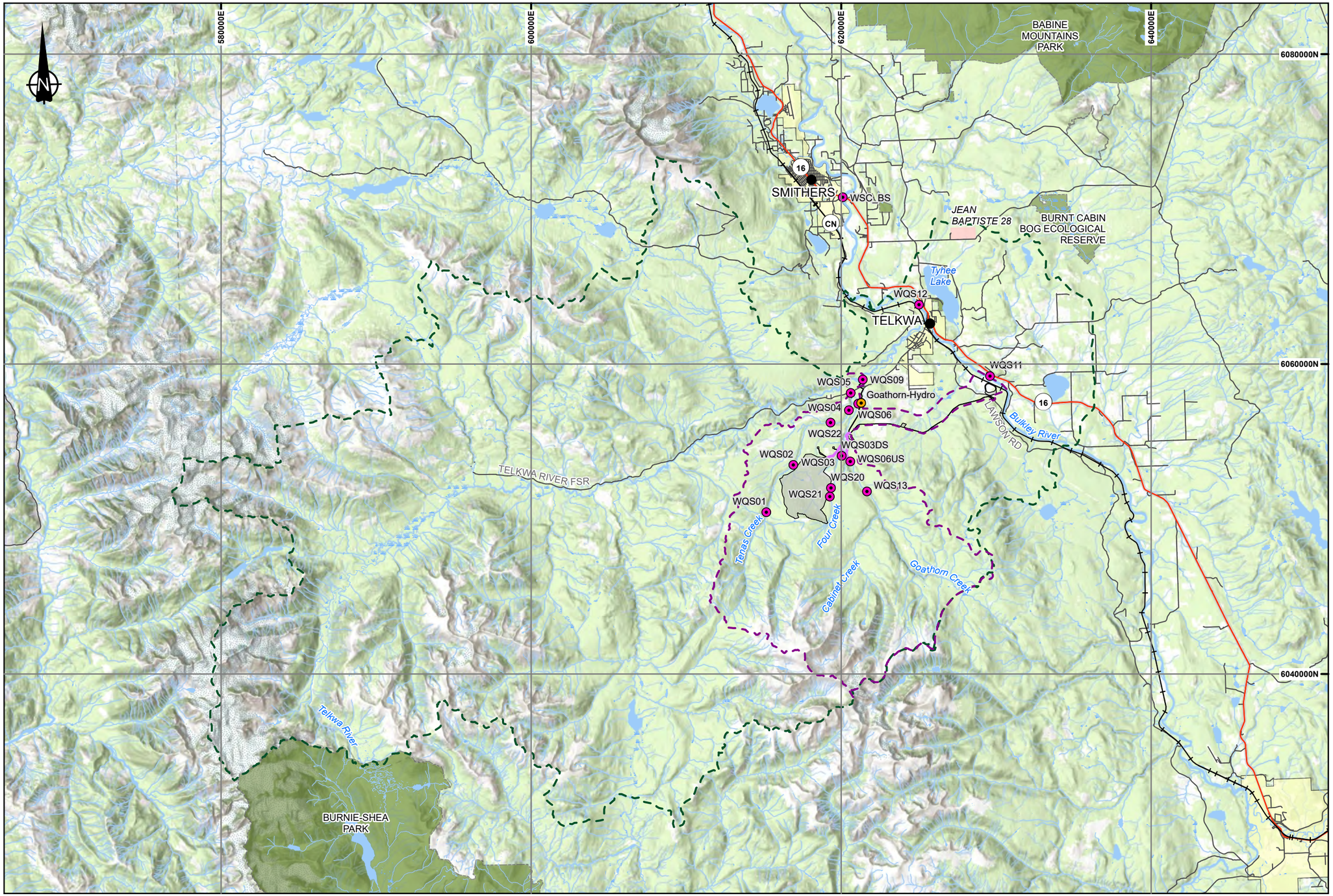
| | | **Precipitations and Temperatures** |
| Job No: 1CT027.004<br>Filename: Fig3_Precip&Temp.pptx | Tenas Project | Date: Oct. 2020 / Approved: GF / Figure: **3** |




**LEGEND**

- WBLM Nodes
- Hydrometric Stations
- City/Town
- LSA Boundary
- RSA Boundary
- Tenas Access Corridor
- Rail Line
- Highway
- Road
- Project Area
- Waterbody
- Wetland
- Watercourse
- Park or Protected Area
- First Nation Reserve
- Municipal Area

**NOTES**

1. All mapped features are approximate and should be used for discussion purposed only.

**REFERENCES**

NAD 1983 UTM Zone 9N
Project features: Allegiance Coal, 2020
Basedata: Government of British Columbia
Basemap: World Topo Base

0 2500 5000 7500 10000
Meters

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SRK JOB NO: 1CT027.004

FILENAME: Fig04_Topo_main_Drainage_basins.pdf

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# Topography of the Main Drainage Basins

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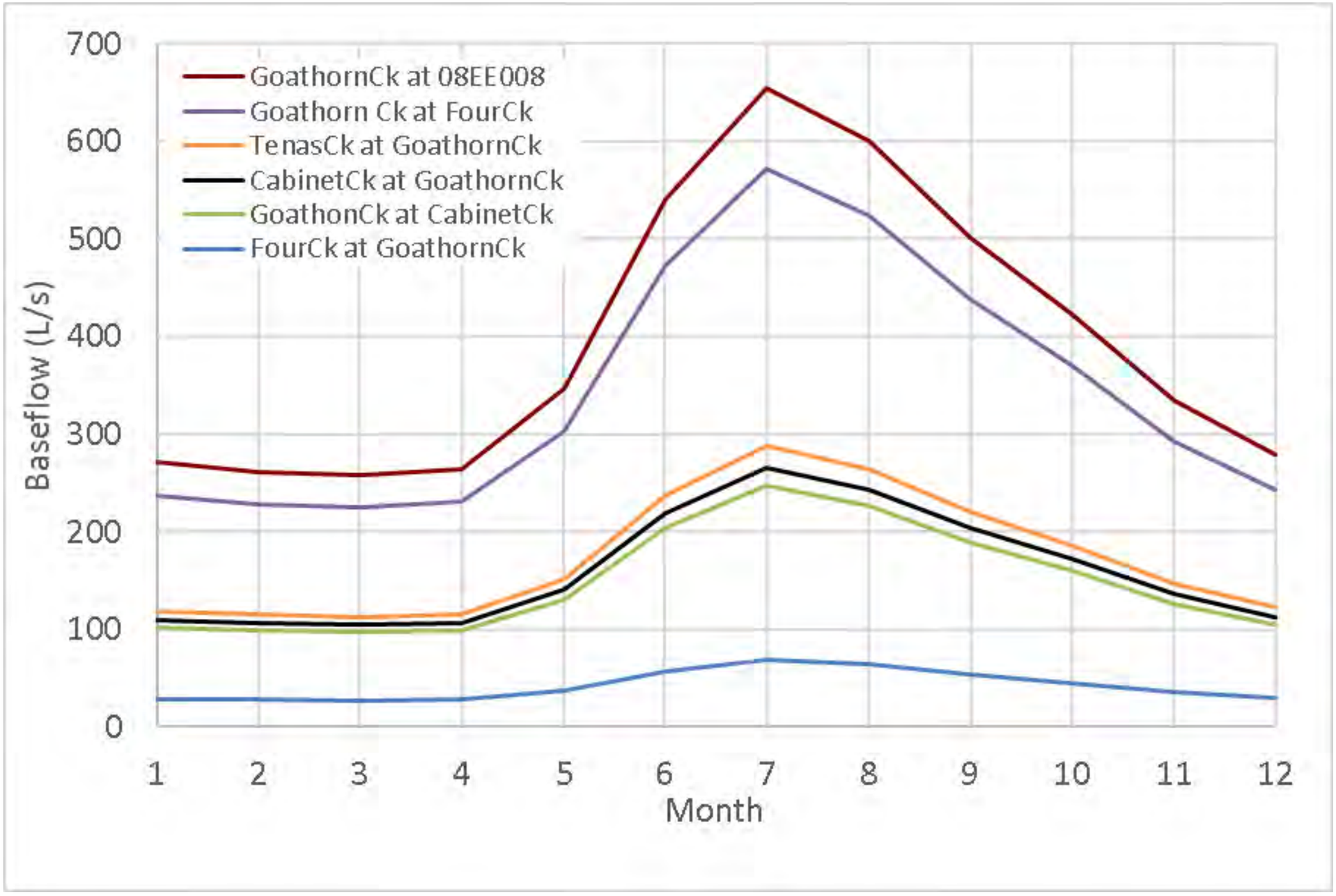


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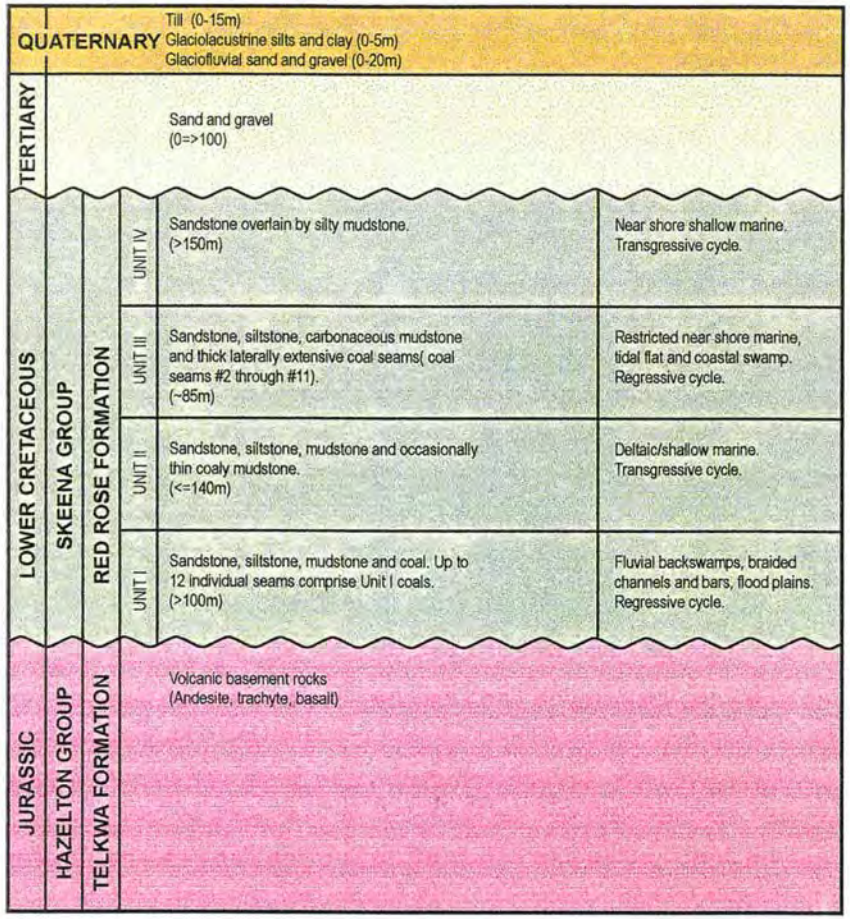
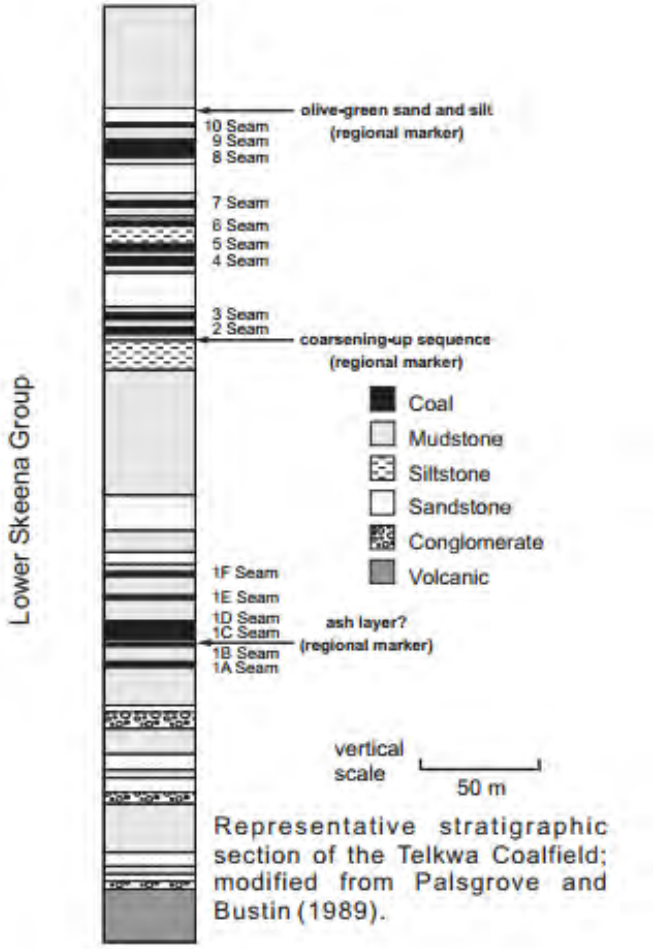
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Estimated Baseflows** |
| Job No: 1CT027.004<br>Filename: Fig5 Estimated_Baseflows.pptx | Tenas Project | Date: Oct. 2020 / Approved: GF / Figure: **5** |




Notes:
1. All formation thicknesses are approximate and could locally vary significantly (esp. Quaternary and Tertiary).
2. Bedrock geology after Manalta (1998).

**Simplified Stratigraphic Column (Piteau, 1998).**




Representative stratigraphic section of the Telkwa Coalfield; modified from Palsgrove and Bustin (1989).

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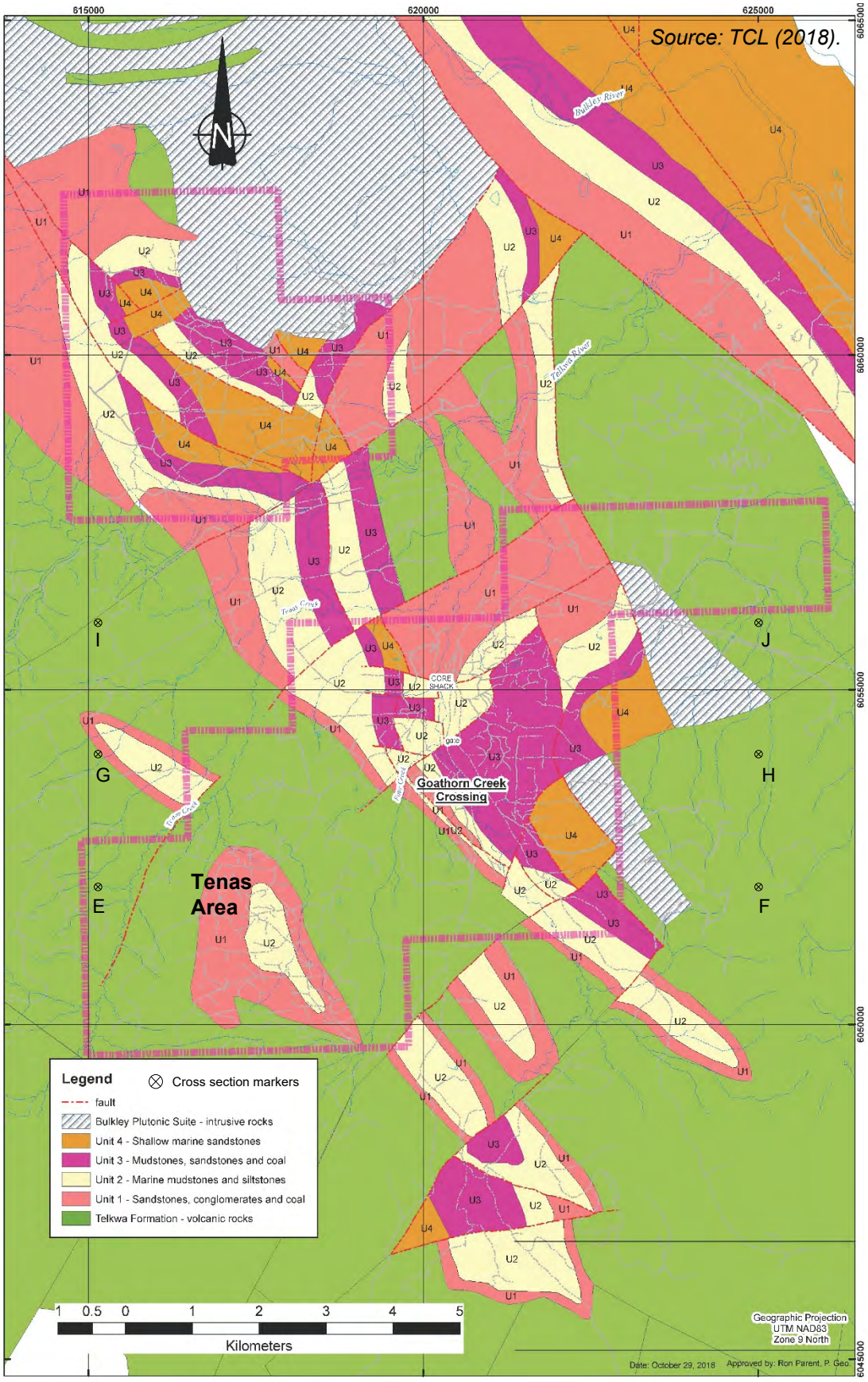
| | | **Stratigraphic column of the Telkwa Project area** |
| Job No: 1CT027.004<br>Filename: Fig6_Strat Colums.pptx | Tenas Project | Date: Nov. 2018 / Approved: GF / Figure: 6 |

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| | | **Geological map of the Telkwa coal field** | | |
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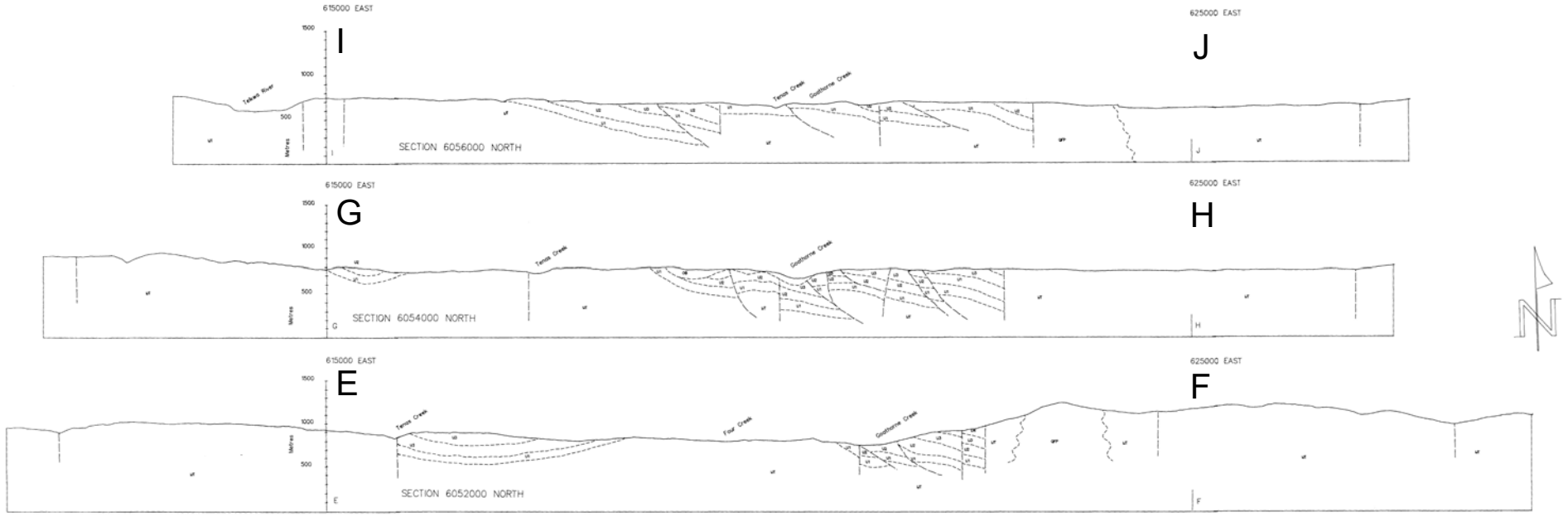


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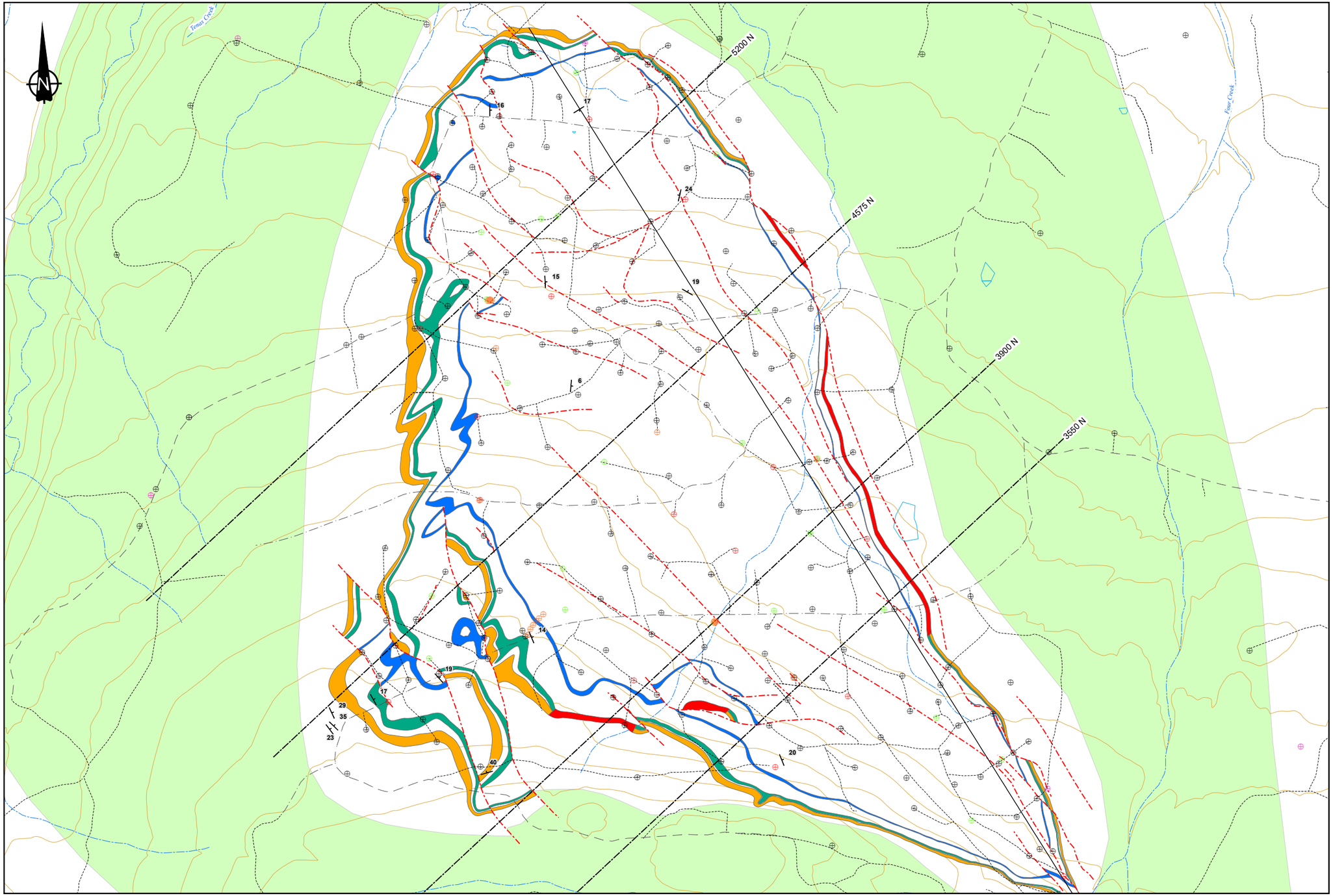
| | | **Cross sections of the Telkwa coal field (Palsgrove, 1991)** |
| Job No: 1CT027.004<br>Filename: Fig8_CS Telkwa coal field.pptx | Tenas Project | Date: Nov.2018 / Approved: GF / Figure: **8** |




**LEGEND**

Existing Drillholes

- ARD Core
- Bulk Sample Core
- Core
- Rotary Core
- Rotary Bulk Samples
- Rotary
- Bedding
- Syncline
- Fault
- Seam C
- Seam 1 Lower
- Seam 1 Upper
- Seam 1
- Hazleton Volcanics
- Creeks
- Cross Sections
- Forest Service Road
- Existing Trails
- Contours (20m)

**NOTES**

1. All mapped features are approximate and should be used for discussion purposed only.

**REFERENCES**

NAD 1983 UTM Zone 9N

Figure produced by SRK, project features provided by Allegiance Coal, 2020

0 250 500 750

Meters

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**Tenas Project**

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# Geological Map of the Tenas Area

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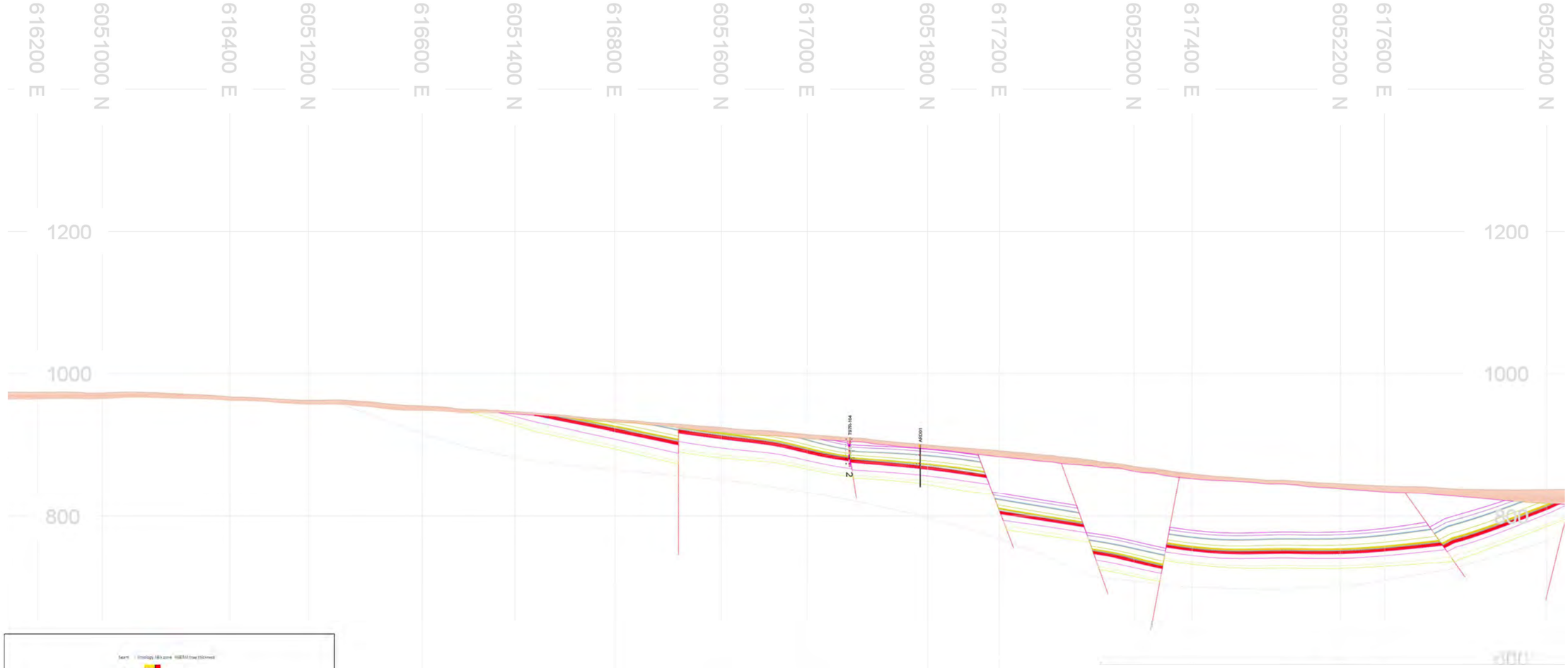


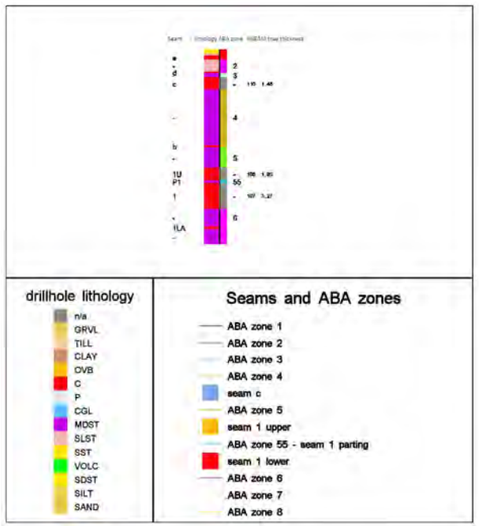


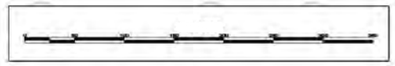

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SEC 5200 facing NW (317 az)

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Tenas Project

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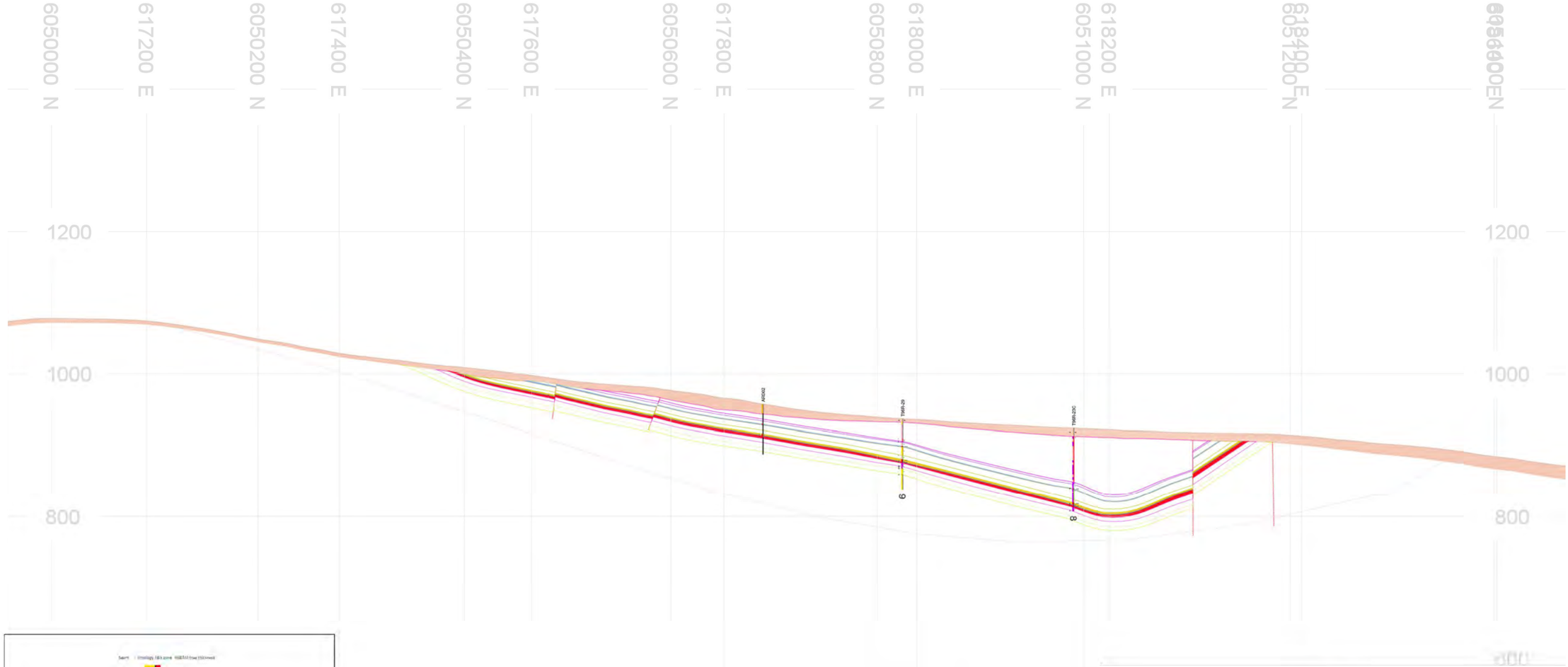


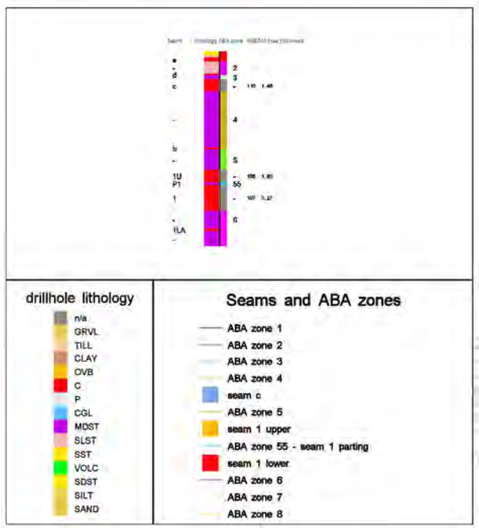


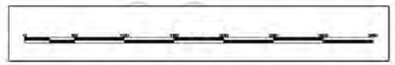

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SEC 3900 facing NW (317 az)

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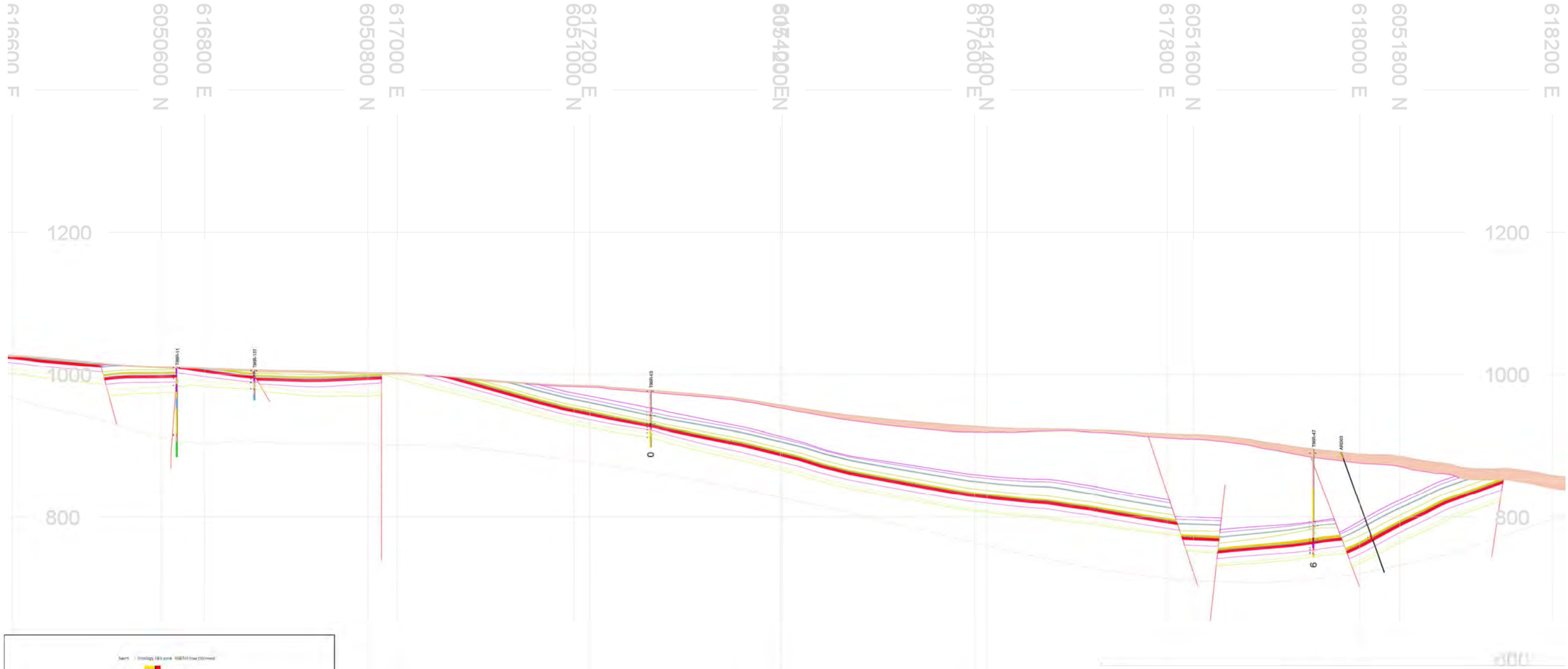


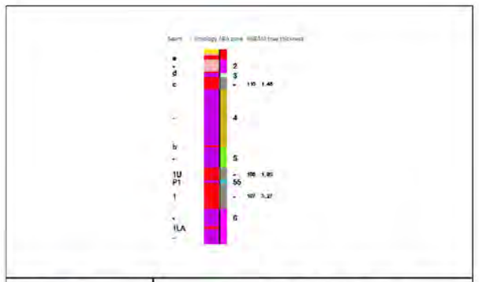


**drillhole lithology**

- n/a
- GRVL
- TILL
- CLAY
- OVB
- C
- P
- CGL
- MDST
- SLST
- SST
- VOLC
- SDST
- SILT
- SAND

**Seams and ABA zones**

- ABA zone 1
- ABA zone 2
- ABA zone 3
- ABA zone 4
- seam c
- ABA zone 5
- seam 1 upper
- ABA zone 55 - seam 1 parting
- seam 1 lower
- ABA zone 6
- ABA zone 7
- ABA zone 8

| | | |
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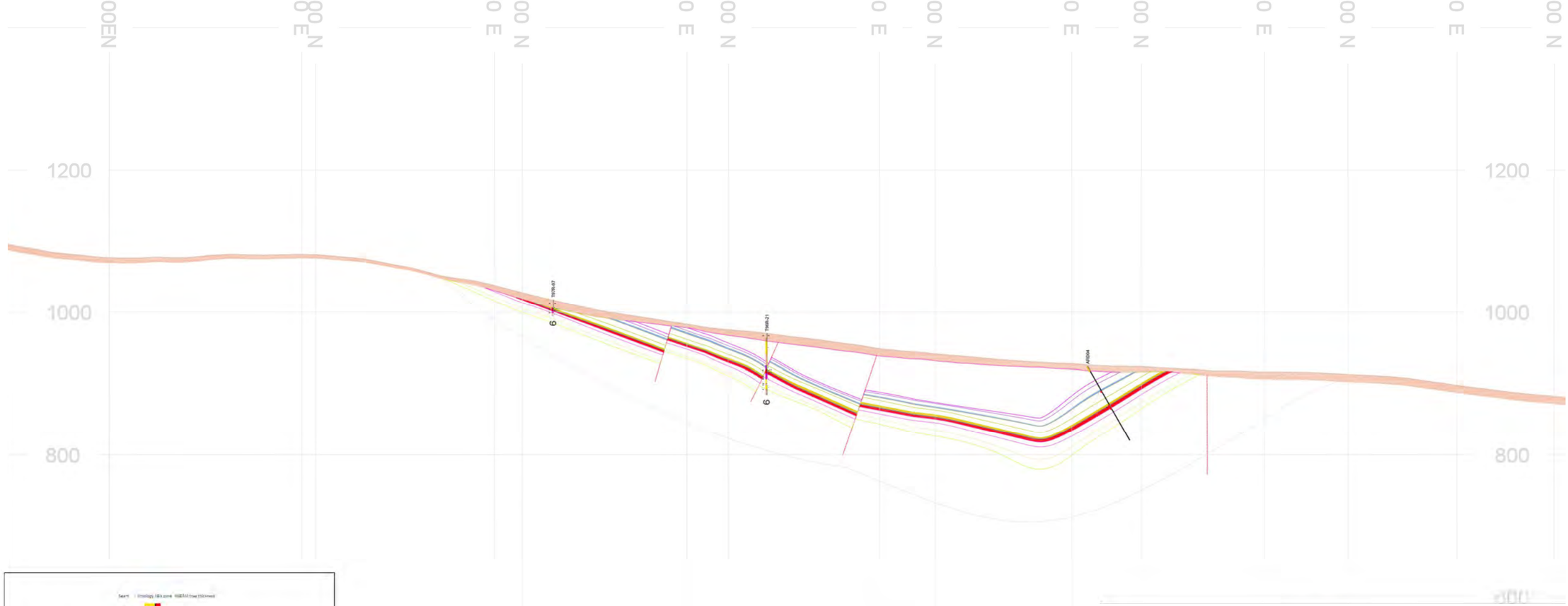
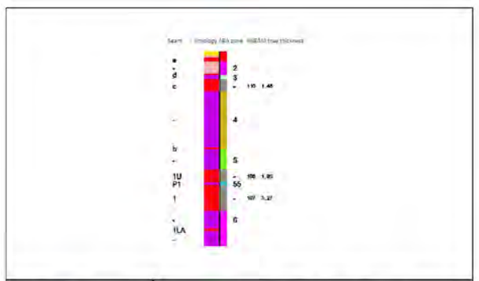


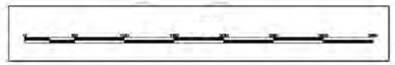



drillhole lithology

- n/a
- GRVL
- TILL
- CLAY
- OVB
- C
- P
- CGL
- MDST
- SLST
- SST
- VOLC
- SDST
- SILT
- SAND

Seams and ABA zones

- ABA zone 1
- ABA zone 2
- ABA zone 3
- ABA zone 4
- seam c
- ABA zone 5
- seam 1 upper
- ABA zone 55 - seam 1 parting
- seam 1 lower
- ABA zone 6
- ABA zone 7
- ABA zone 8



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| srk consulting | ALLEGIANCE COAL LIMITED | Groundwater Technical Report |
| SRK JOB NO.: 1CT027.004 | Tenas Project | SEC 3550 facing NW (317 az) |
| FILE NAME: 1CT027.004 Tenas Geological Model Sections.dwg | | DATE: January 2021 / APPROVED: GF / FIGURE: 13 |

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## Volcanics

## Volcanics

## Weathered Volcanics

| | | | |
|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | |
| | | **Example Photos of Volcanic Units** | |
| Job No: 1CT017.004<br>Filename: Fig14_Volcanics_Photos.pptx | Tenas Project | Date: Apr 2019 | Approved: GF | Figure: **14** |

## Sandstone

## Coal

## Mudstone/Siltstone

## Interbedded Coal and Siltstone

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Example Photos of Skeena Group Units** |
| Job No: 1CT017.004<br>Filename: Fig15_SkeenaGp_Photos.pptx | Tenas Project | Date: Apr 2019 / Approved: GF / Figure: **15** |

614000E
616000E
618000E
620000E
622000E
6054000N
6052000N
6050000N

**LEGEND**

- Test Pit
- Sonic
- Upper Till
- Lower Till
- Sand and Gravel
- Creeks
- Roads

**NOTES**

1. All mapped features are approximate and should be used for discussion purposed only.

**REFERENCES**

NAD 1983 UTM Zone 9N

Figure produced by SRK, data provided by Allegiance Coal, 2020

0 250 500 750 1000

Meters

srk consulting

SRK JOB NO: 1CT027.004

FILENAME: Fig16_Surficial_Geology.pdf

ALLEGIANCE COAL LIMITED

**Tenas Project**

Groundwater Technical Report

Tenas Creek
Surficial Geology

| Date: | Approved: | Figure: |
|---|---|---|
| Jan 2021 | GF | **16** |

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## Till (Diamond)

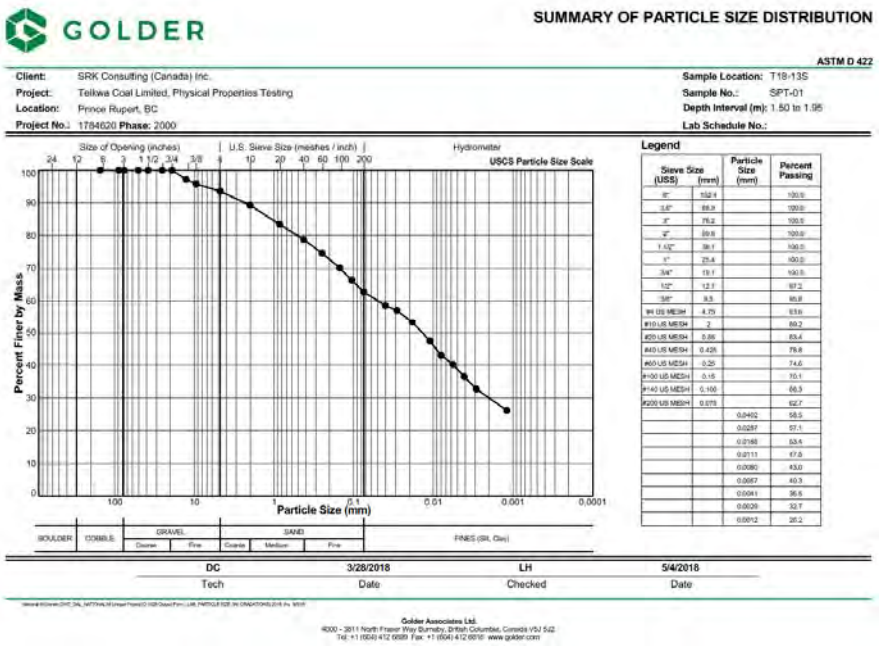
## Till (Shelby)

## Clayey/Silty Sand

## Sand and Gravel

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Example Photos of Overburden Units** |
| Job No: 1CT017.004<br>Filename: Fig17_Overburden_Photos.pptx | Tenas Project | Date: Apr 2019 / Approved: GF / Figure: **17** |

# Till



GOLDER

SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM D 422

Client: SRK Consulting (Canada) Inc.
Project: Telkwa Coal Limited, Physical Properties Testing
Location: Prince Rupert, BC
Project No.: 1784620 Phase: 2000

Sample Location: T18-13S
Sample No.: SPT-01
Depth Interval (m): 1.50 to 1.95
Lab Schedule No.:

Size of Opening (inches) | U.S. Sieve Size (meshes / inch) | Hydrometer — USCS Particle Size Scale

Percent Finer by Mass

Particle Size (mm)

BOULDER | COBBLE | GRAVEL (Coarse, Fine) | SAND (Coarse, Medium, Fine) | FINES (Silt, Clay)

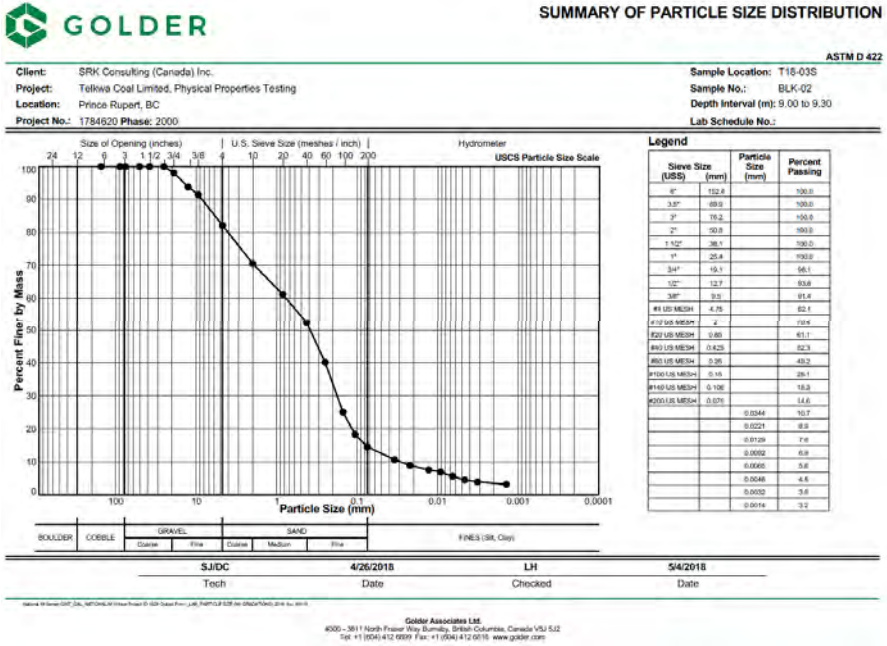
Legend

| Sieve Size (US$) | (mm) | Particle Size (mm) | Percent Passing |
|---|---|---|---|
| 6" | 152.4 | | 100.0 |
| 3.5" | 88.9 | | 100.0 |
| 3" | 76.2 | | 100.0 |
| 2" | 50.8 | | 100.0 |
| 1 1/2" | 38.1 | | 100.0 |
| 1" | 25.4 | | 100.0 |
| 3/4" | 19.1 | | 100.0 |
| 1/2" | 12.7 | | 97.2 |
| 3/8" | 9.5 | | 95.8 |
| #4 US MESH | 4.75 | | 93.6 |
| #10 US MESH | 2 | | 89.2 |
| #20 US MESH | 0.85 | | 83.4 |
| #40 US MESH | 0.425 | | 78.8 |
| #60 US MESH | 0.25 | | 74.6 |
| #100 US MESH | 0.15 | | 70.1 |
| #140 US MESH | 0.106 | | 66.3 |
| #200 US MESH | 0.075 | | 62.7 |
| | | 0.0402 | 58.5 |
| | | 0.0287 | 57.1 |
| | | 0.0168 | 53.4 |
| | | 0.0111 | 47.8 |
| | | 0.0080 | 43.0 |
| | | 0.0057 | 40.3 |
| | | 0.0041 | 36.6 |
| | | 0.0029 | 32.7 |
| | | 0.0012 | 26.2 |

| DC | 3/28/2018 | LH | 5/4/2018 |
|---|---|---|---|
| Tech | Date | Checked | Date |

Golder Associates Ltd.
4000 - 3811 North Fraser Way Burnaby, British Columbia, Canada V5J 5J2
Tel: +1 (604) 412 6999 Fax: +1 (604) 412 6010 www.golder.com

# Sand and Gravel



GOLDER

SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM D 422

Client: SRK Consulting (Canada) Inc.
Project: Telkwa Coal Limited, Physical Properties Testing
Location: Prince Rupert, BC
Project No.: 1784620 Phase: 2000

Sample Location: T18-03S
Sample No.: BLK-02
Depth Interval (m): 9.00 to 9.30
Lab Schedule No.:

Size of Opening (inches) | U.S. Sieve Size (meshes / inch) | Hydrometer — USCS Particle Size Scale

Percent Finer by Mass

Particle Size (mm)

BOULDER | COBBLE | GRAVEL (Coarse, Fine) | SAND (Coarse, Medium, Fine) | FINES (Silt, Clay)

Legend

| Sieve Size (US$) | (mm) | Particle Size (mm) | Percent Passing |
|---|---|---|---|
| 6" | 152.4 | | 100.0 |
| 3.5" | 88.9 | | 100.0 |
| 3" | 76.2 | | 100.0 |
| 2" | 50.8 | | 100.0 |
| 1 1/2" | 38.1 | | 100.0 |
| 1" | 25.4 | | 100.0 |
| 3/4" | 19.1 | | 98.1 |
| 1/2" | 12.7 | | 93.8 |
| 3/8" | 9.5 | | 91.4 |
| #4 US MESH | 4.75 | | 82.1 |
| #10 US MESH | 2 | | 70.5 |
| #20 US MESH | 0.85 | | 61.1 |
| #40 US MESH | 0.425 | | 52.3 |
| #60 US MESH | 0.25 | | 43.2 |
| #100 US MESH | 0.15 | | 29.1 |
| #140 US MESH | 0.106 | | 18.3 |
| #200 US MESH | 0.075 | | 14.6 |
| | | 0.0344 | 10.7 |
| | | 0.0221 | 9.9 |
| | | 0.0129 | 7.6 |
| | | 0.0092 | 6.9 |
| | | 0.0065 | 5.8 |
| | | 0.0046 | 4.6 |
| | | 0.0032 | 3.8 |
| | | 0.0014 | 3.2 |

| SJ/DC | 4/26/2018 | LH | 5/4/2018 |
|---|---|---|---|
| Tech | Date | Checked | Date |

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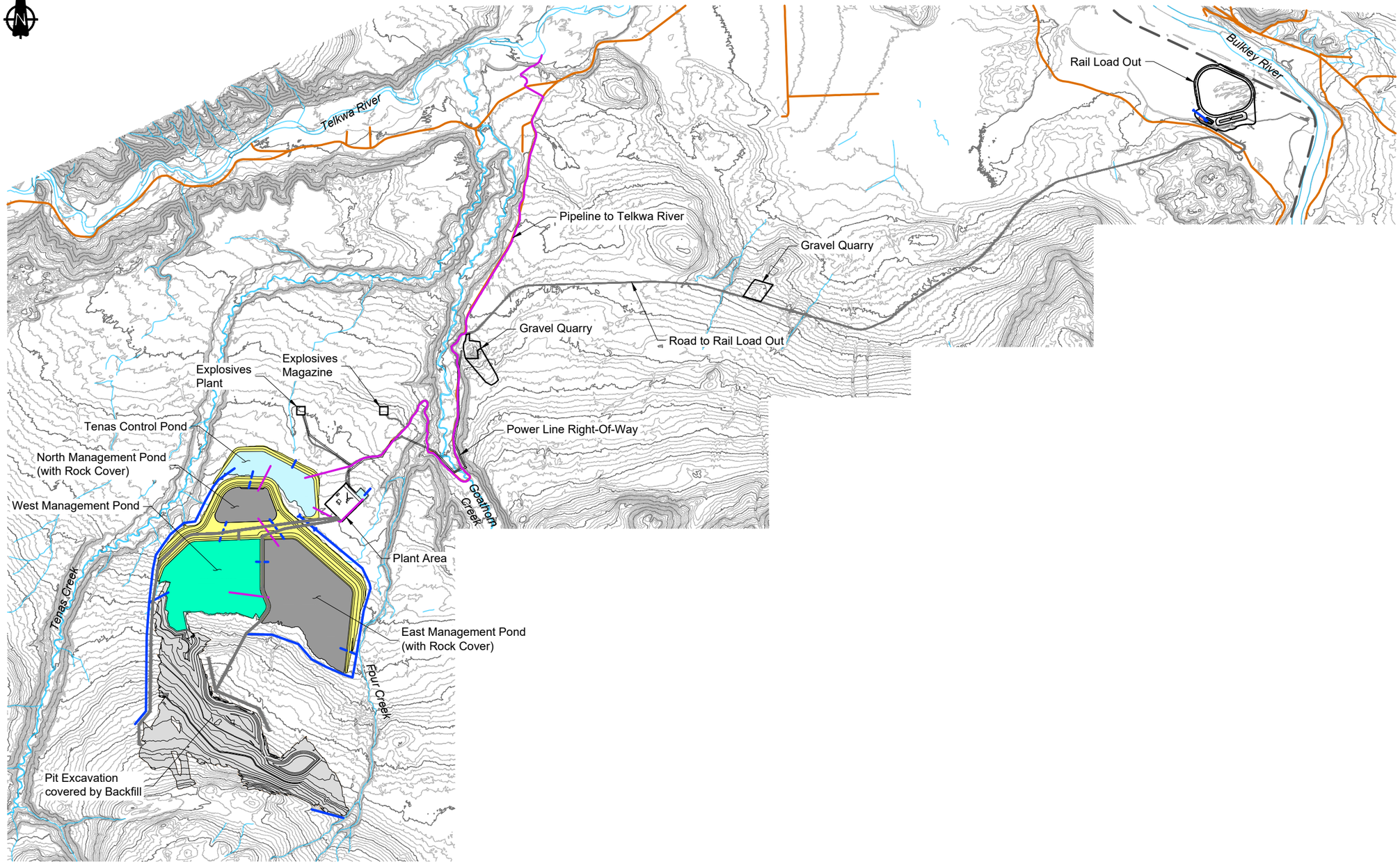
4000 - 3811 North Fraser Way Burnaby, British Columbia, Canada V5J 5J2
Tel: +1 (604) 412 6999 Fax: +1 (604) 412 6010 www.golder.com

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Example of Overburden Particle Size Distribution** |
| Job No: 1CT017.004<br>Filename: Fig18_OverburdenPSD.pptx | Tenas Project | Date: Apr 2019 \| Approved: GF \| Figure: **18** |




## LEGEND

- Water Management Feature
- Spillway
- Existing Watercourse
- Pipeline
- Existing Road
- Proposed Road
- Dams and Buttresses
- Control Pond
- Management Pond
- Backfill / NAG Pile
- Rock Cover

## NOTES

1. Contours shown at 5.0m intervals.
2. All dimensions shown in meters unless otherwise stated.
3. Pile designs by SRK Consulting Ltd.

## REFERENCE

NAD83 UTM Zone 9.

0m 500 1000 1500 2000

| | | |
|---|---|---|
| srk consulting | ALLEGIANCE COAL LIMITED | Groundwater Technical Report |
| SRK JOB NO.: 1CT027.004 | Tenas Project | Mine Plan |
| FILE NAME: Fig19_Mine_Plan.pdf | DATE: Jan 2021 / APPROVED: GF / FIGURE: 19 | |

\\srk.ad\DFS\vancan\Projects\01_SITES\Telkwa Coal\1040_AutoCAD\Figures\1CT027.004 GW Technical Report Mine Plan.dwg

**LEGEND**

- City/Town
- Groundwater LSA
- Groundwater RSA
- Tenas Access Corridor
- Rail Line
- Highway
- Road
- Project Area
- Waterbody
- Wetland
- Watercourse
- Park or Protected Area
- First Nation Reserve
- Municipal Area

**NOTES**

1. All mapped features are approximate and should be used for discussion purposed only.

**REFERENCES**

NAD 1983 UTM Zone 9N
Project features: Allegiance Coal, 2020
Basedata: Government of British Columbia
Basemap: World Topo Base

0 2500 5000 7500 10000
Meters

srk consulting

SRK JOB NO: 1CT027.004

FILENAME: Fig20_Groundwater_RSA_LSA.pdf

ALLEGIANCE COAL LIMITED

**Tenas Project**

Groundwater Technical Report

Local Study Area (LSA) and Regional Study Area (RSA)

| Date: | Approved: | Figure: |
|---|---|---|
| Jan 2021 | GF | **20** |

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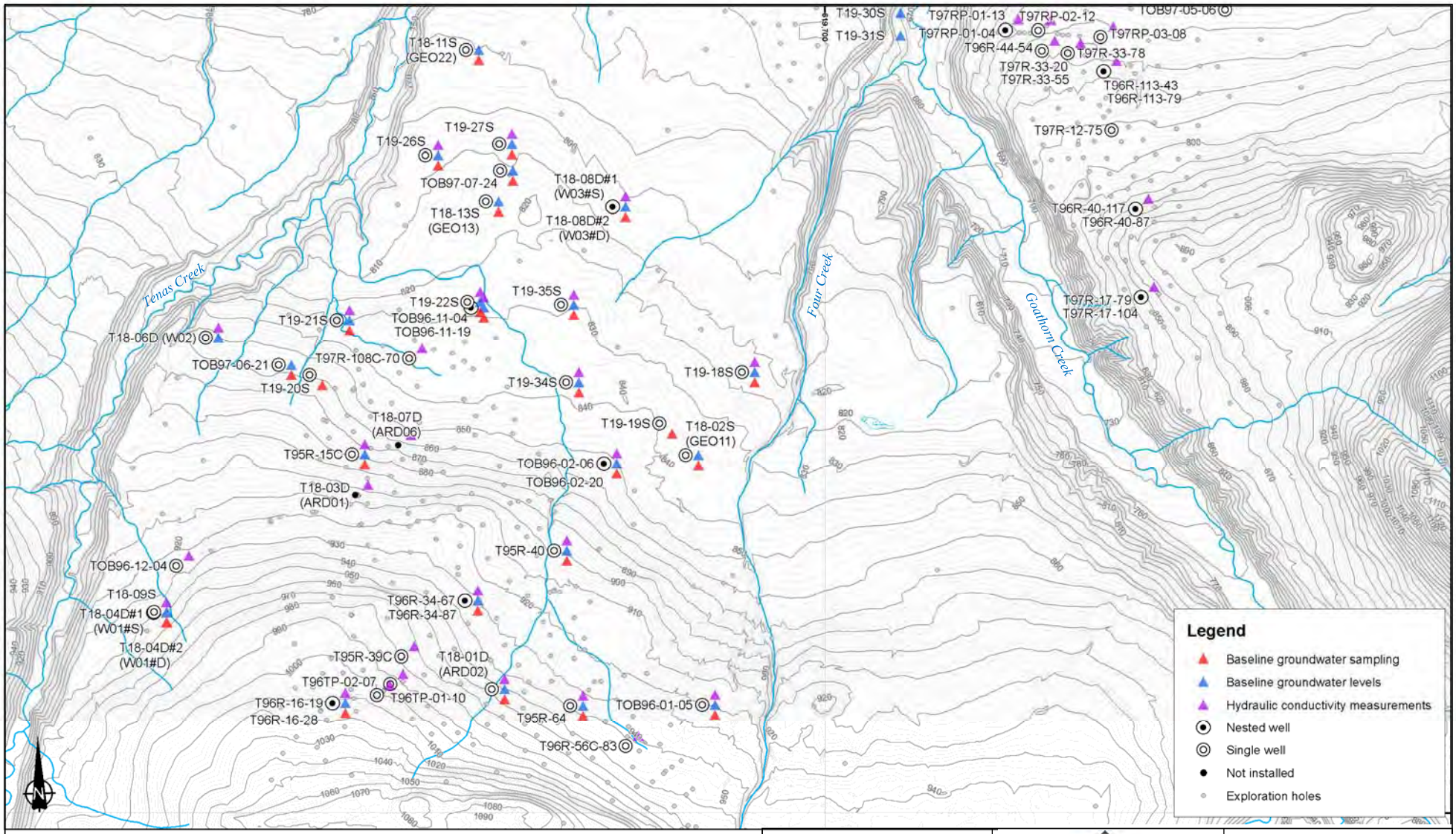
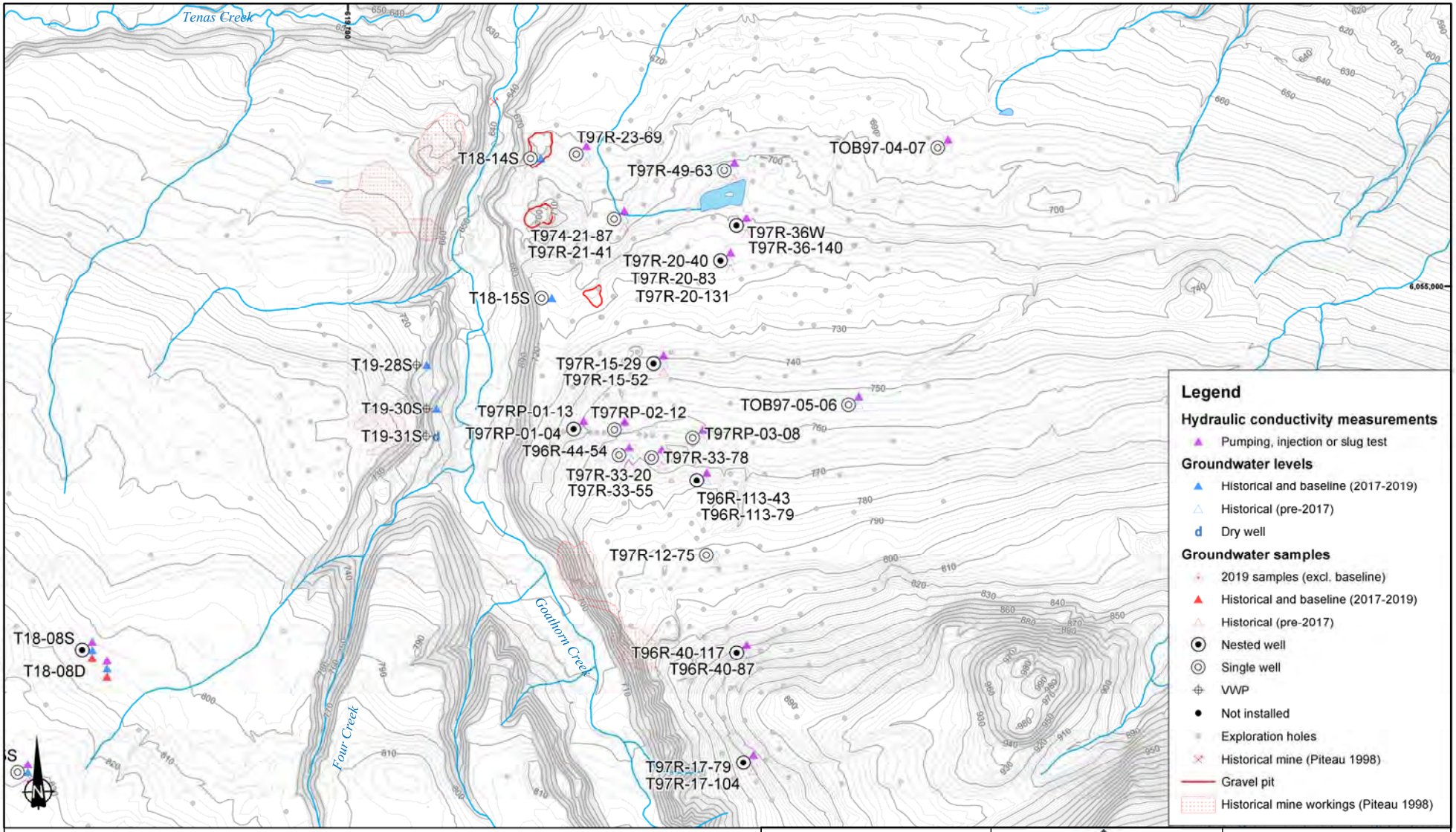

T18-11S (GEO22)
T19-27S
T19-26S
TOB97-07-24
T18-13S (GEO13)
T18-08D#1 (W03#S)
T18-08D#2 (W03#D)
T19-30S
T19-31S
T97RP-01-13
T97RP-01-04
T97RP-02-12
T97RP-03-08
TOB97-05-06
T96R-44-54
T97R-33-78
T97R-33-20
T97R-33-55
T96R-113-43
T96R-113-79
T97R-12-75
T96R-40-117
T96R-40-87
T97R-17-79
T97R-17-104
Tenas Creek
Four Creek
Goathorn Creek
T19-22S
T19-35S
T19-21S
TOB96-11-04
TOB96-11-19
T18-06D (W02)
TOB97-06-21
T97R-108C-70
T19-20S
T19-34S
T19-18S
T18-07D (ARD06)
T19-19S
T18-02S (GEO11)
T95R-15C
TOB96-02-06
TOB96-02-20
T18-03D (ARD01)
T95R-40
TOB96-12-04
T18-09S
T18-04D#1 (W01#S)
T18-04D#2 (W01#D)
T96R-34-67
T96R-34-87
T95R-39C
T18-01D (ARD02)
T96TP-02-07
T96TP-01-10
T96R-16-19
T96R-16-28
T95R-64
TOB96-01-05
T96R-56C-83
Legend
Baseline groundwater sampling
Baseline groundwater levels
Hydraulic conductivity measurements
Nested well
Single well
Not installed
Exploration holes
N
Kilometers
0 0.325 0.65 1.3
Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983
srk consulting
Job No: 1CT027.004
Filename: Fig21_MW locations in Tenas Area
TELKWA COAL LIMITED
Tenas Project
Groundwater Technical Report
Monitoring well locations in Tenas Area
Date: Nov 2020
Approved: GF
Figure: 21
W:\AN-SVR\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_Fig20_TenasMW.mxd




\\VAN-SVR01\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_Fig21_GoathornMW.mxd

0 0.25 0.5 1 Kilometers

Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983

srk consulting

Job No: 1CT027.004
Filename: Fig22_MW locations in Goathorn Area.pptx

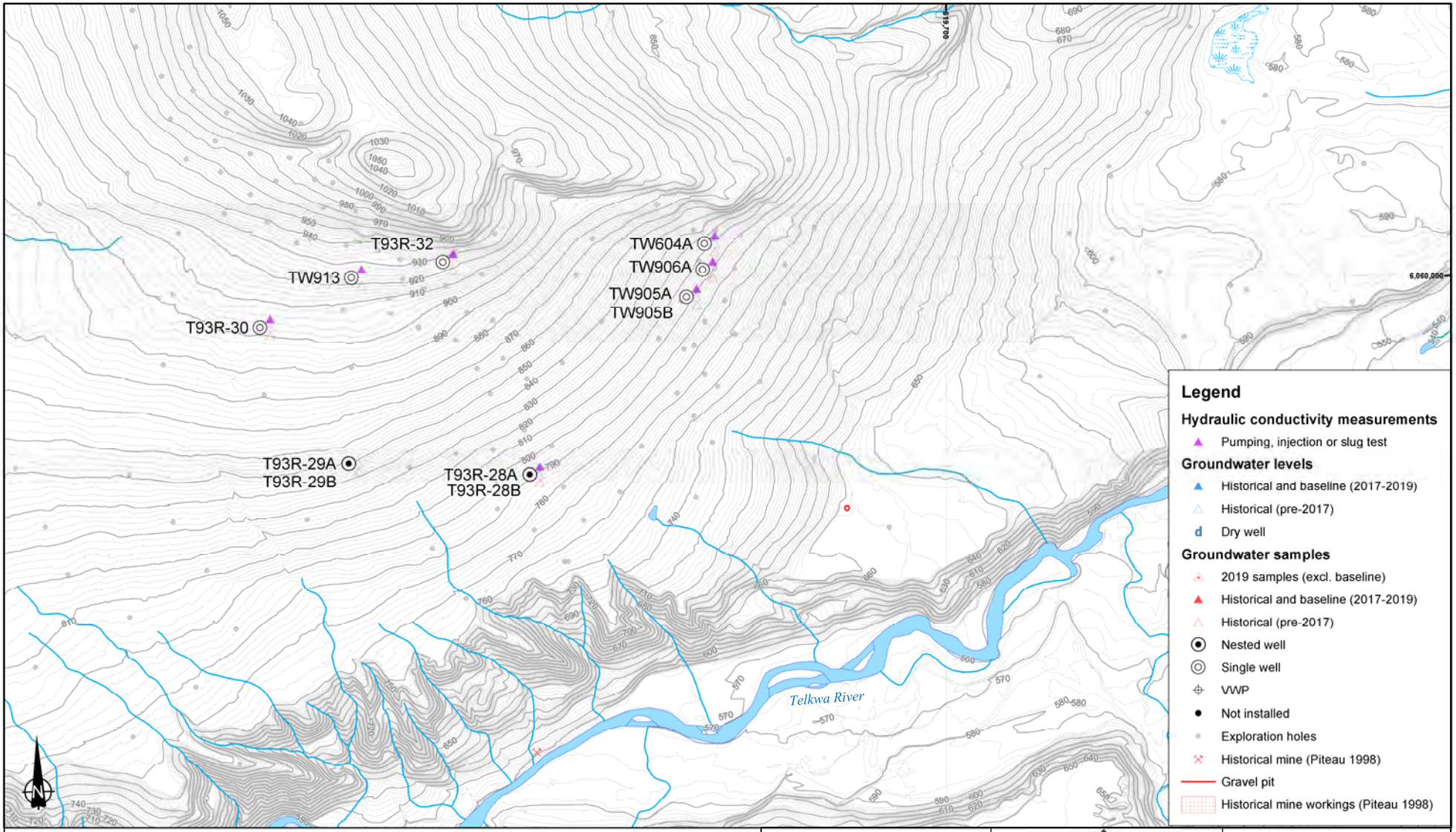
TELKWA COAL LIMITED

Tenas Project

Groundwater Technical Report

**Monitoring well locations in Goathorn Area**

| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 22 |




\\VAN-SVR0\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_Fig22_NorthMW.mxd

srk consulting

Job No: 1CT027.004
Filename: Fig23_MW locations in North Area.pptx

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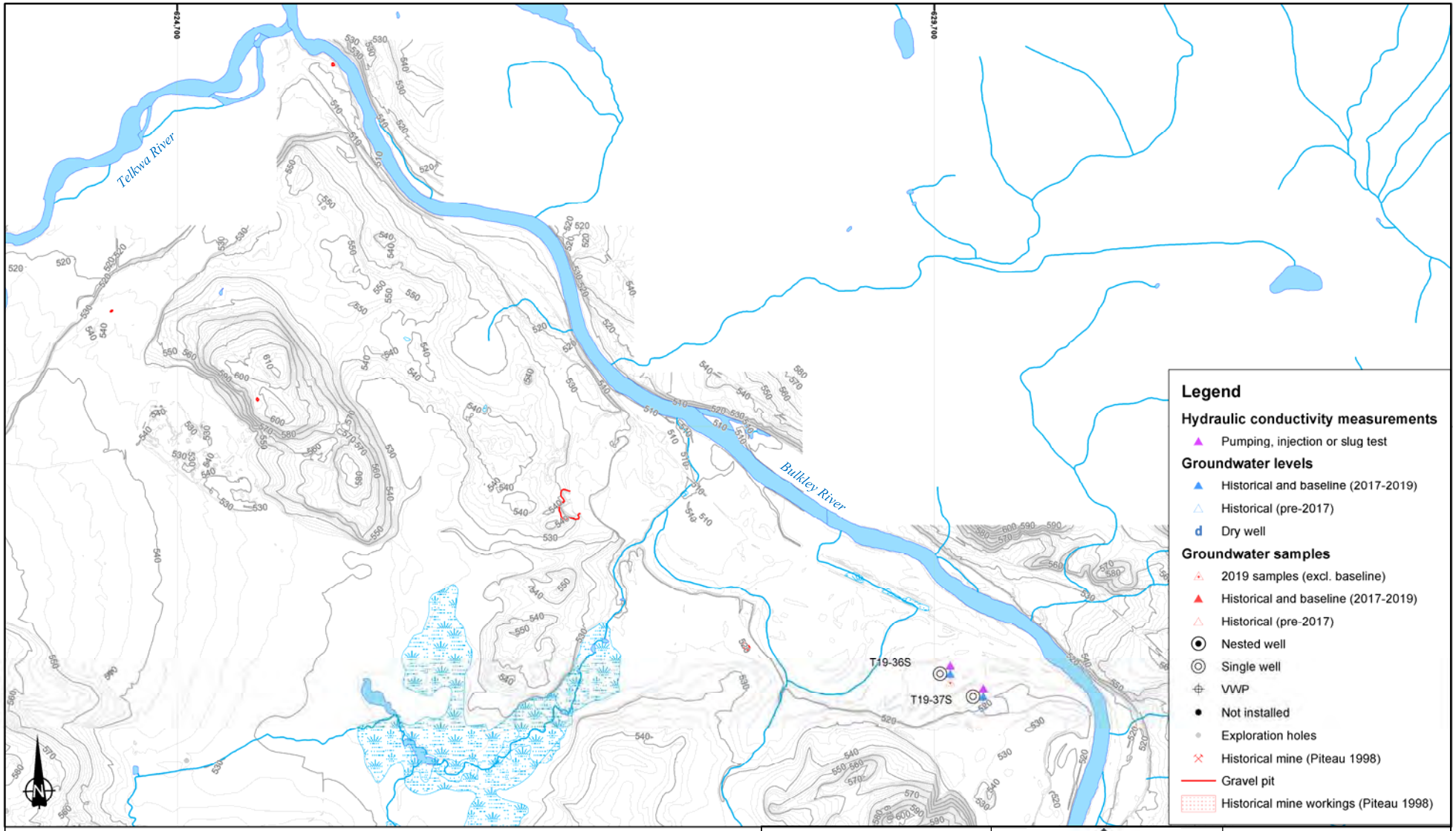
Groundwater Technical Report

**Monitoring Well Locations in North Area**

| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 23 |




Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983

srk consulting

Job No: 1CT027.004
Filename: Fig24_MW locations in Rail Loadout Area.pptx

TELKWA COAL LIMITED

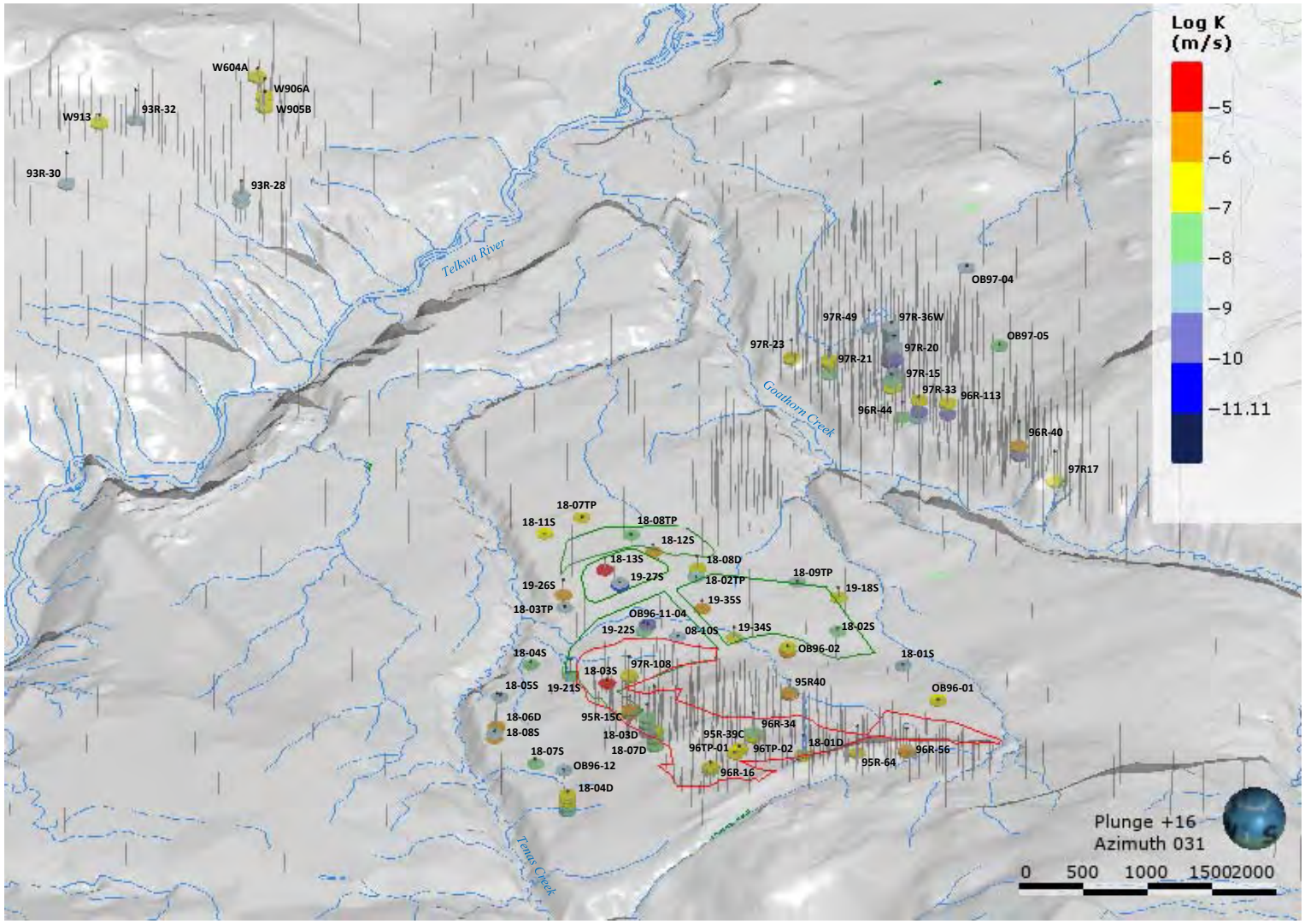
Tenas Project

Groundwater Technical Report

**Monitoring Well Locations in Rail Loadout Area**

| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 24 |

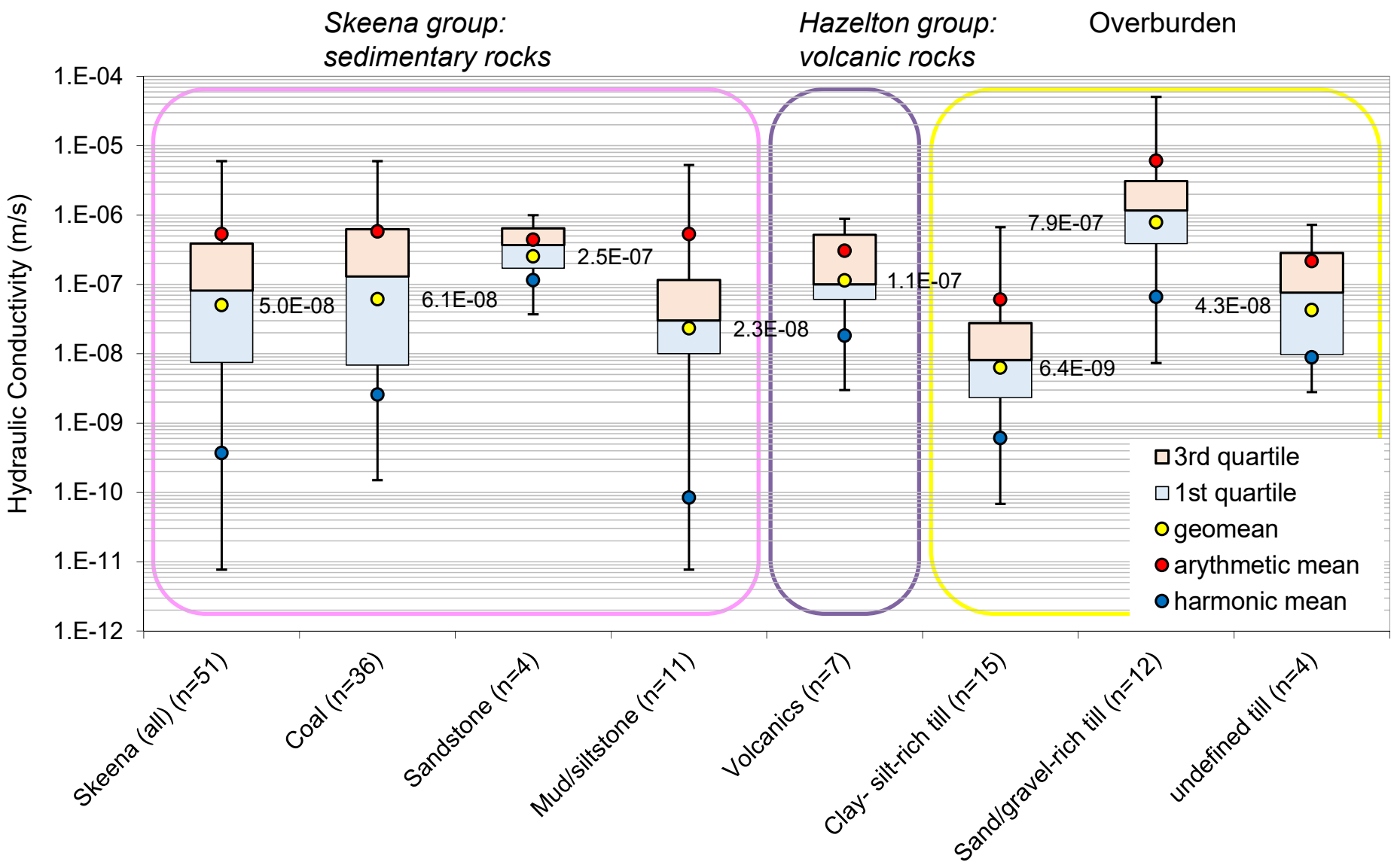
\\VAN-SVR0\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_Fig23_RailLoadoutMW.mxd



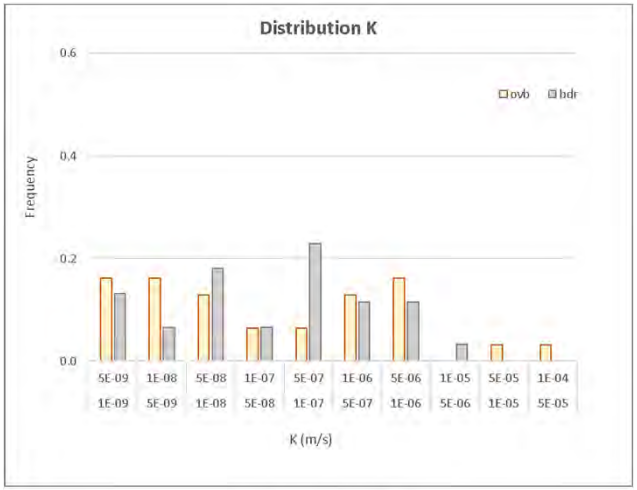

Footprint of the proposed management ponds and control pond

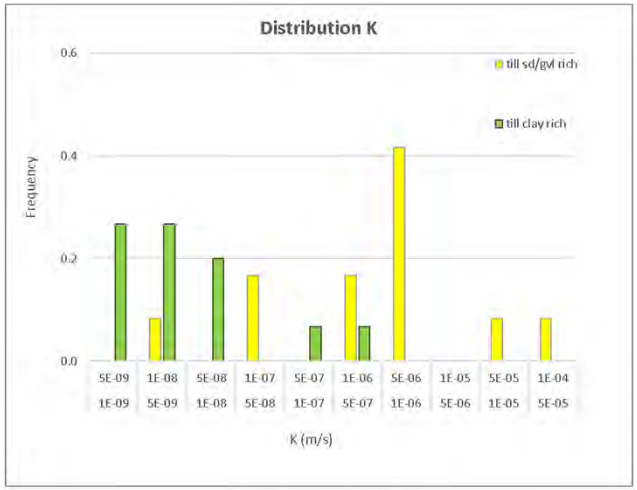
Footprint of the proposed pit

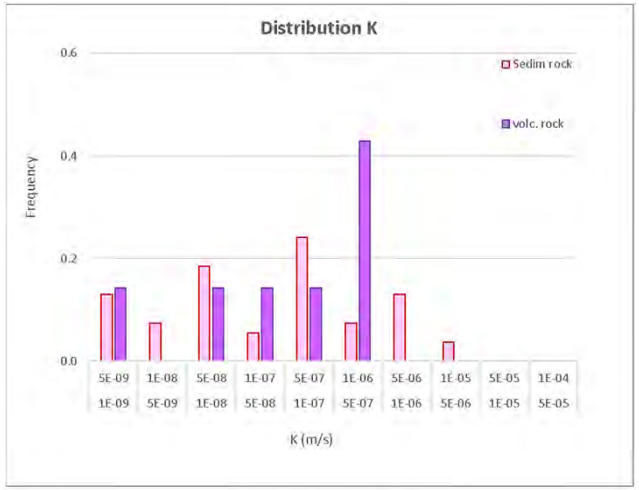
| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **3D perspective view of the hydraulic conductivity measurements** |
| Job No: 1CT027.004<br>Filename: Fig25_3d perspctv K tests.pptx | Tenas Project | Date: Oct 2020 / Approved: GF / Figure: **25** |

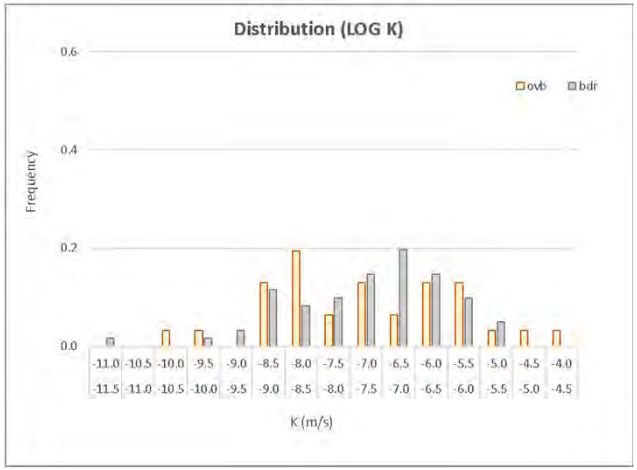


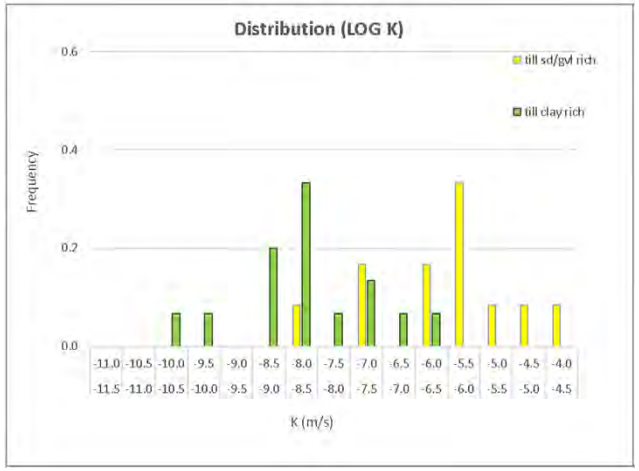

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Box plots of K conductivity measurements by lithology** |
| Job No: 1CT027.004<br>Filename: Fig26_Box plots of K measurements.pptx | Tenas Project | Date: Oct 2020 \| Approved: GF \| Figure: **26** |

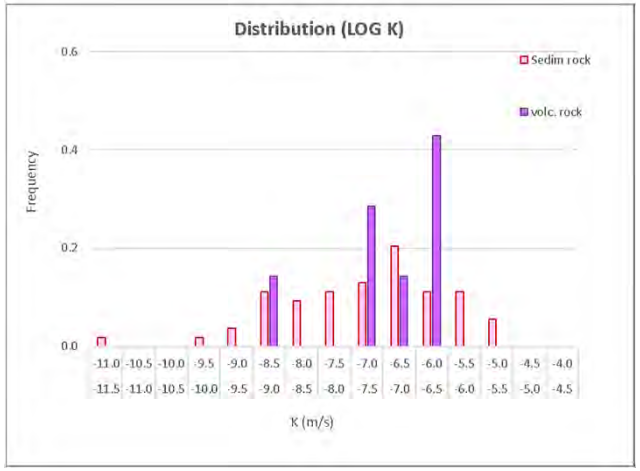


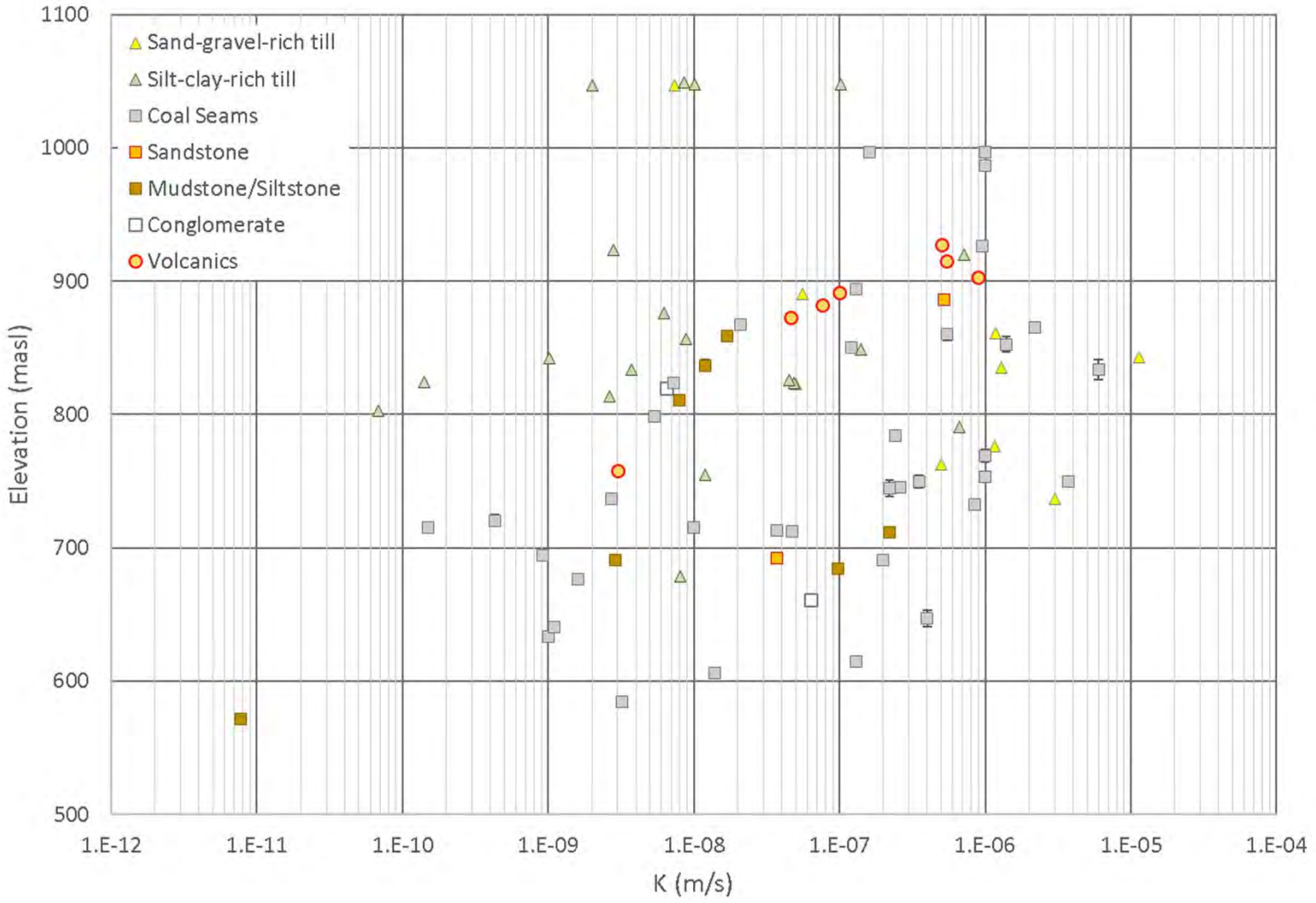



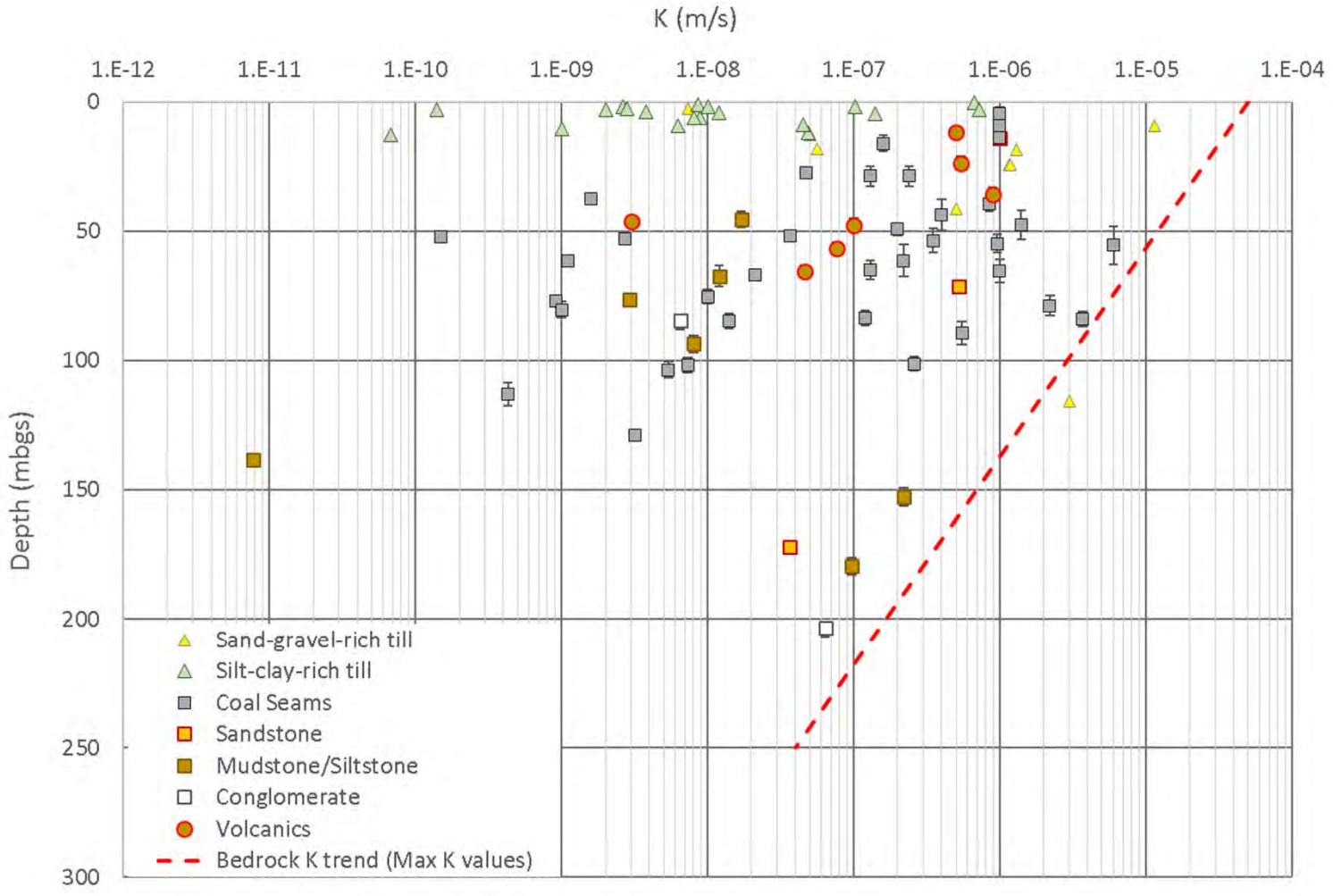




**Note:**
ovb, overburden.
bdr, bedrock.
till sd/gvl rich, sand-gravel-rich till.
till clay rich, silt-clay rich till.
sedim rock, sedimentary rocks.
volc rock, volcanic rocks.

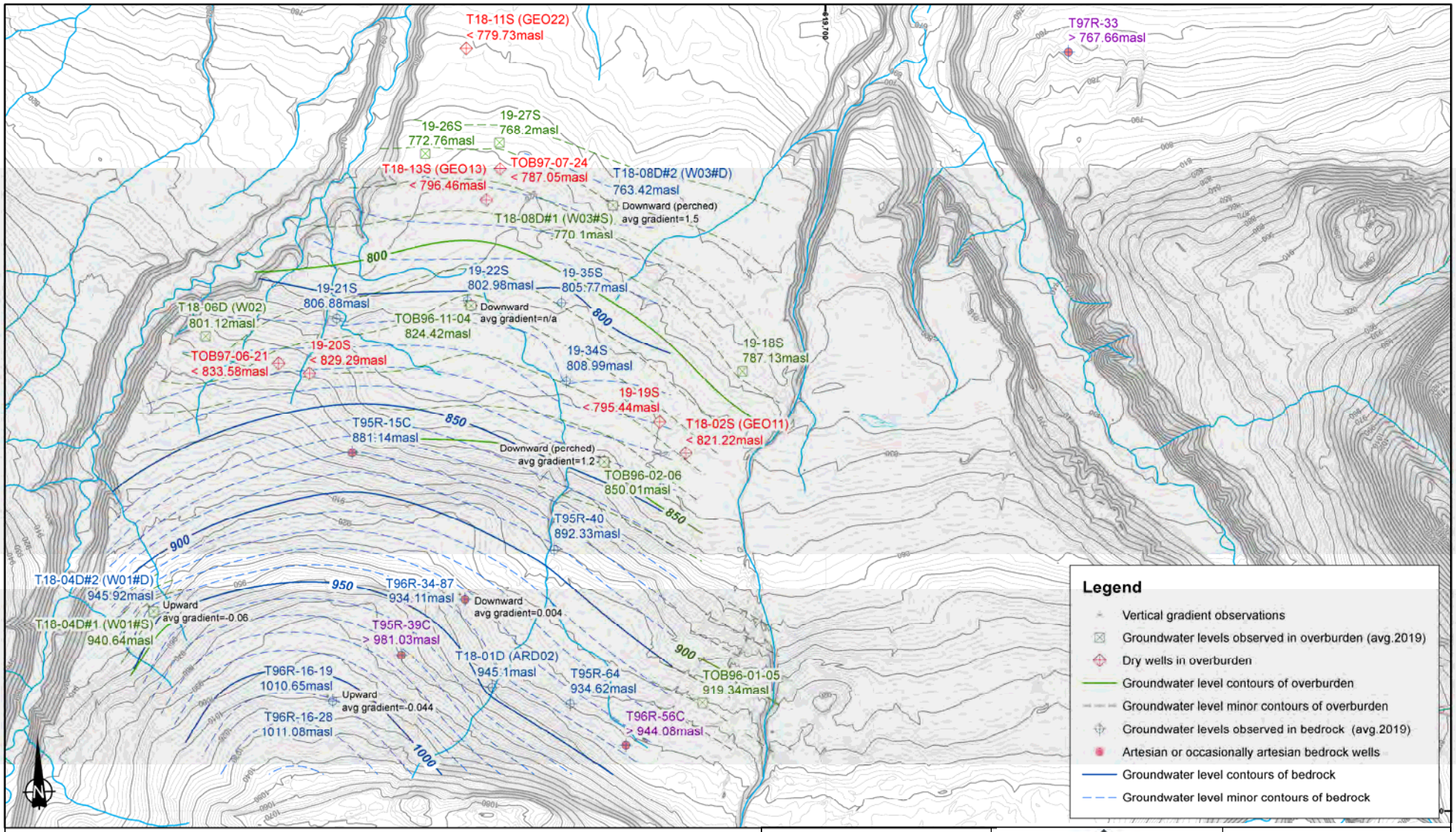
| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig27_K distributions.pptx | Tenas Project | **Distribution of K measurements by lithological types** |
| | | Date: Oct 2020 / Approved: GF / Figure: **27** |




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **K versus Elevation (Tenas, Goathorn and North Areas)** |
| Job No: 1CT027.004<br>Filename: Fig28_KvsZ | Tenas Project | Date: Oct 2020 / Approved: GF / Figure: **28** |




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig29_KvsD | Tenas Project | **K versus Depth (Tenas, Goathorn and North Areas)** |
| | | Date: Oct 2020 \| Approved: GF \| Figure: **29** |




\\VAN-SVR0\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_Fig29_WaterTable.mxd

srk consulting

Job No: 1CT027.004
Filename: Fig30_Groundwater Tenas 2019.pptx

TELKWA COAL LIMITED

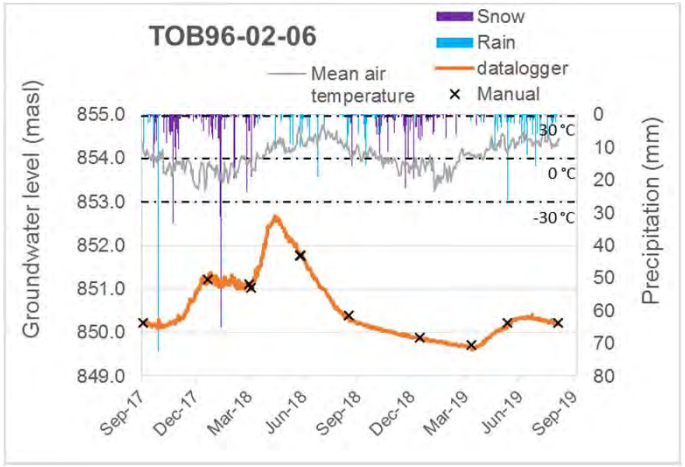
Tenas Project

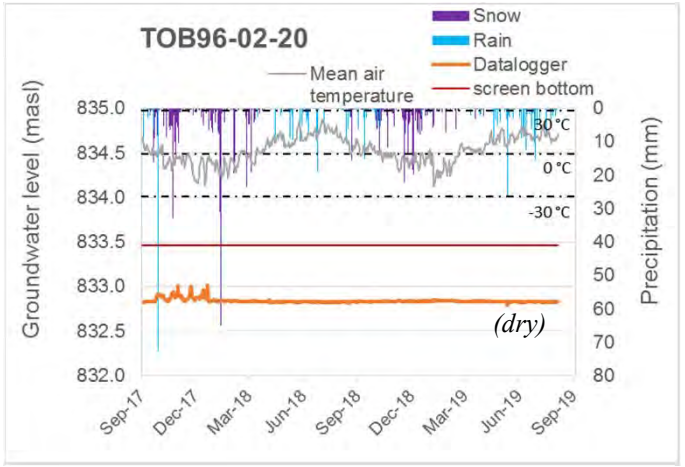
Groundwater Technical Report

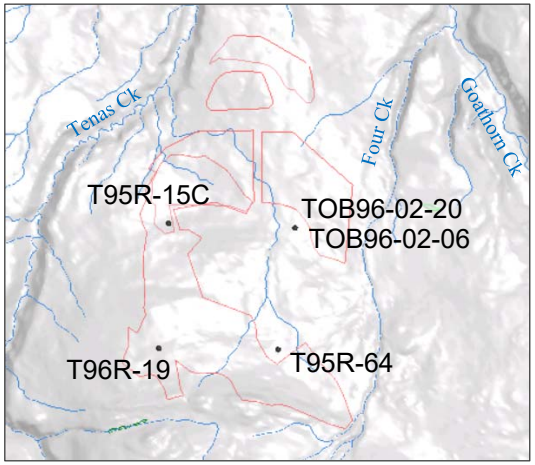
**Groundwater tables in overburden and bedrock in the Tenas area**

| Date: | Approved: | Figure: |
|---|---|---|
| Nov 2020 | GF | 30 |

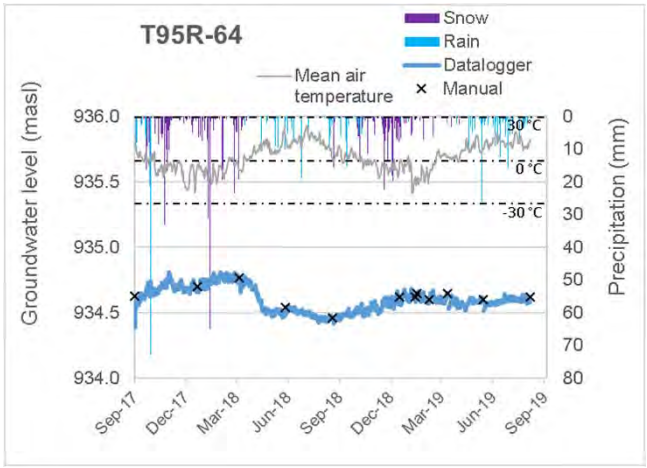
## Level observations in overburden

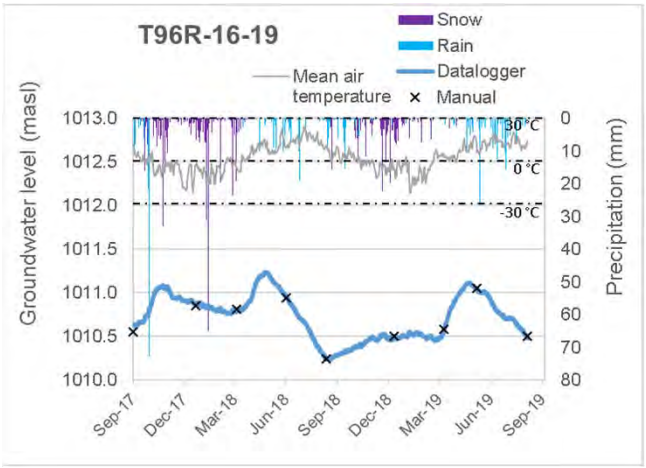


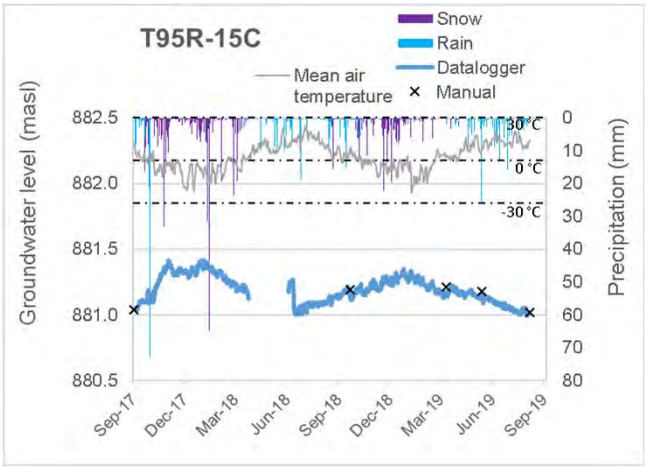




## Level observations in bedrock

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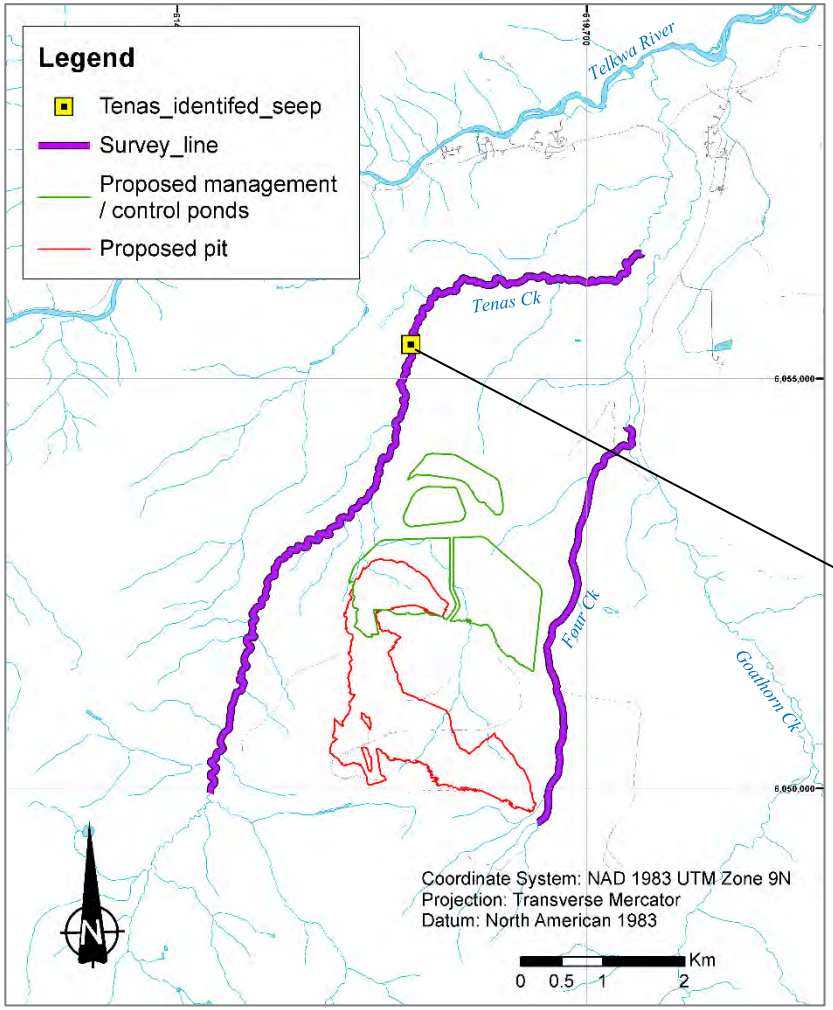
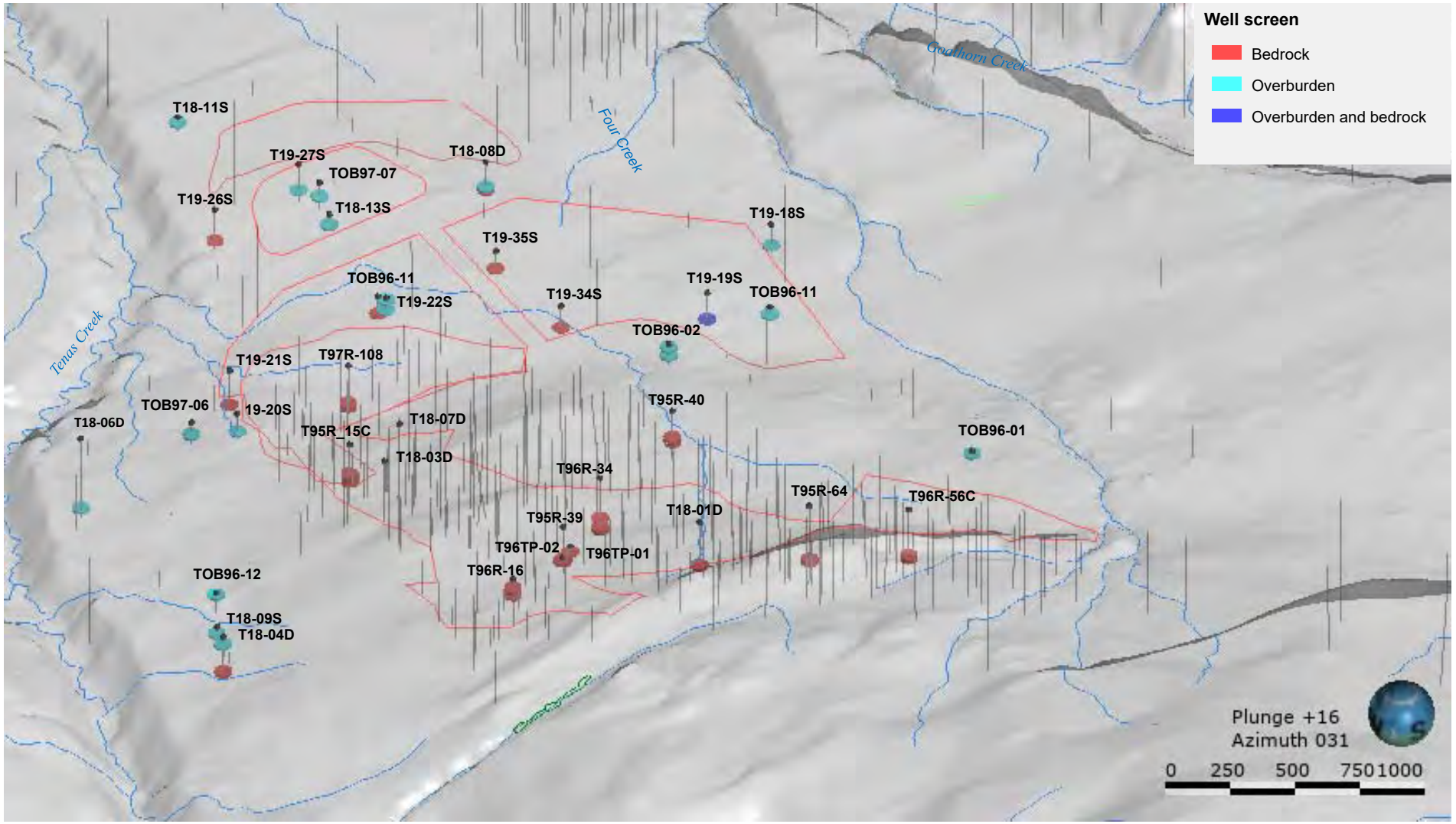
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig31_SeasonalGWL.pptx | Tenas Project | **Seasonal Groundwater Level Observations** |
| | | Date: Oct 2020 / Approved: GF / Figure: **31** |




Tenas seep located at E 617555 N6055416.
Photographed on Dec. 15th 2017.

| | | | | |
|---|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | | |
| | | **Seep survey** | | |
| Job No: 1CT027.002<br>Filename: Fig32_Seep Survey.pptx | Tenas Project | Date: 12 Nov. 2018 | Approved: GF | Figure: **32** |

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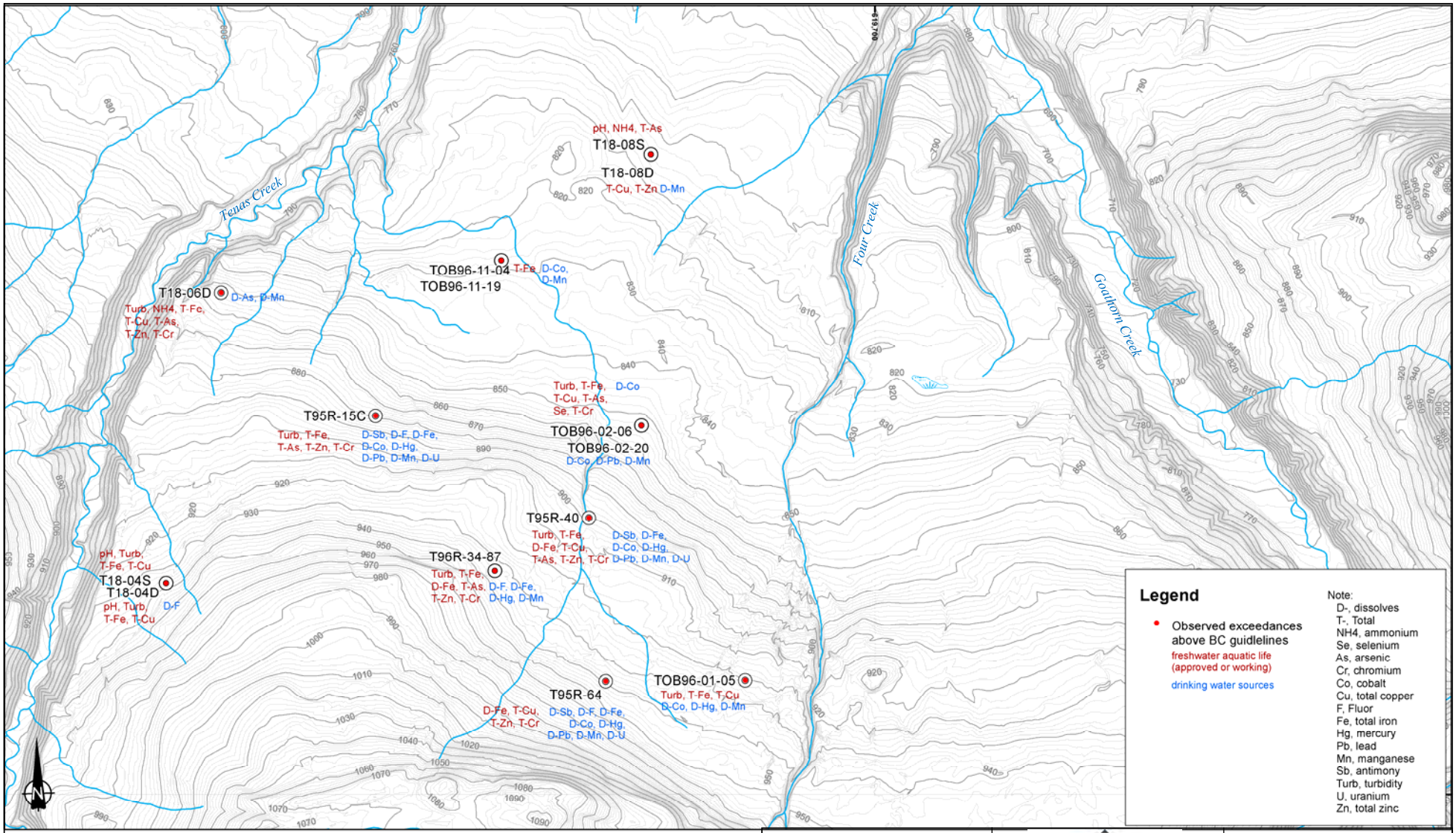
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **3D perspective view of the monitoring well screens** |
| Job No: 1CT027.004<br>Filename: Fig33_3d perspctv well screen.pptx | Tenas Project | Date: Nov 2020 / Approved: GF / Figure: **33** |




Coordinate System: NAD 1983 UTM Zone 9N
Projection: Transverse Mercator
Datum: North American 1983

srk consulting

Job No: 1CT027.004
Filename: Fig34_GWQ-Exceedances Tenas Area.pptx

TELKWA COAL LIMITED

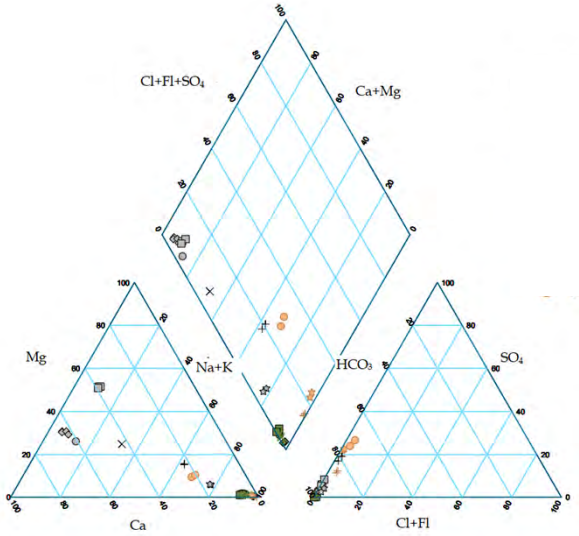
Tenas Project

Groundwater Technical Report

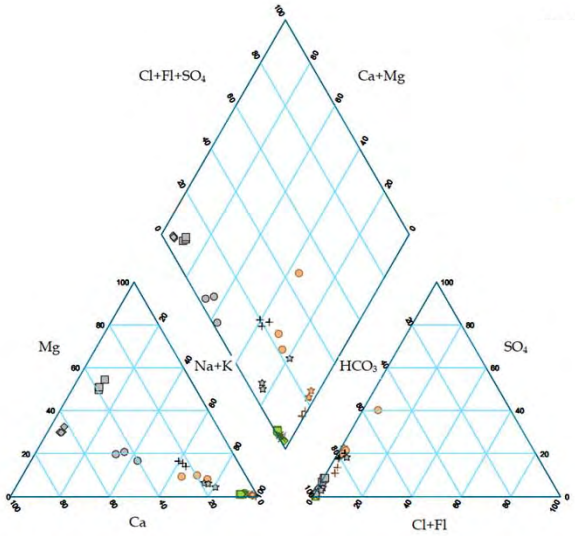
**Groundwater quality exceedances observed in the 2020 Tenas baseline data**

| Date: | Approved: | Figure: |
|---|---|---|
| Jan 2021 | GF | 34 |

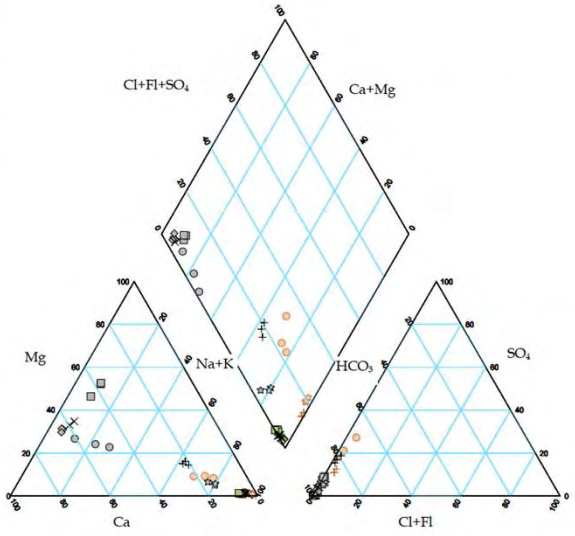
\\VAN-SVR01\Projects\01_SITES\Telkwa Coal\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT027_004_Telkwa_EA_GWQ Exceedances.mxd



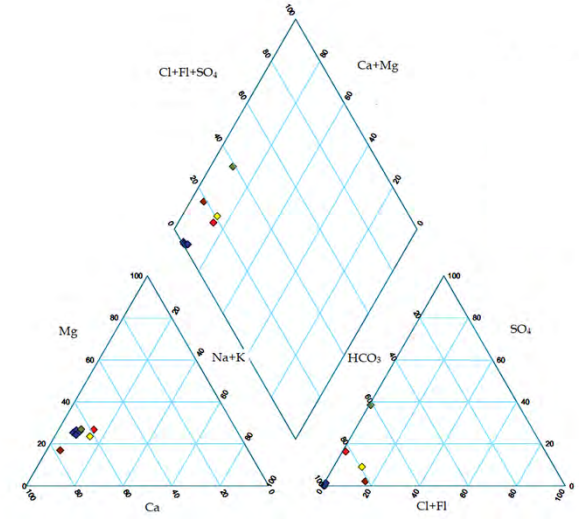

**Project wells, September to November Historical, and 2017 to 2019 Baseline Data [1]**




**Project wells, January and March/April 2018 and 2019 Baseline Data [2]**




**Project wells, June to August, Historical, and 2017 to 2019 Baseline Data [3]**




**Residential wells, Yearly average 2019**

**Project wells**

| Bedrock Wells | Overburden Wells |
|---|---|
| T95R-15C | TOB96-01-05 |
| T95R-40 | TOB96-02-06 |
| T95R-64 | TOB96-11-04 |
| T96R-34-87 | W2 (T18-06D) |
| W1 Deep (T18-04D#2) | W3 Shallow (T18-08D#1) |
| W1 Shallow (T18-04D#1) | |
| W3 Deep (T18-08D#2) | |

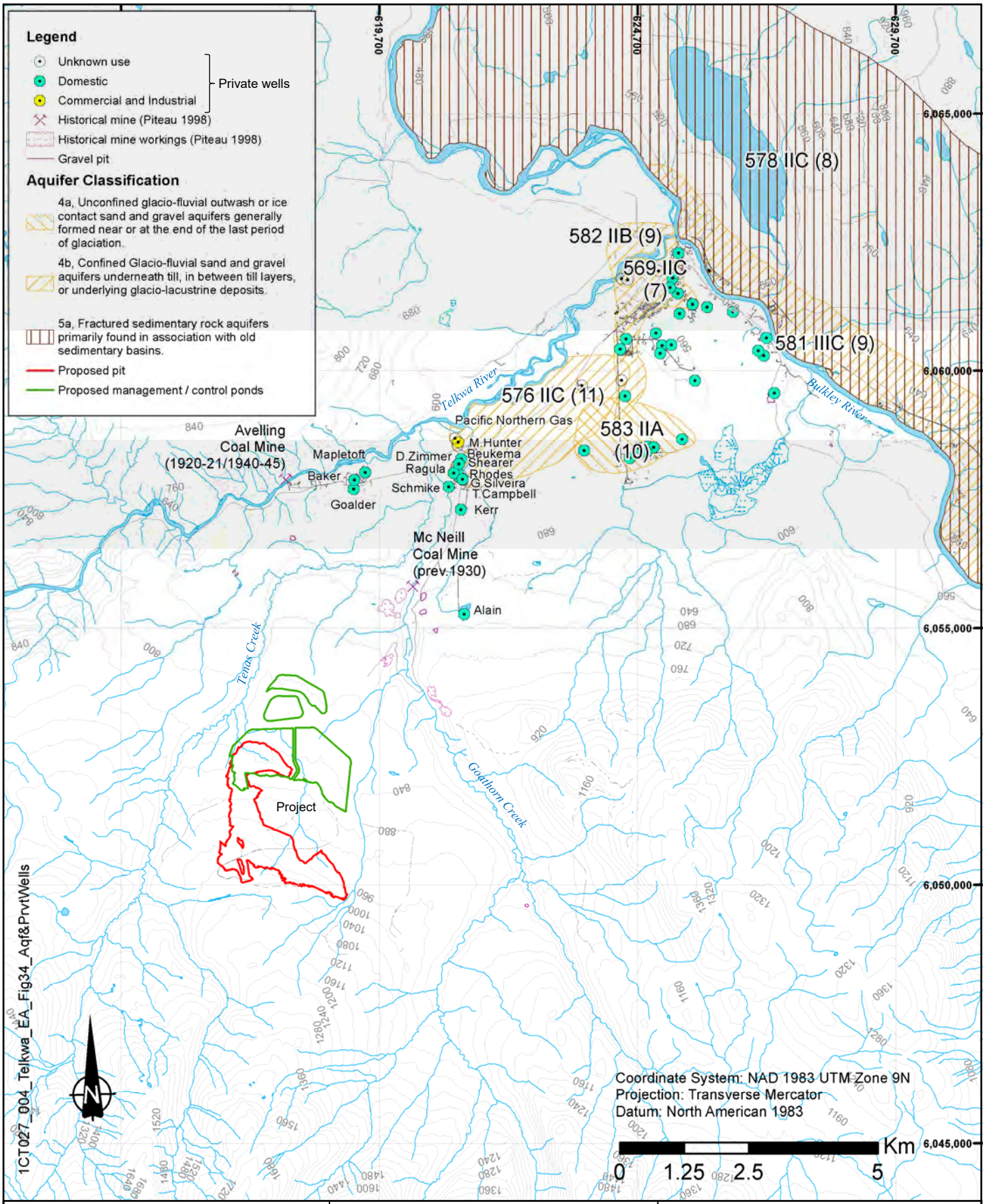
**Private domestic wells**

- Beukema
- Kerr
- Ragula
- Schmike
- Shearer

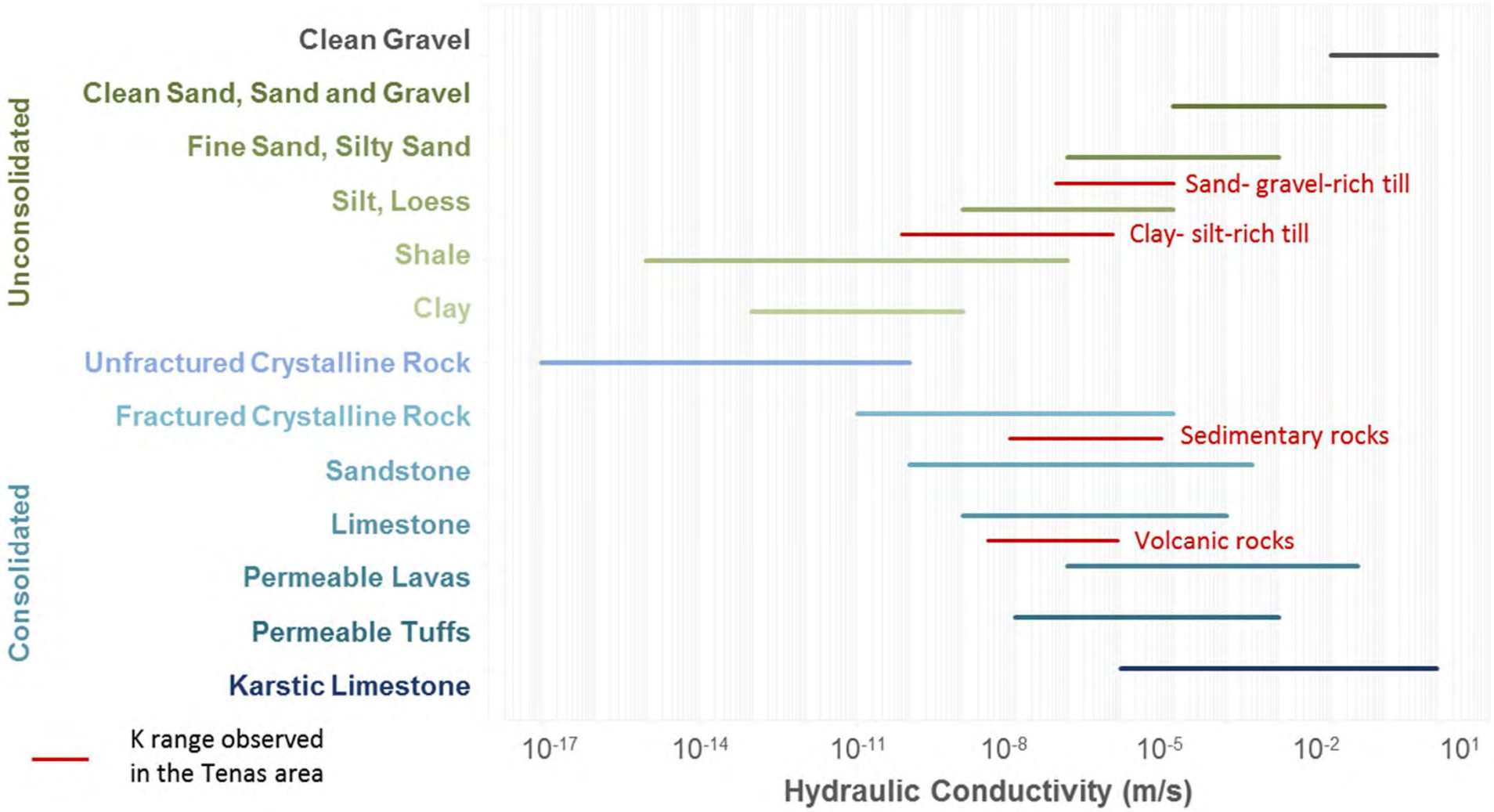
Source: 2017 to 2019 Baseline Report, March 2020. Project #0403488. Cassiar geosciences and ERM (2020)

**Notes:**
[1] Data from October 1995, September and October 1996, November 2016, September 2017, September 2018, and November 2019.
[2] Date from January 2018, March/April 2018, January 2019, and March/April 2019.
[3] Data from August 1997, August 2017, June 2018, June 2019, and August 2019.

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Piper plots of the groundwater quality at Project wells, and residential wells** |
| Job No: 1CT027.004<br>Filename: Fig35_GWQ diagram.pptx | Tenas Project | Date: Nov 2020 / Approved: GF / Figure: 35 |

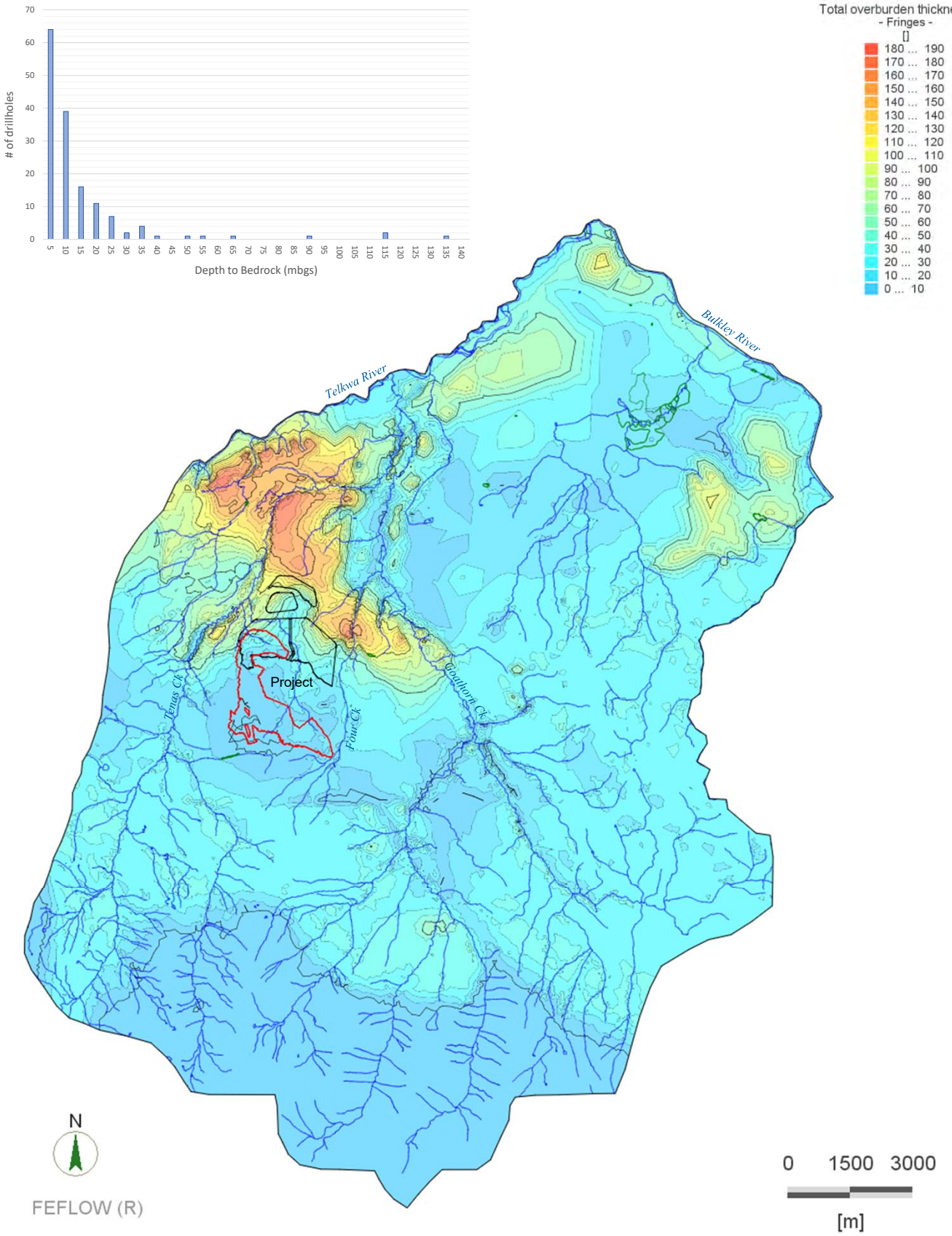



| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Aquifers and private wells** |
| Job No: 1CT027.004<br>Filename: Fig36_Aqf&PrvtWells.pptx | Tenas Project | Date: Oct 2020 \| Approved: GF \| Figure: **36** |



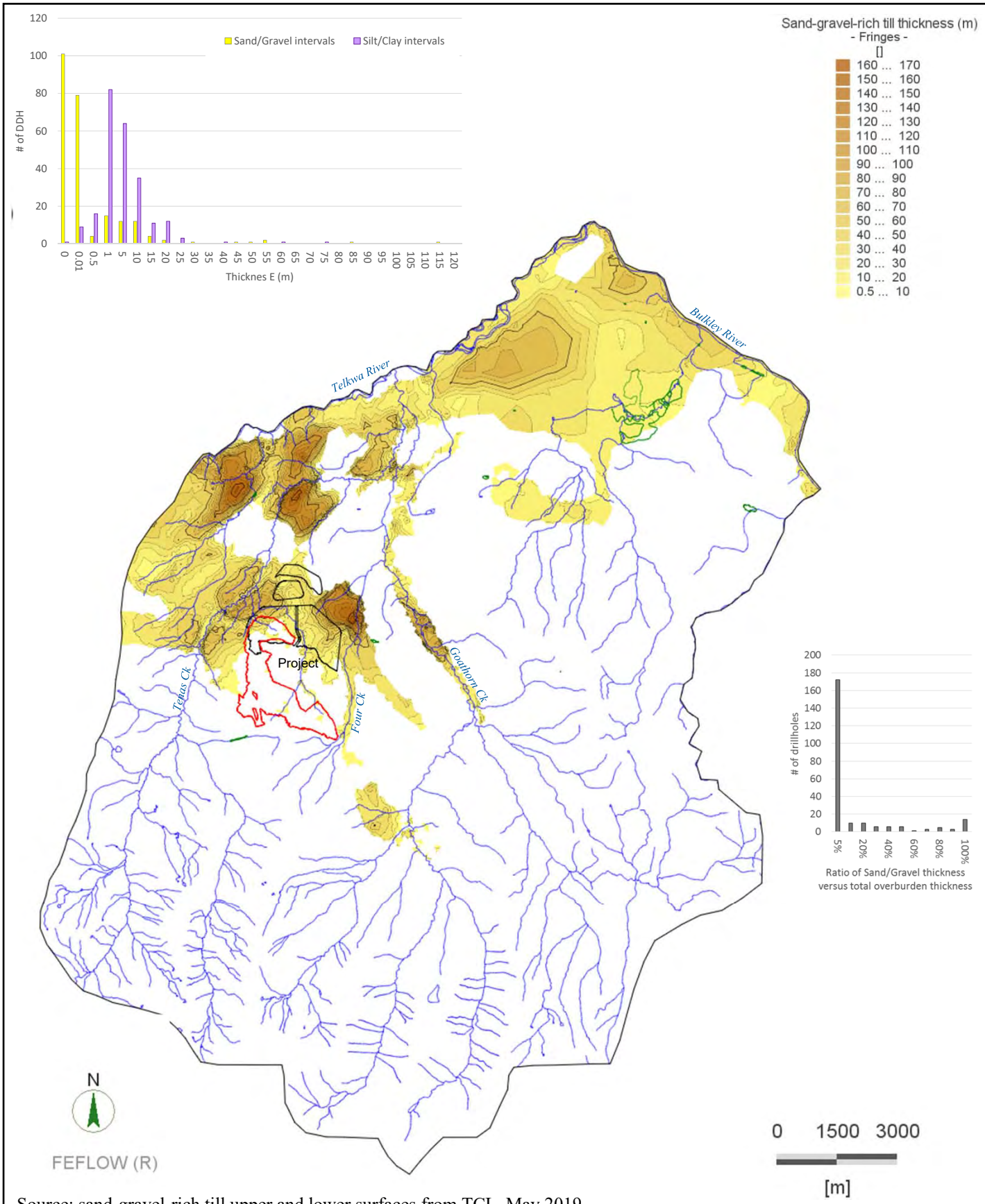

Source K range: Beale G, and J Reed. 2013. Guidelines for evaluating water in pit slope stability. CSIRO Publishing, Collingwood, Australia. 600 p.

| | | | | |
|---|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | | |
| | | **Comparison of Telkwa K values to other hydrostratigraphic units** | | |
| Job No: 1CT027.004<br>Filename: Fig37_Compar_K_Other_Hydrostrat.pptx | Tenas Project | Date: Nov 2020 | Approved: GF | Figure: **37** |




Source: overburden contact surfaced from TCL, May 2019

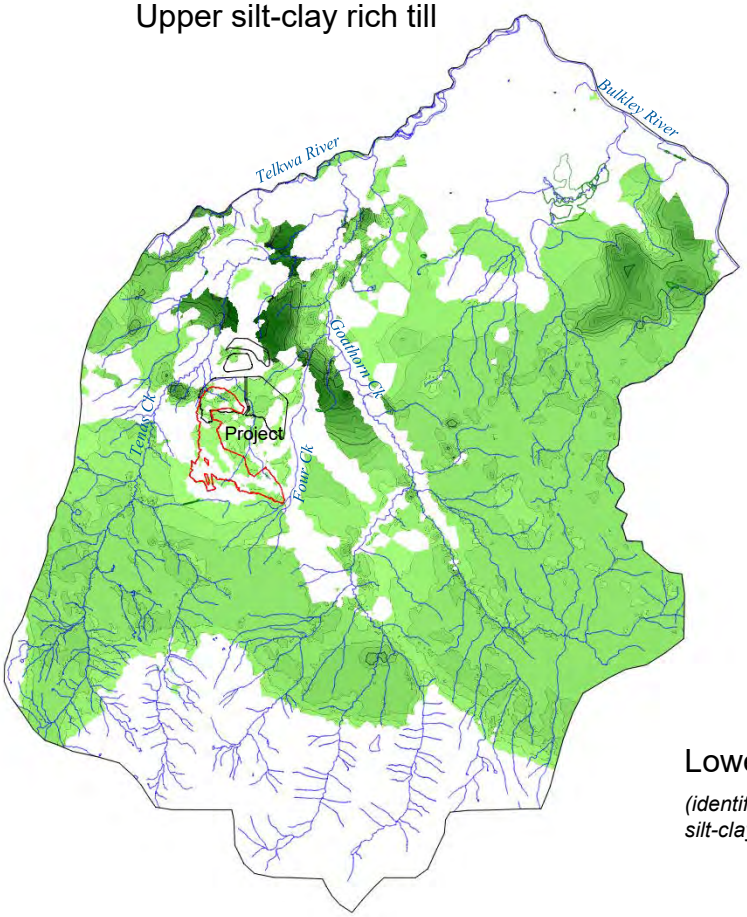
| | | | | |
|---|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | | |
| | | **Total modelled thickness of the overburden** | | |
| Job No: 1CT027.004<br>Filename: Fig38_ThckOVB.pptx | Tenas Project | Date: Dec 2020 | Approved: GF | Figure: **38** |




Source: sand-gravel-rich till upper and lower surfaces from TCL, May 2019

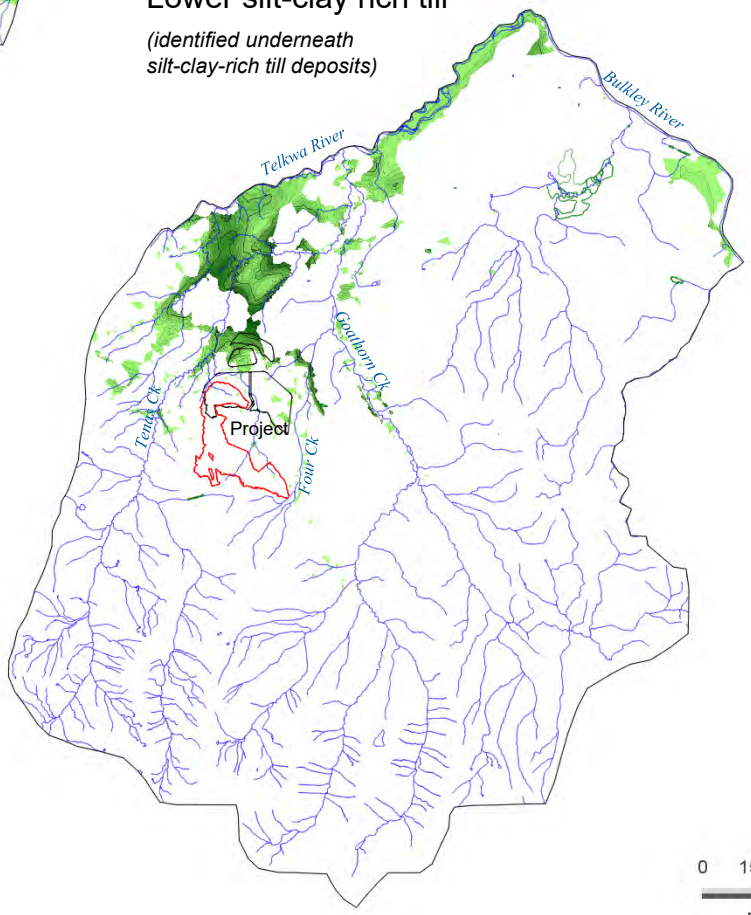
| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled thickness of the sand-gravel-rich till** |
| Job No: 1CT027.004<br>Filename: Fig39_ThckSdGvl.pptx | Tenas Project | Date: Dec 2020 \| Approved: GF \| Figure: **39** |

## Upper silt-clay rich till




## Lower silt-clay rich till

*(identified underneath silt-clay-rich till deposits)*



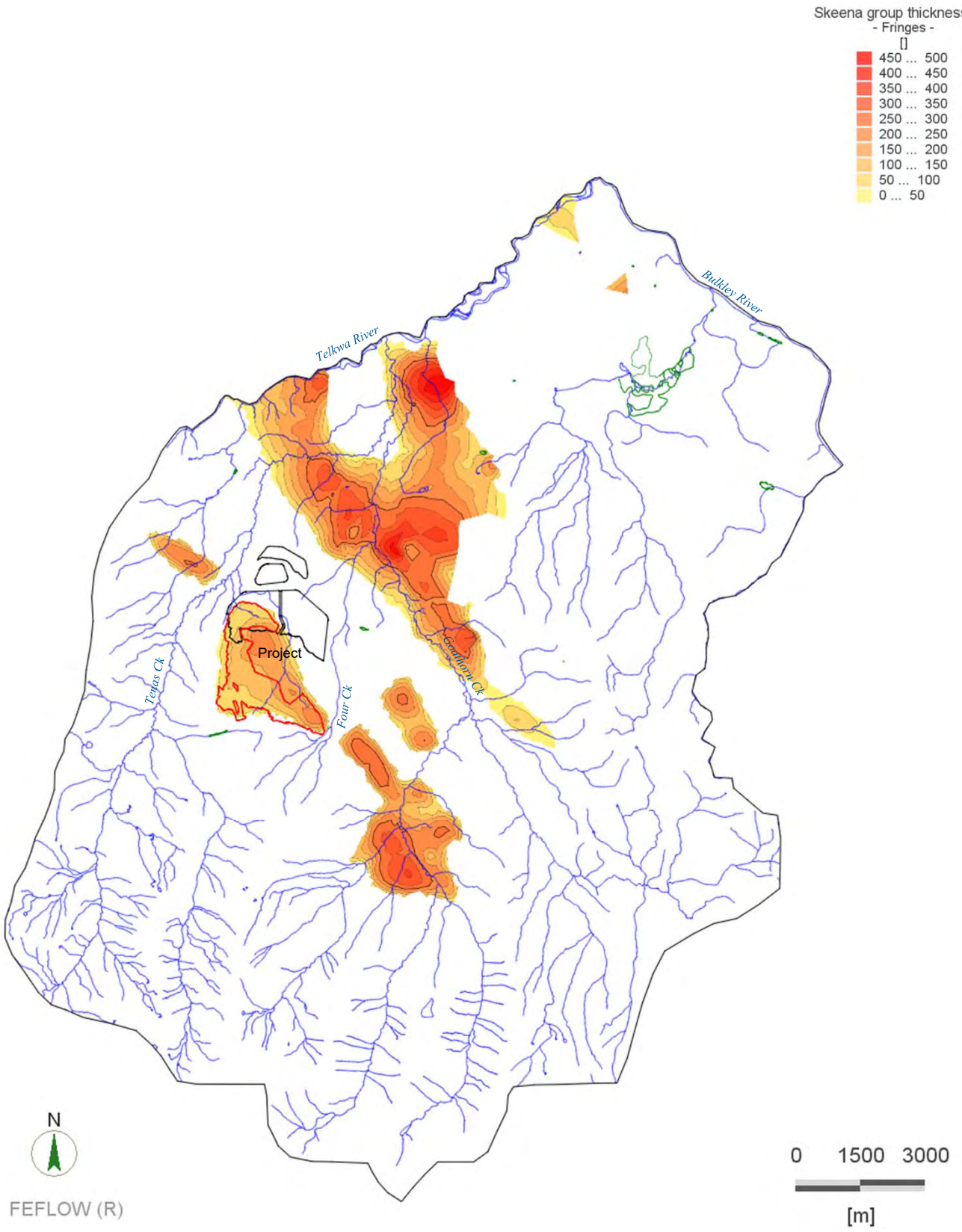
FEFLOW (R)

0 1500 3000

[m]

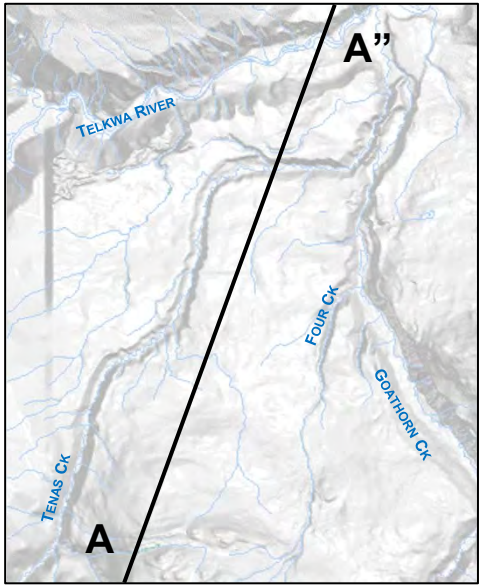
Source: silt-clay-rich till upper and lower surfaces from TCL, May 2019

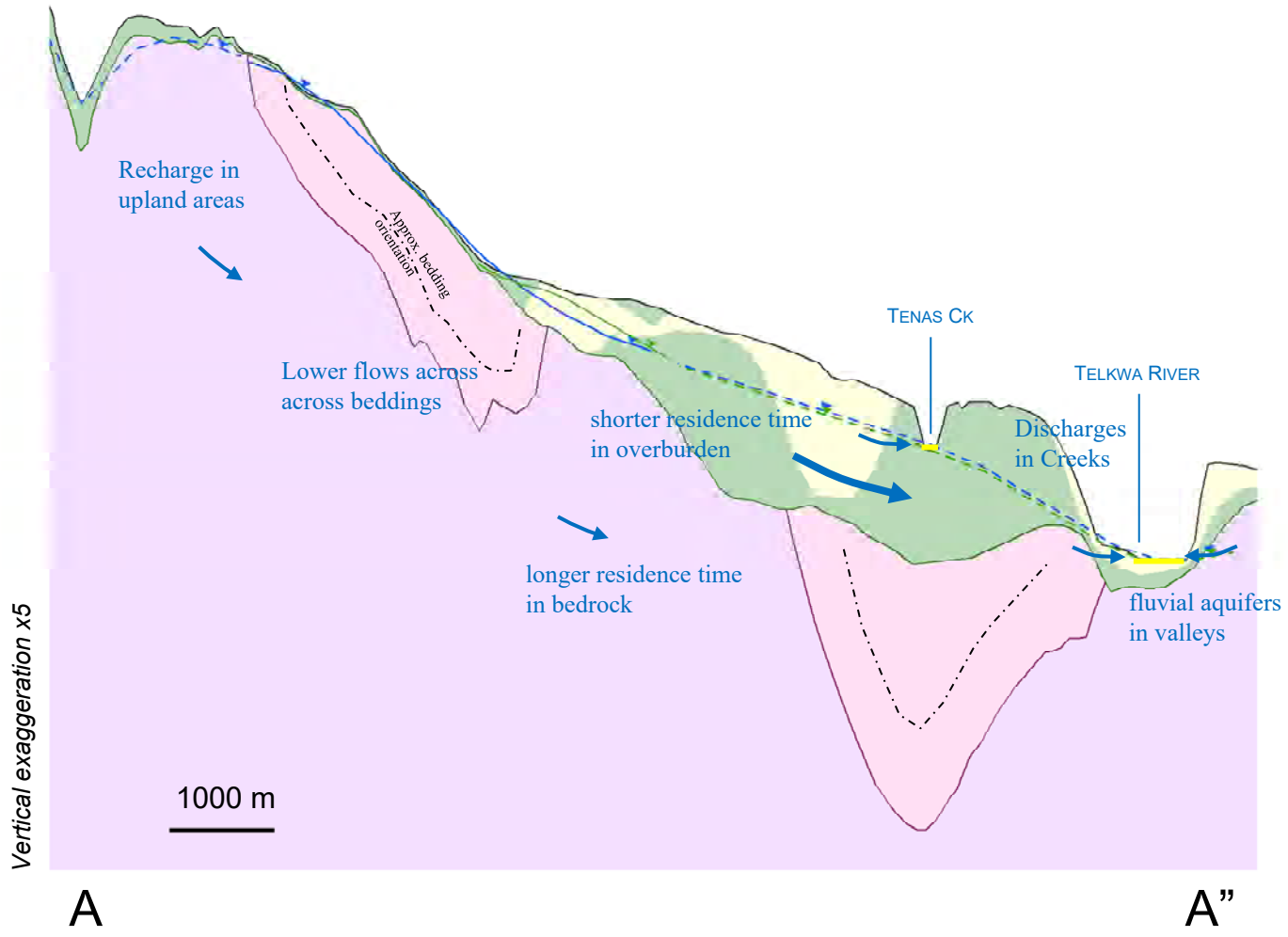
| | | | | |
|---|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | | |
| | | **Modelled thickness of the silt-clay-rich till** | | |
| Job No: 1CT027.004<br>Filename: Fig40_ThckOVB.pptx | Tenas Project | Date: Dec 2020 | Approved: GF | Figure: **40** |




Source: Interpolation based on geological maps, digitized plan view geological maps and vertical cross sections from TCL and MEMPR 1991

| | | | | |
|---|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | | |
| | | **Modelled thickness of the sedimentary rocks (Skeena group)** | | |
| Job No: 1CT027.004<br>Filename: Fig41_ThckSKN.pptx | Tenas Project | Date: Dec 2020 | Approved: GF | Figure: **41** |

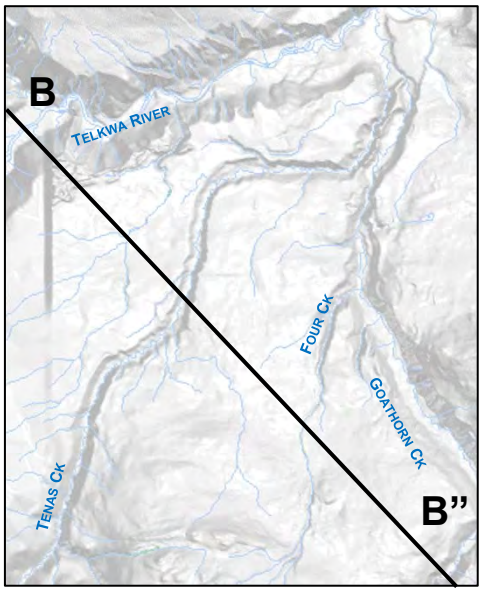


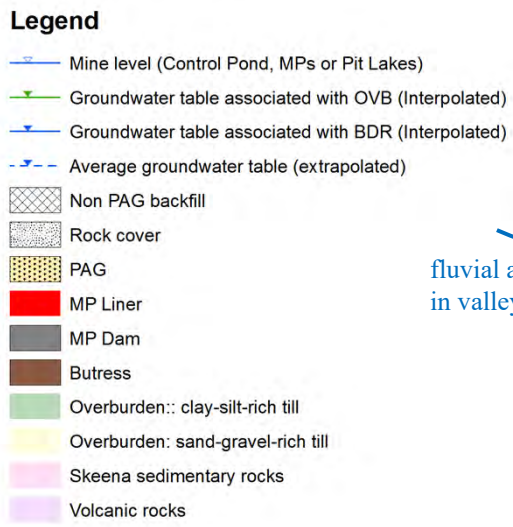



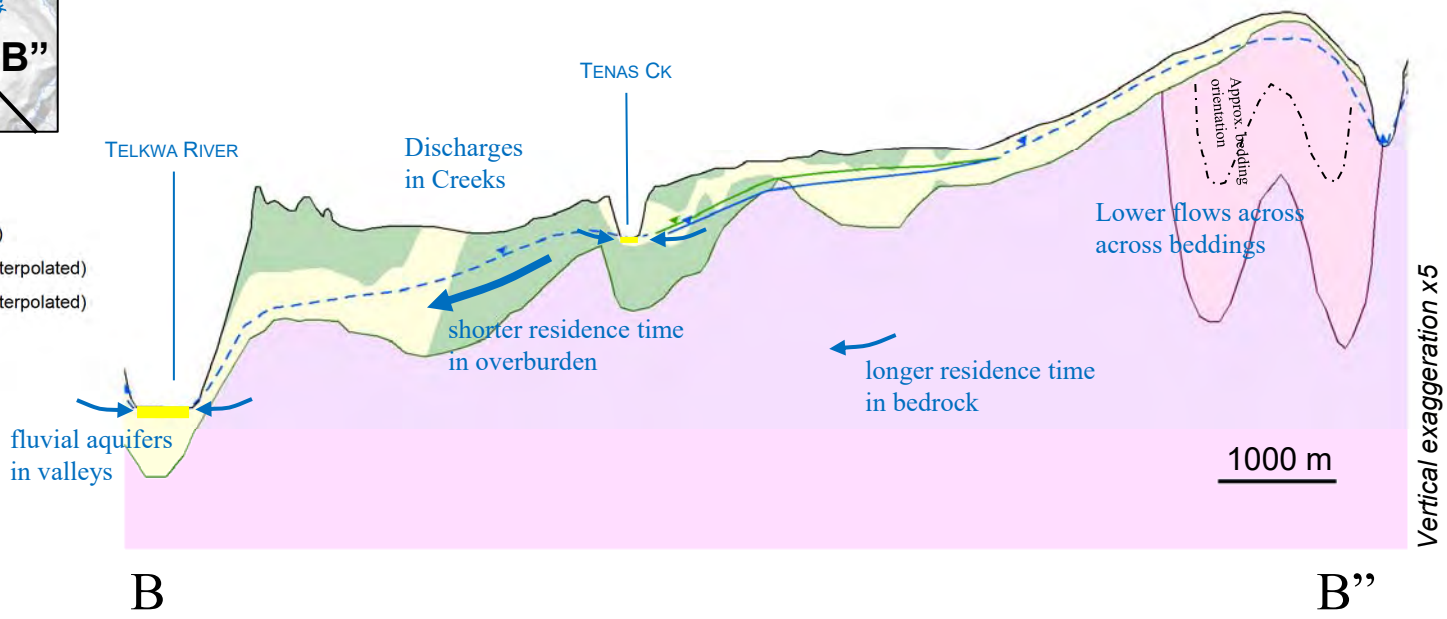

**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

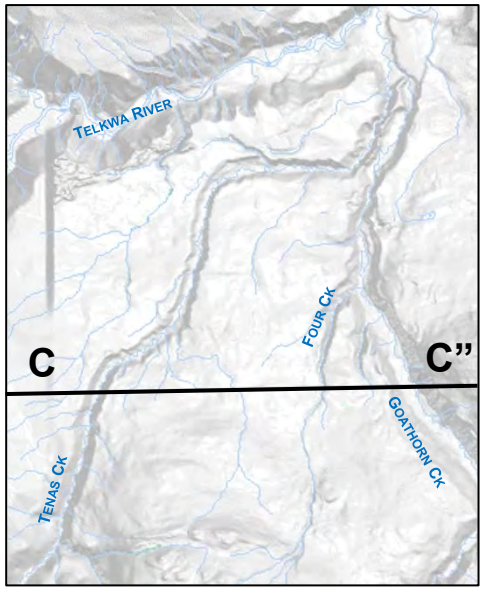
| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section AA” Baseline** |
| | | Date: Dec.2020 / Approved: GF / Figure: **42** |



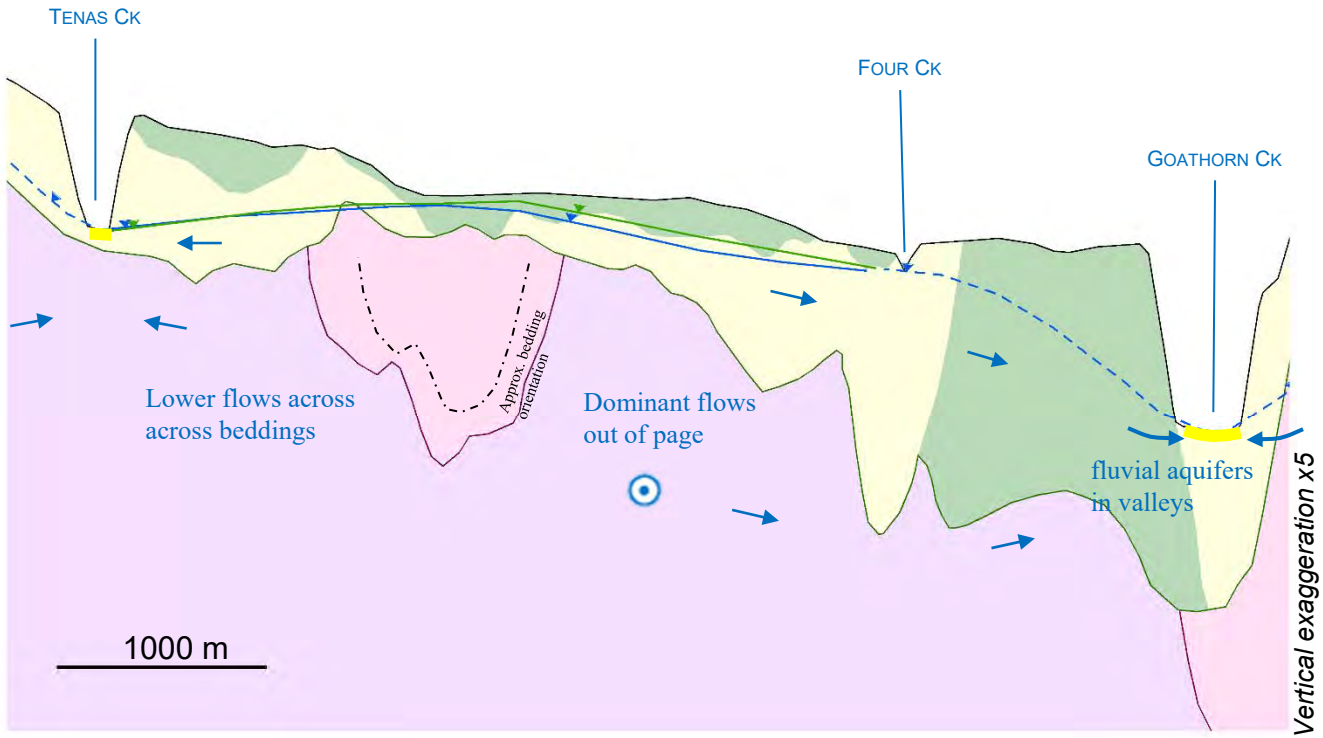




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section BB” Baseline** |
| | | Date: Dec.2020 / Approved: GF / Figure: **43** |

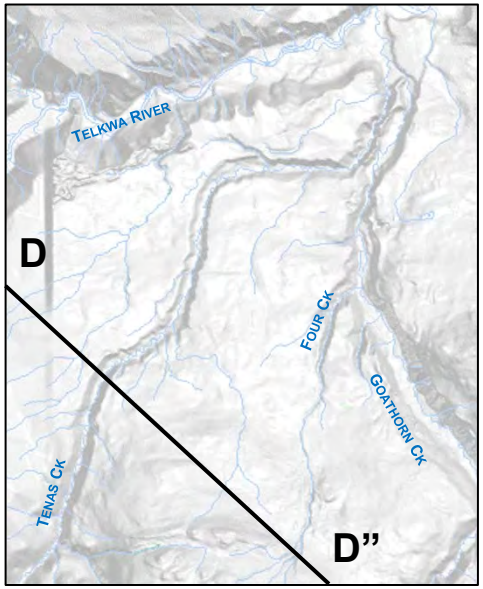


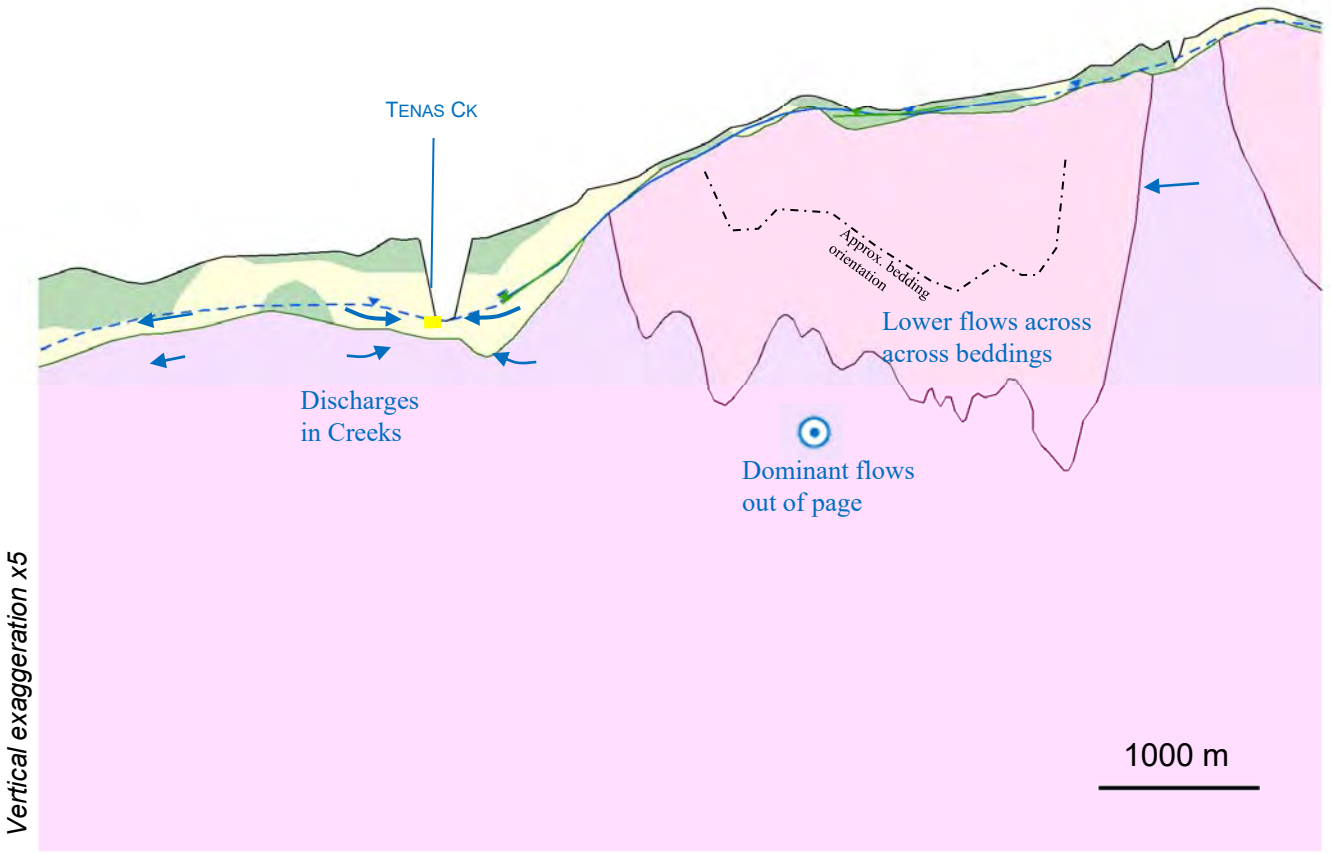

**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section CC” Baseline** |
| | | Date: Dec.2020 / Approved: GF / Figure: **44** |




**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

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TELKWA COAL LIMITED

Groundwater Technical Report

**Conceptual Cross Section DD” Baseline**

Job No: 1CT027.004

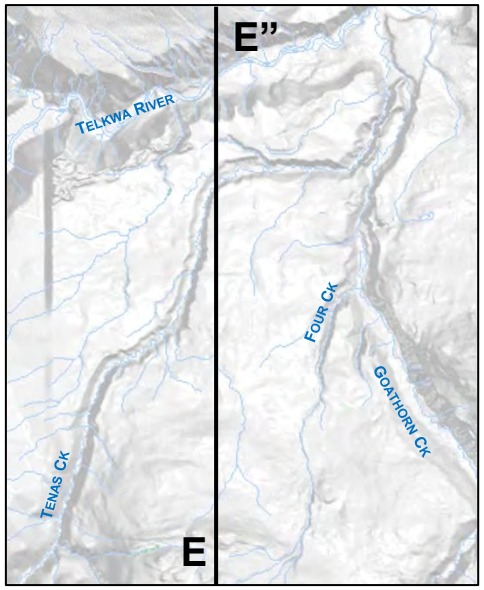
Filename: Fig42to51_ConceptualCrossX.pptx

Tenas Project

Date: Dec.2020

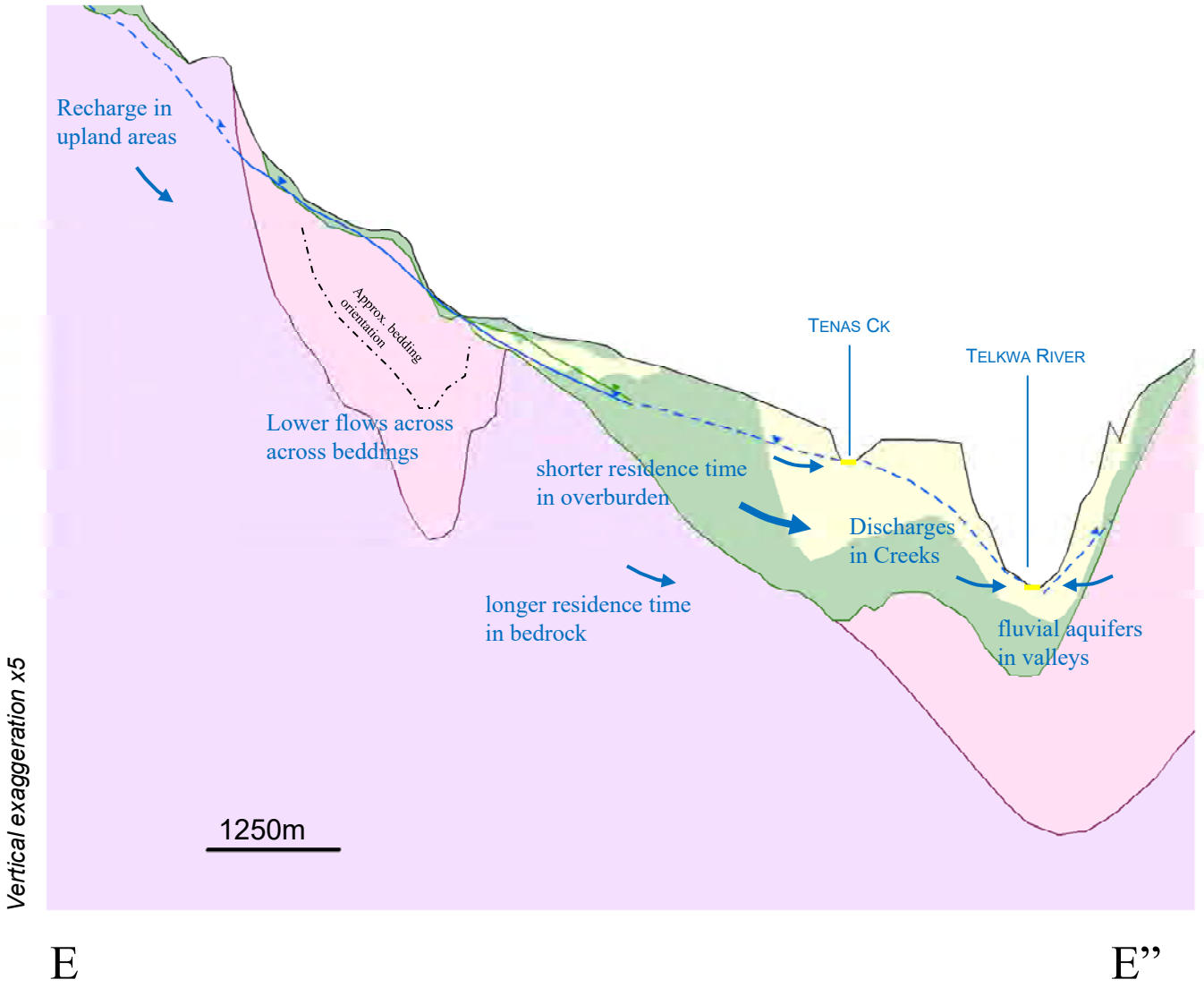
Approved: GF

Figure: **45**

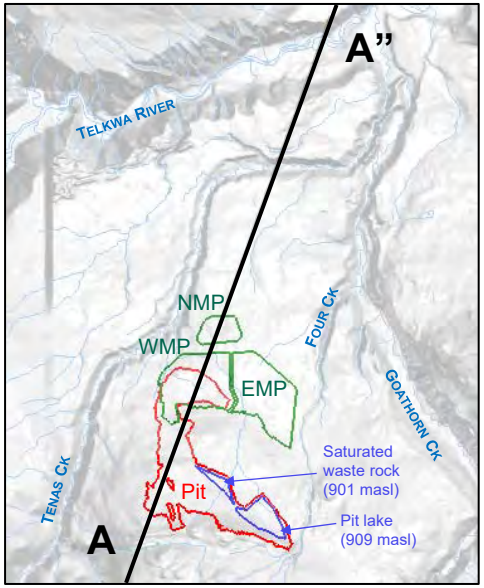



**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

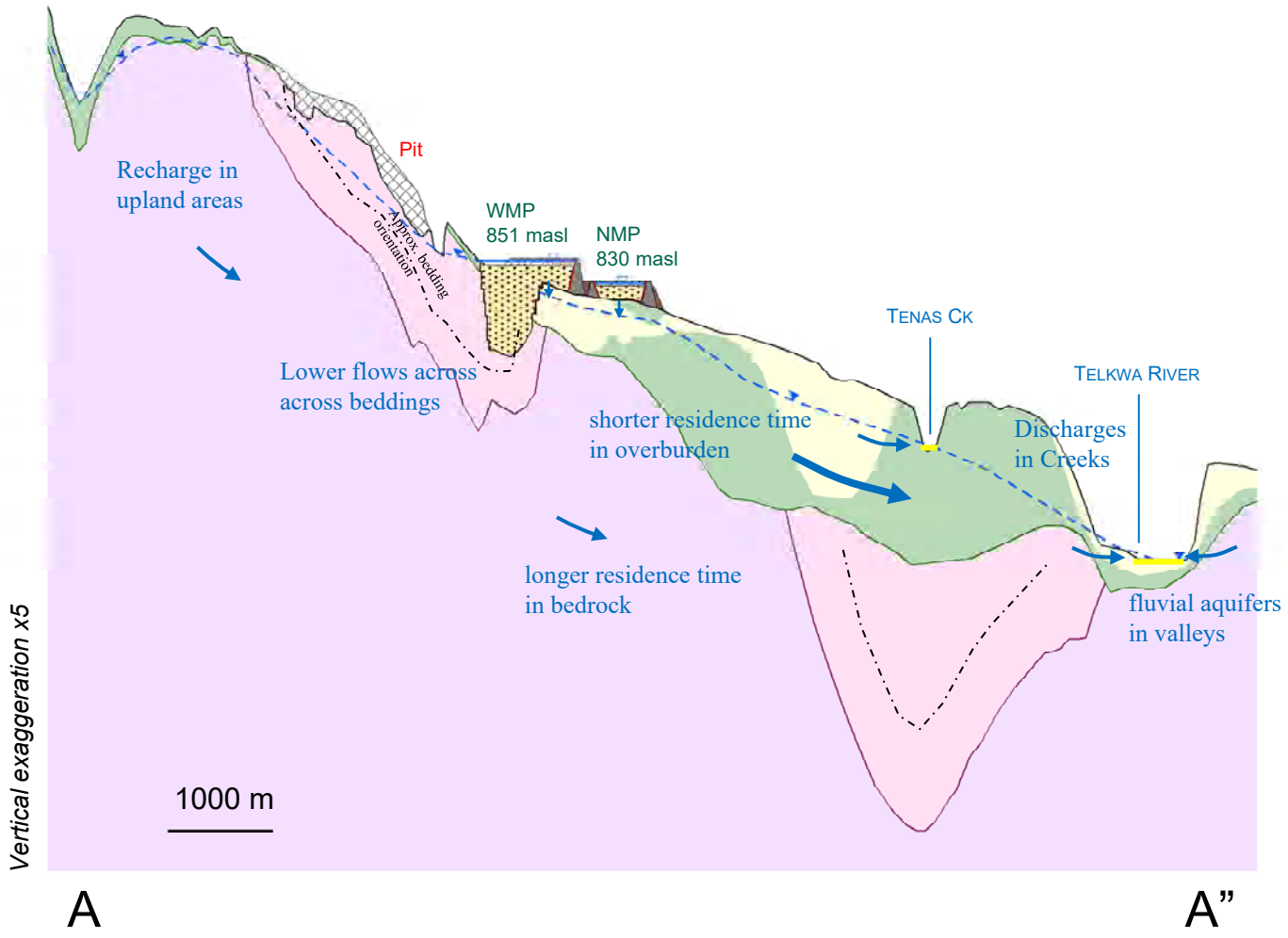



| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section EE” Baseline**<br>Date: Dec.2020 · Approved: GF · Figure: **46** |

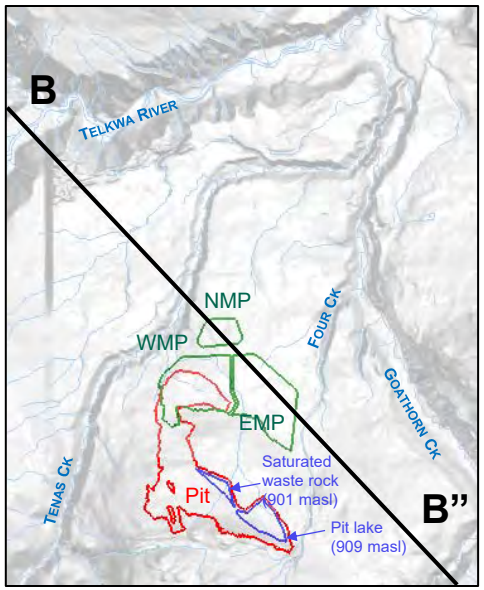


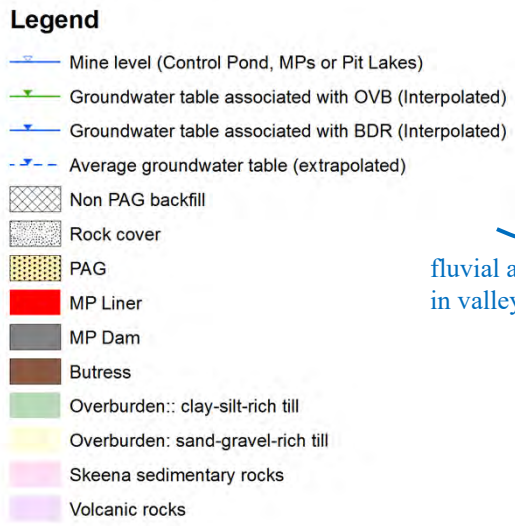

## Legend

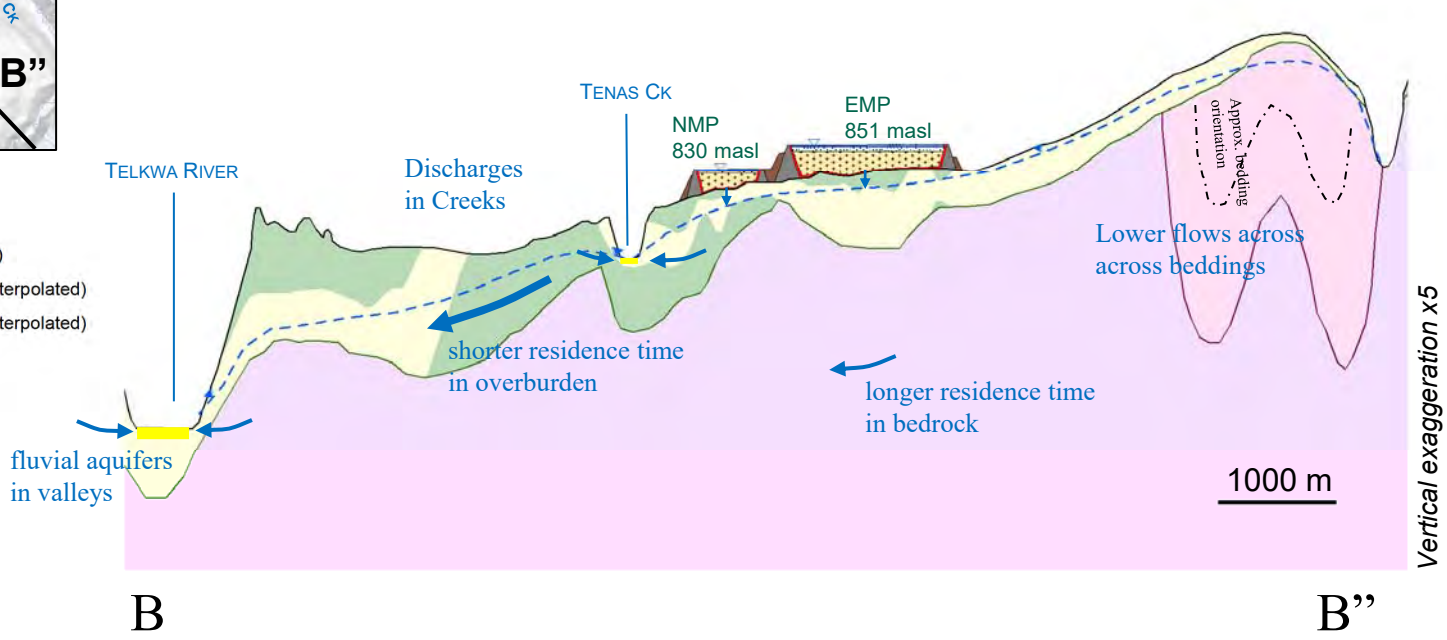
- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks



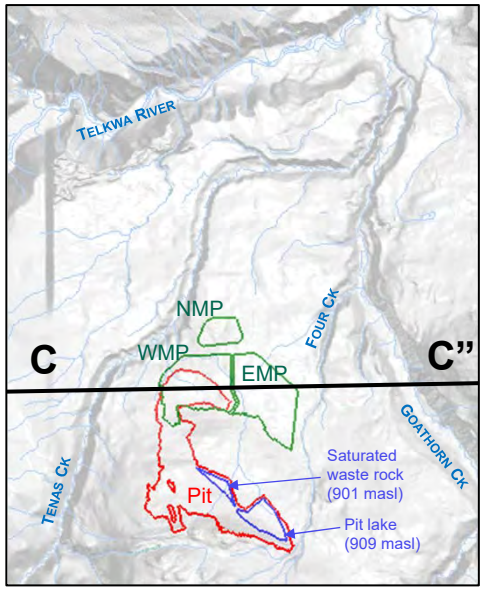

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section AA” Post closure** |
| | | Date: Dec.2020 / Approved: GF / Figure: **47** |




| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section BB”<br>Post closure** |
| | | Date: Dec.2020 / Approved: GF / Figure: **48** |




**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
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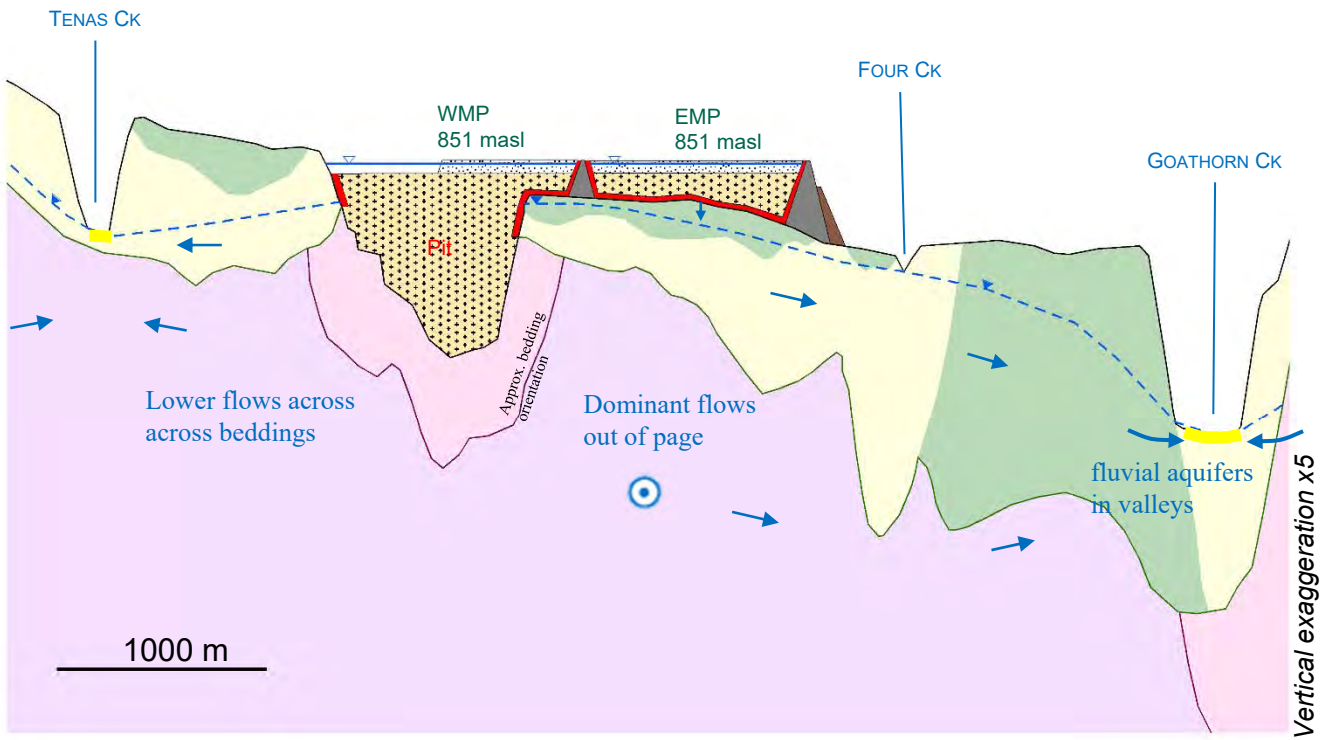
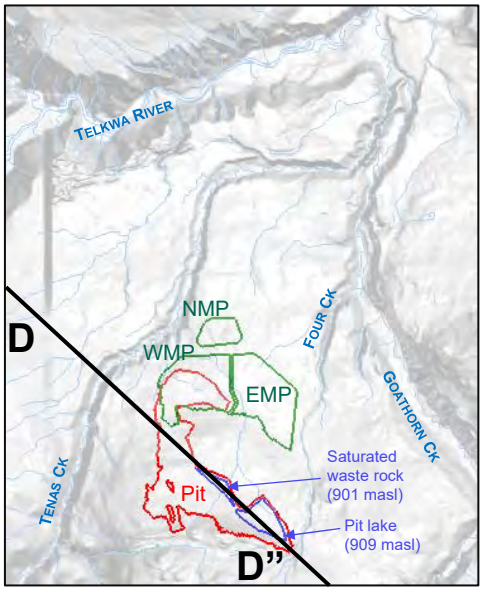
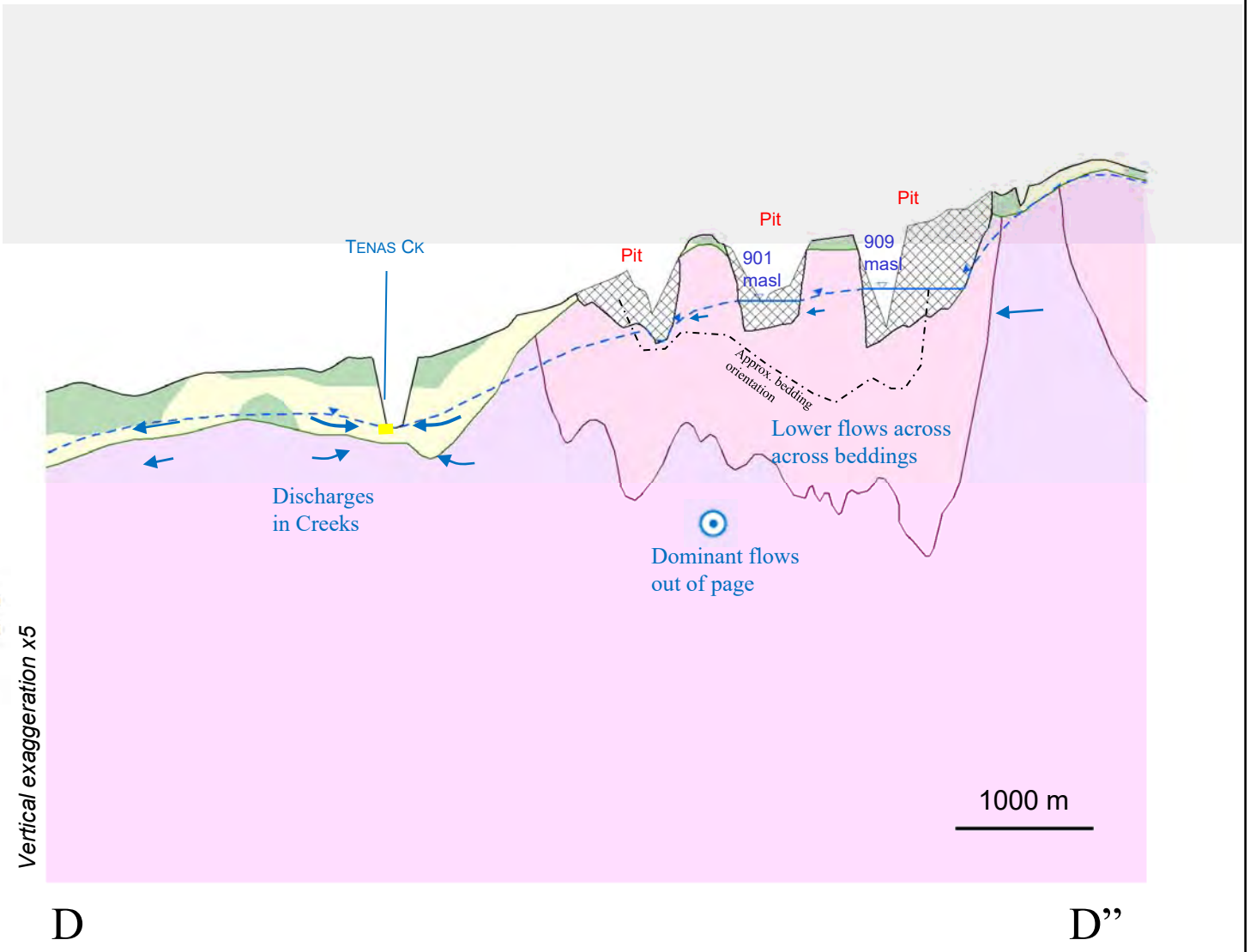
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks




C C”

| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section CC” Post closure** |
| | | Date: Dec.2020 / Approved: GF / Figure: **49** |




**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

| | | |
|---|---|---|
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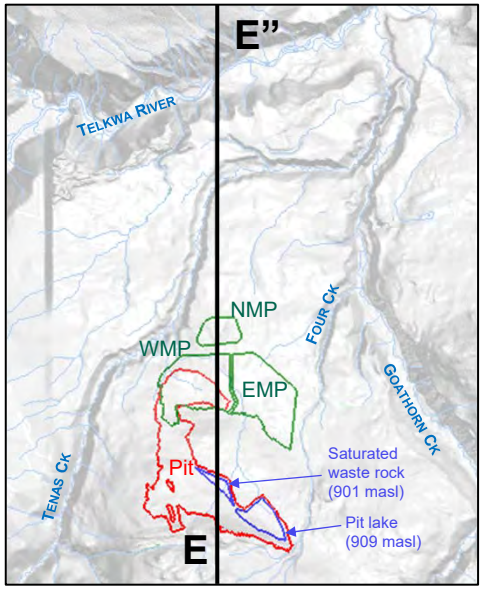
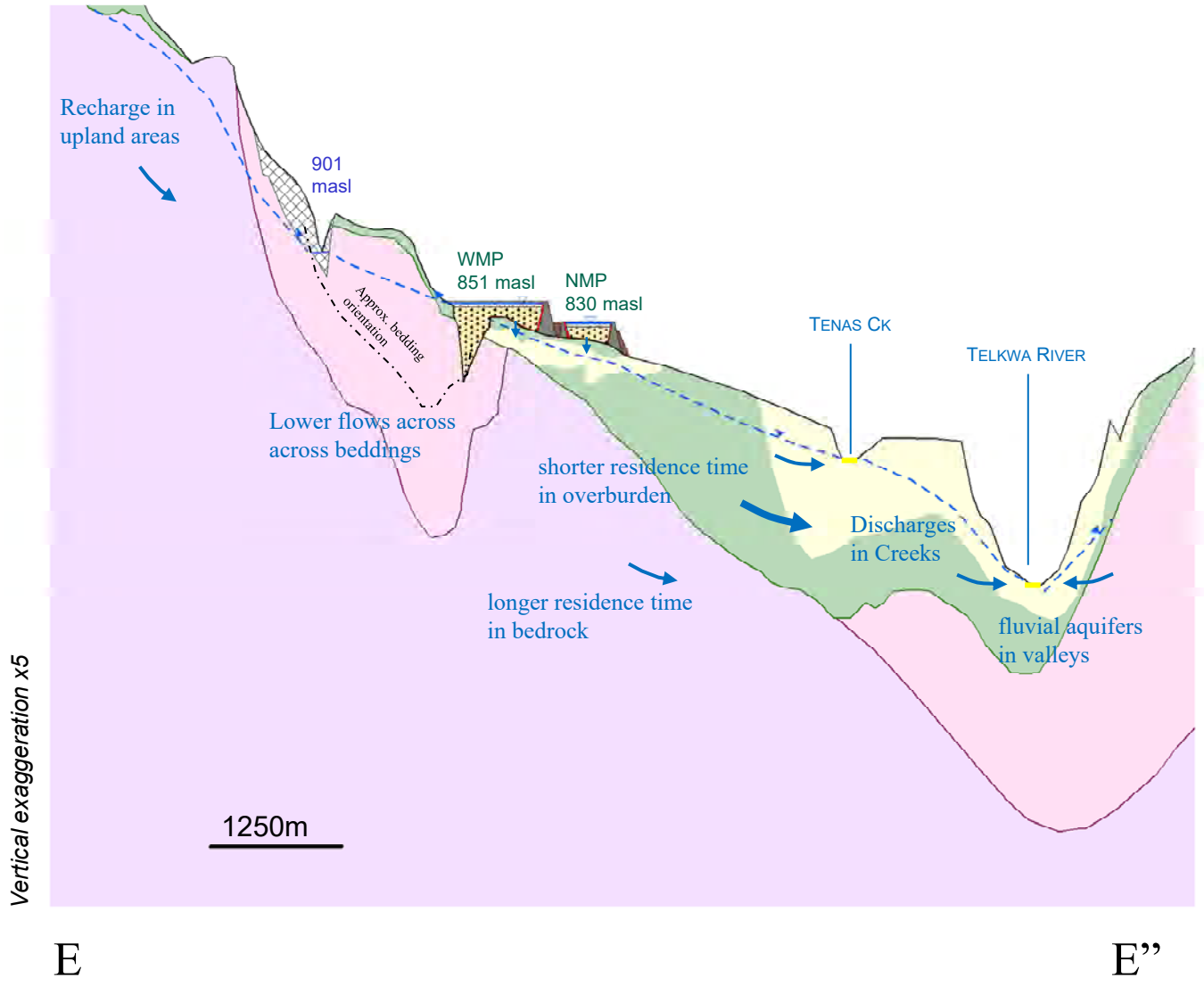
| Job No: 1CT027.004<br>Filename: Fig42to51_ConceptualCrossX.pptx | Tenas Project | **Conceptual Cross Section DD" Post closure** |
| | | Date: Dec.2020 / Approved: GF / Figure: **50** |




**Legend**

- Mine level (Control Pond, MPs or Pit Lakes)
- Groundwater table associated with OVB (Interpolated)
- Groundwater table associated with BDR (Interpolated)
- Average groundwater table (extrapolated)
- Non PAG backfill
- Rock cover
- PAG
- MP Liner
- MP Dam
- Butress
- Overburden:: clay-silt-rich till
- Overburden: sand-gravel-rich till
- Skeena sedimentary rocks
- Volcanic rocks

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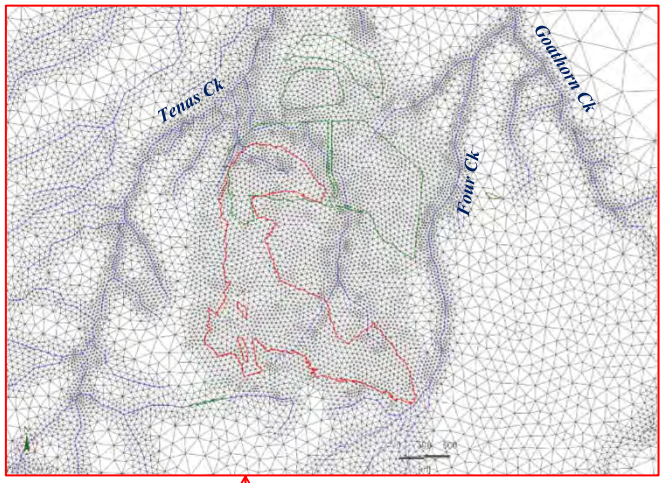
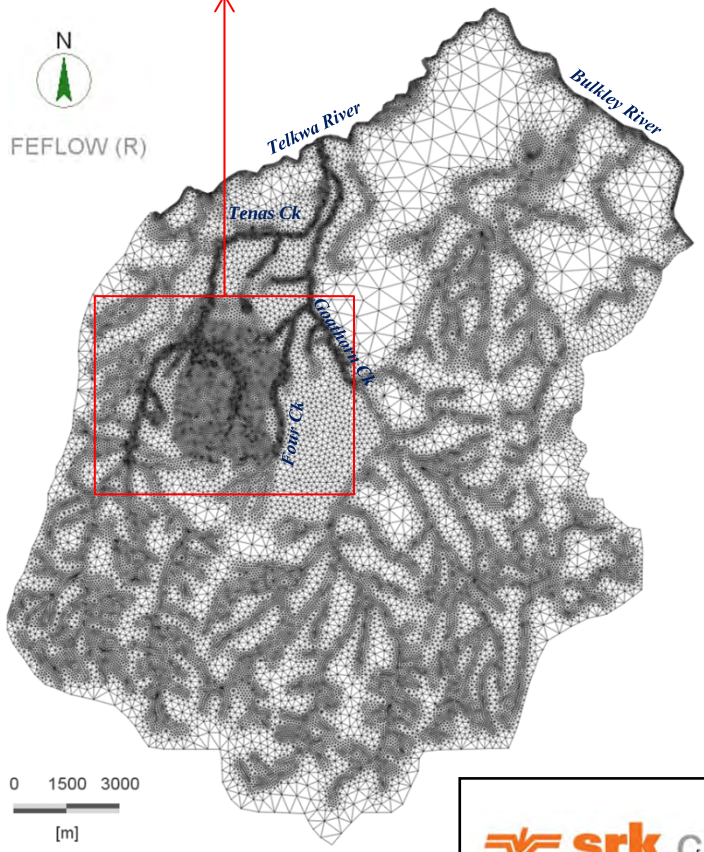
**Conceptual Cross Section EE”**
**Post closure**

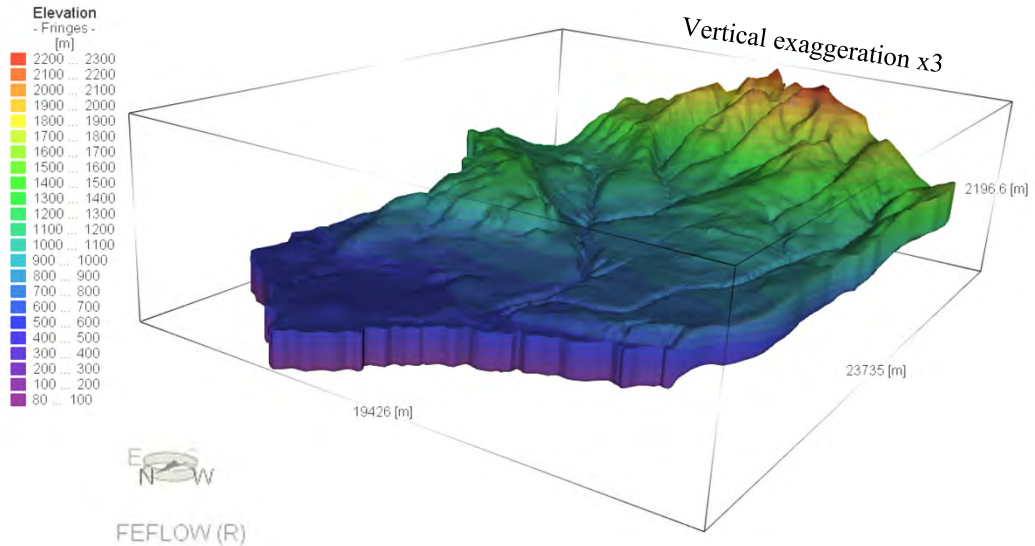
Job No: 1CT027.004
Filename: Fig42to51_ConceptualCrossX.pptx

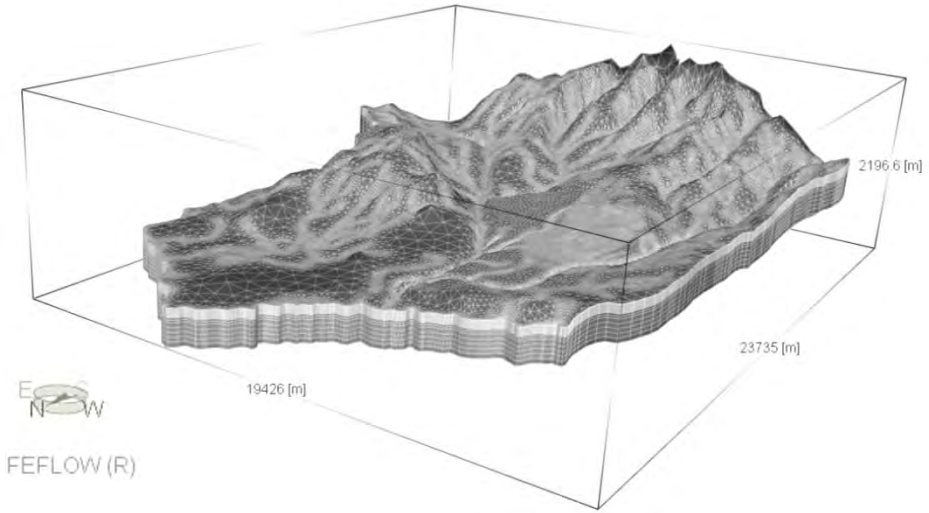
Tenas Project

Date: Dec.2020 | Approved: GF | Figure: **51**

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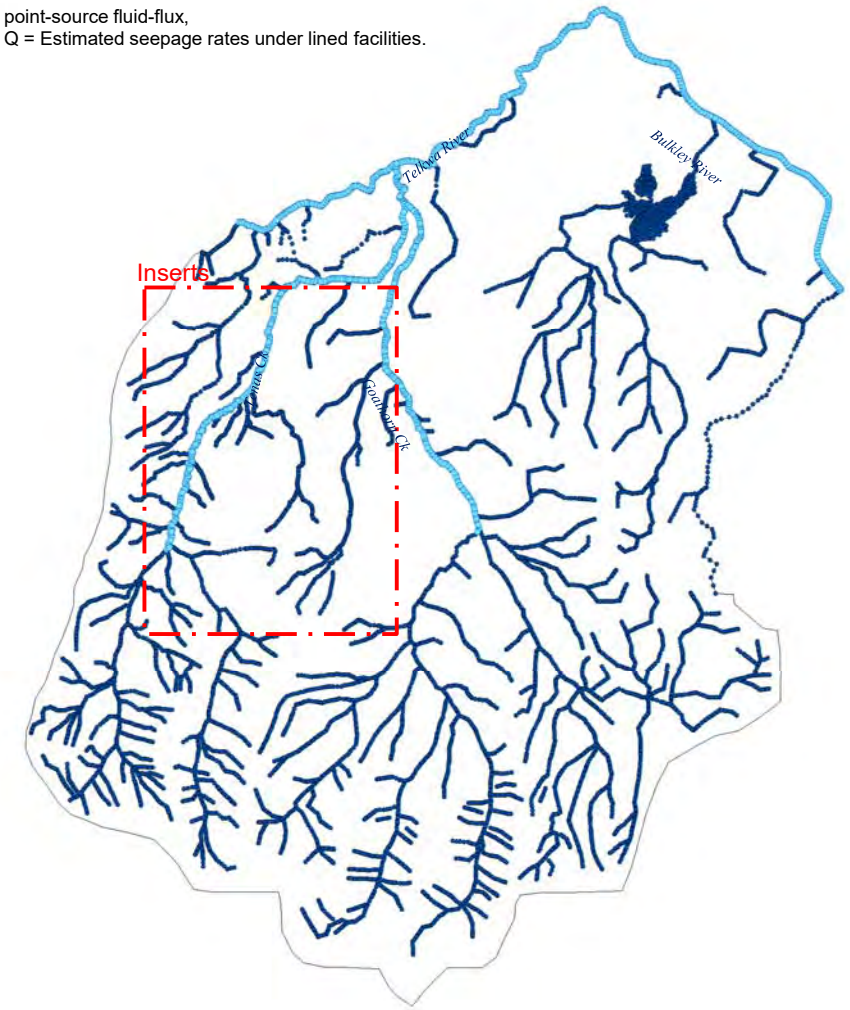
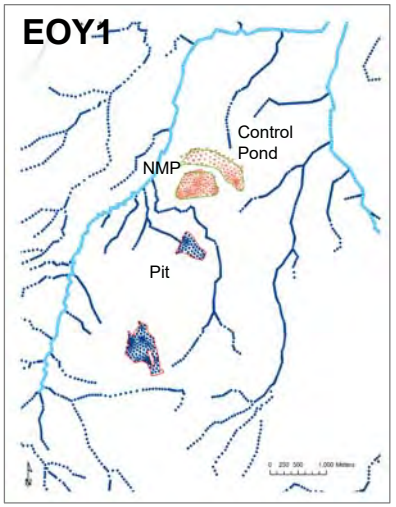
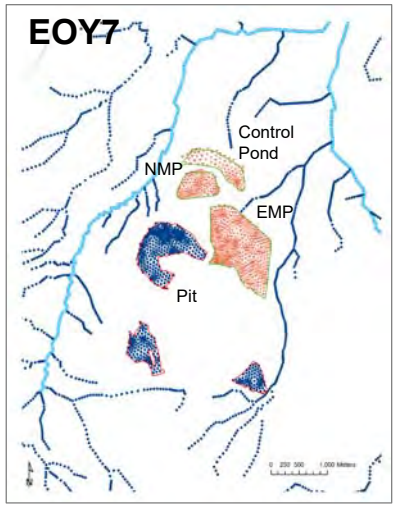
| Job No: 1CT027.004<br>Filename: Fig52_Domain and mesh.pptx | Tenas Project | **Domain and mesh of the 3D numerical model** |
| | | Date: Nov 2020 / Approved: GF / Figure: **52** |

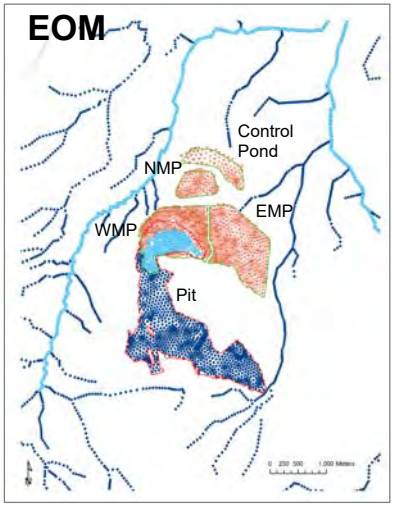
## Legend

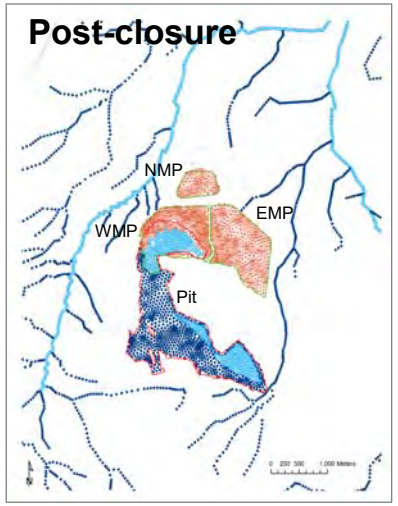
- Dirichlet (constant head),
  H = topo elevation, or water levels at unlined WMP, in-pit saturated waste rock / lake.
- Dirichlet (constant head) with flux constraint (seepage),
  H = Topo elevation, or pit elevation (ie., pit walls).
- point-source fluid-flux,
  Q = Estimated seepage rates under lined facilities.

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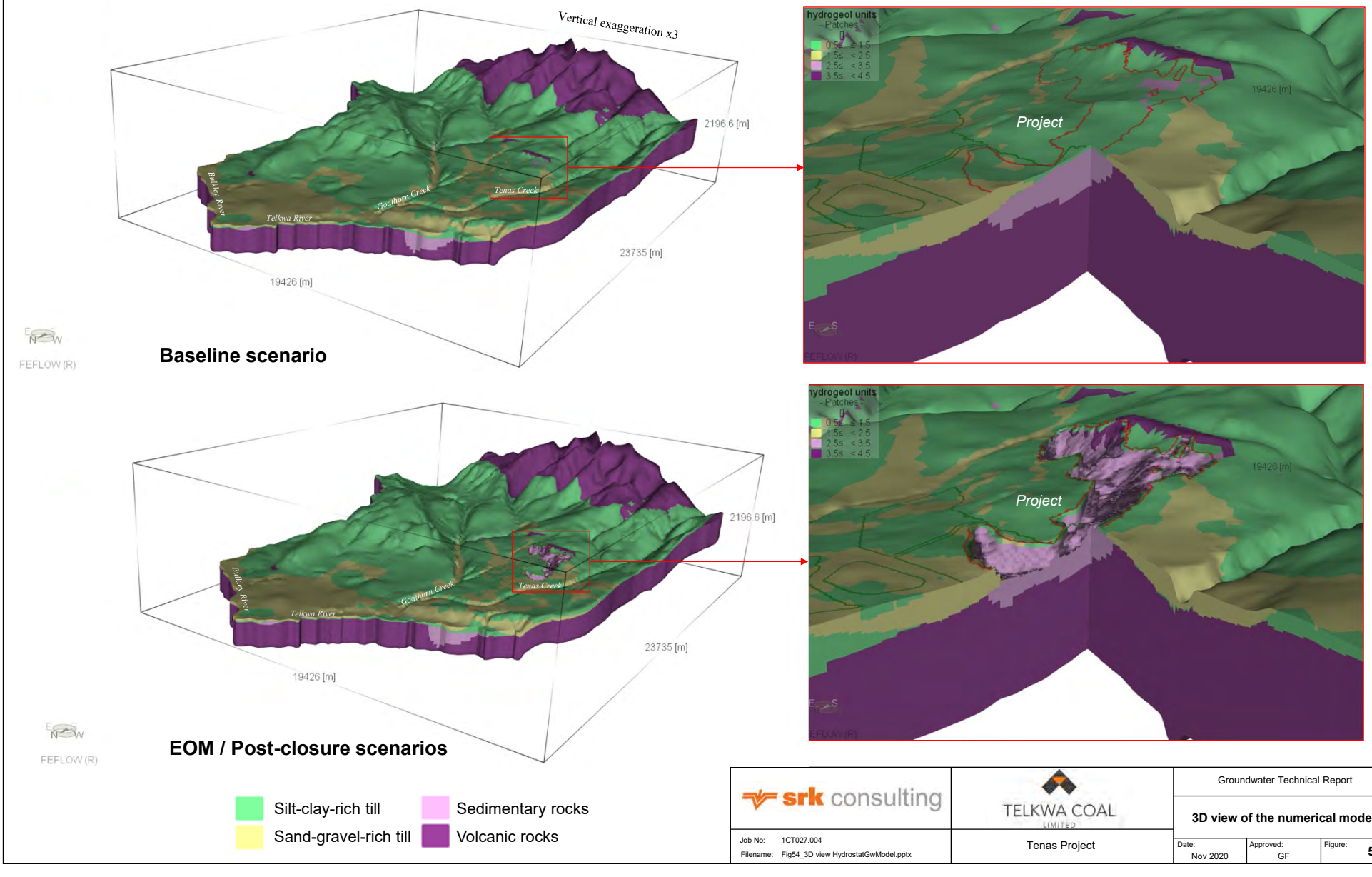
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Boundary conditions** |
| Job No: 1CT027.004<br>Filename: Fig53_Boundary conditions.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: 53 |

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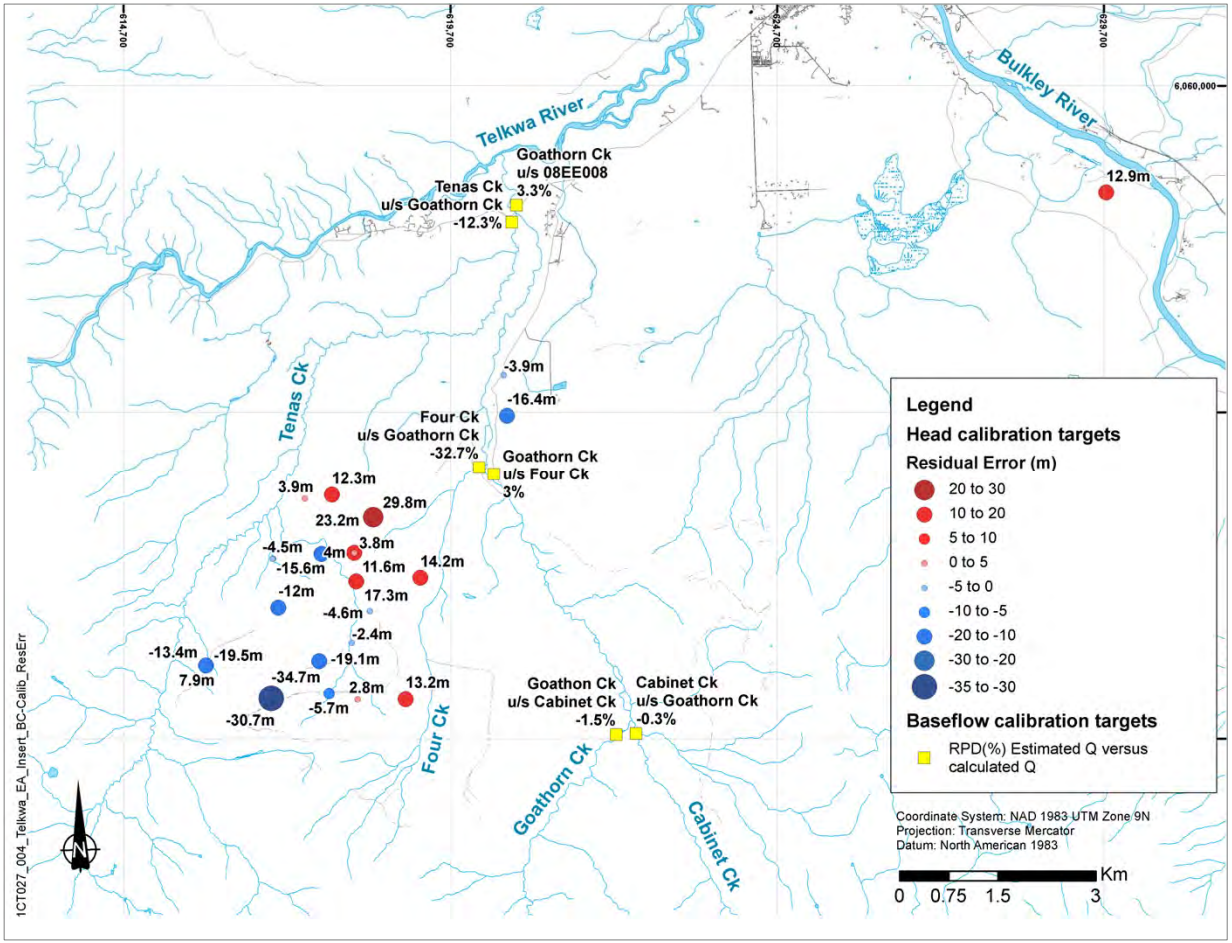
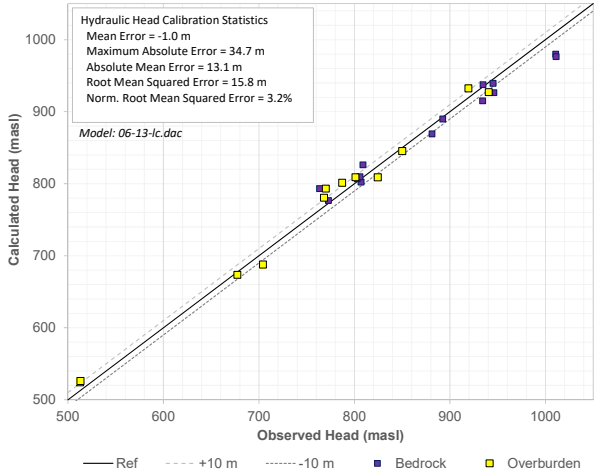
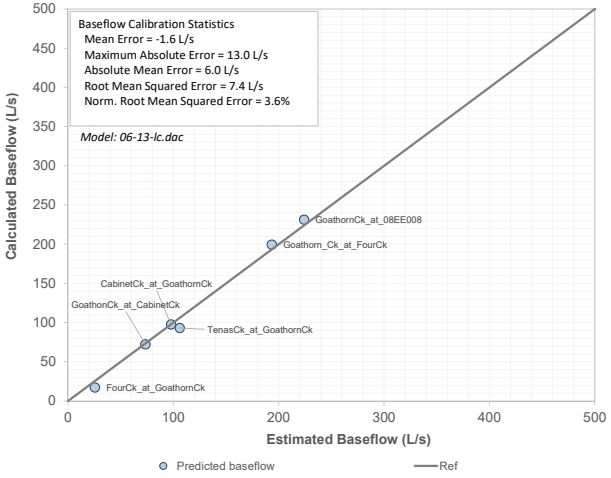
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **3D view of the numerical model** |
| Job No: 1CT027.004<br>Filename: Fig54_3D view HydrostatGwModel.pptx | Tenas Project | Date: Nov 2020 / Approved: GF / Figure: **54** |

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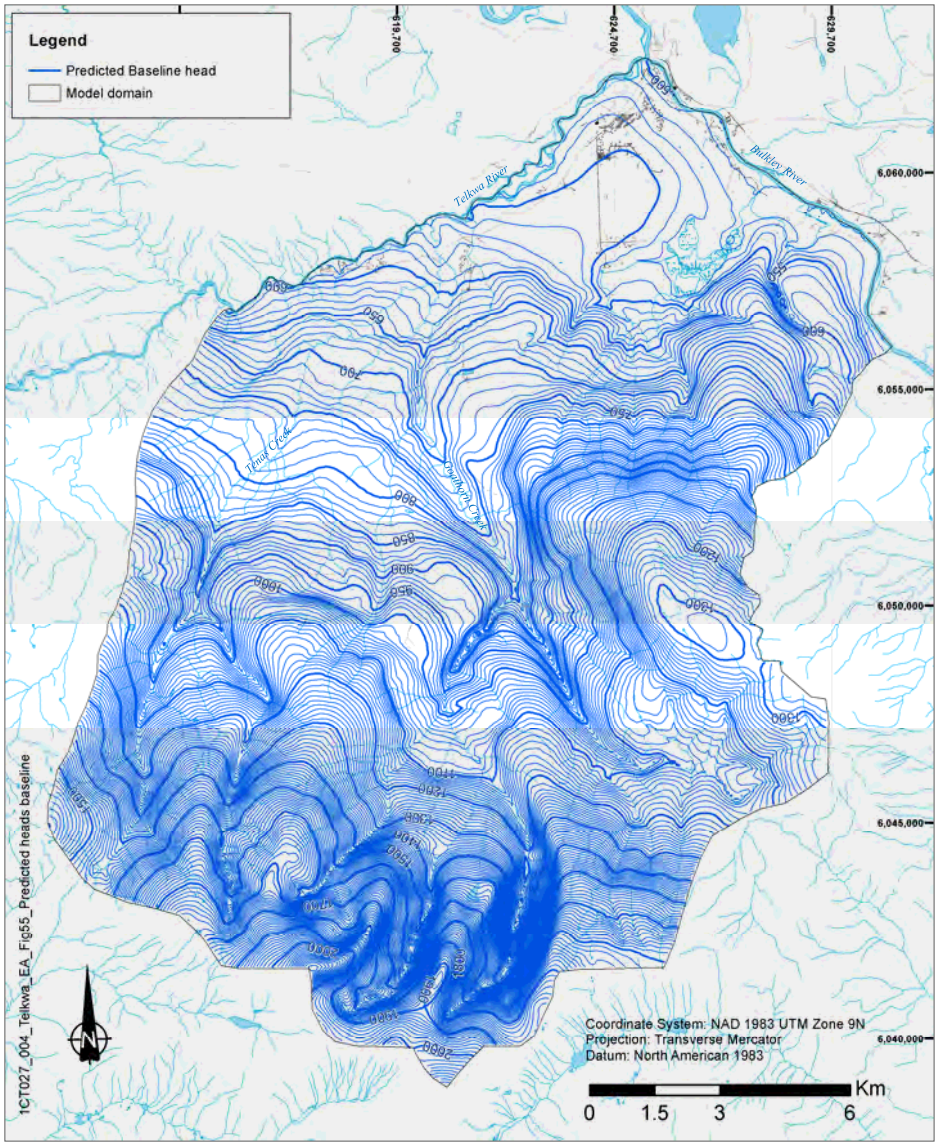
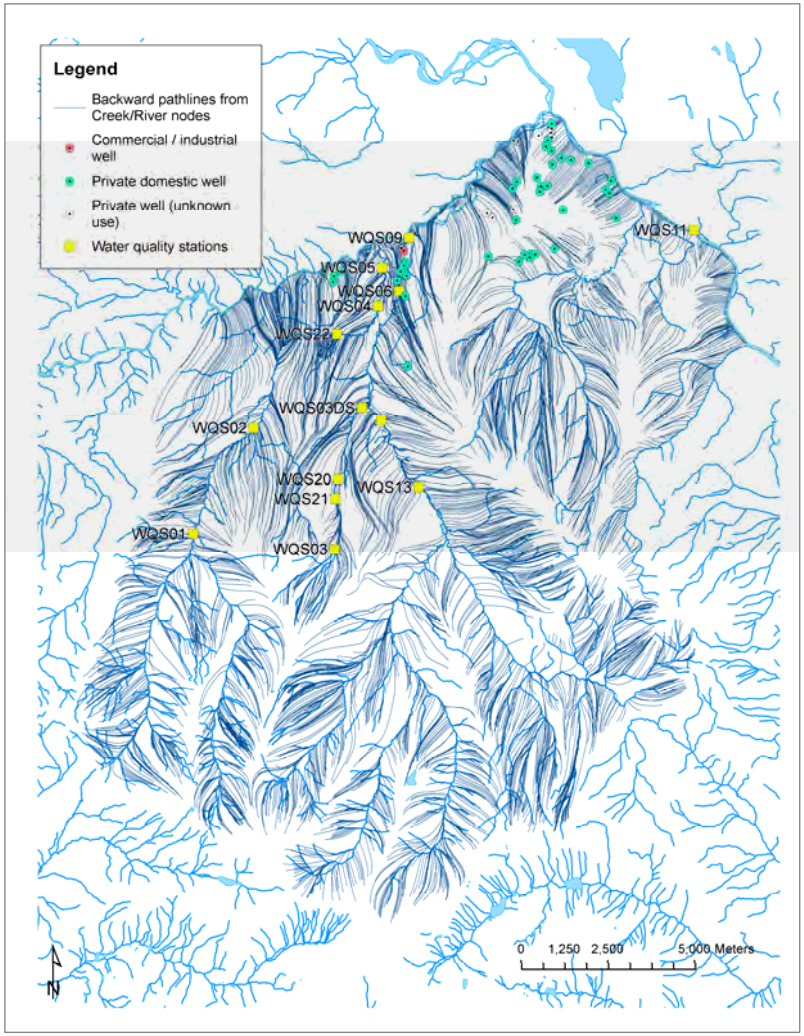
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Base case calibration** |
| Job No: 1CT027.004<br>Filename: Fig55_BC_Calibration.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **55** |

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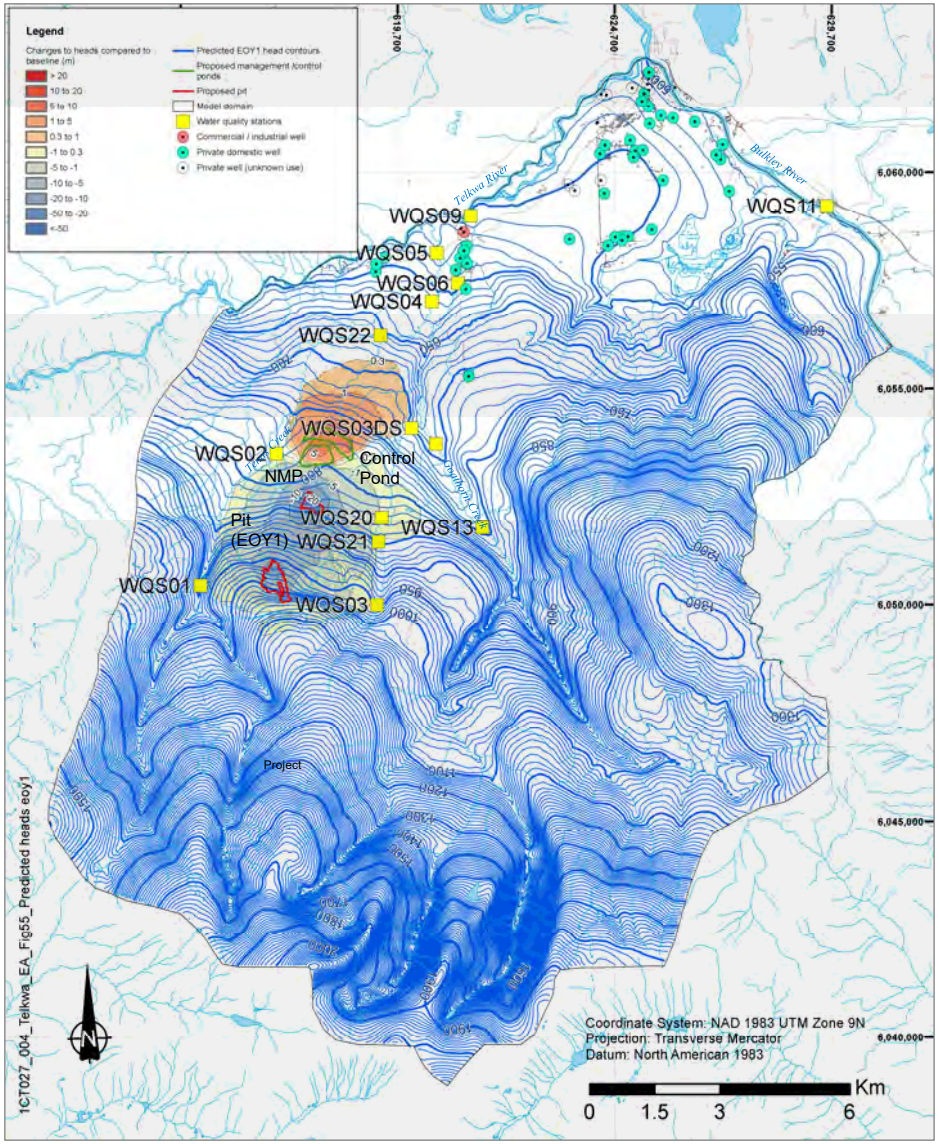
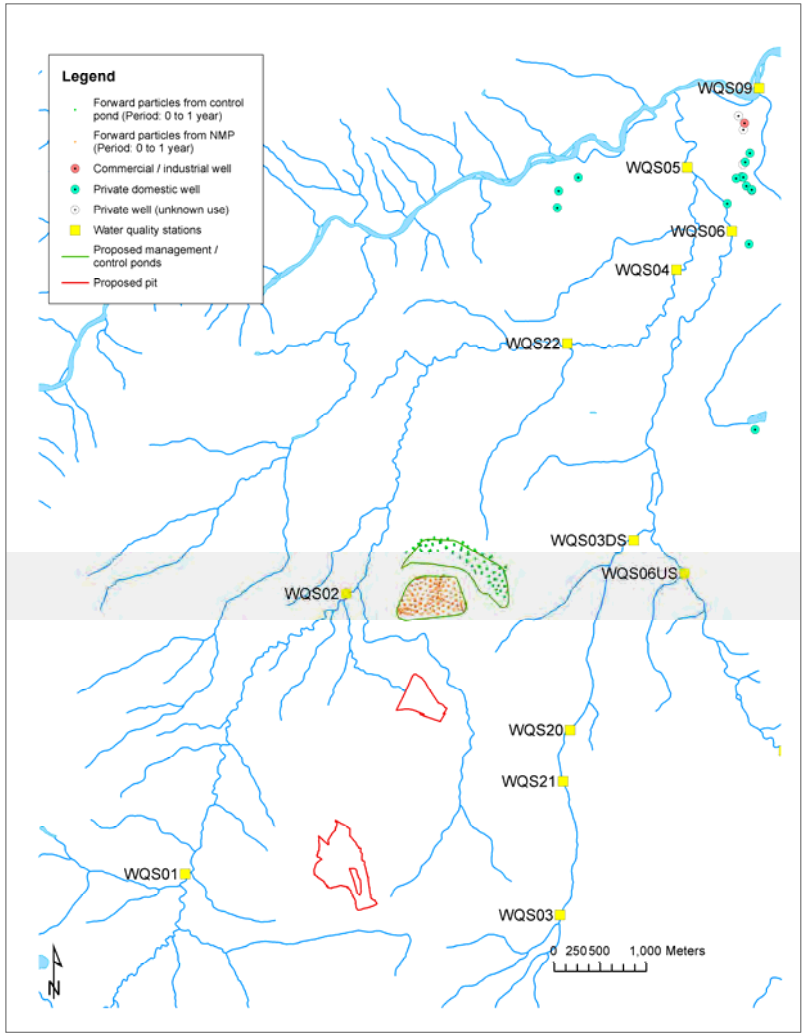
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Base case heads and backward paths for baseline conditions** |
| Job No: 1CT027.002<br>Filename: Fig56_Base case heads&paths bsln.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **56** |

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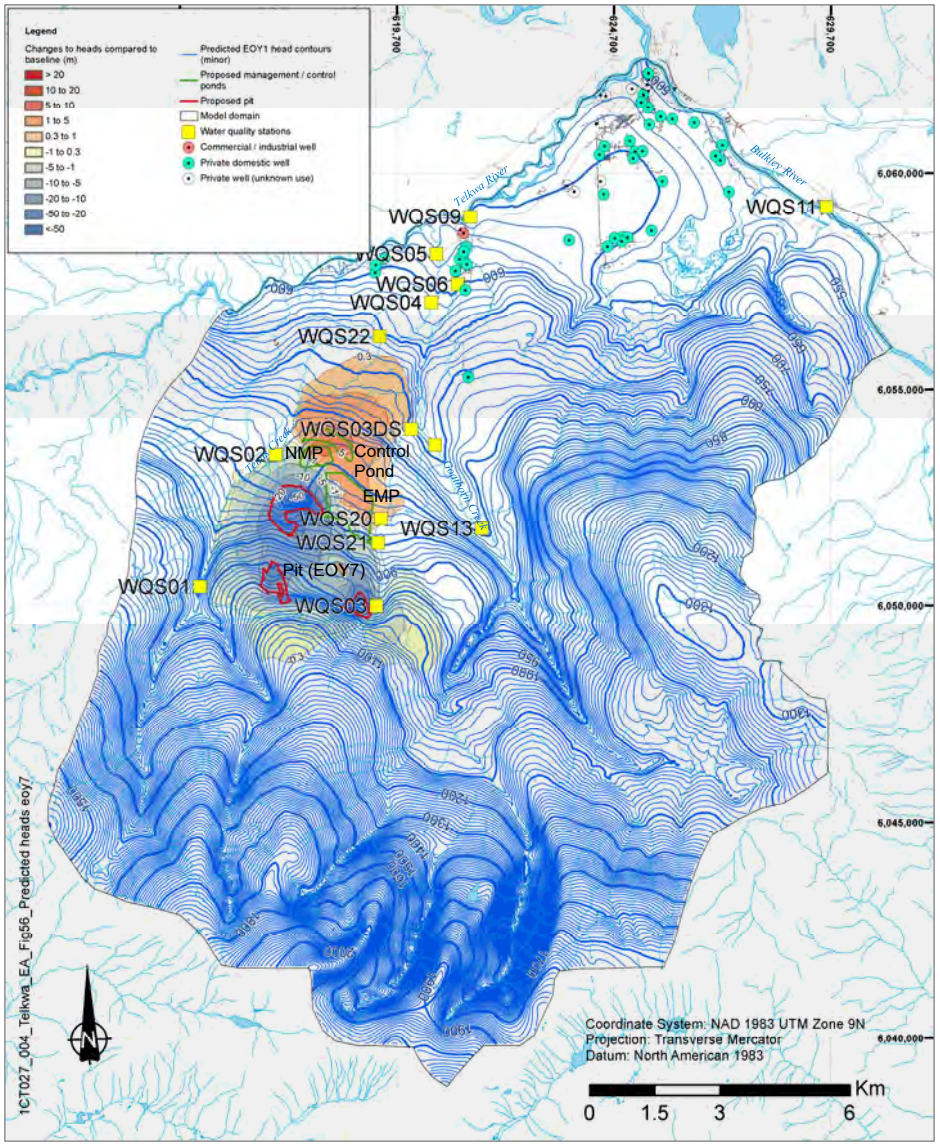
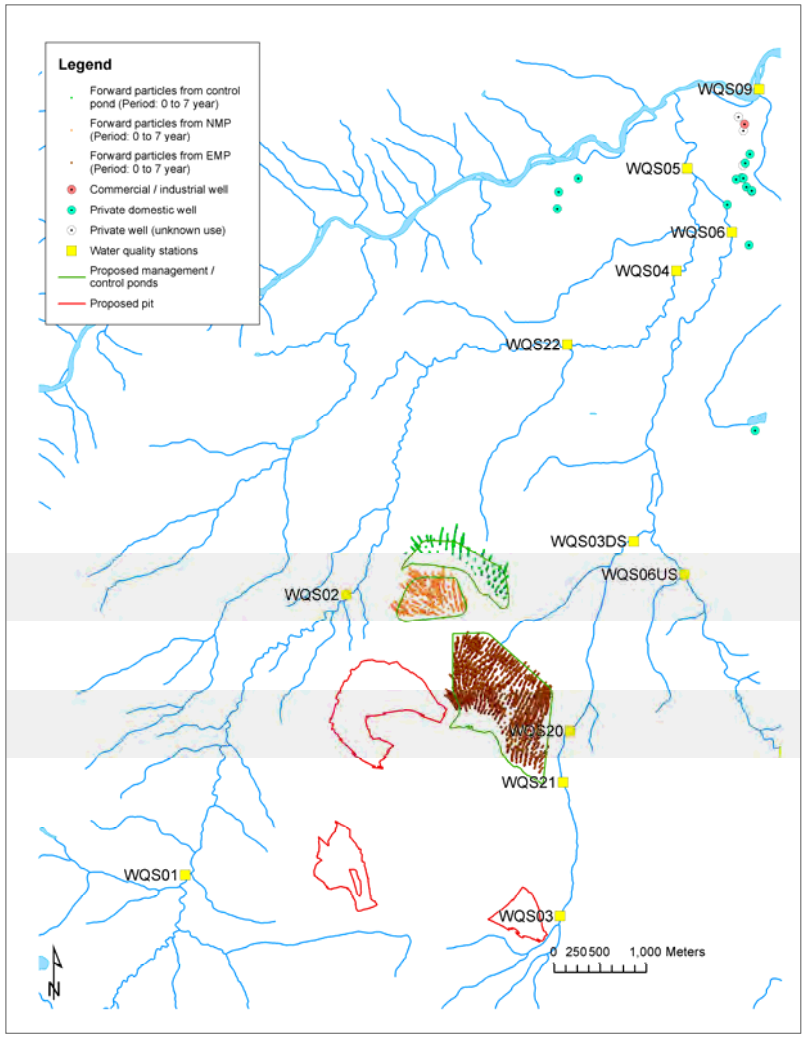
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads and forward paths for EoY1 conditions** |
| Job No: 1CT027.002<br>Filename: Fig57_Base case heads&paths eoy1.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **57** |

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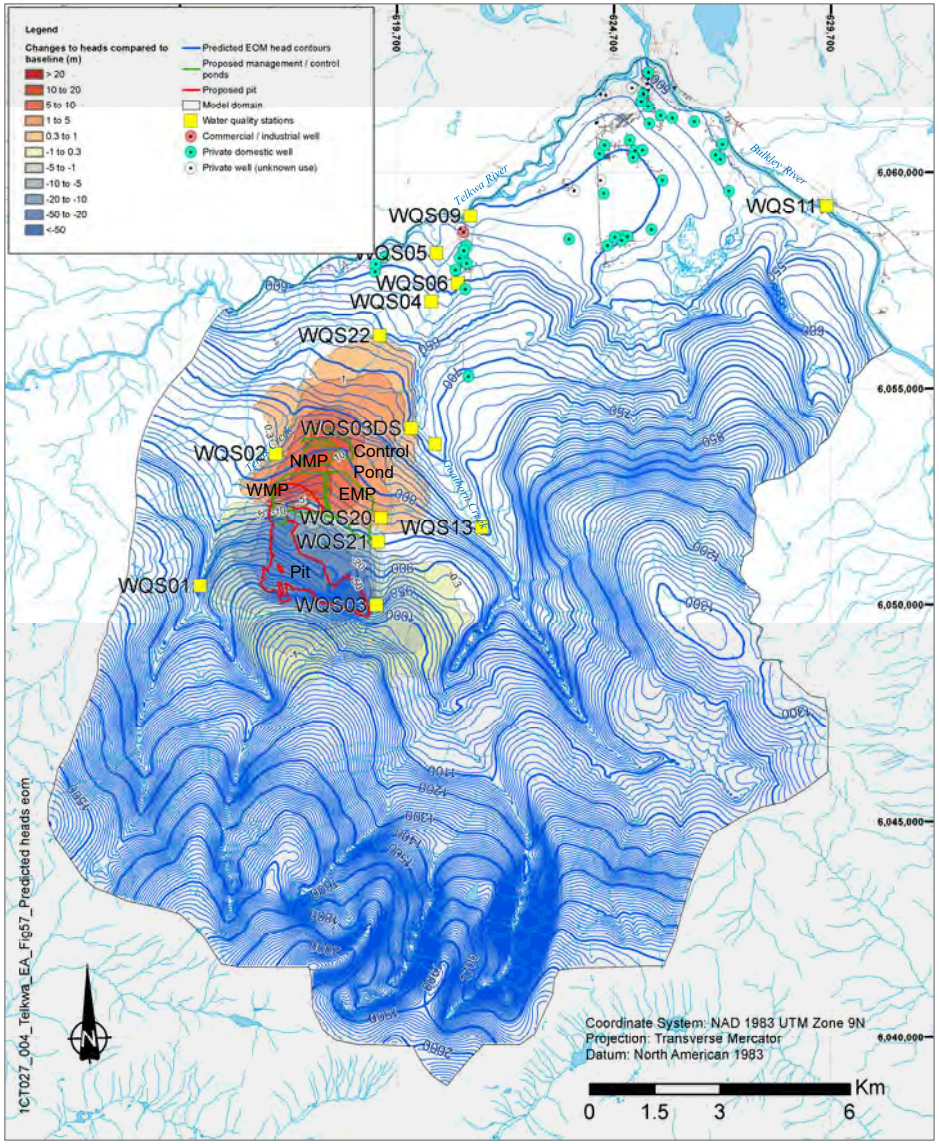
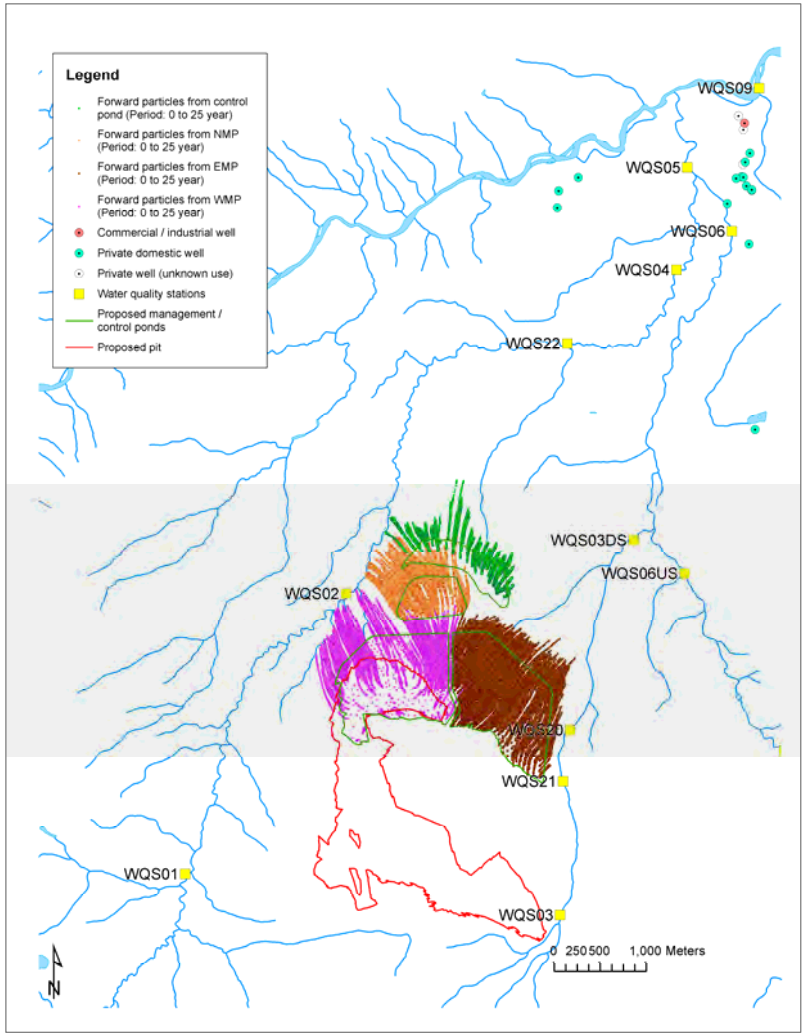
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads and forward paths for EoY7 conditions** |
| Job No: 1CT027.002<br>Filename: Fig58_Base case heads&paths eoy7.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **58** |

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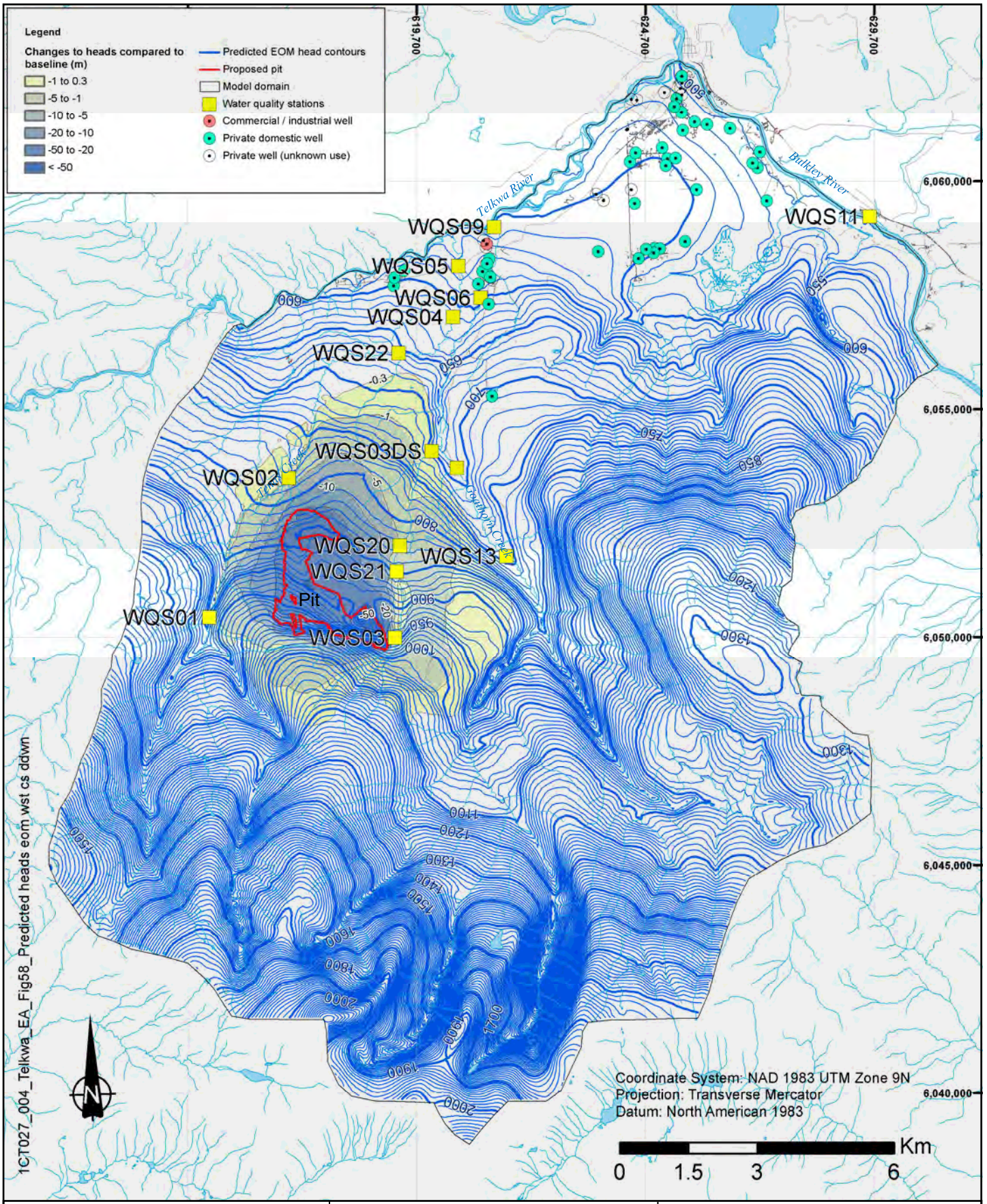
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads and forward paths for EOM conditions** |
| Job No: 1CT027.002<br>Filename: Fig59_Base case heads&paths eom.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **59** |

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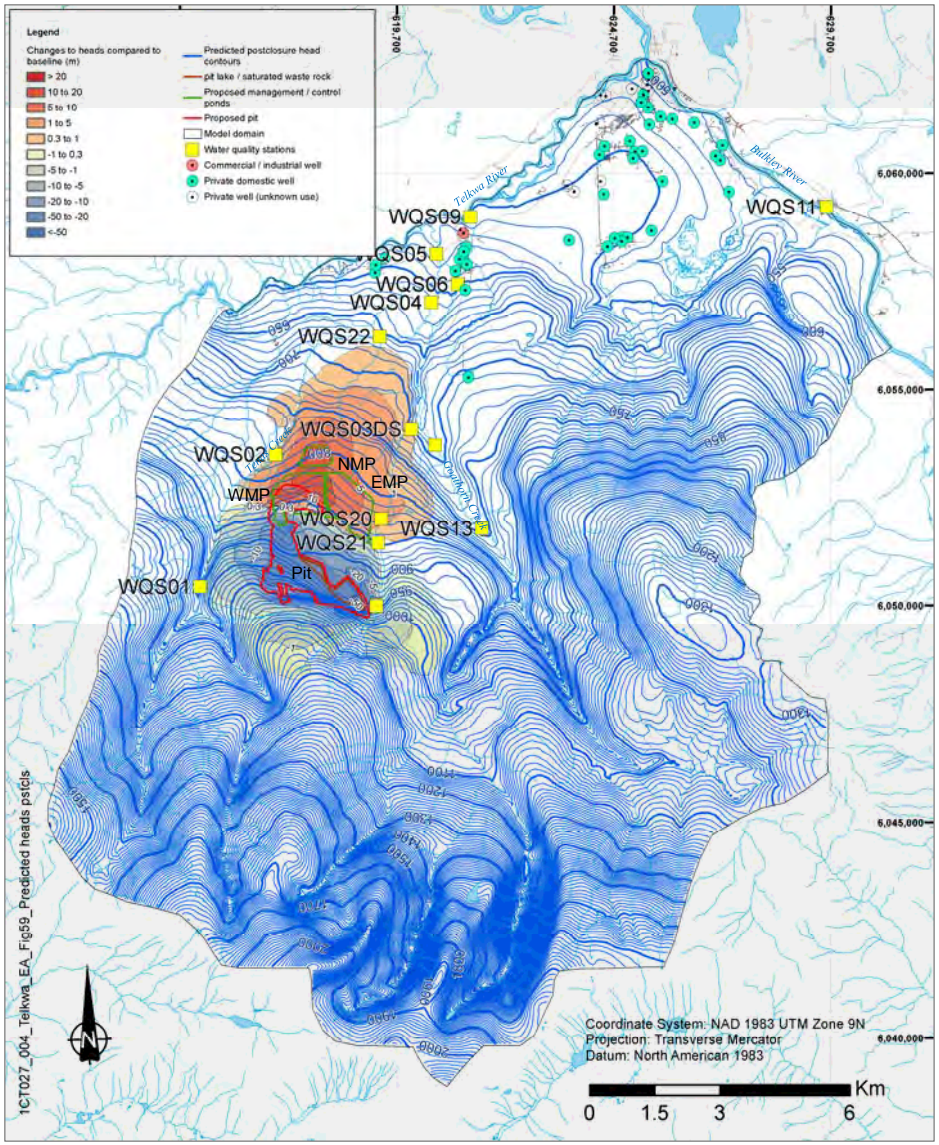
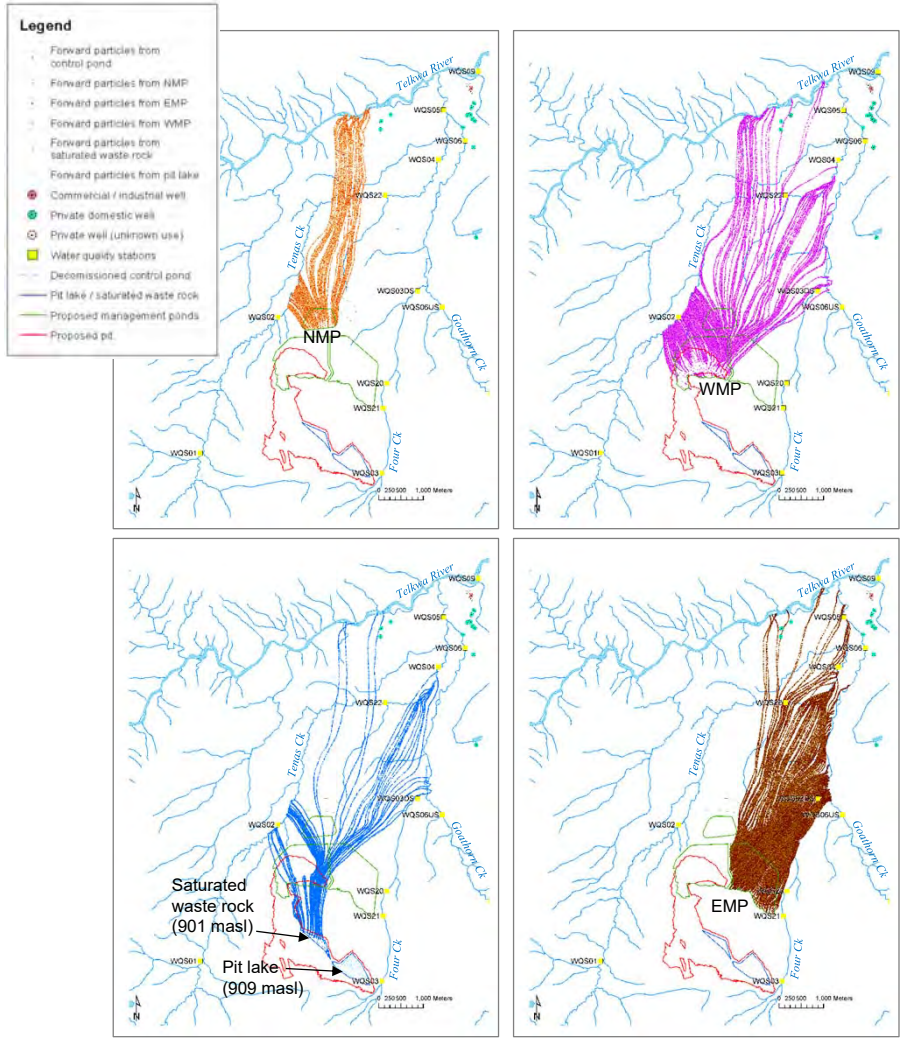
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads for EOM pit conditions and no management ponds (worst case drawdown)** |
| Job No: 1CT027.004<br>Filename: Fig60_Base case heads eom wstddwn.pptx | Tenas Project | Date: Dec 2020 \| Approved: GF \| Figure: **60** |

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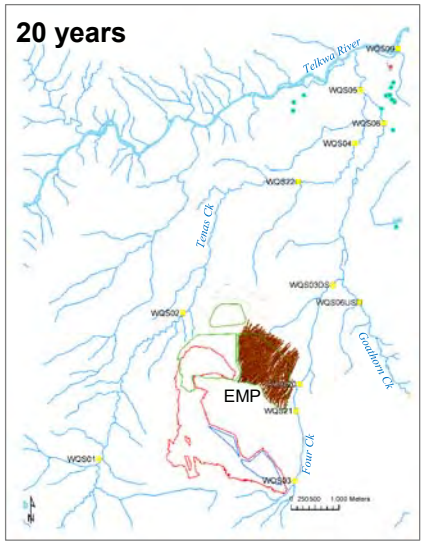
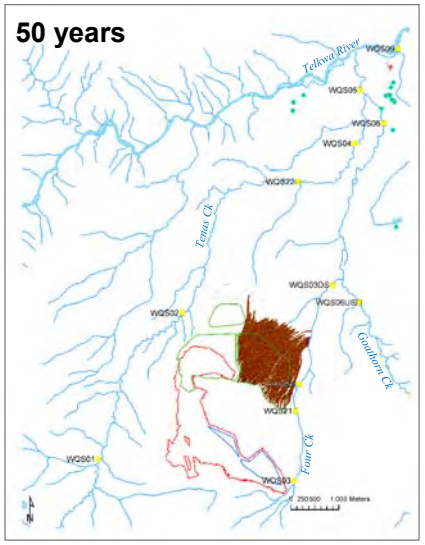
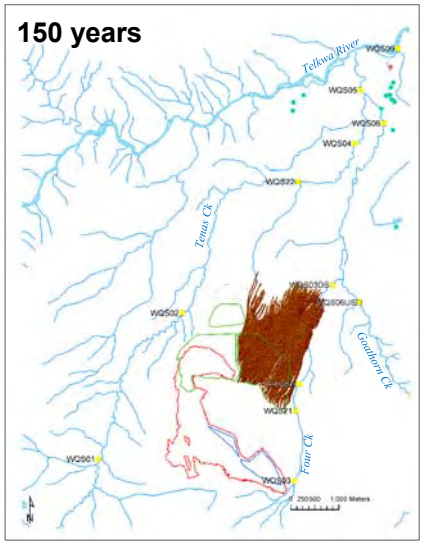
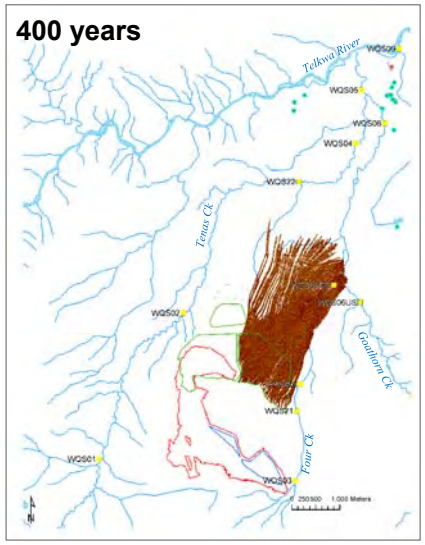
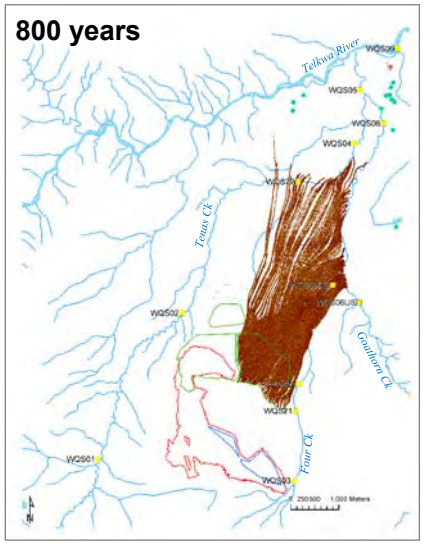
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| | | **Modelled heads and forward paths for post-closure conditions** |
| Job No: 1CT027.002<br>Filename: Fig61_Base case heads&paths pstcls.pptx | Tenas Project | Date: Dec 2020 / Approved: GF / Figure: **61** |

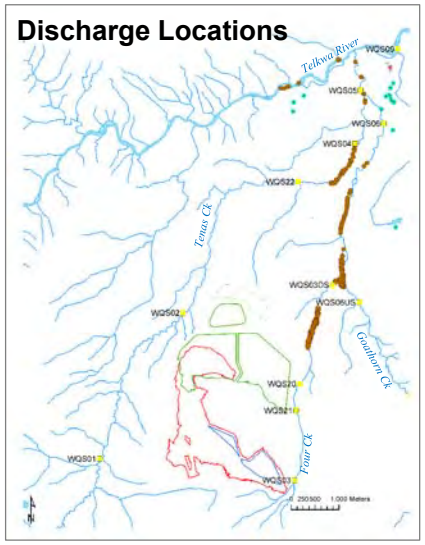



## Legend

- Forward particles from EMP
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

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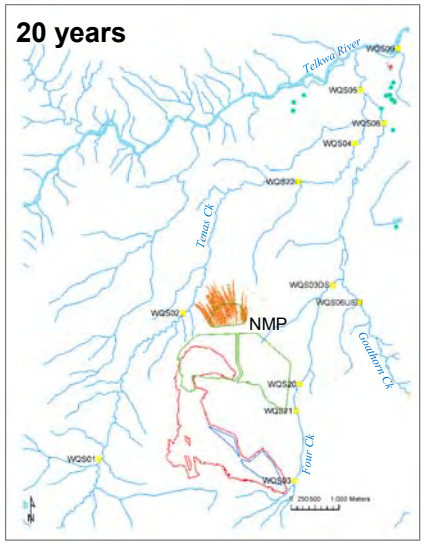
**Modelled forward particle paths from the EMP**

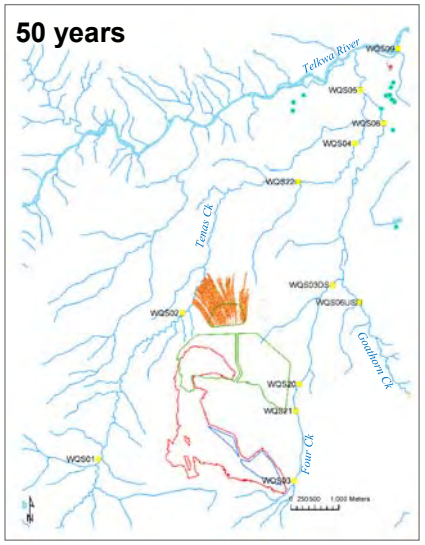
Job No: 1CT027.004

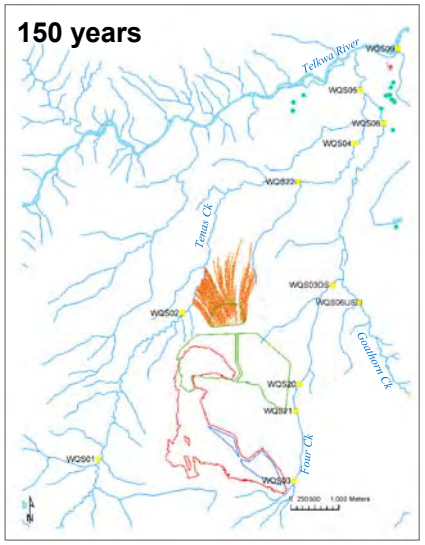
Filename: Fig62_BC_Particles_timesteps_EMP.pptx

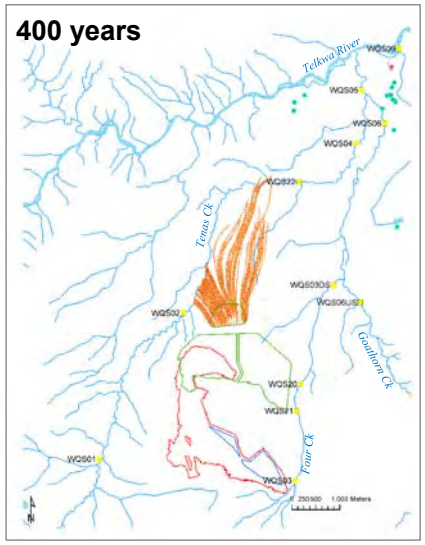
Tenas Project

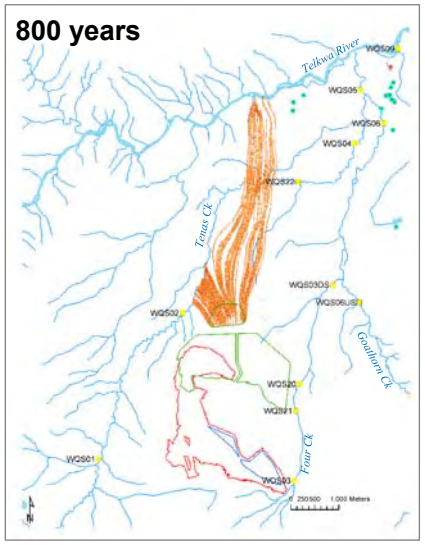
| Date: | Approved: | Figure: |
|---|---|---|
| Dec 2020 | GF | 62 |

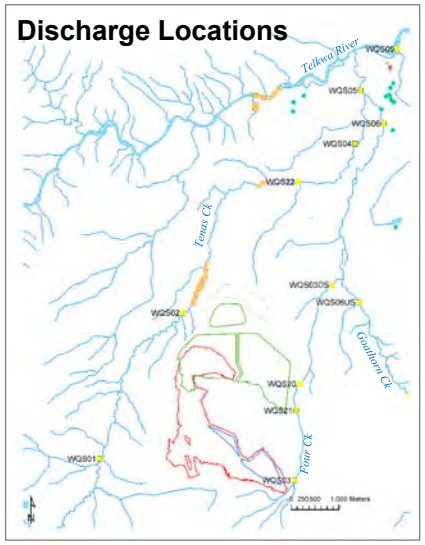



## Legend

- Forward particles from NMP
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

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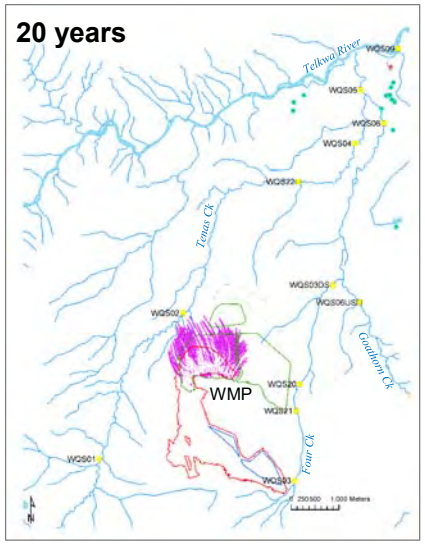
**Modelled forward particle paths from the NMP**

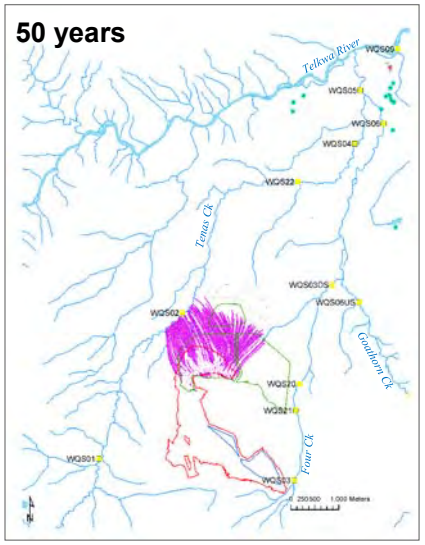
Job No: 1CT027.004

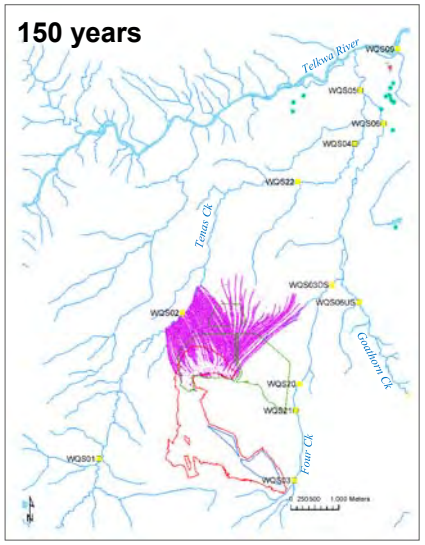
Filename: Fig63_BC_Particles_timesteps_NMP.pptx

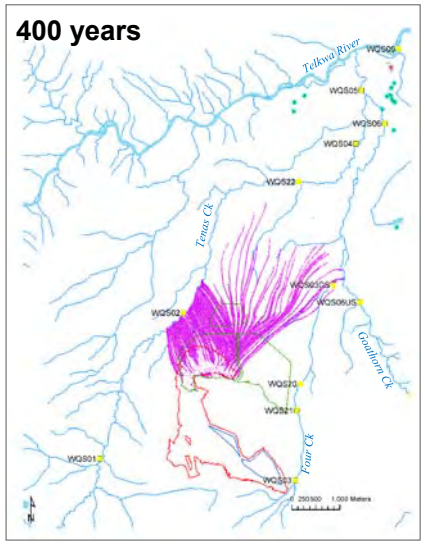
Tenas Project

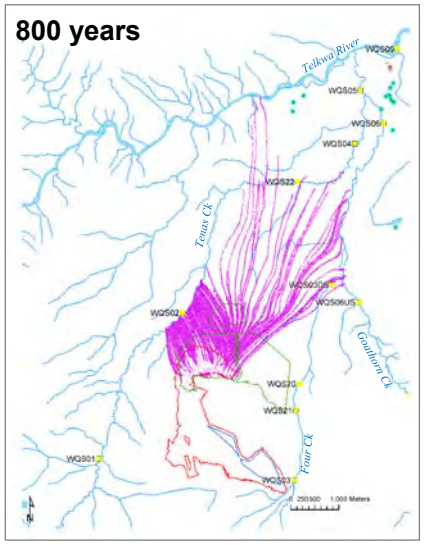
| Date: | Approved: | Figure: |
|---|---|---|
| Dec 2020 | GF | 63 |

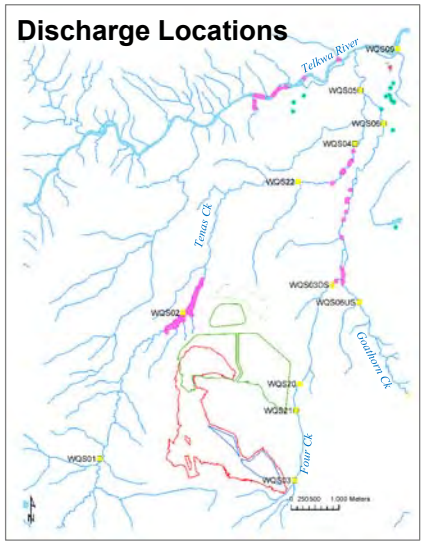


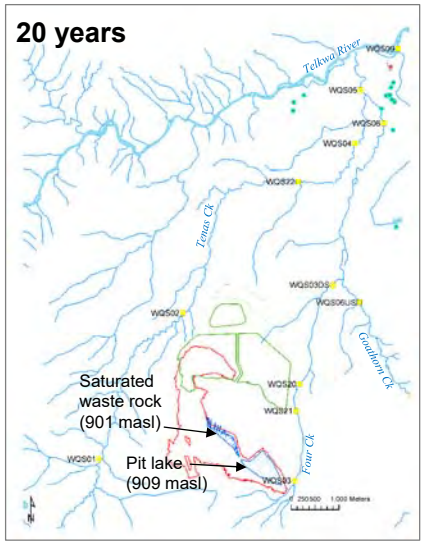



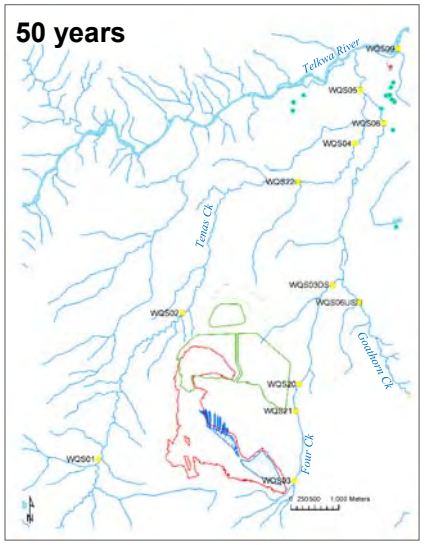



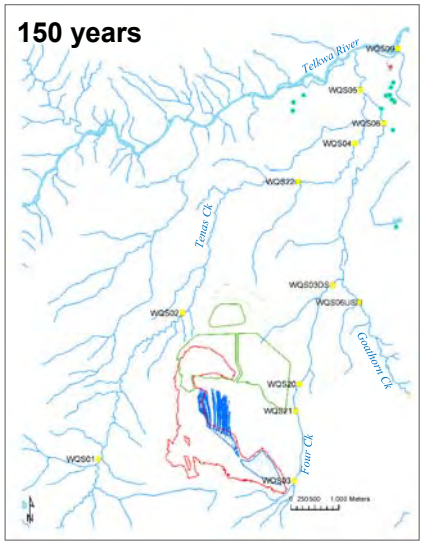

## Legend

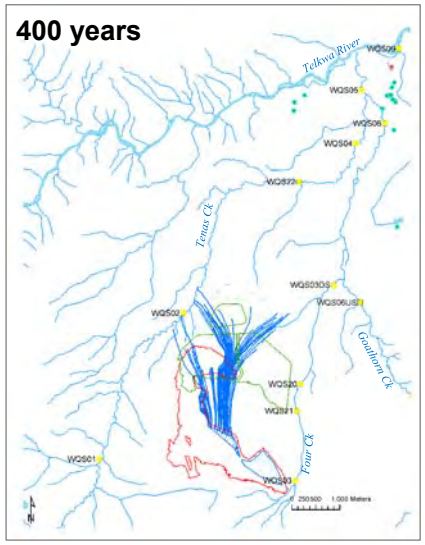
- Forward particles from WMP
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

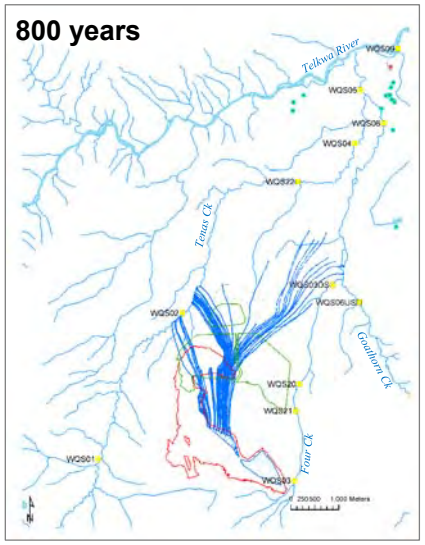
| | | |
|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report |
| Job No: 1CT027.004<br>Filename: Fig64_BC_Particles_timesteps_WMP.pptx | Tenas Project | **Modelled forward particle paths from the WMP** |
| | | Date: Dec 2020 / Approved: GF / Figure: **64** |

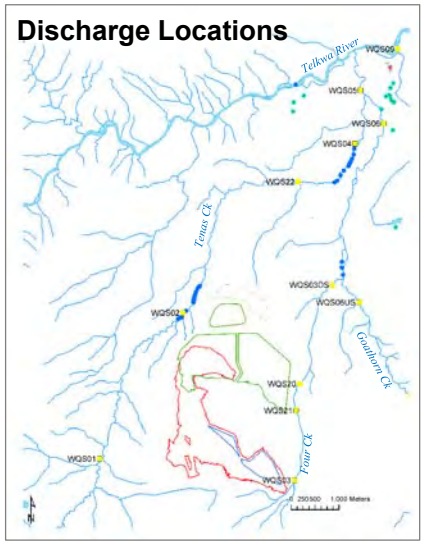



## Legend

- Forward particles from saturated waste rock
- Forward particles from pit lake
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

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Tenas Project

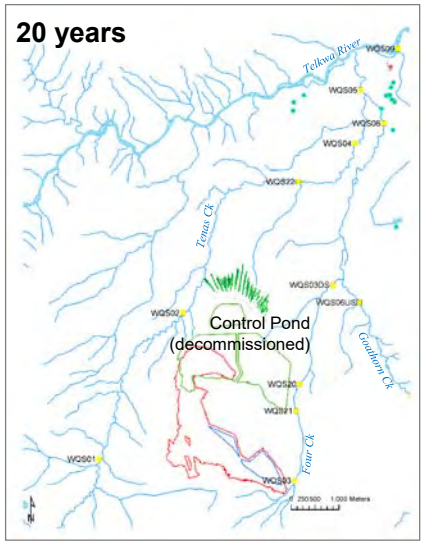
Job No: 1CT027.004

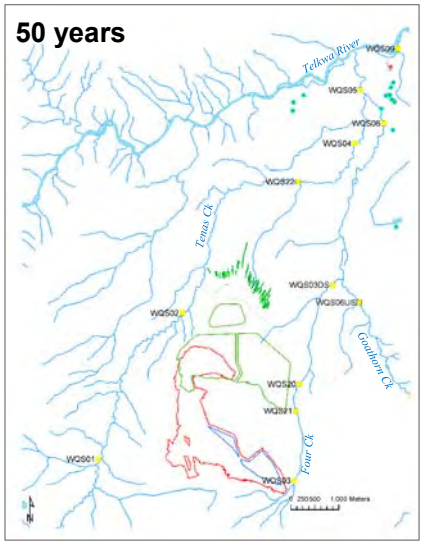
Filename: Fig65_BC_Particles_timesteps_PL_SWr.pptx

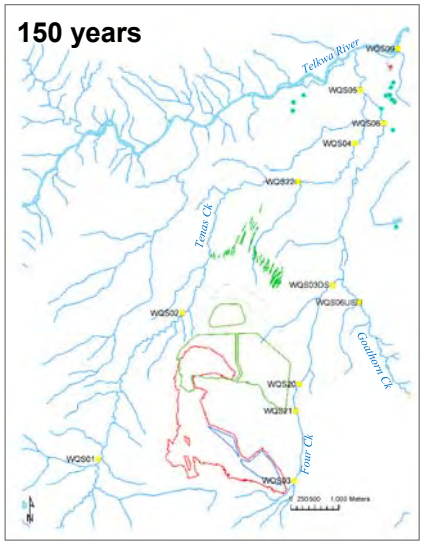
Groundwater Technical Report

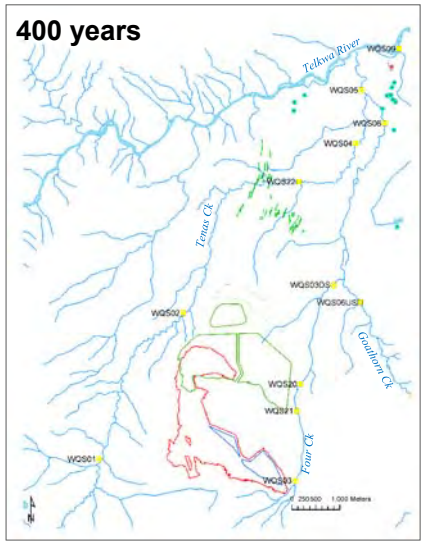
**Modelled forward particle paths from the pit lake / saturated waste rock**

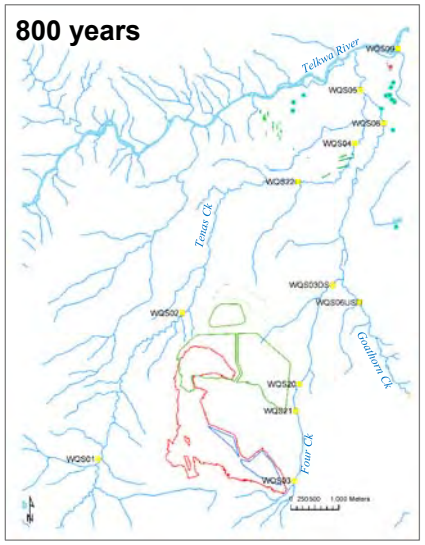
| Date: | Approved: | Figure: |
|---|---|---|
| Dec 2020 | GF | 65 |

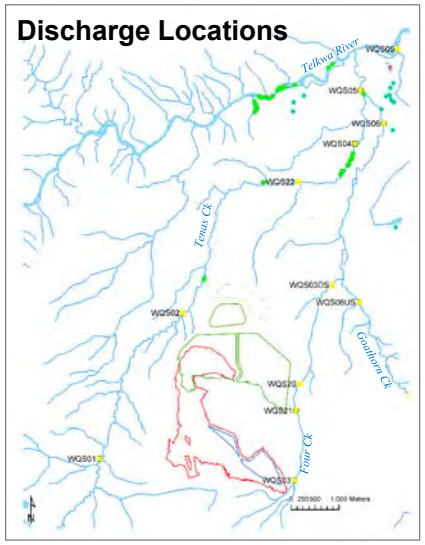



## Legend

- Forward particles from control pond (25 year pulse)
- Commercial / industrial well
- Private domestic well
- Private well (unknown use)
- Water quality stations
- Proposed management / control ponds
- Proposed pit

srk consulting

TELKWA COAL LIMITED

Groundwater Technical Report

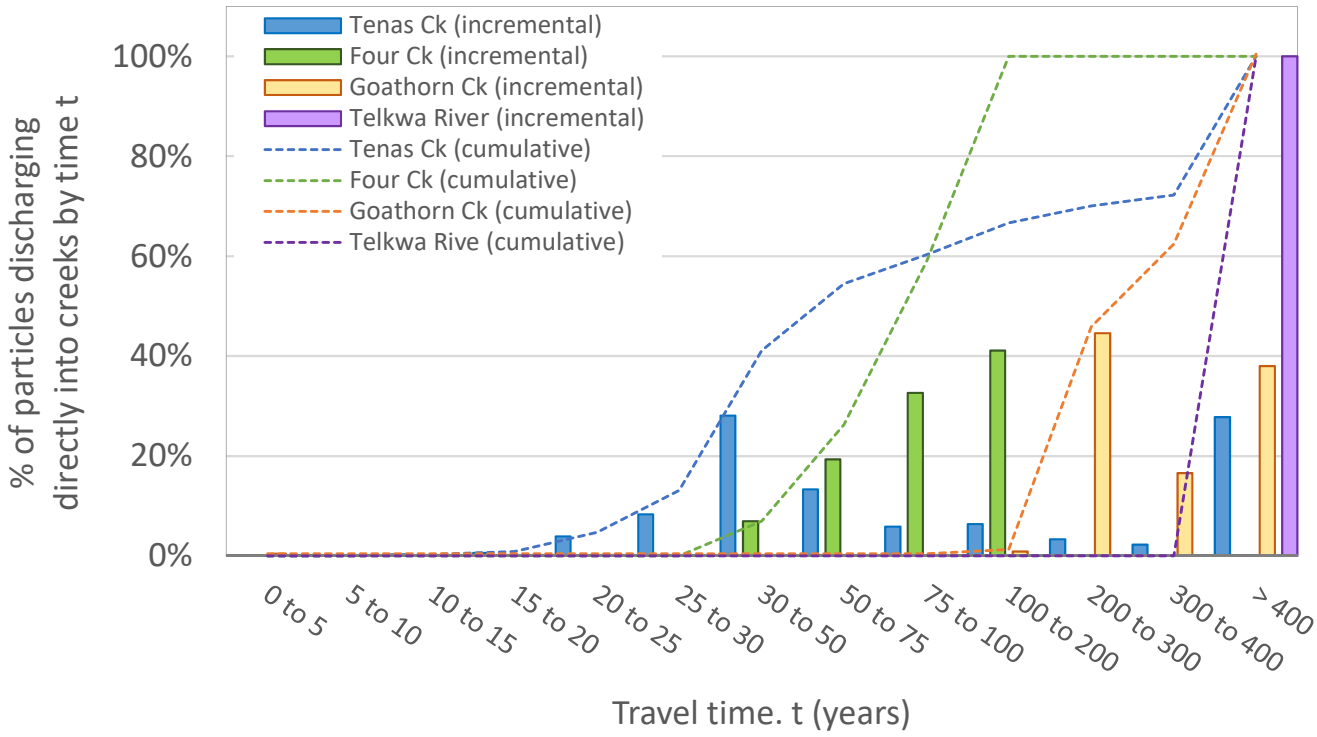
**Modelled forward particle paths from the control pond**

Job No: 1CT027.004

Filename: Fig66_BC_Particles_timesteps_CP.pptx

Tenas Project

| Date: | Approved: | Figure: |
|---|---|---|
| Dec 2020 | GF | 66 |




| | | | |
|---|---|---|---|
| srk consulting | TELKWA COAL LIMITED | Groundwater Technical Report | |
| | | **Plots of predicted particle travel times to creeks** | |
| Job No: 1CT027.004<br>Filename: Fig67_plots_travel_times.pptx | Tenas Project | Date: Dec.2020 | Approved: GF | Figure: **67** |

# Appendix A – Monitoring Well Installation and Monitoring Details

| ID | Area | Installation type | Geol. along Screen | Data availability and usage in EA baseline study | | | Damaged | Dry | Easting | Northing | Collar Elev. | Stick-up | Total depth | Diam. | Screen Top | Screen Bottom | Source | Inspected | Last date of inspection | Comment Last Inspection |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | | - | - | *Hydraulic test* | *Level* | *Sampling* | (yes/no) | (yes/no) | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *mags* | *mbgs* | *inch* | *mgbs* | *mbgs* | - | | **dd/mm/yy** | |
| T18-01D (ARD02) | Tenas | Single well | BDR | yes | yes | No | No | No | 6050689 | 617841 | 956.50 | 0.99 | 78.6 | 3.0 | 69.8 | 72.9 | SRK 2018 | Yes | 6-Sep-18 | - |
| T18-02S (GEO11) | Tenas | Single well | OVB | No | dry | No | No | No | 6051995 | 618921 | 835.22 | 0.50 | 19.5 | 2.0 | 11.0 | 14.0 | SRK 2018 | Yes | 8-Sep-18 | - |
| T18-03D (ARD01) | Tenas | None | OVB+BDR | yes | No | No | n/a | n/a | 6051772 | 617080 | 904.32 | n/a | 102.6 | n/a | n/a | n/a | SRK 2018 | Yes | Feb 18 | - |
| T18-04D (W1D) | Tenas | Nested well | BDR | yes | yes | yes | No | No | 6051115 | 615955 | 938.09 | 1.00 | 70.0 | 2.0 | 56.4 | 59.5 | SRK 2018 | Yes | 13-Sep-18 | - |
| T18-04S (W1S) | Tenas | Nested well | OVB | yes | yes | yes | No | No | 6051115 | 615955 | 938.18 | 0.80 | 70.0 | 2.0 | 10.1 | 13.1 | SRK 2018 | Yes | 6-Sep-18 | - |
| T18-06D (W2) | Tenas | Single well | OVB | yes | yes | Yes | No | No | 6052647 | 616245 | 851.60 | 0.80 | 131.3 | 2.0 | 114.8 | 117.8 | SRK 2018 | Yes | 10-Sep-18 | - |
| T18-07D (ARD06) | Tenas | None | OVB+BDR | yes | No | No | n/a | n/a | 6052051 | 617318 | 864.16 | n/a | 213.7 | n/a | n/a | n/a | SRK 2018 | Yes | Feb 18 | - |
| T18-08D (W3D) | Tenas | Nested well | BDR | yes | yes | Yes | No | No | 6053379 | 618515 | 803.52 | 1.00 | 53.2 | 2.0 | 44.7 | 47.8 | SRK 2018 | Yes | 8-Sep-18 | - |
| T18-08S (W3S) | Tenas | Nested well | OVB | yes | yes | yes | No | No | 6053379 | 618515 | 803.52 | 1.00 | 53.2 | 1.5 | 40.0 | 43.1 | SRK 2018 | Yes | 8-Sep-18 | - |
| T18-09S | Tenas | Single well | OVB | No | No | No | No | No | 6051117 | 615957 | 938.26 | | 13.5 | 2.0 | 10.1 | 13.1 | SRK 2018 | Yes | 10-Feb-18 | |
| T18-11S (GEO22) | Tenas | Single well | OVB | No | dry | No | No | Yes | 6054253 | 617697 | 790.23 | 0.75 | 19.5 | 2.0 | 7.5 | 10.5 | SRK 2018 | Yes | 8-Sep-18 | - |
| T18-13S (GEO13) | Tenas | Single well | OVB | No | dry | No | No | Yes | 6053408 | 617809 | 814.36 | 0.87 | 18.4 | 2.0 | 14.9 | 17.9 | SRK 2018 | Yes | 8-Sep-18 | - |
| T19-18S | Tenas | Single well | OVB | yes | yes | Yes*** | No | No | 6052454 | 619237 | 822.00 | 1.00 | 47.2 | 2.0 | 34.1 | 35.6 | SRK 2019 | Yes | 16-Jan-19 | Bedrock intercepted at 43.4 m. Hole Terminated at 47.2 m |
| T19-19S | Tenas | Single well | OVB+BDR | No | dry | No | No | Yes | 6052171 | 618775 | 839.97 | 2.20 | 47.2 | 2.0 | 43.5 | 45.0 | SRK 2019 | Yes | 19-Jan-19 | Bedrock intercepted at 44.9 m. Hole Terminated at 47.2 m |
| T19-20S | Tenas | Single well | OVB | No | dry | No | No | Yes | 6052440 | 616824 | 858.78 | 1.70 | 44.2 | 2.0 | 28.7 | 30.2 | SRK 2019 | Yes | 21-Jan-19 | Bedrock intercepted at 43.0 m. Hole Terminated at 44.2 m |
| T19-21S | Tenas | Single well | BDR | yes | yes | Yes*** | No | No | 6052746 | 616976 | 833.45 | 1.80 | 59.4 | 2.0 | 56.7 | 58.2 | SRK 2019 | Yes | 27-Jan-19 | Bedrock intercepted at 56.1 m. Hole Terminated at 59.4 m |
| T19-22S | Tenas | Single well | BDR | yes | yes | Yes*** | No | No | 6052847 | 617705 | 825.81 | 2.80 | 29.7 | 2.0 | 27.8 | 29.3 | SRK 2019 | Yes | 29-Jan-19 | Bedrock intercepted at 28.0 m. Hole Terminated at 29.7 m |
| T19-26S | Tenas | Single well | OVB | yes | yes | Yes*** | No | No | 6053665 | 617469 | 814.00 | 1.90 | 67.1 | 2.0 | 50.8 | 52.3 | SRK 2019 | Yes | 6-Feb-19 | No bedrock intercepted. Hole terminated at 67.1 m |
| T19-27S | Tenas | Single well | OVB | yes | yes | Yes*** | No | No | 6053726 | 617883 | 815.07 | 1.90 | 67.1 | 2.0 | 43.0 | 44.5 | SRK 2019 | Yes | 15-Feb-19 | No bedrock intercepted. Hole terminated at 67.1 m |
| T19-34S | Tenas | Single well | BDR | yes | yes | Yes*** | No | No | 6052399 | 618256 | 836.51 | 1.50 | 38.1 | 2.0 | 35.1 | 36.6 | SRK 2019 | Yes | 26-Feb-19 | Bedrock intercepted at 33.5 m. Hole Terminated at 38.1 m |
| T19-35S | Tenas | Single well | BDR | yes | yes | Yes*** | No | No | 6052834 | 618228 | 827.98 | 2.20 | 30.5 | 2.0 | 28.3 | 29.8 | SRK 2019 | Yes | 27-Feb-19 | |
| T95R-15C | Tenas | Single well | BDR | yes | yes | yes | No | No | 6051998 | 617062 | 888.36 | 1.66 | 66.0 | 2.0 | 48.0 | 63.0 | Piteau 98, Stantec 2016 | Yes | 9-Nov-18 | There is a crack in the upper part of the well but it is functional. There is no cap and no protective steel lid. Water level is above the ground surface. |
| T95R-39C | Tenas | Single well | BDR | yes | No* | No* | Yes | n/a | 6050869 | 617336 | 981.03 | 0.80 | 80.0 | 2.0 | 51.2 | 58.4 | Piteau 98, Stantec 2016 | Yes | 25-Jul-18 | Upper part of the well and casing are destroyed. |
| T95R-40 | Tenas | Single well | BDR | yes | yes | yes | No | No | 6051461 | 618188 | 900.18 | 0.26 | n/a | 2.0 | 42.0 | 53.0 | Piteau 98 | Yes | 15-Sep-18 | The dedicated bailer fell down into the well. |
| T95R-64 | Tenas | Single well | BDR | yes | yes | yes | No | No | 6050597 | 618278 | 949.50 | 1.23 | 128.9 | 2.0 | 85.0 | 94.0 | Piteau 98, Stantec 2016 | Yes | 31-Mar-18 | - |
| T96R-16-19 | Tenas | Nested well | BDR | yes | yes | No | No | No | 6050613 | 616954 | 1012.90 | 0.75 | 78.8 | 2.0 | 13.1 | 19.1 | Piteau 98, Stantec 2016 | Yes | 6-Sep-18 | - |
| T96R-16-28 | Tenas | Nested well | BDR | yes | yes | No | No | No | 6050613 | 616954 | 1012.90 | 0.82 | n/a | 2.0 | 24.5 | 27.5 | Piteau 98 | Yes | 6-Sep-18 | - |
| T96R-34-67 | Tenas | Nested well | BDR | yes | No* | No* | Yes | No | 6051180 | 617691 | 934.02 | 0.94 | n/a | 2.0 | 66.2 | 67.5 | Piteau 98 | Yes | 25-Jul-18 | inside casing of T96R-34-67 was found to be damaged during the August 2017 sampling event |
| T96R-34-87 | Tenas | Nested well | BDR | yes | yes | yes | No | No | 6051180 | 617691 | 934.02 | 0.97 | 97.6 | 2.0 | 80.6 | 86.6 | Piteau 98, Stantec 2016 | Yes | 12-Sep-18 | - |
| T96R-56C-83 | Tenas | Single well | BDR | yes | No* | No | Yes | No | 6050370 | 618588 | 944.08 | 1.18 | 93.1 | 2.0 | 74.9 | 82.6 | Piteau 98, Stantec 2016 | Yes | 25-Jul-18 | Suspected damage. Depth to bottom is much shallower than the provided well details. The well casing looks disturbed and tilted. |
| T96TP-01-10 | Tenas | Single well | BDR | yes | No* | No | Yes | No | 6050718 | 617276 | 995.70 | 1.24 | n/a | 3.0 | 8.5 | 10.0 | Piteau 98 | Yes | 25-Jul-18 | The coordinates were off by about 26 meters. Could not find another well in the area. 3" well in some type of testing area. Well is surrounded by a fence. Depth to bottom off by 5 meters from the original depth (screened section is filled with fines?). |
| T96TP-02-07 | Tenas | Single well | BDR | yes | No* | No | No | No | 6050655 | 617201 | 1001.60 | 1.31 | n/a | 3.0 | 2.0 | 7.0 | Piteau 98 | Yes | 25-Jul-18 | 3" diameter well surrounded by a fence. Soft bottom and shallower than original depth. |
| T97R-108C-70 | Tenas | Single well | BDR | yes | No* | No | Yes | No | 6052532 | 617380 | 834.48 | 0.42 | 81.0 | 2.0 | 61.0 | 70.0 | Piteau 98, Stantec 2016 | Yes | 26-Jul-18 | Well is damaged. Casing is bent and the ground around the well is depressed. Depth to bottom is very shallow. |
| TOB96-01-05 | Tenas | Single well | OVB | yes | yes | yes | No | No | 6050602 | 619014 | 922.87 | 0.75 | 10.5 | 2.0 | 1.6 | 4.6 | Piteau 98, Stantec 2016 | Yes | 13-Sep-18 | - |
| TOB96-02-06 | Tenas | Nested well | OVB | yes | yes | yes | No | No | 6051947 | 618466 | 853.41 | 0.38 | 33.5 | 2.0 | 3.0 | 6.0 | Piteau 98, Stantec 2016 | Yes | 10-Sep-18 | - |
| TOB96-02-20 | Tenas | Nested well | OVB | yes | dry | yes | No | n/a | 6051947 | 618466 | 853.41 | 0.34 | n/a | 2.0 | 17.0 | 20.0 | Piteau 98 | Yes | 26-Jul-18 | Observed dry 8 times out 11 sampling events. |
| TOB96-11-04 | Tenas | Nested well | OVB | yes | yes | yes | No | No | 6052818 | 617724 | 827.36 | 0.87 | 20.2 | 2.0 | 1.5 | 4.5 | Piteau 98, Stantec 2016 | Yes | 6-Sep-18 | - |
| TOB96-11-19 | Tenas | Nested well | OVB | No | dry | No | No | Yes | 6052818 | 617724 | 827.36 | 0.31 | 20.2 | 2.0 | 18.7 | 20.2 | Piteau 98, Stantec 2016 | Yes | 6-Sep-18 | Upper part of the PVC casing is cracked and broken (cap on the ground). Well is still useable. Steel protective casing looks good. Water level tape easily can get down the well. |
| TOB96-12-04 | Tenas | Single well | OVB | yes | No* | No* | Yes | n/a | 6051377 | 616082 | 926.02 | 0.42 | 37.0 | 2.0 | 1.0 | 4.0 | Piteau 98, Stantec 2016 | Yes | 26-Jul-18 | Well is damaged. Casing is bent over and the depth to bottom is shallower than the original depth. |
| TOB97-06-21 | Tenas | Single well | OVB | No | dry | No | No | Yes | 6052496 | 616652 | 854.58 | 0.74 | 21.0 | 2.0 | 18.0 | 21.0 | Piteau 98, Stantec 2016 | Yes | 10-Sep-18 | - |
| TOB97-07-24 | Tenas | Single well | OVB | No | dry | No | No | Yes | 6053579 | 617887 | 811.05 | 0.90 | 24.0 | 2.0 | 21.0 | 24.0 | Piteau 98, Stantec 2016 | Yes | 8-Sep-18 | - |
| T18-14S | Access Road | Single well | OVB | No | yes | No | No | No | 6055570 | 620514 | 683.00 | n/a | | 2.0 | 6.7 | 8.2 | Westrek, 2020 | Yes | date install. | Road Geotech |
| T18-15S | Access Road | Single well | OVB | No | yes | No | No | No | 6054948 | 620563 | 716.70 | n/a | | 2.0 | 11.3 | 14.3 | Westrek, 2020 | Yes | date install. | Road Geotech |
| T19-36S | Rail Loadout | Single well | OVB | yes | yes | yes | No | No | 6058365 | 629737 | 515.35 | 0.88 | 5.2 | 2.0 | 3.7 | 5.2 | Cassiar 2020 | Yes | 12-Mar-19 | Rail loadout well |
| T19-37S | Rail Loadout | Single well | OVB | yes | yes | yes | No | No | 6058215 | 629955 | 516.39 | 0.87 | 5.0 | 2.0 | 3.4 | 5.0 | Cassiar 2020 | Yes | 12-Mar-19 | Rail loadout well |
| T19-28S | Access Road | VWP | OVB | No | yes | No | No | No | 6054651 | 620005 | 710.20 | | | n/a | 9.1 | - | Westrek, 2020 | Yes | date install. | Road Geotech |
| T19-30S | Access Road | VWP | OVB | No | yes | No | No | No | 6054456 | 620050 | 706.70 | | | n/a | 14.9 | - | Westrek, 2020 | Yes | date install. | Road Geotech |
| T19-31S | Access Road | VWP | OVB | No | dry | No | No | Yes | 6054334 | 620048 | 704.90 | | | n/a | 7.6 | - | Westrek, 2020 | Yes | date install. | Road Geotech |
| T96R-113-43 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6054134 | 621254 | 771.74 | 0.35** | n/a | 2.0 | 36.5 | 42.5 | Piteau 98 | No | n/a | - |
| T96R-113-79 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6054134 | 621254 | 771.74 | 0.35** | 94.0 | 2.0 | 75.5 | 78.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T96R-40-117 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6053367 | 621431 | 833.50 | 0.78** | n/a | 2.0 | 108.4 | 117.4 | Piteau 98, Stantec 2016 | No | n/a | - |
| T96R-40-87 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6053367 | 621431 | 833.55 | 0.8** | 156.2 | 2.0 | 81.0 | 87.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T96R-44-54 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6054247 | 620908 | 764.94 | 0.62** | 86.0 | 2.0 | 50.5 | 53.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T974-21-87 | Goathorn | Single well | BDR | yes | No* | No | - | - | 6055301 | 620886 | 690.64 | n/a | n/a | 2.0 | 81.7 | 87.7 | Piteau 98 | No | - | - |
| T97R-12-75 | Goathorn | Single well | BDR | No | No* | No* | n/a | n/a | 6053804 | 621297 | 792.54 | 0.65** | 97.0 | 2.0 | 68.0 | 74.8 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-15-29 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6054655 | 621062 | 739.81 | 2.15** | 79.3 | 2.0 | 26.0 | 29.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-15-52 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6054655 | 621062 | 739.81 | 0.60** | n/a | 2.0 | 47.0 | 51.6 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-17-104 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6052878 | 621462 | 846.30 | 0.55** | 116.0 | 2.0 | 98.5 | 104.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-17-79 | Goathorn | Nested well | BDR | No | No* | No* | n/a | n/a | 6052878 | 621462 | 846.30 | 0.52** | n/a | 2.0 | 69.7 | 78.7 | Piteau 98, Stantec 2016 | No | n/a | - |

| ID | Area | Installation type | Geol. along Screen | Data availability and usage in EA baseline study | | | Damaged | Dry | Easting | Northing | Collar Elev. | Stick-up | Total depth | Diam. | Screen Top | Screen Bottom | Source | Inspected | Last date of inspection | Comment Last Inspection |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | | - | - | *Hydraulic test* | *Level* | *Sampling* | (yes/no) | (yes/no) | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *mags* | *mbgs* | *inch* | *mgbs* | *mbgs* | - | | **dd/mm/yy** | |
| T97R-20-131 | Goathorn | Single well | BDR | yes | No* | No | n/a | n/a | 6055114 | 621360 | 713.61 | 0.89** | n/a | 2.0 | 127.0 | 131.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-20-40 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6055114 | 621360 | 713.61 | 0.82** | 163.8 | 2.0 | 35.2 | 39.7 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-20-83 | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6055114 | 621360 | 713.46 | 0.97** | n/a | 2.0 | 77.2 | 83.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-21-41 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6055301 | 620886 | 690.64 | 0.87** | 140.0 | 2.0 | 37.7 | 49.7 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-23-69 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6055588 | 620717 | 679.72 | 0.60** | 104.8 | 2.0 | 61.5 | 68.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-33-20 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6054236 | 621053 | 767.66 | 0.60** | 125.4 | 2.0 | 12.5 | 15.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-33-55 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6054236 | 621053 | 767.66 | 0.80** | 125.4 | 2.0 | 50.7 | 53.7 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-33-78 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6054236 | 621053 | 767.66 | 0.92** | 125.4 | 2.0 | 75.1 | 78.1 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97R-36-140 | Goathorn | Nested well | BDR | yes | No* | No | n/a | n/a | 6055272 | 621430 | 710.28 | 0.86** | n/a | 2.0 | 137.0 | 140.0 | Piteau 98 | No | n/a | - |
| T97R-36W | Goathorn | Nested well | BDR | yes | No* | No* | n/a | n/a | 6055272 | 621430 | 710.71 | 0.45** | n/a | n/a | 11.5 | 132.5 | Piteau 98 | No | n/a | - |
| T97R-49-63 | Goathorn | Single well | BDR | yes | No* | No* | n/a | n/a | 6055515 | 621377 | 701.94 | 0.60** | 116.4 | 2.0 | 60.0 | 63.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97RP-01-04 | Goathorn | Nested well | OVB | yes | No* | No | n/a | n/a | 6054364 | 620705 | 744.49 | 0.66** | 16.0 | n/a | 1.3 | 4.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97RP-01-13 | Goathorn | Nested well | OVB | yes | No* | No | n/a | n/a | 6054364 | 620705 | 744.49 | 0.66** | 16.0 | n/a | 11.5 | 13.0 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97RP-02-12 | Goathorn | Single well | OVB | yes | No* | No | n/a | n/a | 6054362 | 620887 | 758.56 | 0.60** | 21.0 | n/a | 10.8 | 12.3 | Piteau 98, Stantec 2016 | No | n/a | - |
| T97RP-03-08 | Goathorn | Single well | OVB | yes | No* | No | n/a | n/a | 6054325 | 621236 | 764.04 | 0.70** | 12.0 | n/a | 5.5 | 8.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| TOB97-04-07 | Goathorn | Single well | OVB | yes | No* | No | n/a | n/a | 6055616 | 622328 | 684.25 | 0.54** | 9.0 | n/a | 4.5 | 7.5 | Piteau 98, Stantec 2016 | No | n/a | - |
| TOB97-05-06 | Goathorn | Single well | OVB | yes | No* | No | n/a | n/a | 6054474 | 621931 | 759.37 | 0.83** | 8.0 | n/a | 2.8 | 5.9 | Piteau 98, Stantec 2016 | No | n/a | - |
| T93R-28A | North | Nested well | BDR | yes | No* | No* | n/a | n/a | 6059121 | 617859 | 789.74 | 0.95** | n/a | 2.0 | 51.0 | 55.3 | Piteau 98 | No | n/a | - |
| T93R-28B | North | Nested well | BDR | yes | No* | No* | n/a | n/a | 6059121 | 617859 | 790.32 | 0.52** | n/a | 2.0 | 72.5 | 78.1 | Piteau 98 | No | n/a | - |
| T93R-29B | North | Nested well | BDR | No | No* | No* | n/a | n/a | 6059169 | 617057 | 849.69 | 0.7** | n/a | 2.0 | 109.1 | 114.3 | Piteau 98 | No | n/a | - |
| T93R-30 | North | Single well | BDR | yes | No* | No* | n/a | n/a | 6059771 | 616666 | 902.16 | 0.48** | 134.1 | 2.0 | 100.6 | 106.7 | Piteau 98, Stantec 2016 | No | n/a | - |
| T93R-32 | North | Single well | BDR | yes | No | No | n/a | n/a | 6060062 | 617474 | 925.66 | 0.79** | 110.6 | 2.0 | 98.7 | 104.8 | Piteau, 98; Stantec 2016 | No | n/a | - |
| TW604A | North | Single well | BDR | yes | No* | No* | n/a | n/a | 6060143 | 618631 | 812.64 | 0.68** | n/a | n/a | 24.8 | 32.6 | Piteau 98 | No | n/a | - |
| TW905A | North | Single well | BDR | No | No* | No | n/a | n/a | 6059908 | 618552 | 803.15 | 0.225** | n/a | n/a | 17.8 | 26.0 | Piteau 98 | No | n/a | - |
| TW905B | North | Single well | BDR | yes | No | No | n/a | n/a | 6059908 | 618552 | 803.15 | 0.28** | n/a | *n/a* | 48.9 | 58.3 | Piteau 98 | No | n/a | - |
| TW906A | North | Single well | BDR | yes | No | No | n/a | n/a | 6060028 | 618624 | 805.85 | 0.65** | n/a | *n/a* | 55.2 | 67.6 | Piteau 98 | No | n/a | - |
| TW913 | North | Single well | BDR | yes | No | No | n/a | n/a | 6059992 | 617070 | 922.86 | 0.77** | n/a | *n/a* | 24.9 | 32.5 | Piteau 98 | No | n/a | - |
| T93R-29A | North | Nested well | OVB | No | No* | No | n/a | n/a | 6059169 | 617057 | 849.69 | 0.76** | n/a | 2.0 | 26.5 | 33.5 | Piteau 98 | No | n/a | - |

*n/a, not applicable or not available*
*OVB, Overburden*
*BDR, Bedrock*

[1] *Stickup value measurements from the latest inspection unless indicated. Note stickups were raised that a couple of wells after the initial installation. These details are reported with the groundwater level data.*

*, there is no recent (>2017) level data or groundwater samples, but there are level data from between 1989 and 1993, and groundwater sample from between 1993 and 1997.

**, information collected from reports and not verified in the field.

***, well sampled duing one event only, following installation. Groundwater quality not included in the baseline dataset

# Appendix B – Hydraulic Conductivity Measurements

| TEST ID | Hole ID | Area | Test Type | K | Log_K | Ground surf. elev. | Screen/packer/PSD Sample | | Main geological type | Geological Unit | Geology Details | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Top | Bottom | | | | |
| - | - | - | - | *m/s* | *m/s* | *masl* | *mgbs* | *mbgs* | - | - | - | |
| T95R-15C | T95R-15C | Tenas | Slug test | 6.0E-06 | -5.2 | 889.4 | 48.0 | 63.0 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T95R-39C | T95R-39C | Tenas | Slug test | 9.6E-07 | -6.0 | 981.0 | 51.2 | 58.4 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T95R-40 | T95R-40 | Tenas | Slug test | 1.4E-06 | -5.9 | 900.2 | 42.0 | 53.0 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T95R-64 | T95R-64 | Tenas | Slug test | 5.5E-07 | -6.3 | 949.5 | 85.0 | 94.0 | BDR | I | Coal seam #1 (1/1U?) | Piteau, 1988 |
| T96R-16-19 | T96R-16-19 | Tenas | Slug test | 1.6E-07 | -6.8 | 1012.9 | 13.1 | 19.1 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T96R-16-28 | T96R-16-28 | Tenas | Slug test | 3.2E-08 | -7.5 | 1012.9 | 24.5 | 27.5 | BDR | *n/a* | Un-named lower coal | Piteau, 1988 |
| T96R-34-67 | T96R-34-67 | Tenas | Slug test | 2.1E-08 | -7.7 | 934.0 | 66.2 | 67.5 | BDR | *n/a* | Coal (upper ) | Piteau, 1988 |
| T96R-34-87 | T96R-34-87 | Tenas | Slug test | 1.2E-07 | -6.9 | 934.0 | 80.6 | 86.6 | BDR | I | Coal seam #1 (1/1U?) | Piteau, 1988 |
| T96R-56C-83 | T96R-56C-83 | Tenas | Slug test | 2.2E-06 | -5.7 | 944.1 | 74.9 | 82.6 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T97R-108C-70 | T97R-108C-70 | Tenas | Slug test | >1E-6 | -6.0 | 834.5 | 61.0 | 70.0 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T96TP-01-10 | T96TP-01-10 | Tenas | Slug test | >1E-6 | -6.0 | 995.7 | 8.5 | 10.0 | BDR | *n/a* | Coal seam C | Piteau, 1988 |
| T96TP-02-07 | T96TP-02-07 | Tenas | Slug test | >1E-6 | -6.0 | 1001.6 | 2.0 | 7.0 | BDR | I | Coal seam #1 | Piteau, 1988 |
| TOB96-01-05 | TOB96-01-05 | Tenas | Slug test | 7.2E-07 | -6.1 | 922.9 | 1.6 | 4.6 | OVB | *n/a* | Till | Piteau, 1988 |
| TOB96-02-06 | TOB96-02-06 | Tenas | Slug test | 1.4E-07 | -6.9 | 853.4 | 3.0 | 6.0 | OVB | *n/a* | Till | Piteau, 1988 |
| TOB96-02-20 | TOB96-02-20 | Tenas | Slug test | 1.3E-06 | -5.9 | 853.4 | 17.0 | 20.0 | OVB | *n/a* | SAND and GRAVEL | Piteau, 1988 |
| TOB96-11-04 | TOB96-11-04 | Tenas | Slug test | 1.4E-10 | -9.9 | 827.4 | 1.5 | 4.5 | OVB | *n/a* | CLAY | Piteau, 1988 |
| TOB96-12-04 | TOB96-12-04 | Tenas | Slug test | 2.8E-09 | -8.6 | 926.0 | 1.0 | 4.0 | OVB | *n/a* | Till | Piteau, 1988 |
| T18-04D#1 (W1) | T18-04D | Tenas | Packer Injection Test | 4.6E-08 | -7.3 | 938.8 | 63.2 | 68.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-04D#2 (W1) | T18-04D | Tenas | Packer Injection Test | 7.6E-08 | -7.1 | 938.8 | 54.2 | 59.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-04D#3 (W1) | T18-04D | Tenas | Packer Injection Test | 1.0E-07 | -7.0 | 938.8 | 45.2 | 50.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-04D#4 (W1) | T18-04D | Tenas | Packer Injection Test | 8.9E-07 | -6.1 | 938.8 | 33.2 | 38.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-04D#5 (W1) | T18-04D | Tenas | Packer Injection Test | 5.4E-07 | -6.3 | 938.8 | 21.2 | 26.0 | BDR | *n/a* | Volcanics | SRK, 2018 |
| T18-03D#1 (ARD01) | T18-03D | Tenas | Packer Injection Test | 8.0E-09 | -8.1 | 904.3 | 90.2 | 97.0 | BDR | *n/a* | Mudstone/Siltstone | SRK, 2018 |
| T18-03D#2 (ARD01) | T18-03D | Tenas | Packer Injection Test | 6.5E-09 | -8.2 | 904.3 | 81.2 | 88.0 | BDR | *n/a* | Conglomerate | SRK, 2018 |
| T18-03D#3 (ARD01) | T18-03D | Tenas | Packer Injection Test | 1.2E-08 | -7.9 | 904.3 | 63.2 | 71.5 | BDR | *n/a* | Siltstone | SRK, 2018 |
| T18-03D#4 (ARD01) | T18-03D | Tenas | Packer Injection Test | 1.7E-08 | -7.8 | 904.3 | 42.2 | 48.5 | BDR | *n/a* | Mudstone | SRK, 2018 |
| T18-07D#1 (ARD06) | T18-07D | Tenas | Packer Injection Test | 6.4E-08 | -7.2 | 864.2 | 200.2 | 207.0 | BDR | *n/a* | Conglomerate | SRK, 2018 |
| T18-07D#2 (ARD06) | T18-07D | Tenas | Packer Injection Test | 9.7E-08 | -7.0 | 864.2 | 176.2 | 183.0 | BDR | *n/a* | Siltstone | SRK, 2018 |
| T18-07D#3 (ARD06) | T18-07D | Tenas | Packer Injection Test | 3.7E-08 | -7.4 | 864.2 | 170.2 | 174.0 | BDR | *n/a* | Sandstone | SRK, 2018 |
| T18-07D#4 (ARD06) | T18-07D | Tenas | Packer Injection Test | 2.2E-07 | -6.7 | 864.2 | 149.2 | 156.0 | BDR | *n/a* | Siltstone | SRK, 2018 |
| T18-01S | T18-01S | Tenas | Grain Size | 8.9E-09 | -8.1 | 862.8 | 6.1 | 6.4 | OVB | *n/a* | Gravely CLAY with Trace Cobbles | SRK, 2018 |
| T18-02S | T18-02S | Tenas | Grain Size | 4.9E-08 | -7.3 | 835.7 | 11.8 | 12.1 | OVB | *n/a* | Clayey SILT with some Sand | SRK, 2018 |
| T18-02S | T18-02S | Tenas | Grain Size | 5.0E-08 | -7.3 | 835.7 | 12.6 | 12.9 | OVB | *n/a* | Silty SAND with trace clay and trace cobbles | SRK, 2018 |
| T18-02TP | T18-02TP | Tenas | Grain Size | 8.6E-09 | -8.1 | 1050.0 | 0.9 | 1.2 | OVB | *n/a* | Gravely CLAY with Trace Sand | SRK, 2018 |
| T18-03S | T18-03S | Tenas | Grain Size | 1.1E-05 | -4.9 | 851.9 | 9.0 | 9.3 | OVB | *n/a* | Gravely SAND with trace Silt | SRK, 2018 |
| T18-03TP | T18-03TP | Tenas | Grain Size | 7.3E-09 | -8.1 | 1050.0 | 2.7 | 3.0 | OVB | *n/a* | Clayey GRAVEL with Some Cobbles | SRK, 2018 |
| T18-04S | T18-04S | Tenas | Grain Size | 4.5E-08 | -7.3 | 834.3 | 8.6 | 8.9 | OVB | *n/a* | Sandy SILT with Some Clay | SRK, 2018 |
| T18-05S | T18-05S | Tenas | Grain Size | 1.0E-09 | -9.0 | 852.4 | 10.2 | 10.5 | OVB | *n/a* | Gravely CLAY with Trace Cobbles | SRK, 2018 |
| T18-07S | T18-07S | Tenas | Grain Size | 5.6E-08 | -7.3 | 908.4 | 18.1 | 18.4 | OVB | *n/a* | Gravely SAND with some Cobbles | SRK, 2018 |
| T18-07TP | T18-07TP | Tenas | Grain Size | 1.0E-07 | -7.0 | 1050.0 | 1.9 | 2.2 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-08S | T18-08S | Tenas | Grain Size | 6.3E-09 | -8.2 | 885.4 | 9.1 | 9.4 | OVB | *n/a* | Gravely CLAY with Trace Cobbles | SRK, 2018 |
| T18-08TP | T18-08TP | Tenas | Grain Size | 1.0E-08 | -8.0 | 1050.0 | 1.9 | 2.2 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-09TP | T18-09TP | Tenas | Grain Size | 2.0E-09 | -8.7 | 1050.0 | 2.9 | 3.2 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-10S | T18-10S | Tenas | Grain Size | 3.8E-09 | -8.4 | 837.8 | 3.7 | 4.0 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-11S | T18-11S | Tenas | Grain Size | 6.7E-07 | -6.2 | 791.0 | 0.1 | 0.4 | OVB | *n/a* | Sandy CLAY with Trace Cobbles | SRK, 2018 |
| T18-12S | T18-12S | Tenas | Grain Size | 1.2E-06 | -5.9 | 800.8 | 24.1 | 24.4 | OVB | *n/a* | Clayey SAND with Some Gravel | SRK, 2018 |
| T18-13S | T18-13S | Tenas | Grain Size | 2.7E-09 | -8.6 | 815.2 | 1.6 | 1.9 | OVB | *n/a* | Gravely CLAY with Some Cobbles | SRK, 2018 |
| T18-13S | T18-13S | Tenas | Grain Size | 6.8E-11 | -10.2 | 815.2 | 12.6 | 12.9 | OVB | *n/a* | Gravely CLAY with Trace Cobbles | SRK, 2018 |
| T18-08S | T18-08S | Tenas | Grain Size | 1.2E-06 | -5.9 | 885.4 | 24.4 | 24.7 | OVB | *n/a* | silty SAND | SRK, 2018 |
| T18-06D (W2) | T18-06D | Tenas | Slug test | 3.0E-06 | -5.5 | 852.5 | 113.3 | 117.8 | OVB | *n/a* | COBBLES | Cassiar, 2018 |
| T18-01D (ARD02) | T18-01D | Tenas | Slug test | 5.2E-07 | -6.3 | 957.5 | 69.8 | 72.9 | BDR | *n/a* | Sandstone | Cassiar, 2020 |
| T18-04S (W1S) | T18-04D | Tenas | Slug test | 5.0E-07 | -6.3 | 938.8 | 10.1 | 13.1 | BDR | *n/a* | Gravelly Fat Clay (Till) and Volcanics | Cassiar, 2018 |
| T18-08S (W3S) | T18-08D | Tenas | Slug test | 5.0E-07 | -6.3 | 804.5 | 40.0 | 43.1 | OVB | *n/a* | SAND lense in Till | Cassiar, 2018 |
| T18-08D (W3D) | T18-08D | Tenas | Slug test | 3.0E-09 | -8.5 | 804.5 | 44.7 | 47.8 | BDR | *n/a* | Volcanics | Cassiar, 2018 |
| T18-01D (ARD02) | T18-08D | Tenas | Pump Test | 2.2E-07 | -6.7 | 957.5 | 69.8 | 72.9 | BDR | *n/a* | Sandstone | Cassiar, 2020 |
| T19-18S | T19-18S | Tenas | Slug Test | 5.9E-07 | -6.2 | 822.0 | 34.1 | 35.6 | OVB | *n/a* | Clayey Sand | Cassiar, 2020 |
| T19-21S | T19-21S | Tenas | Slug Test | 3.0E-08 | -7.5 | 833.5 | 56.7 | 58.2 | BDR | *n/a* | Weathered Siltstone | Cassiar, 2020 |
| T19-22S | T19-22S | Tenas | Slug Test | 6.6E-08 | -7.2 | 825.8 | 27.8 | 29.3 | BDR | *n/a* | Weathered Siltstone | Cassiar, 2020 |
| T19-26S | T19-26S | Tenas | Slug Test | 3.3E-06 | -5.5 | 814.0 | 50.8 | 52.3 | OVB | *n/a* | Clayey Sand | Cassiar, 2020 |
| T19-27S | T19-27S | Tenas | Slug Test | 5.1E-05 | -4.3 | 815.1 | 43.0 | 44.5 | OVB | *n/a* | Silty Sand with Gravel | Cassiar, 2020 |
| T19-34S | T19-34S | Tenas | Slug Test | 1.4E-07 | -6.9 | 836.5 | 35.1 | 36.6 | BDR | *n/a* | Weathered Siltstone | Cassiar, 2020 |
| T19-35S | T19-35S | Tenas | Slug Test | 5.3E-06 | -5.3 | 828.0 | 28.3 | 29.8 | BDR | *n/a* | Weathered Siltstone | Cassiar, 2020 |
| T19-36S | T19-36S | Rail loadout | Slug Test | 7.5E-04 | -3.1 | 515.4 | 3.3 | 5.3 | OVB | *n/a* | fluvial well-graded sand and gravel | Cassiar, 2020 |
| T19-37S | T19-37S | Rail loadout | Slug Test | 7.2E-06 | -5.1 | 516.4 | 3.0 | 5.0 | OVB | *n/a* | fluvial well-graded sand and gravel | Cassiar, 2020 |
| T96R-40-87 | T96R-40-87 | Goathorn | Slug Test | 3.7E-06 | -5.43 | 833.6 | 81.0 | 87.0 | BDR | III | Coal seam #4 (5?) | Piteau, 1988 |
| T96R-40-117 | T96R-40-117 | Goathorn | Slug Test | 4.3E-10 | -9.37 | 833.5 | 108.4 | 117.4 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T96R-44-54 | T96R-44-54 | Goathorn | Slug Test | 3.7E-08 | -7.43 | 764.9 | 50.5 | 53.5 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T96R-113-43 | T96R-113-43 | Goathorn | Slug Test | 8.5E-07 | -6.07 | 771.7 | 36.5 | 42.5 | BDR | III | Coal seam #4-5 | Piteau, 1988 |
| T96R-113-79 | T96R-113-79 | Goathorn | Slug Test | 9.2E-10 | -9.04 | 771.7 | 75.5 | 78.5 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T97R-15-29 | T97R-15-29 | Goathorn | Slug Test | 4.7E-08 | -7.33 | 739.8 | 26.0 | 29.0 | BDR | III | Coal seam #4-5 | Piteau, 1988 |
| T97R-15-52 | T97R-15-52 | Goathorn | Slug Test | 2.0E-07 | -6.70 | 739.8 | 47.0 | 51.6 | BDR | III | Coal seam #3 | Piteau, 1988 |
| T97R-17-104 | T97R-17-104 | Goathorn | Slug Test | 2.6E-07 | -6.59 | 846.3 | 98.5 | 104.0 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T97R-20-40 | T97R-20-40 | Goathorn | Slug Test | 1.6E-09 | -8.80 | 713.6 | 35.2 | 39.7 | BDR | III | Coal seam #8 | Piteau, 1988 |
| T97R-20-83 | T97R-20-83 | Goathorn | Slug Test | 1.0E-09 | -9.00 | 713.5 | 77.2 | 83.5 | BDR | III | Coal seam #4-5 | Piteau, 1988 |
| T97R-20-131 | T97R-20-131 | Goathorn | Slug Test | 3.2E-09 | -8.49 | 713.6 | 127.0 | 131.0 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T97R-21-41 | T97R-21-41 | Goathorn | Slug Test | 4.0E-07 | -6.40 | 690.6 | 37.7 | 49.7 | BDR | I | Coal seam (#?) | Piteau, 1988 |
| T974-21-87 | T974-21-87 | Goathorn | Slug Test | 1.4E-08 | -7.85 | 690.6 | 81.7 | 87.7 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T97R-23-69 | T97R-23-69 | Goathorn | Slug Test | 1.3E-07 | -6.89 | 679.7 | 61.5 | 68.5 | BDR | I | Coal seam #1 | Piteau, 1988 |
| T97R-33-20 | T97R-33-20 | Goathorn | Slug Test | >1E-6 | -6.00 | 767.7 | 12.5 | 15.5 | BDR | III | Upper Sandstone | Piteau, 1988 |
| T97R-33-55 | T97R-33-55 | Goathorn | Slug Test | 1.5E-10 | -9.82 | 767.7 | 50.7 | 53.7 | BDR | III | Sandstone, Coal seam #3 | Piteau, 1988 |
| T97R-33-78 | T97R-33-78 | Goathorn | Slug Test | 2.9E-09 | -8.54 | 767.7 | 75.1 | 78.1 | BDR | III | Lower Mudstone | Piteau, 1988 |
| T97R-36W | T97R-36W | Goathorn | Pump Test | 2.1E-09 | -8.68 | 710.7 | 11.5 | 132.5 | BDR | *n/a* | Various | Piteau, 1988 |
| T97R-36-140 | T97R-36-140 | Goathorn | Slug Test | 7.7E-12 | -11.11 | 710.3 | 137.0 | 140.0 | BDR | *n/a* | Lower Mudstone | Piteau, 1988 |
| T97R-49-63 | T97R-49-63 | Goathorn | Slug Test | 1.1E-09 | -8.96 | 701.9 | 60.0 | 63.0 | BDR | III | Sandstone, Coal seam #3 | Piteau, 1988 |
| TOB97-04-07 | TOB97-04-07 | Goathorn | Slug Test | 8.1E-09 | -8.09 | 684.3 | 4.5 | 7.5 | OVB | *n/a* | SILT (Till) | Piteau, 1988 |
| TOB97-05-06 | TOB97-05-06 | Goathorn | Slug Test | 1.2E-08 | -7.92 | 759.4 | 2.8 | 5.9 | OVB | *n/a* | Till | Piteau, 1988 |
| T93R-28A | T93R-28A | North | Slug Test | 2.7E-09 | -8.57 | 789.7 | 51.0 | 55.3 | BDR | *n/a* | Coal seam #6 | Piteau, 1988 |
| T93R-28B | T93R-28B | North | Slug Test | 1.0E-08 | -8.00 | 790.3 | 72.5 | 78.1 | BDR | III | Coal seam #2 | Piteau, 1988 |
| T93R-30 | T93R-30 | North | Slug Test | 5.4E-09 | -8.27 | 902.2 | 100.6 | 106.7 | BDR | I | Coal seam #1 | Piteau, 1988 |
| TW604A | TW604A | North | Slug Test | 2.4E-07 | -6.62 | 812.6 | 24.8 | 32.6 | BDR | *n/a* | Coal seam #6, Mudstone | Piteau, 1988 |
| TW905B | TW905B | North | Slug Test | 3.5E-07 | -6.46 | 803.2 | 48.9 | 58.3 | BDR | III | Sandstone, Mudstone, Coal seam #2 | Piteau, 1988 |
| TW906A | TW906A | North | Slug Test | 2.2E-07 | -6.66 | 805.9 | 55.2 | 67.6 | BDR | III | Mudstone, Coal seam #2 | Piteau, 1988 |
| TW913 | TW913 | North | Slug Test | 1.3E-07 | -6.89 | 922.9 | 24.9 | 32.5 | BDR | III | Mudstone, Coal seam #2 | Piteau, 1988 |
| T93R-32 | T93R-32 | North | Slug Test | 7.3E-09 | -8.14 | 925.7 | 98.7 | 104.8 | BDR | III | Coal seam #2 | Piteau, 1988 |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T18-01D | 0 | 12.7 | 12.7 | Overburden | Telkwa_Geotech.csv |
| T18-01D | 12.7 | 14.5 | 1.8 | MDST | Telkwa_Geotech.csv |
| T18-01D | 14.5 | 15.7 | 1.2 | COAL | Telkwa_Geotech.csv |
| T18-01D | 15.7 | 21.7 | 6 | MDST | Telkwa_Geotech.csv |
| T18-01D | 21.7 | 23.2 | 1.5 | COAL | Telkwa_Geotech.csv |
| T18-01D | 23.2 | 30 | 6.8 | MDST | Telkwa_Geotech.csv |
| T18-01D | 30 | 36.42 | 6.42 | SLTS | Telkwa_Geotech.csv |
| T18-01D | 36.42 | 38.5 | 2.08 | COAL | Telkwa_Geotech.csv |
| T18-01D | 38.5 | 39.1 | 0.6 | MDST | Telkwa_Geotech.csv |
| T18-01D | 39.1 | 40.7 | 1.6 | COAL | Telkwa_Geotech.csv |
| T18-01D | 40.7 | 44.5 | 3.8 | MDST | Telkwa_Geotech.csv |
| T18-01D | 44.5 | 44.9 | 0.4 | COAL | Telkwa_Geotech.csv |
| T18-01D | 44.9 | 45.7 | 0.8 | MDST | Telkwa_Geotech.csv |
| T18-01S | 0 | 0.4 | 0.4 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-01TP | 0 | 8 | 8 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-02D | 8 | 8.4 | 0.4 | Overburden | Telkwa_Geotech.csv |
| T18-02D | 8.4 | 36.66 | 28.26 | MDST | Telkwa_Geotech.csv |
| T18-02D | 36.66 | 36.9 | 0.24 | COAL | Telkwa_Geotech.csv |
| T18-02D | 36.9 | 40.8 | 3.9 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 40.8 | 41.45 | 0.65 | COAL | Telkwa_Geotech.csv |
| T18-02D | 41.45 | 48.6 | 7.15 | MDST | Telkwa_Geotech.csv |
| T18-02D | 48.6 | 50.3 | 1.7 | COAL | Telkwa_Geotech.csv |
| T18-02D | 50.3 | 58.1 | 7.8 | MDST | Telkwa_Geotech.csv |
| T18-02D | 58.1 | 58.58 | 0.48 | COAL | Telkwa_Geotech.csv |
| T18-02D | 58.58 | 68.36 | 9.78 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 68.36 | 75.54 | 7.18 | COAL | Telkwa_Geotech.csv |
| T18-02D | 75.54 | 78.63 | 3.09 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 78.63 | 79.8 | 1.17 | COAL | Telkwa_Geotech.csv |
| T18-02D | 79.8 | 80.38 | 0.58 | MDST | Telkwa_Geotech.csv |
| T18-02D | 80.38 | 81.3 | 0.92 | COAL | Telkwa_Geotech.csv |
| T18-02D | 81.3 | 91.8 | 10.5 | MDST | Telkwa_Geotech.csv |
| T18-02D | 91.8 | 92.6 | 0.8 | COAL | Telkwa_Geotech.csv |
| T18-02D | 92.6 | 105.3 | 12.7 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 105.3 | 106.8 | 1.5 | SST | Telkwa_Geotech.csv |
| T18-02D | 106.8 | 108.3 | 1.5 | n/a | Telkwa_Geotech.csv |
| T18-02D | 108.3 | 109.8 | 1.5 | SLTS | Telkwa_Geotech.csv |
| T18-02D | 109.8 | 120.3 | 10.5 | SST | Telkwa_Geotech.csv |
| T18-02D | 120.3 | 121.8 | 1.5 | SLTS | Telkwa_Geotech.csv |
| T18-02S | 0 | 0.7 | 0.7 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-02TP | 0 | 0.3 | 0.3 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-03S | 0 | 0.4 | 0.4 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-03TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-04S | 0 | 0.1 | 0.1 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-04TP | 0 | 0.3 | 0.3 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-05D | 0 | 13.5 | 13.5 | Overburden | Telkwa_Geotech.csv |
| T18-05D | 13.5 | 90 | 76.5 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 90 | 93.62 | 3.62 | MDST | Telkwa_Geotech.csv |
| T18-05D | 93.62 | 94.1 | 0.48 | COAL | Telkwa_Geotech.csv |
| T18-05D | 94.1 | 97.5 | 3.4 | MDST | Telkwa_Geotech.csv |
| T18-05D | 97.5 | 99.4 | 1.9 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 99.4 | 101.6 | 2.2 | COAL | Telkwa_Geotech.csv |
| T18-05D | 101.6 | 111 | 9.4 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 111 | 111.37 | 0.37 | MDST | Telkwa_Geotech.csv |
| T18-05D | 111.37 | 111.67 | 0.3 | COAL | Telkwa_Geotech.csv |
| T18-05D | 111.67 | 118.95 | 7.28 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 118.95 | 126.2 | 7.25 | COAL | Telkwa_Geotech.csv |
| T18-05D | 126.2 | 131.14 | 4.94 | MDST | Telkwa_Geotech.csv |
| T18-05D | 131.14 | 132.14 | 1 | COAL | Telkwa_Geotech.csv |
| T18-05D | 132.14 | 132.4 | 0.26 | MDST | Telkwa_Geotech.csv |
| T18-05D | 132.4 | 133.2 | 0.8 | COAL | Telkwa_Geotech.csv |
| T18-05D | 133.2 | 134.52 | 1.32 | MDST | Telkwa_Geotech.csv |
| T18-05D | 134.52 | 135.47 | 0.95 | COAL | Telkwa_Geotech.csv |
| T18-05D | 135.47 | 139.32 | 3.85 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 139.32 | 140.46 | 1.14 | COAL | Telkwa_Geotech.csv |
| T18-05D | 140.46 | 141 | 0.54 | MDST | Telkwa_Geotech.csv |
| T18-05D | 141 | 142.1 | 1.1 | COAL | Telkwa_Geotech.csv |
| T18-05D | 142.1 | 156 | 13.9 | MDST | Telkwa_Geotech.csv |
| T18-05D | 156 | 175.5 | 19.5 | SLTS | Telkwa_Geotech.csv |
| T18-05D | 175.5 | 177 | 1.5 | MDST | Telkwa_Geotech.csv |
| T18-05S | 0 | 0.4 | 0.4 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-05TP | 0 | 0.3 | 0.3 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-06TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-07S | 0 | 26.2 | 26.2 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-07S | 26.2 | 27.9 | 1.7 | ? | Sonic_Logs_Combined_20180511.csv |
| T18-07TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-08S | 0 | 0.3 | 0.3 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-08TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-09S | 0 | 12.9 | 12.9 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-09S | 12.9 | 13.5 | 0.6 | ? | Sonic_Logs_Combined_20180511.csv |
| T18-09TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-10S | 0 | 0.2 | 0.2 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-10TP | 0 | 0.3 | 0.3 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-11S | 0 | 0.5 | 0.5 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-11TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-12S | 0 | 0.4 | 0.4 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T18-12TP | 0 | 0.2 | 0.2 | Overburden | Test_Pit_Logs_Combined_20180511.csv |
| T18-13S | 0 | 11.7 | 11.7 | Overburden | Sonic_Logs_Combined_20180511.csv |
| T81R-108 | 0 | 25.7 | 25.7 | Overburden | Tenas_Lithology.csv |
| T81R-108 | 25.7 | 38.1 | 12.4 | MDST | Tenas_Lithology.csv |
| T81R-108 | 38.1 | 52.7 | 14.6 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 52.7 | 71.9 | 19.2 | VOLC | Tenas_Lithology.csv |
| T81R-108 | 71.9 | 73.8 | 1.9 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 73.8 | 76.2 | 2.4 | SST | Tenas_Lithology.csv |
| T81R-108 | 76.2 | 77.1 | 0.9 | MDST | Tenas_Lithology.csv |
| T81R-108 | 77.1 | 87.7 | 10.6 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 87.7 | 90.25 | 2.55 | SST | Tenas_Lithology.csv |
| T81R-108 | 90.25 | 95.6 | 5.35 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 95.6 | 100.8 | 5.2 | SST | Tenas_Lithology.csv |
| T81R-108 | 100.8 | 108.5 | 7.7 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 108.5 | 115.6 | 7.1 | MDST | Tenas_Lithology.csv |
| T81R-108 | 115.6 | 126.8 | 11.2 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 126.8 | 129 | 2.2 | CGL | Tenas_Lithology.csv |
| T81R-108 | 129 | 130 | 1 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T81R-108 | 130 | 156.8 | 26.8 | VOLC | Tenas_Lithology.csv |
| T81R-108 | 156.8 | 157.9 | 1.1 | SLTS | Tenas_Lithology.csv |
| T81R-108 | 157.9 | 160.2 | 2.3 | MDST | Tenas_Lithology.csv |
| T81R-108 | 160.2 | 169.8 | 9.6 | VOLC | Tenas_Lithology.csv |
| T92R-39C | 0 | 2.3 | 2.3 | Overburden | Tenas_Lithology.csv |
| T92R-39C | 2.3 | 2.47 | 0.17 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 2.47 | 4.21 | 1.74 | COAL | Tenas_Lithology.csv |
| T92R-39C | 4.21 | 6.68 | 2.47 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 6.68 | 11.03 | 4.35 | COAL | Tenas_Lithology.csv |
| T92R-39C | 11.03 | 11.48 | 0.45 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 11.48 | 11.76 | 0.28 | COAL | Tenas_Lithology.csv |
| T92R-39C | 11.76 | 15.9 | 4.14 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 15.9 | 19.03 | 3.13 | MDST | Tenas_Lithology.csv |
| T92R-39C | 19.03 | 19.1 | 0.07 | COAL | Tenas_Lithology.csv |
| T92R-39C | 19.1 | 19.63 | 0.53 | MDST | Tenas_Lithology.csv |
| T92R-39C | 19.63 | 19.75 | 0.12 | COAL | Tenas_Lithology.csv |
| T92R-39C | 19.75 | 21.2 | 1.45 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 21.2 | 21.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T92R-39C | 21.4 | 23.88 | 2.48 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 23.88 | 24.1 | 0.22 | COAL | Tenas_Lithology.csv |
| T92R-39C | 24.1 | 27.2 | 3.1 | SST | Tenas_Lithology.csv |
| T92R-39C | 27.2 | 27.46 | 0.26 | COAL | Tenas_Lithology.csv |
| T92R-39C | 27.46 | 29.42 | 1.96 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 29.42 | 29.62 | 0.2 | COAL | Tenas_Lithology.csv |
| T92R-39C | 29.62 | 35.2 | 5.58 | SLTS | Tenas_Lithology.csv |
| T92R-39C | 35.2 | 62.5 | 27.3 | SST | Tenas_Lithology.csv |
| T92R-42 | 0 | 7.26 | 7.26 | Overburden | Tenas_Lithology.csv |
| T92R-42 | 7.26 | 10.7 | 3.44 | MDST | Tenas_Lithology.csv |
| T92R-42 | 10.7 | 15.05 | 4.35 | SLTS | Tenas_Lithology.csv |
| T92R-42 | 15.05 | 20 | 4.95 | SST | Tenas_Lithology.csv |
| T92R-42 | 20 | 22.45 | 2.45 | MDST | Tenas_Lithology.csv |
| T92R-42 | 22.45 | 25.5 | 3.05 | SST | Tenas_Lithology.csv |
| T92R-42 | 25.5 | 28.1 | 2.6 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 0 | 6.71 | 6.71 | Overburden | Tenas_Lithology.csv |
| T92R-43 | 6.71 | 26.81 | 20.1 | MDST | Tenas_Lithology.csv |
| T92R-43 | 26.81 | 27.22 | 0.41 | COAL | Tenas_Lithology.csv |
| T92R-43 | 27.22 | 30.1 | 2.88 | MDST | Tenas_Lithology.csv |
| T92R-43 | 30.1 | 30.61 | 0.51 | COAL | Tenas_Lithology.csv |
| T92R-43 | 30.61 | 33.59 | 2.98 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 33.59 | 34.06 | 0.47 | COAL | Tenas_Lithology.csv |
| T92R-43 | 34.06 | 38.79 | 4.73 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 38.79 | 39.22 | 0.43 | COAL | Tenas_Lithology.csv |
| T92R-43 | 39.22 | 42.89 | 3.67 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 42.89 | 48.69 | 5.8 | COAL | Tenas_Lithology.csv |
| T92R-43 | 48.69 | 50.87 | 2.18 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 50.87 | 51.31 | 0.44 | COAL | Tenas_Lithology.csv |
| T92R-43 | 51.31 | 55 | 3.69 | MDST | Tenas_Lithology.csv |
| T92R-43 | 55 | 56.6 | 1.6 | SST | Tenas_Lithology.csv |
| T92R-43 | 56.6 | 57.42 | 0.82 | MDST | Tenas_Lithology.csv |
| T92R-43 | 57.42 | 57.98 | 0.56 | COAL | Tenas_Lithology.csv |
| T92R-43 | 57.98 | 61.86 | 3.88 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 61.86 | 62.45 | 0.59 | COAL | Tenas_Lithology.csv |
| T92R-43 | 62.45 | 62.85 | 0.4 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 62.85 | 63.2 | 0.35 | COAL | Tenas_Lithology.csv |
| T92R-43 | 63.2 | 67.57 | 4.37 | SLTS | Tenas_Lithology.csv |
| T92R-43 | 67.57 | 67.98 | 0.41 | COAL | Tenas_Lithology.csv |
| T92R-43 | 67.98 | 85.3 | 17.32 | SST | Tenas_Lithology.csv |
| T93D-45 | 0 | 39.5 | 39.5 | Overburden | Tenas_Lithology.csv |
| T93D-45 | 39.5 | 40.03 | 0.53 | COAL | Tenas_Lithology.csv |
| T93D-45 | 40.03 | 44.08 | 4.05 | MDST | Tenas_Lithology.csv |
| T93D-45 | 44.08 | 44.57 | 0.49 | COAL | Tenas_Lithology.csv |
| T93D-45 | 44.57 | 44.76 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93D-45 | 44.76 | 46.13 | 1.37 | COAL | Tenas_Lithology.csv |
| T93D-45 | 46.13 | 58.17 | 12.04 | MDST | Tenas_Lithology.csv |
| T93D-45 | 58.17 | 60 | 1.83 | COAL | Tenas_Lithology.csv |
| T93D-45 | 60 | 61.5 | 1.5 | MDST | Tenas_Lithology.csv |
| T93D-45 | 61.5 | 62.3 | 0.8 | COAL | Tenas_Lithology.csv |
| T93D-45 | 62.3 | 65.6 | 3.3 | SLTS | Tenas_Lithology.csv |
| T93D-45 | 65.6 | 66.2 | 0.6 | COAL | Tenas_Lithology.csv |
| T93D-45 | 66.2 | 67.6 | 1.4 | SLTS | Tenas_Lithology.csv |
| T93D-45 | 67.6 | 68.2 | 0.6 | COAL | Tenas_Lithology.csv |
| T93D-45 | 68.2 | 76.4 | 8.2 | SLTS | Tenas_Lithology.csv |
| T93D-45 | 76.4 | 107.5 | 31.1 | SST | Tenas_Lithology.csv |
| T93D-45 | 107.5 | 115.6 | 8.1 | SLTS | Tenas_Lithology.csv |
| T93D-45 | 115.6 | 128.75 | 13.15 | SST | Tenas_Lithology.csv |
| T93D-45 | 128.75 | 129.23 | 0.48 | COAL | Tenas_Lithology.csv |
| T93D-45 | 129.23 | 131.3 | 2.07 | MDST | Tenas_Lithology.csv |
| T93D-45 | 131.3 | 134.7 | 3.4 | SST | Tenas_Lithology.csv |
| T93D-45 | 134.7 | 142.8 | 8.1 | CGL | Tenas_Lithology.csv |
| T93D-47 | 0 | 12.21 | 12.21 | Overburden | Tenas_Lithology.csv |
| T93D-47 | 12.21 | 38.6 | 26.39 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 38.6 | 52.4 | 13.8 | SST | Tenas_Lithology.csv |
| T93D-47 | 52.4 | 92 | 39.6 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 92 | 100 | 8 | SST | Tenas_Lithology.csv |
| T93D-47 | 100 | 110 | 10 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 110 | 116.7 | 6.7 | SST | Tenas_Lithology.csv |
| T93D-47 | 116.7 | 141 | 24.3 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 141 | 166.81 | 25.81 | SST | Tenas_Lithology.csv |
| T93D-47 | 166.81 | 167.17 | 0.36 | COAL | Tenas_Lithology.csv |
| T93D-47 | 167.17 | 168.03 | 0.86 | MDST | Tenas_Lithology.csv |
| T93D-47 | 168.03 | 168.95 | 0.92 | COAL | Tenas_Lithology.csv |
| T93D-47 | 168.95 | 170.02 | 1.07 | MDST | Tenas_Lithology.csv |
| T93D-47 | 170.02 | 171.13 | 1.11 | SLTS | Tenas_Lithology.csv |
| T93D-47 | 171.13 | 173 | 1.87 | CGL | Tenas_Lithology.csv |
| T93D-47 | 173 | 178.9 | 5.9 | SST | Tenas_Lithology.csv |
| T93D-53 | 0 | 7.52 | 7.52 | Overburden | Tenas_Lithology.csv |
| T93D-53 | 7.52 | 9.56 | 2.04 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 9.56 | 14.86 | 5.3 | SST | Tenas_Lithology.csv |
| T93D-53 | 14.86 | 33.43 | 18.57 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 33.43 | 35.83 | 2.4 | SST | Tenas_Lithology.csv |
| T93D-53 | 35.83 | 36.42 | 0.59 | MDST | Tenas_Lithology.csv |
| T93D-53 | 36.42 | 36.47 | 0.05 | COAL | Tenas_Lithology.csv |
| T93D-53 | 36.47 | 39.73 | 3.26 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T93D-53 | 39.73 | 39.89 | 0.16 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 39.89 | 39.97 | 0.08 | MDST | Tenas_Lithology.csv |
| T93D-53 | 39.97 | 40.12 | 0.15 | COAL | Tenas_Lithology.csv |
| T93D-53 | 40.12 | 40.96 | 0.84 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 40.96 | 41.29 | 0.33 | COAL | Tenas_Lithology.csv |
| T93D-53 | 41.29 | 41.39 | 0.1 | MDST | Tenas_Lithology.csv |
| T93D-53 | 41.39 | 43.61 | 2.22 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 43.61 | 43.79 | 0.18 | COAL | Tenas_Lithology.csv |
| T93D-53 | 43.79 | 43.82 | 0.03 | MDST | Tenas_Lithology.csv |
| T93D-53 | 43.82 | 46.45 | 2.63 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 46.45 | 46.48 | 0.03 | MDST | Tenas_Lithology.csv |
| T93D-53 | 46.48 | 48.18 | 1.7 | COAL | Tenas_Lithology.csv |
| T93D-53 | 48.18 | 50.02 | 1.84 | MDST | Tenas_Lithology.csv |
| T93D-53 | 50.02 | 50.41 | 0.39 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 50.41 | 51.32 | 0.91 | MDST | Tenas_Lithology.csv |
| T93D-53 | 51.32 | 56.19 | 4.87 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 56.19 | 58.65 | 2.46 | COAL | Tenas_Lithology.csv |
| T93D-53 | 58.65 | 58.69 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93D-53 | 58.69 | 62.96 | 4.27 | COAL | Tenas_Lithology.csv |
| T93D-53 | 62.96 | 63.07 | 0.11 | MDST | Tenas_Lithology.csv |
| T93D-53 | 63.07 | 67.35 | 4.28 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 67.35 | 67.72 | 0.37 | COAL | Tenas_Lithology.csv |
| T93D-53 | 67.72 | 67.93 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93D-53 | 67.93 | 68.23 | 0.3 | COAL | Tenas_Lithology.csv |
| T93D-53 | 68.23 | 70.88 | 2.65 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 70.88 | 71.23 | 0.35 | MDST | Tenas_Lithology.csv |
| T93D-53 | 71.23 | 71.57 | 0.34 | COAL | Tenas_Lithology.csv |
| T93D-53 | 71.57 | 73.39 | 1.82 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 73.39 | 74.4 | 1.01 | MDST | Tenas_Lithology.csv |
| T93D-53 | 74.4 | 75.15 | 0.75 | COAL | Tenas_Lithology.csv |
| T93D-53 | 75.15 | 75.31 | 0.16 | MDST | Tenas_Lithology.csv |
| T93D-53 | 75.31 | 75.93 | 0.62 | SST | Tenas_Lithology.csv |
| T93D-53 | 75.93 | 76.64 | 0.71 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 76.64 | 77.44 | 0.8 | COAL | Tenas_Lithology.csv |
| T93D-53 | 77.44 | 78.32 | 0.88 | SST | Tenas_Lithology.csv |
| T93D-53 | 78.32 | 78.42 | 0.1 | COAL | Tenas_Lithology.csv |
| T93D-53 | 78.42 | 79.06 | 0.64 | MDST | Tenas_Lithology.csv |
| T93D-53 | 79.06 | 81.02 | 1.96 | SLTS | Tenas_Lithology.csv |
| T93D-53 | 81.02 | 81.59 | 0.57 | SST | Tenas_Lithology.csv |
| T93D-53 | 81.59 | 84.96 | 3.37 | MDST | Tenas_Lithology.csv |
| T93D-53 | 84.96 | 85.34 | 0.38 | COAL | Tenas_Lithology.csv |
| T93D-53 | 85.34 | 91.4 | 6.06 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 0 | 1.66 | 1.66 | Overburden | Tenas_Lithology.csv |
| T93R-02 | 1.66 | 3.35 | 1.69 | COAL | Tenas_Lithology.csv |
| T93R-02 | 3.35 | 3.74 | 0.39 | MDST | Tenas_Lithology.csv |
| T93R-02 | 3.74 | 7.18 | 3.44 | COAL | Tenas_Lithology.csv |
| T93R-02 | 7.18 | 8.55 | 1.37 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 8.55 | 9.28 | 0.73 | COAL | Tenas_Lithology.csv |
| T93R-02 | 9.28 | 10 | 0.72 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 10 | 14.62 | 4.62 | SST | Tenas_Lithology.csv |
| T93R-02 | 14.62 | 14.84 | 0.22 | COAL | Tenas_Lithology.csv |
| T93R-02 | 14.84 | 15.59 | 0.75 | MDST | Tenas_Lithology.csv |
| T93R-02 | 15.59 | 15.72 | 0.13 | COAL | Tenas_Lithology.csv |
| T93R-02 | 15.72 | 20.4 | 4.68 | MDST | Tenas_Lithology.csv |
| T93R-02 | 20.4 | 21.01 | 0.61 | COAL | Tenas_Lithology.csv |
| T93R-02 | 21.01 | 21.39 | 0.38 | MDST | Tenas_Lithology.csv |
| T93R-02 | 21.39 | 21.98 | 0.59 | COAL | Tenas_Lithology.csv |
| T93R-02 | 21.98 | 24 | 2.02 | MDST | Tenas_Lithology.csv |
| T93R-02 | 24 | 28.84 | 4.84 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 28.84 | 29.25 | 0.41 | COAL | Tenas_Lithology.csv |
| T93R-02 | 29.25 | 31.4 | 2.15 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 31.4 | 34.75 | 3.35 | SST | Tenas_Lithology.csv |
| T93R-02 | 34.75 | 39 | 4.25 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 39 | 53.34 | 14.34 | SST | Tenas_Lithology.csv |
| T93R-02 | 53.34 | 57.9 | 4.56 | SLTS | Tenas_Lithology.csv |
| T93R-02 | 57.9 | 63.1 | 5.2 | MDST | Tenas_Lithology.csv |
| T93R-02 | 63.1 | 68.6 | 5.5 | SST | Tenas_Lithology.csv |
| T93R-02 | 68.6 | 80.6 | 12 | MDST | Tenas_Lithology.csv |
| T93R-03 | 0 | 4.43 | 4.43 | Overburden | Tenas_Lithology.csv |
| T93R-03 | 4.43 | 6.7 | 2.27 | MDST | Tenas_Lithology.csv |
| T93R-03 | 6.7 | 58.52 | 51.82 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 58.52 | 67.07 | 8.55 | MDST | Tenas_Lithology.csv |
| T93R-03 | 67.07 | 67.41 | 0.34 | COAL | Tenas_Lithology.csv |
| T93R-03 | 67.41 | 67.73 | 0.32 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-03 | 67.73 | 68.14 | 0.41 | COAL | Tenas_Lithology.csv |
| T93R-03 | 68.14 | 71.95 | 3.81 | MDST | Tenas_Lithology.csv |
| T93R-03 | 71.95 | 72.26 | 0.31 | COAL | Tenas_Lithology.csv |
| T93R-03 | 72.26 | 75.71 | 3.45 | MDST | Tenas_Lithology.csv |
| T93R-03 | 75.71 | 76.04 | 0.33 | COAL | Tenas_Lithology.csv |
| T93R-03 | 76.04 | 76.97 | 0.93 | MDST | Tenas_Lithology.csv |
| T93R-03 | 76.97 | 78.25 | 1.28 | COAL | Tenas_Lithology.csv |
| T93R-03 | 78.25 | 78.38 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-03 | 78.38 | 78.65 | 0.27 | COAL | Tenas_Lithology.csv |
| T93R-03 | 78.65 | 78.94 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-03 | 78.94 | 79.3 | 0.36 | COAL | Tenas_Lithology.csv |
| T93R-03 | 79.3 | 79.4 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-03 | 79.4 | 81.52 | 2.12 | COAL | Tenas_Lithology.csv |
| T93R-03 | 81.52 | 82.78 | 1.26 | MDST | Tenas_Lithology.csv |
| T93R-03 | 82.78 | 83.2 | 0.42 | COAL | Tenas_Lithology.csv |
| T93R-03 | 83.2 | 84.12 | 0.92 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 84.12 | 85.16 | 1.04 | COAL | Tenas_Lithology.csv |
| T93R-03 | 85.16 | 88.9 | 3.74 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 88.9 | 89.12 | 0.22 | COAL | Tenas_Lithology.csv |
| T93R-03 | 89.12 | 91.79 | 2.67 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 91.79 | 92.77 | 0.98 | COAL | Tenas_Lithology.csv |
| T93R-03 | 92.77 | 93.6 | 0.83 | MDST | Tenas_Lithology.csv |
| T93R-03 | 93.6 | 94.47 | 0.87 | COAL | Tenas_Lithology.csv |
| T93R-03 | 94.47 | 96 | 1.53 | SLTS | Tenas_Lithology.csv |
| T93R-03 | 96 | 100.8 | 4.8 | SST | Tenas_Lithology.csv |
| T93R-04 | 0 | 2.14 | 2.14 | Overburden | Tenas_Lithology.csv |
| T93R-04 | 2.14 | 14.32 | 12.18 | SST | Tenas_Lithology.csv |
| T93R-04 | 14.32 | 19.51 | 5.19 | MDST | Tenas_Lithology.csv |
| T93R-04 | 19.51 | 23.16 | 3.65 | SST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T93R-04 | 23.16 | 25.3 | 2.14 | MDST | Tenas_Lithology.csv |
| T93R-04 | 25.3 | 29.87 | 4.57 | SST | Tenas_Lithology.csv |
| T93R-04 | 29.87 | 57.91 | 28.04 | MDST | Tenas_Lithology.csv |
| T93R-04 | 57.91 | 60.65 | 2.74 | SST | Tenas_Lithology.csv |
| T93R-04 | 60.65 | 68.9 | 8.25 | MDST | Tenas_Lithology.csv |
| T93R-04 | 68.9 | 89 | 20.1 | VOLC | Tenas_Lithology.csv |
| T93R-05 | 0 | 3.67 | 3.67 | Overburden | Tenas_Lithology.csv |
| T93R-05 | 3.67 | 11.28 | 7.61 | MDST | Tenas_Lithology.csv |
| T93R-05 | 11.28 | 18.9 | 7.62 | SLTS | Tenas_Lithology.csv |
| T93R-05 | 18.9 | 24.38 | 5.48 | MDST | Tenas_Lithology.csv |
| T93R-05 | 24.38 | 25.6 | 1.22 | SST | Tenas_Lithology.csv |
| T93R-05 | 25.6 | 38.69 | 13.09 | MDST | Tenas_Lithology.csv |
| T93R-05 | 38.69 | 39.15 | 0.46 | COAL | Tenas_Lithology.csv |
| T93R-05 | 39.15 | 41.17 | 2.02 | MDST | Tenas_Lithology.csv |
| T93R-05 | 41.17 | 41.68 | 0.51 | COAL | Tenas_Lithology.csv |
| T93R-05 | 41.68 | 44.17 | 2.49 | MDST | Tenas_Lithology.csv |
| T93R-05 | 44.17 | 44.4 | 0.23 | COAL | Tenas_Lithology.csv |
| T93R-05 | 44.4 | 44.84 | 0.44 | MDST | Tenas_Lithology.csv |
| T93R-05 | 44.84 | 46.34 | 1.5 | COAL | Tenas_Lithology.csv |
| T93R-05 | 46.34 | 54.24 | 7.9 | MDST | Tenas_Lithology.csv |
| T93R-05 | 54.24 | 54.62 | 0.38 | COAL | Tenas_Lithology.csv |
| T93R-05 | 54.62 | 58.79 | 4.17 | MDST | Tenas_Lithology.csv |
| T93R-05 | 58.79 | 64.5 | 5.71 | COAL | Tenas_Lithology.csv |
| T93R-05 | 64.5 | 65.48 | 0.98 | MDST | Tenas_Lithology.csv |
| T93R-05 | 65.48 | 65.82 | 0.34 | COAL | Tenas_Lithology.csv |
| T93R-05 | 65.82 | 66.25 | 0.43 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-05 | 66.25 | 66.8 | 0.55 | COAL | Tenas_Lithology.csv |
| T93R-05 | 66.8 | 68.27 | 1.47 | MDST | Tenas_Lithology.csv |
| T93R-05 | 68.27 | 71.02 | 2.75 | SST | Tenas_Lithology.csv |
| T93R-05 | 71.02 | 77.8 | 6.78 | MDST | Tenas_Lithology.csv |
| T93R-05 | 77.8 | 78.03 | 0.23 | COAL | Tenas_Lithology.csv |
| T93R-05 | 78.03 | 79.39 | 1.36 | MDST | Tenas_Lithology.csv |
| T93R-05 | 79.39 | 80.08 | 0.69 | COAL | Tenas_Lithology.csv |
| T93R-05 | 80.08 | 81.05 | 0.97 | SLTS | Tenas_Lithology.csv |
| T93R-05 | 81.05 | 81.3 | 0.25 | COAL | Tenas_Lithology.csv |
| T93R-05 | 81.3 | 83.14 | 1.84 | SLTS | Tenas_Lithology.csv |
| T93R-05 | 83.14 | 83.5 | 0.36 | COAL | Tenas_Lithology.csv |
| T93R-05 | 83.5 | 85.32 | 1.82 | SLTS | Tenas_Lithology.csv |
| T93R-05 | 85.32 | 85.59 | 0.27 | COAL | Tenas_Lithology.csv |
| T93R-05 | 85.59 | 92.4 | 6.81 | SLTS | Tenas_Lithology.csv |
| T93R-06C | 0 | 1.23 | 1.23 | Overburden | Tenas_Lithology.csv |
| T93R-06C | 1.23 | 4.84 | 3.61 | MDST | Tenas_Lithology.csv |
| T93R-06C | 4.84 | 5.38 | 0.54 | COAL | Tenas_Lithology.csv |
| T93R-06C | 5.38 | 8.58 | 3.2 | MDST | Tenas_Lithology.csv |
| T93R-06C | 8.58 | 8.79 | 0.21 | COAL | Tenas_Lithology.csv |
| T93R-06C | 8.79 | 10.28 | 1.49 | MDST | Tenas_Lithology.csv |
| T93R-06C | 10.28 | 11.88 | 1.6 | COAL | Tenas_Lithology.csv |
| T93R-06C | 11.88 | 18.55 | 6.67 | MDST | Tenas_Lithology.csv |
| T93R-06C | 18.55 | 18.83 | 0.28 | COAL | Tenas_Lithology.csv |
| T93R-06C | 18.83 | 21.01 | 2.18 | MDST | Tenas_Lithology.csv |
| T93R-06C | 21.01 | 22.88 | 1.87 | COAL | Tenas_Lithology.csv |
| T93R-06C | 22.88 | 23.9 | 1.02 | MDST | Tenas_Lithology.csv |
| T93R-06C | 23.9 | 27.07 | 3.17 | COAL | Tenas_Lithology.csv |
| T93R-06C | 27.07 | 27.43 | 0.36 | MDST | Tenas_Lithology.csv |
| T93R-06C | 27.43 | 27.93 | 0.5 | COAL | Tenas_Lithology.csv |
| T93R-06C | 27.93 | 29.07 | 1.14 | MDST | Tenas_Lithology.csv |
| T93R-06C | 29.07 | 29.47 | 0.4 | COAL | Tenas_Lithology.csv |
| T93R-06C | 29.47 | 36.75 | 7.28 | MDST | Tenas_Lithology.csv |
| T93R-06C | 36.75 | 37.18 | 0.43 | COAL | Tenas_Lithology.csv |
| T93R-06C | 37.18 | 44 | 6.82 | MDST | Tenas_Lithology.csv |
| T93R-06C | 44 | 44.28 | 0.28 | COAL | Tenas_Lithology.csv |
| T93R-06C | 44.28 | 50.3 | 6.02 | MDST | Tenas_Lithology.csv |
| T93R-06C | 50.3 | 51.21 | 0.91 | SLTS | Tenas_Lithology.csv |
| T93R-06C | 51.21 | 55.8 | 4.59 | SST | Tenas_Lithology.csv |
| T93R-08C | 0 | 1.84 | 1.84 | Overburden | Tenas_Lithology.csv |
| T93R-08C | 1.84 | 3.13 | 1.29 | MDST | Tenas_Lithology.csv |
| T93R-08C | 3.13 | 4.63 | 1.5 | COAL | Tenas_Lithology.csv |
| T93R-08C | 4.63 | 8.56 | 3.93 | SLTS | Tenas_Lithology.csv |
| T93R-08C | 8.56 | 10.62 | 2.06 | COAL | Tenas_Lithology.csv |
| T93R-08C | 10.62 | 11.42 | 0.8 | MDST | Tenas_Lithology.csv |
| T93R-08C | 11.42 | 12.43 | 1.01 | COAL | Tenas_Lithology.csv |
| T93R-08C | 12.43 | 14.15 | 1.72 | MDST | Tenas_Lithology.csv |
| T93R-08C | 14.15 | 14.9 | 0.75 | COAL | Tenas_Lithology.csv |
| T93R-08C | 14.9 | 16.57 | 1.67 | SLTS | Tenas_Lithology.csv |
| T93R-08C | 16.57 | 17.16 | 0.59 | COAL | Tenas_Lithology.csv |
| T93R-08C | 17.16 | 18.64 | 1.48 | MDST | Tenas_Lithology.csv |
| T93R-08C | 18.64 | 18.95 | 0.31 | COAL | Tenas_Lithology.csv |
| T93R-08C | 18.95 | 26.46 | 7.51 | SLTS | Tenas_Lithology.csv |
| T93R-08C | 26.46 | 27.01 | 0.55 | COAL | Tenas_Lithology.csv |
| T93R-08C | 27.01 | 27.72 | 0.71 | SST | Tenas_Lithology.csv |
| T93R-08C | 27.72 | 28.27 | 0.55 | COAL | Tenas_Lithology.csv |
| T93R-08C | 28.27 | 43 | 14.73 | SST | Tenas_Lithology.csv |
| T93R-09 | 0 | 1.23 | 1.23 | Overburden | Tenas_Lithology.csv |
| T93R-09 | 1.23 | 4.27 | 3.04 | MDST | Tenas_Lithology.csv |
| T93R-09 | 4.27 | 7.01 | 2.74 | SST | Tenas_Lithology.csv |
| T93R-09 | 7.01 | 15.54 | 8.53 | MDST | Tenas_Lithology.csv |
| T93R-09 | 15.54 | 21.03 | 5.49 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 21.03 | 23.77 | 2.74 | MDST | Tenas_Lithology.csv |
| T93R-09 | 23.77 | 26.52 | 2.75 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 26.52 | 42.37 | 15.85 | MDST | Tenas_Lithology.csv |
| T93R-09 | 42.37 | 50.29 | 7.92 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 50.29 | 60.65 | 10.36 | MDST | Tenas_Lithology.csv |
| T93R-09 | 60.65 | 63.4 | 2.75 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 63.4 | 67.66 | 4.26 | SST | Tenas_Lithology.csv |
| T93R-09 | 67.66 | 71.63 | 3.97 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 71.63 | 75.9 | 4.27 | MDST | Tenas_Lithology.csv |
| T93R-09 | 75.9 | 77.72 | 1.82 | SST | Tenas_Lithology.csv |
| T93R-09 | 77.72 | 83.21 | 5.49 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 83.21 | 88.7 | 5.49 | MDST | Tenas_Lithology.csv |
| T93R-09 | 88.7 | 92.05 | 3.35 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 92.05 | 94.18 | 2.13 | MDST | Tenas_Lithology.csv |
| T93R-09 | 94.18 | 106.37 | 12.19 | SST | Tenas_Lithology.csv |
| T93R-09 | 106.37 | 111.56 | 5.19 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T93R-09 | 111.56 | 126.65 | 15.09 | MDST | Tenas_Lithology.csv |
| T93R-09 | 126.65 | 127.46 | 0.81 | COAL | Tenas_Lithology.csv |
| T93R-09 | 127.46 | 132.13 | 4.67 | MDST | Tenas_Lithology.csv |
| T93R-09 | 132.13 | 132.56 | 0.43 | COAL | Tenas_Lithology.csv |
| T93R-09 | 132.56 | 137.77 | 5.21 | MDST | Tenas_Lithology.csv |
| T93R-09 | 137.77 | 140.21 | 2.44 | SST | Tenas_Lithology.csv |
| T93R-09 | 140.21 | 141.43 | 1.22 | SLTS | Tenas_Lithology.csv |
| T93R-09 | 141.43 | 147.22 | 5.79 | SST | Tenas_Lithology.csv |
| T93R-09 | 147.22 | 148.13 | 0.91 | MDST | Tenas_Lithology.csv |
| T93R-09 | 148.13 | 157.58 | 9.45 | SST | Tenas_Lithology.csv |
| T93R-09 | 157.58 | 164.59 | 7.01 | MDST | Tenas_Lithology.csv |
| T93R-09 | 164.59 | 171.3 | 6.71 | SST | Tenas_Lithology.csv |
| T93R-10 | 0 | 3.36 | 3.36 | Overburden | Tenas_Lithology.csv |
| T93R-10 | 3.36 | 28.78 | 25.42 | SST | Tenas_Lithology.csv |
| T93R-10 | 28.78 | 29.65 | 0.87 | COAL | Tenas_Lithology.csv |
| T93R-10 | 29.65 | 32.58 | 2.93 | SLTS | Tenas_Lithology.csv |
| T93R-10 | 32.58 | 33.22 | 0.64 | COAL | Tenas_Lithology.csv |
| T93R-10 | 33.22 | 35.4 | 2.18 | MDST | Tenas_Lithology.csv |
| T93R-10 | 35.4 | 36.1 | 0.7 | COAL | Tenas_Lithology.csv |
| T93R-10 | 36.1 | 53.34 | 17.24 | SLTS | Tenas_Lithology.csv |
| T93R-10 | 53.34 | 61 | 7.66 | VOLC | Tenas_Lithology.csv |
| T93R-12 | 0 | 15.56 | 15.56 | Overburden | Tenas_Lithology.csv |
| T93R-12 | 15.56 | 24.08 | 8.52 | MDST | Tenas_Lithology.csv |
| T93R-12 | 24.08 | 29.26 | 5.18 | SLTS | Tenas_Lithology.csv |
| T93R-12 | 29.26 | 32.61 | 3.35 | MDST | Tenas_Lithology.csv |
| T93R-12 | 32.61 | 35.97 | 3.36 | SLTS | Tenas_Lithology.csv |
| T93R-12 | 35.97 | 65.53 | 29.56 | MDST | Tenas_Lithology.csv |
| T93R-12 | 65.53 | 67.38 | 1.85 | SLTS | Tenas_Lithology.csv |
| T93R-12 | 67.38 | 68.12 | 0.74 | COAL | Tenas_Lithology.csv |
| T93R-12 | 68.12 | 72.85 | 4.73 | MDST | Tenas_Lithology.csv |
| T93R-12 | 72.85 | 73.65 | 0.8 | COAL | Tenas_Lithology.csv |
| T93R-12 | 73.65 | 76.02 | 2.37 | MDST | Tenas_Lithology.csv |
| T93R-12 | 76.02 | 76.25 | 0.23 | COAL | Tenas_Lithology.csv |
| T93R-12 | 76.25 | 78.77 | 2.52 | MDST | Tenas_Lithology.csv |
| T93R-12 | 78.77 | 80.8 | 2.03 | COAL | Tenas_Lithology.csv |
| T93R-12 | 80.8 | 89.61 | 8.81 | MDST | Tenas_Lithology.csv |
| T93R-12 | 89.61 | 91.44 | 1.83 | SST | Tenas_Lithology.csv |
| T93R-12 | 91.44 | 92.7 | 1.26 | MDST | Tenas_Lithology.csv |
| T93R-12 | 92.7 | 93.05 | 0.35 | COAL | Tenas_Lithology.csv |
| T93R-12 | 93.05 | 100.31 | 7.26 | SLTS | Tenas_Lithology.csv |
| T93R-12 | 100.31 | 108.29 | 7.98 | COAL | Tenas_Lithology.csv |
| T93R-12 | 108.29 | 113 | 4.71 | MDST | Tenas_Lithology.csv |
| T93R-12 | 113 | 113.52 | 0.52 | COAL | Tenas_Lithology.csv |
| T93R-12 | 113.52 | 113.97 | 0.45 | MDST | Tenas_Lithology.csv |
| T93R-12 | 113.97 | 114.7 | 0.73 | COAL | Tenas_Lithology.csv |
| T93R-12 | 114.7 | 116.2 | 1.5 | MDST | Tenas_Lithology.csv |
| T93R-12 | 116.2 | 116.85 | 0.65 | COAL | Tenas_Lithology.csv |
| T93R-12 | 116.85 | 120.85 | 4 | MDST | Tenas_Lithology.csv |
| T93R-12 | 120.85 | 121.9 | 1.05 | COAL | Tenas_Lithology.csv |
| T93R-12 | 121.9 | 121.96 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-12 | 121.96 | 122.77 | 0.81 | COAL | Tenas_Lithology.csv |
| T93R-12 | 122.77 | 122.87 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-12 | 122.87 | 123.57 | 0.7 | COAL | Tenas_Lithology.csv |
| T93R-12 | 123.57 | 128.9 | 5.33 | MDST | Tenas_Lithology.csv |
| T93R-13 | 0 | 23.81 | 23.81 | Overburden | Tenas_Lithology.csv |
| T93R-13 | 23.81 | 28.04 | 4.23 | MDST | Tenas_Lithology.csv |
| T93R-13 | 28.04 | 36.58 | 8.54 | SLTS | Tenas_Lithology.csv |
| T93R-13 | 36.58 | 59.13 | 22.55 | MDST | Tenas_Lithology.csv |
| T93R-13 | 59.13 | 60.05 | 0.92 | SLTS | Tenas_Lithology.csv |
| T93R-13 | 60.05 | 64 | 3.95 | MDST | Tenas_Lithology.csv |
| T93R-13 | 64 | 140.8 | 76.8 | VOLC | Tenas_Lithology.csv |
| T93R-14 | 0 | 3.67 | 3.67 | Overburden | Tenas_Lithology.csv |
| T93R-14 | 3.67 | 13.41 | 9.74 | VOLC | Tenas_Lithology.csv |
| T93R-14 | 13.41 | 39.62 | 26.21 | SLTS | Tenas_Lithology.csv |
| T93R-14 | 39.62 | 49.68 | 10.06 | SST | Tenas_Lithology.csv |
| T93R-14 | 49.68 | 54.25 | 4.57 | VOLC | Tenas_Lithology.csv |
| T93R-14 | 54.25 | 57.91 | 3.66 | SST | Tenas_Lithology.csv |
| T93R-14 | 57.91 | 71.63 | 13.72 | VOLC | Tenas_Lithology.csv |
| T93R-14 | 71.63 | 79.86 | 8.23 | SST | Tenas_Lithology.csv |
| T93R-14 | 79.86 | 110 | 30.14 | VOLC | Tenas_Lithology.csv |
| T93R-15 | 0 | 0.13 | 0.13 | Overburden | Tenas_Lithology.csv |
| T93R-16 | 0 | 11.1 | 11.1 | Overburden | Tenas_Lithology.csv |
| T93R-17 | 0 | 3.97 | 3.97 | Overburden | Tenas_Lithology.csv |
| T93R-17 | 3.97 | 26.21 | 22.24 | MDST | Tenas_Lithology.csv |
| T93R-17 | 26.21 | 27.43 | 1.22 | SST | Tenas_Lithology.csv |
| T93R-17 | 27.43 | 43.89 | 16.46 | MDST | Tenas_Lithology.csv |
| T93R-17 | 43.89 | 49.07 | 5.18 | SLTS | Tenas_Lithology.csv |
| T93R-17 | 49.07 | 51.51 | 2.44 | MDST | Tenas_Lithology.csv |
| T93R-17 | 51.51 | 56.08 | 4.57 | SLTS | Tenas_Lithology.csv |
| T93R-17 | 56.08 | 63.7 | 7.62 | SST | Tenas_Lithology.csv |
| T93R-17 | 63.7 | 68.88 | 5.18 | SLTS | Tenas_Lithology.csv |
| T93R-17 | 68.88 | 75.9 | 7.02 | MDST | Tenas_Lithology.csv |
| T93R-17 | 75.9 | 77.41 | 1.51 | SST | Tenas_Lithology.csv |
| T93R-17 | 77.41 | 77.95 | 0.54 | MDST | Tenas_Lithology.csv |
| T93R-17 | 77.95 | 80.41 | 2.46 | COAL | Tenas_Lithology.csv |
| T93R-17 | 80.41 | 81.66 | 1.25 | MDST | Tenas_Lithology.csv |
| T93R-17 | 81.66 | 82.44 | 0.78 | COAL | Tenas_Lithology.csv |
| T93R-17 | 82.44 | 82.7 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-17 | 82.7 | 85.9 | 3.2 | COAL | Tenas_Lithology.csv |
| T93R-17 | 85.9 | 88.88 | 2.98 | MDST | Tenas_Lithology.csv |
| T93R-17 | 88.88 | 89 | 0.12 | COAL | Tenas_Lithology.csv |
| T93R-17 | 89 | 89.2 | 0.2 | MDST | Tenas_Lithology.csv |
| T93R-17 | 89.2 | 89.54 | 0.34 | COAL | Tenas_Lithology.csv |
| T93R-17 | 89.54 | 89.72 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T93R-17 | 89.72 | 90.82 | 1.1 | COAL | Tenas_Lithology.csv |
| T93R-17 | 90.82 | 101.43 | 10.61 | SLTS | Tenas_Lithology.csv |
| T93R-17 | 101.43 | 102.27 | 0.84 | COAL | Tenas_Lithology.csv |
| T93R-17 | 102.27 | 103.14 | 0.87 | MDST | Tenas_Lithology.csv |
| T93R-17 | 103.14 | 103.61 | 0.47 | COAL | Tenas_Lithology.csv |
| T93R-17 | 103.61 | 107.01 | 3.4 | MDST | Tenas_Lithology.csv |
| T93R-17 | 107.01 | 107.3 | 0.29 | COAL | Tenas_Lithology.csv |
| T93R-17 | 107.3 | 123.75 | 16.45 | MDST | Tenas_Lithology.csv |
| T93R-17 | 123.75 | 128.9 | 5.15 | SST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T93R-18 | 0 | 25.08 | 25.08 | Overburden | Tenas_Lithology.csv |
| T93R-18 | 25.08 | 27.1 | 2.02 | n/a | Tenas_Lithology.csv |
| T93R-18 | 27.1 | 40.55 | 13.45 | MDST | Tenas_Lithology.csv |
| T93R-19 | 0 | 10.37 | 10.37 | Overburden | Tenas_Lithology.csv |
| T93R-19 | 10.37 | 122 | 111.63 | VOLC | Tenas_Lithology.csv |
| T93R-51 | 0 | 3.67 | 3.67 | Overburden | Tenas_Lithology.csv |
| T93R-51 | 3.67 | 13.5 | 9.83 | SLTS | Tenas_Lithology.csv |
| T93R-51 | 13.5 | 18.2 | 4.7 | SST | Tenas_Lithology.csv |
| T93R-51 | 18.2 | 19.3 | 1.1 | MDST | Tenas_Lithology.csv |
| T93R-51 | 19.3 | 21 | 1.7 | SST | Tenas_Lithology.csv |
| T93R-51 | 21 | 29.5 | 8.5 | MDST | Tenas_Lithology.csv |
| T93R-51 | 29.5 | 33.53 | 4.03 | SST | Tenas_Lithology.csv |
| T93R-51 | 33.53 | 36.6 | 3.07 | MDST | Tenas_Lithology.csv |
| T93R-51 | 36.6 | 40.5 | 3.9 | SLTS | Tenas_Lithology.csv |
| T93R-51 | 40.5 | 44.5 | 4 | MDST | Tenas_Lithology.csv |
| T93R-51 | 44.5 | 51.52 | 7.02 | SLTS | Tenas_Lithology.csv |
| T93R-51 | 51.52 | 71.3 | 19.78 | MDST | Tenas_Lithology.csv |
| T94R-01 | 0 | 3.06 | 3.06 | Overburden | Tenas_Lithology.csv |
| T94R-01 | 3.06 | 8.2 | 5.14 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 8.2 | 10.48 | 2.28 | MDST | Tenas_Lithology.csv |
| T94R-01 | 10.48 | 12.53 | 2.05 | COAL | Tenas_Lithology.csv |
| T94R-01 | 12.53 | 15.65 | 3.12 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 15.65 | 17.98 | 2.33 | COAL | Tenas_Lithology.csv |
| T94R-01 | 17.98 | 18.34 | 0.36 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-01 | 18.34 | 18.61 | 0.27 | COAL | Tenas_Lithology.csv |
| T94R-01 | 18.61 | 18.83 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-01 | 18.83 | 19.11 | 0.28 | COAL | Tenas_Lithology.csv |
| T94R-01 | 19.11 | 21 | 1.89 | MDST | Tenas_Lithology.csv |
| T94R-01 | 21 | 22.62 | 1.62 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 22.62 | 23.19 | 0.57 | COAL | Tenas_Lithology.csv |
| T94R-01 | 23.19 | 24.1 | 0.91 | MDST | Tenas_Lithology.csv |
| T94R-01 | 24.1 | 24.59 | 0.49 | COAL | Tenas_Lithology.csv |
| T94R-01 | 24.59 | 25.6 | 1.01 | MDST | Tenas_Lithology.csv |
| T94R-01 | 25.6 | 31.2 | 5.6 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 31.2 | 31.56 | 0.36 | COAL | Tenas_Lithology.csv |
| T94R-01 | 31.56 | 33.12 | 1.56 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 33.12 | 33.46 | 0.34 | COAL | Tenas_Lithology.csv |
| T94R-01 | 33.46 | 39.11 | 5.65 | SST | Tenas_Lithology.csv |
| T94R-01 | 39.11 | 39.59 | 0.48 | COAL | Tenas_Lithology.csv |
| T94R-01 | 39.59 | 40.44 | 0.85 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 40.44 | 41.97 | 1.53 | MDST | Tenas_Lithology.csv |
| T94R-01 | 41.97 | 72 | 30.03 | SST | Tenas_Lithology.csv |
| T94R-01 | 72 | 74.25 | 2.25 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 74.25 | 74.66 | 0.41 | COAL | Tenas_Lithology.csv |
| T94R-01 | 74.66 | 75.76 | 1.1 | SLTS | Tenas_Lithology.csv |
| T94R-01 | 75.76 | 76.2 | 0.44 | COAL | Tenas_Lithology.csv |
| T94R-01 | 76.2 | 76.4 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-01 | 76.4 | 76.98 | 0.58 | COAL | Tenas_Lithology.csv |
| T94R-01 | 76.98 | 77.51 | 0.53 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-01 | 77.51 | 77.96 | 0.45 | COAL | Tenas_Lithology.csv |
| T94R-01 | 77.96 | 83.8 | 5.84 | SLTS | Tenas_Lithology.csv |
| T94R-02 | 0 | 0.71 | 0.71 | Overburden | Tenas_Lithology.csv |
| T94R-02 | 0.71 | 37 | 36.29 | VOLC | Tenas_Lithology.csv |
| T94R-03 | 0 | 0.61 | 0.61 | Overburden | Tenas_Lithology.csv |
| T94R-03 | 0.61 | 1.5 | 0.89 | COAL | Tenas_Lithology.csv |
| T94R-03 | 1.5 | 4.15 | 2.65 | MDST | Tenas_Lithology.csv |
| T94R-03 | 4.15 | 8.61 | 4.46 | SST | Tenas_Lithology.csv |
| T94R-03 | 8.61 | 9.04 | 0.43 | COAL | Tenas_Lithology.csv |
| T94R-03 | 9.04 | 14.09 | 5.05 | SLTS | Tenas_Lithology.csv |
| T94R-03 | 14.09 | 19.41 | 5.32 | COAL | Tenas_Lithology.csv |
| T94R-03 | 19.41 | 20.4 | 0.99 | MDST | Tenas_Lithology.csv |
| T94R-03 | 20.4 | 20.75 | 0.35 | COAL | Tenas_Lithology.csv |
| T94R-03 | 20.75 | 21.12 | 0.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-03 | 21.12 | 21.87 | 0.75 | COAL | Tenas_Lithology.csv |
| T94R-03 | 21.87 | 23.2 | 1.33 | MDST | Tenas_Lithology.csv |
| T94R-03 | 23.2 | 23.59 | 0.39 | COAL | Tenas_Lithology.csv |
| T94R-03 | 23.59 | 25.8 | 2.21 | MDST | Tenas_Lithology.csv |
| T94R-03 | 25.8 | 28.84 | 3.04 | SLTS | Tenas_Lithology.csv |
| T94R-03 | 28.84 | 29.11 | 0.27 | COAL | Tenas_Lithology.csv |
| T94R-03 | 29.11 | 30.81 | 1.7 | SLTS | Tenas_Lithology.csv |
| T94R-03 | 30.81 | 31.19 | 0.38 | COAL | Tenas_Lithology.csv |
| T94R-03 | 31.19 | 38.5 | 7.31 | SST | Tenas_Lithology.csv |
| T94R-03 | 38.5 | 38.78 | 0.28 | COAL | Tenas_Lithology.csv |
| T94R-03 | 38.78 | 59.8 | 21.02 | SST | Tenas_Lithology.csv |
| T94R-03 | 59.8 | 71 | 11.2 | SLTS | Tenas_Lithology.csv |
| T94R-03 | 71 | 84.8 | 13.8 | SST | Tenas_Lithology.csv |
| T94R-04C | 0 | 9.91 | 9.91 | Overburden | Tenas_Lithology.csv |
| T94R-04C | 9.91 | 10.97 | 1.06 | MDST | Tenas_Lithology.csv |
| T94R-04C | 10.97 | 13.77 | 2.8 | SST | Tenas_Lithology.csv |
| T94R-04C | 13.77 | 15.2 | 1.43 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 15.2 | 17.77 | 2.57 | MDST | Tenas_Lithology.csv |
| T94R-04C | 17.77 | 24.2 | 6.43 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 24.2 | 30.85 | 6.65 | SST | Tenas_Lithology.csv |
| T94R-04C | 30.85 | 32.2 | 1.35 | MDST | Tenas_Lithology.csv |
| T94R-04C | 32.2 | 33.09 | 0.89 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 33.09 | 33.33 | 0.24 | COAL | Tenas_Lithology.csv |
| T94R-04C | 33.33 | 36.1 | 2.77 | MDST | Tenas_Lithology.csv |
| T94R-04C | 36.1 | 36.12 | 0.02 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 36.12 | 37.5 | 1.38 | MDST | Tenas_Lithology.csv |
| T94R-04C | 37.5 | 37.79 | 0.29 | COAL | Tenas_Lithology.csv |
| T94R-04C | 37.79 | 40.44 | 2.65 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 40.44 | 42.38 | 1.94 | COAL | Tenas_Lithology.csv |
| T94R-04C | 42.38 | 43.28 | 0.9 | MDST | Tenas_Lithology.csv |
| T94R-04C | 43.28 | 49.4 | 6.12 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 49.4 | 49.76 | 0.36 | COAL | Tenas_Lithology.csv |
| T94R-04C | 49.76 | 53.95 | 4.19 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 53.95 | 55.8 | 1.85 | COAL | Tenas_Lithology.csv |
| T94R-04C | 55.8 | 56.36 | 0.56 | MDST | Tenas_Lithology.csv |
| T94R-04C | 56.36 | 60.17 | 3.81 | COAL | Tenas_Lithology.csv |
| T94R-04C | 60.17 | 62.16 | 1.99 | MDST | Tenas_Lithology.csv |
| T94R-04C | 62.16 | 62.64 | 0.48 | COAL | Tenas_Lithology.csv |
| T94R-04C | 62.64 | 62.85 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T94R-04C | 62.85 | 63.05 | 0.2 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T94R-04C | 63.05 | 65.5 | 2.45 | MDST | Tenas_Lithology.csv |
| T94R-04C | 65.5 | 69 | 3.5 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 69 | 69.25 | 0.25 | COAL | Tenas_Lithology.csv |
| T94R-04C | 69.25 | 70.63 | 1.38 | SLTS | Tenas_Lithology.csv |
| T94R-04C | 70.63 | 70.8 | 0.17 | COAL | Tenas_Lithology.csv |
| T94R-04C | 70.8 | 73.65 | 2.85 | SST | Tenas_Lithology.csv |
| T94R-04C | 73.65 | 73.82 | 0.17 | COAL | Tenas_Lithology.csv |
| T94R-04C | 73.82 | 74.7 | 0.88 | SST | Tenas_Lithology.csv |
| T94R-05 | 0 | 3.97 | 3.97 | Overburden | Tenas_Lithology.csv |
| T94R-05 | 3.97 | 8.5 | 4.53 | MDST | Tenas_Lithology.csv |
| T94R-05 | 8.5 | 14 | 5.5 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 14 | 38.4 | 24.4 | SST | Tenas_Lithology.csv |
| T94R-05 | 38.4 | 49.5 | 11.1 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 49.5 | 58.68 | 9.18 | SST | Tenas_Lithology.csv |
| T94R-05 | 58.68 | 59.03 | 0.35 | COAL | Tenas_Lithology.csv |
| T94R-05 | 59.03 | 64.2 | 5.17 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 64.2 | 70.56 | 6.36 | SST | Tenas_Lithology.csv |
| T94R-05 | 70.56 | 71.62 | 1.06 | COAL | Tenas_Lithology.csv |
| T94R-05 | 71.62 | 79.31 | 7.69 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 79.31 | 79.57 | 0.26 | COAL | Tenas_Lithology.csv |
| T94R-05 | 79.57 | 82.35 | 2.78 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 82.35 | 82.79 | 0.44 | COAL | Tenas_Lithology.csv |
| T94R-05 | 82.79 | 84.85 | 2.06 | MDST | Tenas_Lithology.csv |
| T94R-05 | 84.85 | 85.52 | 0.67 | COAL | Tenas_Lithology.csv |
| T94R-05 | 85.52 | 86.46 | 0.94 | MDST | Tenas_Lithology.csv |
| T94R-05 | 86.46 | 86.86 | 0.4 | COAL | Tenas_Lithology.csv |
| T94R-05 | 86.86 | 88.26 | 1.4 | SST | Tenas_Lithology.csv |
| T94R-05 | 88.26 | 88.91 | 0.65 | COAL | Tenas_Lithology.csv |
| T94R-05 | 88.91 | 90.5 | 1.59 | SST | Tenas_Lithology.csv |
| T94R-05 | 90.5 | 91.33 | 0.83 | COAL | Tenas_Lithology.csv |
| T94R-05 | 91.33 | 92.3 | 0.97 | CGL | Tenas_Lithology.csv |
| T94R-05 | 92.3 | 93.53 | 1.23 | SST | Tenas_Lithology.csv |
| T94R-05 | 93.53 | 94.21 | 0.68 | COAL | Tenas_Lithology.csv |
| T94R-05 | 94.21 | 97 | 2.79 | SST | Tenas_Lithology.csv |
| T94R-05 | 97 | 108 | 11 | SLTS | Tenas_Lithology.csv |
| T94R-05 | 108 | 113.4 | 5.4 | SST | Tenas_Lithology.csv |
| T94R-05 | 113.4 | 114.6 | 1.2 | CGL | Tenas_Lithology.csv |
| T94R-05 | 114.6 | 116.46 | 1.86 | MDST | Tenas_Lithology.csv |
| T94R-05 | 116.46 | 121.6 | 5.14 | SST | Tenas_Lithology.csv |
| T94R-06 | 0 | 1.51 | 1.51 | Overburden | Tenas_Lithology.csv |
| T94R-06 | 1.51 | 69 | 67.49 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 69 | 70.6 | 1.6 | SST | Tenas_Lithology.csv |
| T94R-06 | 70.6 | 75.7 | 5.1 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 75.7 | 80.1 | 4.4 | MDST | Tenas_Lithology.csv |
| T94R-06 | 80.1 | 81.3 | 1.2 | SST | Tenas_Lithology.csv |
| T94R-06 | 81.3 | 84.5 | 3.2 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 84.5 | 92.5 | 8 | MDST | Tenas_Lithology.csv |
| T94R-06 | 92.5 | 96.2 | 3.7 | SST | Tenas_Lithology.csv |
| T94R-06 | 96.2 | 102.6 | 6.4 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 102.6 | 105 | 2.4 | MDST | Tenas_Lithology.csv |
| T94R-06 | 105 | 128.3 | 23.3 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 128.3 | 133.5 | 5.2 | SST | Tenas_Lithology.csv |
| T94R-06 | 133.5 | 135 | 1.5 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 135 | 135.14 | 0.14 | COAL | Tenas_Lithology.csv |
| T94R-06 | 135.14 | 137.8 | 2.66 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 137.8 | 140 | 2.2 | SST | Tenas_Lithology.csv |
| T94R-06 | 140 | 141.74 | 1.74 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 141.74 | 142.13 | 0.39 | COAL | Tenas_Lithology.csv |
| T94R-06 | 142.13 | 144.12 | 1.99 | MDST | Tenas_Lithology.csv |
| T94R-06 | 144.12 | 144.58 | 0.46 | COAL | Tenas_Lithology.csv |
| T94R-06 | 144.58 | 145.61 | 1.03 | MDST | Tenas_Lithology.csv |
| T94R-06 | 145.61 | 145.9 | 0.29 | COAL | Tenas_Lithology.csv |
| T94R-06 | 145.9 | 147.06 | 1.16 | MDST | Tenas_Lithology.csv |
| T94R-06 | 147.06 | 147.32 | 0.26 | COAL | Tenas_Lithology.csv |
| T94R-06 | 147.32 | 150.56 | 3.24 | SLTS | Tenas_Lithology.csv |
| T94R-06 | 150.56 | 150.88 | 0.32 | COAL | Tenas_Lithology.csv |
| T94R-06 | 150.88 | 151.94 | 1.06 | SST | Tenas_Lithology.csv |
| T94R-06 | 151.94 | 152.21 | 0.27 | COAL | Tenas_Lithology.csv |
| T94R-06 | 152.21 | 152.22 | 0.01 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 0 | 6.11 | 6.11 | Overburden | Tenas_Lithology.csv |
| T94R-07 | 6.11 | 54.5 | 48.39 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 54.5 | 62.5 | 8 | SST | Tenas_Lithology.csv |
| T94R-07 | 62.5 | 63.1 | 0.6 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 63.1 | 63.22 | 0.12 | COAL | Tenas_Lithology.csv |
| T94R-07 | 63.22 | 64.56 | 1.34 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 64.56 | 64.68 | 0.12 | COAL | Tenas_Lithology.csv |
| T94R-07 | 64.68 | 66.5 | 1.82 | MDST | Tenas_Lithology.csv |
| T94R-07 | 66.5 | 79.28 | 12.78 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 79.28 | 80.52 | 1.24 | COAL | Tenas_Lithology.csv |
| T94R-07 | 80.52 | 89.65 | 9.13 | MDST | Tenas_Lithology.csv |
| T94R-07 | 89.65 | 90.01 | 0.36 | COAL | Tenas_Lithology.csv |
| T94R-07 | 90.01 | 96.37 | 6.36 | SLTS | Tenas_Lithology.csv |
| T94R-07 | 96.37 | 102.27 | 5.9 | COAL | Tenas_Lithology.csv |
| T94R-07 | 102.27 | 107.23 | 4.96 | MDST | Tenas_Lithology.csv |
| T94R-07 | 107.23 | 108.36 | 1.13 | COAL | Tenas_Lithology.csv |
| T94R-07 | 108.36 | 109.7 | 1.34 | MDST | Tenas_Lithology.csv |
| T94R-07 | 109.7 | 110.27 | 0.57 | COAL | Tenas_Lithology.csv |
| T94R-07 | 110.27 | 114.86 | 4.59 | MDST | Tenas_Lithology.csv |
| T94R-07 | 114.86 | 115.43 | 0.57 | COAL | Tenas_Lithology.csv |
| T94R-07 | 115.43 | 116.52 | 1.09 | MDST | Tenas_Lithology.csv |
| T94R-07 | 116.52 | 117.11 | 0.59 | COAL | Tenas_Lithology.csv |
| T94R-07 | 117.11 | 117.72 | 0.61 | MDST | Tenas_Lithology.csv |
| T94R-07 | 117.72 | 118 | 0.28 | COAL | Tenas_Lithology.csv |
| T94R-07 | 118 | 119.69 | 1.69 | MDST | Tenas_Lithology.csv |
| T94R-07 | 119.69 | 120.19 | 0.5 | COAL | Tenas_Lithology.csv |
| T94R-07 | 120.19 | 120.9 | 0.71 | SLTS | Tenas_Lithology.csv |
| T94R-08 | 0 | 17.68 | 17.68 | Overburden | Tenas_Lithology.csv |
| T94R-08 | 17.68 | 21.7 | 4.02 | SST | Tenas_Lithology.csv |
| T94R-08 | 21.7 | 54.5 | 32.8 | MDST | Tenas_Lithology.csv |
| T94R-08 | 54.5 | 106.4 | 51.9 | SLTS | Tenas_Lithology.csv |
| T94R-08 | 106.4 | 113.14 | 6.74 | MDST | Tenas_Lithology.csv |
| T94R-08 | 113.14 | 113.79 | 0.65 | COAL | Tenas_Lithology.csv |
| T94R-08 | 113.79 | 123.8 | 10.01 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T94R-08 | 123.8 | 124.17 | 0.37 | COAL | Tenas_Lithology.csv |
| T94R-08 | 124.17 | 132.4 | 8.23 | MDST | Tenas_Lithology.csv |
| T94R-08 | 132.4 | 138.3 | 5.9 | SLTS | Tenas_Lithology.csv |
| T94R-08 | 138.3 | 144.5 | 6.2 | SST | Tenas_Lithology.csv |
| T94R-09 | 0 | 56.39 | 56.39 | Overburden | Tenas_Lithology.csv |
| T94R-09 | 56.39 | 92.29 | 35.9 | CGL | Tenas_Lithology.csv |
| T94R-09 | 92.29 | 146.66 | 54.37 | VOLC | Tenas_Lithology.csv |
| T94R-10C | 0 | 6.11 | 6.11 | Overburden | Tenas_Lithology.csv |
| T94R-10C | 6.11 | 42.9 | 36.79 | MDST | Tenas_Lithology.csv |
| T94R-10C | 42.9 | 45.73 | 2.83 | SLTS | Tenas_Lithology.csv |
| T94R-10C | 45.73 | 46.34 | 0.61 | COAL | Tenas_Lithology.csv |
| T94R-10C | 46.34 | 49.33 | 2.99 | MDST | Tenas_Lithology.csv |
| T94R-10C | 49.33 | 49.96 | 0.63 | COAL | Tenas_Lithology.csv |
| T94R-10C | 49.96 | 54.53 | 4.57 | MDST | Tenas_Lithology.csv |
| T94R-10C | 54.53 | 56.36 | 1.83 | COAL | Tenas_Lithology.csv |
| T94R-10C | 56.36 | 71.15 | 14.79 | MDST | Tenas_Lithology.csv |
| T94R-10C | 71.15 | 73.66 | 2.51 | COAL | Tenas_Lithology.csv |
| T94R-10C | 73.66 | 74.94 | 1.28 | MDST | Tenas_Lithology.csv |
| T94R-10C | 74.94 | 79.05 | 4.11 | COAL | Tenas_Lithology.csv |
| T94R-10C | 79.05 | 81.51 | 2.46 | MDST | Tenas_Lithology.csv |
| T94R-10C | 81.51 | 82.6 | 1.09 | COAL | Tenas_Lithology.csv |
| T94R-10C | 82.6 | 84.08 | 1.48 | MDST | Tenas_Lithology.csv |
| T94R-10C | 84.08 | 84.52 | 0.44 | COAL | Tenas_Lithology.csv |
| T94R-10C | 84.52 | 89.6 | 5.08 | MDST | Tenas_Lithology.csv |
| T94R-11 | 0 | 67 | 67 | Overburden | Tenas_Lithology.csv |
| T94R-11 | 67 | 71.48 | 4.48 | VOLC | Tenas_Lithology.csv |
| T94R-12 | 0 | 19.51 | 19.51 | Overburden | Tenas_Lithology.csv |
| T94R-12 | 19.51 | 38.05 | 18.54 | MDST | Tenas_Lithology.csv |
| T94R-12 | 38.05 | 38.42 | 0.37 | COAL | Tenas_Lithology.csv |
| T94R-12 | 38.42 | 40.74 | 2.32 | MDST | Tenas_Lithology.csv |
| T94R-12 | 40.74 | 42.81 | 2.07 | COAL | Tenas_Lithology.csv |
| T94R-12 | 42.81 | 53.48 | 10.67 | MDST | Tenas_Lithology.csv |
| T94R-12 | 53.48 | 54.02 | 0.54 | COAL | Tenas_Lithology.csv |
| T94R-12 | 54.02 | 56.09 | 2.07 | MDST | Tenas_Lithology.csv |
| T94R-12 | 56.09 | 56.21 | 0.12 | COAL | Tenas_Lithology.csv |
| T94R-12 | 56.21 | 69.7 | 13.49 | MDST | Tenas_Lithology.csv |
| T94R-12 | 69.7 | 73.2 | 3.5 | SST | Tenas_Lithology.csv |
| T94R-12 | 73.2 | 94.8 | 21.6 | VOLC | Tenas_Lithology.csv |
| T94R-13 | 0 | 2.14 | 2.14 | Overburden | Tenas_Lithology.csv |
| T94R-13 | 2.14 | 41.9 | 39.76 | VOLC | Tenas_Lithology.csv |
| T95R-06 | 0 | 92.9 | 92.9 | Overburden | Tenas_Lithology.csv |
| T95R-06 | 92.9 | 116 | 23.1 | VOLC | Tenas_Lithology.csv |
| T95R-07C | 0 | 6.4 | 6.4 | Overburden | Tenas_Lithology.csv |
| T95R-07C | 6.4 | 6.95 | 0.55 | MDST | Tenas_Lithology.csv |
| T95R-07C | 6.95 | 7.57 | 0.62 | COAL | Tenas_Lithology.csv |
| T95R-07C | 7.57 | 10.94 | 3.37 | MDST | Tenas_Lithology.csv |
| T95R-07C | 10.94 | 13.01 | 2.07 | COAL | Tenas_Lithology.csv |
| T95R-07C | 13.01 | 19.5 | 6.49 | MDST | Tenas_Lithology.csv |
| T95R-07C | 19.5 | 19.85 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-07C | 19.85 | 23.59 | 3.74 | MDST | Tenas_Lithology.csv |
| T95R-07C | 23.59 | 28.94 | 5.35 | COAL | Tenas_Lithology.csv |
| T95R-07C | 28.94 | 30.22 | 1.28 | MDST | Tenas_Lithology.csv |
| T95R-07C | 30.22 | 30.7 | 0.48 | COAL | Tenas_Lithology.csv |
| T95R-07C | 30.7 | 30.83 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-07C | 30.83 | 31.14 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-07C | 31.14 | 32.12 | 0.98 | MDST | Tenas_Lithology.csv |
| T95R-07C | 32.12 | 32.59 | 0.47 | COAL | Tenas_Lithology.csv |
| T95R-07C | 32.59 | 33.69 | 1.1 | MDST | Tenas_Lithology.csv |
| T95R-07C | 33.69 | 34.11 | 0.42 | COAL | Tenas_Lithology.csv |
| T95R-07C | 34.11 | 34.62 | 0.51 | MDST | Tenas_Lithology.csv |
| T95R-07C | 34.62 | 34.8 | 0.18 | COAL | Tenas_Lithology.csv |
| T95R-07C | 34.8 | 37.83 | 3.03 | MDST | Tenas_Lithology.csv |
| T95R-07C | 37.83 | 38.39 | 0.56 | COAL | Tenas_Lithology.csv |
| T95R-07C | 38.39 | 39.2 | 0.81 | MDST | Tenas_Lithology.csv |
| T95R-07C | 39.2 | 39.91 | 0.71 | COAL | Tenas_Lithology.csv |
| T95R-07C | 39.91 | 47.88 | 7.97 | MDST | Tenas_Lithology.csv |
| T95R-07C | 47.88 | 48.23 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-07C | 48.23 | 56 | 7.77 | MDST | Tenas_Lithology.csv |
| T95R-09 | 0 | 151.5 | 151.5 | Overburden | Tenas_Lithology.csv |
| T95R-09 | 151.5 | 153 | 1.5 | MDST | Tenas_Lithology.csv |
| T95R-09 | 153 | 156 | 3 | Overburden | Tenas_Lithology.csv |
| T95R-10 | 0 | 22.36 | 22.36 | Overburden | Tenas_Lithology.csv |
| T95R-10 | 22.36 | 24.4 | 2.04 | COAL | Tenas_Lithology.csv |
| T95R-10 | 24.4 | 26.7 | 2.3 | MDST | Tenas_Lithology.csv |
| T95R-10 | 26.7 | 27.15 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-10 | 27.15 | 27.89 | 0.74 | MDST | Tenas_Lithology.csv |
| T95R-10 | 27.89 | 28.33 | 0.44 | COAL | Tenas_Lithology.csv |
| T95R-10 | 28.33 | 36.05 | 7.72 | MDST | Tenas_Lithology.csv |
| T95R-10 | 36.05 | 37.9 | 1.85 | COAL | Tenas_Lithology.csv |
| T95R-10 | 37.9 | 38.66 | 0.76 | MDST | Tenas_Lithology.csv |
| T95R-10 | 38.66 | 38.98 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-10 | 38.98 | 51.31 | 12.33 | MDST | Tenas_Lithology.csv |
| T95R-10 | 51.31 | 51.7 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-10 | 51.7 | 53.85 | 2.15 | MDST | Tenas_Lithology.csv |
| T95R-10 | 53.85 | 54.2 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-10 | 54.2 | 63 | 8.8 | SLTS | Tenas_Lithology.csv |
| T95R-10 | 63 | 110.3 | 47.3 | SST | Tenas_Lithology.csv |
| T95R-10 | 110.3 | 138 | 27.7 | VOLC | Tenas_Lithology.csv |
| T95R-11 | 0 | 4.51 | 4.51 | Overburden | Tenas_Lithology.csv |
| T95R-11 | 4.51 | 22.95 | 18.44 | SLTS | Tenas_Lithology.csv |
| T95R-11 | 22.95 | 23.6 | 0.65 | COAL | Tenas_Lithology.csv |
| T95R-11 | 23.6 | 25.4 | 1.8 | MDST | Tenas_Lithology.csv |
| T95R-11 | 25.4 | 25.6 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-11 | 25.6 | 26.09 | 0.49 | MDST | Tenas_Lithology.csv |
| T95R-11 | 26.09 | 26.8 | 0.71 | COAL | Tenas_Lithology.csv |
| T95R-11 | 26.8 | 27.57 | 0.77 | MDST | Tenas_Lithology.csv |
| T95R-11 | 27.57 | 28.4 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-11 | 28.4 | 35.9 | 7.5 | MDST | Tenas_Lithology.csv |
| T95R-11 | 35.9 | 36 | 0.1 | COAL | Tenas_Lithology.csv |
| T95R-11 | 36 | 36.58 | 0.58 | MDST | Tenas_Lithology.csv |
| T95R-11 | 36.58 | 36.86 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-11 | 36.86 | 41.2 | 4.34 | SST | Tenas_Lithology.csv |
| T95R-11 | 41.2 | 41.63 | 0.43 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-11 | 41.63 | 43.42 | 1.79 | MDST | Tenas_Lithology.csv |
| T95R-11 | 43.42 | 43.66 | 0.24 | COAL | Tenas_Lithology.csv |
| T95R-11 | 43.66 | 55 | 11.34 | SLTS | Tenas_Lithology.csv |
| T95R-13 | 0 | 6.01 | 6.01 | Overburden | Tenas_Lithology.csv |
| T95R-13 | 6.01 | 30.3 | 24.29 | SLTS | Tenas_Lithology.csv |
| T95R-13 | 30.3 | 41.59 | 11.29 | MDST | Tenas_Lithology.csv |
| T95R-13 | 41.59 | 42.16 | 0.57 | COAL | Tenas_Lithology.csv |
| T95R-13 | 42.16 | 45 | 2.84 | MDST | Tenas_Lithology.csv |
| T95R-13 | 45 | 56.6 | 11.6 | SLTS | Tenas_Lithology.csv |
| T95R-13 | 56.6 | 56.9 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-13 | 56.9 | 60.65 | 3.75 | MDST | Tenas_Lithology.csv |
| T95R-13 | 60.65 | 62.64 | 1.99 | COAL | Tenas_Lithology.csv |
| T95R-13 | 62.64 | 63.6 | 0.96 | MDST | Tenas_Lithology.csv |
| T95R-13 | 63.6 | 67.32 | 3.72 | COAL | Tenas_Lithology.csv |
| T95R-13 | 67.32 | 69.7 | 2.38 | MDST | Tenas_Lithology.csv |
| T95R-13 | 69.7 | 71.3 | 1.6 | COAL | Tenas_Lithology.csv |
| T95R-13 | 71.3 | 73.3 | 2 | MDST | Tenas_Lithology.csv |
| T95R-13 | 73.3 | 73.6 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-13 | 73.6 | 78.65 | 5.05 | MDST | Tenas_Lithology.csv |
| T95R-13 | 78.65 | 79.4 | 0.75 | COAL | Tenas_Lithology.csv |
| T95R-13 | 79.4 | 81.82 | 2.42 | MDST | Tenas_Lithology.csv |
| T95R-13 | 81.82 | 82.36 | 0.54 | COAL | Tenas_Lithology.csv |
| T95R-13 | 82.36 | 85.12 | 2.76 | MDST | Tenas_Lithology.csv |
| T95R-13 | 85.12 | 85.33 | 0.21 | COAL | Tenas_Lithology.csv |
| T95R-13 | 85.33 | 91.1 | 5.77 | SLTS | Tenas_Lithology.csv |
| T95R-13 | 91.1 | 96 | 4.9 | SST | Tenas_Lithology.csv |
| T95R-13 | 96 | 105.3 | 9.3 | CGL | Tenas_Lithology.csv |
| T95R-14 | 0 | 9.01 | 9.01 | Overburden | Tenas_Lithology.csv |
| T95R-14 | 9.01 | 30 | 20.99 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 30 | 54.3 | 24.3 | MDST | Tenas_Lithology.csv |
| T95R-14 | 54.3 | 97.5 | 43.2 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 97.5 | 100.7 | 3.2 | SST | Tenas_Lithology.csv |
| T95R-14 | 100.7 | 105.6 | 4.9 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 105.6 | 109.7 | 4.1 | SST | Tenas_Lithology.csv |
| T95R-14 | 109.7 | 114.67 | 4.97 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 114.67 | 115.45 | 0.78 | COAL | Tenas_Lithology.csv |
| T95R-14 | 115.45 | 119.17 | 3.72 | MDST | Tenas_Lithology.csv |
| T95R-14 | 119.17 | 120.9 | 1.73 | COAL | Tenas_Lithology.csv |
| T95R-14 | 120.9 | 133.9 | 13 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 133.9 | 135.95 | 2.05 | COAL | Tenas_Lithology.csv |
| T95R-14 | 135.95 | 142.15 | 6.2 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 142.15 | 143.27 | 1.12 | COAL | Tenas_Lithology.csv |
| T95R-14 | 143.27 | 143.48 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-14 | 143.48 | 144.68 | 1.2 | COAL | Tenas_Lithology.csv |
| T95R-14 | 144.68 | 152.34 | 7.66 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 152.34 | 153.18 | 0.84 | COAL | Tenas_Lithology.csv |
| T95R-14 | 153.18 | 155.2 | 2.02 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 155.2 | 162.6 | 7.4 | CGL | Tenas_Lithology.csv |
| T95R-14 | 162.6 | 167 | 4.4 | SLTS | Tenas_Lithology.csv |
| T95R-14 | 167 | 178 | 11 | SST | Tenas_Lithology.csv |
| T95R-15C | 0 | 6.51 | 6.51 | Overburden | Tenas_Lithology.csv |
| T95R-15C | 6.51 | 19.57 | 13.06 | SLTS | Tenas_Lithology.csv |
| T95R-15C | 19.57 | 27.84 | 8.27 | MDST | Tenas_Lithology.csv |
| T95R-15C | 27.84 | 29.91 | 2.07 | SLTS | Tenas_Lithology.csv |
| T95R-15C | 29.91 | 31.2 | 1.29 | MDST | Tenas_Lithology.csv |
| T95R-15C | 31.2 | 31.5 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-15C | 31.5 | 36.3 | 4.8 | MDST | Tenas_Lithology.csv |
| T95R-15C | 36.3 | 36.7 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-15C | 36.7 | 39.02 | 2.32 | MDST | Tenas_Lithology.csv |
| T95R-15C | 39.02 | 41.2 | 2.18 | COAL | Tenas_Lithology.csv |
| T95R-15C | 41.2 | 47.63 | 6.43 | MDST | Tenas_Lithology.csv |
| T95R-15C | 47.63 | 47.92 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-15C | 47.92 | 51.18 | 3.26 | MDST | Tenas_Lithology.csv |
| T95R-15C | 51.18 | 53.47 | 2.29 | COAL | Tenas_Lithology.csv |
| T95R-15C | 53.47 | 56.9 | 3.43 | MDST | Tenas_Lithology.csv |
| T95R-15C | 56.9 | 61.22 | 4.32 | COAL | Tenas_Lithology.csv |
| T95R-15C | 61.22 | 63.84 | 2.62 | MDST | Tenas_Lithology.csv |
| T95R-15C | 63.84 | 71.4 | 7.56 | SST | Tenas_Lithology.csv |
| T95R-15C | 71.4 | 75.35 | 3.95 | MDST | Tenas_Lithology.csv |
| T95R-15C | 75.35 | 75.62 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-15C | 75.62 | 77.1 | 1.48 | MDST | Tenas_Lithology.csv |
| T95R-15C | 77.1 | 77.42 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-15C | 77.42 | 80.2 | 2.78 | MDST | Tenas_Lithology.csv |
| T95R-15C | 80.2 | 80.65 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-15C | 80.65 | 81.95 | 1.3 | MDST | Tenas_Lithology.csv |
| T95R-15C | 81.95 | 82.21 | 0.26 | COAL | Tenas_Lithology.csv |
| T95R-15C | 82.21 | 100 | 17.79 | SLTS | Tenas_Lithology.csv |
| T95R-17 | 0 | 5.51 | 5.51 | Overburden | Tenas_Lithology.csv |
| T95R-17 | 5.51 | 40.7 | 35.19 | SST | Tenas_Lithology.csv |
| T95R-17 | 40.7 | 46.8 | 6.1 | SLTS | Tenas_Lithology.csv |
| T95R-17 | 46.8 | 50.3 | 3.5 | SST | Tenas_Lithology.csv |
| T95R-17 | 50.3 | 118.5 | 68.2 | MDST | Tenas_Lithology.csv |
| T95R-17 | 118.5 | 121 | 2.5 | SST | Tenas_Lithology.csv |
| T95R-17 | 121 | 125.15 | 4.15 | MDST | Tenas_Lithology.csv |
| T95R-17 | 125.15 | 125.57 | 0.42 | COAL | Tenas_Lithology.csv |
| T95R-17 | 125.57 | 127.61 | 2.04 | MDST | Tenas_Lithology.csv |
| T95R-17 | 127.61 | 128.31 | 0.7 | COAL | Tenas_Lithology.csv |
| T95R-17 | 128.31 | 129.83 | 1.52 | MDST | Tenas_Lithology.csv |
| T95R-17 | 129.83 | 130 | 0.17 | COAL | Tenas_Lithology.csv |
| T95R-17 | 130 | 130.25 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-17 | 130.25 | 130.5 | 0.25 | COAL | Tenas_Lithology.csv |
| T95R-17 | 130.5 | 131.9 | 1.4 | MDST | Tenas_Lithology.csv |
| T95R-17 | 131.9 | 132.1 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-17 | 132.1 | 133.8 | 1.7 | MDST | Tenas_Lithology.csv |
| T95R-17 | 133.8 | 134.3 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-17 | 134.3 | 135.1 | 0.8 | MDST | Tenas_Lithology.csv |
| T95R-17 | 135.1 | 135.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-17 | 135.4 | 142.4 | 7 | MDST | Tenas_Lithology.csv |
| T95R-17 | 142.4 | 158.5 | 16.1 | SLTS | Tenas_Lithology.csv |
| T95R-17 | 158.5 | 178 | 19.5 | SST | Tenas_Lithology.csv |
| T95R-19C | 0 | 7.01 | 7.01 | Overburden | Tenas_Lithology.csv |
| T95R-19C | 7.01 | 33.83 | 26.82 | MDST | Tenas_Lithology.csv |
| T95R-19C | 33.83 | 34.3 | 0.47 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-19C | 34.3 | 37.8 | 3.5 | MDST | Tenas_Lithology.csv |
| T95R-19C | 37.8 | 38.15 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-19C | 38.15 | 40.11 | 1.96 | MDST | Tenas_Lithology.csv |
| T95R-19C | 40.11 | 40.27 | 0.16 | COAL | Tenas_Lithology.csv |
| T95R-19C | 40.27 | 43.27 | 3 | MDST | Tenas_Lithology.csv |
| T95R-19C | 43.27 | 43.47 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-19C | 43.47 | 44.46 | 0.99 | MDST | Tenas_Lithology.csv |
| T95R-19C | 44.46 | 46.37 | 1.91 | COAL | Tenas_Lithology.csv |
| T95R-19C | 46.37 | 53.34 | 6.97 | MDST | Tenas_Lithology.csv |
| T95R-19C | 53.34 | 53.78 | 0.44 | COAL | Tenas_Lithology.csv |
| T95R-19C | 53.78 | 59.76 | 5.98 | MDST | Tenas_Lithology.csv |
| T95R-19C | 59.76 | 61.85 | 2.09 | COAL | Tenas_Lithology.csv |
| T95R-19C | 61.85 | 61.9 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-19C | 61.9 | 66.21 | 4.31 | COAL | Tenas_Lithology.csv |
| T95R-19C | 66.21 | 69.64 | 3.43 | MDST | Tenas_Lithology.csv |
| T95R-19C | 69.64 | 69.97 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-19C | 69.97 | 70.06 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-19C | 70.06 | 71.19 | 1.13 | COAL | Tenas_Lithology.csv |
| T95R-19C | 71.19 | 71.68 | 0.49 | MDST | Tenas_Lithology.csv |
| T95R-19C | 71.68 | 72.43 | 0.75 | COAL | Tenas_Lithology.csv |
| T95R-19C | 72.43 | 77.32 | 4.89 | MDST | Tenas_Lithology.csv |
| T95R-19C | 77.32 | 77.63 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-19C | 77.63 | 77.9 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-19C | 77.9 | 78.08 | 0.18 | COAL | Tenas_Lithology.csv |
| T95R-19C | 78.08 | 78.73 | 0.65 | MDST | Tenas_Lithology.csv |
| T95R-19C | 78.73 | 79.48 | 0.75 | COAL | Tenas_Lithology.csv |
| T95R-19C | 79.48 | 79.89 | 0.41 | MDST | Tenas_Lithology.csv |
| T95R-19C | 79.89 | 80.63 | 0.74 | COAL | Tenas_Lithology.csv |
| T95R-19C | 80.63 | 82.81 | 2.18 | MDST | Tenas_Lithology.csv |
| T95R-19C | 82.81 | 83.93 | 1.12 | COAL | Tenas_Lithology.csv |
| T95R-19C | 83.93 | 84.95 | 1.02 | MDST | Tenas_Lithology.csv |
| T95R-19C | 84.95 | 85.11 | 0.16 | COAL | Tenas_Lithology.csv |
| T95R-19C | 85.11 | 85.9 | 0.79 | MDST | Tenas_Lithology.csv |
| T95R-20 | 0 | 12 | 12 | Overburden | Tenas_Lithology.csv |
| T95R-21 | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T95R-21 | 6 | 13.78 | 7.78 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 13.78 | 13.98 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-21 | 13.98 | 17.92 | 3.94 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 17.92 | 18.26 | 0.34 | COAL | Tenas_Lithology.csv |
| T95R-21 | 18.26 | 21.18 | 2.92 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 21.18 | 21.85 | 0.67 | COAL | Tenas_Lithology.csv |
| T95R-21 | 21.85 | 25.93 | 4.08 | MDST | Tenas_Lithology.csv |
| T95R-21 | 25.93 | 26.17 | 0.24 | COAL | Tenas_Lithology.csv |
| T95R-21 | 26.17 | 26.58 | 0.41 | MDST | Tenas_Lithology.csv |
| T95R-21 | 26.58 | 28.4 | 1.82 | COAL | Tenas_Lithology.csv |
| T95R-21 | 28.4 | 35.15 | 6.75 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 35.15 | 35.47 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-21 | 35.47 | 40.47 | 5 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 40.47 | 46.35 | 5.88 | COAL | Tenas_Lithology.csv |
| T95R-21 | 46.35 | 47.78 | 1.43 | MDST | Tenas_Lithology.csv |
| T95R-21 | 47.78 | 48.28 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-21 | 48.28 | 48.55 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-21 | 48.55 | 48.88 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-21 | 48.88 | 61.76 | 12.88 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 61.76 | 62.4 | 0.64 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-21 | 62.4 | 63.85 | 1.45 | MDST | Tenas_Lithology.csv |
| T95R-21 | 63.85 | 64.38 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-21 | 64.38 | 67.59 | 3.21 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 67.59 | 68.01 | 0.42 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-21 | 68.01 | 69.76 | 1.75 | SLTS | Tenas_Lithology.csv |
| T95R-21 | 69.76 | 70.13 | 0.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-21 | 70.13 | 73 | 2.87 | SLTS | Tenas_Lithology.csv |
| T95R-22C | 0 | 12.51 | 12.51 | Overburden | Tenas_Lithology.csv |
| T95R-22C | 12.51 | 12.8 | 0.29 | MDST | Tenas_Lithology.csv |
| T95R-22C | 12.8 | 15.25 | 2.45 | COAL | Tenas_Lithology.csv |
| T95R-22C | 15.25 | 15.65 | 0.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-22C | 15.65 | 18.2 | 2.55 | COAL | Tenas_Lithology.csv |
| T95R-22C | 18.2 | 19.85 | 1.65 | MDST | Tenas_Lithology.csv |
| T95R-22C | 19.85 | 21.72 | 1.87 | COAL | Tenas_Lithology.csv |
| T95R-22C | 21.72 | 22.53 | 0.81 | MDST | Tenas_Lithology.csv |
| T95R-22C | 22.53 | 22.91 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-22C | 22.91 | 24.18 | 1.27 | MDST | Tenas_Lithology.csv |
| T95R-22C | 24.18 | 24.85 | 0.67 | COAL | Tenas_Lithology.csv |
| T95R-22C | 24.85 | 25.4 | 0.55 | MDST | Tenas_Lithology.csv |
| T95R-22C | 25.4 | 28.6 | 3.2 | COAL | Tenas_Lithology.csv |
| T95R-22C | 28.6 | 33.6 | 5 | MDST | Tenas_Lithology.csv |
| T95R-22C | 33.6 | 34.29 | 0.69 | COAL | Tenas_Lithology.csv |
| T95R-22C | 34.29 | 36.39 | 2.1 | MDST | Tenas_Lithology.csv |
| T95R-22C | 36.39 | 37.23 | 0.84 | COAL | Tenas_Lithology.csv |
| T95R-22C | 37.23 | 38.26 | 1.03 | MDST | Tenas_Lithology.csv |
| T95R-22C | 38.26 | 38.53 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-22C | 38.53 | 51.9 | 13.37 | MDST | Tenas_Lithology.csv |
| T95R-22C | 51.9 | 52.6 | 0.7 | COAL | Tenas_Lithology.csv |
| T95R-22C | 52.6 | 52.9 | 0.3 | MDST | Tenas_Lithology.csv |
| T95R-22C | 52.9 | 53 | 0.1 | COAL | Tenas_Lithology.csv |
| T95R-22C | 53 | 53.15 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-22C | 53.15 | 54.13 | 0.98 | COAL | Tenas_Lithology.csv |
| T95R-22C | 54.13 | 62.34 | 8.21 | MDST | Tenas_Lithology.csv |
| T95R-22C | 62.34 | 63.12 | 0.78 | COAL | Tenas_Lithology.csv |
| T95R-22C | 63.12 | 96.5 | 33.38 | MDST | Tenas_Lithology.csv |
| T95R-22C | 96.5 | 97.4 | 0.9 | SST | Tenas_Lithology.csv |
| T95R-22C | 97.4 | 114.9 | 17.5 | CGL | Tenas_Lithology.csv |
| T95R-24 | 0 | 5.31 | 5.31 | Overburden | Tenas_Lithology.csv |
| T95R-24 | 5.31 | 14.5 | 9.19 | MDST | Tenas_Lithology.csv |
| T95R-24 | 14.5 | 16.04 | 1.54 | SST | Tenas_Lithology.csv |
| T95R-24 | 16.04 | 16.21 | 0.17 | MDST | Tenas_Lithology.csv |
| T95R-24 | 16.21 | 16.54 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-24 | 16.54 | 18.81 | 2.27 | MDST | Tenas_Lithology.csv |
| T95R-24 | 18.81 | 19.37 | 0.56 | COAL | Tenas_Lithology.csv |
| T95R-24 | 19.37 | 25.28 | 5.91 | SLTS | Tenas_Lithology.csv |
| T95R-24 | 25.28 | 26.23 | 0.95 | COAL | Tenas_Lithology.csv |
| T95R-24 | 26.23 | 37.38 | 11.15 | SLTS | Tenas_Lithology.csv |
| T95R-24 | 37.38 | 39.22 | 1.84 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-24 | 39.22 | 40.75 | 1.53 | MDST | Tenas_Lithology.csv |
| T95R-24 | 40.75 | 44.19 | 3.44 | COAL | Tenas_Lithology.csv |
| T95R-24 | 44.19 | 44.69 | 0.5 | MDST | Tenas_Lithology.csv |
| T95R-24 | 44.69 | 45.22 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-24 | 45.22 | 45.37 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-24 | 45.37 | 45.77 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-24 | 45.77 | 49 | 3.23 | SST | Tenas_Lithology.csv |
| T95R-24 | 49 | 57.65 | 8.65 | MDST | Tenas_Lithology.csv |
| T95R-24 | 57.65 | 58.08 | 0.43 | COAL | Tenas_Lithology.csv |
| T95R-24 | 58.08 | 59.8 | 1.72 | MDST | Tenas_Lithology.csv |
| T95R-24 | 59.8 | 60.3 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-24 | 60.3 | 63.84 | 3.54 | MDST | Tenas_Lithology.csv |
| T95R-24 | 63.84 | 64.27 | 0.43 | COAL | Tenas_Lithology.csv |
| T95R-24 | 64.27 | 66.72 | 2.45 | MDST | Tenas_Lithology.csv |
| T95R-24 | 66.72 | 67.03 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-24 | 67.03 | 67.9 | 0.87 | MDST | Tenas_Lithology.csv |
| T95R-25 | 0 | 5.21 | 5.21 | Overburden | Tenas_Lithology.csv |
| T95R-25 | 5.21 | 5.5 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-25 | 5.5 | 7.1 | 1.6 | MDST | Tenas_Lithology.csv |
| T95R-25 | 7.1 | 7.37 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-25 | 7.37 | 8.8 | 1.43 | SLTS | Tenas_Lithology.csv |
| T95R-25 | 8.8 | 9 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-25 | 9 | 15 | 6 | SST | Tenas_Lithology.csv |
| T95R-25 | 15 | 15.27 | 0.27 | MDST | Tenas_Lithology.csv |
| T95R-25 | 15.27 | 15.72 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-25 | 15.72 | 15.9 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-25 | 15.9 | 16.52 | 0.62 | COAL | Tenas_Lithology.csv |
| T95R-25 | 16.52 | 18.58 | 2.06 | MDST | Tenas_Lithology.csv |
| T95R-25 | 18.58 | 26.85 | 8.27 | SST | Tenas_Lithology.csv |
| T95R-25 | 26.85 | 27.44 | 0.59 | COAL | Tenas_Lithology.csv |
| T95R-25 | 27.44 | 31.7 | 4.26 | SLTS | Tenas_Lithology.csv |
| T95R-25 | 31.7 | 37 | 5.3 | SST | Tenas_Lithology.csv |
| T95R-25 | 37 | 43 | 6 | CGL | Tenas_Lithology.csv |
| T95R-26 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T95R-26 | 7 | 11 | 4 | CGL | Tenas_Lithology.csv |
| T95R-26 | 11 | 15 | 4 | MDST | Tenas_Lithology.csv |
| T95R-26 | 15 | 16 | 1 | CGL | Tenas_Lithology.csv |
| T95R-26 | 16 | 19 | 3 | MDST | Tenas_Lithology.csv |
| T95R-26 | 19 | 23 | 4 | CGL | Tenas_Lithology.csv |
| T95R-26 | 23 | 26 | 3 | MDST | Tenas_Lithology.csv |
| T95R-26 | 26 | 32 | 6 | CGL | Tenas_Lithology.csv |
| T95R-26 | 32 | 57 | 25 | MDST | Tenas_Lithology.csv |
| T95R-26 | 57 | 80 | 23 | VOLC | Tenas_Lithology.csv |
| T95R-28C | 0 | 5.81 | 5.81 | Overburden | Tenas_Lithology.csv |
| T95R-28C | 5.81 | 15.6 | 9.79 | SLTS | Tenas_Lithology.csv |
| T95R-28C | 15.6 | 30.56 | 14.96 | MDST | Tenas_Lithology.csv |
| T95R-28C | 30.56 | 33.76 | 3.2 | SLTS | Tenas_Lithology.csv |
| T95R-28C | 33.76 | 34.41 | 0.65 | MDST | Tenas_Lithology.csv |
| T95R-28C | 34.41 | 34.95 | 0.54 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 34.95 | 40.3 | 5.35 | MDST | Tenas_Lithology.csv |
| T95R-28C | 40.3 | 40.67 | 0.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 40.67 | 46.76 | 6.09 | MDST | Tenas_Lithology.csv |
| T95R-28C | 46.76 | 48.62 | 1.86 | COAL | Tenas_Lithology.csv |
| T95R-28C | 48.62 | 55.57 | 6.95 | MDST | Tenas_Lithology.csv |
| T95R-28C | 55.57 | 55.72 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 55.72 | 59.5 | 3.78 | MDST | Tenas_Lithology.csv |
| T95R-28C | 59.5 | 61.29 | 1.79 | COAL | Tenas_Lithology.csv |
| T95R-28C | 61.29 | 62.39 | 1.1 | MDST | Tenas_Lithology.csv |
| T95R-28C | 62.39 | 63.7 | 1.31 | COAL | Tenas_Lithology.csv |
| T95R-28C | 63.7 | 64.99 | 1.29 | MDST | Tenas_Lithology.csv |
| T95R-28C | 64.99 | 67.37 | 2.38 | COAL | Tenas_Lithology.csv |
| T95R-28C | 67.37 | 67.6 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 67.6 | 67.85 | 0.25 | COAL | Tenas_Lithology.csv |
| T95R-28C | 67.85 | 76.22 | 8.37 | MDST | Tenas_Lithology.csv |
| T95R-28C | 76.22 | 77.01 | 0.79 | COAL | Tenas_Lithology.csv |
| T95R-28C | 77.01 | 77.97 | 0.96 | MDST | Tenas_Lithology.csv |
| T95R-28C | 77.97 | 78.38 | 0.41 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-28C | 78.38 | 86.43 | 8.05 | MDST | Tenas_Lithology.csv |
| T95R-28C | 86.43 | 86.78 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-28C | 86.78 | 87.28 | 0.5 | MDST | Tenas_Lithology.csv |
| T95R-28C | 87.28 | 88.14 | 0.86 | COAL | Tenas_Lithology.csv |
| T95R-28C | 88.14 | 89.17 | 1.03 | MDST | Tenas_Lithology.csv |
| T95R-28C | 89.17 | 89.42 | 0.25 | COAL | Tenas_Lithology.csv |
| T95R-28C | 89.42 | 89.76 | 0.34 | MDST | Tenas_Lithology.csv |
| T95R-28C | 89.76 | 90 | 0.24 | COAL | Tenas_Lithology.csv |
| T95R-28C | 90 | 91.25 | 1.25 | MDST | Tenas_Lithology.csv |
| T95R-28C | 91.25 | 91.91 | 0.66 | COAL | Tenas_Lithology.csv |
| T95R-28C | 91.91 | 99.7 | 7.79 | MDST | Tenas_Lithology.csv |
| T95R-28C | 99.7 | 115.9 | 16.2 | SLTS | Tenas_Lithology.csv |
| T95R-30 | 0 | 12.01 | 12.01 | Overburden | Tenas_Lithology.csv |
| T95R-30 | 12.01 | 53.3 | 41.29 | VOLC | Tenas_Lithology.csv |
| T95R-31 | 0 | 9.01 | 9.01 | Overburden | Tenas_Lithology.csv |
| T95R-31 | 9.01 | 25.3 | 16.29 | SST | Tenas_Lithology.csv |
| T95R-31 | 25.3 | 34.2 | 8.9 | MDST | Tenas_Lithology.csv |
| T95R-31 | 34.2 | 47.92 | 13.72 | SLTS | Tenas_Lithology.csv |
| T95R-31 | 47.92 | 49.45 | 1.53 | COAL | Tenas_Lithology.csv |
| T95R-31 | 49.45 | 56.55 | 7.1 | SLTS | Tenas_Lithology.csv |
| T95R-31 | 56.55 | 56.88 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-31 | 56.88 | 58.9 | 2.02 | MDST | Tenas_Lithology.csv |
| T95R-31 | 58.9 | 61.5 | 2.6 | SST | Tenas_Lithology.csv |
| T95R-31 | 61.5 | 64.02 | 2.52 | MDST | Tenas_Lithology.csv |
| T95R-31 | 64.02 | 65.45 | 1.43 | COAL | Tenas_Lithology.csv |
| T95R-31 | 65.45 | 65.75 | 0.3 | MDST | Tenas_Lithology.csv |
| T95R-31 | 65.75 | 67.07 | 1.32 | COAL | Tenas_Lithology.csv |
| T95R-31 | 67.07 | 67.75 | 0.68 | MDST | Tenas_Lithology.csv |
| T95R-31 | 67.75 | 67.97 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-31 | 67.97 | 69.44 | 1.47 | MDST | Tenas_Lithology.csv |
| T95R-31 | 69.44 | 70.2 | 0.76 | COAL | Tenas_Lithology.csv |
| T95R-31 | 70.2 | 70.35 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-31 | 70.35 | 71.4 | 1.05 | COAL | Tenas_Lithology.csv |
| T95R-31 | 71.4 | 72.42 | 1.02 | MDST | Tenas_Lithology.csv |
| T95R-31 | 72.42 | 73.03 | 0.61 | COAL | Tenas_Lithology.csv |
| T95R-31 | 73.03 | 74.85 | 1.82 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-31 | 74.85 | 75.65 | 0.8 | COAL | Tenas_Lithology.csv |
| T95R-31 | 75.65 | 85.05 | 9.4 | MDST | Tenas_Lithology.csv |
| T95R-31 | 85.05 | 85.45 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-31 | 85.45 | 86.2 | 0.75 | MDST | Tenas_Lithology.csv |
| T95R-31 | 86.2 | 87.93 | 1.73 | COAL | Tenas_Lithology.csv |
| T95R-31 | 87.93 | 95.17 | 7.24 | MDST | Tenas_Lithology.csv |
| T95R-31 | 95.17 | 95.7 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-31 | 95.7 | 108.3 | 12.6 | SLTS | Tenas_Lithology.csv |
| T95R-31 | 108.3 | 146 | 37.7 | SST | Tenas_Lithology.csv |
| T95R-32 | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T95R-32 | 6 | 41.54 | 35.54 | SLTS | Tenas_Lithology.csv |
| T95R-32 | 41.54 | 42.11 | 0.57 | COAL | Tenas_Lithology.csv |
| T95R-32 | 42.11 | 43.49 | 1.38 | MDST | Tenas_Lithology.csv |
| T95R-32 | 43.49 | 43.82 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-32 | 43.82 | 44.66 | 0.84 | MDST | Tenas_Lithology.csv |
| T95R-32 | 44.66 | 45.28 | 0.62 | COAL | Tenas_Lithology.csv |
| T95R-32 | 45.28 | 47 | 1.72 | MDST | Tenas_Lithology.csv |
| T95R-32 | 47 | 47.2 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-32 | 47.2 | 49.5 | 2.3 | MDST | Tenas_Lithology.csv |
| T95R-32 | 49.5 | 50.48 | 0.98 | CGL | Tenas_Lithology.csv |
| T95R-32 | 50.48 | 50.61 | 0.13 | COAL | Tenas_Lithology.csv |
| T95R-32 | 50.61 | 52.3 | 1.69 | CGL | Tenas_Lithology.csv |
| T95R-32 | 52.3 | 58.3 | 6 | SLTS | Tenas_Lithology.csv |
| T95R-32 | 58.3 | 58.7 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-32 | 58.7 | 71.3 | 12.6 | SLTS | Tenas_Lithology.csv |
| T95R-32 | 71.3 | 75.6 | 4.3 | SST | Tenas_Lithology.csv |
| T95R-32 | 75.6 | 80.2 | 4.6 | CGL | Tenas_Lithology.csv |
| T95R-32 | 80.2 | 89.1 | 8.9 | SST | Tenas_Lithology.csv |
| T95R-32 | 89.1 | 95.6 | 6.5 | MDST | Tenas_Lithology.csv |
| T95R-32 | 95.6 | 105.2 | 9.6 | SST | Tenas_Lithology.csv |
| T95R-32 | 105.2 | 117.4 | 12.2 | CGL | Tenas_Lithology.csv |
| T95R-32 | 117.4 | 142.05 | 24.65 | MDST | Tenas_Lithology.csv |
| T95R-32 | 142.05 | 147 | 4.95 | VOLC | Tenas_Lithology.csv |
| T95R-34 | 0 | 5.01 | 5.01 | Overburden | Tenas_Lithology.csv |
| T95R-34 | 5.01 | 46.25 | 41.24 | MDST | Tenas_Lithology.csv |
| T95R-34 | 46.25 | 48.2 | 1.95 | COAL | Tenas_Lithology.csv |
| T95R-34 | 48.2 | 55.89 | 7.69 | MDST | Tenas_Lithology.csv |
| T95R-34 | 55.89 | 56.28 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-34 | 56.28 | 63.08 | 6.8 | MDST | Tenas_Lithology.csv |
| T95R-34 | 63.08 | 64.23 | 1.15 | COAL | Tenas_Lithology.csv |
| T95R-34 | 64.23 | 64.6 | 0.37 | MDST | Tenas_Lithology.csv |
| T95R-34 | 64.6 | 65.01 | 0.41 | COAL | Tenas_Lithology.csv |
| T95R-34 | 65.01 | 65.17 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-34 | 65.17 | 66.13 | 0.96 | COAL | Tenas_Lithology.csv |
| T95R-34 | 66.13 | 66.41 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-34 | 66.41 | 69.88 | 3.47 | COAL | Tenas_Lithology.csv |
| T95R-34 | 69.88 | 73.22 | 3.34 | MDST | Tenas_Lithology.csv |
| T95R-34 | 73.22 | 73.68 | 0.46 | COAL | Tenas_Lithology.csv |
| T95R-34 | 73.68 | 75.3 | 1.62 | MDST | Tenas_Lithology.csv |
| T95R-34 | 75.3 | 75.99 | 0.69 | COAL | Tenas_Lithology.csv |
| T95R-34 | 75.99 | 76.52 | 0.53 | MDST | Tenas_Lithology.csv |
| T95R-34 | 76.52 | 76.75 | 0.23 | COAL | Tenas_Lithology.csv |
| T95R-34 | 76.75 | 77.3 | 0.55 | MDST | Tenas_Lithology.csv |
| T95R-34 | 77.3 | 77.7 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-34 | 77.7 | 81.89 | 4.19 | SLTS | Tenas_Lithology.csv |
| T95R-34 | 81.89 | 82.73 | 0.84 | COAL | Tenas_Lithology.csv |
| T95R-34 | 82.73 | 84.15 | 1.42 | MDST | Tenas_Lithology.csv |
| T95R-34 | 84.15 | 84.73 | 0.58 | COAL | Tenas_Lithology.csv |
| T95R-34 | 84.73 | 88.2 | 3.47 | SST | Tenas_Lithology.csv |
| T95R-34 | 88.2 | 91.8 | 3.6 | SLTS | Tenas_Lithology.csv |
| T95R-34 | 91.8 | 92.4 | 0.6 | COAL | Tenas_Lithology.csv |
| T95R-34 | 92.4 | 113 | 20.6 | SLTS | Tenas_Lithology.csv |
| T95R-34 | 113 | 116 | 3 | SST | Tenas_Lithology.csv |
| T95R-35C | 0 | 10.61 | 10.61 | Overburden | Tenas_Lithology.csv |
| T95R-35C | 10.61 | 20.5 | 9.89 | MDST | Tenas_Lithology.csv |
| T95R-35C | 20.5 | 23.9 | 3.4 | SST | Tenas_Lithology.csv |
| T95R-35C | 23.9 | 31.4 | 7.5 | SLTS | Tenas_Lithology.csv |
| T95R-35C | 31.4 | 50 | 18.6 | SST | Tenas_Lithology.csv |
| T95R-35C | 50 | 62.4 | 12.4 | MDST | Tenas_Lithology.csv |
| T95R-35C | 62.4 | 67.6 | 5.2 | SST | Tenas_Lithology.csv |
| T95R-35C | 67.6 | 75.36 | 7.76 | MDST | Tenas_Lithology.csv |
| T95R-35C | 75.36 | 75.5 | 0.14 | COAL | Tenas_Lithology.csv |
| T95R-35C | 75.5 | 77.02 | 1.52 | MDST | Tenas_Lithology.csv |
| T95R-35C | 77.02 | 79.37 | 2.35 | COAL | Tenas_Lithology.csv |
| T95R-35C | 79.37 | 84.05 | 4.68 | SLTS | Tenas_Lithology.csv |
| T95R-35C | 84.05 | 84.23 | 0.18 | MDST | Tenas_Lithology.csv |
| T95R-35C | 84.23 | 84.54 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-35C | 84.54 | 89.1 | 4.56 | MDST | Tenas_Lithology.csv |
| T95R-35C | 89.1 | 89.2 | 0.1 | COAL | Tenas_Lithology.csv |
| T95R-35C | 89.2 | 98.99 | 9.79 | SLTS | Tenas_Lithology.csv |
| T95R-35C | 98.99 | 100.08 | 1.09 | SST | Tenas_Lithology.csv |
| T95R-35C | 100.08 | 102.14 | 2.06 | SLTS | Tenas_Lithology.csv |
| T95R-35C | 102.14 | 130 | 27.86 | SST | Tenas_Lithology.csv |
| T95R-36 | 0 | 4.01 | 4.01 | Overburden | Tenas_Lithology.csv |
| T95R-36 | 4.01 | 5.61 | 1.6 | MDST | Tenas_Lithology.csv |
| T95R-36 | 5.61 | 5.82 | 0.21 | COAL | Tenas_Lithology.csv |
| T95R-36 | 5.82 | 7.43 | 1.61 | MDST | Tenas_Lithology.csv |
| T95R-36 | 7.43 | 7.71 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-36 | 7.71 | 11.98 | 4.27 | SLTS | Tenas_Lithology.csv |
| T95R-36 | 11.98 | 12.27 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-36 | 12.27 | 12.6 | 0.33 | SLTS | Tenas_Lithology.csv |
| T95R-36 | 12.6 | 14.71 | 2.11 | SST | Tenas_Lithology.csv |
| T95R-36 | 14.71 | 15.1 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-36 | 15.1 | 17.4 | 2.3 | SST | Tenas_Lithology.csv |
| T95R-36 | 17.4 | 19.65 | 2.25 | SLTS | Tenas_Lithology.csv |
| T95R-36 | 19.65 | 19.93 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-36 | 19.93 | 20.72 | 0.79 | MDST | Tenas_Lithology.csv |
| T95R-36 | 20.72 | 21.09 | 0.37 | COAL | Tenas_Lithology.csv |
| T95R-36 | 21.09 | 40.1 | 19.01 | SST | Tenas_Lithology.csv |
| T95R-36 | 40.1 | 55 | 14.9 | MDST | Tenas_Lithology.csv |
| T95R-38C | 0 | 7.01 | 7.01 | Overburden | Tenas_Lithology.csv |
| T95R-38C | 7.01 | 17.48 | 10.47 | MDST | Tenas_Lithology.csv |
| T95R-38C | 17.48 | 18.29 | 0.81 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-38C | 18.29 | 28.25 | 9.96 | MDST | Tenas_Lithology.csv |
| T95R-38C | 28.25 | 38.66 | 10.41 | COAL | Tenas_Lithology.csv |
| T95R-38C | 38.66 | 44.62 | 5.96 | MDST | Tenas_Lithology.csv |
| T95R-38C | 44.62 | 45.47 | 0.85 | COAL | Tenas_Lithology.csv |
| T95R-38C | 45.47 | 45.62 | 0.15 | MDST | Tenas_Lithology.csv |
| T95R-38C | 45.62 | 45.77 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-38C | 45.77 | 47.83 | 2.06 | MDST | Tenas_Lithology.csv |
| T95R-38C | 47.83 | 48.89 | 1.06 | COAL | Tenas_Lithology.csv |
| T95R-38C | 48.89 | 51.83 | 2.94 | MDST | Tenas_Lithology.csv |
| T95R-38C | 51.83 | 52.52 | 0.69 | COAL | Tenas_Lithology.csv |
| T95R-38C | 52.52 | 57 | 4.48 | MDST | Tenas_Lithology.csv |
| T95R-38C | 57 | 57.17 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-38C | 57.17 | 59.62 | 2.45 | MDST | Tenas_Lithology.csv |
| T95R-38C | 59.62 | 60.25 | 0.63 | COAL | Tenas_Lithology.csv |
| T95R-38C | 60.25 | 61.96 | 1.71 | MDST | Tenas_Lithology.csv |
| T95R-38C | 61.96 | 62.55 | 0.59 | COAL | Tenas_Lithology.csv |
| T95R-38C | 62.55 | 70.1 | 7.55 | MDST | Tenas_Lithology.csv |
| T95R-38C | 70.1 | 83.05 | 12.95 | SST | Tenas_Lithology.csv |
| T95R-38C | 83.05 | 104.7 | 21.65 | CGL | Tenas_Lithology.csv |
| T95R-39C | 0 | 3.01 | 3.01 | Overburden | Tenas_Lithology.csv |
| T95R-39C | 3.01 | 17.49 | 14.48 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 17.49 | 30.24 | 12.75 | MDST | Tenas_Lithology.csv |
| T95R-39C | 30.24 | 31.83 | 1.59 | SST | Tenas_Lithology.csv |
| T95R-39C | 31.83 | 32.08 | 0.25 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 32.08 | 32.35 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-39C | 32.35 | 35.81 | 3.46 | MDST | Tenas_Lithology.csv |
| T95R-39C | 35.81 | 36.15 | 0.34 | COAL | Tenas_Lithology.csv |
| T95R-39C | 36.15 | 38.78 | 2.63 | MDST | Tenas_Lithology.csv |
| T95R-39C | 38.78 | 38.94 | 0.16 | COAL | Tenas_Lithology.csv |
| T95R-39C | 38.94 | 39.78 | 0.84 | MDST | Tenas_Lithology.csv |
| T95R-39C | 39.78 | 41.43 | 1.65 | COAL | Tenas_Lithology.csv |
| T95R-39C | 41.43 | 50.29 | 8.86 | MDST | Tenas_Lithology.csv |
| T95R-39C | 50.29 | 50.61 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-39C | 50.61 | 53.9 | 3.29 | MDST | Tenas_Lithology.csv |
| T95R-39C | 53.9 | 55.98 | 2.08 | COAL | Tenas_Lithology.csv |
| T95R-39C | 55.98 | 56.44 | 0.46 | MDST | Tenas_Lithology.csv |
| T95R-39C | 56.44 | 57.11 | 0.67 | COAL | Tenas_Lithology.csv |
| T95R-39C | 57.11 | 64.53 | 7.42 | MDST | Tenas_Lithology.csv |
| T95R-39C | 64.53 | 64.83 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-39C | 64.83 | 65.87 | 1.04 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 65.87 | 66.74 | 0.87 | COAL | Tenas_Lithology.csv |
| T95R-39C | 66.74 | 70.1 | 3.36 | MDST | Tenas_Lithology.csv |
| T95R-39C | 70.1 | 71.22 | 1.12 | SST | Tenas_Lithology.csv |
| T95R-39C | 71.22 | 71.42 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-39C | 71.42 | 75.45 | 4.03 | MDST | Tenas_Lithology.csv |
| T95R-39C | 75.45 | 76.24 | 0.79 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 76.24 | 76.66 | 0.42 | SST | Tenas_Lithology.csv |
| T95R-39C | 76.66 | 77.82 | 1.16 | SLTS | Tenas_Lithology.csv |
| T95R-39C | 77.82 | 80 | 2.18 | SST | Tenas_Lithology.csv |
| T95R-40 | 0 | 38 | 38 | Overburden | Tenas_Lithology.csv |
| T95R-40 | 38 | 43 | 5 | MDST | Tenas_Lithology.csv |
| T95R-40 | 43 | 52.7 | 9.7 | COAL | Tenas_Lithology.csv |
| T95R-40 | 52.7 | 57.52 | 4.82 | MDST | Tenas_Lithology.csv |
| T95R-40 | 57.52 | 58.25 | 0.73 | COAL | Tenas_Lithology.csv |
| T95R-40 | 58.25 | 60.33 | 2.08 | MDST | Tenas_Lithology.csv |
| T95R-40 | 60.33 | 61 | 0.67 | COAL | Tenas_Lithology.csv |
| T95R-40 | 61 | 63.1 | 2.1 | MDST | Tenas_Lithology.csv |
| T95R-40 | 63.1 | 63.57 | 0.47 | COAL | Tenas_Lithology.csv |
| T95R-40 | 63.57 | 64.05 | 0.48 | MDST | Tenas_Lithology.csv |
| T95R-40 | 64.05 | 64.3 | 0.25 | COAL | Tenas_Lithology.csv |
| T95R-40 | 64.3 | 70.29 | 5.99 | MDST | Tenas_Lithology.csv |
| T95R-40 | 70.29 | 70.6 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-40 | 70.6 | 70.9 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-40 | 70.9 | 72.22 | 1.32 | COAL | Tenas_Lithology.csv |
| T95R-40 | 72.22 | 75.45 | 3.23 | MDST | Tenas_Lithology.csv |
| T95R-40 | 75.45 | 75.72 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-40 | 75.72 | 80 | 4.28 | MDST | Tenas_Lithology.csv |
| T95R-43 | 0 | 22.5 | 22.5 | Overburden | Tenas_Lithology.csv |
| T95R-43 | 22.5 | 52.35 | 29.85 | SST | Tenas_Lithology.csv |
| T95R-43 | 52.35 | 53.12 | 0.77 | COAL | Tenas_Lithology.csv |
| T95R-43 | 53.12 | 53.45 | 0.33 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-43 | 53.45 | 55.28 | 1.83 | COAL | Tenas_Lithology.csv |
| T95R-43 | 55.28 | 56.7 | 1.42 | MDST | Tenas_Lithology.csv |
| T95R-43 | 56.7 | 60.7 | 4 | SLTS | Tenas_Lithology.csv |
| T95R-43 | 60.7 | 85.3 | 24.6 | CGL | Tenas_Lithology.csv |
| T95R-43 | 85.3 | 86 | 0.7 | MDST | Tenas_Lithology.csv |
| T95R-43 | 86 | 88.6 | 2.6 | SST | Tenas_Lithology.csv |
| T95R-43 | 88.6 | 98.5 | 9.9 | CGL | Tenas_Lithology.csv |
| T95R-44 | 0 | 136 | 136 | Overburden | Tenas_Lithology.csv |
| T95R-44 | 136 | 138 | 2 | VOLC | Tenas_Lithology.csv |
| T95R-45 | 0 | 1.01 | 1.01 | Overburden | Tenas_Lithology.csv |
| T95R-45 | 1.01 | 56 | 54.99 | VOLC | Tenas_Lithology.csv |
| T95R-46 | 0 | 3.01 | 3.01 | Overburden | Tenas_Lithology.csv |
| T95R-46 | 3.01 | 28.28 | 25.27 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 28.28 | 28.67 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-46 | 28.67 | 33.36 | 4.69 | MDST | Tenas_Lithology.csv |
| T95R-46 | 33.36 | 33.55 | 0.19 | COAL | Tenas_Lithology.csv |
| T95R-46 | 33.55 | 36.09 | 2.54 | MDST | Tenas_Lithology.csv |
| T95R-46 | 36.09 | 37.75 | 1.66 | COAL | Tenas_Lithology.csv |
| T95R-46 | 37.75 | 44.93 | 7.18 | MDST | Tenas_Lithology.csv |
| T95R-46 | 44.93 | 45.24 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-46 | 45.24 | 48.8 | 3.56 | MDST | Tenas_Lithology.csv |
| T95R-46 | 48.8 | 50.72 | 1.92 | COAL | Tenas_Lithology.csv |
| T95R-46 | 50.72 | 51.08 | 0.36 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-46 | 51.08 | 54.4 | 3.32 | COAL | Tenas_Lithology.csv |
| T95R-46 | 54.4 | 55.22 | 0.82 | MDST | Tenas_Lithology.csv |
| T95R-46 | 55.22 | 56.17 | 0.95 | COAL | Tenas_Lithology.csv |
| T95R-46 | 56.17 | 65 | 8.83 | SST | Tenas_Lithology.csv |
| T95R-46 | 65 | 66 | 1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-46 | 66 | 71.61 | 5.61 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 71.61 | 72.13 | 0.52 | COAL | Tenas_Lithology.csv |
| T95R-46 | 72.13 | 74.1 | 1.97 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 74.1 | 75.15 | 1.05 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-46 | 75.15 | 77.23 | 2.08 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 77.23 | 77.65 | 0.42 | COAL | Tenas_Lithology.csv |
| T95R-46 | 77.65 | 79.55 | 1.9 | SLTS | Tenas_Lithology.csv |
| T95R-46 | 79.55 | 79.86 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-46 | 79.86 | 82.06 | 2.2 | MDST | Tenas_Lithology.csv |
| T95R-46 | 82.06 | 82.54 | 0.48 | COAL | Tenas_Lithology.csv |
| T95R-46 | 82.54 | 97.5 | 14.96 | SST | Tenas_Lithology.csv |
| T95R-50C | 0 | 6.15 | 6.15 | Overburden | Tenas_Lithology.csv |
| T95R-50C | 6.15 | 6.34 | 0.19 | MDST | Tenas_Lithology.csv |
| T95R-50C | 6.34 | 6.87 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-50C | 6.87 | 8.87 | 2 | MDST | Tenas_Lithology.csv |
| T95R-50C | 8.87 | 8.98 | 0.11 | COAL | Tenas_Lithology.csv |
| T95R-50C | 8.98 | 9.25 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-50C | 9.25 | 9.75 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-50C | 9.75 | 20.91 | 11.16 | MDST | Tenas_Lithology.csv |
| T95R-50C | 20.91 | 23.2 | 2.29 | COAL | Tenas_Lithology.csv |
| T95R-50C | 23.2 | 23.92 | 0.72 | MDST | Tenas_Lithology.csv |
| T95R-50C | 23.92 | 29.82 | 5.9 | COAL | Tenas_Lithology.csv |
| T95R-50C | 29.82 | 33.2 | 3.38 | SLTS | Tenas_Lithology.csv |
| T95R-50C | 33.2 | 33.7 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-50C | 33.7 | 35.39 | 1.69 | MDST | Tenas_Lithology.csv |
| T95R-50C | 35.39 | 35.61 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-50C | 35.61 | 83.8 | 48.19 | SST | Tenas_Lithology.csv |
| T95R-60 | 0 | 7.01 | 7.01 | Overburden | Tenas_Lithology.csv |
| T95R-60 | 7.01 | 13.13 | 6.12 | MDST | Tenas_Lithology.csv |
| T95R-60 | 13.13 | 13.48 | 0.35 | COAL | Tenas_Lithology.csv |
| T95R-60 | 13.48 | 18.94 | 5.46 | MDST | Tenas_Lithology.csv |
| T95R-60 | 18.94 | 19.28 | 0.34 | COAL | Tenas_Lithology.csv |
| T95R-60 | 19.28 | 19.7 | 0.42 | MDST | Tenas_Lithology.csv |
| T95R-60 | 19.7 | 20.29 | 0.59 | COAL | Tenas_Lithology.csv |
| T95R-60 | 20.29 | 31.23 | 10.94 | SLTS | Tenas_Lithology.csv |
| T95R-60 | 31.23 | 33.81 | 2.58 | COAL | Tenas_Lithology.csv |
| T95R-60 | 33.81 | 45.66 | 11.85 | SLTS | Tenas_Lithology.csv |
| T95R-60 | 45.66 | 46.15 | 0.49 | COAL | Tenas_Lithology.csv |
| T95R-60 | 46.15 | 57.87 | 11.72 | SLTS | Tenas_Lithology.csv |
| T95R-60 | 57.87 | 66.64 | 8.77 | COAL | Tenas_Lithology.csv |
| T95R-60 | 66.64 | 71.05 | 4.41 | MDST | Tenas_Lithology.csv |
| T95R-60 | 71.05 | 71.85 | 0.8 | COAL | Tenas_Lithology.csv |
| T95R-60 | 71.85 | 73.85 | 2 | MDST | Tenas_Lithology.csv |
| T95R-60 | 73.85 | 74.95 | 1.1 | COAL | Tenas_Lithology.csv |
| T95R-60 | 74.95 | 77.24 | 2.29 | MDST | Tenas_Lithology.csv |
| T95R-60 | 77.24 | 77.6 | 0.36 | COAL | Tenas_Lithology.csv |
| T95R-60 | 77.6 | 77.9 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-60 | 77.9 | 78.37 | 0.47 | COAL | Tenas_Lithology.csv |
| T95R-60 | 78.37 | 83.43 | 5.06 | MDST | Tenas_Lithology.csv |
| T95R-60 | 83.43 | 84.21 | 0.78 | COAL | Tenas_Lithology.csv |
| T95R-60 | 84.21 | 85.43 | 1.22 | MDST | Tenas_Lithology.csv |
| T95R-60 | 85.43 | 86.26 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-60 | 86.26 | 96.06 | 9.8 | SLTS | Tenas_Lithology.csv |
| T95R-60 | 96.06 | 96.89 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-60 | 96.89 | 101.2 | 4.31 | MDST | Tenas_Lithology.csv |
| T95R-60 | 101.2 | 115.7 | 14.5 | SST | Tenas_Lithology.csv |
| T95R-61 | 0 | 13.41 | 13.41 | Overburden | Tenas_Lithology.csv |
| T95R-61 | 13.41 | 20.6 | 7.19 | SST | Tenas_Lithology.csv |
| T95R-61 | 20.6 | 31.9 | 11.3 | SLTS | Tenas_Lithology.csv |
| T95R-61 | 31.9 | 51.23 | 19.33 | SST | Tenas_Lithology.csv |
| T95R-61 | 51.23 | 52.31 | 1.08 | COAL | Tenas_Lithology.csv |
| T95R-61 | 52.31 | 59.42 | 7.11 | SLTS | Tenas_Lithology.csv |
| T95R-61 | 59.42 | 59.8 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-61 | 59.8 | 66.6 | 6.8 | SLTS | Tenas_Lithology.csv |
| T95R-61 | 66.6 | 69.05 | 2.45 | COAL | Tenas_Lithology.csv |
| T95R-61 | 69.05 | 69.6 | 0.55 | MDST | Tenas_Lithology.csv |
| T95R-61 | 69.6 | 69.93 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-61 | 69.93 | 71.55 | 1.62 | MDST | Tenas_Lithology.csv |
| T95R-61 | 71.55 | 73.67 | 2.12 | COAL | Tenas_Lithology.csv |
| T95R-61 | 73.67 | 75.05 | 1.38 | MDST | Tenas_Lithology.csv |
| T95R-61 | 75.05 | 75.64 | 0.59 | COAL | Tenas_Lithology.csv |
| T95R-61 | 75.64 | 76.77 | 1.13 | MDST | Tenas_Lithology.csv |
| T95R-61 | 76.77 | 77.75 | 0.98 | COAL | Tenas_Lithology.csv |
| T95R-61 | 77.75 | 79.02 | 1.27 | MDST | Tenas_Lithology.csv |
| T95R-61 | 79.02 | 79.48 | 0.46 | COAL | Tenas_Lithology.csv |
| T95R-61 | 79.48 | 84.6 | 5.12 | SLTS | Tenas_Lithology.csv |
| T95R-61 | 84.6 | 84.91 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-61 | 84.91 | 86.6 | 1.69 | MDST | Tenas_Lithology.csv |
| T95R-61 | 86.6 | 87.37 | 0.77 | COAL | Tenas_Lithology.csv |
| T95R-61 | 87.37 | 93.06 | 5.69 | MDST | Tenas_Lithology.csv |
| T95R-61 | 93.06 | 93.47 | 0.41 | COAL | Tenas_Lithology.csv |
| T95R-61 | 93.47 | 104.7 | 11.23 | SST | Tenas_Lithology.csv |
| T95R-62 | 0 | 5.01 | 5.01 | Overburden | Tenas_Lithology.csv |
| T95R-62 | 5.01 | 34.25 | 29.24 | SLTS | Tenas_Lithology.csv |
| T95R-62 | 34.25 | 34.65 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-62 | 34.65 | 37.42 | 2.77 | SST | Tenas_Lithology.csv |
| T95R-62 | 37.42 | 37.88 | 0.46 | COAL | Tenas_Lithology.csv |
| T95R-62 | 37.88 | 42.36 | 4.48 | SLTS | Tenas_Lithology.csv |
| T95R-62 | 42.36 | 43.77 | 1.41 | COAL | Tenas_Lithology.csv |
| T95R-62 | 43.77 | 57.32 | 13.55 | SLTS | Tenas_Lithology.csv |
| T95R-62 | 57.32 | 58.55 | 1.23 | COAL | Tenas_Lithology.csv |
| T95R-62 | 58.55 | 60.2 | 1.65 | MDST | Tenas_Lithology.csv |
| T95R-62 | 60.2 | 61.03 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-62 | 61.03 | 66.27 | 5.24 | SLTS | Tenas_Lithology.csv |
| T95R-62 | 66.27 | 66.64 | 0.37 | COAL | Tenas_Lithology.csv |
| T95R-62 | 66.64 | 68.8 | 2.16 | SST | Tenas_Lithology.csv |
| T95R-62 | 68.8 | 81.3 | 12.5 | CGL | Tenas_Lithology.csv |
| T95R-62 | 81.3 | 90.7 | 9.4 | SST | Tenas_Lithology.csv |
| T95R-63 | 0 | 19 | 19 | Overburden | Tenas_Lithology.csv |
| T95R-63 | 19 | 20.51 | 1.51 | MDST | Tenas_Lithology.csv |
| T95R-63 | 20.51 | 21.13 | 0.62 | COAL | Tenas_Lithology.csv |
| T95R-63 | 21.13 | 24.89 | 3.76 | MDST | Tenas_Lithology.csv |
| T95R-63 | 24.89 | 25 | 0.11 | COAL | Tenas_Lithology.csv |
| T95R-63 | 25 | 25.83 | 0.83 | MDST | Tenas_Lithology.csv |
| T95R-63 | 25.83 | 26.81 | 0.98 | COAL | Tenas_Lithology.csv |
| T95R-63 | 26.81 | 30.2 | 3.39 | MDST | Tenas_Lithology.csv |
| T95R-63 | 30.2 | 34.65 | 4.45 | SST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-63 | 34.65 | 34.91 | 0.26 | COAL | Tenas_Lithology.csv |
| T95R-63 | 34.91 | 39.29 | 4.38 | MDST | Tenas_Lithology.csv |
| T95R-63 | 39.29 | 41.01 | 1.72 | COAL | Tenas_Lithology.csv |
| T95R-63 | 41.01 | 41.14 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-63 | 41.14 | 44.94 | 3.8 | COAL | Tenas_Lithology.csv |
| T95R-63 | 44.94 | 47.3 | 2.36 | MDST | Tenas_Lithology.csv |
| T95R-63 | 47.3 | 48.2 | 0.9 | COAL | Tenas_Lithology.csv |
| T95R-63 | 48.2 | 48.9 | 0.7 | MDST | Tenas_Lithology.csv |
| T95R-63 | 48.9 | 49.63 | 0.73 | COAL | Tenas_Lithology.csv |
| T95R-63 | 49.63 | 50.78 | 1.15 | MDST | Tenas_Lithology.csv |
| T95R-63 | 50.78 | 51.28 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-63 | 51.28 | 55.01 | 3.73 | SLTS | Tenas_Lithology.csv |
| T95R-63 | 55.01 | 55.4 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-63 | 55.4 | 57.5 | 2.1 | SST | Tenas_Lithology.csv |
| T95R-63 | 57.5 | 58.15 | 0.65 | COAL | Tenas_Lithology.csv |
| T95R-63 | 58.15 | 65.48 | 7.33 | MDST | Tenas_Lithology.csv |
| T95R-63 | 65.48 | 65.78 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-63 | 65.78 | 78.7 | 12.92 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 0 | 10.01 | 10.01 | Overburden | Tenas_Lithology.csv |
| T95R-64 | 10.01 | 54.05 | 44.04 | SST | Tenas_Lithology.csv |
| T95R-64 | 54.05 | 64.55 | 10.5 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 64.55 | 64.95 | 0.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 64.95 | 69.54 | 4.59 | MDST | Tenas_Lithology.csv |
| T95R-64 | 69.54 | 69.9 | 0.36 | COAL | Tenas_Lithology.csv |
| T95R-64 | 69.9 | 70.75 | 0.85 | MDST | Tenas_Lithology.csv |
| T95R-64 | 70.75 | 71.08 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-64 | 71.08 | 75.35 | 4.27 | MDST | Tenas_Lithology.csv |
| T95R-64 | 75.35 | 76.14 | 0.79 | COAL | Tenas_Lithology.csv |
| T95R-64 | 76.14 | 76.32 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 76.32 | 77.1 | 0.78 | COAL | Tenas_Lithology.csv |
| T95R-64 | 77.1 | 82.25 | 5.15 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 82.25 | 82.49 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 82.49 | 86.13 | 3.64 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 86.13 | 89 | 2.87 | COAL | Tenas_Lithology.csv |
| T95R-64 | 89 | 89.35 | 0.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 89.35 | 89.51 | 0.16 | COAL | Tenas_Lithology.csv |
| T95R-64 | 89.51 | 89.75 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-64 | 89.75 | 92.3 | 2.55 | COAL | Tenas_Lithology.csv |
| T95R-64 | 92.3 | 94.65 | 2.35 | MDST | Tenas_Lithology.csv |
| T95R-64 | 94.65 | 95.05 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-64 | 95.05 | 96.6 | 1.55 | MDST | Tenas_Lithology.csv |
| T95R-64 | 96.6 | 97.43 | 0.83 | COAL | Tenas_Lithology.csv |
| T95R-64 | 97.43 | 105.58 | 8.15 | SLTS | Tenas_Lithology.csv |
| T95R-64 | 105.58 | 105.84 | 0.26 | COAL | Tenas_Lithology.csv |
| T95R-64 | 105.84 | 107.3 | 1.46 | MDST | Tenas_Lithology.csv |
| T95R-64 | 107.3 | 108.17 | 0.87 | COAL | Tenas_Lithology.csv |
| T95R-64 | 108.17 | 116.47 | 8.3 | SST | Tenas_Lithology.csv |
| T95R-64 | 116.47 | 116.87 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-64 | 116.87 | 128.9 | 12.03 | SST | Tenas_Lithology.csv |
| T95R-65 | 0 | 14 | 14 | Overburden | Tenas_Lithology.csv |
| T95R-65 | 14 | 78.6 | 64.6 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 78.6 | 82.5 | 3.9 | MDST | Tenas_Lithology.csv |
| T95R-65 | 82.5 | 98.12 | 15.62 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 98.12 | 99.19 | 1.07 | COAL | Tenas_Lithology.csv |
| T95R-65 | 99.19 | 109.55 | 10.36 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 109.55 | 110.05 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-65 | 110.05 | 117.67 | 7.62 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 117.67 | 120.15 | 2.48 | COAL | Tenas_Lithology.csv |
| T95R-65 | 120.15 | 120.31 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-65 | 120.31 | 123.44 | 3.13 | COAL | Tenas_Lithology.csv |
| T95R-65 | 123.44 | 125.45 | 2.01 | MDST | Tenas_Lithology.csv |
| T95R-65 | 125.45 | 125.89 | 0.44 | COAL | Tenas_Lithology.csv |
| T95R-65 | 125.89 | 127.22 | 1.33 | MDST | Tenas_Lithology.csv |
| T95R-65 | 127.22 | 128.28 | 1.06 | COAL | Tenas_Lithology.csv |
| T95R-65 | 128.28 | 128.45 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-65 | 128.45 | 129 | 0.55 | COAL | Tenas_Lithology.csv |
| T95R-65 | 129 | 133.18 | 4.18 | MDST | Tenas_Lithology.csv |
| T95R-65 | 133.18 | 133.55 | 0.37 | COAL | Tenas_Lithology.csv |
| T95R-65 | 133.55 | 137.1 | 3.55 | SLTS | Tenas_Lithology.csv |
| T95R-65 | 137.1 | 137.5 | 0.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-65 | 137.5 | 140.66 | 3.16 | MDST | Tenas_Lithology.csv |
| T95R-65 | 140.66 | 141.05 | 0.39 | COAL | Tenas_Lithology.csv |
| T95R-65 | 141.05 | 141.31 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-65 | 141.31 | 142.3 | 0.99 | COAL | Tenas_Lithology.csv |
| T95R-65 | 142.3 | 144.94 | 2.64 | SST | Tenas_Lithology.csv |
| T95R-65 | 144.94 | 145.67 | 0.73 | COAL | Tenas_Lithology.csv |
| T95R-65 | 145.67 | 148.9 | 3.23 | MDST | Tenas_Lithology.csv |
| T95R-65 | 148.9 | 159.2 | 10.3 | SST | Tenas_Lithology.csv |
| T95R-66 | 0 | 15.01 | 15.01 | Overburden | Tenas_Lithology.csv |
| T95R-66 | 15.01 | 21.1 | 6.09 | MDST | Tenas_Lithology.csv |
| T95R-66 | 21.1 | 66.52 | 45.42 | SST | Tenas_Lithology.csv |
| T95R-66 | 66.52 | 75.92 | 9.4 | SLTS | Tenas_Lithology.csv |
| T95R-66 | 75.92 | 76.31 | 0.39 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-66 | 76.31 | 76.92 | 0.61 | MDST | Tenas_Lithology.csv |
| T95R-66 | 76.92 | 77.23 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-66 | 77.23 | 80.9 | 3.67 | MDST | Tenas_Lithology.csv |
| T95R-66 | 80.9 | 81.33 | 0.43 | COAL | Tenas_Lithology.csv |
| T95R-66 | 81.33 | 90.47 | 9.14 | MDST | Tenas_Lithology.csv |
| T95R-66 | 90.47 | 90.92 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-66 | 90.92 | 97.1 | 6.18 | MDST | Tenas_Lithology.csv |
| T95R-66 | 97.1 | 97.2 | 0.1 | COAL | Tenas_Lithology.csv |
| T95R-66 | 97.2 | 99.36 | 2.16 | MDST | Tenas_Lithology.csv |
| T95R-66 | 99.36 | 100.87 | 1.51 | COAL | Tenas_Lithology.csv |
| T95R-66 | 100.87 | 102.15 | 1.28 | MDST | Tenas_Lithology.csv |
| T95R-66 | 102.15 | 102.75 | 0.6 | COAL | Tenas_Lithology.csv |
| T95R-66 | 102.75 | 108.1 | 5.35 | MDST | Tenas_Lithology.csv |
| T95R-66 | 108.1 | 108.25 | 0.15 | COAL | Tenas_Lithology.csv |
| T95R-66 | 108.25 | 109.25 | 1 | MDST | Tenas_Lithology.csv |
| T95R-66 | 109.25 | 109.7 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-66 | 109.7 | 117.7 | 8 | MDST | Tenas_Lithology.csv |
| T95R-66 | 117.7 | 151 | 33.3 | SST | Tenas_Lithology.csv |
| T95R-67 | 0 | 2.01 | 2.01 | Overburden | Tenas_Lithology.csv |
| T95R-67 | 2.01 | 5.35 | 3.34 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-67 | 5.35 | 6.88 | 1.53 | COAL | Tenas_Lithology.csv |
| T95R-67 | 6.88 | 12.85 | 5.97 | MDST | Tenas_Lithology.csv |
| T95R-67 | 12.85 | 13.15 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-67 | 13.15 | 15.32 | 2.17 | MDST | Tenas_Lithology.csv |
| T95R-67 | 15.32 | 17.17 | 1.85 | COAL | Tenas_Lithology.csv |
| T95R-67 | 17.17 | 18.25 | 1.08 | MDST | Tenas_Lithology.csv |
| T95R-67 | 18.25 | 22.08 | 3.83 | COAL | Tenas_Lithology.csv |
| T95R-67 | 22.08 | 23.37 | 1.29 | MDST | Tenas_Lithology.csv |
| T95R-67 | 23.37 | 23.67 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-67 | 23.67 | 33.11 | 9.44 | SLTS | Tenas_Lithology.csv |
| T95R-67 | 33.11 | 33.54 | 0.43 | COAL | Tenas_Lithology.csv |
| T95R-67 | 33.54 | 38.02 | 4.48 | SLTS | Tenas_Lithology.csv |
| T95R-67 | 38.02 | 39.61 | 1.59 | MDST | Tenas_Lithology.csv |
| T95R-67 | 39.61 | 39.92 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-67 | 39.92 | 55 | 15.08 | SST | Tenas_Lithology.csv |
| T95R-68 | 0 | 4.51 | 4.51 | Overburden | Tenas_Lithology.csv |
| T95R-68 | 4.51 | 17.65 | 13.14 | MDST | Tenas_Lithology.csv |
| T95R-68 | 17.65 | 23.1 | 5.45 | SLTS | Tenas_Lithology.csv |
| T95R-68 | 23.1 | 24.9 | 1.8 | SST | Tenas_Lithology.csv |
| T95R-68 | 24.9 | 26.64 | 1.74 | MDST | Tenas_Lithology.csv |
| T95R-68 | 26.64 | 27.02 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-68 | 27.02 | 30.11 | 3.09 | MDST | Tenas_Lithology.csv |
| T95R-68 | 30.11 | 30.33 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-68 | 30.33 | 30.8 | 0.47 | MDST | Tenas_Lithology.csv |
| T95R-68 | 30.8 | 31.02 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-68 | 31.02 | 32.9 | 1.88 | MDST | Tenas_Lithology.csv |
| T95R-68 | 32.9 | 33.16 | 0.26 | COAL | Tenas_Lithology.csv |
| T95R-68 | 33.16 | 34.75 | 1.59 | MDST | Tenas_Lithology.csv |
| T95R-68 | 34.75 | 36.34 | 1.59 | COAL | Tenas_Lithology.csv |
| T95R-68 | 36.34 | 43.48 | 7.14 | MDST | Tenas_Lithology.csv |
| T95R-68 | 43.48 | 43.7 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-68 | 43.7 | 50.31 | 6.61 | MDST | Tenas_Lithology.csv |
| T95R-68 | 50.31 | 51.95 | 1.64 | COAL | Tenas_Lithology.csv |
| T95R-68 | 51.95 | 52.15 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-68 | 52.15 | 56.25 | 4.1 | COAL | Tenas_Lithology.csv |
| T95R-68 | 56.25 | 60.24 | 3.99 | SLTS | Tenas_Lithology.csv |
| T95R-68 | 60.24 | 60.52 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-68 | 60.52 | 60.67 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-68 | 60.67 | 60.82 | 0.15 | COAL | Tenas_Lithology.csv |
| T95R-68 | 60.82 | 61.02 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-68 | 61.02 | 61.86 | 0.84 | COAL | Tenas_Lithology.csv |
| T95R-68 | 61.86 | 62.5 | 0.64 | MDST | Tenas_Lithology.csv |
| T95R-68 | 62.5 | 63.27 | 0.77 | COAL | Tenas_Lithology.csv |
| T95R-68 | 63.27 | 64 | 0.73 | MDST | Tenas_Lithology.csv |
| T95R-68 | 64 | 64.22 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-68 | 64.22 | 67.38 | 3.16 | MDST | Tenas_Lithology.csv |
| T95R-68 | 67.38 | 67.9 | 0.52 | COAL | Tenas_Lithology.csv |
| T95R-68 | 67.9 | 73.69 | 5.79 | MDST | Tenas_Lithology.csv |
| T95R-68 | 73.69 | 73.97 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-68 | 73.97 | 96.6 | 22.63 | SST | Tenas_Lithology.csv |
| T95R-68 | 96.6 | 107.57 | 10.97 | SLTS | Tenas_Lithology.csv |
| T95R-68 | 107.57 | 120 | 12.43 | SST | Tenas_Lithology.csv |
| T95R-69 | 0 | 6.3 | 6.3 | Overburden | Tenas_Lithology.csv |
| T95R-69 | 6.3 | 15.15 | 8.85 | MDST | Tenas_Lithology.csv |
| T95R-69 | 15.15 | 15.45 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-69 | 15.45 | 19.58 | 4.13 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 19.58 | 20.11 | 0.53 | COAL | Tenas_Lithology.csv |
| T95R-69 | 20.11 | 23.27 | 3.16 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 23.27 | 25.05 | 1.78 | COAL | Tenas_Lithology.csv |
| T95R-69 | 25.05 | 32.25 | 7.2 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 32.25 | 32.55 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-69 | 32.55 | 35.4 | 2.85 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 35.4 | 37.3 | 1.9 | COAL | Tenas_Lithology.csv |
| T95R-69 | 37.3 | 38.25 | 0.95 | MDST | Tenas_Lithology.csv |
| T95R-69 | 38.25 | 41.78 | 3.53 | COAL | Tenas_Lithology.csv |
| T95R-69 | 41.78 | 42.13 | 0.35 | MDST | Tenas_Lithology.csv |
| T95R-69 | 42.13 | 42.65 | 0.52 | COAL | Tenas_Lithology.csv |
| T95R-69 | 42.65 | 43.69 | 1.04 | MDST | Tenas_Lithology.csv |
| T95R-69 | 43.69 | 44.05 | 0.36 | COAL | Tenas_Lithology.csv |
| T95R-69 | 44.05 | 53.2 | 9.15 | SST | Tenas_Lithology.csv |
| T95R-69 | 53.2 | 55.38 | 2.18 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 55.38 | 56.03 | 0.65 | COAL | Tenas_Lithology.csv |
| T95R-69 | 56.03 | 60.41 | 4.38 | SST | Tenas_Lithology.csv |
| T95R-69 | 60.41 | 63.1 | 2.69 | SLTS | Tenas_Lithology.csv |
| T95R-69 | 63.1 | 63.43 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-69 | 63.43 | 80 | 16.57 | SST | Tenas_Lithology.csv |
| T95R-70 | 0 | 9.01 | 9.01 | Overburden | Tenas_Lithology.csv |
| T95R-70 | 9.01 | 16.7 | 7.69 | SLTS | Tenas_Lithology.csv |
| T95R-70 | 16.7 | 20.53 | 3.83 | SST | Tenas_Lithology.csv |
| T95R-70 | 20.53 | 28.49 | 7.96 | CGL | Tenas_Lithology.csv |
| T95R-70 | 28.49 | 80.8 | 52.31 | SST | Tenas_Lithology.csv |
| T95R-70 | 80.8 | 105 | 24.2 | CGL | Tenas_Lithology.csv |
| T95R-71 | 0 | 12.01 | 12.01 | Overburden | Tenas_Lithology.csv |
| T95R-71 | 12.01 | 20.51 | 8.5 | SLTS | Tenas_Lithology.csv |
| T95R-71 | 20.51 | 24.5 | 3.99 | MDST | Tenas_Lithology.csv |
| T95R-71 | 24.5 | 26 | 1.5 | SST | Tenas_Lithology.csv |
| T95R-71 | 26 | 30.15 | 4.15 | SLTS | Tenas_Lithology.csv |
| T95R-71 | 30.15 | 30.44 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-71 | 30.44 | 34.65 | 4.21 | SST | Tenas_Lithology.csv |
| T95R-71 | 34.65 | 35.31 | 0.66 | COAL | Tenas_Lithology.csv |
| T95R-71 | 35.31 | 36.24 | 0.93 | MDST | Tenas_Lithology.csv |
| T95R-71 | 36.24 | 38.35 | 2.11 | COAL | Tenas_Lithology.csv |
| T95R-71 | 38.35 | 54.46 | 16.11 | SST | Tenas_Lithology.csv |
| T95R-71 | 54.46 | 57.52 | 3.06 | COAL | Tenas_Lithology.csv |
| T95R-71 | 57.52 | 57.66 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-71 | 57.66 | 60.56 | 2.9 | COAL | Tenas_Lithology.csv |
| T95R-71 | 60.56 | 62.3 | 1.74 | MDST | Tenas_Lithology.csv |
| T95R-71 | 62.3 | 62.85 | 0.55 | COAL | Tenas_Lithology.csv |
| T95R-71 | 62.85 | 64.64 | 1.79 | MDST | Tenas_Lithology.csv |
| T95R-71 | 64.64 | 65.29 | 0.65 | COAL | Tenas_Lithology.csv |
| T95R-71 | 65.29 | 66.09 | 0.8 | MDST | Tenas_Lithology.csv |
| T95R-71 | 66.09 | 66.84 | 0.75 | COAL | Tenas_Lithology.csv |
| T95R-71 | 66.84 | 67.54 | 0.7 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-71 | 67.54 | 67.92 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-71 | 67.92 | 75.11 | 7.19 | MDST | Tenas_Lithology.csv |
| T95R-71 | 75.11 | 75.9 | 0.79 | COAL | Tenas_Lithology.csv |
| T95R-71 | 75.9 | 80 | 4.1 | SLTS | Tenas_Lithology.csv |
| T95R-71 | 80 | 80.19 | 0.19 | MDST | Tenas_Lithology.csv |
| T95R-71 | 80.19 | 82.57 | 2.38 | SST | Tenas_Lithology.csv |
| T95R-71 | 82.57 | 82.78 | 0.21 | COAL | Tenas_Lithology.csv |
| T95R-71 | 82.78 | 97.5 | 14.72 | SST | Tenas_Lithology.csv |
| T95R-74 | 0 | 4.01 | 4.01 | Overburden | Tenas_Lithology.csv |
| T95R-74 | 4.01 | 9.12 | 5.11 | MDST | Tenas_Lithology.csv |
| T95R-74 | 9.12 | 14.4 | 5.28 | COAL | Tenas_Lithology.csv |
| T95R-74 | 14.4 | 17.86 | 3.46 | MDST | Tenas_Lithology.csv |
| T95R-74 | 17.86 | 18.15 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-74 | 18.15 | 18.74 | 0.59 | MDST | Tenas_Lithology.csv |
| T95R-74 | 18.74 | 19.29 | 0.55 | COAL | Tenas_Lithology.csv |
| T95R-74 | 19.29 | 22.45 | 3.16 | MDST | Tenas_Lithology.csv |
| T95R-74 | 22.45 | 22.74 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-74 | 22.74 | 24.13 | 1.39 | MDST | Tenas_Lithology.csv |
| T95R-74 | 24.13 | 24.76 | 0.63 | COAL | Tenas_Lithology.csv |
| T95R-74 | 24.76 | 27.42 | 2.66 | SST | Tenas_Lithology.csv |
| T95R-74 | 27.42 | 27.8 | 0.38 | COAL | Tenas_Lithology.csv |
| T95R-74 | 27.8 | 34.29 | 6.49 | SST | Tenas_Lithology.csv |
| T95R-74 | 34.29 | 34.65 | 0.36 | COAL | Tenas_Lithology.csv |
| T95R-74 | 34.65 | 61.5 | 26.85 | SST | Tenas_Lithology.csv |
| T95R-76 | 0 | 3.01 | 3.01 | Overburden | Tenas_Lithology.csv |
| T95R-76 | 3.01 | 8.7 | 5.69 | MDST | Tenas_Lithology.csv |
| T95R-76 | 8.7 | 10.73 | 2.03 | COAL | Tenas_Lithology.csv |
| T95R-76 | 10.73 | 13.68 | 2.95 | MDST | Tenas_Lithology.csv |
| T95R-76 | 13.68 | 16 | 2.32 | COAL | Tenas_Lithology.csv |
| T95R-76 | 16 | 16.18 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-76 | 16.18 | 18.4 | 2.22 | COAL | Tenas_Lithology.csv |
| T95R-76 | 18.4 | 18.98 | 0.58 | MDST | Tenas_Lithology.csv |
| T95R-76 | 18.98 | 19.48 | 0.5 | COAL | Tenas_Lithology.csv |
| T95R-76 | 19.48 | 19.91 | 0.43 | MDST | Tenas_Lithology.csv |
| T95R-76 | 19.91 | 20.52 | 0.61 | COAL | Tenas_Lithology.csv |
| T95R-76 | 20.52 | 26.6 | 6.08 | MDST | Tenas_Lithology.csv |
| T95R-76 | 26.6 | 30.7 | 4.1 | SST | Tenas_Lithology.csv |
| T95R-76 | 30.7 | 31.15 | 0.45 | COAL | Tenas_Lithology.csv |
| T95R-76 | 31.15 | 32.46 | 1.31 | MDST | Tenas_Lithology.csv |
| T95R-76 | 32.46 | 32.59 | 0.13 | COAL | Tenas_Lithology.csv |
| T95R-76 | 32.59 | 35.24 | 2.65 | SST | Tenas_Lithology.csv |
| T95R-76 | 35.24 | 35.42 | 0.18 | COAL | Tenas_Lithology.csv |
| T95R-76 | 35.42 | 39.43 | 4.01 | MDST | Tenas_Lithology.csv |
| T95R-76 | 39.43 | 39.74 | 0.31 | COAL | Tenas_Lithology.csv |
| T95R-76 | 39.74 | 45.2 | 5.46 | SST | Tenas_Lithology.csv |
| T95R-76 | 45.2 | 54.4 | 9.2 | MDST | Tenas_Lithology.csv |
| T95R-76 | 54.4 | 62.05 | 7.65 | CGL | Tenas_Lithology.csv |
| T95R-76 | 62.05 | 73 | 10.95 | SST | Tenas_Lithology.csv |
| T95R-77 | 0 | 9.11 | 9.11 | Overburden | Tenas_Lithology.csv |
| T95R-77 | 9.11 | 23.8 | 14.69 | SLTS | Tenas_Lithology.csv |
| T95R-77 | 23.8 | 33.5 | 9.7 | MDST | Tenas_Lithology.csv |
| T95R-77 | 33.5 | 34.1 | 0.6 | SST | Tenas_Lithology.csv |
| T95R-77 | 34.1 | 39.3 | 5.2 | MDST | Tenas_Lithology.csv |
| T95R-77 | 39.3 | 40.8 | 1.5 | SST | Tenas_Lithology.csv |
| T95R-77 | 40.8 | 44.7 | 3.9 | MDST | Tenas_Lithology.csv |
| T95R-77 | 44.7 | 46 | 1.3 | SST | Tenas_Lithology.csv |
| T95R-77 | 46 | 55.3 | 9.3 | CGL | Tenas_Lithology.csv |
| T95R-77 | 55.3 | 70 | 14.7 | VOLC | Tenas_Lithology.csv |
| T95R-78 | 0 | 2.01 | 2.01 | Overburden | Tenas_Lithology.csv |
| T95R-78 | 2.01 | 11.29 | 9.28 | SLTS | Tenas_Lithology.csv |
| T95R-78 | 11.29 | 11.61 | 0.32 | COAL | Tenas_Lithology.csv |
| T95R-78 | 11.61 | 12.78 | 1.17 | MDST | Tenas_Lithology.csv |
| T95R-78 | 12.78 | 13.12 | 0.34 | COAL | Tenas_Lithology.csv |
| T95R-78 | 13.12 | 17.59 | 4.47 | MDST | Tenas_Lithology.csv |
| T95R-78 | 17.59 | 17.89 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-78 | 17.89 | 20.45 | 2.56 | SST | Tenas_Lithology.csv |
| T95R-78 | 20.45 | 22.75 | 2.3 | MDST | Tenas_Lithology.csv |
| T95R-78 | 22.75 | 55 | 32.25 | SST | Tenas_Lithology.csv |
| T95R-78 | 55 | 56.95 | 1.95 | CGL | Tenas_Lithology.csv |
| T95R-78 | 56.95 | 74 | 17.05 | SST | Tenas_Lithology.csv |
| T95R-79 | 0 | 13.7 | 13.7 | Overburden | Tenas_Lithology.csv |
| T95R-79 | 13.7 | 14.45 | 0.75 | MDST | Tenas_Lithology.csv |
| T95R-79 | 14.45 | 14.72 | 0.27 | COAL | Tenas_Lithology.csv |
| T95R-79 | 14.72 | 16.34 | 1.62 | MDST | Tenas_Lithology.csv |
| T95R-79 | 16.34 | 18.6 | 2.26 | COAL | Tenas_Lithology.csv |
| T95R-79 | 18.6 | 28.79 | 10.19 | MDST | Tenas_Lithology.csv |
| T95R-79 | 28.79 | 29.08 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-79 | 29.08 | 29.89 | 0.81 | MDST | Tenas_Lithology.csv |
| T95R-79 | 29.89 | 30.36 | 0.47 | COAL | Tenas_Lithology.csv |
| T95R-79 | 30.36 | 31.2 | 0.84 | MDST | Tenas_Lithology.csv |
| T95R-79 | 31.2 | 31.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-79 | 31.4 | 33.33 | 1.93 | MDST | Tenas_Lithology.csv |
| T95R-79 | 33.33 | 33.73 | 0.4 | COAL | Tenas_Lithology.csv |
| T95R-79 | 33.73 | 36.5 | 2.77 | MDST | Tenas_Lithology.csv |
| T95R-79 | 36.5 | 40.51 | 4.01 | SLTS | Tenas_Lithology.csv |
| T95R-79 | 40.51 | 48.9 | 8.39 | SST | Tenas_Lithology.csv |
| T95R-79 | 48.9 | 52 | 3.1 | CGL | Tenas_Lithology.csv |
| T95R-79 | 52 | 53 | 1 | SLTS | Tenas_Lithology.csv |
| T95R-79 | 53 | 55 | 2 | SST | Tenas_Lithology.csv |
| T95R-80 | 0 | 5.01 | 5.01 | Overburden | Tenas_Lithology.csv |
| T95R-80 | 5.01 | 6.25 | 1.24 | MDST | Tenas_Lithology.csv |
| T95R-80 | 6.25 | 9.89 | 3.64 | COAL | Tenas_Lithology.csv |
| T95R-80 | 9.89 | 10.26 | 0.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-80 | 10.26 | 10.8 | 0.54 | COAL | Tenas_Lithology.csv |
| T95R-80 | 10.8 | 22.57 | 11.77 | SLTS | Tenas_Lithology.csv |
| T95R-80 | 22.57 | 23.05 | 0.48 | COAL | Tenas_Lithology.csv |
| T95R-80 | 23.05 | 23.55 | 0.5 | MDST | Tenas_Lithology.csv |
| T95R-80 | 23.55 | 24.54 | 0.99 | COAL | Tenas_Lithology.csv |
| T95R-80 | 24.54 | 28.85 | 4.31 | SLTS | Tenas_Lithology.csv |
| T95R-80 | 28.85 | 29.13 | 0.28 | COAL | Tenas_Lithology.csv |
| T95R-80 | 29.13 | 31.54 | 2.41 | SLTS | Tenas_Lithology.csv |
| T95R-80 | 31.54 | 31.87 | 0.33 | COAL | Tenas_Lithology.csv |
| T95R-80 | 31.87 | 46.75 | 14.88 | SST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T95R-80 | 46.75 | 51 | 4.25 | CGL | Tenas_Lithology.csv |
| T95R-80 | 51 | 62 | 11 | SST | Tenas_Lithology.csv |
| T95R-81 | 0 | 9 | 9 | Overburden | Tenas_Lithology.csv |
| T95R-81 | 9 | 20.4 | 11.4 | MDST | Tenas_Lithology.csv |
| T95R-81 | 20.4 | 22.2 | 1.8 | SLTS | Tenas_Lithology.csv |
| T95R-81 | 22.2 | 24.76 | 2.56 | MDST | Tenas_Lithology.csv |
| T95R-81 | 24.76 | 24.98 | 0.22 | COAL | Tenas_Lithology.csv |
| T95R-81 | 24.98 | 28.05 | 3.07 | SLTS | Tenas_Lithology.csv |
| T95R-81 | 28.05 | 28.74 | 0.69 | COAL | Tenas_Lithology.csv |
| T95R-81 | 28.74 | 35.49 | 6.75 | SLTS | Tenas_Lithology.csv |
| T95R-81 | 35.49 | 37.26 | 1.77 | COAL | Tenas_Lithology.csv |
| T95R-81 | 37.26 | 37.5 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T95R-81 | 37.5 | 38.49 | 0.99 | COAL | Tenas_Lithology.csv |
| T95R-81 | 38.49 | 41 | 2.51 | MDST | Tenas_Lithology.csv |
| T95R-81 | 41 | 41.2 | 0.2 | COAL | Tenas_Lithology.csv |
| T95R-81 | 41.2 | 44.25 | 3.05 | MDST | Tenas_Lithology.csv |
| T95R-81 | 44.25 | 44.49 | 0.24 | COAL | Tenas_Lithology.csv |
| T95R-81 | 44.49 | 45.1 | 0.61 | MDST | Tenas_Lithology.csv |
| T95R-81 | 45.1 | 45.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T95R-81 | 45.4 | 48.42 | 3.02 | CGL | Tenas_Lithology.csv |
| T95R-81 | 48.42 | 48.79 | 0.37 | COAL | Tenas_Lithology.csv |
| T95R-81 | 48.79 | 52.33 | 3.54 | MDST | Tenas_Lithology.csv |
| T95R-81 | 52.33 | 52.75 | 0.42 | COAL | Tenas_Lithology.csv |
| T95R-81 | 52.75 | 53.56 | 0.81 | MDST | Tenas_Lithology.csv |
| T95R-81 | 53.56 | 53.85 | 0.29 | COAL | Tenas_Lithology.csv |
| T95R-81 | 53.85 | 57.8 | 3.95 | MDST | Tenas_Lithology.csv |
| T95R-81 | 57.8 | 60.2 | 2.4 | SST | Tenas_Lithology.csv |
| T95R-81 | 60.2 | 67.85 | 7.65 | CGL | Tenas_Lithology.csv |
| T95R-81 | 67.85 | 80 | 12.15 | SST | Tenas_Lithology.csv |
| T96R-01 | 0 | 6.27 | 6.27 | Overburden | Tenas_Lithology.csv |
| T96R-01 | 6.27 | 11 | 4.73 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 11 | 13.5 | 2.5 | MDST | Tenas_Lithology.csv |
| T96R-01 | 13.5 | 16 | 2.5 | SST | Tenas_Lithology.csv |
| T96R-01 | 16 | 26 | 10 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 26 | 34.6 | 8.6 | MDST | Tenas_Lithology.csv |
| T96R-01 | 34.6 | 38 | 3.4 | SST | Tenas_Lithology.csv |
| T96R-01 | 38 | 58 | 20 | MDST | Tenas_Lithology.csv |
| T96R-01 | 58 | 67 | 9 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 67 | 70.2 | 3.2 | SST | Tenas_Lithology.csv |
| T96R-01 | 70.2 | 85.95 | 15.75 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 85.95 | 86.97 | 1.02 | COAL | Tenas_Lithology.csv |
| T96R-01 | 86.97 | 91.7 | 4.73 | SST | Tenas_Lithology.csv |
| T96R-01 | 91.7 | 95.5 | 3.8 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 95.5 | 95.7 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-01 | 95.7 | 103.33 | 7.63 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 103.33 | 105.37 | 2.04 | COAL | Tenas_Lithology.csv |
| T96R-01 | 105.37 | 105.47 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-01 | 105.47 | 109.53 | 4.06 | COAL | Tenas_Lithology.csv |
| T96R-01 | 109.53 | 114.15 | 4.62 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 114.15 | 114.7 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-01 | 114.7 | 115.87 | 1.17 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 115.87 | 117.02 | 1.15 | COAL | Tenas_Lithology.csv |
| T96R-01 | 117.02 | 119.58 | 2.56 | SST | Tenas_Lithology.csv |
| T96R-01 | 119.58 | 120.02 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-01 | 120.02 | 120.89 | 0.87 | MDST | Tenas_Lithology.csv |
| T96R-01 | 120.89 | 121.1 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-01 | 121.1 | 130.64 | 9.54 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 130.64 | 130.87 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-01 | 130.87 | 131.17 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-01 | 131.17 | 132.25 | 1.08 | COAL | Tenas_Lithology.csv |
| T96R-01 | 132.25 | 133.15 | 0.9 | MDST | Tenas_Lithology.csv |
| T96R-01 | 133.15 | 133.31 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-01 | 133.31 | 133.57 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-01 | 133.57 | 134.93 | 1.36 | COAL | Tenas_Lithology.csv |
| T96R-01 | 134.93 | 137.71 | 2.78 | SST | Tenas_Lithology.csv |
| T96R-01 | 137.71 | 138.23 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-01 | 138.23 | 148.6 | 10.37 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 148.6 | 153.3 | 4.7 | SST | Tenas_Lithology.csv |
| T96R-01 | 153.3 | 153.8 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-01 | 153.8 | 168.8 | 15 | SLTS | Tenas_Lithology.csv |
| T96R-01 | 168.8 | 195.2 | 26.4 | SST | Tenas_Lithology.csv |
| T96R-02 | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T96R-02 | 6 | 32 | 26 | SLTS | Tenas_Lithology.csv |
| T96R-02 | 32 | 35 | 3 | SST | Tenas_Lithology.csv |
| T96R-02 | 35 | 66.03 | 31.03 | MDST | Tenas_Lithology.csv |
| T96R-02 | 66.03 | 66.36 | 0.33 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-02 | 66.36 | 67.79 | 1.43 | MDST | Tenas_Lithology.csv |
| T96R-02 | 67.79 | 69.06 | 1.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-02 | 69.06 | 70.5 | 1.44 | SLTS | Tenas_Lithology.csv |
| T96R-02 | 70.5 | 71.5 | 1 | SST | Tenas_Lithology.csv |
| T96R-02 | 71.5 | 77 | 5.5 | CGL | Tenas_Lithology.csv |
| T96R-02 | 77 | 90.7 | 13.7 | VOLC | Tenas_Lithology.csv |
| T96R-03 | 0 | 13.71 | 13.71 | Overburden | Tenas_Lithology.csv |
| T96R-03 | 13.71 | 55.8 | 42.09 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 55.8 | 64.9 | 9.1 | SST | Tenas_Lithology.csv |
| T96R-03 | 64.9 | 65.19 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-03 | 65.19 | 69.88 | 4.69 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 69.88 | 70.02 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-03 | 70.02 | 72.65 | 2.63 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 72.65 | 72.79 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-03 | 72.79 | 78 | 5.21 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 78 | 80.98 | 2.98 | MDST | Tenas_Lithology.csv |
| T96R-03 | 80.98 | 82.52 | 1.54 | COAL | Tenas_Lithology.csv |
| T96R-03 | 82.52 | 83.14 | 0.62 | MDST | Tenas_Lithology.csv |
| T96R-03 | 83.14 | 83.34 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-03 | 83.34 | 84.8 | 1.46 | MDST | Tenas_Lithology.csv |
| T96R-03 | 84.8 | 84.95 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-03 | 84.95 | 85.31 | 0.36 | MDST | Tenas_Lithology.csv |
| T96R-03 | 85.31 | 87.74 | 2.43 | COAL | Tenas_Lithology.csv |
| T96R-03 | 87.74 | 90.08 | 2.34 | MDST | Tenas_Lithology.csv |
| T96R-03 | 90.08 | 90.41 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-03 | 90.41 | 91.3 | 0.89 | MDST | Tenas_Lithology.csv |
| T96R-03 | 91.3 | 92.03 | 0.73 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-03 | 92.03 | 92.57 | 0.54 | MDST | Tenas_Lithology.csv |
| T96R-03 | 92.57 | 93.28 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-03 | 93.28 | 95.45 | 2.17 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 95.45 | 97.1 | 1.65 | SST | Tenas_Lithology.csv |
| T96R-03 | 97.1 | 97.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-03 | 97.4 | 102 | 4.6 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 102 | 106.5 | 4.5 | SST | Tenas_Lithology.csv |
| T96R-03 | 106.5 | 106.8 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-03 | 106.8 | 114.3 | 7.5 | SLTS | Tenas_Lithology.csv |
| T96R-03 | 114.3 | 135.1 | 20.8 | SST | Tenas_Lithology.csv |
| T96R-04C | 0 | 3.05 | 3.05 | Overburden | Tenas_Lithology.csv |
| T96R-04C | 3.05 | 6 | 2.95 | MDST | Tenas_Lithology.csv |
| T96R-04C | 6 | 14.38 | 8.38 | SST | Tenas_Lithology.csv |
| T96R-04C | 14.38 | 14.63 | 0.25 | SLTS | Tenas_Lithology.csv |
| T96R-04C | 14.63 | 15.17 | 0.54 | COAL | Tenas_Lithology.csv |
| T96R-04C | 15.17 | 16.74 | 1.57 | SLTS | Tenas_Lithology.csv |
| T96R-04C | 16.74 | 16.92 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-04C | 16.92 | 17.46 | 0.54 | MDST | Tenas_Lithology.csv |
| T96R-04C | 17.46 | 18.98 | 1.52 | COAL | Tenas_Lithology.csv |
| T96R-04C | 18.98 | 26.14 | 7.16 | MDST | Tenas_Lithology.csv |
| T96R-04C | 26.14 | 26.45 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-04C | 26.45 | 29.11 | 2.66 | MDST | Tenas_Lithology.csv |
| T96R-04C | 29.11 | 30.8 | 1.69 | COAL | Tenas_Lithology.csv |
| T96R-04C | 30.8 | 31.09 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-04C | 31.09 | 34.44 | 3.35 | COAL | Tenas_Lithology.csv |
| T96R-04C | 34.44 | 36.68 | 2.24 | MDST | Tenas_Lithology.csv |
| T96R-04C | 36.68 | 37.06 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-04C | 37.06 | 39 | 1.94 | MDST | Tenas_Lithology.csv |
| T96R-05C | 0 | 9.01 | 9.01 | Overburden | Tenas_Lithology.csv |
| T96R-05C | 9.01 | 12.88 | 3.87 | MDST | Tenas_Lithology.csv |
| T96R-05C | 12.88 | 21.8 | 8.92 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 21.8 | 31.61 | 9.81 | MDST | Tenas_Lithology.csv |
| T96R-05C | 31.61 | 32.52 | 0.91 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 32.52 | 33.86 | 1.34 | SST | Tenas_Lithology.csv |
| T96R-05C | 33.86 | 35.41 | 1.55 | MDST | Tenas_Lithology.csv |
| T96R-05C | 35.41 | 35.55 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-05C | 35.55 | 39.51 | 3.96 | MDST | Tenas_Lithology.csv |
| T96R-05C | 39.51 | 41.3 | 1.79 | COAL | Tenas_Lithology.csv |
| T96R-05C | 41.3 | 42.12 | 0.82 | MDST | Tenas_Lithology.csv |
| T96R-05C | 42.12 | 44.4 | 2.28 | COAL | Tenas_Lithology.csv |
| T96R-05C | 44.4 | 44.98 | 0.58 | MDST | Tenas_Lithology.csv |
| T96R-05C | 44.98 | 45.62 | 0.64 | COAL | Tenas_Lithology.csv |
| T96R-05C | 45.62 | 46.68 | 1.06 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 46.68 | 50.84 | 4.16 | COAL | Tenas_Lithology.csv |
| T96R-05C | 50.84 | 55.15 | 4.31 | MDST | Tenas_Lithology.csv |
| T96R-05C | 55.15 | 56.1 | 0.95 | COAL | Tenas_Lithology.csv |
| T96R-05C | 56.1 | 58.06 | 1.96 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 58.06 | 58.52 | 0.46 | MDST | Tenas_Lithology.csv |
| T96R-05C | 58.52 | 59.52 | 1 | COAL | Tenas_Lithology.csv |
| T96R-05C | 59.52 | 63.46 | 3.94 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 63.46 | 64 | 0.54 | MDST | Tenas_Lithology.csv |
| T96R-05C | 64 | 72.2 | 8.2 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 72.2 | 73.27 | 1.07 | MDST | Tenas_Lithology.csv |
| T96R-05C | 73.27 | 73.51 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-05C | 73.51 | 73.58 | 0.07 | MDST | Tenas_Lithology.csv |
| T96R-05C | 73.58 | 75.51 | 1.93 | SLTS | Tenas_Lithology.csv |
| T96R-05C | 75.51 | 76 | 0.49 | COAL | Tenas_Lithology.csv |
| T96R-05C | 76 | 76.31 | 0.31 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-05C | 76.31 | 76.55 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-05C | 76.55 | 77.98 | 1.43 | MDST | Tenas_Lithology.csv |
| T96R-05C | 77.98 | 78.81 | 0.83 | COAL | Tenas_Lithology.csv |
| T96R-05C | 78.81 | 85.08 | 6.27 | MDST | Tenas_Lithology.csv |
| T96R-05C | 85.08 | 85.32 | 0.24 | SST | Tenas_Lithology.csv |
| T96R-05C | 85.32 | 85.52 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-05C | 85.52 | 85.78 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-05C | 85.78 | 86.62 | 0.84 | COAL | Tenas_Lithology.csv |
| T96R-05C | 86.62 | 87.62 | 1 | MDST | Tenas_Lithology.csv |
| T96R-06 | 0 | 17 | 17 | Overburden | Tenas_Lithology.csv |
| T96R-06 | 17 | 22 | 5 | SST | Tenas_Lithology.csv |
| T96R-06 | 22 | 35.1 | 13.1 | SLTS | Tenas_Lithology.csv |
| T96R-06 | 35.1 | 51.01 | 15.91 | SST | Tenas_Lithology.csv |
| T96R-06 | 51.01 | 51.1 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-06 | 51.1 | 51.41 | 0.31 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-06 | 51.41 | 51.71 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-06 | 51.71 | 53.65 | 1.94 | MDST | Tenas_Lithology.csv |
| T96R-06 | 53.65 | 53.82 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-06 | 53.82 | 54.08 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-06 | 54.08 | 55.81 | 1.73 | COAL | Tenas_Lithology.csv |
| T96R-06 | 55.81 | 60.5 | 4.69 | MDST | Tenas_Lithology.csv |
| T96R-06 | 60.5 | 63.03 | 2.53 | SLTS | Tenas_Lithology.csv |
| T96R-06 | 63.03 | 63.4 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-06 | 63.4 | 66.69 | 3.29 | SLTS | Tenas_Lithology.csv |
| T96R-06 | 66.69 | 70.97 | 4.28 | MDST | Tenas_Lithology.csv |
| T96R-06 | 70.97 | 72.85 | 1.88 | COAL | Tenas_Lithology.csv |
| T96R-06 | 72.85 | 72.91 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-06 | 72.91 | 73.8 | 0.89 | COAL | Tenas_Lithology.csv |
| T96R-06 | 73.8 | 74.14 | 0.34 | MDST | Tenas_Lithology.csv |
| T96R-06 | 74.14 | 76.88 | 2.74 | COAL | Tenas_Lithology.csv |
| T96R-06 | 76.88 | 77.92 | 1.04 | MDST | Tenas_Lithology.csv |
| T96R-06 | 77.92 | 78 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-06 | 78 | 78.15 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-06 | 78.15 | 78.47 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-06 | 78.47 | 79.59 | 1.12 | MDST | Tenas_Lithology.csv |
| T96R-06 | 79.59 | 80.29 | 0.7 | COAL | Tenas_Lithology.csv |
| T96R-06 | 80.29 | 80.89 | 0.6 | MDST | Tenas_Lithology.csv |
| T96R-06 | 80.89 | 81.45 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-06 | 81.45 | 82.26 | 0.81 | MDST | Tenas_Lithology.csv |
| T96R-06 | 82.26 | 82.5 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-06 | 82.5 | 85 | 2.5 | MDST | Tenas_Lithology.csv |
| T96R-06 | 85 | 89.19 | 4.19 | SST | Tenas_Lithology.csv |
| T96R-06 | 89.19 | 89.8 | 0.61 | COAL | Tenas_Lithology.csv |
| T96R-06 | 89.8 | 96.12 | 6.32 | SLTS | Tenas_Lithology.csv |
| T96R-06 | 96.12 | 96.54 | 0.42 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-06 | 96.54 | 110.1 | 13.56 | SST | Tenas_Lithology.csv |
| T96R-07C | 0 | 1.52 | 1.52 | Overburden | Tenas_Lithology.csv |
| T96R-07C | 1.52 | 3.92 | 2.4 | MDST | Tenas_Lithology.csv |
| T96R-07C | 3.92 | 5.41 | 1.49 | COAL | Tenas_Lithology.csv |
| T96R-07C | 5.41 | 10.9 | 5.49 | MDST | Tenas_Lithology.csv |
| T96R-07C | 10.9 | 12.32 | 1.42 | SLTS | Tenas_Lithology.csv |
| T96R-07C | 12.32 | 12.61 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-07C | 12.61 | 13.9 | 1.29 | MDST | Tenas_Lithology.csv |
| T96R-07C | 13.9 | 15.35 | 1.45 | SLTS | Tenas_Lithology.csv |
| T96R-07C | 15.35 | 17.04 | 1.69 | COAL | Tenas_Lithology.csv |
| T96R-07C | 17.04 | 17.44 | 0.4 | MDST | Tenas_Lithology.csv |
| T96R-07C | 17.44 | 20.89 | 3.45 | COAL | Tenas_Lithology.csv |
| T96R-07C | 20.89 | 22.81 | 1.92 | MDST | Tenas_Lithology.csv |
| T96R-07C | 22.81 | 23.13 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-07C | 23.13 | 23.2 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-07C | 23.2 | 23.5 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-07C | 23.5 | 25.6 | 2.1 | MDST | Tenas_Lithology.csv |
| T96R-08 | 0 | 3.5 | 3.5 | Overburden | Tenas_Lithology.csv |
| T96R-08 | 3.5 | 6.13 | 2.63 | MDST | Tenas_Lithology.csv |
| T96R-08 | 6.13 | 7.05 | 0.92 | COAL | Tenas_Lithology.csv |
| T96R-08 | 7.05 | 7.22 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-08 | 7.22 | 7.39 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-08 | 7.39 | 7.73 | 0.34 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-08 | 7.73 | 8.32 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-08 | 8.32 | 13.17 | 4.85 | MDST | Tenas_Lithology.csv |
| T96R-08 | 13.17 | 13.32 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-08 | 13.32 | 15.38 | 2.06 | MDST | Tenas_Lithology.csv |
| T96R-08 | 15.38 | 15.61 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-08 | 15.61 | 20.82 | 5.21 | SLTS | Tenas_Lithology.csv |
| T96R-08 | 20.82 | 20.91 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-08 | 20.91 | 22.21 | 1.3 | SLTS | Tenas_Lithology.csv |
| T96R-08 | 22.21 | 22.38 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-08 | 22.38 | 27.3 | 4.92 | MDST | Tenas_Lithology.csv |
| T96R-08 | 27.3 | 37 | 9.7 | SST | Tenas_Lithology.csv |
| T96R-08 | 37 | 47 | 10 | CGL | Tenas_Lithology.csv |
| T96R-08 | 47 | 58 | 11 | SST | Tenas_Lithology.csv |
| T96R-08 | 58 | 67.7 | 9.7 | CGL | Tenas_Lithology.csv |
| T96R-10 | 0 | 5 | 5 | Overburden | Tenas_Lithology.csv |
| T96R-10 | 5 | 7 | 2 | SLTS | Tenas_Lithology.csv |
| T96R-10 | 7 | 11.64 | 4.64 | SST | Tenas_Lithology.csv |
| T96R-10 | 11.64 | 12.04 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-10 | 12.04 | 15.83 | 3.79 | MDST | Tenas_Lithology.csv |
| T96R-10 | 15.83 | 16.51 | 0.68 | COAL | Tenas_Lithology.csv |
| T96R-10 | 16.51 | 18.18 | 1.67 | MDST | Tenas_Lithology.csv |
| T96R-10 | 18.18 | 18.57 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-10 | 18.57 | 18.85 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-10 | 18.85 | 20.82 | 1.97 | COAL | Tenas_Lithology.csv |
| T96R-10 | 20.82 | 26.71 | 5.89 | SLTS | Tenas_Lithology.csv |
| T96R-10 | 26.71 | 27.55 | 0.84 | COAL | Tenas_Lithology.csv |
| T96R-10 | 27.55 | 27.64 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-10 | 27.64 | 30.45 | 2.81 | COAL | Tenas_Lithology.csv |
| T96R-10 | 30.45 | 32.14 | 1.69 | SST | Tenas_Lithology.csv |
| T96R-10 | 32.14 | 32.54 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-10 | 32.54 | 32.76 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-10 | 32.76 | 33 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-10 | 33 | 37 | 4 | SST | Tenas_Lithology.csv |
| T96R-10 | 37 | 41 | 4 | CGL | Tenas_Lithology.csv |
| T96R-10 | 41 | 44.9 | 3.9 | SST | Tenas_Lithology.csv |
| T96R-10 | 44.9 | 45.1 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-10 | 45.1 | 46.31 | 1.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-10 | 46.31 | 46.71 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-10 | 46.71 | 62 | 15.29 | SST | Tenas_Lithology.csv |
| T96R-10 | 62 | 67.1 | 5.1 | CGL | Tenas_Lithology.csv |
| T96R-105 | 0 | 53 | 53 | Overburden | Tenas_Lithology.csv |
| T96R-105 | 53 | 54.5 | 1.5 | SLTS | Tenas_Lithology.csv |
| T96R-105 | 54.5 | 95.5 | 41 | SST | Tenas_Lithology.csv |
| T96R-105 | 95.5 | 100 | 4.5 | CGL | Tenas_Lithology.csv |
| T96R-105 | 100 | 102.7 | 2.7 | SST | Tenas_Lithology.csv |
| T96R-11 | 0 | 2 | 2 | Overburden | Tenas_Lithology.csv |
| T96R-11 | 2 | 2.24 | 0.24 | MDST | Tenas_Lithology.csv |
| T96R-11 | 2.24 | 4 | 1.76 | COAL | Tenas_Lithology.csv |
| T96R-11 | 4 | 11.24 | 7.24 | MDST | Tenas_Lithology.csv |
| T96R-11 | 11.24 | 11.47 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-11 | 11.47 | 14.39 | 2.92 | MDST | Tenas_Lithology.csv |
| T96R-11 | 14.39 | 14.81 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-11 | 14.81 | 16.25 | 1.44 | SLTS | Tenas_Lithology.csv |
| T96R-11 | 16.25 | 16.84 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-11 | 16.84 | 23.88 | 7.04 | SLTS | Tenas_Lithology.csv |
| T96R-11 | 23.88 | 24.09 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-11 | 24.09 | 25.62 | 1.53 | MDST | Tenas_Lithology.csv |
| T96R-11 | 25.62 | 25.9 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-11 | 25.9 | 26.8 | 0.9 | MDST | Tenas_Lithology.csv |
| T96R-11 | 26.8 | 27.15 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-11 | 27.15 | 34.57 | 7.42 | MDST | Tenas_Lithology.csv |
| T96R-11 | 34.57 | 34.8 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-11 | 34.8 | 42 | 7.2 | SST | Tenas_Lithology.csv |
| T96R-11 | 42 | 45 | 3 | SLTS | Tenas_Lithology.csv |
| T96R-11 | 45 | 58.5 | 13.5 | CGL | Tenas_Lithology.csv |
| T96R-11 | 58.5 | 93.55 | 35.05 | SST | Tenas_Lithology.csv |
| T96R-11 | 93.55 | 94.3 | 0.75 | COAL | Tenas_Lithology.csv |
| T96R-11 | 94.3 | 96.7 | 2.4 | SST | Tenas_Lithology.csv |
| T96R-11 | 96.7 | 97.2 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-11 | 97.2 | 101.4 | 4.2 | SLTS | Tenas_Lithology.csv |
| T96R-11 | 101.4 | 125.7 | 24.3 | VOLC | Tenas_Lithology.csv |
| T96R-110 | 0 | 37.5 | 37.5 | Overburden | Tenas_Lithology.csv |
| T96R-110 | 37.5 | 38.18 | 0.68 | SLTS | Tenas_Lithology.csv |
| T96R-110 | 38.18 | 42.3 | 4.12 | COAL | Tenas_Lithology.csv |
| T96R-110 | 42.3 | 46 | 3.7 | MDST | Tenas_Lithology.csv |
| T96R-110 | 46 | 47 | 1 | COAL | Tenas_Lithology.csv |
| T96R-110 | 47 | 47.4 | 0.4 | MDST | Tenas_Lithology.csv |
| T96R-110 | 47.4 | 47.65 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-110 | 47.65 | 56.01 | 8.36 | SLTS | Tenas_Lithology.csv |
| T96R-110 | 56.01 | 56.38 | 0.37 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-110 | 56.38 | 66.3 | 9.92 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 0 | 4 | 4 | Overburden | Tenas_Lithology.csv |
| T96R-119 | 4 | 15 | 11 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 15 | 21 | 6 | SST | Tenas_Lithology.csv |
| T96R-119 | 21 | 26 | 5 | MDST | Tenas_Lithology.csv |
| T96R-119 | 26 | 53.96 | 27.96 | SST | Tenas_Lithology.csv |
| T96R-119 | 53.96 | 54.44 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-119 | 54.44 | 54.96 | 0.52 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 54.96 | 55.81 | 0.85 | COAL | Tenas_Lithology.csv |
| T96R-119 | 55.81 | 59.52 | 3.71 | MDST | Tenas_Lithology.csv |
| T96R-119 | 59.52 | 59.78 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-119 | 59.78 | 59.85 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-119 | 59.85 | 60.03 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-119 | 60.03 | 61.13 | 1.1 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 61.13 | 61.33 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-119 | 61.33 | 72.89 | 11.56 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 72.89 | 73.46 | 0.57 | COAL | Tenas_Lithology.csv |
| T96R-119 | 73.46 | 75.1 | 1.64 | SLTS | Tenas_Lithology.csv |
| T96R-119 | 75.1 | 75.45 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-119 | 75.45 | 80.7 | 5.25 | MDST | Tenas_Lithology.csv |
| T96R-119 | 80.7 | 84 | 3.3 | SST | Tenas_Lithology.csv |
| T96R-120 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-120 | 7 | 19.1 | 12.1 | MDST | Tenas_Lithology.csv |
| T96R-120 | 19.1 | 25.32 | 6.22 | SST | Tenas_Lithology.csv |
| T96R-120 | 25.32 | 25.49 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-120 | 25.49 | 28.01 | 2.52 | MDST | Tenas_Lithology.csv |
| T96R-120 | 28.01 | 28.6 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-120 | 28.6 | 32.04 | 3.44 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 32.04 | 33.74 | 1.7 | COAL | Tenas_Lithology.csv |
| T96R-120 | 33.74 | 33.84 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-120 | 33.84 | 34.84 | 1 | COAL | Tenas_Lithology.csv |
| T96R-120 | 34.84 | 44.38 | 9.54 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 44.38 | 44.91 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-120 | 44.91 | 47.9 | 2.99 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 47.9 | 48.42 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-120 | 48.42 | 51.11 | 2.69 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 51.11 | 51.52 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-120 | 51.52 | 60.04 | 8.52 | SLTS | Tenas_Lithology.csv |
| T96R-120 | 60.04 | 60.56 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-120 | 60.56 | 63 | 2.44 | SST | Tenas_Lithology.csv |
| T96R-120 | 63 | 65 | 2 | CGL | Tenas_Lithology.csv |
| T96R-120 | 65 | 73.7 | 8.7 | SST | Tenas_Lithology.csv |
| T96R-121 | 0 | 7.3 | 7.3 | Overburden | Tenas_Lithology.csv |
| T96R-121 | 7.3 | 41.18 | 33.88 | SST | Tenas_Lithology.csv |
| T96R-121 | 41.18 | 41.43 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-121 | 41.43 | 44.08 | 2.65 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 44.08 | 44.63 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-121 | 44.63 | 47.81 | 3.18 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 47.81 | 49.72 | 1.91 | COAL | Tenas_Lithology.csv |
| T96R-121 | 49.72 | 59.33 | 9.61 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 59.33 | 59.64 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-121 | 59.64 | 62.93 | 3.29 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 62.93 | 65.01 | 2.08 | COAL | Tenas_Lithology.csv |
| T96R-121 | 65.01 | 66.57 | 1.56 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 66.57 | 67.29 | 0.72 | COAL | Tenas_Lithology.csv |
| T96R-121 | 67.29 | 67.62 | 0.33 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-121 | 67.62 | 70.47 | 2.85 | COAL | Tenas_Lithology.csv |
| T96R-121 | 70.47 | 74.18 | 3.71 | MDST | Tenas_Lithology.csv |
| T96R-121 | 74.18 | 75.32 | 1.14 | COAL | Tenas_Lithology.csv |
| T96R-121 | 75.32 | 76.16 | 0.84 | MDST | Tenas_Lithology.csv |
| T96R-121 | 76.16 | 76.29 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-121 | 76.29 | 82.53 | 6.24 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 82.53 | 83.49 | 0.96 | COAL | Tenas_Lithology.csv |
| T96R-121 | 83.49 | 85.91 | 2.42 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 85.91 | 86.37 | 0.46 | COAL | Tenas_Lithology.csv |
| T96R-121 | 86.37 | 90.02 | 3.65 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 90.02 | 90.2 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-121 | 90.2 | 91.86 | 1.66 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 91.86 | 92.2 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-121 | 92.2 | 97 | 4.8 | SLTS | Tenas_Lithology.csv |
| T96R-121 | 97 | 109.4 | 12.4 | SST | Tenas_Lithology.csv |
| T96R-124 | 0 | 21.47 | 21.47 | Overburden | Tenas_Lithology.csv |
| T96R-124 | 21.47 | 39.21 | 17.74 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 39.21 | 39.58 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-124 | 39.58 | 42.73 | 3.15 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 42.73 | 43.4 | 0.67 | COAL | Tenas_Lithology.csv |
| T96R-124 | 43.4 | 46.05 | 2.65 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 46.05 | 48.1 | 2.05 | COAL | Tenas_Lithology.csv |
| T96R-124 | 48.1 | 56.49 | 8.39 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 56.49 | 56.88 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-124 | 56.88 | 60.05 | 3.17 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 60.05 | 62.15 | 2.1 | COAL | Tenas_Lithology.csv |
| T96R-124 | 62.15 | 62.98 | 0.83 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 62.98 | 67.04 | 4.06 | COAL | Tenas_Lithology.csv |
| T96R-124 | 67.04 | 70.22 | 3.18 | MDST | Tenas_Lithology.csv |
| T96R-124 | 70.22 | 71.17 | 0.95 | COAL | Tenas_Lithology.csv |
| T96R-124 | 71.17 | 71.81 | 0.64 | MDST | Tenas_Lithology.csv |
| T96R-124 | 71.81 | 71.87 | 0.06 | COAL | Tenas_Lithology.csv |
| T96R-124 | 71.87 | 73 | 1.13 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 73 | 78.5 | 5.5 | CGL | Tenas_Lithology.csv |
| T96R-124 | 78.5 | 78.89 | 0.39 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 78.89 | 79.67 | 0.78 | COAL | Tenas_Lithology.csv |
| T96R-124 | 79.67 | 79.94 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-124 | 79.94 | 80.6 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-124 | 80.6 | 85.61 | 5.01 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 85.61 | 85.72 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-124 | 85.72 | 87.09 | 1.37 | SLTS | Tenas_Lithology.csv |
| T96R-124 | 87.09 | 87.15 | 0.06 | COAL | Tenas_Lithology.csv |
| T96R-124 | 87.15 | 91.7 | 4.55 | SST | Tenas_Lithology.csv |
| T96R-125 | 0 | 6.35 | 6.35 | Overburden | Tenas_Lithology.csv |
| T96R-125 | 6.35 | 7 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-125 | 7 | 8.54 | 1.54 | MDST | Tenas_Lithology.csv |
| T96R-125 | 8.54 | 8.83 | 0.29 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-125 | 8.83 | 9.1 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-125 | 9.1 | 10.72 | 1.62 | COAL | Tenas_Lithology.csv |
| T96R-125 | 10.72 | 16.72 | 6 | SST | Tenas_Lithology.csv |
| T96R-125 | 16.72 | 17.07 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-125 | 17.07 | 20.79 | 3.72 | MDST | Tenas_Lithology.csv |
| T96R-125 | 20.79 | 26 | 5.21 | COAL | Tenas_Lithology.csv |
| T96R-125 | 26 | 27.44 | 1.44 | MDST | Tenas_Lithology.csv |
| T96R-125 | 27.44 | 27.65 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-125 | 27.65 | 28.13 | 0.48 | SLTS | Tenas_Lithology.csv |
| T96R-125 | 28.13 | 28.33 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-125 | 28.33 | 29.03 | 0.7 | MDST | Tenas_Lithology.csv |
| T96R-125 | 29.03 | 29.45 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-125 | 29.45 | 30.1 | 0.65 | MDST | Tenas_Lithology.csv |
| T96R-125 | 30.1 | 30.53 | 0.43 | COAL | Tenas_Lithology.csv |
| T96R-125 | 30.53 | 34.81 | 4.28 | SLTS | Tenas_Lithology.csv |
| T96R-125 | 34.81 | 35.03 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-125 | 35.03 | 36.38 | 1.35 | SST | Tenas_Lithology.csv |
| T96R-125 | 36.38 | 37.02 | 0.64 | COAL | Tenas_Lithology.csv |
| T96R-125 | 37.02 | 43.98 | 6.96 | SST | Tenas_Lithology.csv |
| T96R-125 | 43.98 | 44.3 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-125 | 44.3 | 49.3 | 5 | SST | Tenas_Lithology.csv |
| T96R-126 | 0 | 18.55 | 18.55 | Overburden | Tenas_Lithology.csv |
| T96R-126 | 18.55 | 23 | 4.45 | MDST | Tenas_Lithology.csv |
| T96R-126 | 23 | 26.27 | 3.27 | COAL | Tenas_Lithology.csv |
| T96R-126 | 26.27 | 28.41 | 2.14 | MDST | Tenas_Lithology.csv |
| T96R-126 | 28.41 | 29 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-126 | 29 | 29.61 | 0.61 | MDST | Tenas_Lithology.csv |
| T96R-126 | 29.61 | 30.06 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-126 | 30.06 | 32 | 1.94 | SLTS | Tenas_Lithology.csv |
| T96R-126 | 32 | 32.1 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-126 | 32.1 | 32.8 | 0.7 | MDST | Tenas_Lithology.csv |
| T96R-126 | 32.8 | 32.9 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-126 | 32.9 | 35.8 | 2.9 | MDST | Tenas_Lithology.csv |
| T96R-126 | 35.8 | 36 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-126 | 36 | 36.58 | 0.58 | MDST | Tenas_Lithology.csv |
| T96R-126 | 36.58 | 37.04 | 0.46 | COAL | Tenas_Lithology.csv |
| T96R-126 | 37.04 | 44.93 | 7.89 | SST | Tenas_Lithology.csv |
| T96R-126 | 44.93 | 45.3 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-126 | 45.3 | 55.3 | 10 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 0 | 26.5 | 26.5 | Overburden | Tenas_Lithology.csv |
| T96R-127 | 26.5 | 27.17 | 0.67 | COAL | Tenas_Lithology.csv |
| T96R-127 | 27.17 | 30.49 | 3.32 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 30.49 | 30.6 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-127 | 30.6 | 33.91 | 3.31 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 33.91 | 35.93 | 2.02 | COAL | Tenas_Lithology.csv |
| T96R-127 | 35.93 | 37.43 | 1.5 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 37.43 | 38.09 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-127 | 38.09 | 38.27 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-127 | 38.27 | 41.13 | 2.86 | COAL | Tenas_Lithology.csv |
| T96R-127 | 41.13 | 43.19 | 2.06 | MDST | Tenas_Lithology.csv |
| T96R-127 | 43.19 | 43.44 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-127 | 43.44 | 43.67 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-127 | 43.67 | 44.57 | 0.9 | COAL | Tenas_Lithology.csv |
| T96R-127 | 44.57 | 45.53 | 0.96 | MDST | Tenas_Lithology.csv |
| T96R-127 | 45.53 | 45.8 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-127 | 45.8 | 46.14 | 0.34 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-127 | 46.14 | 46.26 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-127 | 46.26 | 51.21 | 4.95 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 51.21 | 51.48 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-127 | 51.48 | 53.31 | 1.83 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 53.31 | 53.93 | 0.62 | COAL | Tenas_Lithology.csv |
| T96R-127 | 53.93 | 59.36 | 5.43 | SST | Tenas_Lithology.csv |
| T96R-127 | 59.36 | 59.54 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-127 | 59.54 | 61.06 | 1.52 | SLTS | Tenas_Lithology.csv |
| T96R-127 | 61.06 | 61.28 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-127 | 61.28 | 72.6 | 11.32 | SST | Tenas_Lithology.csv |
| T96R-128 | 0 | 3.6 | 3.6 | Overburden | Tenas_Lithology.csv |
| T96R-128 | 3.6 | 10.74 | 7.14 | MDST | Tenas_Lithology.csv |
| T96R-128 | 10.74 | 10.9 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-128 | 10.9 | 15.3 | 4.4 | MDST | Tenas_Lithology.csv |
| T96R-128 | 15.3 | 43.3 | 28 | SLTS | Tenas_Lithology.csv |
| T96R-128 | 43.3 | 45.1 | 1.8 | CGL | Tenas_Lithology.csv |
| T96R-128 | 45.1 | 47.2 | 2.1 | SLTS | Tenas_Lithology.csv |
| T96R-128 | 47.2 | 51.8 | 4.6 | MDST | Tenas_Lithology.csv |
| T96R-128 | 51.8 | 53.5 | 1.7 | SST | Tenas_Lithology.csv |
| T96R-129 | 0 | 7.2 | 7.2 | Overburden | Tenas_Lithology.csv |
| T96R-129 | 7.2 | 11 | 3.8 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 11 | 14.2 | 3.2 | MDST | Tenas_Lithology.csv |
| T96R-129 | 14.2 | 21.2 | 7 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 21.2 | 23 | 1.8 | MDST | Tenas_Lithology.csv |
| T96R-129 | 23 | 23.3 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-129 | 23.3 | 23.6 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-129 | 23.6 | 24.3 | 0.7 | COAL | Tenas_Lithology.csv |
| T96R-129 | 24.3 | 32.52 | 8.22 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 32.52 | 32.7 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-129 | 32.7 | 36.52 | 3.82 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 36.52 | 41.45 | 4.93 | COAL | Tenas_Lithology.csv |
| T96R-129 | 41.45 | 45.01 | 3.56 | MDST | Tenas_Lithology.csv |
| T96R-129 | 45.01 | 45.56 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-129 | 45.56 | 45.86 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-129 | 45.86 | 46.6 | 0.74 | COAL | Tenas_Lithology.csv |
| T96R-129 | 46.6 | 47.05 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-129 | 47.05 | 47.47 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-129 | 47.47 | 48.3 | 0.83 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 48.3 | 48.5 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-129 | 48.5 | 52.17 | 3.67 | MDST | Tenas_Lithology.csv |
| T96R-129 | 52.17 | 52.76 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-129 | 52.76 | 54.3 | 1.54 | SLTS | Tenas_Lithology.csv |
| T96R-129 | 54.3 | 54.5 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-129 | 54.5 | 65.5 | 11 | n/a | Tenas_Lithology.csv |
| T96R-12C | 0 | 0.76 | 0.76 | Overburden | Tenas_Lithology.csv |
| T96R-12C | 0.76 | 2.29 | 1.53 | COAL | Tenas_Lithology.csv |
| T96R-12C | 2.29 | 3.4 | 1.11 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-12C | 3.4 | 7.81 | 4.41 | SLTS | Tenas_Lithology.csv |
| T96R-12C | 7.81 | 9.07 | 1.26 | MDST | Tenas_Lithology.csv |
| T96R-12C | 9.07 | 9.37 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-12C | 9.37 | 12.35 | 2.98 | MDST | Tenas_Lithology.csv |
| T96R-12C | 12.35 | 14.06 | 1.71 | COAL | Tenas_Lithology.csv |
| T96R-12C | 14.06 | 14.48 | 0.42 | MDST | Tenas_Lithology.csv |
| T96R-12C | 14.48 | 17.75 | 3.27 | COAL | Tenas_Lithology.csv |
| T96R-12C | 17.75 | 19.44 | 1.69 | MDST | Tenas_Lithology.csv |
| T96R-12C | 19.44 | 19.84 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-12C | 19.84 | 19.95 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-12C | 19.95 | 20.22 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-12C | 20.22 | 22.8 | 2.58 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T96R-130 | 15 | 31 | 16 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 31 | 48 | 17 | MDST | Tenas_Lithology.csv |
| T96R-130 | 48 | 53 | 5 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 53 | 76 | 23 | SST | Tenas_Lithology.csv |
| T96R-130 | 76 | 79 | 3 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 79 | 92.54 | 13.54 | MDST | Tenas_Lithology.csv |
| T96R-130 | 92.54 | 94.4 | 1.86 | COAL | Tenas_Lithology.csv |
| T96R-130 | 94.4 | 96.17 | 1.77 | MDST | Tenas_Lithology.csv |
| T96R-130 | 96.17 | 98.4 | 2.23 | COAL | Tenas_Lithology.csv |
| T96R-130 | 98.4 | 111 | 12.6 | SLTS | Tenas_Lithology.csv |
| T96R-130 | 111 | 112.08 | 1.08 | COAL | Tenas_Lithology.csv |
| T96R-130 | 112.08 | 115 | 2.92 | SST | Tenas_Lithology.csv |
| T96R-130 | 115 | 116 | 1 | CGL | Tenas_Lithology.csv |
| T96R-130 | 116 | 118 | 2 | SST | Tenas_Lithology.csv |
| T96R-130 | 118 | 139.1 | 21.1 | CGL | Tenas_Lithology.csv |
| T96R-131 | 0 | 8.81 | 8.81 | Overburden | Tenas_Lithology.csv |
| T96R-131 | 8.81 | 19 | 10.19 | MDST | Tenas_Lithology.csv |
| T96R-131 | 19 | 22.3 | 3.3 | SST | Tenas_Lithology.csv |
| T96R-131 | 22.3 | 49.2 | 26.9 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 49.2 | 57.7 | 8.5 | SST | Tenas_Lithology.csv |
| T96R-131 | 57.7 | 58 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-131 | 58 | 59.87 | 1.87 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 59.87 | 60.3 | 0.43 | COAL | Tenas_Lithology.csv |
| T96R-131 | 60.3 | 62.24 | 1.94 | MDST | Tenas_Lithology.csv |
| T96R-131 | 62.24 | 62.42 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-131 | 62.42 | 63.09 | 0.67 | MDST | Tenas_Lithology.csv |
| T96R-131 | 63.09 | 65.01 | 1.92 | COAL | Tenas_Lithology.csv |
| T96R-131 | 65.01 | 73.43 | 8.42 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 73.43 | 76.91 | 3.48 | COAL | Tenas_Lithology.csv |
| T96R-131 | 76.91 | 77.01 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-131 | 77.01 | 77.29 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-131 | 77.29 | 77.41 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-131 | 77.41 | 80.83 | 3.42 | COAL | Tenas_Lithology.csv |
| T96R-131 | 80.83 | 83.25 | 2.42 | MDST | Tenas_Lithology.csv |
| T96R-131 | 83.25 | 83.8 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-131 | 83.8 | 84.45 | 0.65 | MDST | Tenas_Lithology.csv |
| T96R-131 | 84.45 | 85.29 | 0.84 | COAL | Tenas_Lithology.csv |
| T96R-131 | 85.29 | 87.3 | 2.01 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 87.3 | 87.6 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-131 | 87.6 | 88.15 | 0.55 | MDST | Tenas_Lithology.csv |
| T96R-131 | 88.15 | 88.37 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-131 | 88.37 | 90.7 | 2.33 | MDST | Tenas_Lithology.csv |
| T96R-131 | 90.7 | 90.9 | 0.2 | SLTS | Tenas_Lithology.csv |
| T96R-131 | 90.9 | 91.2 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-131 | 91.2 | 91.8 | 0.6 | MDST | Tenas_Lithology.csv |
| T96R-131 | 91.8 | 92 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-131 | 92 | 93.9 | 1.9 | MDST | Tenas_Lithology.csv |
| T96R-131 | 93.9 | 94 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-131 | 94 | 103.8 | 9.8 | MDST | Tenas_Lithology.csv |
| T96R-137 | 0 | 2.1 | 2.1 | Overburden | Tenas_Lithology.csv |
| T96R-137 | 2.1 | 8.42 | 6.32 | MDST | Tenas_Lithology.csv |
| T96R-137 | 8.42 | 10.16 | 1.74 | COAL | Tenas_Lithology.csv |
| T96R-137 | 10.16 | 10.49 | 0.33 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-137 | 10.49 | 10.63 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-137 | 10.63 | 10.98 | 0.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-137 | 10.98 | 11.85 | 0.87 | COAL | Tenas_Lithology.csv |
| T96R-137 | 11.85 | 12.53 | 0.68 | MDST | Tenas_Lithology.csv |
| T96R-137 | 12.53 | 12.71 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-137 | 12.71 | 12.92 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-137 | 12.92 | 13.16 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-137 | 13.16 | 15.13 | 1.97 | MDST | Tenas_Lithology.csv |
| T96R-137 | 15.13 | 15.25 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-137 | 15.25 | 16.78 | 1.53 | SLTS | Tenas_Lithology.csv |
| T96R-137 | 16.78 | 17.04 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-137 | 17.04 | 18.03 | 0.99 | SLTS | Tenas_Lithology.csv |
| T96R-137 | 18.03 | 18.39 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-137 | 18.39 | 26.2 | 7.81 | SLTS | Tenas_Lithology.csv |
| T96R-137 | 26.2 | 26.36 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-137 | 26.36 | 27.4 | 1.04 | MDST | Tenas_Lithology.csv |
| T96R-137 | 27.4 | 34.1 | 6.7 | SLTS | Tenas_Lithology.csv |
| T96R-137 | 34.1 | 42.7 | 8.6 | CGL | Tenas_Lithology.csv |
| T96R-13C | 0 | 0.8 | 0.8 | Overburden | Tenas_Lithology.csv |
| T96R-13C | 0.8 | 2.05 | 1.25 | SLTS | Tenas_Lithology.csv |
| T96R-13C | 2.05 | 6.48 | 4.43 | MDST | Tenas_Lithology.csv |
| T96R-13C | 6.48 | 6.81 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-13C | 6.81 | 9.5 | 2.69 | MDST | Tenas_Lithology.csv |
| T96R-13C | 9.5 | 11 | 1.5 | COAL | Tenas_Lithology.csv |
| T96R-13C | 11 | 11.59 | 0.59 | SLTS | Tenas_Lithology.csv |
| T96R-13C | 11.59 | 14.73 | 3.14 | COAL | Tenas_Lithology.csv |
| T96R-13C | 14.73 | 16.2 | 1.47 | MDST | Tenas_Lithology.csv |
| T96R-13C | 16.2 | 16.99 | 0.79 | COAL | Tenas_Lithology.csv |
| T96R-13C | 16.99 | 20 | 3.01 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 0 | 9 | 9 | Overburden | Tenas_Lithology.csv |
| T96R-14 | 9 | 14 | 5 | MDST | Tenas_Lithology.csv |
| T96R-14 | 14 | 21.5 | 7.5 | SST | Tenas_Lithology.csv |
| T96R-14 | 21.5 | 33.5 | 12 | MDST | Tenas_Lithology.csv |
| T96R-14 | 33.5 | 45.5 | 12 | SST | Tenas_Lithology.csv |
| T96R-14 | 45.5 | 57.93 | 12.43 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 57.93 | 59.46 | 1.53 | COAL | Tenas_Lithology.csv |
| T96R-14 | 59.46 | 66.76 | 7.3 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-14 | 66.76 | 67.02 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-14 | 67.02 | 72.6 | 5.58 | MDST | Tenas_Lithology.csv |
| T96R-14 | 72.6 | 74.11 | 1.51 | COAL | Tenas_Lithology.csv |
| T96R-14 | 74.11 | 74.47 | 0.36 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 74.47 | 75.79 | 1.32 | COAL | Tenas_Lithology.csv |
| T96R-14 | 75.79 | 76.16 | 0.37 | MDST | Tenas_Lithology.csv |
| T96R-14 | 76.16 | 76.42 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-14 | 76.42 | 76.69 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 76.69 | 77.48 | 0.79 | COAL | Tenas_Lithology.csv |
| T96R-14 | 77.48 | 77.71 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 77.71 | 78.31 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-14 | 78.31 | 78.53 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 78.53 | 79.54 | 1.01 | COAL | Tenas_Lithology.csv |
| T96R-14 | 79.54 | 81.86 | 2.32 | MDST | Tenas_Lithology.csv |
| T96R-14 | 81.86 | 82.38 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-14 | 82.38 | 83.77 | 1.39 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 83.77 | 83.98 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-14 | 83.98 | 84.22 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 84.22 | 84.87 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-14 | 84.87 | 88 | 3.13 | SLTS | Tenas_Lithology.csv |
| T96R-14 | 88 | 91.6 | 3.6 | MDST | Tenas_Lithology.csv |
| T96R-14 | 91.6 | 96.1 | 4.5 | SST | Tenas_Lithology.csv |
| T96R-14 | 96.1 | 96.24 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-14 | 96.24 | 96.52 | 0.28 | MDST | Tenas_Lithology.csv |
| T96R-14 | 96.52 | 97.2 | 0.68 | COAL | Tenas_Lithology.csv |
| T96R-14 | 97.2 | 100 | 2.8 | MDST | Tenas_Lithology.csv |
| T96R-14 | 100 | 103.34 | 3.34 | SST | Tenas_Lithology.csv |
| T96R-14 | 103.34 | 103.7 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-14 | 103.7 | 123 | 19.3 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 0 | 11.5 | 11.5 | Overburden | Tenas_Lithology.csv |
| T96R-15 | 11.5 | 29 | 17.5 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 29 | 36 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-15 | 36 | 39.4 | 3.4 | SST | Tenas_Lithology.csv |
| T96R-15 | 39.4 | 39.71 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-15 | 39.71 | 47 | 7.29 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 47 | 52.59 | 5.59 | SST | Tenas_Lithology.csv |
| T96R-15 | 52.59 | 53.57 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-15 | 53.57 | 61.69 | 8.12 | SST | Tenas_Lithology.csv |
| T96R-15 | 61.69 | 62.01 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-15 | 62.01 | 65.99 | 3.98 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 65.99 | 67.6 | 1.61 | COAL | Tenas_Lithology.csv |
| T96R-15 | 67.6 | 68.59 | 0.99 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 68.59 | 69.85 | 1.26 | COAL | Tenas_Lithology.csv |
| T96R-15 | 69.85 | 70.11 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-15 | 70.11 | 72.89 | 2.78 | COAL | Tenas_Lithology.csv |
| T96R-15 | 72.89 | 77.47 | 4.58 | MDST | Tenas_Lithology.csv |
| T96R-15 | 77.47 | 77.89 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-15 | 77.89 | 79.5 | 1.61 | MDST | Tenas_Lithology.csv |
| T96R-15 | 79.5 | 80.14 | 0.64 | COAL | Tenas_Lithology.csv |
| T96R-15 | 80.14 | 80.91 | 0.77 | MDST | Tenas_Lithology.csv |
| T96R-15 | 80.91 | 81.15 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-15 | 81.15 | 81.57 | 0.42 | MDST | Tenas_Lithology.csv |
| T96R-15 | 81.57 | 81.91 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-15 | 81.91 | 83.35 | 1.44 | MDST | Tenas_Lithology.csv |
| T96R-15 | 83.35 | 83.53 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-15 | 83.53 | 87.64 | 4.11 | MDST | Tenas_Lithology.csv |
| T96R-15 | 87.64 | 88.1 | 0.46 | COAL | Tenas_Lithology.csv |
| T96R-15 | 88.1 | 88.18 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-15 | 88.18 | 88.33 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-15 | 88.33 | 89.32 | 0.99 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 89.32 | 90.04 | 0.72 | COAL | Tenas_Lithology.csv |
| T96R-15 | 90.04 | 96.14 | 6.1 | SLTS | Tenas_Lithology.csv |
| T96R-15 | 96.14 | 96.65 | 0.51 | COAL | Tenas_Lithology.csv |
| T96R-15 | 96.65 | 112.5 | 15.85 | SST | Tenas_Lithology.csv |
| T96R-15 | 112.5 | 119.5 | 7 | CGL | Tenas_Lithology.csv |
| T96R-15 | 119.5 | 128.2 | 8.7 | SST | Tenas_Lithology.csv |
| T96R-16 | 0 | 0.25 | 0.25 | Overburden | Tenas_Lithology.csv |
| T96R-16 | 0.25 | 1.2 | 0.95 | COAL | Tenas_Lithology.csv |
| T96R-16 | 1.2 | 1.65 | 0.45 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 1.65 | 2.24 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-16 | 2.24 | 6 | 3.76 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 6 | 7.47 | 1.47 | MDST | Tenas_Lithology.csv |
| T96R-16 | 7.47 | 7.62 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-16 | 7.62 | 9.56 | 1.94 | MDST | Tenas_Lithology.csv |
| T96R-16 | 9.56 | 11.45 | 1.89 | COAL | Tenas_Lithology.csv |
| T96R-16 | 11.45 | 14.32 | 2.87 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 14.32 | 16.3 | 1.98 | COAL | Tenas_Lithology.csv |
| T96R-16 | 16.3 | 16.46 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-16 | 16.46 | 16.6 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-16 | 16.6 | 16.95 | 0.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-16 | 16.95 | 17.8 | 0.85 | COAL | Tenas_Lithology.csv |
| T96R-16 | 17.8 | 18.36 | 0.56 | MDST | Tenas_Lithology.csv |
| T96R-16 | 18.36 | 18.6 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-16 | 18.6 | 18.83 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-16 | 18.83 | 18.96 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-16 | 18.96 | 25.15 | 6.19 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 25.15 | 25.3 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-16 | 25.3 | 25.4 | 0.1 | MDST | Tenas_Lithology.csv |
| T96R-16 | 25.4 | 25.52 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-16 | 25.52 | 26.32 | 0.8 | MDST | Tenas_Lithology.csv |
| T96R-16 | 26.32 | 26.62 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-16 | 26.62 | 31.6 | 4.98 | MDST | Tenas_Lithology.csv |
| T96R-16 | 31.6 | 31.7 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-16 | 31.7 | 35.52 | 3.82 | SLTS | Tenas_Lithology.csv |
| T96R-16 | 35.52 | 35.81 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-16 | 35.81 | 44.5 | 8.69 | SST | Tenas_Lithology.csv |
| T96R-16 | 44.5 | 45.9 | 1.4 | CGL | Tenas_Lithology.csv |
| T96R-16 | 45.9 | 59 | 13.1 | SST | Tenas_Lithology.csv |
| T96R-16 | 59 | 72 | 13 | CGL | Tenas_Lithology.csv |
| T96R-16 | 72 | 78.8 | 6.8 | SST | Tenas_Lithology.csv |
| T96R-17C | 0 | 0.91 | 0.91 | Overburden | Tenas_Lithology.csv |
| T96R-17C | 0.91 | 3.47 | 2.56 | MDST | Tenas_Lithology.csv |
| T96R-17C | 3.47 | 3.75 | 0.28 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-17C | 3.75 | 6.71 | 2.96 | MDST | Tenas_Lithology.csv |
| T96R-17C | 6.71 | 8.36 | 1.65 | COAL | Tenas_Lithology.csv |
| T96R-17C | 8.36 | 8.81 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-17C | 8.81 | 12.07 | 3.26 | COAL | Tenas_Lithology.csv |
| T96R-17C | 12.07 | 13.39 | 1.32 | MDST | Tenas_Lithology.csv |
| T96R-17C | 13.39 | 13.8 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-17C | 13.8 | 13.9 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-17C | 13.9 | 14.31 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-17C | 14.31 | 17 | 2.69 | MDST | Tenas_Lithology.csv |
| T96R-18C | 0 | 0.91 | 0.91 | Overburden | Tenas_Lithology.csv |
| T96R-18C | 0.91 | 1.89 | 0.98 | MDST | Tenas_Lithology.csv |
| T96R-18C | 1.89 | 3.97 | 2.08 | SLTS | Tenas_Lithology.csv |
| T96R-18C | 3.97 | 5.59 | 1.62 | COAL | Tenas_Lithology.csv |
| T96R-18C | 5.59 | 6.05 | 0.46 | MDST | Tenas_Lithology.csv |
| T96R-18C | 6.05 | 9.38 | 3.33 | COAL | Tenas_Lithology.csv |
| T96R-18C | 9.38 | 10.78 | 1.4 | SLTS | Tenas_Lithology.csv |
| T96R-18C | 10.78 | 11.16 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-18C | 11.16 | 11.26 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-18C | 11.26 | 11.58 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-18C | 11.58 | 13.5 | 1.92 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 0 | 2.3 | 2.3 | Overburden | Tenas_Lithology.csv |
| T96R-19 | 2.3 | 5.2 | 2.9 | MDST | Tenas_Lithology.csv |
| T96R-19 | 5.2 | 14.88 | 9.68 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 14.88 | 15.25 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-19 | 15.25 | 19.13 | 3.88 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 19.13 | 19.58 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-19 | 19.58 | 21.62 | 2.04 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 21.62 | 21.76 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-19 | 21.76 | 22.64 | 0.88 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 22.64 | 24.07 | 1.43 | COAL | Tenas_Lithology.csv |
| T96R-19 | 24.07 | 30.83 | 6.76 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 30.83 | 31.03 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-19 | 31.03 | 33.62 | 2.59 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 33.62 | 35.23 | 1.61 | COAL | Tenas_Lithology.csv |
| T96R-19 | 35.23 | 36.39 | 1.16 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 36.39 | 39.73 | 3.34 | COAL | Tenas_Lithology.csv |
| T96R-19 | 39.73 | 40.7 | 0.97 | MDST | Tenas_Lithology.csv |
| T96R-19 | 40.7 | 40.81 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-19 | 40.81 | 41 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-19 | 41 | 41.17 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-19 | 41.17 | 44.54 | 3.37 | SST | Tenas_Lithology.csv |
| T96R-19 | 44.54 | 44.61 | 0.07 | COAL | Tenas_Lithology.csv |
| T96R-19 | 44.61 | 44.88 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-19 | 44.88 | 44.94 | 0.06 | COAL | Tenas_Lithology.csv |
| T96R-19 | 44.94 | 45.38 | 0.44 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 45.38 | 45.47 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-19 | 45.47 | 46.33 | 0.86 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 46.33 | 46.6 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-19 | 46.6 | 50.01 | 3.41 | SLTS | Tenas_Lithology.csv |
| T96R-19 | 50.01 | 50.1 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-19 | 50.1 | 65.5 | 15.4 | SST | Tenas_Lithology.csv |
| T96R-19 | 65.5 | 70 | 4.5 | CGL | Tenas_Lithology.csv |
| T96R-19 | 70 | 79.6 | 9.6 | SST | Tenas_Lithology.csv |
| T96R-20C | 0 | 3.04 | 3.04 | Overburden | Tenas_Lithology.csv |
| T96R-20C | 3.04 | 5.27 | 2.23 | MDST | Tenas_Lithology.csv |
| T96R-20C | 5.27 | 5.98 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-20C | 5.98 | 7.96 | 1.98 | MDST | Tenas_Lithology.csv |
| T96R-20C | 7.96 | 8.04 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-20C | 8.04 | 8.58 | 0.54 | MDST | Tenas_Lithology.csv |
| T96R-20C | 8.58 | 9.97 | 1.39 | COAL | Tenas_Lithology.csv |
| T96R-20C | 9.97 | 9.98 | 0.01 | MDST | Tenas_Lithology.csv |
| T96R-21 | 0 | 11 | 11 | Overburden | Tenas_Lithology.csv |
| T96R-21 | 11 | 29 | 18 | SST | Tenas_Lithology.csv |
| T96R-21 | 29 | 44.31 | 15.31 | SLTS | Tenas_Lithology.csv |
| T96R-21 | 44.31 | 44.5 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-21 | 44.5 | 49.82 | 5.32 | MDST | Tenas_Lithology.csv |
| T96R-21 | 49.82 | 50.06 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-21 | 50.06 | 50.16 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-21 | 50.16 | 55.49 | 5.33 | COAL | Tenas_Lithology.csv |
| T96R-21 | 55.49 | 58.9 | 3.41 | MDST | Tenas_Lithology.csv |
| T96R-21 | 58.9 | 59.3 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-21 | 59.3 | 59.8 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-21 | 59.8 | 60.66 | 0.86 | COAL | Tenas_Lithology.csv |
| T96R-21 | 60.66 | 62.58 | 1.92 | MDST | Tenas_Lithology.csv |
| T96R-21 | 62.58 | 62.87 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-21 | 62.87 | 63.32 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-21 | 63.32 | 63.53 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-21 | 63.53 | 69.6 | 6.07 | SST | Tenas_Lithology.csv |
| T96R-21 | 69.6 | 70.2 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-21 | 70.2 | 71.77 | 1.57 | SLTS | Tenas_Lithology.csv |
| T96R-21 | 71.77 | 71.91 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-21 | 71.91 | 77.54 | 5.63 | SST | Tenas_Lithology.csv |
| T96R-21 | 77.54 | 77.93 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-21 | 77.93 | 85.6 | 7.67 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 0 | 9.5 | 9.5 | Overburden | Tenas_Lithology.csv |
| T96R-22 | 9.5 | 30.05 | 20.55 | MDST | Tenas_Lithology.csv |
| T96R-22 | 30.05 | 30.58 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-22 | 30.58 | 34.51 | 3.93 | MDST | Tenas_Lithology.csv |
| T96R-22 | 34.51 | 36.08 | 1.57 | COAL | Tenas_Lithology.csv |
| T96R-22 | 36.08 | 36.35 | 0.27 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 36.35 | 36.48 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 36.48 | 37.04 | 0.56 | MDST | Tenas_Lithology.csv |
| T96R-22 | 37.04 | 39.18 | 2.14 | COAL | Tenas_Lithology.csv |
| T96R-22 | 39.18 | 39.71 | 0.53 | MDST | Tenas_Lithology.csv |
| T96R-22 | 39.71 | 40.08 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-22 | 40.08 | 40.27 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 40.27 | 40.44 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-22 | 40.44 | 41.47 | 1.03 | MDST | Tenas_Lithology.csv |
| T96R-22 | 41.47 | 42.4 | 0.93 | COAL | Tenas_Lithology.csv |
| T96R-22 | 42.4 | 42.7 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-22 | 42.7 | 44.91 | 2.21 | COAL | Tenas_Lithology.csv |
| T96R-22 | 44.91 | 47.12 | 2.21 | MDST | Tenas_Lithology.csv |
| T96R-22 | 47.12 | 47.67 | 0.55 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-22 | 47.67 | 50.1 | 2.43 | MDST | Tenas_Lithology.csv |
| T96R-22 | 50.1 | 50.32 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-22 | 50.32 | 50.65 | 0.33 | MDST | Tenas_Lithology.csv |
| T96R-22 | 50.65 | 51.25 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-22 | 51.25 | 53.63 | 2.38 | MDST | Tenas_Lithology.csv |
| T96R-22 | 53.63 | 54.61 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-22 | 54.61 | 55.73 | 1.12 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 55.73 | 56.03 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 56.03 | 58.93 | 2.9 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 58.93 | 59.33 | 0.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 59.33 | 59.96 | 0.63 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 59.96 | 60.23 | 0.27 | MDST | Tenas_Lithology.csv |
| T96R-22 | 60.23 | 61.13 | 0.9 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 61.13 | 61.52 | 0.39 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 61.52 | 67.6 | 6.08 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 67.6 | 68.65 | 1.05 | COAL | Tenas_Lithology.csv |
| T96R-22 | 68.65 | 68.87 | 0.22 | MDST | Tenas_Lithology.csv |
| T96R-22 | 68.87 | 70.1 | 1.23 | COAL | Tenas_Lithology.csv |
| T96R-22 | 70.1 | 72.59 | 2.49 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 72.59 | 72.7 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 72.7 | 75.38 | 2.68 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 75.38 | 75.69 | 0.31 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-22 | 75.69 | 76.48 | 0.79 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 76.48 | 77.39 | 0.91 | COAL | Tenas_Lithology.csv |
| T96R-22 | 77.39 | 95 | 17.61 | SLTS | Tenas_Lithology.csv |
| T96R-22 | 95 | 106.5 | 11.5 | SST | Tenas_Lithology.csv |
| T96R-22 | 106.5 | 110 | 3.5 | CGL | Tenas_Lithology.csv |
| T96R-22 | 110 | 128.5 | 18.5 | SST | Tenas_Lithology.csv |
| T96R-23C | 0 | 11.3 | 11.3 | Overburden | Tenas_Lithology.csv |
| T96R-23C | 11.3 | 14.62 | 3.32 | MDST | Tenas_Lithology.csv |
| T96R-23C | 14.62 | 18.1 | 3.48 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 18.1 | 18.83 | 0.73 | SST | Tenas_Lithology.csv |
| T96R-23C | 18.83 | 24.9 | 6.07 | MDST | Tenas_Lithology.csv |
| T96R-23C | 24.9 | 25.4 | 0.5 | SST | Tenas_Lithology.csv |
| T96R-23C | 25.4 | 44.89 | 19.49 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 44.89 | 47.97 | 3.08 | MDST | Tenas_Lithology.csv |
| T96R-23C | 47.97 | 56.94 | 8.97 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 56.94 | 64.56 | 7.62 | MDST | Tenas_Lithology.csv |
| T96R-23C | 64.56 | 68.3 | 3.74 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 68.3 | 72.15 | 3.85 | MDST | Tenas_Lithology.csv |
| T96R-23C | 72.15 | 80.93 | 8.78 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 80.93 | 83.45 | 2.52 | MDST | Tenas_Lithology.csv |
| T96R-23C | 83.45 | 83.71 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-23C | 83.71 | 84.44 | 0.73 | MDST | Tenas_Lithology.csv |
| T96R-23C | 84.44 | 85.46 | 1.02 | COAL | Tenas_Lithology.csv |
| T96R-23C | 85.46 | 89.05 | 3.59 | MDST | Tenas_Lithology.csv |
| T96R-23C | 89.05 | 90 | 0.95 | SLTS | Tenas_Lithology.csv |
| T96R-23C | 90 | 104.57 | 14.57 | MDST | Tenas_Lithology.csv |
| T96R-23C | 104.57 | 107.74 | 3.17 | COAL | Tenas_Lithology.csv |
| T96R-23C | 107.74 | 108.03 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-23C | 108.03 | 108.15 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-23C | 108.15 | 108.49 | 0.34 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-23C | 108.49 | 111.03 | 2.54 | COAL | Tenas_Lithology.csv |
| T96R-23C | 111.03 | 116.07 | 5.04 | MDST | Tenas_Lithology.csv |
| T96R-23C | 116.07 | 116.37 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-23C | 116.37 | 116.7 | 0.33 | MDST | Tenas_Lithology.csv |
| T96R-24 | 0 | 2.8 | 2.8 | Overburden | Tenas_Lithology.csv |
| T96R-24 | 2.8 | 22.37 | 19.57 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 22.37 | 22.69 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-24 | 22.69 | 27.58 | 4.89 | MDST | Tenas_Lithology.csv |
| T96R-24 | 27.58 | 27.82 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-24 | 27.82 | 28.66 | 0.84 | MDST | Tenas_Lithology.csv |
| T96R-24 | 28.66 | 29.26 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-24 | 29.26 | 38.92 | 9.66 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 38.92 | 40.15 | 1.23 | COAL | Tenas_Lithology.csv |
| T96R-24 | 40.15 | 40.3 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 40.3 | 41.9 | 1.6 | COAL | Tenas_Lithology.csv |
| T96R-24 | 41.9 | 46.66 | 4.76 | MDST | Tenas_Lithology.csv |
| T96R-24 | 46.66 | 47.27 | 0.61 | COAL | Tenas_Lithology.csv |
| T96R-24 | 47.27 | 58.37 | 11.1 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 58.37 | 60.61 | 2.24 | COAL | Tenas_Lithology.csv |
| T96R-24 | 60.61 | 60.72 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 60.72 | 63.8 | 3.08 | COAL | Tenas_Lithology.csv |
| T96R-24 | 63.8 | 64 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 64 | 65.65 | 1.65 | COAL | Tenas_Lithology.csv |
| T96R-24 | 65.65 | 65.82 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 65.82 | 67.11 | 1.29 | COAL | Tenas_Lithology.csv |
| T96R-24 | 67.11 | 69.41 | 2.3 | MDST | Tenas_Lithology.csv |
| T96R-24 | 69.41 | 70.53 | 1.12 | COAL | Tenas_Lithology.csv |
| T96R-24 | 70.53 | 72.05 | 1.52 | MDST | Tenas_Lithology.csv |
| T96R-24 | 72.05 | 72.26 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-24 | 72.26 | 72.43 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 72.43 | 72.72 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-24 | 72.72 | 73.82 | 1.1 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 73.82 | 74.7 | 0.88 | COAL | Tenas_Lithology.csv |
| T96R-24 | 74.7 | 80.07 | 5.37 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 80.07 | 80.4 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-24 | 80.4 | 80.53 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 80.53 | 81.33 | 0.8 | COAL | Tenas_Lithology.csv |
| T96R-24 | 81.33 | 81.97 | 0.64 | MDST | Tenas_Lithology.csv |
| T96R-24 | 81.97 | 82.18 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-24 | 82.18 | 82.25 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-24 | 82.25 | 83.11 | 0.86 | COAL | Tenas_Lithology.csv |
| T96R-24 | 83.11 | 92.88 | 9.77 | SLTS | Tenas_Lithology.csv |
| T96R-24 | 92.88 | 93.64 | 0.76 | COAL | Tenas_Lithology.csv |
| T96R-24 | 93.64 | 128.5 | 34.86 | SST | Tenas_Lithology.csv |
| T96R-25 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-25 | 7 | 24.6 | 17.6 | MDST | Tenas_Lithology.csv |
| T96R-25 | 24.6 | 31 | 6.4 | SLTS | Tenas_Lithology.csv |
| T96R-25 | 31 | 37.5 | 6.5 | MDST | Tenas_Lithology.csv |
| T96R-25 | 37.5 | 38.1 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-25 | 38.1 | 39.8 | 1.7 | MDST | Tenas_Lithology.csv |
| T96R-25 | 39.8 | 40 | 0.2 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-25 | 40 | 40.8 | 0.8 | MDST | Tenas_Lithology.csv |
| T96R-25 | 40.8 | 42.5 | 1.7 | COAL | Tenas_Lithology.csv |
| T96R-25 | 42.5 | 47.3 | 4.8 | SLTS | Tenas_Lithology.csv |
| T96R-25 | 47.3 | 47.5 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-25 | 47.5 | 52.8 | 5.3 | MDST | Tenas_Lithology.csv |
| T96R-25 | 52.8 | 58.4 | 5.6 | COAL | Tenas_Lithology.csv |
| T96R-25 | 58.4 | 61.2 | 2.8 | MDST | Tenas_Lithology.csv |
| T96R-25 | 61.2 | 61.5 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-25 | 61.5 | 61.65 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-25 | 61.65 | 62.8 | 1.15 | COAL | Tenas_Lithology.csv |
| T96R-25 | 62.8 | 63.9 | 1.1 | MDST | Tenas_Lithology.csv |
| T96R-25 | 63.9 | 64.5 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-25 | 64.5 | 64.8 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-25 | 64.8 | 65 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-25 | 65 | 68.1 | 3.1 | SLTS | Tenas_Lithology.csv |
| T96R-25 | 68.1 | 68.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-25 | 68.4 | 68.5 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-25 | 68.5 | 68.75 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-25 | 68.75 | 70.4 | 1.65 | MDST | Tenas_Lithology.csv |
| T96R-25 | 70.4 | 71 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-25 | 71 | 71.5 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-25 | 71.5 | 71.7 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-25 | 71.7 | 78.5 | 6.8 | MDST | Tenas_Lithology.csv |
| T96R-26 | 0 | 13.9 | 13.9 | Overburden | Tenas_Lithology.csv |
| T96R-26 | 13.9 | 33.2 | 19.3 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 33.2 | 44.21 | 11.01 | SST | Tenas_Lithology.csv |
| T96R-26 | 44.21 | 44.71 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-26 | 44.71 | 49.09 | 4.38 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 49.09 | 49.42 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-26 | 49.42 | 49.54 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 49.54 | 50.08 | 0.54 | COAL | Tenas_Lithology.csv |
| T96R-26 | 50.08 | 56.86 | 6.78 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 56.86 | 58.17 | 1.31 | COAL | Tenas_Lithology.csv |
| T96R-26 | 58.17 | 67.42 | 9.25 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 67.42 | 68.32 | 0.9 | COAL | Tenas_Lithology.csv |
| T96R-26 | 68.32 | 68.7 | 0.38 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 68.7 | 69.36 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-26 | 69.36 | 70.2 | 0.84 | MDST | Tenas_Lithology.csv |
| T96R-26 | 70.2 | 70.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-26 | 70.4 | 73.56 | 3.16 | MDST | Tenas_Lithology.csv |
| T96R-26 | 73.56 | 74.54 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-26 | 74.54 | 75.95 | 1.41 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 75.95 | 76.2 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 76.2 | 81.45 | 5.25 | SLTS | Tenas_Lithology.csv |
| T96R-26 | 81.45 | 89.65 | 8.2 | MDST | Tenas_Lithology.csv |
| T96R-26 | 89.65 | 90.18 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-26 | 90.18 | 90.33 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 90.33 | 90.6 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-26 | 90.6 | 91.08 | 0.48 | MDST | Tenas_Lithology.csv |
| T96R-26 | 91.08 | 91.26 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-26 | 91.26 | 91.35 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-26 | 91.35 | 92.06 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-26 | 92.06 | 93.9 | 1.84 | SST | Tenas_Lithology.csv |
| T96R-26 | 93.9 | 94 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-26 | 94 | 106.2 | 12.2 | SST | Tenas_Lithology.csv |
| T96R-27 | 0 | 1.23 | 1.23 | Overburden | Tenas_Lithology.csv |
| T96R-27 | 1.23 | 1.68 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-27 | 1.68 | 2.11 | 0.43 | MDST | Tenas_Lithology.csv |
| T96R-27 | 2.11 | 3.93 | 1.82 | SLTS | Tenas_Lithology.csv |
| T96R-27 | 3.93 | 4.5 | 0.57 | COAL | Tenas_Lithology.csv |
| T96R-27 | 4.5 | 5.8 | 1.3 | MDST | Tenas_Lithology.csv |
| T96R-27 | 5.8 | 7.55 | 1.75 | COAL | Tenas_Lithology.csv |
| T96R-27 | 7.55 | 10.2 | 2.65 | MDST | Tenas_Lithology.csv |
| T96R-27 | 10.2 | 10.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-27 | 10.4 | 12.6 | 2.2 | MDST | Tenas_Lithology.csv |
| T96R-27 | 12.6 | 13.52 | 0.92 | COAL | Tenas_Lithology.csv |
| T96R-27 | 13.52 | 14.4 | 0.88 | MDST | Tenas_Lithology.csv |
| T96R-27 | 14.4 | 14.75 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-27 | 14.75 | 16.2 | 1.45 | MDST | Tenas_Lithology.csv |
| T96R-27 | 16.2 | 16.68 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-27 | 16.68 | 18.4 | 1.72 | MDST | Tenas_Lithology.csv |
| T96R-27 | 18.4 | 18.61 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-27 | 18.61 | 24.67 | 6.06 | SLTS | Tenas_Lithology.csv |
| T96R-27 | 24.67 | 25.03 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-27 | 25.03 | 33.33 | 8.3 | SLTS | Tenas_Lithology.csv |
| T96R-27 | 33.33 | 33.58 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-27 | 33.58 | 42 | 8.42 | SST | Tenas_Lithology.csv |
| T96R-27 | 42 | 58 | 16 | CGL | Tenas_Lithology.csv |
| T96R-27 | 58 | 62 | 4 | SLTS | Tenas_Lithology.csv |
| T96R-27 | 62 | 71 | 9 | SST | Tenas_Lithology.csv |
| T96R-27 | 71 | 73.5 | 2.5 | CGL | Tenas_Lithology.csv |
| T96R-28C | 0 | 10.68 | 10.68 | Overburden | Tenas_Lithology.csv |
| T96R-28C | 10.68 | 14.68 | 4 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 14.68 | 15.08 | 0.4 | SST | Tenas_Lithology.csv |
| T96R-28C | 15.08 | 17.07 | 1.99 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 17.07 | 17.73 | 0.66 | MDST | Tenas_Lithology.csv |
| T96R-28C | 17.73 | 55.72 | 37.99 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 55.72 | 69.93 | 14.21 | MDST | Tenas_Lithology.csv |
| T96R-28C | 69.93 | 72.08 | 2.15 | SST | Tenas_Lithology.csv |
| T96R-28C | 72.08 | 73.19 | 1.11 | MDST | Tenas_Lithology.csv |
| T96R-28C | 73.19 | 73.61 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-28C | 73.61 | 81.9 | 8.29 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 81.9 | 88.42 | 6.52 | MDST | Tenas_Lithology.csv |
| T96R-28C | 88.42 | 89 | 0.58 | SLTS | Tenas_Lithology.csv |
| T96R-28C | 89 | 89.13 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-28C | 89.13 | 89.97 | 0.84 | MDST | Tenas_Lithology.csv |
| T96R-28C | 89.97 | 91.21 | 1.24 | COAL | Tenas_Lithology.csv |
| T96R-28C | 91.21 | 99.03 | 7.82 | MDST | Tenas_Lithology.csv |
| T96R-28C | 99.03 | 99.44 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-28C | 99.44 | 104.76 | 5.32 | MDST | Tenas_Lithology.csv |
| T96R-28C | 104.76 | 106.95 | 2.19 | COAL | Tenas_Lithology.csv |
| T96R-28C | 106.95 | 107.01 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-28C | 107.01 | 111.31 | 4.3 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-28C | 111.31 | 115.46 | 4.15 | MDST | Tenas_Lithology.csv |
| T96R-28C | 115.46 | 115.81 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-28C | 115.81 | 115.96 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-28C | 115.96 | 117.18 | 1.22 | COAL | Tenas_Lithology.csv |
| T96R-28C | 117.18 | 117.88 | 0.7 | MDST | Tenas_Lithology.csv |
| T96R-28C | 117.88 | 118.5 | 0.62 | COAL | Tenas_Lithology.csv |
| T96R-28C | 118.5 | 119.12 | 0.62 | MDST | Tenas_Lithology.csv |
| T96R-28C | 119.12 | 119.27 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-28C | 119.27 | 120.7 | 1.43 | MDST | Tenas_Lithology.csv |
| T96R-29 | 0 | 4.5 | 4.5 | Overburden | Tenas_Lithology.csv |
| T96R-29 | 4.5 | 7 | 2.5 | SST | Tenas_Lithology.csv |
| T96R-29 | 7 | 27.55 | 20.55 | SLTS | Tenas_Lithology.csv |
| T96R-29 | 27.55 | 27.81 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-29 | 27.81 | 31.23 | 3.42 | SLTS | Tenas_Lithology.csv |
| T96R-29 | 31.23 | 31.29 | 0.06 | COAL | Tenas_Lithology.csv |
| T96R-29 | 31.29 | 32.26 | 0.97 | MDST | Tenas_Lithology.csv |
| T96R-29 | 32.26 | 32.57 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-29 | 32.57 | 37.66 | 5.09 | SLTS | Tenas_Lithology.csv |
| T96R-29 | 37.66 | 38.93 | 1.27 | COAL | Tenas_Lithology.csv |
| T96R-29 | 38.93 | 50.5 | 11.57 | SST | Tenas_Lithology.csv |
| T96R-29 | 50.5 | 50.63 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-29 | 50.63 | 56.14 | 5.51 | SLTS | Tenas_Lithology.csv |
| T96R-29 | 56.14 | 61.35 | 5.21 | COAL | Tenas_Lithology.csv |
| T96R-29 | 61.35 | 65.31 | 3.96 | MDST | Tenas_Lithology.csv |
| T96R-29 | 65.31 | 65.57 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-29 | 65.57 | 65.76 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-29 | 65.76 | 65.93 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-29 | 65.93 | 66.25 | 0.32 | MDST | Tenas_Lithology.csv |
| T96R-29 | 66.25 | 66.35 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-29 | 66.35 | 67.44 | 1.09 | MDST | Tenas_Lithology.csv |
| T96R-29 | 67.44 | 68.07 | 0.63 | COAL | Tenas_Lithology.csv |
| T96R-29 | 68.07 | 68.92 | 0.85 | MDST | Tenas_Lithology.csv |
| T96R-29 | 68.92 | 69.36 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-29 | 69.36 | 77.41 | 8.05 | SST | Tenas_Lithology.csv |
| T96R-29 | 77.41 | 77.68 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-29 | 77.68 | 79 | 1.32 | SST | Tenas_Lithology.csv |
| T96R-30 | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T96R-30 | 6 | 19 | 13 | SST | Tenas_Lithology.csv |
| T96R-30 | 19 | 31 | 12 | MDST | Tenas_Lithology.csv |
| T96R-30 | 31 | 35.09 | 4.09 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 35.09 | 35.5 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-30 | 35.5 | 40.94 | 5.44 | MDST | Tenas_Lithology.csv |
| T96R-30 | 40.94 | 41.26 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-30 | 41.26 | 41.52 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 41.52 | 42.19 | 0.67 | COAL | Tenas_Lithology.csv |
| T96R-30 | 42.19 | 51.08 | 8.89 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 51.08 | 53.31 | 2.23 | COAL | Tenas_Lithology.csv |
| T96R-30 | 53.31 | 65.79 | 12.48 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 65.79 | 66.2 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-30 | 66.2 | 77.15 | 10.95 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 77.15 | 79.01 | 1.86 | COAL | Tenas_Lithology.csv |
| T96R-30 | 79.01 | 79.46 | 0.45 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 79.46 | 79.88 | 0.42 | COAL | Tenas_Lithology.csv |
| T96R-30 | 79.88 | 79.97 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 79.97 | 81.21 | 1.24 | COAL | Tenas_Lithology.csv |
| T96R-30 | 81.21 | 81.42 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 81.42 | 82.72 | 1.3 | COAL | Tenas_Lithology.csv |
| T96R-30 | 82.72 | 82.85 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 82.85 | 85.16 | 2.31 | COAL | Tenas_Lithology.csv |
| T96R-30 | 85.16 | 87.54 | 2.38 | MDST | Tenas_Lithology.csv |
| T96R-30 | 87.54 | 88.16 | 0.62 | COAL | Tenas_Lithology.csv |
| T96R-30 | 88.16 | 91.14 | 2.98 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 91.14 | 92.41 | 1.27 | COAL | Tenas_Lithology.csv |
| T96R-30 | 92.41 | 94.23 | 1.82 | MDST | Tenas_Lithology.csv |
| T96R-30 | 94.23 | 94.42 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-30 | 94.42 | 94.82 | 0.4 | MDST | Tenas_Lithology.csv |
| T96R-30 | 94.82 | 95.29 | 0.47 | COAL | Tenas_Lithology.csv |
| T96R-30 | 95.29 | 96.29 | 1 | MDST | Tenas_Lithology.csv |
| T96R-30 | 96.29 | 96.49 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-30 | 96.49 | 99.56 | 3.07 | SLTS | Tenas_Lithology.csv |
| T96R-30 | 99.56 | 99.92 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-30 | 99.92 | 100.02 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-30 | 100.02 | 100.5 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-30 | 100.5 | 105.81 | 5.31 | SST | Tenas_Lithology.csv |
| T96R-30 | 105.81 | 106.46 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-30 | 106.46 | 109 | 2.54 | MDST | Tenas_Lithology.csv |
| T96R-30 | 109 | 128.2 | 19.2 | SST | Tenas_Lithology.csv |
| T96R-31 | 0 | 0.96 | 0.96 | Overburden | Tenas_Lithology.csv |
| T96R-31 | 0.96 | 5.72 | 4.76 | MDST | Tenas_Lithology.csv |
| T96R-31 | 5.72 | 6.13 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-31 | 6.13 | 9.88 | 3.75 | SLTS | Tenas_Lithology.csv |
| T96R-31 | 9.88 | 10.48 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-31 | 10.48 | 10.95 | 0.47 | MDST | Tenas_Lithology.csv |
| T96R-31 | 10.95 | 12.88 | 1.93 | COAL | Tenas_Lithology.csv |
| T96R-31 | 12.88 | 13.06 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-31 | 13.06 | 13.3 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-31 | 13.3 | 16.92 | 3.62 | SST | Tenas_Lithology.csv |
| T96R-31 | 16.92 | 18.8 | 1.88 | COAL | Tenas_Lithology.csv |
| T96R-31 | 18.8 | 19.1 | 0.3 | SLTS | Tenas_Lithology.csv |
| T96R-31 | 19.1 | 19.96 | 0.86 | COAL | Tenas_Lithology.csv |
| T96R-31 | 19.96 | 20.22 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-31 | 20.22 | 20.59 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-31 | 20.59 | 21.46 | 0.87 | MDST | Tenas_Lithology.csv |
| T96R-31 | 21.46 | 21.7 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-31 | 21.7 | 22.15 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-31 | 22.15 | 22.88 | 0.73 | COAL | Tenas_Lithology.csv |
| T96R-31 | 22.88 | 27 | 4.12 | SLTS | Tenas_Lithology.csv |
| T96R-31 | 27 | 31.08 | 4.08 | SST | Tenas_Lithology.csv |
| T96R-31 | 31.08 | 31.3 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-31 | 31.3 | 32.11 | 0.81 | SLTS | Tenas_Lithology.csv |
| T96R-31 | 32.11 | 32.64 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-31 | 32.64 | 37.5 | 4.86 | SST | Tenas_Lithology.csv |
| T96R-31 | 37.5 | 37.66 | 0.16 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-31 | 37.66 | 41.11 | 3.45 | SST | Tenas_Lithology.csv |
| T96R-31 | 41.11 | 41.41 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-31 | 41.41 | 46 | 4.59 | MDST | Tenas_Lithology.csv |
| T96R-31 | 46 | 63 | 17 | CGL | Tenas_Lithology.csv |
| T96R-31 | 63 | 66 | 3 | SST | Tenas_Lithology.csv |
| T96R-32 | 0 | 16.2 | 16.2 | Overburden | Tenas_Lithology.csv |
| T96R-32 | 16.2 | 18.81 | 2.61 | MDST | Tenas_Lithology.csv |
| T96R-32 | 18.81 | 19.28 | 0.47 | COAL | Tenas_Lithology.csv |
| T96R-32 | 19.28 | 19.34 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-32 | 19.34 | 23.38 | 4.04 | COAL | Tenas_Lithology.csv |
| T96R-32 | 23.38 | 27.19 | 3.81 | MDST | Tenas_Lithology.csv |
| T96R-32 | 27.19 | 27.45 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-32 | 27.45 | 28.18 | 0.73 | MDST | Tenas_Lithology.csv |
| T96R-32 | 28.18 | 28.76 | 0.58 | COAL | Tenas_Lithology.csv |
| T96R-32 | 28.76 | 30.12 | 1.36 | SLTS | Tenas_Lithology.csv |
| T96R-32 | 30.12 | 30.68 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-32 | 30.68 | 31.2 | 0.52 | MDST | Tenas_Lithology.csv |
| T96R-32 | 31.2 | 31.36 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-32 | 31.36 | 35.92 | 4.56 | SST | Tenas_Lithology.csv |
| T96R-32 | 35.92 | 36.23 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-32 | 36.23 | 36.46 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-32 | 36.46 | 36.55 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-32 | 36.55 | 43.2 | 6.65 | SLTS | Tenas_Lithology.csv |
| T96R-32 | 43.2 | 43.51 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-32 | 43.51 | 49 | 5.49 | SLTS | Tenas_Lithology.csv |
| T96R-32 | 49 | 57 | 8 | SST | Tenas_Lithology.csv |
| T96R-32 | 57 | 64 | 7 | CGL | Tenas_Lithology.csv |
| T96R-32 | 64 | 67.6 | 3.6 | SST | Tenas_Lithology.csv |
| T96R-33 | 0 | 0.31 | 0.31 | Overburden | Tenas_Lithology.csv |
| T96R-33 | 0.31 | 1 | 0.69 | COAL | Tenas_Lithology.csv |
| T96R-33 | 1 | 3.28 | 2.28 | MDST | Tenas_Lithology.csv |
| T96R-33 | 3.28 | 5.66 | 2.38 | COAL | Tenas_Lithology.csv |
| T96R-33 | 5.66 | 6.6 | 0.94 | MDST | Tenas_Lithology.csv |
| T96R-33 | 6.6 | 7.52 | 0.92 | COAL | Tenas_Lithology.csv |
| T96R-33 | 7.52 | 9.22 | 1.7 | MDST | Tenas_Lithology.csv |
| T96R-33 | 9.22 | 9.45 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-33 | 9.45 | 10.74 | 1.29 | MDST | Tenas_Lithology.csv |
| T96R-33 | 10.74 | 10.85 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-33 | 10.85 | 11.83 | 0.98 | MDST | Tenas_Lithology.csv |
| T96R-33 | 11.83 | 11.92 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-33 | 11.92 | 21.1 | 9.18 | MDST | Tenas_Lithology.csv |
| T96R-33 | 21.1 | 21.81 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-33 | 21.81 | 22.3 | 0.49 | MDST | Tenas_Lithology.csv |
| T96R-33 | 22.3 | 22.64 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-33 | 22.64 | 31.74 | 9.1 | MDST | Tenas_Lithology.csv |
| T96R-33 | 31.74 | 32.13 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-33 | 32.13 | 40 | 7.87 | SST | Tenas_Lithology.csv |
| T96R-33 | 40 | 48.8 | 8.8 | CGL | Tenas_Lithology.csv |
| T96R-34 | 0 | 12 | 12 | Overburden | Tenas_Lithology.csv |
| T96R-34 | 12 | 34 | 22 | SST | Tenas_Lithology.csv |
| T96R-34 | 34 | 48 | 14 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 48 | 57.83 | 9.83 | SST | Tenas_Lithology.csv |
| T96R-34 | 57.83 | 58.17 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-34 | 58.17 | 61.04 | 2.87 | MDST | Tenas_Lithology.csv |
| T96R-34 | 61.04 | 61.2 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-34 | 61.2 | 61.69 | 0.49 | MDST | Tenas_Lithology.csv |
| T96R-34 | 61.69 | 61.96 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-34 | 61.96 | 65.81 | 3.85 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 65.81 | 66.4 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-34 | 66.4 | 66.46 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-34 | 66.46 | 67.27 | 0.81 | COAL | Tenas_Lithology.csv |
| T96R-34 | 67.27 | 75.34 | 8.07 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 75.34 | 75.64 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-34 | 75.64 | 81.09 | 5.45 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 81.09 | 86.36 | 5.27 | COAL | Tenas_Lithology.csv |
| T96R-34 | 86.36 | 88.59 | 2.23 | MDST | Tenas_Lithology.csv |
| T96R-34 | 88.59 | 88.93 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-34 | 88.93 | 89.33 | 0.4 | MDST | Tenas_Lithology.csv |
| T96R-34 | 89.33 | 89.67 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-34 | 89.67 | 96.2 | 6.53 | SLTS | Tenas_Lithology.csv |
| T96R-34 | 96.2 | 96.51 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-34 | 96.51 | 97.6 | 1.09 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 0 | 1.6 | 1.6 | Overburden | Tenas_Lithology.csv |
| T96R-35 | 1.6 | 3.7 | 2.1 | MDST | Tenas_Lithology.csv |
| T96R-35 | 3.7 | 3.97 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-35 | 3.97 | 5.45 | 1.48 | MDST | Tenas_Lithology.csv |
| T96R-35 | 5.45 | 5.61 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-35 | 5.61 | 6.11 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-35 | 6.11 | 6.27 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-35 | 6.27 | 6.58 | 0.31 | MDST | Tenas_Lithology.csv |
| T96R-35 | 6.58 | 6.91 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-35 | 6.91 | 13.47 | 6.56 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 13.47 | 13.81 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-35 | 13.81 | 23 | 9.19 | MDST | Tenas_Lithology.csv |
| T96R-35 | 23 | 36 | 13 | CGL | Tenas_Lithology.csv |
| T96R-35 | 36 | 39 | 3 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 39 | 46 | 7 | SST | Tenas_Lithology.csv |
| T96R-35 | 46 | 59 | 13 | CGL | Tenas_Lithology.csv |
| T96R-35 | 59 | 63.15 | 4.15 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 63.15 | 63.34 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-35 | 63.34 | 64.02 | 0.68 | MDST | Tenas_Lithology.csv |
| T96R-35 | 64.02 | 64.2 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-35 | 64.2 | 65 | 0.8 | SLTS | Tenas_Lithology.csv |
| T96R-35 | 65 | 73.6 | 8.6 | VOLC | Tenas_Lithology.csv |
| T96R-37 | 0 | 2.5 | 2.5 | Overburden | Tenas_Lithology.csv |
| T96R-37 | 2.5 | 8.6 | 6.1 | MDST | Tenas_Lithology.csv |
| T96R-37 | 8.6 | 8.9 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-37 | 8.9 | 11.72 | 2.82 | MDST | Tenas_Lithology.csv |
| T96R-37 | 11.72 | 11.97 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-37 | 11.97 | 15.7 | 3.73 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 15.7 | 15.89 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-37 | 15.89 | 17.13 | 1.24 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 17.13 | 18.29 | 1.16 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-37 | 18.29 | 26.5 | 8.21 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 26.5 | 26.6 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-37 | 26.6 | 30.74 | 4.14 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 30.74 | 35.67 | 4.93 | COAL | Tenas_Lithology.csv |
| T96R-37 | 35.67 | 37.6 | 1.93 | MDST | Tenas_Lithology.csv |
| T96R-37 | 37.6 | 38.3 | 0.7 | COAL | Tenas_Lithology.csv |
| T96R-37 | 38.3 | 41.04 | 2.74 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 41.04 | 41.45 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-37 | 41.45 | 43.1 | 1.65 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 43.1 | 43.3 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-37 | 43.3 | 46.6 | 3.3 | MDST | Tenas_Lithology.csv |
| T96R-37 | 46.6 | 46.9 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-37 | 46.9 | 48.2 | 1.3 | SLTS | Tenas_Lithology.csv |
| T96R-37 | 48.2 | 48.8 | 0.6 | COAL | Tenas_Lithology.csv |
| T96R-37 | 48.8 | 55.16 | 6.36 | SST | Tenas_Lithology.csv |
| T96R-37 | 55.16 | 55.54 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-37 | 55.54 | 61.6 | 6.06 | SST | Tenas_Lithology.csv |
| T96R-38 | 0 | 5.1 | 5.1 | Overburden | Tenas_Lithology.csv |
| T96R-38 | 5.1 | 11.91 | 6.81 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 11.91 | 12.41 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-38 | 12.41 | 19.49 | 7.08 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 19.49 | 19.92 | 0.43 | COAL | Tenas_Lithology.csv |
| T96R-38 | 19.92 | 22.79 | 2.87 | MDST | Tenas_Lithology.csv |
| T96R-38 | 22.79 | 22.98 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-38 | 22.98 | 24.16 | 1.18 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 24.16 | 24.33 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-38 | 24.33 | 24.46 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-38 | 24.46 | 24.63 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-38 | 24.63 | 24.87 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-38 | 24.87 | 25.42 | 0.55 | COAL | Tenas_Lithology.csv |
| T96R-38 | 25.42 | 29.45 | 4.03 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 29.45 | 29.94 | 0.49 | COAL | Tenas_Lithology.csv |
| T96R-38 | 29.94 | 34.43 | 4.49 | SST | Tenas_Lithology.csv |
| T96R-38 | 34.43 | 34.78 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-38 | 34.78 | 47 | 12.22 | SLTS | Tenas_Lithology.csv |
| T96R-38 | 47 | 53 | 6 | CGL | Tenas_Lithology.csv |
| T96R-38 | 53 | 68 | 15 | SST | Tenas_Lithology.csv |
| T96R-38 | 68 | 69 | 1 | CGL | Tenas_Lithology.csv |
| T96R-38 | 69 | 76.1 | 7.1 | SST | Tenas_Lithology.csv |
| T96R-39 | 0 | 2.83 | 2.83 | Overburden | Tenas_Lithology.csv |
| T96R-39 | 2.83 | 10.87 | 8.04 | SLTS | Tenas_Lithology.csv |
| T96R-39 | 10.87 | 11.07 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-39 | 11.07 | 18 | 6.93 | SLTS | Tenas_Lithology.csv |
| T96R-39 | 18 | 18.12 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-39 | 18.12 | 19.99 | 1.87 | MDST | Tenas_Lithology.csv |
| T96R-39 | 19.99 | 20.07 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-39 | 20.07 | 25.76 | 5.69 | SLTS | Tenas_Lithology.csv |
| T96R-39 | 25.76 | 26.29 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-39 | 26.29 | 31 | 4.71 | MDST | Tenas_Lithology.csv |
| T96R-39 | 31 | 61.5 | 30.5 | SST | Tenas_Lithology.csv |
| T96R-41 | 0 | 23 | 23 | Overburden | Tenas_Lithology.csv |
| T96R-41 | 23 | 34 | 11 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 34 | 49.1 | 15.1 | SST | Tenas_Lithology.csv |
| T96R-41 | 49.1 | 49.37 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-41 | 49.37 | 51.05 | 1.68 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 51.05 | 51.3 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-41 | 51.3 | 51.54 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-41 | 51.54 | 51.68 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-41 | 51.68 | 52.54 | 0.86 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 52.54 | 53.07 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-41 | 53.07 | 57.85 | 4.78 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 57.85 | 59.03 | 1.18 | COAL | Tenas_Lithology.csv |
| T96R-41 | 59.03 | 59.13 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-41 | 59.13 | 60.06 | 0.93 | COAL | Tenas_Lithology.csv |
| T96R-41 | 60.06 | 70.48 | 10.42 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 70.48 | 71.81 | 1.33 | COAL | Tenas_Lithology.csv |
| T96R-41 | 71.81 | 76.38 | 4.57 | MDST | Tenas_Lithology.csv |
| T96R-41 | 76.38 | 76.6 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-41 | 76.6 | 77.86 | 1.26 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 77.86 | 78.47 | 0.61 | COAL | Tenas_Lithology.csv |
| T96R-41 | 78.47 | 79 | 0.53 | SLTS | Tenas_Lithology.csv |
| T96R-41 | 79 | 85 | 6 | SST | Tenas_Lithology.csv |
| T96R-41 | 85 | 105 | 20 | CGL | Tenas_Lithology.csv |
| T96R-41 | 105 | 121.4 | 16.4 | SST | Tenas_Lithology.csv |
| T96R-42C | 0 | 6.4 | 6.4 | Overburden | Tenas_Lithology.csv |
| T96R-42C | 6.4 | 12.5 | 6.1 | MDST | Tenas_Lithology.csv |
| T96R-42C | 12.5 | 14.26 | 1.76 | SST | Tenas_Lithology.csv |
| T96R-42C | 14.26 | 18.86 | 4.6 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 18.86 | 31.53 | 12.67 | MDST | Tenas_Lithology.csv |
| T96R-42C | 31.53 | 36.04 | 4.51 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 36.04 | 37.18 | 1.14 | SST | Tenas_Lithology.csv |
| T96R-42C | 37.18 | 39.46 | 2.28 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 39.46 | 41.34 | 1.88 | MDST | Tenas_Lithology.csv |
| T96R-42C | 41.34 | 82.28 | 40.94 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 82.28 | 90.76 | 8.48 | MDST | Tenas_Lithology.csv |
| T96R-42C | 90.76 | 91.56 | 0.8 | SST | Tenas_Lithology.csv |
| T96R-42C | 91.56 | 96.63 | 5.07 | MDST | Tenas_Lithology.csv |
| T96R-42C | 96.63 | 102 | 5.37 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 102 | 103.24 | 1.24 | MDST | Tenas_Lithology.csv |
| T96R-42C | 103.24 | 105.99 | 2.75 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 105.99 | 107.75 | 1.76 | MDST | Tenas_Lithology.csv |
| T96R-42C | 107.75 | 108.12 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-42C | 108.12 | 110.16 | 2.04 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 110.16 | 110.81 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-42C | 110.81 | 115 | 4.19 | MDST | Tenas_Lithology.csv |
| T96R-42C | 115 | 116.69 | 1.69 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 116.69 | 116.77 | 0.08 | MDST | Tenas_Lithology.csv |
| T96R-42C | 116.77 | 117.3 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-42C | 117.3 | 118.04 | 0.74 | MDST | Tenas_Lithology.csv |
| T96R-42C | 118.04 | 118.6 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-42C | 118.6 | 121.3 | 2.7 | MDST | Tenas_Lithology.csv |
| T96R-42C | 121.3 | 123.12 | 1.82 | SST | Tenas_Lithology.csv |
| T96R-42C | 123.12 | 126.45 | 3.33 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-42C | 126.45 | 127.1 | 0.65 | MDST | Tenas_Lithology.csv |
| T96R-42C | 127.1 | 128 | 0.9 | COAL | Tenas_Lithology.csv |
| T96R-42C | 128 | 133.9 | 5.9 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 133.9 | 135.21 | 1.31 | MDST | Tenas_Lithology.csv |
| T96R-42C | 135.21 | 135.57 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-42C | 135.57 | 141.78 | 6.21 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 141.78 | 145.87 | 4.09 | MDST | Tenas_Lithology.csv |
| T96R-42C | 145.87 | 147.83 | 1.96 | SLTS | Tenas_Lithology.csv |
| T96R-42C | 147.83 | 150.1 | 2.27 | SST | Tenas_Lithology.csv |
| T96R-43 | 0 | 15.5 | 15.5 | Overburden | Tenas_Lithology.csv |
| T96R-43 | 15.5 | 27.75 | 12.25 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 27.75 | 29.36 | 1.61 | COAL | Tenas_Lithology.csv |
| T96R-43 | 29.36 | 37.32 | 7.96 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 37.32 | 37.63 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-43 | 37.63 | 45.74 | 8.11 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 45.74 | 52.76 | 7.02 | COAL | Tenas_Lithology.csv |
| T96R-43 | 52.76 | 54.5 | 1.74 | MDST | Tenas_Lithology.csv |
| T96R-43 | 54.5 | 55.15 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-43 | 55.15 | 57.18 | 2.03 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 57.18 | 58.17 | 0.99 | COAL | Tenas_Lithology.csv |
| T96R-43 | 58.17 | 63.5 | 5.33 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 63.5 | 68.06 | 4.56 | MDST | Tenas_Lithology.csv |
| T96R-43 | 68.06 | 70.48 | 2.42 | COAL | Tenas_Lithology.csv |
| T96R-43 | 70.48 | 70.64 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-43 | 70.64 | 72.69 | 2.05 | COAL | Tenas_Lithology.csv |
| T96R-43 | 72.69 | 82.75 | 10.06 | SLTS | Tenas_Lithology.csv |
| T96R-43 | 82.75 | 83.4 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-43 | 83.4 | 91.2 | 7.8 | SLTS | Tenas_Lithology.csv |
| T96R-45 | 0 | 22.9 | 22.9 | Overburden | Tenas_Lithology.csv |
| T96R-45 | 22.9 | 44.5 | 21.6 | SLTS | Tenas_Lithology.csv |
| T96R-45 | 44.5 | 49 | 4.5 | CGL | Tenas_Lithology.csv |
| T96R-45 | 49 | 51.5 | 2.5 | MDST | Tenas_Lithology.csv |
| T96R-45 | 51.5 | 54 | 2.5 | SST | Tenas_Lithology.csv |
| T96R-45 | 54 | 68 | 14 | CGL | Tenas_Lithology.csv |
| T96R-45 | 68 | 75.8 | 7.8 | SLTS | Tenas_Lithology.csv |
| T96R-45 | 75.8 | 78 | 2.2 | CGL | Tenas_Lithology.csv |
| T96R-45 | 78 | 79.6 | 1.6 | VOLC | Tenas_Lithology.csv |
| T96R-46 | 0 | 3.8 | 3.8 | Overburden | Tenas_Lithology.csv |
| T96R-46 | 3.8 | 50 | 46.2 | SLTS | Tenas_Lithology.csv |
| T96R-46 | 50 | 83.6 | 33.6 | SST | Tenas_Lithology.csv |
| T96R-46 | 83.6 | 86.28 | 2.68 | SLTS | Tenas_Lithology.csv |
| T96R-46 | 86.28 | 87.46 | 1.18 | COAL | Tenas_Lithology.csv |
| T96R-46 | 87.46 | 100.03 | 12.57 | SLTS | Tenas_Lithology.csv |
| T96R-46 | 100.03 | 104.17 | 4.14 | COAL | Tenas_Lithology.csv |
| T96R-46 | 104.17 | 107.16 | 2.99 | MDST | Tenas_Lithology.csv |
| T96R-46 | 107.16 | 108.29 | 1.13 | COAL | Tenas_Lithology.csv |
| T96R-46 | 108.29 | 115.38 | 7.09 | SLTS | Tenas_Lithology.csv |
| T96R-46 | 115.38 | 115.86 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-46 | 115.86 | 118.48 | 2.62 | SST | Tenas_Lithology.csv |
| T96R-46 | 118.48 | 118.98 | 0.5 | COAL | Tenas_Lithology.csv |
| T96R-46 | 118.98 | 121.91 | 2.93 | SST | Tenas_Lithology.csv |
| T96R-46 | 121.91 | 122.16 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-46 | 122.16 | 123.8 | 1.64 | SST | Tenas_Lithology.csv |
| T96R-46 | 123.8 | 124 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-46 | 124 | 140.4 | 16.4 | SST | Tenas_Lithology.csv |
| T96R-47 | 0 | 11.5 | 11.5 | Overburden | Tenas_Lithology.csv |
| T96R-47 | 11.5 | 55 | 43.5 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 55 | 101.41 | 46.41 | SST | Tenas_Lithology.csv |
| T96R-47 | 101.41 | 101.53 | 0.12 | COAL | Tenas_Lithology.csv |
| T96R-47 | 101.53 | 102.47 | 0.94 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 102.47 | 102.74 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-47 | 102.74 | 107.11 | 4.37 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 107.11 | 107.77 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-47 | 107.77 | 110.83 | 3.06 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 110.83 | 111.03 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-47 | 111.03 | 124.66 | 13.63 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 124.66 | 127.24 | 2.58 | COAL | Tenas_Lithology.csv |
| T96R-47 | 127.24 | 127.29 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-47 | 127.29 | 128.55 | 1.26 | COAL | Tenas_Lithology.csv |
| T96R-47 | 128.55 | 128.66 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-47 | 128.66 | 128.94 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-47 | 128.94 | 129.36 | 0.42 | MDST | Tenas_Lithology.csv |
| T96R-47 | 129.36 | 132.44 | 3.08 | COAL | Tenas_Lithology.csv |
| T96R-47 | 132.44 | 137.98 | 5.54 | MDST | Tenas_Lithology.csv |
| T96R-47 | 137.98 | 139.34 | 1.36 | COAL | Tenas_Lithology.csv |
| T96R-47 | 139.34 | 141.26 | 1.92 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 141.26 | 141.8 | 0.54 | COAL | Tenas_Lithology.csv |
| T96R-47 | 141.8 | 144.91 | 3.11 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 144.91 | 145.04 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-47 | 145.04 | 145.98 | 0.94 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 145.98 | 147.19 | 1.21 | COAL | Tenas_Lithology.csv |
| T96R-47 | 147.19 | 149.5 | 2.31 | SLTS | Tenas_Lithology.csv |
| T96R-47 | 149.5 | 152.1 | 2.6 | SST | Tenas_Lithology.csv |
| T96R-49 | 0 | 10.97 | 10.97 | Overburden | Tenas_Lithology.csv |
| T96R-49 | 10.97 | 17.98 | 7.01 | SST | Tenas_Lithology.csv |
| T96R-49 | 17.98 | 28.95 | 10.97 | MDST | Tenas_Lithology.csv |
| T96R-49 | 28.95 | 32 | 3.05 | SST | Tenas_Lithology.csv |
| T96R-49 | 32 | 70.51 | 38.51 | MDST | Tenas_Lithology.csv |
| T96R-49 | 70.51 | 70.83 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-49 | 70.83 | 85.43 | 14.6 | MDST | Tenas_Lithology.csv |
| T96R-49 | 85.43 | 85.63 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-49 | 85.63 | 91.49 | 5.86 | SLTS | Tenas_Lithology.csv |
| T96R-49 | 91.49 | 91.63 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-49 | 91.63 | 108.2 | 16.57 | SST | Tenas_Lithology.csv |
| T96R-49 | 108.2 | 109.6 | 1.4 | VOLC | Tenas_Lithology.csv |
| T96R-50 | 0 | 7.8 | 7.8 | Overburden | Tenas_Lithology.csv |
| T96R-50 | 7.8 | 13.33 | 5.53 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 13.33 | 13.91 | 0.58 | COAL | Tenas_Lithology.csv |
| T96R-50 | 13.91 | 13.99 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-50 | 13.99 | 17.16 | 3.17 | COAL | Tenas_Lithology.csv |
| T96R-50 | 17.16 | 19.21 | 2.05 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 19.21 | 20.08 | 0.87 | COAL | Tenas_Lithology.csv |
| T96R-50 | 20.08 | 20.26 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-50 | 20.26 | 22.71 | 2.45 | COAL | Tenas_Lithology.csv |
| T96R-50 | 22.71 | 24.2 | 1.49 | MDST | Tenas_Lithology.csv |
| T96R-50 | 24.2 | 24.86 | 0.66 | COAL | Tenas_Lithology.csv |
| T96R-50 | 24.86 | 27.01 | 2.15 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 27.01 | 27.81 | 0.8 | COAL | Tenas_Lithology.csv |
| T96R-50 | 27.81 | 28.1 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-50 | 28.1 | 31.87 | 3.77 | COAL | Tenas_Lithology.csv |
| T96R-50 | 31.87 | 32.21 | 0.34 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-50 | 32.21 | 33.24 | 1.03 | COAL | Tenas_Lithology.csv |
| T96R-50 | 33.24 | 39.28 | 6.04 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 39.28 | 40.38 | 1.1 | COAL | Tenas_Lithology.csv |
| T96R-50 | 40.38 | 42.8 | 2.42 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 42.8 | 43 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-50 | 43 | 44.28 | 1.28 | MDST | Tenas_Lithology.csv |
| T96R-50 | 44.28 | 45.26 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-50 | 45.26 | 63.56 | 18.3 | SST | Tenas_Lithology.csv |
| T96R-50 | 63.56 | 63.95 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-50 | 63.95 | 64.16 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-50 | 64.16 | 64.37 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-50 | 64.37 | 64.67 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-50 | 64.67 | 65.47 | 0.8 | COAL | Tenas_Lithology.csv |
| T96R-50 | 65.47 | 67 | 1.53 | SLTS | Tenas_Lithology.csv |
| T96R-50 | 67 | 73.5 | 6.5 | SST | Tenas_Lithology.csv |
| T96R-51 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-51 | 7 | 16.7 | 9.7 | MDST | Tenas_Lithology.csv |
| T96R-51 | 16.7 | 20.7 | 4 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 20.7 | 36.6 | 15.9 | SST | Tenas_Lithology.csv |
| T96R-51 | 36.6 | 71.52 | 34.92 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 71.52 | 71.68 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-51 | 71.68 | 75.67 | 3.99 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 75.67 | 75.88 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-51 | 75.88 | 76.07 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-51 | 76.07 | 76.55 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-51 | 76.55 | 83.68 | 7.13 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 83.68 | 85.61 | 1.93 | COAL | Tenas_Lithology.csv |
| T96R-51 | 85.61 | 99.89 | 14.28 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 99.89 | 100.71 | 0.82 | COAL | Tenas_Lithology.csv |
| T96R-51 | 100.71 | 101.72 | 1.01 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 101.72 | 101.96 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-51 | 101.96 | 102.35 | 0.39 | MDST | Tenas_Lithology.csv |
| T96R-51 | 102.35 | 102.72 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-51 | 102.72 | 103.5 | 0.78 | MDST | Tenas_Lithology.csv |
| T96R-51 | 103.5 | 103.65 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-51 | 103.65 | 105.92 | 2.27 | MDST | Tenas_Lithology.csv |
| T96R-51 | 105.92 | 106.2 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-51 | 106.2 | 106.34 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-51 | 106.34 | 106.78 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-51 | 106.78 | 108.2 | 1.42 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 108.2 | 112.8 | 4.6 | SST | Tenas_Lithology.csv |
| T96R-51 | 112.8 | 116 | 3.2 | SLTS | Tenas_Lithology.csv |
| T96R-51 | 116 | 127.9 | 11.9 | SST | Tenas_Lithology.csv |
| T96R-52 | 0 | 22.2 | 22.2 | Overburden | Tenas_Lithology.csv |
| T96R-52 | 22.2 | 24 | 1.8 | MDST | Tenas_Lithology.csv |
| T96R-52 | 24 | 59.75 | 35.75 | SST | Tenas_Lithology.csv |
| T96R-52 | 59.75 | 64.53 | 4.78 | MDST | Tenas_Lithology.csv |
| T96R-52 | 64.53 | 64.61 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-52 | 64.61 | 71.88 | 7.27 | SLTS | Tenas_Lithology.csv |
| T96R-52 | 71.88 | 72.11 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-52 | 72.11 | 78.65 | 6.54 | SLTS | Tenas_Lithology.csv |
| T96R-52 | 78.65 | 80.35 | 1.7 | COAL | Tenas_Lithology.csv |
| T96R-52 | 80.35 | 100.74 | 20.39 | SLTS | Tenas_Lithology.csv |
| T96R-52 | 100.74 | 107.84 | 7.1 | COAL | Tenas_Lithology.csv |
| T96R-52 | 107.84 | 113.92 | 6.08 | MDST | Tenas_Lithology.csv |
| T96R-52 | 113.92 | 115.19 | 1.27 | COAL | Tenas_Lithology.csv |
| T96R-52 | 115.19 | 117.31 | 2.12 | SLTS | Tenas_Lithology.csv |
| T96R-52 | 117.31 | 117.75 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-52 | 117.75 | 121.95 | 4.2 | MDST | Tenas_Lithology.csv |
| T96R-52 | 121.95 | 123.05 | 1.1 | COAL | Tenas_Lithology.csv |
| T96R-52 | 123.05 | 123.76 | 0.71 | MDST | Tenas_Lithology.csv |
| T96R-52 | 123.76 | 124.48 | 0.72 | COAL | Tenas_Lithology.csv |
| T96R-52 | 124.48 | 127.2 | 2.72 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 0 | 11.3 | 11.3 | Overburden | Tenas_Lithology.csv |
| T96R-56C | 11.3 | 12.5 | 1.2 | SST | Tenas_Lithology.csv |
| T96R-56C | 12.5 | 19.47 | 6.97 | MDST | Tenas_Lithology.csv |
| T96R-56C | 19.47 | 19.83 | 0.36 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 19.83 | 23.47 | 3.64 | MDST | Tenas_Lithology.csv |
| T96R-56C | 23.47 | 24.56 | 1.09 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 24.56 | 24.86 | 0.3 | SST | Tenas_Lithology.csv |
| T96R-56C | 24.86 | 27.8 | 2.94 | MDST | Tenas_Lithology.csv |
| T96R-56C | 27.8 | 29.44 | 1.64 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 29.44 | 36.42 | 6.98 | MDST | Tenas_Lithology.csv |
| T96R-56C | 36.42 | 38.65 | 2.23 | SST | Tenas_Lithology.csv |
| T96R-56C | 38.65 | 60.34 | 21.69 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 60.34 | 65.71 | 5.37 | MDST | Tenas_Lithology.csv |
| T96R-56C | 65.71 | 66.22 | 0.51 | SST | Tenas_Lithology.csv |
| T96R-56C | 66.22 | 69.09 | 2.87 | MDST | Tenas_Lithology.csv |
| T96R-56C | 69.09 | 69.23 | 0.14 | COAL | Tenas_Lithology.csv |
| T96R-56C | 69.23 | 74.94 | 5.71 | MDST | Tenas_Lithology.csv |
| T96R-56C | 74.94 | 76.71 | 1.77 | COAL | Tenas_Lithology.csv |
| T96R-56C | 76.71 | 77.27 | 0.56 | MDST | Tenas_Lithology.csv |
| T96R-56C | 77.27 | 78.89 | 1.62 | COAL | Tenas_Lithology.csv |
| T96R-56C | 78.89 | 79.18 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-56C | 79.18 | 82.63 | 3.45 | COAL | Tenas_Lithology.csv |
| T96R-56C | 82.63 | 85.52 | 2.89 | MDST | Tenas_Lithology.csv |
| T96R-56C | 85.52 | 85.67 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-56C | 85.67 | 85.77 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-56C | 85.77 | 86.18 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-56C | 86.18 | 87.68 | 1.5 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 87.68 | 88.13 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-56C | 88.13 | 88.98 | 0.85 | MDST | Tenas_Lithology.csv |
| T96R-56C | 88.98 | 89.23 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-56C | 89.23 | 90.31 | 1.08 | SLTS | Tenas_Lithology.csv |
| T96R-56C | 90.31 | 90.68 | 0.37 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-56C | 90.68 | 93.1 | 2.42 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 0 | 2 | 2 | Overburden | Tenas_Lithology.csv |
| T96R-58 | 2 | 17.3 | 15.3 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 17.3 | 20.2 | 2.9 | MDST | Tenas_Lithology.csv |
| T96R-58 | 20.2 | 29.6 | 9.4 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 29.6 | 29.8 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-58 | 29.8 | 32.02 | 2.22 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 32.02 | 32.47 | 0.45 | COAL | Tenas_Lithology.csv |
| T96R-58 | 32.47 | 35.25 | 2.78 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 35.25 | 35.4 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-58 | 35.4 | 35.93 | 0.53 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 35.93 | 37.41 | 1.48 | COAL | Tenas_Lithology.csv |
| T96R-58 | 37.41 | 40 | 2.59 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 40 | 51.26 | 11.26 | SST | Tenas_Lithology.csv |
| T96R-58 | 51.26 | 56.45 | 5.19 | COAL | Tenas_Lithology.csv |
| T96R-58 | 56.45 | 58.36 | 1.91 | MDST | Tenas_Lithology.csv |
| T96R-58 | 58.36 | 58.71 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-58 | 58.71 | 58.85 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-58 | 58.85 | 59.19 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-58 | 59.19 | 65.71 | 6.52 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 65.71 | 65.96 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-58 | 65.96 | 70.23 | 4.27 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 70.23 | 70.49 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-58 | 70.49 | 73.62 | 3.13 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 73.62 | 74.1 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-58 | 74.1 | 77.5 | 3.4 | SLTS | Tenas_Lithology.csv |
| T96R-58 | 77.5 | 77.8 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-58 | 77.8 | 79.03 | 1.23 | MDST | Tenas_Lithology.csv |
| T96R-58 | 79.03 | 79.3 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-58 | 79.3 | 79.9 | 0.6 | SLTS | Tenas_Lithology.csv |
| T96R-59 | 0 | 21 | 21 | Overburden | Tenas_Lithology.csv |
| T96R-59 | 21 | 26.57 | 5.57 | MDST | Tenas_Lithology.csv |
| T96R-59 | 26.57 | 27.68 | 1.11 | COAL | Tenas_Lithology.csv |
| T96R-59 | 27.68 | 29.24 | 1.56 | MDST | Tenas_Lithology.csv |
| T96R-59 | 29.24 | 29.81 | 0.57 | COAL | Tenas_Lithology.csv |
| T96R-59 | 29.81 | 36.28 | 6.47 | SLTS | Tenas_Lithology.csv |
| T96R-59 | 36.28 | 36.92 | 0.64 | COAL | Tenas_Lithology.csv |
| T96R-59 | 36.92 | 54.5 | 17.58 | SST | Tenas_Lithology.csv |
| T96R-59 | 54.5 | 59 | 4.5 | CGL | Tenas_Lithology.csv |
| T96R-59 | 59 | 61 | 2 | SST | Tenas_Lithology.csv |
| T96R-59 | 61 | 62.7 | 1.7 | MDST | Tenas_Lithology.csv |
| T96R-59 | 62.7 | 64.5 | 1.8 | CGL | Tenas_Lithology.csv |
| T96R-59 | 64.5 | 73.6 | 9.1 | SST | Tenas_Lithology.csv |
| T96R-60 | 0 | 0.9 | 0.9 | Overburden | Tenas_Lithology.csv |
| T96R-60 | 0.9 | 7 | 6.1 | SLTS | Tenas_Lithology.csv |
| T96R-60 | 7 | 7.23 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-60 | 7.23 | 7.66 | 0.43 | MDST | Tenas_Lithology.csv |
| T96R-60 | 7.66 | 13.18 | 5.52 | COAL | Tenas_Lithology.csv |
| T96R-60 | 13.18 | 14.07 | 0.89 | MDST | Tenas_Lithology.csv |
| T96R-60 | 14.07 | 14.78 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-60 | 14.78 | 15.64 | 0.86 | MDST | Tenas_Lithology.csv |
| T96R-60 | 15.64 | 16.11 | 0.47 | COAL | Tenas_Lithology.csv |
| T96R-60 | 16.11 | 17.4 | 1.29 | SLTS | Tenas_Lithology.csv |
| T96R-60 | 17.4 | 17.6 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-60 | 17.6 | 18.1 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-60 | 18.1 | 18.3 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-60 | 18.3 | 22.28 | 3.98 | MDST | Tenas_Lithology.csv |
| T96R-60 | 22.28 | 22.55 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-60 | 22.55 | 22.81 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-60 | 22.81 | 23 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-60 | 23 | 23.95 | 0.95 | MDST | Tenas_Lithology.csv |
| T96R-60 | 23.95 | 24.36 | 0.41 | COAL | Tenas_Lithology.csv |
| T96R-60 | 24.36 | 30.68 | 6.32 | SLTS | Tenas_Lithology.csv |
| T96R-60 | 30.68 | 30.93 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-60 | 30.93 | 34 | 3.07 | MDST | Tenas_Lithology.csv |
| T96R-60 | 34 | 49.2 | 15.2 | SST | Tenas_Lithology.csv |
| T96R-61 | 0 | 6.5 | 6.5 | Overburden | Tenas_Lithology.csv |
| T96R-61 | 6.5 | 42.5 | 36 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 42.5 | 53.65 | 11.15 | SST | Tenas_Lithology.csv |
| T96R-61 | 53.65 | 53.93 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-61 | 53.93 | 57.19 | 3.26 | SST | Tenas_Lithology.csv |
| T96R-61 | 57.19 | 57.29 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-61 | 57.29 | 58.07 | 0.78 | MDST | Tenas_Lithology.csv |
| T96R-61 | 58.07 | 58.36 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-61 | 58.36 | 63.94 | 5.58 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 63.94 | 65.41 | 1.47 | COAL | Tenas_Lithology.csv |
| T96R-61 | 65.41 | 73.3 | 7.89 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 73.3 | 73.61 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-61 | 73.61 | 80.34 | 6.73 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 80.34 | 83.99 | 3.65 | COAL | Tenas_Lithology.csv |
| T96R-61 | 83.99 | 84.05 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-61 | 84.05 | 86.03 | 1.98 | COAL | Tenas_Lithology.csv |
| T96R-61 | 86.03 | 88.71 | 2.68 | MDST | Tenas_Lithology.csv |
| T96R-61 | 88.71 | 88.95 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-61 | 88.95 | 89.28 | 0.33 | MDST | Tenas_Lithology.csv |
| T96R-61 | 89.28 | 90.26 | 0.98 | COAL | Tenas_Lithology.csv |
| T96R-61 | 90.26 | 90.68 | 0.42 | MDST | Tenas_Lithology.csv |
| T96R-61 | 90.68 | 91.16 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-61 | 91.16 | 95.18 | 4.02 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 95.18 | 95.48 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-61 | 95.48 | 96.82 | 1.34 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 96.82 | 97.35 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-61 | 97.35 | 101.3 | 3.95 | SST | Tenas_Lithology.csv |
| T96R-61 | 101.3 | 106.38 | 5.08 | SLTS | Tenas_Lithology.csv |
| T96R-61 | 106.38 | 106.65 | 0.27 | COAL | Tenas_Lithology.csv |
| T96R-61 | 106.65 | 109.7 | 3.05 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T96R-63 | 3 | 24.71 | 21.71 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 24.71 | 24.96 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-63 | 24.96 | 30.81 | 5.85 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 30.81 | 31 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-63 | 31 | 34.61 | 3.61 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 34.61 | 35.92 | 1.31 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-63 | 35.92 | 42.9 | 6.98 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 42.9 | 43.1 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-63 | 43.1 | 46.14 | 3.04 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 46.14 | 47.77 | 1.63 | COAL | Tenas_Lithology.csv |
| T96R-63 | 47.77 | 48.04 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-63 | 48.04 | 51.36 | 3.32 | COAL | Tenas_Lithology.csv |
| T96R-63 | 51.36 | 51.96 | 0.6 | MDST | Tenas_Lithology.csv |
| T96R-63 | 51.96 | 52.2 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-63 | 52.2 | 52.36 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-63 | 52.36 | 52.68 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-63 | 52.68 | 55.31 | 2.63 | SLTS | Tenas_Lithology.csv |
| T96R-63 | 55.31 | 55.5 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-63 | 55.5 | 59.31 | 3.81 | SST | Tenas_Lithology.csv |
| T96R-63 | 59.31 | 59.53 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-63 | 59.53 | 65.42 | 5.89 | SST | Tenas_Lithology.csv |
| T96R-63 | 65.42 | 65.81 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-63 | 65.81 | 79.6 | 13.79 | SST | Tenas_Lithology.csv |
| T96R-64 | 0 | 22.43 | 22.43 | Overburden | Tenas_Lithology.csv |
| T96R-64 | 22.43 | 81.13 | 58.7 | SST | Tenas_Lithology.csv |
| T96R-64 | 81.13 | 82.67 | 1.54 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 82.67 | 82.97 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-64 | 82.97 | 87.16 | 4.19 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 87.16 | 87.9 | 0.74 | COAL | Tenas_Lithology.csv |
| T96R-64 | 87.9 | 92.58 | 4.68 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 92.58 | 92.8 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-64 | 92.8 | 95.32 | 2.52 | MDST | Tenas_Lithology.csv |
| T96R-64 | 95.32 | 96.76 | 1.44 | COAL | Tenas_Lithology.csv |
| T96R-64 | 96.76 | 104.89 | 8.13 | SST | Tenas_Lithology.csv |
| T96R-64 | 104.89 | 105.15 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-64 | 105.15 | 111.15 | 6 | SST | Tenas_Lithology.csv |
| T96R-64 | 111.15 | 118.69 | 7.54 | COAL | Tenas_Lithology.csv |
| T96R-64 | 118.69 | 119.2 | 0.51 | MDST | Tenas_Lithology.csv |
| T96R-64 | 119.2 | 119.6 | 0.4 | COAL | Tenas_Lithology.csv |
| T96R-64 | 119.6 | 121.42 | 1.82 | MDST | Tenas_Lithology.csv |
| T96R-64 | 121.42 | 122.2 | 0.78 | COAL | Tenas_Lithology.csv |
| T96R-64 | 122.2 | 122.32 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-64 | 122.32 | 122.53 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-64 | 122.53 | 123.28 | 0.75 | MDST | Tenas_Lithology.csv |
| T96R-64 | 123.28 | 123.48 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-64 | 123.48 | 128.2 | 4.72 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 128.2 | 128.82 | 0.62 | COAL | Tenas_Lithology.csv |
| T96R-64 | 128.82 | 130.54 | 1.72 | MDST | Tenas_Lithology.csv |
| T96R-64 | 130.54 | 130.7 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-64 | 130.7 | 130.82 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-64 | 130.82 | 131.1 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-64 | 131.1 | 134.73 | 3.63 | MDST | Tenas_Lithology.csv |
| T96R-64 | 134.73 | 134.81 | 0.08 | COAL | Tenas_Lithology.csv |
| T96R-64 | 134.81 | 138 | 3.19 | SLTS | Tenas_Lithology.csv |
| T96R-64 | 138 | 138.36 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-64 | 138.36 | 140.4 | 2.04 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 0 | 18.3 | 18.3 | Overburden | Tenas_Lithology.csv |
| T96R-65C | 18.3 | 21.12 | 2.82 | MDST | Tenas_Lithology.csv |
| T96R-65C | 21.12 | 44.16 | 23.04 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 44.16 | 53.2 | 9.04 | MDST | Tenas_Lithology.csv |
| T96R-65C | 53.2 | 55.96 | 2.76 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 55.96 | 56.46 | 0.5 | MDST | Tenas_Lithology.csv |
| T96R-65C | 56.46 | 56.56 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 56.56 | 61.98 | 5.42 | MDST | Tenas_Lithology.csv |
| T96R-65C | 61.98 | 64.09 | 2.11 | COAL | Tenas_Lithology.csv |
| T96R-65C | 64.09 | 65.72 | 1.63 | MDST | Tenas_Lithology.csv |
| T96R-65C | 65.72 | 83.38 | 17.66 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 83.38 | 86.32 | 2.94 | COAL | Tenas_Lithology.csv |
| T96R-65C | 86.32 | 86.48 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 86.48 | 92.34 | 5.86 | COAL | Tenas_Lithology.csv |
| T96R-65C | 92.34 | 98.86 | 6.52 | MDST | Tenas_Lithology.csv |
| T96R-65C | 98.86 | 100.16 | 1.3 | SST | Tenas_Lithology.csv |
| T96R-65C | 100.16 | 100.46 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-65C | 100.46 | 101.17 | 0.71 | MDST | Tenas_Lithology.csv |
| T96R-65C | 101.17 | 102.51 | 1.34 | COAL | Tenas_Lithology.csv |
| T96R-65C | 102.51 | 105.3 | 2.79 | MDST | Tenas_Lithology.csv |
| T96R-65C | 105.3 | 105.48 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-65C | 105.48 | 109.9 | 4.42 | MDST | Tenas_Lithology.csv |
| T96R-65C | 109.9 | 110.27 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-65C | 110.27 | 110.4 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 110.4 | 110.86 | 0.46 | COAL | Tenas_Lithology.csv |
| T96R-65C | 110.86 | 111.1 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 111.1 | 111.43 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-65C | 111.43 | 112.65 | 1.22 | MDST | Tenas_Lithology.csv |
| T96R-65C | 112.65 | 113.03 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-65C | 113.03 | 113.33 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-65C | 113.33 | 113.69 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-65C | 113.69 | 121.6 | 7.91 | SLTS | Tenas_Lithology.csv |
| T96R-65C | 121.6 | 122.18 | 0.58 | MDST | Tenas_Lithology.csv |
| T96R-67 | 0 | 1.2 | 1.2 | Overburden | Tenas_Lithology.csv |
| T96R-67 | 1.2 | 21.5 | 20.3 | SLTS | Tenas_Lithology.csv |
| T96R-67 | 21.5 | 81.7 | 60.2 | SST | Tenas_Lithology.csv |
| T96R-67 | 81.7 | 83.24 | 1.54 | COAL | Tenas_Lithology.csv |
| T96R-67 | 83.24 | 102.51 | 19.27 | SLTS | Tenas_Lithology.csv |
| T96R-67 | 102.51 | 108.66 | 6.15 | COAL | Tenas_Lithology.csv |
| T96R-67 | 108.66 | 111.73 | 3.07 | MDST | Tenas_Lithology.csv |
| T96R-67 | 111.73 | 112.04 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-67 | 112.04 | 112.17 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-67 | 112.17 | 112.54 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-67 | 112.54 | 112.72 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-67 | 112.72 | 113.4 | 0.68 | COAL | Tenas_Lithology.csv |
| T96R-67 | 113.4 | 114.9 | 1.5 | MDST | Tenas_Lithology.csv |
| T96R-67 | 114.9 | 115.27 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-67 | 115.27 | 119.99 | 4.72 | SLTS | Tenas_Lithology.csv |
| T96R-67 | 119.99 | 120.08 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-67 | 120.08 | 121.61 | 1.53 | MDST | Tenas_Lithology.csv |
| T96R-67 | 121.61 | 122.2 | 0.59 | COAL | Tenas_Lithology.csv |
| T96R-67 | 122.2 | 126.84 | 4.64 | SLTS | Tenas_Lithology.csv |
| T96R-67 | 126.84 | 127.14 | 0.3 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-67 | 127.14 | 129.16 | 2.02 | SST | Tenas_Lithology.csv |
| T96R-67 | 129.16 | 129.45 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-67 | 129.45 | 134.5 | 5.05 | SST | Tenas_Lithology.csv |
| T96R-69 | 0 | 2.5 | 2.5 | Overburden | Tenas_Lithology.csv |
| T96R-69 | 2.5 | 34.6 | 32.1 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 34.6 | 44.3 | 9.7 | SST | Tenas_Lithology.csv |
| T96R-69 | 44.3 | 53 | 8.7 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 53 | 59.5 | 6.5 | SST | Tenas_Lithology.csv |
| T96R-69 | 59.5 | 74.8 | 15.3 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 74.8 | 75 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-69 | 75 | 78.05 | 3.05 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 78.05 | 80 | 1.95 | COAL | Tenas_Lithology.csv |
| T96R-69 | 80 | 80.3 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-69 | 80.3 | 83.76 | 3.46 | COAL | Tenas_Lithology.csv |
| T96R-69 | 83.76 | 86.2 | 2.44 | MDST | Tenas_Lithology.csv |
| T96R-69 | 86.2 | 86.48 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-69 | 86.48 | 90.85 | 4.37 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 90.85 | 91 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-69 | 91 | 100.81 | 9.81 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 100.81 | 100.94 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-69 | 100.94 | 103.44 | 2.5 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 103.44 | 103.57 | 0.13 | COAL | Tenas_Lithology.csv |
| T96R-69 | 103.57 | 114.35 | 10.78 | SLTS | Tenas_Lithology.csv |
| T96R-69 | 114.35 | 114.45 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-69 | 114.45 | 115.6 | 1.15 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T96R-70 | 15 | 44.5 | 29.5 | SST | Tenas_Lithology.csv |
| T96R-70 | 44.5 | 48 | 3.5 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 48 | 75 | 27 | SST | Tenas_Lithology.csv |
| T96R-70 | 75 | 81.89 | 6.89 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 81.89 | 82.23 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-70 | 82.23 | 85.63 | 3.4 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 85.63 | 86.38 | 0.75 | COAL | Tenas_Lithology.csv |
| T96R-70 | 86.38 | 93.26 | 6.88 | SST | Tenas_Lithology.csv |
| T96R-70 | 93.26 | 94.95 | 1.69 | COAL | Tenas_Lithology.csv |
| T96R-70 | 94.95 | 113.22 | 18.27 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 113.22 | 117.27 | 4.05 | COAL | Tenas_Lithology.csv |
| T96R-70 | 117.27 | 117.33 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-70 | 117.33 | 121.01 | 3.68 | COAL | Tenas_Lithology.csv |
| T96R-70 | 121.01 | 123.31 | 2.3 | MDST | Tenas_Lithology.csv |
| T96R-70 | 123.31 | 123.5 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-70 | 123.5 | 129.87 | 6.37 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 129.87 | 130.07 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-70 | 130.07 | 130.18 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-70 | 130.18 | 130.93 | 0.75 | COAL | Tenas_Lithology.csv |
| T96R-70 | 130.93 | 133.2 | 2.27 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 133.2 | 133.4 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-70 | 133.4 | 133.6 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-70 | 133.6 | 133.9 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-70 | 133.9 | 134.7 | 0.8 | MDST | Tenas_Lithology.csv |
| T96R-70 | 134.7 | 135 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-70 | 135 | 136.8 | 1.8 | SLTS | Tenas_Lithology.csv |
| T96R-70 | 136.8 | 137 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-70 | 137 | 141.1 | 4.1 | MDST | Tenas_Lithology.csv |
| T96R-70 | 141.1 | 141.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-70 | 141.4 | 146.6 | 5.2 | SST | Tenas_Lithology.csv |
| T96R-72 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-72 | 7 | 31 | 24 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 31 | 48 | 17 | MDST | Tenas_Lithology.csv |
| T96R-72 | 48 | 59 | 11 | SST | Tenas_Lithology.csv |
| T96R-72 | 59 | 100 | 41 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 100 | 138 | 38 | SST | Tenas_Lithology.csv |
| T96R-72 | 138 | 145.77 | 7.77 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 145.77 | 146.01 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-72 | 146.01 | 148.36 | 2.35 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 148.36 | 157 | 8.64 | MDST | Tenas_Lithology.csv |
| T96R-72 | 157 | 168 | 11 | SLTS | Tenas_Lithology.csv |
| T96R-72 | 168 | 178 | 10 | SST | Tenas_Lithology.csv |
| T96R-72 | 178 | 182.8 | 4.8 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 0 | 7.8 | 7.8 | Overburden | Tenas_Lithology.csv |
| T96R-73 | 7.8 | 15 | 7.2 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 15 | 20.6 | 5.6 | SST | Tenas_Lithology.csv |
| T96R-73 | 20.6 | 33 | 12.4 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 33 | 105.83 | 72.83 | SST | Tenas_Lithology.csv |
| T96R-73 | 105.83 | 106.36 | 0.53 | COAL | Tenas_Lithology.csv |
| T96R-73 | 106.36 | 106.43 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-73 | 106.43 | 109.83 | 3.4 | COAL | Tenas_Lithology.csv |
| T96R-73 | 109.83 | 110.2 | 0.37 | MDST | Tenas_Lithology.csv |
| T96R-73 | 110.2 | 113.06 | 2.86 | COAL | Tenas_Lithology.csv |
| T96R-73 | 113.06 | 114.5 | 1.44 | MDST | Tenas_Lithology.csv |
| T96R-73 | 114.5 | 115.6 | 1.1 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 115.6 | 119.29 | 3.69 | MDST | Tenas_Lithology.csv |
| T96R-73 | 119.29 | 119.6 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-73 | 119.6 | 119.91 | 0.31 | MDST | Tenas_Lithology.csv |
| T96R-73 | 119.91 | 120.27 | 0.36 | COAL | Tenas_Lithology.csv |
| T96R-73 | 120.27 | 121.02 | 0.75 | SLTS | Tenas_Lithology.csv |
| T96R-73 | 121.02 | 121.76 | 0.74 | COAL | Tenas_Lithology.csv |
| T96R-73 | 121.76 | 125.79 | 4.03 | MDST | Tenas_Lithology.csv |
| T96R-73 | 125.79 | 126.03 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-73 | 126.03 | 126.62 | 0.59 | MDST | Tenas_Lithology.csv |
| T96R-73 | 126.62 | 127.18 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-73 | 127.18 | 133.57 | 6.39 | SST | Tenas_Lithology.csv |
| T96R-73 | 133.57 | 133.77 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-73 | 133.77 | 134.5 | 0.73 | SST | Tenas_Lithology.csv |
| T96R-75 | 0 | 14.5 | 14.5 | Overburden | Tenas_Lithology.csv |
| T96R-75 | 14.5 | 30.16 | 15.66 | SST | Tenas_Lithology.csv |
| T96R-75 | 30.16 | 36.28 | 6.12 | COAL | Tenas_Lithology.csv |
| T96R-75 | 36.28 | 39.47 | 3.19 | MDST | Tenas_Lithology.csv |
| T96R-75 | 39.47 | 40.4 | 0.93 | COAL | Tenas_Lithology.csv |
| T96R-75 | 40.4 | 40.68 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-75 | 40.68 | 41.61 | 0.93 | COAL | Tenas_Lithology.csv |
| T96R-75 | 41.61 | 51.77 | 10.16 | SLTS | Tenas_Lithology.csv |
| T96R-75 | 51.77 | 53.23 | 1.46 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-75 | 53.23 | 58.16 | 4.93 | SLTS | Tenas_Lithology.csv |
| T96R-75 | 58.16 | 58.84 | 0.68 | COAL | Tenas_Lithology.csv |
| T96R-75 | 58.84 | 63.05 | 4.21 | SLTS | Tenas_Lithology.csv |
| T96R-75 | 63.05 | 63.68 | 0.63 | COAL | Tenas_Lithology.csv |
| T96R-75 | 63.68 | 67.6 | 3.92 | SST | Tenas_Lithology.csv |
| T96R-76 | 0 | 0.02 | 0.02 | Overburden | Tenas_Lithology.csv |
| T96R-76 | 0.02 | 1.23 | 1.21 | SLTS | Tenas_Lithology.csv |
| T96R-76 | 1.23 | 2.85 | 1.62 | COAL | Tenas_Lithology.csv |
| T96R-76 | 2.85 | 3.26 | 0.41 | MDST | Tenas_Lithology.csv |
| T96R-76 | 3.26 | 6.75 | 3.49 | COAL | Tenas_Lithology.csv |
| T96R-76 | 6.75 | 8.24 | 1.49 | SLTS | Tenas_Lithology.csv |
| T96R-76 | 8.24 | 8.76 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-76 | 8.76 | 17.9 | 9.14 | SLTS | Tenas_Lithology.csv |
| T96R-77 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T96R-77 | 7 | 43 | 36 | SLTS | Tenas_Lithology.csv |
| T96R-77 | 43 | 50 | 7 | MDST | Tenas_Lithology.csv |
| T96R-77 | 50 | 54.5 | 4.5 | SST | Tenas_Lithology.csv |
| T96R-77 | 54.5 | 60 | 5.5 | MDST | Tenas_Lithology.csv |
| T96R-77 | 60 | 127.29 | 67.29 | SST | Tenas_Lithology.csv |
| T96R-77 | 127.29 | 127.51 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-77 | 127.51 | 131.4 | 3.89 | SLTS | Tenas_Lithology.csv |
| T96R-77 | 131.4 | 133.26 | 1.86 | COAL | Tenas_Lithology.csv |
| T96R-77 | 133.26 | 133.93 | 0.67 | MDST | Tenas_Lithology.csv |
| T96R-77 | 133.93 | 134.03 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-77 | 134.03 | 134.24 | 0.21 | MDST | Tenas_Lithology.csv |
| T96R-77 | 134.24 | 137.93 | 3.69 | COAL | Tenas_Lithology.csv |
| T96R-77 | 137.93 | 140.25 | 2.32 | MDST | Tenas_Lithology.csv |
| T96R-77 | 140.25 | 140.6 | 0.35 | COAL | Tenas_Lithology.csv |
| T96R-77 | 140.6 | 164.7 | 24.1 | SST | Tenas_Lithology.csv |
| T96R-78 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T96R-78 | 3 | 6.4 | 3.4 | SST | Tenas_Lithology.csv |
| T96R-78 | 6.4 | 33.25 | 26.85 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 33.25 | 36.3 | 3.05 | SST | Tenas_Lithology.csv |
| T96R-78 | 36.3 | 38.1 | 1.8 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 38.1 | 41.4 | 3.3 | MDST | Tenas_Lithology.csv |
| T96R-78 | 41.4 | 43.6 | 2.2 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 43.6 | 44.9 | 1.3 | MDST | Tenas_Lithology.csv |
| T96R-78 | 44.9 | 45.08 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-78 | 45.08 | 49.56 | 4.48 | MDST | Tenas_Lithology.csv |
| T96R-78 | 49.56 | 49.8 | 0.24 | COAL | Tenas_Lithology.csv |
| T96R-78 | 49.8 | 49.94 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-78 | 49.94 | 50.28 | 0.34 | COAL | Tenas_Lithology.csv |
| T96R-78 | 50.28 | 53.26 | 2.98 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 53.26 | 54.45 | 1.19 | COAL | Tenas_Lithology.csv |
| T96R-78 | 54.45 | 54.57 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-78 | 54.57 | 55.26 | 0.69 | COAL | Tenas_Lithology.csv |
| T96R-78 | 55.26 | 67.43 | 12.17 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 67.43 | 69.51 | 2.08 | COAL | Tenas_Lithology.csv |
| T96R-78 | 69.51 | 73.1 | 3.59 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 73.1 | 75.42 | 2.32 | COAL | Tenas_Lithology.csv |
| T96R-78 | 75.42 | 76.47 | 1.05 | MDST | Tenas_Lithology.csv |
| T96R-78 | 76.47 | 76.66 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-78 | 76.66 | 76.8 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-78 | 76.8 | 77.1 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-78 | 77.1 | 77.4 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-78 | 77.4 | 77.66 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-78 | 77.66 | 78.02 | 0.36 | MDST | Tenas_Lithology.csv |
| T96R-78 | 78.02 | 78.07 | 0.05 | COAL | Tenas_Lithology.csv |
| T96R-78 | 78.07 | 80.17 | 2.1 | MDST | Tenas_Lithology.csv |
| T96R-78 | 80.17 | 80.42 | 0.25 | COAL | Tenas_Lithology.csv |
| T96R-78 | 80.42 | 83.22 | 2.8 | MDST | Tenas_Lithology.csv |
| T96R-78 | 83.22 | 83.29 | 0.07 | COAL | Tenas_Lithology.csv |
| T96R-78 | 83.29 | 84.77 | 1.48 | MDST | Tenas_Lithology.csv |
| T96R-78 | 84.77 | 84.93 | 0.16 | COAL | Tenas_Lithology.csv |
| T96R-78 | 84.93 | 87.8 | 2.87 | SLTS | Tenas_Lithology.csv |
| T96R-78 | 87.8 | 96.6 | 8.8 | SST | Tenas_Lithology.csv |
| T96R-78 | 96.6 | 103.1 | 6.5 | VOLC | Tenas_Lithology.csv |
| T96R-79 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T96R-79 | 15 | 29.52 | 14.52 | SST | Tenas_Lithology.csv |
| T96R-79 | 29.52 | 29.83 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-79 | 29.83 | 32.79 | 2.96 | SLTS | Tenas_Lithology.csv |
| T96R-79 | 32.79 | 33 | 0.21 | COAL | Tenas_Lithology.csv |
| T96R-79 | 33 | 43.84 | 10.84 | SLTS | Tenas_Lithology.csv |
| T96R-79 | 43.84 | 44.71 | 0.87 | COAL | Tenas_Lithology.csv |
| T96R-79 | 44.71 | 47 | 2.29 | SLTS | Tenas_Lithology.csv |
| T96R-79 | 47 | 73.5 | 26.5 | SST | Tenas_Lithology.csv |
| T96R-82 | 0 | 10 | 10 | Overburden | Tenas_Lithology.csv |
| T96R-82 | 10 | 23 | 13 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 23 | 34 | 11 | SST | Tenas_Lithology.csv |
| T96R-82 | 34 | 37.04 | 3.04 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 37.04 | 37.36 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-82 | 37.36 | 43.23 | 5.87 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 43.23 | 43.6 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-82 | 43.6 | 49.21 | 5.61 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 49.21 | 50.94 | 1.73 | COAL | Tenas_Lithology.csv |
| T96R-82 | 50.94 | 61.7 | 10.76 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 61.7 | 62 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-82 | 62 | 68.47 | 6.47 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 68.47 | 71.03 | 2.56 | COAL | Tenas_Lithology.csv |
| T96R-82 | 71.03 | 72.37 | 1.34 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 72.37 | 76.96 | 4.59 | COAL | Tenas_Lithology.csv |
| T96R-82 | 76.96 | 82.21 | 5.25 | MDST | Tenas_Lithology.csv |
| T96R-82 | 82.21 | 82.31 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-82 | 82.31 | 82.74 | 0.43 | MDST | Tenas_Lithology.csv |
| T96R-82 | 82.74 | 84.02 | 1.28 | COAL | Tenas_Lithology.csv |
| T96R-82 | 84.02 | 85.83 | 1.81 | MDST | Tenas_Lithology.csv |
| T96R-82 | 85.83 | 86.06 | 0.23 | COAL | Tenas_Lithology.csv |
| T96R-82 | 86.06 | 93.12 | 7.06 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 93.12 | 93.6 | 0.48 | COAL | Tenas_Lithology.csv |
| T96R-82 | 93.6 | 95.26 | 1.66 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 95.26 | 95.7 | 0.44 | COAL | Tenas_Lithology.csv |
| T96R-82 | 95.7 | 102.49 | 6.79 | SLTS | Tenas_Lithology.csv |
| T96R-82 | 102.49 | 102.8 | 0.31 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-82 | 102.8 | 104.2 | 1.4 | SLTS | Tenas_Lithology.csv |
| T96R-83 | 0 | 12.92 | 12.92 | Overburden | Tenas_Lithology.csv |
| T96R-83 | 12.92 | 25 | 12.08 | n/a | Tenas_Lithology.csv |
| T96R-84 | 0 | 26.5 | 26.5 | Overburden | Tenas_Lithology.csv |
| T96R-84 | 26.5 | 38.43 | 11.93 | SST | Tenas_Lithology.csv |
| T96R-84 | 38.43 | 38.75 | 0.32 | COAL | Tenas_Lithology.csv |
| T96R-84 | 38.75 | 39.3 | 0.55 | MDST | Tenas_Lithology.csv |
| T96R-84 | 39.3 | 39.69 | 0.39 | COAL | Tenas_Lithology.csv |
| T96R-84 | 39.69 | 40.54 | 0.85 | MDST | Tenas_Lithology.csv |
| T96R-84 | 40.54 | 41.26 | 0.72 | COAL | Tenas_Lithology.csv |
| T96R-84 | 41.26 | 49 | 7.74 | SLTS | Tenas_Lithology.csv |
| T96R-84 | 49 | 52.2 | 3.2 | VOLC | Tenas_Lithology.csv |
| T96R-86 | 0 | 17 | 17 | Overburden | Tenas_Lithology.csv |
| T96R-86 | 17 | 22.53 | 5.53 | MDST | Tenas_Lithology.csv |
| T96R-86 | 22.53 | 23.3 | 0.77 | COAL | Tenas_Lithology.csv |
| T96R-86 | 23.3 | 26.78 | 3.48 | SLTS | Tenas_Lithology.csv |
| T96R-86 | 26.78 | 28.77 | 1.99 | COAL | Tenas_Lithology.csv |
| T96R-86 | 28.77 | 31.62 | 2.85 | SLTS | Tenas_Lithology.csv |
| T96R-86 | 31.62 | 32.27 | 0.65 | COAL | Tenas_Lithology.csv |
| T96R-86 | 32.27 | 32.43 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-86 | 32.43 | 35.66 | 3.23 | COAL | Tenas_Lithology.csv |
| T96R-86 | 35.66 | 35.95 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-86 | 35.95 | 36.24 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-86 | 36.24 | 36.45 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-86 | 36.45 | 36.74 | 0.29 | COAL | Tenas_Lithology.csv |
| T96R-86 | 36.74 | 37.19 | 0.45 | MDST | Tenas_Lithology.csv |
| T96R-86 | 37.19 | 37.75 | 0.56 | COAL | Tenas_Lithology.csv |
| T96R-86 | 37.75 | 40.8 | 3.05 | MDST | Tenas_Lithology.csv |
| T96R-86 | 40.8 | 43 | 2.2 | SST | Tenas_Lithology.csv |
| T96R-86 | 43 | 46.23 | 3.23 | MDST | Tenas_Lithology.csv |
| T96R-86 | 46.23 | 46.42 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-86 | 46.42 | 46.59 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-86 | 46.59 | 46.78 | 0.19 | COAL | Tenas_Lithology.csv |
| T96R-86 | 46.78 | 48.02 | 1.24 | MDST | Tenas_Lithology.csv |
| T96R-86 | 48.02 | 48.54 | 0.52 | COAL | Tenas_Lithology.csv |
| T96R-86 | 48.54 | 51.54 | 3 | MDST | Tenas_Lithology.csv |
| T96R-86 | 51.54 | 51.76 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-86 | 51.76 | 53.19 | 1.43 | SLTS | Tenas_Lithology.csv |
| T96R-86 | 53.19 | 53.37 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-86 | 53.37 | 55.5 | 2.13 | MDST | Tenas_Lithology.csv |
| T96R-86 | 55.5 | 60.9 | 5.4 | SST | Tenas_Lithology.csv |
| T96R-87 | 0 | 18 | 18 | Overburden | Tenas_Lithology.csv |
| T96R-87 | 18 | 26.47 | 8.47 | MDST | Tenas_Lithology.csv |
| T96R-87 | 26.47 | 27.1 | 0.63 | COAL | Tenas_Lithology.csv |
| T96R-87 | 27.1 | 27.92 | 0.82 | SLTS | Tenas_Lithology.csv |
| T96R-87 | 27.92 | 31.74 | 3.82 | COAL | Tenas_Lithology.csv |
| T96R-87 | 31.74 | 37.1 | 5.36 | MDST | Tenas_Lithology.csv |
| T96R-87 | 37.1 | 37.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T96R-87 | 37.4 | 38.18 | 0.78 | MDST | Tenas_Lithology.csv |
| T96R-87 | 38.18 | 38.35 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-87 | 38.35 | 47.3 | 8.95 | SLTS | Tenas_Lithology.csv |
| T96R-87 | 47.3 | 71.8 | 24.5 | SST | Tenas_Lithology.csv |
| T96R-91 | 0 | 1.8 | 1.8 | Overburden | Tenas_Lithology.csv |
| T96R-91 | 1.8 | 9.1 | 7.3 | SLTS | Tenas_Lithology.csv |
| T96R-91 | 9.1 | 28.6 | 19.5 | SST | Tenas_Lithology.csv |
| T96R-91 | 28.6 | 35.85 | 7.25 | SLTS | Tenas_Lithology.csv |
| T96R-91 | 35.85 | 36.02 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-91 | 36.02 | 36.99 | 0.97 | MDST | Tenas_Lithology.csv |
| T96R-91 | 36.99 | 37.6 | 0.61 | COAL | Tenas_Lithology.csv |
| T96R-91 | 37.6 | 37.83 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-91 | 37.83 | 38.01 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-91 | 38.01 | 44.2 | 6.19 | SST | Tenas_Lithology.csv |
| T96R-91 | 44.2 | 44.5 | 0.3 | MDST | Tenas_Lithology.csv |
| T96R-91 | 44.5 | 46.3 | 1.8 | SST | Tenas_Lithology.csv |
| T96R-91 | 46.3 | 46.41 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-91 | 46.41 | 47.93 | 1.52 | MDST | Tenas_Lithology.csv |
| T96R-91 | 47.93 | 48.04 | 0.11 | COAL | Tenas_Lithology.csv |
| T96R-91 | 48.04 | 48.16 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-91 | 48.16 | 48.26 | 0.1 | COAL | Tenas_Lithology.csv |
| T96R-91 | 48.26 | 49.48 | 1.22 | SLTS | Tenas_Lithology.csv |
| T96R-91 | 49.48 | 49.81 | 0.33 | COAL | Tenas_Lithology.csv |
| T96R-91 | 49.81 | 53.88 | 4.07 | SST | Tenas_Lithology.csv |
| T96R-91 | 53.88 | 54.03 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-91 | 54.03 | 56.23 | 2.2 | SLTS | Tenas_Lithology.csv |
| T96R-91 | 56.23 | 56.4 | 0.17 | COAL | Tenas_Lithology.csv |
| T96R-91 | 56.4 | 59.4 | 3 | SST | Tenas_Lithology.csv |
| T96R-91 | 59.4 | 65.5 | 6.1 | MDST | Tenas_Lithology.csv |
| T96R-91 | 65.5 | 76.2 | 10.7 | SST | Tenas_Lithology.csv |
| T96R-92 | 0 | 23.8 | 23.8 | Overburden | Tenas_Lithology.csv |
| T96R-92 | 23.8 | 24.74 | 0.94 | MDST | Tenas_Lithology.csv |
| T96R-92 | 24.74 | 30.3 | 5.56 | COAL | Tenas_Lithology.csv |
| T96R-92 | 30.3 | 34.93 | 4.63 | MDST | Tenas_Lithology.csv |
| T96R-92 | 34.93 | 35.15 | 0.22 | COAL | Tenas_Lithology.csv |
| T96R-92 | 35.15 | 35.31 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-92 | 35.31 | 36.9 | 1.59 | COAL | Tenas_Lithology.csv |
| T96R-92 | 36.9 | 38.5 | 1.6 | MDST | Tenas_Lithology.csv |
| T96R-92 | 38.5 | 47.49 | 8.99 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 47.49 | 48.2 | 0.71 | COAL | Tenas_Lithology.csv |
| T96R-92 | 48.2 | 48.75 | 0.55 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 48.75 | 49.44 | 0.69 | COAL | Tenas_Lithology.csv |
| T96R-92 | 49.44 | 51.79 | 2.35 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 51.79 | 52.1 | 0.31 | COAL | Tenas_Lithology.csv |
| T96R-92 | 52.1 | 54.06 | 1.96 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 54.06 | 54.34 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-92 | 54.34 | 56.76 | 2.42 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 56.76 | 56.85 | 0.09 | COAL | Tenas_Lithology.csv |
| T96R-92 | 56.85 | 61.2 | 4.35 | SLTS | Tenas_Lithology.csv |
| T96R-92 | 61.2 | 79.7 | 18.5 | SST | Tenas_Lithology.csv |
| T96R-99 | 0 | 32.92 | 32.92 | Overburden | Tenas_Lithology.csv |
| T96R-99 | 32.92 | 36.3 | 3.38 | COAL | Tenas_Lithology.csv |
| T96R-99 | 36.3 | 39.66 | 3.36 | MDST | Tenas_Lithology.csv |
| T96R-99 | 39.66 | 39.92 | 0.26 | COAL | Tenas_Lithology.csv |
| T96R-99 | 39.92 | 40.04 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T96R-99 | 40.04 | 40.42 | 0.38 | COAL | Tenas_Lithology.csv |
| T96R-99 | 40.42 | 40.6 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T96R-99 | 40.6 | 41.23 | 0.63 | COAL | Tenas_Lithology.csv |
| T96R-99 | 41.23 | 42.16 | 0.93 | MDST | Tenas_Lithology.csv |
| T96R-99 | 42.16 | 42.44 | 0.28 | COAL | Tenas_Lithology.csv |
| T96R-99 | 42.44 | 48.02 | 5.58 | MDST | Tenas_Lithology.csv |
| T96R-99 | 48.02 | 48.2 | 0.18 | COAL | Tenas_Lithology.csv |
| T96R-99 | 48.2 | 50.08 | 1.88 | SLTS | Tenas_Lithology.csv |
| T96R-99 | 50.08 | 50.45 | 0.37 | COAL | Tenas_Lithology.csv |
| T96R-99 | 50.45 | 54 | 3.55 | SLTS | Tenas_Lithology.csv |
| T96R-99 | 54 | 55.5 | 1.5 | CGL | Tenas_Lithology.csv |
| T96R-99 | 55.5 | 55.52 | 0.02 | SLTS | Tenas_Lithology.csv |
| T96R-99 | 55.52 | 55.67 | 0.15 | COAL | Tenas_Lithology.csv |
| T96R-99 | 55.67 | 56.9 | 1.23 | SLTS | Tenas_Lithology.csv |
| T96R-99 | 56.9 | 57.1 | 0.2 | COAL | Tenas_Lithology.csv |
| T96R-99 | 57.1 | 79.6 | 22.5 | SST | Tenas_Lithology.csv |
| T97R-100C | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-100C | 3 | 23.42 | 20.42 | SLTS | Tenas_Lithology.csv |
| T97R-100C | 23.42 | 30.85 | 7.43 | MDST | Tenas_Lithology.csv |
| T97R-100C | 30.85 | 31.41 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-100C | 31.41 | 31.59 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-100C | 31.59 | 35.24 | 3.65 | COAL | Tenas_Lithology.csv |
| T97R-100C | 35.24 | 35.71 | 0.47 | MDST | Tenas_Lithology.csv |
| T97R-100C | 35.71 | 36.73 | 1.02 | COAL | Tenas_Lithology.csv |
| T97R-100C | 36.73 | 38.32 | 1.59 | MDST | Tenas_Lithology.csv |
| T97R-100C | 38.32 | 39.1 | 0.78 | SLTS | Tenas_Lithology.csv |
| T97R-100C | 39.1 | 42.68 | 3.58 | SST | Tenas_Lithology.csv |
| T97R-100C | 42.68 | 46 | 3.32 | MDST | Tenas_Lithology.csv |
| T97R-101 | 0 | 10 | 10 | Overburden | Tenas_Lithology.csv |
| T97R-101 | 10 | 12.9 | 2.9 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 12.9 | 13.5 | 0.6 | COAL | Tenas_Lithology.csv |
| T97R-101 | 13.5 | 22.7 | 9.2 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 22.7 | 28.56 | 5.86 | SST | Tenas_Lithology.csv |
| T97R-101 | 28.56 | 29.63 | 1.07 | COAL | Tenas_Lithology.csv |
| T97R-101 | 29.63 | 39.84 | 10.21 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 39.84 | 40.22 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-101 | 40.22 | 40.5 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-101 | 40.5 | 41.06 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-101 | 41.06 | 44.61 | 3.55 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 44.61 | 44.75 | 0.14 | COAL | Tenas_Lithology.csv |
| T97R-101 | 44.75 | 46.05 | 1.3 | MDST | Tenas_Lithology.csv |
| T97R-101 | 46.05 | 46.2 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-101 | 46.2 | 46.45 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-101 | 46.45 | 46.97 | 0.52 | COAL | Tenas_Lithology.csv |
| T97R-101 | 46.97 | 48.72 | 1.75 | MDST | Tenas_Lithology.csv |
| T97R-101 | 48.72 | 48.98 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-101 | 48.98 | 49.06 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-101 | 49.06 | 49.35 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-101 | 49.35 | 50.24 | 0.89 | MDST | Tenas_Lithology.csv |
| T97R-101 | 50.24 | 50.35 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-101 | 50.35 | 52.23 | 1.88 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 52.23 | 52.38 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-101 | 52.38 | 52.44 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-101 | 52.44 | 52.71 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-101 | 52.71 | 54.13 | 1.42 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 54.13 | 54.41 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-101 | 54.41 | 65.2 | 10.79 | SLTS | Tenas_Lithology.csv |
| T97R-101 | 65.2 | 74.4 | 9.2 | SST | Tenas_Lithology.csv |
| T97R-102 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-102 | 3 | 27.3 | 24.3 | SLTS | Tenas_Lithology.csv |
| T97R-102 | 27.3 | 37.7 | 10.4 | SST | Tenas_Lithology.csv |
| T97R-102 | 37.7 | 41.49 | 3.79 | SLTS | Tenas_Lithology.csv |
| T97R-102 | 41.49 | 42.28 | 0.79 | COAL | Tenas_Lithology.csv |
| T97R-102 | 42.28 | 44.52 | 2.24 | SLTS | Tenas_Lithology.csv |
| T97R-102 | 44.52 | 44.81 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-102 | 44.81 | 45.92 | 1.11 | SLTS | Tenas_Lithology.csv |
| T97R-102 | 45.92 | 46.81 | 0.89 | COAL | Tenas_Lithology.csv |
| T97R-102 | 46.81 | 48.04 | 1.23 | MDST | Tenas_Lithology.csv |
| T97R-102 | 48.04 | 51.45 | 3.41 | COAL | Tenas_Lithology.csv |
| T97R-102 | 51.45 | 51.88 | 0.43 | MDST | Tenas_Lithology.csv |
| T97R-102 | 51.88 | 52.48 | 0.6 | COAL | Tenas_Lithology.csv |
| T97R-102 | 52.48 | 52.71 | 0.23 | MDST | Tenas_Lithology.csv |
| T97R-102 | 52.71 | 53.1 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-102 | 53.1 | 61 | 7.9 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 0 | 7.5 | 7.5 | Overburden | Tenas_Lithology.csv |
| T97R-103 | 7.5 | 50.8 | 43.3 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 50.8 | 63.6 | 12.8 | MDST | Tenas_Lithology.csv |
| T97R-103 | 63.6 | 70.5 | 6.9 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 70.5 | 81.6 | 11.1 | MDST | Tenas_Lithology.csv |
| T97R-103 | 81.6 | 110.69 | 29.09 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 110.69 | 113.83 | 3.14 | COAL | Tenas_Lithology.csv |
| T97R-103 | 113.83 | 114.36 | 0.53 | MDST | Tenas_Lithology.csv |
| T97R-103 | 114.36 | 115.67 | 1.31 | COAL | Tenas_Lithology.csv |
| T97R-103 | 115.67 | 115.72 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-103 | 115.72 | 116.07 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-103 | 116.07 | 121.88 | 5.81 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 121.88 | 122.79 | 0.91 | COAL | Tenas_Lithology.csv |
| T97R-103 | 122.79 | 123.74 | 0.95 | MDST | Tenas_Lithology.csv |
| T97R-103 | 123.74 | 124.81 | 1.07 | COAL | Tenas_Lithology.csv |
| T97R-103 | 124.81 | 126.04 | 1.23 | MDST | Tenas_Lithology.csv |
| T97R-103 | 126.04 | 128.66 | 2.62 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 128.66 | 129.43 | 0.77 | COAL | Tenas_Lithology.csv |
| T97R-103 | 129.43 | 129.61 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-103 | 129.61 | 129.72 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-103 | 129.72 | 131.14 | 1.42 | SLTS | Tenas_Lithology.csv |
| T97R-103 | 131.14 | 131.45 | 0.31 | COAL | Tenas_Lithology.csv |
| T97R-103 | 131.45 | 135 | 3.55 | SLTS | Tenas_Lithology.csv |
| T97R-104 | 0 | 5 | 5 | Overburden | Tenas_Lithology.csv |
| T97R-104 | 5 | 9.88 | 4.88 | SLTS | Tenas_Lithology.csv |
| T97R-104 | 9.88 | 10.07 | 0.19 | COAL | Tenas_Lithology.csv |
| T97R-104 | 10.07 | 12.68 | 2.61 | MDST | Tenas_Lithology.csv |
| T97R-104 | 12.68 | 13.3 | 0.62 | COAL | Tenas_Lithology.csv |
| T97R-104 | 13.3 | 18.42 | 5.12 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-104 | 18.42 | 18.82 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-104 | 18.82 | 18.85 | 0.03 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-104 | 18.85 | 19.48 | 0.63 | COAL | Tenas_Lithology.csv |
| T97R-104 | 19.48 | 24.1 | 4.62 | SLTS | Tenas_Lithology.csv |
| T97R-104 | 24.1 | 24.31 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-104 | 24.31 | 27.73 | 3.42 | MDST | Tenas_Lithology.csv |
| T97R-104 | 27.73 | 29.8 | 2.07 | COAL | Tenas_Lithology.csv |
| T97R-104 | 29.8 | 30.5 | 0.7 | MDST | Tenas_Lithology.csv |
| T97R-104 | 30.5 | 31.17 | 0.67 | COAL | Tenas_Lithology.csv |
| T97R-104 | 31.17 | 36.05 | 4.88 | SLTS | Tenas_Lithology.csv |
| T97R-104 | 36.05 | 36.33 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-104 | 36.33 | 37.04 | 0.71 | MDST | Tenas_Lithology.csv |
| T97R-104 | 37.04 | 37.88 | 0.84 | COAL | Tenas_Lithology.csv |
| T97R-104 | 37.88 | 41.8 | 3.92 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 0 | 2 | 2 | Overburden | Tenas_Lithology.csv |
| T97R-105 | 2 | 4.7 | 2.7 | SST | Tenas_Lithology.csv |
| T97R-105 | 4.7 | 5 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-105 | 5 | 6.7 | 1.7 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 6.7 | 8.02 | 1.32 | MDST | Tenas_Lithology.csv |
| T97R-105 | 8.02 | 9.82 | 1.8 | COAL | Tenas_Lithology.csv |
| T97R-105 | 9.82 | 12.88 | 3.06 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 12.88 | 14.97 | 2.09 | COAL | Tenas_Lithology.csv |
| T97R-105 | 14.97 | 15.05 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-105 | 15.05 | 16.8 | 1.75 | COAL | Tenas_Lithology.csv |
| T97R-105 | 16.8 | 20.4 | 3.6 | SST | Tenas_Lithology.csv |
| T97R-105 | 20.4 | 24.5 | 4.1 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 24.5 | 25 | 0.5 | COAL | Tenas_Lithology.csv |
| T97R-105 | 25 | 26.15 | 1.15 | SLTS | Tenas_Lithology.csv |
| T97R-105 | 26.15 | 26.6 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-105 | 26.6 | 31 | 4.4 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 0 | 3.5 | 3.5 | Overburden | Tenas_Lithology.csv |
| T97R-106 | 3.5 | 14.1 | 10.6 | MDST | Tenas_Lithology.csv |
| T97R-106 | 14.1 | 61.4 | 47.3 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 61.4 | 68.4 | 7 | MDST | Tenas_Lithology.csv |
| T97R-106 | 68.4 | 97.4 | 29 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 97.4 | 100.3 | 2.9 | MDST | Tenas_Lithology.csv |
| T97R-106 | 100.3 | 102.8 | 2.5 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 102.8 | 110 | 7.2 | MDST | Tenas_Lithology.csv |
| T97R-106 | 110 | 114.25 | 4.25 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 114.25 | 121.01 | 6.76 | MDST | Tenas_Lithology.csv |
| T97R-106 | 121.01 | 121.25 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-106 | 121.25 | 122.05 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-106 | 122.05 | 122.74 | 0.69 | COAL | Tenas_Lithology.csv |
| T97R-106 | 122.74 | 123.59 | 0.85 | MDST | Tenas_Lithology.csv |
| T97R-106 | 123.59 | 123.79 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-106 | 123.79 | 125.24 | 1.45 | MDST | Tenas_Lithology.csv |
| T97R-106 | 125.24 | 125.44 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-106 | 125.44 | 127.05 | 1.61 | MDST | Tenas_Lithology.csv |
| T97R-106 | 127.05 | 127.77 | 0.72 | COAL | Tenas_Lithology.csv |
| T97R-106 | 127.77 | 129.11 | 1.34 | MDST | Tenas_Lithology.csv |
| T97R-106 | 129.11 | 129.46 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-106 | 129.46 | 138.25 | 8.79 | SLTS | Tenas_Lithology.csv |
| T97R-106 | 138.25 | 152.2 | 13.95 | SST | Tenas_Lithology.csv |
| T97R-107 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T97R-107 | 15 | 22.3 | 7.3 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 22.3 | 22.8 | 0.5 | SST | Tenas_Lithology.csv |
| T97R-107 | 22.8 | 27.3 | 4.5 | MDST | Tenas_Lithology.csv |
| T97R-107 | 27.3 | 34 | 6.7 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 34 | 35.2 | 1.2 | SST | Tenas_Lithology.csv |
| T97R-107 | 35.2 | 40.9 | 5.7 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 40.9 | 41.6 | 0.7 | SST | Tenas_Lithology.csv |
| T97R-107 | 41.6 | 49.1 | 7.5 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 49.1 | 49.6 | 0.5 | SST | Tenas_Lithology.csv |
| T97R-107 | 49.6 | 61.3 | 11.7 | MDST | Tenas_Lithology.csv |
| T97R-107 | 61.3 | 74.7 | 13.4 | SST | Tenas_Lithology.csv |
| T97R-107 | 74.7 | 89.2 | 14.5 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 89.2 | 90.1 | 0.9 | COAL | Tenas_Lithology.csv |
| T97R-107 | 90.1 | 98.68 | 8.58 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 98.68 | 99.09 | 0.41 | COAL | Tenas_Lithology.csv |
| T97R-107 | 99.09 | 102.13 | 3.04 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 102.13 | 103.85 | 1.72 | COAL | Tenas_Lithology.csv |
| T97R-107 | 103.85 | 103.9 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-107 | 103.9 | 105.1 | 1.2 | COAL | Tenas_Lithology.csv |
| T97R-107 | 105.1 | 106.07 | 0.97 | MDST | Tenas_Lithology.csv |
| T97R-107 | 106.07 | 109.16 | 3.09 | COAL | Tenas_Lithology.csv |
| T97R-107 | 109.16 | 112.4 | 3.24 | MDST | Tenas_Lithology.csv |
| T97R-107 | 112.4 | 112.8 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-107 | 112.8 | 113.1 | 0.3 | MDST | Tenas_Lithology.csv |
| T97R-107 | 113.1 | 113.87 | 0.77 | COAL | Tenas_Lithology.csv |
| T97R-107 | 113.87 | 117.34 | 3.47 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 117.34 | 117.56 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-107 | 117.56 | 117.72 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-107 | 117.72 | 118.23 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-107 | 118.23 | 118.48 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-107 | 118.48 | 118.67 | 0.19 | COAL | Tenas_Lithology.csv |
| T97R-107 | 118.67 | 119.42 | 0.75 | MDST | Tenas_Lithology.csv |
| T97R-107 | 119.42 | 120.32 | 0.9 | COAL | Tenas_Lithology.csv |
| T97R-107 | 120.32 | 124.77 | 4.45 | SLTS | Tenas_Lithology.csv |
| T97R-107 | 124.77 | 124.93 | 0.16 | COAL | Tenas_Lithology.csv |
| T97R-107 | 124.93 | 128 | 3.07 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 0 | 28.2 | 28.2 | Overburden | Tenas_Lithology.csv |
| T97R-108C | 28.2 | 45.53 | 17.33 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 45.53 | 46.6 | 1.07 | MDST | Tenas_Lithology.csv |
| T97R-108C | 46.6 | 47.98 | 1.38 | COAL | Tenas_Lithology.csv |
| T97R-108C | 47.98 | 51.38 | 3.4 | MDST | Tenas_Lithology.csv |
| T97R-108C | 51.38 | 56.61 | 5.23 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 56.61 | 56.91 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-108C | 56.91 | 62.05 | 5.14 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 62.05 | 62.46 | 0.41 | COAL | Tenas_Lithology.csv |
| T97R-108C | 62.46 | 62.49 | 0.03 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-108C | 62.49 | 64.35 | 1.86 | COAL | Tenas_Lithology.csv |
| T97R-108C | 64.35 | 64.41 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-108C | 64.41 | 64.57 | 0.16 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-108C | 64.57 | 65.72 | 1.15 | MDST | Tenas_Lithology.csv |
| T97R-108C | 65.72 | 67.86 | 2.14 | COAL | Tenas_Lithology.csv |
| T97R-108C | 67.86 | 67.9 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-108C | 67.9 | 70.2 | 2.3 | COAL | Tenas_Lithology.csv |
| T97R-108C | 70.2 | 70.7 | 0.5 | MDST | Tenas_Lithology.csv |
| T97R-108C | 70.7 | 73.5 | 2.8 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 73.5 | 73.9 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-108C | 73.9 | 74.26 | 0.36 | MDST | Tenas_Lithology.csv |
| T97R-108C | 74.26 | 74.48 | 0.22 | SLTS | Tenas_Lithology.csv |
| T97R-108C | 74.48 | 75.87 | 1.39 | MDST | Tenas_Lithology.csv |
| T97R-108C | 75.87 | 76.4 | 0.53 | COAL | Tenas_Lithology.csv |
| T97R-108C | 76.4 | 76.65 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-108C | 76.65 | 77.1 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-108C | 77.1 | 79.1 | 2 | MDST | Tenas_Lithology.csv |
| T97R-108C | 79.1 | 80.9 | 1.8 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 0 | 8.5 | 8.5 | Overburden | Tenas_Lithology.csv |
| T97R-109 | 8.5 | 16.3 | 7.8 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 16.3 | 27.6 | 11.3 | MDST | Tenas_Lithology.csv |
| T97R-109 | 27.6 | 32.8 | 5.2 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 32.8 | 39.2 | 6.4 | MDST | Tenas_Lithology.csv |
| T97R-109 | 39.2 | 39.8 | 0.6 | SST | Tenas_Lithology.csv |
| T97R-109 | 39.8 | 44.8 | 5 | MDST | Tenas_Lithology.csv |
| T97R-109 | 44.8 | 47.3 | 2.5 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 47.3 | 47.9 | 0.6 | SST | Tenas_Lithology.csv |
| T97R-109 | 47.9 | 62.4 | 14.5 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 62.4 | 63.3 | 0.9 | SST | Tenas_Lithology.csv |
| T97R-109 | 63.3 | 74.2 | 10.9 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 74.2 | 74.6 | 0.4 | SST | Tenas_Lithology.csv |
| T97R-109 | 74.6 | 80.4 | 5.8 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 80.4 | 90.6 | 10.2 | SST | Tenas_Lithology.csv |
| T97R-109 | 90.6 | 92.06 | 1.46 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 92.06 | 92.39 | 0.33 | COAL | Tenas_Lithology.csv |
| T97R-109 | 92.39 | 98.27 | 5.88 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 98.27 | 98.61 | 0.34 | COAL | Tenas_Lithology.csv |
| T97R-109 | 98.61 | 102.19 | 3.58 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 102.19 | 102.42 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-109 | 102.42 | 104.87 | 2.45 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 104.87 | 106.64 | 1.77 | COAL | Tenas_Lithology.csv |
| T97R-109 | 106.64 | 115.61 | 8.97 | SST | Tenas_Lithology.csv |
| T97R-109 | 115.61 | 115.95 | 0.34 | COAL | Tenas_Lithology.csv |
| T97R-109 | 115.95 | 121.81 | 5.86 | SLTS | Tenas_Lithology.csv |
| T97R-109 | 121.81 | 122.21 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-109 | 122.21 | 122.33 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-109 | 122.33 | 125.52 | 3.19 | COAL | Tenas_Lithology.csv |
| T97R-109 | 125.52 | 126 | 0.48 | MDST | Tenas_Lithology.csv |
| T97R-109 | 126 | 126.25 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-109 | 126.25 | 126.67 | 0.42 | MDST | Tenas_Lithology.csv |
| T97R-109 | 126.67 | 129.42 | 2.75 | COAL | Tenas_Lithology.csv |
| T97R-109 | 129.42 | 134.3 | 4.88 | MDST | Tenas_Lithology.csv |
| T97R-109 | 134.3 | 134.67 | 0.37 | COAL | Tenas_Lithology.csv |
| T97R-109 | 134.67 | 134.92 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-109 | 134.92 | 136.27 | 1.35 | COAL | Tenas_Lithology.csv |
| T97R-109 | 136.27 | 142.5 | 6.23 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 0 | 8 | 8 | Overburden | Tenas_Lithology.csv |
| T97R-110 | 8 | 27.63 | 19.63 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 27.63 | 27.93 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-110 | 27.93 | 28.6 | 0.67 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 28.6 | 29.07 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-110 | 29.07 | 29.14 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-110 | 29.14 | 29.29 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-110 | 29.29 | 37.35 | 8.06 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 37.35 | 38.61 | 1.26 | COAL | Tenas_Lithology.csv |
| T97R-110 | 38.61 | 51.06 | 12.45 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 51.06 | 51.83 | 0.77 | COAL | Tenas_Lithology.csv |
| T97R-110 | 51.83 | 56.15 | 4.32 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 56.15 | 64.74 | 8.59 | COAL | Tenas_Lithology.csv |
| T97R-110 | 64.74 | 68.31 | 3.57 | MDST | Tenas_Lithology.csv |
| T97R-110 | 68.31 | 68.45 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-110 | 68.45 | 69.09 | 0.64 | MDST | Tenas_Lithology.csv |
| T97R-110 | 69.09 | 69.65 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-110 | 69.65 | 70.55 | 0.9 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 70.55 | 70.68 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-110 | 70.68 | 70.85 | 0.17 | MDST | Tenas_Lithology.csv |
| T97R-110 | 70.85 | 72.89 | 2.04 | COAL | Tenas_Lithology.csv |
| T97R-110 | 72.89 | 74.59 | 1.7 | SLTS | Tenas_Lithology.csv |
| T97R-110 | 74.59 | 75.84 | 1.25 | COAL | Tenas_Lithology.csv |
| T97R-110 | 75.84 | 78.6 | 2.76 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 0 | 8 | 8 | Overburden | Tenas_Lithology.csv |
| T97R-111 | 8 | 25.1 | 17.1 | MDST | Tenas_Lithology.csv |
| T97R-111 | 25.1 | 36.6 | 11.5 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 36.6 | 51.3 | 14.7 | MDST | Tenas_Lithology.csv |
| T97R-111 | 51.3 | 61.1 | 9.8 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 61.1 | 61.7 | 0.6 | MDST | Tenas_Lithology.csv |
| T97R-111 | 61.7 | 76.15 | 14.45 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 76.15 | 77.33 | 1.18 | COAL | Tenas_Lithology.csv |
| T97R-111 | 77.33 | 87.71 | 10.38 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 87.71 | 88.15 | 0.44 | COAL | Tenas_Lithology.csv |
| T97R-111 | 88.15 | 92.69 | 4.54 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 92.69 | 94.55 | 1.86 | COAL | Tenas_Lithology.csv |
| T97R-111 | 94.55 | 94.6 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-111 | 94.6 | 98.58 | 3.98 | COAL | Tenas_Lithology.csv |
| T97R-111 | 98.58 | 101.48 | 2.9 | MDST | Tenas_Lithology.csv |
| T97R-111 | 101.48 | 101.83 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-111 | 101.83 | 101.98 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-111 | 101.98 | 102.28 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-111 | 102.28 | 104.18 | 1.9 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 104.18 | 104.82 | 0.64 | COAL | Tenas_Lithology.csv |
| T97R-111 | 104.82 | 106.77 | 1.95 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 106.77 | 107.17 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-111 | 107.17 | 108.6 | 1.43 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 108.6 | 109.8 | 1.2 | MDST | Tenas_Lithology.csv |
| T97R-111 | 109.8 | 113.25 | 3.45 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 113.25 | 113.43 | 0.18 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-111 | 113.43 | 113.47 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-111 | 113.47 | 113.83 | 0.36 | COAL | Tenas_Lithology.csv |
| T97R-111 | 113.83 | 115.27 | 1.44 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 115.27 | 116.19 | 0.92 | COAL | Tenas_Lithology.csv |
| T97R-111 | 116.19 | 117.08 | 0.89 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 117.08 | 117.23 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-111 | 117.23 | 118.79 | 1.56 | SLTS | Tenas_Lithology.csv |
| T97R-111 | 118.79 | 119 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-111 | 119 | 119.13 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-111 | 119.13 | 119.47 | 0.34 | COAL | Tenas_Lithology.csv |
| T97R-111 | 119.47 | 121.6 | 2.13 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 0 | 5 | 5 | Overburden | Tenas_Lithology.csv |
| T97R-112 | 5 | 13.4 | 8.4 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 13.4 | 29.8 | 16.4 | MDST | Tenas_Lithology.csv |
| T97R-112 | 29.8 | 30.9 | 1.1 | SST | Tenas_Lithology.csv |
| T97R-112 | 30.9 | 54.6 | 23.7 | MDST | Tenas_Lithology.csv |
| T97R-112 | 54.6 | 60.8 | 6.2 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 60.8 | 73.8 | 13 | MDST | Tenas_Lithology.csv |
| T97R-112 | 73.8 | 74.8 | 1 | SST | Tenas_Lithology.csv |
| T97R-112 | 74.8 | 94.2 | 19.4 | MDST | Tenas_Lithology.csv |
| T97R-112 | 94.2 | 107.1 | 12.9 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 107.1 | 108 | 0.9 | SST | Tenas_Lithology.csv |
| T97R-112 | 108 | 131.75 | 23.75 | MDST | Tenas_Lithology.csv |
| T97R-112 | 131.75 | 144.76 | 13.01 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 144.76 | 145.06 | 0.3 | MDST | Tenas_Lithology.csv |
| T97R-112 | 145.06 | 145.56 | 0.5 | COAL | Tenas_Lithology.csv |
| T97R-112 | 145.56 | 149.95 | 4.39 | MDST | Tenas_Lithology.csv |
| T97R-112 | 149.95 | 150.24 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-112 | 150.24 | 153.19 | 2.95 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 153.19 | 153.45 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-112 | 153.45 | 156.1 | 2.65 | MDST | Tenas_Lithology.csv |
| T97R-112 | 156.1 | 158.05 | 1.95 | COAL | Tenas_Lithology.csv |
| T97R-112 | 158.05 | 162.77 | 4.72 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 162.77 | 163.25 | 0.48 | COAL | Tenas_Lithology.csv |
| T97R-112 | 163.25 | 165.78 | 2.53 | MDST | Tenas_Lithology.csv |
| T97R-112 | 165.78 | 165.98 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-112 | 165.98 | 167.91 | 1.93 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 167.91 | 169.98 | 2.07 | MDST | Tenas_Lithology.csv |
| T97R-112 | 169.98 | 170.34 | 0.36 | COAL | Tenas_Lithology.csv |
| T97R-112 | 170.34 | 171.11 | 0.77 | MDST | Tenas_Lithology.csv |
| T97R-112 | 171.11 | 171.32 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-112 | 171.32 | 174.2 | 2.88 | SST | Tenas_Lithology.csv |
| T97R-112 | 174.2 | 174.67 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-112 | 174.67 | 182.7 | 8.03 | SST | Tenas_Lithology.csv |
| T97R-112 | 182.7 | 183 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-112 | 183 | 184.8 | 1.8 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 184.8 | 185.03 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-112 | 185.03 | 191.75 | 6.72 | SLTS | Tenas_Lithology.csv |
| T97R-112 | 191.75 | 207.3 | 15.55 | SST | Tenas_Lithology.csv |
| T97R-113 | 0 | 4 | 4 | Overburden | Tenas_Lithology.csv |
| T97R-113 | 4 | 71.2 | 67.2 | SLTS | Tenas_Lithology.csv |
| T97R-113 | 71.2 | 75.6 | 4.4 | SST | Tenas_Lithology.csv |
| T97R-113 | 75.6 | 76.4 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-113 | 76.4 | 85 | 8.6 | SLTS | Tenas_Lithology.csv |
| T97R-113 | 85 | 86.98 | 1.98 | COAL | Tenas_Lithology.csv |
| T97R-113 | 86.98 | 89.8 | 2.82 | SLTS | Tenas_Lithology.csv |
| T97R-113 | 89.8 | 95.81 | 6.01 | SST | Tenas_Lithology.csv |
| T97R-113 | 95.81 | 96.08 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-113 | 96.08 | 102.2 | 6.12 | SLTS | Tenas_Lithology.csv |
| T97R-113 | 102.2 | 103.7 | 1.5 | COAL | Tenas_Lithology.csv |
| T97R-113 | 103.7 | 104 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-113 | 104 | 108.13 | 4.13 | COAL | Tenas_Lithology.csv |
| T97R-113 | 108.13 | 110.88 | 2.75 | MDST | Tenas_Lithology.csv |
| T97R-113 | 110.88 | 111.21 | 0.33 | COAL | Tenas_Lithology.csv |
| T97R-113 | 111.21 | 111.34 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-113 | 111.34 | 112.1 | 0.76 | COAL | Tenas_Lithology.csv |
| T97R-113 | 112.1 | 112.4 | 0.3 | MDST | Tenas_Lithology.csv |
| T97R-113 | 112.4 | 113.14 | 0.74 | COAL | Tenas_Lithology.csv |
| T97R-113 | 113.14 | 118.12 | 4.98 | SST | Tenas_Lithology.csv |
| T97R-113 | 118.12 | 122.3 | 4.18 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 0 | 1.8 | 1.8 | Overburden | Tenas_Lithology.csv |
| T97R-114 | 1.8 | 61.8 | 60 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 61.8 | 69.8 | 8 | MDST | Tenas_Lithology.csv |
| T97R-114 | 69.8 | 74.8 | 5 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 74.8 | 81.3 | 6.5 | MDST | Tenas_Lithology.csv |
| T97R-114 | 81.3 | 87.34 | 6.04 | SST | Tenas_Lithology.csv |
| T97R-114 | 87.34 | 87.55 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-114 | 87.55 | 89.9 | 2.35 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 89.9 | 94.7 | 4.8 | MDST | Tenas_Lithology.csv |
| T97R-114 | 94.7 | 95.05 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-114 | 95.05 | 95.33 | 0.28 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-114 | 95.33 | 95.84 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-114 | 95.84 | 103.04 | 7.2 | SST | Tenas_Lithology.csv |
| T97R-114 | 103.04 | 103.2 | 0.16 | COAL | Tenas_Lithology.csv |
| T97R-114 | 103.2 | 105.38 | 2.18 | SLTS | Tenas_Lithology.csv |
| T97R-114 | 105.38 | 105.78 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-114 | 105.78 | 107.13 | 1.35 | MDST | Tenas_Lithology.csv |
| T97R-114 | 107.13 | 109.28 | 2.15 | SST | Tenas_Lithology.csv |
| T97R-114 | 109.28 | 109.38 | 0.1 | COAL | Tenas_Lithology.csv |
| T97R-114 | 109.38 | 109.46 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-114 | 109.46 | 109.71 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-114 | 109.71 | 123 | 13.29 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-115 | 3 | 18.3 | 15.3 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 18.3 | 34.3 | 16 | MDST | Tenas_Lithology.csv |
| T97R-115 | 34.3 | 38.78 | 4.48 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 38.78 | 39.24 | 0.46 | COAL | Tenas_Lithology.csv |
| T97R-115 | 39.24 | 42.13 | 2.89 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 42.13 | 42.82 | 0.69 | COAL | Tenas_Lithology.csv |
| T97R-115 | 42.82 | 46.08 | 3.26 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 46.08 | 47.82 | 1.74 | COAL | Tenas_Lithology.csv |
| T97R-115 | 47.82 | 54.84 | 7.02 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 54.84 | 55.15 | 0.31 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-115 | 55.15 | 58.66 | 3.51 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 58.66 | 60.35 | 1.69 | COAL | Tenas_Lithology.csv |
| T97R-115 | 60.35 | 61.08 | 0.73 | SLTS | Tenas_Lithology.csv |
| T97R-115 | 61.08 | 64.86 | 3.78 | COAL | Tenas_Lithology.csv |
| T97R-115 | 64.86 | 66.64 | 1.78 | MDST | Tenas_Lithology.csv |
| T97R-115 | 66.64 | 67.11 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-115 | 67.11 | 67.27 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-115 | 67.27 | 67.55 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-115 | 67.55 | 75 | 7.45 | SST | Tenas_Lithology.csv |
| T97R-116 | 0 | 0.8 | 0.8 | Overburden | Tenas_Lithology.csv |
| T97R-116 | 0.8 | 3.5 | 2.7 | MDST | Tenas_Lithology.csv |
| T97R-116 | 3.5 | 80.2 | 76.7 | SLTS | Tenas_Lithology.csv |
| T97R-116 | 80.2 | 87.4 | 7.2 | MDST | Tenas_Lithology.csv |
| T97R-116 | 87.4 | 88.1 | 0.7 | SST | Tenas_Lithology.csv |
| T97R-116 | 88.1 | 100.7 | 12.6 | MDST | Tenas_Lithology.csv |
| T97R-116 | 100.7 | 124.8 | 24.1 | SLTS | Tenas_Lithology.csv |
| T97R-116 | 124.8 | 128.4 | 3.6 | MDST | Tenas_Lithology.csv |
| T97R-116 | 128.4 | 139.25 | 10.85 | SLTS | Tenas_Lithology.csv |
| T97R-116 | 139.25 | 139.5 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-116 | 139.5 | 142.18 | 2.68 | SLTS | Tenas_Lithology.csv |
| T97R-116 | 142.18 | 142.33 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-116 | 142.33 | 151.4 | 9.07 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-117 | 3 | 7 | 4 | SST | Tenas_Lithology.csv |
| T97R-117 | 7 | 48.6 | 41.6 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 48.6 | 69.5 | 20.9 | MDST | Tenas_Lithology.csv |
| T97R-117 | 69.5 | 112.23 | 42.73 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 112.23 | 112.46 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-117 | 112.46 | 115.2 | 2.74 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 115.2 | 115.79 | 0.59 | COAL | Tenas_Lithology.csv |
| T97R-117 | 115.79 | 117.33 | 1.54 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 117.33 | 117.88 | 0.55 | COAL | Tenas_Lithology.csv |
| T97R-117 | 117.88 | 120.43 | 2.55 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 120.43 | 120.96 | 0.53 | COAL | Tenas_Lithology.csv |
| T97R-117 | 120.96 | 133.3 | 12.34 | SLTS | Tenas_Lithology.csv |
| T97R-117 | 133.3 | 141 | 7.7 | SST | Tenas_Lithology.csv |
| T97R-118 | 0 | 29 | 29 | Overburden | Tenas_Lithology.csv |
| T97R-118 | 29 | 37.86 | 8.86 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 37.86 | 39.17 | 1.31 | COAL | Tenas_Lithology.csv |
| T97R-118 | 39.17 | 39.32 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-118 | 39.32 | 40.12 | 0.8 | COAL | Tenas_Lithology.csv |
| T97R-118 | 40.12 | 42.74 | 2.62 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 42.74 | 43.79 | 1.05 | COAL | Tenas_Lithology.csv |
| T97R-118 | 43.79 | 43.89 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-118 | 43.89 | 43.98 | 0.09 | COAL | Tenas_Lithology.csv |
| T97R-118 | 43.98 | 44.07 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-118 | 44.07 | 44.8 | 0.73 | COAL | Tenas_Lithology.csv |
| T97R-118 | 44.8 | 51.48 | 6.68 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 51.48 | 52.04 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-118 | 52.04 | 54.04 | 2 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 54.04 | 54.39 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-118 | 54.39 | 63.8 | 9.41 | SLTS | Tenas_Lithology.csv |
| T97R-118 | 63.8 | 80.8 | 17 | SST | Tenas_Lithology.csv |
| T97R-118 | 80.8 | 91.9 | 11.1 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 0 | 6.3 | 6.3 | Overburden | Tenas_Lithology.csv |
| T97R-119 | 6.3 | 19.1 | 12.8 | MDST | Tenas_Lithology.csv |
| T97R-119 | 19.1 | 23.1 | 4 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 23.1 | 35.3 | 12.2 | MDST | Tenas_Lithology.csv |
| T97R-119 | 35.3 | 42.1 | 6.8 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 42.1 | 58 | 15.9 | MDST | Tenas_Lithology.csv |
| T97R-119 | 58 | 59.2 | 1.2 | SST | Tenas_Lithology.csv |
| T97R-119 | 59.2 | 76.6 | 17.4 | MDST | Tenas_Lithology.csv |
| T97R-119 | 76.6 | 93.8 | 17.2 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 93.8 | 94.6 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-119 | 94.6 | 94.8 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-119 | 94.8 | 100.7 | 5.9 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 100.7 | 102.15 | 1.45 | COAL | Tenas_Lithology.csv |
| T97R-119 | 102.15 | 109.17 | 7.02 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 109.17 | 109.43 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-119 | 109.43 | 112.66 | 3.23 | SLTS | Tenas_Lithology.csv |
| T97R-119 | 112.66 | 114.45 | 1.79 | COAL | Tenas_Lithology.csv |
| T97R-119 | 114.45 | 115.41 | 0.96 | MDST | Tenas_Lithology.csv |
| T97R-119 | 115.41 | 115.52 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-119 | 115.52 | 115.69 | 0.17 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-119 | 115.69 | 119.16 | 3.47 | COAL | Tenas_Lithology.csv |
| T97R-119 | 119.16 | 120.69 | 1.53 | MDST | Tenas_Lithology.csv |
| T97R-119 | 120.69 | 121.07 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-119 | 121.07 | 121.18 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-119 | 121.18 | 121.33 | 0.15 | COAL | Tenas_Lithology.csv |
| T97R-119 | 121.33 | 126.9 | 5.57 | SST | Tenas_Lithology.csv |
| T97R-119 | 126.9 | 127.44 | 0.54 | COAL | Tenas_Lithology.csv |
| T97R-119 | 127.44 | 133.6 | 6.16 | SST | Tenas_Lithology.csv |
| T97R-120 | 0 | 1.44 | 1.44 | Overburden | Tenas_Lithology.csv |
| T97R-120 | 1.44 | 2 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-120 | 2 | 3.57 | 1.57 | SLTS | Tenas_Lithology.csv |
| T97R-120 | 3.57 | 5.53 | 1.96 | COAL | Tenas_Lithology.csv |
| T97R-120 | 5.53 | 12.8 | 7.27 | SLTS | Tenas_Lithology.csv |
| T97R-120 | 12.8 | 13.33 | 0.53 | COAL | Tenas_Lithology.csv |
| T97R-120 | 13.33 | 14.13 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-120 | 14.13 | 14.78 | 0.65 | COAL | Tenas_Lithology.csv |
| T97R-120 | 14.78 | 16.54 | 1.76 | SLTS | Tenas_Lithology.csv |
| T97R-120 | 16.54 | 16.81 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-120 | 16.81 | 23.54 | 6.73 | SLTS | Tenas_Lithology.csv |
| T97R-120 | 23.54 | 23.78 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-120 | 23.78 | 24.25 | 0.47 | MDST | Tenas_Lithology.csv |
| T97R-120 | 24.25 | 24.66 | 0.41 | COAL | Tenas_Lithology.csv |
| T97R-120 | 24.66 | 30 | 5.34 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-121 | 3 | 19.8 | 16.8 | MDST | Tenas_Lithology.csv |
| T97R-121 | 19.8 | 30.48 | 10.68 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 30.48 | 30.99 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-121 | 30.99 | 33.83 | 2.84 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 33.83 | 34.04 | 0.21 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-121 | 34.04 | 35.29 | 1.25 | MDST | Tenas_Lithology.csv |
| T97R-121 | 35.29 | 36.48 | 1.19 | COAL | Tenas_Lithology.csv |
| T97R-121 | 36.48 | 44.17 | 7.69 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 44.17 | 46.06 | 1.89 | COAL | Tenas_Lithology.csv |
| T97R-121 | 46.06 | 49.61 | 3.55 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 49.61 | 54.44 | 4.83 | SST | Tenas_Lithology.csv |
| T97R-121 | 54.44 | 54.62 | 0.18 | COAL | Tenas_Lithology.csv |
| T97R-121 | 54.62 | 54.67 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-121 | 54.67 | 55.02 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-121 | 55.02 | 59.35 | 4.33 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 59.35 | 59.8 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-121 | 59.8 | 60.05 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-121 | 60.05 | 60.15 | 0.1 | COAL | Tenas_Lithology.csv |
| T97R-121 | 60.15 | 61.19 | 1.04 | SLTS | Tenas_Lithology.csv |
| T97R-121 | 61.19 | 61.35 | 0.16 | COAL | Tenas_Lithology.csv |
| T97R-121 | 61.35 | 61.41 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-121 | 61.41 | 61.98 | 0.57 | COAL | Tenas_Lithology.csv |
| T97R-121 | 61.98 | 67.55 | 5.57 | SST | Tenas_Lithology.csv |
| T97R-121 | 67.55 | 67.94 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-121 | 67.94 | 78.6 | 10.66 | SLTS | Tenas_Lithology.csv |
| T97R-65 | 0 | 0.85 | 0.85 | Overburden | Tenas_Lithology.csv |
| T97R-65 | 0.85 | 1.49 | 0.64 | COAL | Tenas_Lithology.csv |
| T97R-65 | 1.49 | 4 | 2.51 | SLTS | Tenas_Lithology.csv |
| T97R-65 | 4 | 4.3 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-65 | 4.3 | 7.3 | 3 | MDST | Tenas_Lithology.csv |
| T97R-65 | 7.3 | 11.46 | 4.16 | SST | Tenas_Lithology.csv |
| T97R-65 | 11.46 | 12.04 | 0.58 | COAL | Tenas_Lithology.csv |
| T97R-65 | 12.04 | 12.75 | 0.71 | MDST | Tenas_Lithology.csv |
| T97R-65 | 12.75 | 12.85 | 0.1 | COAL | Tenas_Lithology.csv |
| T97R-65 | 12.85 | 12.97 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-65 | 12.97 | 13.4 | 0.43 | COAL | Tenas_Lithology.csv |
| T97R-65 | 13.4 | 13.66 | 0.26 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-65 | 13.66 | 13.77 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-65 | 13.77 | 14.66 | 0.89 | MDST | Tenas_Lithology.csv |
| T97R-65 | 14.66 | 14.84 | 0.18 | COAL | Tenas_Lithology.csv |
| T97R-65 | 14.84 | 22.38 | 7.54 | SST | Tenas_Lithology.csv |
| T97R-65 | 22.38 | 22.47 | 0.09 | COAL | Tenas_Lithology.csv |
| T97R-65 | 22.47 | 22.6 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-65 | 22.6 | 22.99 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-65 | 22.99 | 29.8 | 6.81 | SST | Tenas_Lithology.csv |
| T97R-66 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T97R-66 | 3 | 5.44 | 2.44 | SLTS | Tenas_Lithology.csv |
| T97R-66 | 5.44 | 5.76 | 0.32 | COAL | Tenas_Lithology.csv |
| T97R-66 | 5.76 | 6.21 | 0.45 | MDST | Tenas_Lithology.csv |
| T97R-66 | 6.21 | 8.1 | 1.89 | COAL | Tenas_Lithology.csv |
| T97R-66 | 8.1 | 8.28 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-66 | 8.28 | 9 | 0.72 | COAL | Tenas_Lithology.csv |
| T97R-66 | 9 | 9.72 | 0.72 | MDST | Tenas_Lithology.csv |
| T97R-66 | 9.72 | 10.15 | 0.43 | COAL | Tenas_Lithology.csv |
| T97R-66 | 10.15 | 24 | 13.85 | MDST | Tenas_Lithology.csv |
| T97R-66 | 24 | 24.5 | 0.5 | COAL | Tenas_Lithology.csv |
| T97R-66 | 24.5 | 25 | 0.5 | MDST | Tenas_Lithology.csv |
| T97R-66 | 25 | 25.85 | 0.85 | COAL | Tenas_Lithology.csv |
| T97R-66 | 25.85 | 33.25 | 7.4 | SLTS | Tenas_Lithology.csv |
| T97R-66 | 33.25 | 33.85 | 0.6 | COAL | Tenas_Lithology.csv |
| T97R-66 | 33.85 | 36.5 | 2.65 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 0 | 5 | 5 | Overburden | Tenas_Lithology.csv |
| T97R-67 | 5 | 8.6 | 3.6 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 8.6 | 14 | 5.4 | SST | Tenas_Lithology.csv |
| T97R-67 | 14 | 14.25 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 14.25 | 17.72 | 3.47 | SST | Tenas_Lithology.csv |
| T97R-67 | 17.72 | 18.17 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-67 | 18.17 | 20.97 | 2.8 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 20.97 | 21.6 | 0.63 | COAL | Tenas_Lithology.csv |
| T97R-67 | 21.6 | 26.57 | 4.97 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 26.57 | 27.44 | 0.87 | COAL | Tenas_Lithology.csv |
| T97R-67 | 27.44 | 27.49 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 27.49 | 28.21 | 0.72 | COAL | Tenas_Lithology.csv |
| T97R-67 | 28.21 | 35.1 | 6.89 | SST | Tenas_Lithology.csv |
| T97R-67 | 35.1 | 35.4 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-67 | 35.4 | 40.98 | 5.58 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 40.98 | 42.93 | 1.95 | COAL | Tenas_Lithology.csv |
| T97R-67 | 42.93 | 43.03 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 43.03 | 43.88 | 0.85 | COAL | Tenas_Lithology.csv |
| T97R-67 | 43.88 | 43.94 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 43.94 | 45.85 | 1.91 | COAL | Tenas_Lithology.csv |
| T97R-67 | 45.85 | 46.03 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 46.03 | 46.83 | 0.8 | COAL | Tenas_Lithology.csv |
| T97R-67 | 46.83 | 48.62 | 1.79 | MDST | Tenas_Lithology.csv |
| T97R-67 | 48.62 | 49.56 | 0.94 | COAL | Tenas_Lithology.csv |
| T97R-67 | 49.56 | 56 | 6.44 | SST | Tenas_Lithology.csv |
| T97R-67 | 56 | 56.3 | 0.3 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 56.3 | 60.04 | 3.74 | SLTS | Tenas_Lithology.csv |
| T97R-67 | 60.04 | 60.4 | 0.36 | COAL | Tenas_Lithology.csv |
| T97R-67 | 60.4 | 60.86 | 0.46 | MDST | Tenas_Lithology.csv |
| T97R-67 | 60.86 | 61.04 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 61.04 | 62.24 | 1.2 | MDST | Tenas_Lithology.csv |
| T97R-67 | 62.24 | 62.9 | 0.66 | COAL | Tenas_Lithology.csv |
| T97R-67 | 62.9 | 67.2 | 4.3 | MDST | Tenas_Lithology.csv |
| T97R-67 | 67.2 | 67.49 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-67 | 67.49 | 68.34 | 0.85 | MDST | Tenas_Lithology.csv |
| T97R-67 | 68.34 | 68.63 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-67 | 68.63 | 79.4 | 10.77 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 0 | 12.75 | 12.75 | Overburden | Tenas_Lithology.csv |
| T97R-69 | 12.75 | 55.6 | 42.85 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 55.6 | 65.53 | 9.93 | SST | Tenas_Lithology.csv |
| T97R-69 | 65.53 | 82.66 | 17.13 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 82.66 | 83.38 | 0.72 | COAL | Tenas_Lithology.csv |
| T97R-69 | 83.38 | 90.45 | 7.07 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 90.45 | 90.7 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-69 | 90.7 | 98.18 | 7.48 | SLTS | Tenas_Lithology.csv |
| T97R-69 | 98.18 | 99.9 | 1.72 | COAL | Tenas_Lithology.csv |
| T97R-69 | 99.9 | 100.2 | 0.3 | MDST | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-69 | 100.2 | 100.66 | 0.46 | COAL | Tenas_Lithology.csv |
| T97R-69 | 100.66 | 100.72 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-69 | 100.72 | 101.75 | 1.03 | COAL | Tenas_Lithology.csv |
| T97R-69 | 101.75 | 101.88 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-69 | 101.88 | 104.11 | 2.23 | COAL | Tenas_Lithology.csv |
| T97R-69 | 104.11 | 104.18 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-69 | 104.18 | 104.86 | 0.68 | COAL | Tenas_Lithology.csv |
| T97R-69 | 104.86 | 109.52 | 4.66 | MDST | Tenas_Lithology.csv |
| T97R-69 | 109.52 | 109.9 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-69 | 109.9 | 111.71 | 1.81 | MDST | Tenas_Lithology.csv |
| T97R-69 | 111.71 | 111.84 | 0.13 | COAL | Tenas_Lithology.csv |
| T97R-69 | 111.84 | 111.96 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-69 | 111.96 | 112.93 | 0.97 | COAL | Tenas_Lithology.csv |
| T97R-69 | 112.93 | 115.53 | 2.6 | MDST | Tenas_Lithology.csv |
| T97R-69 | 115.53 | 115.82 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-69 | 115.82 | 116.92 | 1.1 | MDST | Tenas_Lithology.csv |
| T97R-69 | 116.92 | 117.55 | 0.63 | COAL | Tenas_Lithology.csv |
| T97R-69 | 117.55 | 119.12 | 1.57 | MDST | Tenas_Lithology.csv |
| T97R-69 | 119.12 | 119.43 | 0.31 | COAL | Tenas_Lithology.csv |
| T97R-69 | 119.43 | 119.76 | 0.33 | MDST | Tenas_Lithology.csv |
| T97R-69 | 119.76 | 120.55 | 0.79 | COAL | Tenas_Lithology.csv |
| T97R-69 | 120.55 | 121.27 | 0.72 | MDST | Tenas_Lithology.csv |
| T97R-69 | 121.27 | 122.14 | 0.87 | COAL | Tenas_Lithology.csv |
| T97R-69 | 122.14 | 128 | 5.86 | MDST | Tenas_Lithology.csv |
| T97R-70 | 0 | 11 | 11 | Overburden | Tenas_Lithology.csv |
| T97R-70 | 11 | 14.38 | 3.38 | SLTS | Tenas_Lithology.csv |
| T97R-70 | 14.38 | 14.6 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-70 | 14.6 | 18.57 | 3.97 | SLTS | Tenas_Lithology.csv |
| T97R-70 | 18.57 | 21.31 | 2.74 | COAL | Tenas_Lithology.csv |
| T97R-70 | 21.31 | 22.88 | 1.57 | SLTS | Tenas_Lithology.csv |
| T97R-70 | 22.88 | 25.36 | 2.48 | COAL | Tenas_Lithology.csv |
| T97R-70 | 25.36 | 25.96 | 0.6 | MDST | Tenas_Lithology.csv |
| T97R-70 | 25.96 | 26.63 | 0.67 | COAL | Tenas_Lithology.csv |
| T97R-70 | 26.63 | 27.74 | 1.11 | MDST | Tenas_Lithology.csv |
| T97R-70 | 27.74 | 32.75 | 5.01 | COAL | Tenas_Lithology.csv |
| T97R-70 | 32.75 | 38.41 | 5.66 | MDST | Tenas_Lithology.csv |
| T97R-70 | 38.41 | 39.32 | 0.91 | COAL | Tenas_Lithology.csv |
| T97R-70 | 39.32 | 39.66 | 0.34 | MDST | Tenas_Lithology.csv |
| T97R-70 | 39.66 | 39.75 | 0.09 | COAL | Tenas_Lithology.csv |
| T97R-70 | 39.75 | 42.15 | 2.4 | SLTS | Tenas_Lithology.csv |
| T97R-70 | 42.15 | 42.5 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-70 | 42.5 | 42.7 | 0.2 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-70 | 42.7 | 42.95 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-70 | 42.95 | 43.2 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-70 | 43.2 | 43.5 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-70 | 43.5 | 43.85 | 0.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-70 | 43.85 | 44.1 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-70 | 44.1 | 61 | 16.9 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 0 | 14 | 14 | Overburden | Tenas_Lithology.csv |
| T97R-71 | 14 | 39.6 | 25.6 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 39.6 | 48.28 | 8.68 | SST | Tenas_Lithology.csv |
| T97R-71 | 48.28 | 48.75 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-71 | 48.75 | 52.98 | 4.23 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 52.98 | 54.07 | 1.09 | COAL | Tenas_Lithology.csv |
| T97R-71 | 54.07 | 60.14 | 6.07 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 60.14 | 60.36 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-71 | 60.36 | 60.42 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 60.42 | 61.99 | 1.57 | COAL | Tenas_Lithology.csv |
| T97R-71 | 61.99 | 67.8 | 5.81 | SST | Tenas_Lithology.csv |
| T97R-71 | 67.8 | 70.6 | 2.8 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 70.6 | 71 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-71 | 71 | 75.59 | 4.59 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 75.59 | 77.53 | 1.94 | COAL | Tenas_Lithology.csv |
| T97R-71 | 77.53 | 78.49 | 0.96 | MDST | Tenas_Lithology.csv |
| T97R-71 | 78.49 | 78.89 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-71 | 78.89 | 78.94 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 78.94 | 79.96 | 1.02 | COAL | Tenas_Lithology.csv |
| T97R-71 | 79.96 | 80.44 | 0.48 | MDST | Tenas_Lithology.csv |
| T97R-71 | 80.44 | 80.85 | 0.41 | COAL | Tenas_Lithology.csv |
| T97R-71 | 80.85 | 81.52 | 0.67 | MDST | Tenas_Lithology.csv |
| T97R-71 | 81.52 | 82.27 | 0.75 | COAL | Tenas_Lithology.csv |
| T97R-71 | 82.27 | 82.43 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 82.43 | 84.06 | 1.63 | COAL | Tenas_Lithology.csv |
| T97R-71 | 84.06 | 84.55 | 0.49 | MDST | Tenas_Lithology.csv |
| T97R-71 | 84.55 | 85 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-71 | 85 | 87.12 | 2.12 | MDST | Tenas_Lithology.csv |
| T97R-71 | 87.12 | 87.71 | 0.59 | COAL | Tenas_Lithology.csv |
| T97R-71 | 87.71 | 89.67 | 1.96 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 89.67 | 90.51 | 0.84 | COAL | Tenas_Lithology.csv |
| T97R-71 | 90.51 | 91.26 | 0.75 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 91.26 | 91.51 | 0.25 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 91.51 | 92.31 | 0.8 | MDST | Tenas_Lithology.csv |
| T97R-71 | 92.31 | 92.69 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-71 | 92.69 | 93.62 | 0.93 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 93.62 | 93.84 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 93.84 | 94.74 | 0.9 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 94.74 | 94.83 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-71 | 94.83 | 99.5 | 4.67 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 99.5 | 100.36 | 0.86 | COAL | Tenas_Lithology.csv |
| T97R-71 | 100.36 | 100.72 | 0.36 | SLTS | Tenas_Lithology.csv |
| T97R-71 | 100.72 | 101.56 | 0.84 | COAL | Tenas_Lithology.csv |
| T97R-71 | 101.56 | 103.7 | 2.14 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 0 | 15 | 15 | Overburden | Tenas_Lithology.csv |
| T97R-75 | 15 | 35.4 | 20.4 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 35.4 | 40.4 | 5 | SST | Tenas_Lithology.csv |
| T97R-75 | 40.4 | 55.3 | 14.9 | MDST | Tenas_Lithology.csv |
| T97R-75 | 55.3 | 94.33 | 39.03 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 94.33 | 96.02 | 1.69 | COAL | Tenas_Lithology.csv |
| T97R-75 | 96.02 | 100.8 | 4.78 | SST | Tenas_Lithology.csv |
| T97R-75 | 100.8 | 104.3 | 3.5 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 104.3 | 104.55 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-75 | 104.55 | 110.01 | 5.46 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 110.01 | 111.75 | 1.74 | COAL | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-75 | 111.75 | 112.56 | 0.81 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 112.56 | 112.98 | 0.42 | COAL | Tenas_Lithology.csv |
| T97R-75 | 112.98 | 113.05 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-75 | 113.05 | 114.15 | 1.1 | COAL | Tenas_Lithology.csv |
| T97R-75 | 114.15 | 114.28 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-75 | 114.28 | 117.45 | 3.17 | COAL | Tenas_Lithology.csv |
| T97R-75 | 117.45 | 120.01 | 2.56 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 120.01 | 121.72 | 1.71 | SST | Tenas_Lithology.csv |
| T97R-75 | 121.72 | 123.43 | 1.71 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 123.43 | 124.37 | 0.94 | COAL | Tenas_Lithology.csv |
| T97R-75 | 124.37 | 127.9 | 3.53 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 127.9 | 128.37 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-75 | 128.37 | 128.68 | 0.31 | MDST | Tenas_Lithology.csv |
| T97R-75 | 128.68 | 128.91 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-75 | 128.91 | 129.64 | 0.73 | MDST | Tenas_Lithology.csv |
| T97R-75 | 129.64 | 129.96 | 0.32 | COAL | Tenas_Lithology.csv |
| T97R-75 | 129.96 | 130.72 | 0.76 | MDST | Tenas_Lithology.csv |
| T97R-75 | 130.72 | 132.87 | 2.15 | SLTS | Tenas_Lithology.csv |
| T97R-75 | 132.87 | 133.13 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-75 | 133.13 | 135.1 | 1.97 | SST | Tenas_Lithology.csv |
| T97R-78 | 0 | 9.5 | 9.5 | Overburden | Tenas_Lithology.csv |
| T97R-78 | 9.5 | 21.5 | 12 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 21.5 | 31.11 | 9.61 | SST | Tenas_Lithology.csv |
| T97R-78 | 31.11 | 45.5 | 14.39 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 45.5 | 47.24 | 1.74 | COAL | Tenas_Lithology.csv |
| T97R-78 | 47.24 | 55.01 | 7.77 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 55.01 | 55.4 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-78 | 55.4 | 58.66 | 3.26 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 58.66 | 60.28 | 1.62 | COAL | Tenas_Lithology.csv |
| T97R-78 | 60.28 | 61.3 | 1.02 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 61.3 | 62.63 | 1.33 | COAL | Tenas_Lithology.csv |
| T97R-78 | 62.63 | 62.92 | 0.29 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 62.92 | 63.19 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-78 | 63.19 | 63.41 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 63.41 | 63.72 | 0.31 | COAL | Tenas_Lithology.csv |
| T97R-78 | 63.72 | 63.9 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 63.9 | 66.19 | 2.29 | COAL | Tenas_Lithology.csv |
| T97R-78 | 66.19 | 70.75 | 4.56 | MDST | Tenas_Lithology.csv |
| T97R-78 | 70.75 | 71.07 | 0.32 | COAL | Tenas_Lithology.csv |
| T97R-78 | 71.07 | 72.41 | 1.34 | MDST | Tenas_Lithology.csv |
| T97R-78 | 72.41 | 72.49 | 0.08 | COAL | Tenas_Lithology.csv |
| T97R-78 | 72.49 | 72.64 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 72.64 | 73.44 | 0.8 | COAL | Tenas_Lithology.csv |
| T97R-78 | 73.44 | 76.41 | 2.97 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 76.41 | 76.57 | 0.16 | COAL | Tenas_Lithology.csv |
| T97R-78 | 76.57 | 81.91 | 5.34 | MDST | Tenas_Lithology.csv |
| T97R-78 | 81.91 | 82.54 | 0.63 | SLTS | Tenas_Lithology.csv |
| T97R-78 | 82.54 | 82.72 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-78 | 82.72 | 83.18 | 0.46 | MDST | Tenas_Lithology.csv |
| T97R-78 | 83.18 | 83.67 | 0.49 | COAL | Tenas_Lithology.csv |
| T97R-78 | 83.67 | 84.6 | 0.93 | MDST | Tenas_Lithology.csv |
| T97R-78 | 84.6 | 85.8 | 1.2 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 0 | 10.5 | 10.5 | Overburden | Tenas_Lithology.csv |
| T97R-80 | 10.5 | 29.8 | 19.3 | MDST | Tenas_Lithology.csv |
| T97R-80 | 29.8 | 48.15 | 18.35 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 48.15 | 51.2 | 3.05 | SST | Tenas_Lithology.csv |
| T97R-80 | 51.2 | 55 | 3.8 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 55 | 55.85 | 0.85 | MDST | Tenas_Lithology.csv |
| T97R-80 | 55.85 | 57.36 | 1.51 | COAL | Tenas_Lithology.csv |
| T97R-80 | 57.36 | 57.97 | 0.61 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 57.97 | 58.37 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-80 | 58.37 | 58.43 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 58.43 | 59.35 | 0.92 | COAL | Tenas_Lithology.csv |
| T97R-80 | 59.35 | 59.44 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 59.44 | 59.72 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-80 | 59.72 | 59.79 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 59.79 | 62.45 | 2.66 | COAL | Tenas_Lithology.csv |
| T97R-80 | 62.45 | 66.91 | 4.46 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 66.91 | 67.18 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-80 | 67.18 | 69.19 | 2.01 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 69.19 | 70.07 | 0.88 | COAL | Tenas_Lithology.csv |
| T97R-80 | 70.07 | 74.84 | 4.77 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 74.84 | 75.22 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-80 | 75.22 | 78.87 | 3.65 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 78.87 | 79.54 | 0.67 | COAL | Tenas_Lithology.csv |
| T97R-80 | 79.54 | 79.61 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 79.61 | 79.78 | 0.17 | COAL | Tenas_Lithology.csv |
| T97R-80 | 79.78 | 80.68 | 0.9 | MDST | Tenas_Lithology.csv |
| T97R-80 | 80.68 | 80.79 | 0.11 | COAL | Tenas_Lithology.csv |
| T97R-80 | 80.79 | 80.85 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-80 | 80.85 | 81.73 | 0.88 | COAL | Tenas_Lithology.csv |
| T97R-80 | 81.73 | 87.65 | 5.92 | SLTS | Tenas_Lithology.csv |
| T97R-80 | 87.65 | 88.17 | 0.52 | COAL | Tenas_Lithology.csv |
| T97R-80 | 88.17 | 91.3 | 3.13 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 0 | 13.5 | 13.5 | Overburden | Tenas_Lithology.csv |
| T97R-84 | 13.5 | 29.7 | 16.2 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 29.7 | 37.43 | 7.73 | SST | Tenas_Lithology.csv |
| T97R-84 | 37.43 | 40.3 | 2.87 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 40.3 | 41.54 | 1.24 | MDST | Tenas_Lithology.csv |
| T97R-84 | 41.54 | 42.15 | 0.61 | COAL | Tenas_Lithology.csv |
| T97R-84 | 42.15 | 44.31 | 2.16 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 44.31 | 44.56 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-84 | 44.56 | 44.87 | 0.31 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-84 | 44.87 | 46.59 | 1.72 | COAL | Tenas_Lithology.csv |
| T97R-84 | 46.59 | 54.88 | 8.29 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 54.88 | 55.28 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-84 | 55.28 | 60.88 | 5.6 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 60.88 | 62.74 | 1.86 | COAL | Tenas_Lithology.csv |
| T97R-84 | 62.74 | 62.86 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-84 | 62.86 | 63.8 | 0.94 | COAL | Tenas_Lithology.csv |
| T97R-84 | 63.8 | 63.91 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-84 | 63.91 | 64.88 | 0.97 | COAL | Tenas_Lithology.csv |
| T97R-84 | 64.88 | 65.01 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-84 | 65.01 | 66.75 | 1.74 | COAL | Tenas_Lithology.csv |
| T97R-84 | 66.75 | 68.73 | 1.98 | MDST | Tenas_Lithology.csv |
| T97R-84 | 68.73 | 69.24 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-84 | 69.24 | 70.43 | 1.19 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 70.43 | 71.29 | 0.86 | COAL | Tenas_Lithology.csv |
| T97R-84 | 71.29 | 71.52 | 0.23 | MDST | Tenas_Lithology.csv |
| T97R-84 | 71.52 | 72.09 | 0.57 | COAL | Tenas_Lithology.csv |
| T97R-84 | 72.09 | 72.84 | 0.75 | MDST | Tenas_Lithology.csv |
| T97R-84 | 72.84 | 73.14 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-84 | 73.14 | 76 | 2.86 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 76 | 76.29 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-84 | 76.29 | 78.4 | 2.11 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 78.4 | 79.11 | 0.71 | COAL | Tenas_Lithology.csv |
| T97R-84 | 79.11 | 86.12 | 7.01 | SLTS | Tenas_Lithology.csv |
| T97R-84 | 86.12 | 86.54 | 0.42 | COAL | Tenas_Lithology.csv |
| T97R-84 | 86.54 | 90 | 3.46 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 0 | 9.5 | 9.5 | Overburden | Tenas_Lithology.csv |
| T97R-87 | 9.5 | 18.4 | 8.9 | MDST | Tenas_Lithology.csv |
| T97R-87 | 18.4 | 41.9 | 23.5 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 41.9 | 48.2 | 6.3 | MDST | Tenas_Lithology.csv |
| T97R-87 | 48.2 | 62.56 | 14.36 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 62.56 | 62.69 | 0.13 | COAL | Tenas_Lithology.csv |
| T97R-87 | 62.69 | 63.6 | 0.91 | MDST | Tenas_Lithology.csv |
| T97R-87 | 63.6 | 63.98 | 0.38 | COAL | Tenas_Lithology.csv |
| T97R-87 | 63.98 | 72.26 | 8.28 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 72.26 | 73.74 | 1.48 | COAL | Tenas_Lithology.csv |
| T97R-87 | 73.74 | 90.28 | 16.54 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 90.28 | 92.4 | 2.12 | COAL | Tenas_Lithology.csv |
| T97R-87 | 92.4 | 92.48 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 92.48 | 93.55 | 1.07 | COAL | Tenas_Lithology.csv |
| T97R-87 | 93.55 | 93.68 | 0.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 93.68 | 93.98 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-87 | 93.98 | 94.05 | 0.07 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 94.05 | 96.54 | 2.49 | COAL | Tenas_Lithology.csv |
| T97R-87 | 96.54 | 100.14 | 3.6 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 100.14 | 100.26 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 100.26 | 100.76 | 0.5 | MDST | Tenas_Lithology.csv |
| T97R-87 | 100.76 | 101.8 | 1.04 | COAL | Tenas_Lithology.csv |
| T97R-87 | 101.8 | 105.76 | 3.96 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 105.76 | 106.13 | 0.37 | COAL | Tenas_Lithology.csv |
| T97R-87 | 106.13 | 108.15 | 2.02 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 108.15 | 108.36 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-87 | 108.36 | 108.54 | 0.18 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 108.54 | 109 | 0.46 | COAL | Tenas_Lithology.csv |
| T97R-87 | 109 | 109.1 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-87 | 109.1 | 109.39 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-87 | 109.39 | 110.47 | 1.08 | SLTS | Tenas_Lithology.csv |
| T97R-87 | 110.47 | 111.23 | 0.76 | COAL | Tenas_Lithology.csv |
| T97R-87 | 111.23 | 116.8 | 5.57 | SLTS | Tenas_Lithology.csv |
| T97R-88 | 0 | 16 | 16 | Overburden | Tenas_Lithology.csv |
| T97R-88 | 16 | 20 | 4 | MDST | Tenas_Lithology.csv |
| T97R-88 | 20 | 20.3 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-88 | 20.3 | 22.7 | 2.4 | MDST | Tenas_Lithology.csv |
| T97R-88 | 22.7 | 33.95 | 11.25 | SLTS | Tenas_Lithology.csv |
| T97R-88 | 33.95 | 34.58 | 0.63 | COAL | Tenas_Lithology.csv |
| T97R-88 | 34.58 | 34.64 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-88 | 34.64 | 35.43 | 0.79 | COAL | Tenas_Lithology.csv |
| T97R-88 | 35.43 | 41.57 | 6.14 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 0 | 21 | 21 | Overburden | Tenas_Lithology.csv |
| T97R-90 | 21 | 26.95 | 5.95 | MDST | Tenas_Lithology.csv |
| T97R-90 | 26.95 | 27.38 | 0.43 | COAL | Tenas_Lithology.csv |
| T97R-90 | 27.38 | 33.8 | 6.42 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 33.8 | 34.25 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-90 | 34.25 | 37.89 | 3.64 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 37.89 | 38.12 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-90 | 38.12 | 40.72 | 2.6 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 40.72 | 41.75 | 1.03 | COAL | Tenas_Lithology.csv |
| T97R-90 | 41.75 | 41.85 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 41.85 | 42.82 | 0.97 | COAL | Tenas_Lithology.csv |
| T97R-90 | 42.82 | 55.44 | 12.62 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 55.44 | 55.61 | 0.17 | COAL | Tenas_Lithology.csv |
| T97R-90 | 55.61 | 60.4 | 4.79 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 60.4 | 60.48 | 0.08 | COAL | Tenas_Lithology.csv |
| T97R-90 | 60.48 | 60.64 | 0.16 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 60.64 | 63.38 | 2.74 | COAL | Tenas_Lithology.csv |
| T97R-90 | 63.38 | 63.52 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 63.52 | 63.78 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-90 | 63.78 | 64.97 | 1.19 | MDST | Tenas_Lithology.csv |
| T97R-90 | 64.97 | 68.9 | 3.93 | COAL | Tenas_Lithology.csv |
| T97R-90 | 68.9 | 68.94 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 68.94 | 69.94 | 1 | COAL | Tenas_Lithology.csv |
| T97R-90 | 69.94 | 73.8 | 3.86 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 73.8 | 74.15 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-90 | 74.15 | 74.29 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-90 | 74.29 | 75.79 | 1.5 | COAL | Tenas_Lithology.csv |
| T97R-90 | 75.79 | 83.2 | 7.41 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 83.2 | 85.4 | 2.2 | SST | Tenas_Lithology.csv |
| T97R-90 | 85.4 | 88 | 2.6 | SLTS | Tenas_Lithology.csv |
| T97R-90 | 88 | 88.2 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-90 | 88.2 | 98.5 | 10.3 | SST | Tenas_Lithology.csv |
| T97R-91 | 0 | 9 | 9 | Overburden | Tenas_Lithology.csv |
| T97R-91 | 9 | 12.4 | 3.4 | SLTS | Tenas_Lithology.csv |
| T97R-91 | 12.4 | 19.01 | 6.61 | SST | Tenas_Lithology.csv |
| T97R-91 | 19.01 | 19.5 | 0.49 | COAL | Tenas_Lithology.csv |
| T97R-91 | 19.5 | 22.48 | 2.98 | SLTS | Tenas_Lithology.csv |
| T97R-91 | 22.48 | 22.68 | 0.2 | COAL | Tenas_Lithology.csv |
| T97R-91 | 22.68 | 23.45 | 0.77 | MDST | Tenas_Lithology.csv |
| T97R-91 | 23.45 | 23.76 | 0.31 | COAL | Tenas_Lithology.csv |
| T97R-91 | 23.76 | 29.7 | 5.94 | SLTS | Tenas_Lithology.csv |
| T97R-91 | 29.7 | 31.34 | 1.64 | COAL | Tenas_Lithology.csv |
| T97R-91 | 31.34 | 38.58 | 7.24 | SLTS | Tenas_Lithology.csv |
| T97R-91 | 38.58 | 38.97 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-91 | 38.97 | 44.23 | 5.26 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-91 | 44.23 | 46.43 | 2.2 | COAL | Tenas_Lithology.csv |
| T97R-91 | 46.43 | 46.48 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-91 | 46.48 | 47.41 | 0.93 | COAL | Tenas_Lithology.csv |
| T97R-91 | 47.41 | 47.49 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-91 | 47.49 | 51.05 | 3.56 | COAL | Tenas_Lithology.csv |
| T97R-91 | 51.05 | 54.14 | 3.09 | MDST | Tenas_Lithology.csv |
| T97R-91 | 54.14 | 54.56 | 0.42 | COAL | Tenas_Lithology.csv |
| T97R-91 | 54.56 | 54.8 | 0.24 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-91 | 54.8 | 55.04 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-91 | 55.04 | 55.63 | 0.59 | MDST | Tenas_Lithology.csv |
| T97R-91 | 55.63 | 56.14 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-91 | 56.14 | 56.87 | 0.73 | MDST | Tenas_Lithology.csv |
| T97R-91 | 56.87 | 57.3 | 0.43 | COAL | Tenas_Lithology.csv |
| T97R-91 | 57.3 | 59.1 | 1.8 | MDST | Tenas_Lithology.csv |
| T97R-91 | 59.1 | 67.5 | 8.4 | SLTS | Tenas_Lithology.csv |
| T97R-94 | 0 | 1 | 1 | Overburden | Tenas_Lithology.csv |
| T97R-94 | 1 | 3 | 2 | COAL | Tenas_Lithology.csv |
| T97R-94 | 3 | 9.21 | 6.21 | SLTS | Tenas_Lithology.csv |
| T97R-94 | 9.21 | 9.49 | 0.28 | COAL | Tenas_Lithology.csv |
| T97R-94 | 9.49 | 11.82 | 2.33 | SLTS | Tenas_Lithology.csv |
| T97R-94 | 11.82 | 13.71 | 1.89 | COAL | Tenas_Lithology.csv |
| T97R-94 | 13.71 | 14.57 | 0.86 | MDST | Tenas_Lithology.csv |
| T97R-94 | 14.57 | 16.05 | 1.48 | COAL | Tenas_Lithology.csv |
| T97R-94 | 16.05 | 16.14 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 16.14 | 16.65 | 0.51 | COAL | Tenas_Lithology.csv |
| T97R-94 | 16.65 | 16.7 | 0.05 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 16.7 | 16.94 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-94 | 16.94 | 17.04 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 17.04 | 17.91 | 0.87 | COAL | Tenas_Lithology.csv |
| T97R-94 | 17.91 | 19.42 | 1.51 | MDST | Tenas_Lithology.csv |
| T97R-94 | 19.42 | 19.87 | 0.45 | COAL | Tenas_Lithology.csv |
| T97R-94 | 19.87 | 19.95 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 19.95 | 20.19 | 0.24 | COAL | Tenas_Lithology.csv |
| T97R-94 | 20.19 | 26.14 | 5.95 | SST | Tenas_Lithology.csv |
| T97R-94 | 26.14 | 26.43 | 0.29 | COAL | Tenas_Lithology.csv |
| T97R-94 | 26.43 | 26.64 | 0.21 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 26.64 | 26.89 | 0.25 | COAL | Tenas_Lithology.csv |
| T97R-94 | 26.89 | 27.79 | 0.9 | MDST | Tenas_Lithology.csv |
| T97R-94 | 27.79 | 27.88 | 0.09 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-94 | 27.88 | 30 | 2.12 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 0 | 1 | 1 | Overburden | Tenas_Lithology.csv |
| T97R-95C | 1 | 2.03 | 1.03 | MDST | Tenas_Lithology.csv |
| T97R-95C | 2.03 | 2.81 | 0.78 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 2.81 | 3.9 | 1.09 | MDST | Tenas_Lithology.csv |
| T97R-95C | 3.9 | 4.17 | 0.27 | COAL | Tenas_Lithology.csv |
| T97R-95C | 4.17 | 6.48 | 2.31 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 6.48 | 8.05 | 1.57 | COAL | Tenas_Lithology.csv |
| T97R-95C | 8.05 | 8.18 | 0.13 | MDST | Tenas_Lithology.csv |
| T97R-95C | 8.18 | 8.93 | 0.75 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 8.93 | 9.69 | 0.76 | MDST | Tenas_Lithology.csv |
| T97R-95C | 9.69 | 11.2 | 1.51 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 11.2 | 11.42 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-95C | 11.42 | 12.1 | 0.68 | MDST | Tenas_Lithology.csv |
| T97R-95C | 12.1 | 13.27 | 1.17 | COAL | Tenas_Lithology.csv |
| T97R-95C | 13.27 | 13.54 | 0.27 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-95C | 13.54 | 13.72 | 0.18 | COAL | Tenas_Lithology.csv |
| T97R-95C | 13.72 | 14.23 | 0.51 | MDST | Tenas_Lithology.csv |
| T97R-95C | 14.23 | 15.35 | 1.12 | COAL | Tenas_Lithology.csv |
| T97R-95C | 15.35 | 16.14 | 0.79 | MDST | Tenas_Lithology.csv |
| T97R-95C | 16.14 | 16.4 | 0.26 | COAL | Tenas_Lithology.csv |
| T97R-95C | 16.4 | 17.11 | 0.71 | MDST | Tenas_Lithology.csv |
| T97R-95C | 17.11 | 17.67 | 0.56 | COAL | Tenas_Lithology.csv |
| T97R-95C | 17.67 | 18.51 | 0.84 | MDST | Tenas_Lithology.csv |
| T97R-95C | 18.51 | 18.73 | 0.22 | COAL | Tenas_Lithology.csv |
| T97R-95C | 18.73 | 19.36 | 0.63 | MDST | Tenas_Lithology.csv |
| T97R-95C | 19.36 | 19.66 | 0.3 | SST | Tenas_Lithology.csv |
| T97R-95C | 19.66 | 21.33 | 1.67 | MDST | Tenas_Lithology.csv |
| T97R-95C | 21.33 | 23.7 | 2.37 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 23.7 | 26.5 | 2.8 | SST | Tenas_Lithology.csv |
| T97R-95C | 26.5 | 26.97 | 0.47 | COAL | Tenas_Lithology.csv |
| T97R-95C | 26.97 | 29.31 | 2.34 | SLTS | Tenas_Lithology.csv |
| T97R-95C | 29.31 | 29.52 | 0.21 | COAL | Tenas_Lithology.csv |
| T97R-95C | 29.52 | 36 | 6.48 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 0 | 14 | 14 | Overburden | Tenas_Lithology.csv |
| T97R-96 | 14 | 23.1 | 9.1 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 23.1 | 38.8 | 15.7 | MDST | Tenas_Lithology.csv |
| T97R-96 | 38.8 | 42.4 | 3.6 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 42.4 | 55.7 | 13.3 | MDST | Tenas_Lithology.csv |
| T97R-96 | 55.7 | 60.1 | 4.4 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 60.1 | 62.1 | 2 | MDST | Tenas_Lithology.csv |
| T97R-96 | 62.1 | 81.04 | 18.94 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 81.04 | 81.39 | 0.35 | COAL | Tenas_Lithology.csv |
| T97R-96 | 81.39 | 82.96 | 1.57 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 82.96 | 83.51 | 0.55 | COAL | Tenas_Lithology.csv |
| T97R-96 | 83.51 | 86.18 | 2.67 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 86.18 | 87.46 | 1.28 | COAL | Tenas_Lithology.csv |
| T97R-96 | 87.46 | 91.78 | 4.32 | SLTS | Tenas_Lithology.csv |
| T97R-96 | 91.78 | 92.18 | 0.4 | COAL | Tenas_Lithology.csv |
| T97R-96 | 92.18 | 93.7 | 1.52 | MDST | Tenas_Lithology.csv |
| T97R-96 | 93.7 | 94.32 | 0.62 | COAL | Tenas_Lithology.csv |
| T97R-96 | 94.32 | 101.6 | 7.28 | SST | Tenas_Lithology.csv |
| T97R-96 | 101.6 | 101.94 | 0.34 | COAL | Tenas_Lithology.csv |
| T97R-96 | 101.94 | 104.06 | 2.12 | SST | Tenas_Lithology.csv |
| T97R-96 | 104.06 | 104.43 | 0.37 | COAL | Tenas_Lithology.csv |
| T97R-96 | 104.43 | 124 | 19.57 | SLTS | Tenas_Lithology.csv |
| T97R-97 | 0 | 11.6 | 11.6 | Overburden | Tenas_Lithology.csv |
| T97R-97 | 11.6 | 12.6 | 1 | MDST | Tenas_Lithology.csv |
| T97R-97 | 12.6 | 16.6 | 4 | COAL | Tenas_Lithology.csv |
| T97R-97 | 16.6 | 17.75 | 1.15 | MDST | Tenas_Lithology.csv |
| T97R-97 | 17.75 | 18.14 | 0.39 | COAL | Tenas_Lithology.csv |
| T97R-97 | 18.14 | 18.9 | 0.76 | MDST | Tenas_Lithology.csv |
| T97R-97 | 18.9 | 19.61 | 0.71 | COAL | Tenas_Lithology.csv |
| T97R-97 | 19.61 | 23.8 | 4.19 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T97R-99 | 0 | 7 | 7 | Overburden | Tenas_Lithology.csv |
| T97R-99 | 7 | 19.9 | 12.9 | MDST | Tenas_Lithology.csv |
| T97R-99 | 19.9 | 31.4 | 11.5 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 31.4 | 31.63 | 0.23 | COAL | Tenas_Lithology.csv |
| T97R-99 | 31.63 | 42.61 | 10.98 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 42.61 | 44.76 | 2.15 | COAL | Tenas_Lithology.csv |
| T97R-99 | 44.76 | 53.14 | 8.38 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 53.14 | 53.44 | 0.3 | COAL | Tenas_Lithology.csv |
| T97R-99 | 53.44 | 56.02 | 2.58 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 56.02 | 57.7 | 1.68 | COAL | Tenas_Lithology.csv |
| T97R-99 | 57.7 | 60.18 | 2.48 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 60.18 | 63.79 | 3.61 | COAL | Tenas_Lithology.csv |
| T97R-99 | 63.79 | 65.38 | 1.59 | MDST | Tenas_Lithology.csv |
| T97R-99 | 65.38 | 65.53 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-99 | 65.53 | 66.35 | 0.82 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 66.35 | 68.04 | 1.69 | COAL | Tenas_Lithology.csv |
| T97R-99 | 68.04 | 70.69 | 2.65 | SLTS | Tenas_Lithology.csv |
| T97R-99 | 70.69 | 70.83 | 0.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T97R-99 | 70.83 | 80 | 9.17 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 0 | 6 | 6 | Overburden | Tenas_Lithology.csv |
| T98R-03C | 6 | 8.35 | 2.35 | MDST | Tenas_Lithology.csv |
| T98R-03C | 8.35 | 8.45 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-03C | 8.45 | 9.75 | 1.3 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 9.75 | 11.4 | 1.65 | COAL | Tenas_Lithology.csv |
| T98R-03C | 11.4 | 11.96 | 0.56 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 11.96 | 18.1 | 6.14 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-03C | 18.1 | 18.35 | 0.25 | COAL | Tenas_Lithology.csv |
| T98R-03C | 18.35 | 19.9 | 1.55 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-03C | 19.9 | 20.6 | 0.7 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 20.6 | 22.7 | 2.1 | COAL | Tenas_Lithology.csv |
| T98R-03C | 22.7 | 23.55 | 0.85 | MDST | Tenas_Lithology.csv |
| T98R-03C | 23.55 | 26.8 | 3.25 | COAL | Tenas_Lithology.csv |
| T98R-03C | 26.8 | 27.1 | 0.3 | MDST | Tenas_Lithology.csv |
| T98R-03C | 27.1 | 27.65 | 0.55 | COAL | Tenas_Lithology.csv |
| T98R-03C | 27.65 | 28.1 | 0.45 | MDST | Tenas_Lithology.csv |
| T98R-03C | 28.1 | 28.28 | 0.18 | SLTS | Tenas_Lithology.csv |
| T98R-03C | 28.28 | 28.63 | 0.35 | MDST | Tenas_Lithology.csv |
| T98R-03C | 28.63 | 28.88 | 0.25 | COAL | Tenas_Lithology.csv |
| T98R-03C | 28.88 | 28.96 | 0.08 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-07C | 0 | 19 | 19 | Overburden | Tenas_Lithology.csv |
| T98R-07C | 19 | 61.04 | 42.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-07C | 61.04 | 61.13 | 0.09 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 61.13 | 61.32 | 0.19 | SST | Tenas_Lithology.csv |
| T98R-07C | 61.32 | 61.45 | 0.13 | MDST | Tenas_Lithology.csv |
| T98R-07C | 61.45 | 61.73 | 0.28 | SST | Tenas_Lithology.csv |
| T98R-07C | 61.73 | 62.03 | 0.3 | MDST | Tenas_Lithology.csv |
| T98R-07C | 62.03 | 62.57 | 0.54 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 62.57 | 63.07 | 0.5 | MDST | Tenas_Lithology.csv |
| T98R-07C | 63.07 | 63.94 | 0.87 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 63.94 | 64.02 | 0.08 | MDST | Tenas_Lithology.csv |
| T98R-07C | 64.02 | 66.12 | 2.1 | COAL | Tenas_Lithology.csv |
| T98R-07C | 66.12 | 67.1 | 0.98 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 67.1 | 83.5 | 16.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-07C | 83.5 | 84.87 | 1.37 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-07C | 84.87 | 91.86 | 6.99 | COAL | Tenas_Lithology.csv |
| T98R-07C | 91.86 | 92 | 0.14 | MDST | Tenas_Lithology.csv |
| T98R-07C | 92 | 92.87 | 0.87 | SLTS | Tenas_Lithology.csv |
| T98R-07C | 92.87 | 97.5 | 4.63 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-09C | 0 | 15.06 | 15.06 | Overburden | Tenas_Lithology.csv |
| T98R-09C | 15.06 | 18.28 | 3.22 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 18.28 | 18.74 | 0.46 | SST | Tenas_Lithology.csv |
| T98R-09C | 18.74 | 32.75 | 14.01 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 32.75 | 44.81 | 12.06 | MDST | Tenas_Lithology.csv |
| T98R-09C | 44.81 | 45.83 | 1.02 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 45.83 | 46.26 | 0.43 | COAL | Tenas_Lithology.csv |
| T98R-09C | 46.26 | 48.86 | 2.6 | MDST | Tenas_Lithology.csv |
| T98R-09C | 48.86 | 49.09 | 0.23 | COAL | Tenas_Lithology.csv |
| T98R-09C | 49.09 | 49.31 | 0.22 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-09C | 49.31 | 49.61 | 0.3 | COAL | Tenas_Lithology.csv |
| T98R-09C | 49.61 | 50.21 | 0.6 | MDST | Tenas_Lithology.csv |
| T98R-09C | 50.21 | 52.52 | 2.31 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 52.52 | 52.82 | 0.3 | COAL | Tenas_Lithology.csv |
| T98R-09C | 52.82 | 52.92 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-09C | 52.92 | 54.53 | 1.61 | COAL | Tenas_Lithology.csv |
| T98R-09C | 54.53 | 56.71 | 2.18 | MDST | Tenas_Lithology.csv |
| T98R-09C | 56.71 | 58.89 | 2.18 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 58.89 | 61.1 | 2.21 | MDST | Tenas_Lithology.csv |
| T98R-09C | 61.1 | 61.29 | 0.19 | COAL | Tenas_Lithology.csv |
| T98R-09C | 61.29 | 62.97 | 1.68 | MDST | Tenas_Lithology.csv |
| T98R-09C | 62.97 | 68.87 | 5.9 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 68.87 | 74.42 | 5.55 | COAL | Tenas_Lithology.csv |
| T98R-09C | 74.42 | 75.12 | 0.7 | MDST | Tenas_Lithology.csv |
| T98R-09C | 75.12 | 77.18 | 2.06 | SLTS | Tenas_Lithology.csv |
| T98R-09C | 77.18 | 77.63 | 0.45 | COAL | Tenas_Lithology.csv |
| T98R-09C | 77.63 | 77.75 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-09C | 77.75 | 78.2 | 0.45 | COAL | Tenas_Lithology.csv |
| T98R-13C | 0 | 12 | 12 | Overburden | Tenas_Lithology.csv |
| T98R-13C | 12 | 72.93 | 60.93 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-13C | 72.93 | 75.04 | 2.11 | MDST | Tenas_Lithology.csv |
| T98R-13C | 75.04 | 76 | 0.96 | COAL | Tenas_Lithology.csv |
| T98R-13C | 76 | 76.06 | 0.06 | MDST | Tenas_Lithology.csv |
| T98R-13C | 76.06 | 76.83 | 0.77 | SLTS | Tenas_Lithology.csv |
| T98R-13C | 76.83 | 85.74 | 8.91 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-13C | 85.74 | 86.05 | 0.31 | COAL | Tenas_Lithology.csv |
| T98R-13C | 86.05 | 88.6 | 2.55 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-13C | 88.6 | 89.65 | 1.05 | SLTS | Tenas_Lithology.csv |
| T98R-13C | 89.65 | 89.95 | 0.3 | SST | Tenas_Lithology.csv |
| T98R-13C | 89.95 | 91.28 | 1.33 | SLTS | Tenas_Lithology.csv |
| T98R-13C | 91.28 | 91.35 | 0.07 | MDST | Tenas_Lithology.csv |
| T98R-13C | 91.35 | 91.63 | 0.28 | SLTS | Tenas_Lithology.csv |
| T98R-13C | 91.63 | 97.58 | 5.95 | COAL | Tenas_Lithology.csv |
| T98R-13C | 97.58 | 97.73 | 0.15 | MDST | Tenas_Lithology.csv |
| T98R-13C | 97.73 | 97.89 | 0.16 | SLTS | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T98R-13C | 97.89 | 103.6 | 5.71 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-14 | 0 | 3.8 | 3.8 | Overburden | Tenas_Lithology.csv |
| T98R-14 | 3.8 | 11.25 | 7.45 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 11.25 | 16.5 | 5.25 | MDST | Tenas_Lithology.csv |
| T98R-14 | 16.5 | 18.25 | 1.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 18.25 | 21 | 2.75 | MDST | Tenas_Lithology.csv |
| T98R-14 | 21 | 24 | 3 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 24 | 26.75 | 2.75 | MDST | Tenas_Lithology.csv |
| T98R-14 | 26.75 | 30.25 | 3.5 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 30.25 | 30.75 | 0.5 | MDST | Tenas_Lithology.csv |
| T98R-14 | 30.75 | 35.5 | 4.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 35.5 | 38 | 2.5 | MDST | Tenas_Lithology.csv |
| T98R-14 | 38 | 41 | 3 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 41 | 46.25 | 5.25 | MDST | Tenas_Lithology.csv |
| T98R-14 | 46.25 | 48 | 1.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 48 | 49.5 | 1.5 | MDST | Tenas_Lithology.csv |
| T98R-14 | 49.5 | 60 | 10.5 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 60 | 61.25 | 1.25 | MDST | Tenas_Lithology.csv |
| T98R-14 | 61.25 | 63 | 1.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 63 | 63.25 | 0.25 | MDST | Tenas_Lithology.csv |
| T98R-14 | 63.25 | 78 | 14.75 | SLTS | Tenas_Lithology.csv |
| T98R-14 | 78 | 84.4 | 6.4 | MDST | Tenas_Lithology.csv |
| T98R-16 | 0 | 22 | 22 | Overburden | Tenas_Lithology.csv |
| T98R-16 | 22 | 25.16 | 3.16 | MDST | Tenas_Lithology.csv |
| T98R-16 | 25.16 | 26.98 | 1.82 | COAL | Tenas_Lithology.csv |
| T98R-16 | 26.98 | 35.2 | 8.22 | SST | Tenas_Lithology.csv |
| T98R-16 | 35.2 | 35.57 | 0.37 | COAL | Tenas_Lithology.csv |
| T98R-16 | 35.57 | 47.12 | 11.55 | MDST | Tenas_Lithology.csv |
| T98R-16 | 47.12 | 49.75 | 2.63 | COAL | Tenas_Lithology.csv |
| T98R-16 | 49.75 | 49.86 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-16 | 49.86 | 55.3 | 5.44 | COAL | Tenas_Lithology.csv |
| T98R-16 | 55.3 | 56.55 | 1.25 | MDST | Tenas_Lithology.csv |
| T98R-16 | 56.55 | 57.34 | 0.79 | COAL | Tenas_Lithology.csv |
| T98R-16 | 57.34 | 65.5 | 8.16 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T98R-18 | 3 | 3.29 | 0.29 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 3.29 | 3.83 | 0.54 | COAL | Tenas_Lithology.csv |
| T98R-18 | 3.83 | 6.6 | 2.77 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 6.6 | 7.23 | 0.63 | MDST | Tenas_Lithology.csv |
| T98R-18 | 7.23 | 7.34 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-18 | 7.34 | 8.11 | 0.77 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 8.11 | 9.52 | 1.41 | COAL | Tenas_Lithology.csv |
| T98R-18 | 9.52 | 15.9 | 6.38 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 15.9 | 16.45 | 0.55 | COAL | Tenas_Lithology.csv |
| T98R-18 | 16.45 | 19.5 | 3.05 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 19.5 | 20.39 | 0.89 | MDST | Tenas_Lithology.csv |
| T98R-18 | 20.39 | 22.09 | 1.7 | COAL | Tenas_Lithology.csv |
| T98R-18 | 22.09 | 22.21 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-18 | 22.21 | 23.8 | 1.59 | COAL | Tenas_Lithology.csv |
| T98R-18 | 23.8 | 23.91 | 0.11 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-18 | 23.91 | 25.75 | 1.84 | COAL | Tenas_Lithology.csv |
| T98R-18 | 25.75 | 27.85 | 2.1 | SLTS | Tenas_Lithology.csv |
| T98R-18 | 27.85 | 28.69 | 0.84 | COAL | Tenas_Lithology.csv |
| T98R-18 | 28.69 | 29.82 | 1.13 | MDST | Tenas_Lithology.csv |
| T98R-18 | 29.82 | 30.15 | 0.33 | COAL | Tenas_Lithology.csv |
| T98R-18 | 30.15 | 30.83 | 0.68 | MDST | Tenas_Lithology.csv |
| T98R-18 | 30.83 | 31.29 | 0.46 | COAL | Tenas_Lithology.csv |
| T98R-18 | 31.29 | 34.7 | 3.41 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 0 | 3 | 3 | Overburden | Tenas_Lithology.csv |
| T98R-20 | 3 | 4.55 | 1.55 | MDST | Tenas_Lithology.csv |
| T98R-20 | 4.55 | 6.33 | 1.78 | COAL | Tenas_Lithology.csv |
| T98R-20 | 6.33 | 7.59 | 1.26 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 7.59 | 10.92 | 3.33 | COAL | Tenas_Lithology.csv |
| T98R-20 | 10.92 | 11.5 | 0.58 | MDST | Tenas_Lithology.csv |
| T98R-20 | 11.5 | 12.1 | 0.6 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 12.1 | 12.84 | 0.74 | COAL | Tenas_Lithology.csv |
| T98R-20 | 12.84 | 13 | 0.16 | MDST | Tenas_Lithology.csv |
| T98R-20 | 13 | 14.8 | 1.8 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 14.8 | 15.18 | 0.38 | COAL | Tenas_Lithology.csv |
| T98R-20 | 15.18 | 16 | 0.82 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 16 | 16.28 | 0.28 | COAL | Tenas_Lithology.csv |
| T98R-20 | 16.28 | 21.3 | 5.02 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 21.3 | 22.1 | 0.8 | COAL | Tenas_Lithology.csv |
| T98R-20 | 22.1 | 23.3 | 1.2 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 23.3 | 23.7 | 0.4 | COAL | Tenas_Lithology.csv |
| T98R-20 | 23.7 | 26.5 | 2.8 | SLTS | Tenas_Lithology.csv |
| T98R-20 | 26.5 | 42.5 | 16 | MDST | Tenas_Lithology.csv |
| T98R-21C | 0 | 12 | 12 | Overburden | Tenas_Lithology.csv |
| T98R-21C | 12 | 59.32 | 47.32 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 59.32 | 59.37 | 0.05 | COAL | Tenas_Lithology.csv |
| T98R-21C | 59.37 | 61.02 | 1.65 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 61.02 | 61.12 | 0.1 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 61.12 | 61.25 | 0.13 | MDST | Tenas_Lithology.csv |
| T98R-21C | 61.25 | 61.75 | 0.5 | COAL | Tenas_Lithology.csv |
| T98R-21C | 61.75 | 62.31 | 0.56 | MDST | Tenas_Lithology.csv |
| T98R-21C | 62.31 | 63.26 | 0.95 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 63.26 | 63.34 | 0.08 | MDST | Tenas_Lithology.csv |
| T98R-21C | 63.34 | 63.59 | 0.25 | COAL | Tenas_Lithology.csv |
| T98R-21C | 63.59 | 63.63 | 0.04 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 63.63 | 63.72 | 0.09 | COAL | Tenas_Lithology.csv |
| T98R-21C | 63.72 | 63.9 | 0.18 | MDST | Tenas_Lithology.csv |
| T98R-21C | 63.9 | 64.29 | 0.39 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 64.29 | 64.35 | 0.06 | MDST | Tenas_Lithology.csv |
| T98R-21C | 64.35 | 66.23 | 1.88 | COAL | Tenas_Lithology.csv |
| T98R-21C | 66.23 | 66.31 | 0.08 | MDST | Tenas_Lithology.csv |
| T98R-21C | 66.31 | 66.85 | 0.54 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 66.85 | 73.54 | 6.69 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 73.54 | 75.08 | 1.54 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 75.08 | 75.15 | 0.07 | MDST | Tenas_Lithology.csv |
| T98R-21C | 75.15 | 77.34 | 2.19 | COAL | Tenas_Lithology.csv |
| T98R-21C | 77.34 | 77.4 | 0.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 77.4 | 78.92 | 1.52 | COAL | Tenas_Lithology.csv |
| T98R-21C | 78.92 | 79.07 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |

*Table modified from original : merged successive intervals with same lithology descriptor*

| Hole ID | From (m) | To (m) | Length (m) | LITHO_SMPLFD | Source |
|---|---|---|---|---|---|
| T98R-21C | 79.07 | 79.32 | 0.25 | COAL | Tenas_Lithology.csv |
| T98R-21C | 79.32 | 79.51 | 0.19 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 79.51 | 82.72 | 3.21 | COAL | Tenas_Lithology.csv |
| T98R-21C | 82.72 | 82.86 | 0.14 | MDST | Tenas_Lithology.csv |
| T98R-21C | 82.86 | 83.26 | 0.4 | SLTS | Tenas_Lithology.csv |
| T98R-21C | 83.26 | 84.94 | 1.68 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 84.94 | 85.86 | 0.92 | COAL | Tenas_Lithology.csv |
| T98R-21C | 85.86 | 86.09 | 0.23 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 86.09 | 87.15 | 1.06 | COAL | Tenas_Lithology.csv |
| T98R-21C | 87.15 | 89.28 | 2.13 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-21C | 89.28 | 89.45 | 0.17 | COAL | Tenas_Lithology.csv |
| T98R-21C | 89.45 | 91.8 | 2.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-23 | 0 | 1.6 | 1.6 | Overburden | Tenas_Lithology.csv |
| T98R-23 | 1.6 | 2.87 | 1.27 | COAL | Tenas_Lithology.csv |
| T98R-23 | 2.87 | 4.76 | 1.89 | MDST | Tenas_Lithology.csv |
| T98R-23 | 4.76 | 5.8 | 1.04 | COAL | Tenas_Lithology.csv |
| T98R-23 | 5.8 | 7 | 1.2 | MDST | Tenas_Lithology.csv |
| T98R-23 | 7 | 7.55 | 0.55 | SLTS | Tenas_Lithology.csv |
| T98R-23 | 7.55 | 7.85 | 0.3 | COAL | Tenas_Lithology.csv |
| T98R-23 | 7.85 | 8.31 | 0.46 | MDST | Tenas_Lithology.csv |
| T98R-23 | 8.31 | 8.88 | 0.57 | COAL | Tenas_Lithology.csv |
| T98R-23 | 8.88 | 15 | 6.12 | SLTS | Tenas_Lithology.csv |
| T98R-23 | 15 | 16.5 | 1.5 | MDST | Tenas_Lithology.csv |
| T98R-23 | 16.5 | 24.8 | 8.3 | SLTS | Tenas_Lithology.csv |
| T98R-24 | 0 | 1.8 | 1.8 | Overburden | Tenas_Lithology.csv |
| T98R-24 | 1.8 | 2.53 | 0.73 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-24 | 2.53 | 3.3 | 0.77 | COAL | Tenas_Lithology.csv |
| T98R-24 | 3.3 | 4.7 | 1.4 | MDST | Tenas_Lithology.csv |
| T98R-24 | 4.7 | 6.3 | 1.6 | COAL | Tenas_Lithology.csv |
| T98R-24 | 6.3 | 9.16 | 2.86 | MDST | Tenas_Lithology.csv |
| T98R-24 | 9.16 | 9.33 | 0.17 | COAL | Tenas_Lithology.csv |
| T98R-24 | 9.33 | 10.63 | 1.3 | MDST | Tenas_Lithology.csv |
| T98R-24 | 10.63 | 12.63 | 2 | COAL | Tenas_Lithology.csv |
| T98R-24 | 12.63 | 15.04 | 2.41 | SLTS | Tenas_Lithology.csv |
| T98R-24 | 15.04 | 17.71 | 2.67 | COAL | Tenas_Lithology.csv |
| T98R-24 | 17.71 | 18.14 | 0.43 | MDST | Tenas_Lithology.csv |
| T98R-24 | 18.14 | 18.34 | 0.2 | COAL | Tenas_Lithology.csv |
| T98R-24 | 18.34 | 18.66 | 0.32 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-24 | 18.66 | 18.74 | 0.08 | COAL | Tenas_Lithology.csv |
| T98R-24 | 18.74 | 19.8 | 1.06 | MDST | Tenas_Lithology.csv |
| T98R-24 | 19.8 | 20.28 | 0.48 | COAL | Tenas_Lithology.csv |
| T98R-24 | 20.28 | 20.43 | 0.15 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-24 | 20.43 | 21.51 | 1.08 | COAL | Tenas_Lithology.csv |
| T98R-24 | 21.51 | 30.5 | 8.99 | MDST | Tenas_Lithology.csv |
| T98R-25 | 0 | 4.34 | 4.34 | Overburden | Tenas_Lithology.csv |
| T98R-25 | 4.34 | 5.51 | 1.17 | COAL | Tenas_Lithology.csv |
| T98R-25 | 5.51 | 6.53 | 1.02 | MDST | Tenas_Lithology.csv |
| T98R-25 | 6.53 | 9.92 | 3.39 | COAL | Tenas_Lithology.csv |
| T98R-25 | 9.92 | 10.41 | 0.49 | MDST | Tenas_Lithology.csv |
| T98R-25 | 10.41 | 11.05 | 0.64 | COAL | Tenas_Lithology.csv |
| T98R-25 | 11.05 | 11.17 | 0.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-25 | 11.17 | 11.63 | 0.46 | COAL | Tenas_Lithology.csv |
| T98R-25 | 11.63 | 18.5 | 6.87 | MDST | Tenas_Lithology.csv |
| T98R-31C | 0 | 6.7 | 6.7 | Overburden | Tenas_Lithology.csv |
| T98R-31C | 6.7 | 16.82 | 10.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 16.82 | 17.22 | 0.4 | COAL | Tenas_Lithology.csv |
| T98R-31C | 17.22 | 19.62 | 2.4 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 19.62 | 20.2 | 0.58 | COAL | Tenas_Lithology.csv |
| T98R-31C | 20.2 | 24.55 | 4.35 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 24.55 | 26.2 | 1.65 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 26.2 | 26.3 | 0.1 | MDST | Tenas_Lithology.csv |
| T98R-31C | 26.3 | 27.2 | 0.9 | COAL | Tenas_Lithology.csv |
| T98R-31C | 27.2 | 27.26 | 0.06 | MDST | Tenas_Lithology.csv |
| T98R-31C | 27.26 | 27.71 | 0.45 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 27.71 | 36.77 | 9.06 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 36.77 | 38.05 | 1.28 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 38.05 | 38.1 | 0.05 | MDST | Tenas_Lithology.csv |
| T98R-31C | 38.1 | 40.09 | 1.99 | COAL | Tenas_Lithology.csv |
| T98R-31C | 40.09 | 40.47 | 0.38 | MDST | Tenas_Lithology.csv |
| T98R-31C | 40.47 | 41.26 | 0.79 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 41.26 | 41.36 | 0.1 | MDST | Tenas_Lithology.csv |
| T98R-31C | 41.36 | 45.05 | 3.69 | COAL | Tenas_Lithology.csv |
| T98R-31C | 45.05 | 45.09 | 0.04 | MDST | Tenas_Lithology.csv |
| T98R-31C | 45.09 | 45.7 | 0.61 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 45.7 | 45.77 | 0.07 | MDST | Tenas_Lithology.csv |
| T98R-31C | 45.77 | 46.34 | 0.57 | COAL | Tenas_Lithology.csv |
| T98R-31C | 46.34 | 46.44 | 0.1 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| T98R-31C | 46.44 | 46.71 | 0.27 | COAL | Tenas_Lithology.csv |
| T98R-31C | 46.71 | 47.08 | 0.37 | SLTS | Tenas_Lithology.csv |
| T98R-31C | 47.08 | 51.2 | 4.12 | ? (BENT, OBR, P, SHC, UNDF | Tenas_Lithology.csv |
| TOB96-01-05 | 0 | 4.6 | 4.6 | Overburden | Tenas_Lithology.csv |
| TOB96-01-05 | 4.6 | 10.55 | 5.95 | MDST | Tenas_Lithology.csv |
| TOB96-02-06 | 0 | 32.7 | 32.7 | Overburden | Tenas_Lithology.csv |
| TOB96-02-06 | 32.7 | 33.7 | 1 | MDST | Tenas_Lithology.csv |
| TOB96-04 | 0 | 117.5 | 117.5 | Overburden | Tenas_Lithology.csv |
| TOB96-04 | 117.5 | 123 | 5.5 | VOLC | Tenas_Lithology.csv |
| TOB96-11-04 | 0 | 4.92 | 4.92 | Overburden | Tenas_Lithology.csv |
| TOB96-12-04 | 0 | 3.64 | 3.64 | Overburden | Tenas_Lithology.csv |
| TOB96-12-04 | 3.64 | 7 | 3.36 | VOLC | Tenas_Lithology.csv |
| TOB96-13 | 0 | 13.15 | 13.15 | Overburden | Tenas_Lithology.csv |
| TOB96-13 | 13.15 | 20 | 6.85 | VOLC | Tenas_Lithology.csv |
| TOB96-18 | 0 | 18.2 | 18.2 | Overburden | Tenas_Lithology.csv |
| TOB96-18 | 18.2 | 20.25 | 2.05 | MDST | Tenas_Lithology.csv |
| TOB97-07-24 | 0 | 10.2 | 10.2 | Overburden | Tenas_Lithology.csv |
| W01 | 0 | 11.5 | 11.5 | Overburden | Tenas_Lithology.csv |
| W01 | 11.5 | 70 | 58.5 | VOLC | Tenas_Lithology.csv |
| W02 | 0 | 117.8 | 117.8 | Overburden | Tenas_Lithology.csv |
| W02 | 117.8 | 120.65 | 2.85 | VOLC | Tenas_Lithology.csv |
| W03 | 0 | 44.2 | 44.2 | Overburden | Tenas_Lithology.csv |
| W03 | 44.2 | 53.2 | 9 | VOLC | Tenas_Lithology.csv |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T18-01D | 6.8 | 5E-07 | 3.39E-06 | 1.36E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 6.4 | 3E-08 | 1.93E-07 | 2.14E+08 | 19.8 | 3E-08 | 5.94E-07 | 6.60E+08 |
| T18-01S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-01TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-02D | 13.1 | 5E-07 | 6.57E-06 | 2.63E+07 | 12.0 | 3E-07 | 3.60E-06 | 4.00E+07 | 32.5 | 3E-08 | 9.74E-07 | 1.08E+09 | 54.3 | 3E-08 | 1.63E-06 | 1.81E+09 |
| T18-02S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-02TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-03S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-03TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-04S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-04TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-05D | 15.2 | 5E-07 | 7.61E-06 | 3.04E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 118.4 | 3E-08 | 3.55E-06 | 3.95E+09 | 29.9 | 3E-08 | 8.96E-07 | 9.95E+08 |
| T18-05S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-05TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-06TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-07S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-07TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-08S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-08TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-09S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-09TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-10S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-10TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-11S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-11TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-12S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-12TP | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T18-13S | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T81R-108 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 10.2 | 3E-07 | 3.05E-06 | 3.38E+07 | 53.5 | 3E-08 | 1.60E-06 | 1.78E+09 | 22.7 | 3E-08 | 6.81E-07 | 7.57E+08 |
| T92R-39C | 7.4 | 5E-07 | 3.72E-06 | 1.49E+07 | 30.4 | 3E-07 | 9.12E-06 | 1.01E+08 | 18.7 | 3E-08 | 5.61E-07 | 6.23E+08 | 3.7 | 3E-08 | 1.10E-07 | 1.22E+08 |
| T92R-42 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 8.0 | 3E-07 | 2.40E-06 | 2.67E+07 | 7.0 | 3E-08 | 2.09E-07 | 2.32E+08 | 5.9 | 3E-08 | 1.77E-07 | 1.96E+08 |
| T92R-43 | 10.0 | 5E-07 | 4.99E-06 | 1.99E+07 | 18.9 | 3E-07 | 5.68E-06 | 6.31E+07 | 22.2 | 3E-08 | 6.66E-07 | 7.40E+08 | 27.5 | 3E-08 | 8.25E-07 | 9.16E+08 |
| T93D-45 | 6.7 | 5E-07 | 3.35E-06 | 1.34E+07 | 47.7 | 3E-07 | 1.43E-05 | 1.59E+08 | 21.0 | 3E-08 | 6.30E-07 | 7.00E+08 | 19.7 | 3E-08 | 5.90E-07 | 6.55E+08 |
| T93D-47 | 1.3 | 5E-07 | 6.40E-07 | 2.56E+06 | 60.2 | 3E-07 | 1.81E-05 | 2.01E+08 | 101.4 | 3E-08 | 3.04E-06 | 3.38E+09 | 1.9 | 3E-08 | 5.79E-08 | 6.43E+07 |
| T93D-53 | 12.2 | 5E-07 | 6.09E-06 | 2.44E+07 | 9.8 | 3E-07 | 2.93E-06 | 3.26E+07 | 49.2 | 3E-08 | 1.48E-06 | 1.64E+09 | 12.5 | 3E-08 | 3.74E-07 | 4.16E+08 |
| T93R-02 | 7.8 | 5E-07 | 3.91E-06 | 1.56E+07 | 27.8 | 3E-07 | 8.34E-06 | 9.27E+07 | 17.9 | 3E-08 | 5.37E-07 | 5.96E+08 | 25.4 | 3E-08 | 7.63E-07 | 8.47E+08 |
| T93R-03 | 9.0 | 5E-07 | 4.48E-06 | 1.79E+07 | 4.8 | 3E-07 | 1.44E-06 | 1.60E+07 | 60.7 | 3E-08 | 1.82E-06 | 2.02E+09 | 21.1 | 3E-08 | 6.33E-07 | 7.03E+08 |
| T93R-04 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 23.1 | 3E-07 | 6.94E-06 | 7.71E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 43.6 | 3E-08 | 1.31E-06 | 1.45E+09 |
| T93R-05 | 11.5 | 5E-07 | 5.74E-06 | 2.30E+07 | 4.0 | 3E-07 | 1.19E-06 | 1.32E+07 | 19.1 | 3E-08 | 5.72E-07 | 6.35E+08 | 53.8 | 3E-08 | 1.61E-06 | 1.79E+09 |
| T93R-06C | 9.3 | 5E-07 | 4.64E-06 | 1.86E+07 | 4.6 | 3E-07 | 1.38E-06 | 1.53E+07 | 0.9 | 3E-08 | 2.73E-08 | 3.03E+07 | 39.8 | 3E-08 | 1.19E-06 | 1.33E+09 |
| T93R-08C | 7.3 | 5E-07 | 3.66E-06 | 1.46E+07 | 15.4 | 3E-07 | 4.63E-06 | 5.15E+07 | 13.1 | 3E-08 | 3.93E-07 | 4.37E+08 | 5.3 | 3E-08 | 1.59E-07 | 1.76E+08 |
| T93R-09 | 1.2 | 5E-07 | 6.20E-07 | 2.48E+06 | 45.4 | 3E-07 | 1.36E-05 | 1.51E+08 | 38.1 | 3E-08 | 1.14E-06 | 1.27E+09 | 85.3 | 3E-08 | 2.56E-06 | 2.84E+09 |
| T93R-10 | 2.2 | 5E-07 | 1.11E-06 | 4.42E+06 | 25.4 | 3E-07 | 7.63E-06 | 8.47E+07 | 20.2 | 3E-08 | 6.05E-07 | 6.72E+08 | 2.2 | 3E-08 | 6.54E-08 | 7.27E+07 |
| T93R-12 | 16.6 | 5E-07 | 8.30E-06 | 3.32E+07 | 1.8 | 3E-07 | 5.49E-07 | 6.10E+06 | 17.7 | 3E-08 | 5.30E-07 | 5.88E+08 | 77.1 | 3E-08 | 2.31E-06 | 2.57E+09 |
| T93R-13 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 9.5 | 3E-08 | 2.84E-07 | 3.15E+08 | 30.7 | 3E-08 | 9.22E-07 | 1.02E+09 |
| T93R-14 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 22.0 | 3E-07 | 6.59E-06 | 7.32E+07 | 26.2 | 3E-08 | 7.86E-07 | 8.74E+08 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T93R-15 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T93R-16 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T93R-17 | 9.6 | 5E-07 | 4.80E-06 | 1.92E+07 | 15.5 | 3E-07 | 4.65E-06 | 5.17E+07 | 25.5 | 3E-08 | 7.66E-07 | 8.51E+08 | 73.9 | 3E-08 | 2.22E-06 | 2.46E+09 |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T93R-18 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 13.5 | 3E-08 | 4.04E-07 | 4.48E+08 |
| T93R-19 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T93R-51 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 10.4 | 3E-07 | 3.13E-06 | 3.48E+07 | 20.8 | 3E-08 | 6.23E-07 | 6.92E+08 | 36.5 | 3E-08 | 1.09E-06 | 1.22E+09 |
| T94R-01 | 9.0 | 5E-07 | 4.52E-06 | 1.81E+07 | 35.7 | 3E-07 | 1.07E-05 | 1.19E+08 | 27.1 | 3E-08 | 8.12E-07 | 9.03E+08 | 7.6 | 3E-08 | 2.29E-07 | 2.54E+08 |
| T94R-02 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T94R-03 | 9.1 | 5E-07 | 4.53E-06 | 1.81E+07 | 46.6 | 3E-07 | 1.40E-05 | 1.55E+08 | 21.0 | 3E-08 | 6.30E-07 | 7.00E+08 | 7.2 | 3E-08 | 2.15E-07 | 2.39E+08 |
| T94R-04C | 9.8 | 5E-07 | 4.88E-06 | 1.95E+07 | 13.2 | 3E-07 | 3.95E-06 | 4.39E+07 | 26.6 | 3E-08 | 7.98E-07 | 8.87E+08 | 15.0 | 3E-08 | 4.51E-07 | 5.01E+08 |
| T94R-05 | 5.3 | 5E-07 | 2.67E-06 | 1.07E+07 | 57.5 | 3E-07 | 1.72E-05 | 1.92E+08 | 43.2 | 3E-08 | 1.30E-06 | 1.44E+09 | 9.4 | 3E-08 | 2.82E-07 | 3.13E+08 |
| T94R-06 | 2.1 | 5E-07 | 1.06E-06 | 4.26E+06 | 15.0 | 3E-07 | 4.49E-06 | 4.99E+07 | 114.6 | 3E-08 | 3.44E-06 | 3.82E+09 | 19.0 | 3E-08 | 5.69E-07 | 6.33E+08 |
| T94R-07 | 11.4 | 5E-07 | 5.69E-06 | 2.28E+07 | 8.0 | 3E-07 | 2.40E-06 | 2.67E+07 | 70.2 | 3E-08 | 2.11E-06 | 2.34E+09 | 25.2 | 3E-08 | 7.57E-07 | 8.41E+08 |
| T94R-08 | 1.0 | 5E-07 | 5.10E-07 | 2.04E+06 | 10.2 | 3E-07 | 3.07E-06 | 3.41E+07 | 57.8 | 3E-08 | 1.73E-06 | 1.93E+09 | 57.8 | 3E-08 | 1.73E-06 | 1.93E+09 |
| T94R-09 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T94R-10C | 11.2 | 5E-07 | 5.61E-06 | 2.24E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 2.8 | 3E-08 | 8.49E-08 | 9.43E+07 | 69.4 | 3E-08 | 2.08E-06 | 2.31E+09 |
| T94R-11 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T94R-12 | 3.1 | 5E-07 | 1.55E-06 | 6.20E+06 | 3.5 | 3E-07 | 1.05E-06 | 1.17E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 47.1 | 3E-08 | 1.41E-06 | 1.57E+09 |
| T94R-13 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-06 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-07C | 11.9 | 5E-07 | 5.94E-06 | 2.37E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 37.6 | 3E-08 | 1.13E-06 | 1.25E+09 |
| T95R-09 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 1.5 | 3E-08 | 4.50E-08 | 5.00E+07 |
| T95R-10 | 5.8 | 5E-07 | 2.92E-06 | 1.17E+07 | 47.3 | 3E-07 | 1.42E-05 | 1.58E+08 | 8.8 | 3E-08 | 2.64E-07 | 2.93E+08 | 26.0 | 3E-08 | 7.80E-07 | 8.67E+08 |
| T95R-11 | 3.4 | 5E-07 | 1.72E-06 | 6.88E+06 | 4.3 | 3E-07 | 1.30E-06 | 1.45E+07 | 29.8 | 3E-08 | 8.93E-07 | 9.93E+08 | 12.9 | 3E-08 | 3.88E-07 | 4.31E+08 |
| T95R-13 | 10.0 | 5E-07 | 4.99E-06 | 2.00E+07 | 4.9 | 3E-07 | 1.47E-06 | 1.63E+07 | 41.7 | 3E-08 | 1.25E-06 | 1.39E+09 | 33.5 | 3E-08 | 1.00E-06 | 1.12E+09 |
| T95R-14 | 7.7 | 5E-07 | 3.86E-06 | 1.54E+07 | 18.3 | 3E-07 | 5.49E-06 | 6.10E+07 | 107.3 | 3E-08 | 3.22E-06 | 3.58E+09 | 28.0 | 3E-08 | 8.41E-07 | 9.34E+08 |
| T95R-15C | 11.1 | 5E-07 | 5.54E-06 | 2.22E+07 | 7.6 | 3E-07 | 2.27E-06 | 2.52E+07 | 32.9 | 3E-08 | 9.88E-07 | 1.10E+09 | 41.9 | 3E-08 | 1.26E-06 | 1.40E+09 |
| T95R-17 | 2.5 | 5E-07 | 1.27E-06 | 5.08E+06 | 60.7 | 3E-07 | 1.82E-05 | 2.02E+08 | 22.2 | 3E-08 | 6.66E-07 | 7.40E+08 | 86.8 | 3E-08 | 2.60E-06 | 2.89E+09 |
| T95R-19C | 15.4 | 5E-07 | 7.70E-06 | 3.08E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 63.1 | 3E-08 | 1.89E-06 | 2.10E+09 |
| T95R-20 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-21 | 10.8 | 5E-07 | 5.42E-06 | 2.17E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 47.1 | 3E-08 | 1.41E-06 | 1.57E+09 | 7.4 | 3E-08 | 2.21E-07 | 2.46E+08 |
| T95R-22C | 15.5 | 5E-07 | 7.74E-06 | 3.10E+07 | 0.9 | 3E-07 | 2.70E-07 | 3.00E+06 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 68.0 | 3E-08 | 2.04E-06 | 2.27E+09 |
| T95R-24 | 9.7 | 5E-07 | 4.86E-06 | 1.94E+07 | 4.8 | 3E-07 | 1.43E-06 | 1.59E+07 | 17.1 | 3E-08 | 5.12E-07 | 5.69E+08 | 30.9 | 3E-08 | 9.27E-07 | 1.03E+09 |
| T95R-25 | 2.2 | 5E-07 | 1.11E-06 | 4.44E+06 | 19.6 | 3E-07 | 5.87E-06 | 6.52E+07 | 5.7 | 3E-08 | 1.71E-07 | 1.90E+08 | 3.9 | 3E-08 | 1.18E-07 | 1.31E+08 |
| T95R-26 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 35.0 | 3E-08 | 1.05E-06 | 1.17E+09 |
| T95R-28C | 10.7 | 5E-07 | 5.37E-06 | 2.15E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 29.2 | 3E-08 | 8.76E-07 | 9.73E+08 | 68.5 | 3E-08 | 2.05E-06 | 2.28E+09 |
| T95R-30 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-31 | 10.7 | 5E-07 | 5.36E-06 | 2.14E+07 | 56.6 | 3E-07 | 1.70E-05 | 1.89E+08 | 33.4 | 3E-08 | 1.00E-06 | 1.11E+09 | 36.1 | 3E-08 | 1.08E-06 | 1.20E+09 |
| T95R-32 | 2.3 | 5E-07 | 1.13E-06 | 4.50E+06 | 22.8 | 3E-07 | 6.84E-06 | 7.60E+07 | 54.1 | 3E-08 | 1.62E-06 | 1.80E+09 | 37.4 | 3E-08 | 1.12E-06 | 1.25E+09 |
| T95R-34 | 12.1 | 5E-07 | 6.07E-06 | 2.43E+07 | 6.5 | 3E-07 | 1.94E-06 | 2.16E+07 | 28.4 | 3E-08 | 8.52E-07 | 9.46E+08 | 63.6 | 3E-08 | 1.91E-06 | 2.12E+09 |
| T95R-35C | 2.9 | 5E-07 | 1.45E-06 | 5.80E+06 | 56.2 | 3E-07 | 1.68E-05 | 1.87E+08 | 24.0 | 3E-08 | 7.21E-07 | 8.01E+08 | 36.3 | 3E-08 | 1.09E-06 | 1.21E+09 |
| T95R-36 | 1.8 | 5E-07 | 9.10E-07 | 3.64E+06 | 23.4 | 3E-07 | 7.03E-06 | 7.81E+07 | 6.9 | 3E-08 | 2.06E-07 | 2.28E+08 | 18.9 | 3E-08 | 5.67E-07 | 6.30E+08 |
| T95R-38C | 15.0 | 5E-07 | 7.52E-06 | 3.01E+07 | 13.0 | 3E-07 | 3.89E-06 | 4.32E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 47.7 | 3E-08 | 1.43E-06 | 1.59E+09 |
| T95R-39C | 6.9 | 5E-07 | 3.43E-06 | 1.37E+07 | 5.3 | 3E-07 | 1.59E-06 | 1.77E+07 | 17.7 | 3E-08 | 5.32E-07 | 5.91E+08 | 47.1 | 3E-08 | 1.41E-06 | 1.57E+09 |
| T95R-40 | 13.7 | 5E-07 | 6.86E-06 | 2.74E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 28.0 | 3E-08 | 8.39E-07 | 9.33E+08 |
| T95R-43 | 2.6 | 5E-07 | 1.30E-06 | 5.20E+06 | 32.5 | 3E-07 | 9.74E-06 | 1.08E+08 | 4.0 | 3E-08 | 1.20E-07 | 1.33E+08 | 2.1 | 3E-08 | 6.36E-08 | 7.07E+07 |
| T95R-44 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T95R-45 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-46 | 11.5 | 5E-07 | 5.76E-06 | 2.30E+07 | 23.8 | 3E-07 | 7.14E-06 | 7.93E+07 | 36.8 | 3E-08 | 1.10E-06 | 1.23E+09 | 21.0 | 3E-08 | 6.30E-07 | 7.00E+08 |
| T95R-50C | 10.1 | 5E-07 | 5.03E-06 | 2.01E+07 | 48.2 | 3E-07 | 1.45E-05 | 1.61E+08 | 3.4 | 3E-08 | 1.01E-07 | 1.13E+08 | 15.8 | 3E-08 | 4.73E-07 | 5.25E+08 |
| T95R-60 | 18.3 | 5E-07 | 9.15E-06 | 3.66E+07 | 14.5 | 3E-07 | 4.35E-06 | 4.83E+07 | 44.3 | 3E-08 | 1.33E-06 | 1.48E+09 | 31.3 | 3E-08 | 9.39E-07 | 1.04E+09 |
| T95R-61 | 9.9 | 5E-07 | 4.94E-06 | 1.98E+07 | 37.8 | 3E-07 | 1.13E-05 | 1.26E+08 | 30.3 | 3E-08 | 9.10E-07 | 1.01E+09 | 13.3 | 3E-08 | 4.00E-07 | 4.44E+08 |
| T95R-62 | 4.7 | 5E-07 | 2.35E-06 | 9.40E+06 | 14.3 | 3E-07 | 4.30E-06 | 4.78E+07 | 52.5 | 3E-08 | 1.58E-06 | 1.75E+09 | 1.7 | 3E-08 | 4.95E-08 | 5.50E+07 |
| T95R-63 | 11.0 | 5E-07 | 5.48E-06 | 2.19E+07 | 6.6 | 3E-07 | 1.97E-06 | 2.18E+07 | 16.7 | 3E-08 | 5.00E-07 | 5.55E+08 | 25.4 | 3E-08 | 7.62E-07 | 8.47E+08 |
| T95R-64 | 10.6 | 5E-07 | 5.30E-06 | 2.12E+07 | 64.4 | 3E-07 | 1.93E-05 | 2.15E+08 | 27.4 | 3E-08 | 8.23E-07 | 9.15E+08 | 15.1 | 3E-08 | 4.52E-07 | 5.02E+08 |
| T95R-65 | 11.7 | 5E-07 | 5.86E-06 | 2.34E+07 | 12.9 | 3E-07 | 3.88E-06 | 4.31E+07 | 101.8 | 3E-08 | 3.05E-06 | 3.39E+09 | 17.8 | 3E-08 | 5.34E-07 | 5.94E+08 |
| T95R-66 | 4.0 | 5E-07 | 2.00E-06 | 8.00E+06 | 78.7 | 3E-07 | 2.36E-05 | 2.62E+08 | 9.4 | 3E-08 | 2.82E-07 | 3.13E+08 | 43.5 | 3E-08 | 1.30E-06 | 1.45E+09 |
| T95R-67 | 8.6 | 5E-07 | 4.28E-06 | 1.71E+07 | 15.1 | 3E-07 | 4.52E-06 | 5.03E+07 | 13.9 | 3E-08 | 4.18E-07 | 4.64E+08 | 15.4 | 3E-08 | 4.63E-07 | 5.15E+08 |
| T95R-68 | 11.7 | 5E-07 | 5.85E-06 | 2.34E+07 | 36.9 | 3E-07 | 1.11E-05 | 1.23E+08 | 20.4 | 3E-08 | 6.12E-07 | 6.80E+08 | 46.0 | 3E-08 | 1.38E-06 | 1.53E+09 |
| T95R-69 | 10.2 | 5E-07 | 5.10E-06 | 2.04E+07 | 30.1 | 3E-07 | 9.03E-06 | 1.00E+08 | 22.2 | 3E-08 | 6.66E-07 | 7.40E+08 | 11.2 | 3E-08 | 3.36E-07 | 3.73E+08 |
| T95R-70 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 56.1 | 3E-07 | 1.68E-05 | 1.87E+08 | 7.7 | 3E-08 | 2.31E-07 | 2.56E+08 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T95R-71 | 12.4 | 5E-07 | 6.18E-06 | 2.47E+07 | 38.9 | 3E-07 | 1.17E-05 | 1.30E+08 | 16.8 | 3E-08 | 5.03E-07 | 5.58E+08 | 17.3 | 3E-08 | 5.20E-07 | 5.78E+08 |
| T95R-74 | 7.8 | 5E-07 | 3.89E-06 | 1.56E+07 | 36.0 | 3E-07 | 1.08E-05 | 1.20E+08 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 13.7 | 3E-08 | 4.11E-07 | 4.57E+08 |
| T95R-76 | 8.8 | 5E-07 | 4.38E-06 | 1.75E+07 | 23.2 | 3E-07 | 6.95E-06 | 7.72E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 30.3 | 3E-08 | 9.08E-07 | 1.01E+09 |
| T95R-77 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 3.4 | 3E-07 | 1.02E-06 | 1.13E+07 | 14.7 | 3E-08 | 4.41E-07 | 4.90E+08 | 18.8 | 3E-08 | 5.64E-07 | 6.27E+08 |
| T95R-78 | 1.0 | 5E-07 | 4.80E-07 | 1.92E+06 | 51.9 | 3E-07 | 1.56E-05 | 1.73E+08 | 9.3 | 3E-08 | 2.78E-07 | 3.09E+08 | 7.9 | 3E-08 | 2.38E-07 | 2.65E+08 |
| T95R-79 | 3.9 | 5E-07 | 1.95E-06 | 7.78E+06 | 10.4 | 3E-07 | 3.12E-06 | 3.46E+07 | 5.0 | 3E-08 | 1.50E-07 | 1.67E+08 | 18.9 | 3E-08 | 5.67E-07 | 6.30E+08 |
| T95R-80 | 6.3 | 5E-07 | 3.13E-06 | 1.25E+07 | 25.9 | 3E-07 | 7.76E-06 | 8.63E+07 | 18.5 | 3E-08 | 5.55E-07 | 6.16E+08 | 1.7 | 3E-08 | 5.22E-08 | 5.80E+07 |
| T95R-81 | 5.5 | 5E-07 | 2.75E-06 | 1.10E+07 | 14.6 | 3E-07 | 4.37E-06 | 4.85E+07 | 11.6 | 3E-08 | 3.49E-07 | 3.87E+08 | 28.4 | 3E-08 | 8.53E-07 | 9.48E+08 |
| T96R-01 | 13.5 | 5E-07 | 6.76E-06 | 2.70E+07 | 50.3 | 3E-07 | 1.51E-05 | 1.68E+08 | 91.6 | 3E-08 | 2.75E-06 | 3.05E+09 | 32.9 | 3E-08 | 9.86E-07 | 1.10E+09 |
| T96R-02 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 4.0 | 3E-07 | 1.20E-06 | 1.33E+07 | 27.4 | 3E-08 | 8.23E-07 | 9.15E+08 | 32.5 | 3E-08 | 9.74E-07 | 1.08E+09 |
| T96R-03 | 7.3 | 5E-07 | 3.63E-06 | 1.45E+07 | 36.1 | 3E-07 | 1.08E-05 | 1.20E+08 | 68.9 | 3E-08 | 2.07E-06 | 2.30E+09 | 9.2 | 3E-08 | 2.76E-07 | 3.06E+08 |
| T96R-04C | 8.0 | 5E-07 | 3.99E-06 | 1.59E+07 | 8.4 | 3E-07 | 2.51E-06 | 2.79E+07 | 1.8 | 3E-08 | 5.46E-08 | 6.07E+07 | 17.5 | 3E-08 | 5.25E-07 | 5.83E+08 |
| T96R-05C | 13.8 | 5E-07 | 6.90E-06 | 2.76E+07 | 1.6 | 3E-07 | 4.74E-07 | 5.27E+06 | 26.9 | 3E-08 | 8.08E-07 | 8.97E+08 | 35.7 | 3E-08 | 1.07E-06 | 1.19E+09 |
| T96R-06 | 11.1 | 5E-07 | 5.55E-06 | 2.22E+07 | 38.7 | 3E-07 | 1.16E-05 | 1.29E+08 | 25.2 | 3E-08 | 7.57E-07 | 8.41E+08 | 17.3 | 3E-08 | 5.20E-07 | 5.77E+08 |
| T96R-07C | 7.5 | 5E-07 | 3.77E-06 | 1.51E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 2.9 | 3E-08 | 8.61E-08 | 9.57E+07 | 13.6 | 3E-08 | 4.08E-07 | 4.53E+08 |
| T96R-08 | 2.3 | 5E-07 | 1.16E-06 | 4.64E+06 | 20.7 | 3E-07 | 6.21E-06 | 6.90E+07 | 6.5 | 3E-08 | 1.95E-07 | 2.17E+08 | 14.5 | 3E-08 | 4.34E-07 | 4.82E+08 |
| T96R-10 | 8.3 | 5E-07 | 4.17E-06 | 1.67E+07 | 29.5 | 3E-07 | 8.86E-06 | 9.84E+07 | 7.9 | 3E-08 | 2.37E-07 | 2.63E+08 | 5.5 | 3E-08 | 1.64E-07 | 1.82E+08 |
| T96R-105 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 43.7 | 3E-07 | 1.31E-05 | 1.46E+08 | 1.5 | 3E-08 | 4.50E-08 | 5.00E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T96R-11 | 5.3 | 5E-07 | 2.66E-06 | 1.06E+07 | 44.7 | 3E-07 | 1.34E-05 | 1.49E+08 | 15.7 | 3E-08 | 4.70E-07 | 5.23E+08 | 20.3 | 3E-08 | 6.08E-07 | 6.75E+08 |
| T96R-110 | 5.7 | 5E-07 | 2.87E-06 | 1.15E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 19.0 | 3E-08 | 5.69E-07 | 6.32E+08 | 4.1 | 3E-08 | 1.23E-07 | 1.37E+08 |
| T96R-119 | 2.9 | 5E-07 | 1.45E-06 | 5.78E+06 | 37.3 | 3E-07 | 1.12E-05 | 1.24E+08 | 25.8 | 3E-08 | 7.75E-07 | 8.61E+08 | 14.0 | 3E-08 | 4.19E-07 | 4.65E+08 |
| T96R-120 | 5.4 | 5E-07 | 2.72E-06 | 1.09E+07 | 17.4 | 3E-07 | 5.21E-06 | 5.79E+07 | 27.2 | 3E-08 | 8.15E-07 | 9.06E+08 | 14.6 | 3E-08 | 4.39E-07 | 4.87E+08 |
| T96R-121 | 11.9 | 5E-07 | 5.94E-06 | 2.38E+07 | 46.3 | 3E-07 | 1.39E-05 | 1.54E+08 | 39.1 | 3E-08 | 1.17E-06 | 1.30E+09 | 4.6 | 3E-08 | 1.37E-07 | 1.52E+08 |
| T96R-124 | 12.3 | 5E-07 | 6.13E-06 | 2.45E+07 | 4.6 | 3E-07 | 1.37E-06 | 1.52E+07 | 43.8 | 3E-08 | 1.31E-06 | 1.46E+09 | 3.8 | 3E-08 | 1.15E-07 | 1.27E+08 |
| T96R-125 | 10.6 | 5E-07 | 5.28E-06 | 2.11E+07 | 19.3 | 3E-07 | 5.79E-06 | 6.44E+07 | 4.8 | 3E-08 | 1.43E-07 | 1.59E+08 | 8.1 | 3E-08 | 2.42E-07 | 2.68E+08 |
| T96R-126 | 5.5 | 5E-07 | 2.77E-06 | 1.11E+07 | 7.9 | 3E-07 | 2.37E-06 | 2.63E+07 | 11.9 | 3E-08 | 3.58E-07 | 3.98E+08 | 11.4 | 3E-08 | 3.41E-07 | 3.79E+08 |
| T96R-127 | 9.2 | 5E-07 | 4.58E-06 | 1.83E+07 | 16.8 | 3E-07 | 5.03E-06 | 5.58E+07 | 16.4 | 3E-08 | 4.93E-07 | 5.48E+08 | 3.0 | 3E-08 | 9.06E-08 | 1.01E+08 |
| T96R-128 | 0.2 | 5E-07 | 8.00E-08 | 3.20E+05 | 1.7 | 3E-07 | 5.10E-07 | 5.67E+06 | 30.1 | 3E-08 | 9.03E-07 | 1.00E+09 | 16.1 | 3E-08 | 4.84E-07 | 5.38E+08 |
| T96R-129 | 8.8 | 5E-07 | 4.41E-06 | 1.76E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 25.2 | 3E-08 | 7.56E-07 | 8.40E+08 | 13.0 | 3E-08 | 3.89E-07 | 4.33E+08 |
| T96R-12C | 7.5 | 5E-07 | 3.74E-06 | 1.50E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 7.0 | 3E-08 | 2.10E-07 | 2.33E+08 | 7.5 | 3E-08 | 2.24E-07 | 2.49E+08 |
| T96R-130 | 5.2 | 5E-07 | 2.59E-06 | 1.03E+07 | 27.9 | 3E-07 | 8.38E-06 | 9.31E+07 | 36.6 | 3E-08 | 1.10E-06 | 1.22E+09 | 32.3 | 3E-08 | 9.69E-07 | 1.08E+09 |
| T96R-131 | 12.3 | 5E-07 | 6.16E-06 | 2.46E+07 | 11.8 | 3E-07 | 3.54E-06 | 3.93E+07 | 39.4 | 3E-08 | 1.18E-06 | 1.31E+09 | 31.1 | 3E-08 | 9.32E-07 | 1.04E+09 |
| T96R-137 | 4.1 | 5E-07 | 2.04E-06 | 8.14E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 17.0 | 3E-08 | 5.11E-07 | 5.68E+08 | 10.0 | 3E-08 | 3.00E-07 | 3.34E+08 |
| T96R-13C | 5.8 | 5E-07 | 2.88E-06 | 1.15E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 4.9 | 3E-08 | 1.46E-07 | 1.62E+08 | 8.6 | 3E-08 | 2.58E-07 | 2.86E+08 |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T96R-14 | 9.7 | 5E-07 | 4.85E-06 | 1.94E+07 | 27.3 | 3E-07 | 8.20E-06 | 9.11E+07 | 43.9 | 3E-08 | 1.32E-06 | 1.46E+09 | 32.0 | 3E-08 | 9.58E-07 | 1.07E+09 |
| T96R-15 | 10.7 | 5E-07 | 5.34E-06 | 2.14E+07 | 41.7 | 3E-07 | 1.25E-05 | 1.39E+08 | 36.9 | 3E-08 | 1.11E-06 | 1.23E+09 | 12.9 | 3E-08 | 3.88E-07 | 4.31E+08 |
| T96R-16 | 7.9 | 5E-07 | 3.94E-06 | 1.58E+07 | 28.6 | 3E-07 | 8.58E-06 | 9.53E+07 | 17.1 | 3E-08 | 5.13E-07 | 5.70E+08 | 9.9 | 3E-08 | 2.96E-07 | 3.28E+08 |
| T96R-17C | 6.0 | 5E-07 | 3.01E-06 | 1.20E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 10.0 | 3E-08 | 2.99E-07 | 3.33E+08 |
| T96R-18C | 5.7 | 5E-07 | 2.83E-06 | 1.13E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 5.4 | 3E-08 | 1.62E-07 | 1.80E+08 | 1.4 | 3E-08 | 4.32E-08 | 4.80E+07 |
| T96R-19 | 8.4 | 5E-07 | 4.20E-06 | 1.68E+07 | 28.4 | 3E-07 | 8.51E-06 | 9.46E+07 | 31.7 | 3E-08 | 9.51E-07 | 1.06E+09 | 3.9 | 3E-08 | 1.16E-07 | 1.29E+08 |
| T96R-20C | 2.2 | 5E-07 | 1.09E-06 | 4.36E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 4.8 | 3E-08 | 1.43E-07 | 1.59E+08 |
| T96R-21 | 8.7 | 5E-07 | 4.33E-06 | 1.73E+07 | 29.7 | 3E-07 | 8.91E-06 | 9.90E+07 | 24.6 | 3E-08 | 7.36E-07 | 8.18E+08 | 11.6 | 3E-08 | 3.48E-07 | 3.87E+08 |
| T96R-22 | 13.5 | 5E-07 | 6.73E-06 | 2.69E+07 | 30.0 | 3E-07 | 9.00E-06 | 1.00E+08 | 35.5 | 3E-08 | 1.06E-06 | 1.18E+09 | 34.7 | 3E-08 | 1.04E-06 | 1.16E+09 |
| T96R-23C | 7.4 | 5E-07 | 3.71E-06 | 1.48E+07 | 1.2 | 3E-07 | 3.69E-07 | 4.10E+06 | 45.4 | 3E-08 | 1.36E-06 | 1.51E+09 | 50.7 | 3E-08 | 1.52E-06 | 1.69E+09 |
| T96R-24 | 18.3 | 5E-07 | 9.16E-06 | 3.66E+07 | 34.9 | 3E-07 | 1.05E-05 | 1.16E+08 | 56.6 | 3E-08 | 1.70E-06 | 1.89E+09 | 15.0 | 3E-08 | 4.49E-07 | 4.98E+08 |
| T96R-25 | 11.7 | 5E-07 | 5.85E-06 | 2.34E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 14.3 | 3E-08 | 4.29E-07 | 4.77E+08 | 45.1 | 3E-08 | 1.35E-06 | 1.50E+09 |
| T96R-26 | 7.2 | 5E-07 | 3.61E-06 | 1.44E+07 | 25.1 | 3E-07 | 7.52E-06 | 8.35E+07 | 45.3 | 3E-08 | 1.36E-06 | 1.51E+09 | 12.7 | 3E-08 | 3.80E-07 | 4.23E+08 |
| T96R-27 | 5.5 | 5E-07 | 2.77E-06 | 1.11E+07 | 17.4 | 3E-07 | 5.23E-06 | 5.81E+07 | 20.2 | 3E-08 | 6.05E-07 | 6.73E+08 | 10.6 | 3E-08 | 3.19E-07 | 3.54E+08 |
| T96R-28C | 11.0 | 5E-07 | 5.52E-06 | 2.21E+07 | 2.5 | 3E-07 | 7.65E-07 | 8.50E+06 | 52.9 | 3E-08 | 1.59E-06 | 1.76E+09 | 43.4 | 3E-08 | 1.30E-06 | 1.45E+09 |
| T96R-29 | 9.0 | 5E-07 | 4.51E-06 | 1.80E+07 | 23.4 | 3E-07 | 7.03E-06 | 7.81E+07 | 34.6 | 3E-08 | 1.04E-06 | 1.15E+09 | 7.2 | 3E-08 | 2.16E-07 | 2.40E+08 |
| T96R-30 | 15.4 | 5E-07 | 7.70E-06 | 3.08E+07 | 37.5 | 3E-07 | 1.13E-05 | 1.25E+08 | 42.5 | 3E-08 | 1.27E-06 | 1.42E+09 | 25.6 | 3E-08 | 7.67E-07 | 8.53E+08 |
| T96R-31 | 8.5 | 5E-07 | 4.24E-06 | 1.69E+07 | 19.0 | 3E-07 | 5.70E-06 | 6.34E+07 | 9.0 | 3E-08 | 2.69E-07 | 2.99E+08 | 11.1 | 3E-08 | 3.34E-07 | 3.71E+08 |
| T96R-32 | 6.8 | 5E-07 | 3.39E-06 | 1.36E+07 | 16.2 | 3E-07 | 4.85E-06 | 5.39E+07 | 13.5 | 3E-08 | 4.05E-07 | 4.50E+08 | 7.7 | 3E-08 | 2.30E-07 | 2.56E+08 |
| T96R-33 | 5.9 | 5E-07 | 2.93E-06 | 1.17E+07 | 7.9 | 3E-07 | 2.36E-06 | 2.62E+07 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 26.0 | 3E-08 | 7.79E-07 | 8.65E+08 |
| T96R-34 | 8.7 | 5E-07 | 4.37E-06 | 1.75E+07 | 31.8 | 3E-07 | 9.55E-06 | 1.06E+08 | 39.0 | 3E-08 | 1.17E-06 | 1.30E+09 | 6.0 | 3E-08 | 1.80E-07 | 2.00E+08 |
| T96R-35 | 1.6 | 5E-07 | 8.15E-07 | 3.26E+06 | 7.0 | 3E-07 | 2.10E-06 | 2.33E+07 | 14.5 | 3E-08 | 4.35E-07 | 4.84E+08 | 14.3 | 3E-08 | 4.28E-07 | 4.75E+08 |
| T96R-37 | 9.5 | 5E-07 | 4.76E-06 | 1.90E+07 | 12.4 | 3E-07 | 3.73E-06 | 4.14E+07 | 23.0 | 3E-08 | 6.90E-07 | 7.67E+08 | 14.2 | 3E-08 | 4.25E-07 | 4.72E+08 |
| T96R-38 | 2.9 | 5E-07 | 1.43E-06 | 5.70E+06 | 26.6 | 3E-07 | 7.98E-06 | 8.86E+07 | 31.3 | 3E-08 | 9.40E-07 | 1.04E+09 | 2.9 | 3E-08 | 8.61E-08 | 9.57E+07 |
| T96R-39 | 0.9 | 5E-07 | 4.65E-07 | 1.86E+06 | 30.5 | 3E-07 | 9.15E-06 | 1.02E+08 | 20.7 | 3E-08 | 6.20E-07 | 6.89E+08 | 6.6 | 3E-08 | 1.97E-07 | 2.19E+08 |
| T96R-41 | 5.5 | 5E-07 | 2.73E-06 | 1.09E+07 | 37.5 | 3E-07 | 1.13E-05 | 1.25E+08 | 30.5 | 3E-08 | 9.16E-07 | 1.02E+09 | 4.6 | 3E-08 | 1.37E-07 | 1.52E+08 |
| T96R-42C | 3.4 | 5E-07 | 1.69E-06 | 6.74E+06 | 7.8 | 3E-07 | 2.34E-06 | 2.60E+07 | 81.6 | 3E-08 | 2.45E-06 | 2.72E+09 | 51.0 | 3E-08 | 1.53E-06 | 1.70E+09 |
| T96R-43 | 15.7 | 5E-07 | 7.85E-06 | 3.14E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 53.5 | 3E-08 | 1.61E-06 | 1.78E+09 | 6.3 | 3E-08 | 1.89E-07 | 2.10E+08 |
| T96R-45 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 2.5 | 3E-07 | 7.50E-07 | 8.33E+06 | 29.4 | 3E-08 | 8.82E-07 | 9.80E+08 | 2.5 | 3E-08 | 7.50E-08 | 8.33E+07 |
| T96R-46 | 7.7 | 5E-07 | 3.84E-06 | 1.54E+07 | 57.2 | 3E-07 | 1.72E-05 | 1.91E+08 | 68.5 | 3E-08 | 2.06E-06 | 2.28E+09 | 3.0 | 3E-08 | 8.97E-08 | 9.97E+07 |
| T96R-47 | 11.7 | 5E-07 | 5.85E-06 | 2.34E+07 | 49.0 | 3E-07 | 1.47E-05 | 1.63E+08 | 73.8 | 3E-08 | 2.21E-06 | 2.46E+09 | 6.0 | 3E-08 | 1.79E-07 | 1.99E+08 |
| T96R-49 | 0.7 | 5E-07 | 3.30E-07 | 1.32E+06 | 26.6 | 3E-07 | 7.99E-06 | 8.88E+07 | 5.9 | 3E-08 | 1.76E-07 | 1.95E+08 | 64.1 | 3E-08 | 1.92E-06 | 2.14E+09 |
| T96R-50 | 17.0 | 5E-07 | 8.51E-06 | 3.40E+07 | 24.8 | 3E-07 | 7.44E-06 | 8.27E+07 | 19.7 | 3E-08 | 5.92E-07 | 6.57E+08 | 3.1 | 3E-08 | 9.21E-08 | 1.02E+08 |
| T96R-51 | 5.1 | 5E-07 | 2.54E-06 | 1.02E+07 | 32.4 | 3E-07 | 9.72E-06 | 1.08E+08 | 70.0 | 3E-08 | 2.10E-06 | 2.33E+09 | 13.1 | 3E-08 | 3.94E-07 | 4.38E+08 |
| T96R-52 | 12.6 | 5E-07 | 6.32E-06 | 2.53E+07 | 35.8 | 3E-07 | 1.07E-05 | 1.19E+08 | 39.0 | 3E-08 | 1.17E-06 | 1.30E+09 | 17.6 | 3E-08 | 5.27E-07 | 5.86E+08 |
| T96R-56C | 8.6 | 5E-07 | 4.31E-06 | 1.72E+07 | 4.2 | 3E-07 | 1.27E-06 | 1.41E+07 | 29.8 | 3E-08 | 8.93E-07 | 9.93E+08 | 38.8 | 3E-08 | 1.16E-06 | 1.29E+09 |
| T96R-58 | 9.7 | 5E-07 | 4.86E-06 | 1.94E+07 | 11.3 | 3E-07 | 3.38E-06 | 3.75E+07 | 50.7 | 3E-08 | 1.52E-06 | 1.69E+09 | 6.0 | 3E-08 | 1.81E-07 | 2.01E+08 |
| T96R-59 | 2.3 | 5E-07 | 1.16E-06 | 4.64E+06 | 28.7 | 3E-07 | 8.60E-06 | 9.56E+07 | 6.5 | 3E-08 | 1.94E-07 | 2.16E+08 | 8.8 | 3E-08 | 2.65E-07 | 2.94E+08 |
| T96R-60 | 8.5 | 5E-07 | 4.23E-06 | 1.69E+07 | 15.2 | 3E-07 | 4.56E-06 | 5.07E+07 | 13.7 | 3E-08 | 4.11E-07 | 4.57E+08 | 10.7 | 3E-08 | 3.20E-07 | 3.56E+08 |
| T96R-61 | 10.9 | 5E-07 | 5.44E-06 | 2.18E+07 | 18.4 | 3E-07 | 5.51E-06 | 6.12E+07 | 69.7 | 3E-08 | 2.09E-06 | 2.32E+09 | 4.2 | 3E-08 | 1.26E-07 | 1.40E+08 |
| T96R-63 | 8.3 | 5E-07 | 4.13E-06 | 1.65E+07 | 23.5 | 3E-07 | 7.05E-06 | 7.83E+07 | 43.8 | 3E-08 | 1.31E-06 | 1.46E+09 | 0.6 | 3E-08 | 1.80E-08 | 2.00E+07 |
| T96R-64 | 13.6 | 5E-07 | 6.80E-06 | 2.72E+07 | 72.8 | 3E-07 | 2.18E-05 | 2.43E+08 | 20.4 | 3E-08 | 6.11E-07 | 6.79E+08 | 11.0 | 3E-08 | 3.29E-07 | 3.65E+08 |
| T96R-65C | 14.6 | 5E-07 | 7.32E-06 | 2.93E+07 | 1.3 | 3E-07 | 3.90E-07 | 4.33E+06 | 51.4 | 3E-08 | 1.54E-06 | 1.71E+09 | 35.7 | 3E-08 | 1.07E-06 | 1.19E+09 |
| T96R-67 | 10.7 | 5E-07 | 5.34E-06 | 2.14E+07 | 67.3 | 3E-07 | 2.02E-05 | 2.24E+08 | 48.9 | 3E-08 | 1.47E-06 | 1.63E+09 | 6.1 | 3E-08 | 1.83E-07 | 2.03E+08 |
| T96R-69 | 6.4 | 5E-07 | 3.20E-06 | 1.28E+07 | 16.2 | 3E-07 | 4.86E-06 | 5.40E+07 | 87.8 | 3E-08 | 2.63E-06 | 2.93E+09 | 2.7 | 3E-08 | 8.22E-08 | 9.13E+07 |
| T96R-70 | 13.0 | 5E-07 | 6.48E-06 | 2.59E+07 | 68.6 | 3E-07 | 2.06E-05 | 2.29E+08 | 42.5 | 3E-08 | 1.28E-06 | 1.42E+09 | 7.2 | 3E-08 | 2.16E-07 | 2.40E+08 |
| T96R-72 | 0.2 | 5E-07 | 1.20E-07 | 4.80E+05 | 59.0 | 3E-07 | 1.77E-05 | 1.97E+08 | 90.9 | 3E-08 | 2.73E-06 | 3.03E+09 | 25.6 | 3E-08 | 7.69E-07 | 8.55E+08 |
| T96R-73 | 9.2 | 5E-07 | 4.60E-06 | 1.84E+07 | 85.6 | 3E-07 | 2.57E-05 | 2.85E+08 | 21.5 | 3E-08 | 6.44E-07 | 7.15E+08 | 10.4 | 3E-08 | 3.13E-07 | 3.48E+08 |

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T96R-75 | 10.8 | 5E-07 | 5.38E-06 | 2.15E+07 | 19.6 | 3E-07 | 5.87E-06 | 6.53E+07 | 19.3 | 3E-08 | 5.79E-07 | 6.43E+08 | 3.2 | 3E-08 | 9.57E-08 | 1.06E+08 |
| T96R-76 | 5.6 | 5E-07 | 2.82E-06 | 1.13E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 11.8 | 3E-08 | 3.55E-07 | 3.95E+08 | 0.4 | 3E-08 | 1.23E-08 | 1.37E+07 |
| T96R-77 | 6.2 | 5E-07 | 3.11E-06 | 1.24E+07 | 95.9 | 3E-07 | 2.88E-05 | 3.20E+08 | 39.9 | 3E-08 | 1.20E-06 | 1.33E+09 | 15.7 | 3E-08 | 4.71E-07 | 5.23E+08 |
| T96R-78 | 8.3 | 5E-07 | 4.16E-06 | 1.66E+07 | 15.3 | 3E-07 | 4.58E-06 | 5.08E+07 | 52.5 | 3E-08 | 1.57E-06 | 1.75E+09 | 17.2 | 3E-08 | 5.15E-07 | 5.72E+08 |
| T96R-79 | 1.4 | 5E-07 | 6.95E-07 | 2.78E+06 | 41.0 | 3E-07 | 1.23E-05 | 1.37E+08 | 16.1 | 3E-08 | 4.83E-07 | 5.36E+08 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T96R-82 | 12.7 | 5E-07 | 6.36E-06 | 2.54E+07 | 11.0 | 3E-07 | 3.30E-06 | 3.67E+07 | 63.0 | 3E-08 | 1.89E-06 | 2.10E+09 | 7.5 | 3E-08 | 2.25E-07 | 2.50E+08 |
| T96R-83 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T96R-84 | 1.4 | 5E-07 | 7.15E-07 | 2.86E+06 | 11.9 | 3E-07 | 3.58E-06 | 3.98E+07 | 7.7 | 3E-08 | 2.32E-07 | 2.58E+08 | 1.4 | 3E-08 | 4.20E-08 | 4.67E+07 |
| T96R-86 | 9.1 | 5E-07 | 4.54E-06 | 1.82E+07 | 7.6 | 3E-07 | 2.28E-06 | 2.53E+07 | 7.8 | 3E-08 | 2.33E-07 | 2.59E+08 | 18.6 | 3E-08 | 5.59E-07 | 6.21E+08 |
| T96R-87 | 4.9 | 5E-07 | 2.46E-06 | 9.84E+06 | 24.5 | 3E-07 | 7.35E-06 | 8.17E+07 | 9.8 | 3E-08 | 2.93E-07 | 3.26E+08 | 14.6 | 3E-08 | 4.38E-07 | 4.87E+08 |
| T96R-91 | 1.9 | 5E-07 | 9.65E-07 | 3.86E+06 | 45.3 | 3E-07 | 1.36E-05 | 1.51E+08 | 18.0 | 3E-08 | 5.39E-07 | 5.99E+08 | 8.9 | 3E-08 | 2.67E-07 | 2.96E+08 |
| T96R-92 | 9.5 | 5E-07 | 4.73E-06 | 1.89E+07 | 18.5 | 3E-07 | 5.55E-06 | 6.17E+07 | 20.6 | 3E-08 | 6.19E-07 | 6.87E+08 | 7.2 | 3E-08 | 2.15E-07 | 2.39E+08 |
| T96R-99 | 5.8 | 5E-07 | 2.92E-06 | 1.17E+07 | 22.5 | 3E-07 | 6.75E-06 | 7.50E+07 | 6.7 | 3E-08 | 2.00E-07 | 2.23E+08 | 9.9 | 3E-08 | 2.96E-07 | 3.29E+08 |
| T97R-100C | 5.2 | 5E-07 | 2.62E-06 | 1.05E+07 | 3.6 | 3E-07 | 1.07E-06 | 1.19E+07 | 21.2 | 3E-08 | 6.36E-07 | 7.07E+08 | 12.8 | 3E-08 | 3.84E-07 | 4.27E+08 |
| T97R-101 | 4.8 | 5E-07 | 2.39E-06 | 9.56E+06 | 15.1 | 3E-07 | 4.52E-06 | 5.02E+07 | 40.0 | 3E-08 | 1.20E-06 | 1.33E+09 | 3.9 | 3E-08 | 1.18E-07 | 1.31E+08 |
| T97R-102 | 6.4 | 5E-07 | 3.19E-06 | 1.27E+07 | 10.4 | 3E-07 | 3.12E-06 | 3.47E+07 | 39.3 | 3E-08 | 1.18E-06 | 1.31E+09 | 1.9 | 3E-08 | 5.67E-08 | 6.30E+07 |
| T97R-103 | 8.0 | 5E-07 | 3.99E-06 | 1.59E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 92.7 | 3E-08 | 2.78E-06 | 3.09E+09 | 26.6 | 3E-08 | 7.98E-07 | 8.87E+08 |
| T97R-104 | 5.9 | 5E-07 | 2.96E-06 | 1.18E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 23.4 | 3E-08 | 7.03E-07 | 7.81E+08 | 7.4 | 3E-08 | 2.23E-07 | 2.48E+08 |
| T97R-105 | 6.9 | 5E-07 | 3.45E-06 | 1.38E+07 | 6.3 | 3E-07 | 1.89E-06 | 2.10E+07 | 14.4 | 3E-08 | 4.32E-07 | 4.80E+08 | 1.3 | 3E-08 | 3.96E-08 | 4.40E+07 |
| T97R-106 | 2.4 | 5E-07 | 1.20E-06 | 4.80E+06 | 14.0 | 3E-07 | 4.19E-06 | 4.65E+07 | 91.8 | 3E-08 | 2.76E-06 | 3.06E+09 | 40.5 | 3E-08 | 1.22E-06 | 1.35E+09 |
| T97R-107 | 10.5 | 5E-07 | 5.23E-06 | 2.09E+07 | 16.3 | 3E-07 | 4.89E-06 | 5.43E+07 | 64.3 | 3E-08 | 1.93E-06 | 2.14E+09 | 21.5 | 3E-08 | 6.44E-07 | 7.15E+08 |
| T97R-108C | 9.9 | 5E-07 | 4.96E-06 | 1.99E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 32.5 | 3E-08 | 9.76E-07 | 1.08E+09 | 9.9 | 3E-08 | 2.96E-07 | 3.29E+08 |
| T97R-109 | 11.1 | 5E-07 | 5.53E-06 | 2.21E+07 | 21.7 | 3E-07 | 6.50E-06 | 7.22E+07 | 72.2 | 3E-08 | 2.16E-06 | 2.41E+09 | 28.5 | 3E-08 | 8.54E-07 | 9.49E+08 |
| T97R-110 | 15.4 | 5E-07 | 7.70E-06 | 3.08E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 50.5 | 3E-08 | 1.51E-06 | 1.68E+09 | 4.4 | 3E-08 | 1.31E-07 | 1.46E+08 |
| T97R-111 | 11.3 | 5E-07 | 5.66E-06 | 2.26E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 65.4 | 3E-08 | 1.96E-06 | 2.18E+09 | 36.5 | 3E-08 | 1.10E-06 | 1.22E+09 |
| T97R-112 | 5.3 | 5E-07 | 2.63E-06 | 1.05E+07 | 29.5 | 3E-07 | 8.84E-06 | 9.82E+07 | 58.6 | 3E-08 | 1.76E-06 | 1.95E+09 | 109.0 | 3E-08 | 3.27E-06 | 3.63E+09 |
| T97R-113 | 9.7 | 5E-07 | 4.85E-06 | 1.94E+07 | 15.4 | 3E-07 | 4.62E-06 | 5.13E+07 | 88.9 | 3E-08 | 2.67E-06 | 2.96E+09 | 3.9 | 3E-08 | 1.16E-07 | 1.28E+08 |
| T97R-114 | 2.0 | 5E-07 | 9.90E-07 | 3.96E+06 | 15.4 | 3E-07 | 4.62E-06 | 5.13E+07 | 82.8 | 3E-08 | 2.48E-06 | 2.76E+09 | 20.7 | 3E-08 | 6.20E-07 | 6.88E+08 |
| T97R-115 | 9.4 | 5E-07 | 4.71E-06 | 1.88E+07 | 7.5 | 3E-07 | 2.24E-06 | 2.48E+07 | 37.2 | 3E-08 | 1.12E-06 | 1.24E+09 | 17.8 | 3E-08 | 5.33E-07 | 5.93E+08 |
| T97R-116 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.7 | 3E-07 | 2.10E-07 | 2.33E+06 | 123.4 | 3E-08 | 3.70E-06 | 4.11E+09 | 26.1 | 3E-08 | 7.83E-07 | 8.70E+08 |
| T97R-117 | 1.9 | 5E-07 | 9.50E-07 | 3.80E+06 | 11.7 | 3E-07 | 3.51E-06 | 3.90E+07 | 103.5 | 3E-08 | 3.11E-06 | 3.45E+09 | 20.9 | 3E-08 | 6.27E-07 | 6.97E+08 |
| T97R-118 | 4.9 | 5E-07 | 2.45E-06 | 9.78E+06 | 17.0 | 3E-07 | 5.10E-06 | 5.67E+07 | 40.7 | 3E-08 | 1.22E-06 | 1.36E+09 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| T97R-119 | 8.3 | 5E-07 | 4.18E-06 | 1.67E+07 | 12.9 | 3E-07 | 3.88E-06 | 4.31E+07 | 44.2 | 3E-08 | 1.32E-06 | 1.47E+09 | 61.6 | 3E-08 | 1.85E-06 | 2.05E+09 |
| T97R-120 | 4.6 | 5E-07 | 2.31E-06 | 9.24E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 22.7 | 3E-08 | 6.80E-07 | 7.56E+08 | 1.3 | 3E-08 | 3.81E-08 | 4.23E+07 |
| T97R-121 | 6.0 | 5E-07 | 3.00E-06 | 1.20E+07 | 10.4 | 3E-07 | 3.12E-06 | 3.47E+07 | 40.8 | 3E-08 | 1.22E-06 | 1.36E+09 | 18.1 | 3E-08 | 5.42E-07 | 6.02E+08 |
| T97R-65 | 2.8 | 5E-07 | 1.41E-06 | 5.64E+06 | 18.5 | 3E-07 | 5.55E-06 | 6.17E+07 | 2.5 | 3E-08 | 7.53E-08 | 8.37E+07 | 4.6 | 3E-08 | 1.38E-07 | 1.53E+08 |
| T97R-66 | 5.3 | 5E-07 | 2.66E-06 | 1.06E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 12.5 | 3E-08 | 3.75E-07 | 4.16E+08 | 15.5 | 3E-08 | 4.66E-07 | 5.17E+08 |
| T97R-67 | 10.7 | 5E-07 | 5.37E-06 | 2.15E+07 | 22.2 | 3E-07 | 6.66E-06 | 7.40E+07 | 31.5 | 3E-08 | 9.44E-07 | 1.05E+09 | 8.6 | 3E-08 | 2.58E-07 | 2.87E+08 |
| T97R-69 | 11.5 | 5E-07 | 5.73E-06 | 2.29E+07 | 9.9 | 3E-07 | 2.98E-06 | 3.31E+07 | 74.5 | 3E-08 | 2.24E-06 | 2.48E+09 | 19.0 | 3E-08 | 5.69E-07 | 6.32E+08 |
| T97R-70 | 13.3 | 5E-07 | 6.64E-06 | 2.65E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 28.2 | 3E-08 | 8.47E-07 | 9.41E+08 | 7.7 | 3E-08 | 2.31E-07 | 2.57E+08 |
| T97R-71 | 13.9 | 5E-07 | 6.93E-06 | 2.77E+07 | 14.5 | 3E-07 | 4.35E-06 | 4.83E+07 | 55.0 | 3E-08 | 1.65E-06 | 1.83E+09 | 5.5 | 3E-08 | 1.66E-07 | 1.84E+08 |
| T97R-75 | 10.6 | 5E-07 | 5.30E-06 | 2.12E+07 | 13.5 | 3E-07 | 4.04E-06 | 4.49E+07 | 79.2 | 3E-08 | 2.37E-06 | 2.64E+09 | 16.7 | 3E-08 | 5.01E-07 | 5.57E+08 |
| T97R-78 | 9.8 | 5E-07 | 4.90E-06 | 1.96E+07 | 9.6 | 3E-07 | 2.88E-06 | 3.20E+07 | 43.2 | 3E-08 | 1.30E-06 | 1.44E+09 | 12.6 | 3E-08 | 3.79E-07 | 4.21E+08 |
| T97R-80 | 9.7 | 5E-07 | 4.83E-06 | 1.93E+07 | 3.1 | 3E-07 | 9.15E-07 | 1.02E+07 | 46.7 | 3E-08 | 1.40E-06 | 1.56E+09 | 21.1 | 3E-08 | 6.32E-07 | 7.02E+08 |
| T97R-84 | 12.2 | 5E-07 | 6.08E-06 | 2.43E+07 | 7.7 | 3E-07 | 2.32E-06 | 2.58E+07 | 51.8 | 3E-08 | 1.55E-06 | 1.73E+09 | 4.2 | 3E-08 | 1.26E-07 | 1.40E+08 |
| T97R-87 | 11.1 | 5E-07 | 5.55E-06 | 2.22E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 78.9 | 3E-08 | 2.37E-06 | 2.63E+09 | 16.6 | 3E-08 | 4.98E-07 | 5.54E+08 |
| T97R-88 | 1.7 | 5E-07 | 8.60E-07 | 3.44E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 17.4 | 3E-08 | 5.22E-07 | 5.80E+08 | 6.4 | 3E-08 | 1.92E-07 | 2.13E+08 |
| T97R-90 | 13.3 | 5E-07 | 6.67E-06 | 2.67E+07 | 12.5 | 3E-07 | 3.75E-06 | 4.17E+07 | 43.9 | 3E-08 | 1.32E-06 | 1.46E+09 | 7.1 | 3E-08 | 2.14E-07 | 2.38E+08 |

Calc

| Hole ID | B1 | K1 | B1 x K1 | Bn / K1 | B2 | K2 | B2 x K2 | B4 / K4 | B3 | K3 | B3 x K3 | B3 / K3 | B4 | K4 | B4 x K4 | B4 / K4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COAL | - | - | - | SST | - | - | | SLTS | - | - | - | MDST | - | - | - |
| T97R-91 | 11.3 | 5E-07 | 5.66E-06 | 2.26E+07 | 6.6 | 3E-07 | 1.98E-06 | 2.20E+07 | 33.2 | 3E-08 | 9.97E-07 | 1.11E+09 | 7.0 | 3E-08 | 2.09E-07 | 2.33E+08 |
| T97R-94 | 8.5 | 5E-07 | 4.25E-06 | 1.70E+07 | 6.0 | 3E-07 | 1.79E-06 | 1.98E+07 | 10.7 | 3E-08 | 3.20E-07 | 3.55E+08 | 3.3 | 3E-08 | 9.81E-08 | 1.09E+08 |
| T97R-95C | 6.3 | 5E-07 | 3.13E-06 | 1.25E+07 | 3.1 | 3E-07 | 9.30E-07 | 1.03E+07 | 16.5 | 3E-08 | 4.96E-07 | 5.51E+08 | 8.8 | 3E-08 | 2.65E-07 | 2.95E+08 |
| T97R-96 | 3.9 | 5E-07 | 1.96E-06 | 7.82E+06 | 9.4 | 3E-07 | 2.82E-06 | 3.13E+07 | 64.2 | 3E-08 | 1.93E-06 | 2.14E+09 | 32.5 | 3E-08 | 9.76E-07 | 1.08E+09 |
| T97R-97 | 5.1 | 5E-07 | 2.55E-06 | 1.02E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 4.2 | 3E-08 | 1.26E-07 | 1.40E+08 | 2.9 | 3E-08 | 8.73E-08 | 9.70E+07 |
| T97R-99 | 9.7 | 5E-07 | 4.83E-06 | 1.93E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 48.6 | 3E-08 | 1.46E-06 | 1.62E+09 | 14.5 | 3E-08 | 4.35E-07 | 4.83E+08 |
| T98R-03C | 8.1 | 5E-07 | 4.03E-06 | 1.61E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 2.7 | 3E-08 | 8.22E-08 | 9.13E+07 | 4.3 | 3E-08 | 1.29E-07 | 1.43E+08 |
| T98R-07C | 9.1 | 5E-07 | 4.55E-06 | 1.82E+07 | 0.5 | 3E-07 | 1.41E-07 | 1.57E+06 | 3.3 | 3E-08 | 1.01E-07 | 1.12E+08 | 1.2 | 3E-08 | 3.45E-08 | 3.83E+07 |
| T98R-09C | 9.5 | 5E-07 | 4.75E-06 | 1.90E+07 | 0.5 | 3E-07 | 1.38E-07 | 1.53E+06 | 30.7 | 3E-08 | 9.21E-07 | 1.02E+09 | 22.0 | 3E-08 | 6.61E-07 | 7.34E+08 |
| T98R-13C | 7.2 | 5E-07 | 3.61E-06 | 1.44E+07 | 0.3 | 3E-07 | 9.00E-08 | 1.00E+06 | 3.6 | 3E-08 | 1.08E-07 | 1.20E+08 | 2.4 | 3E-08 | 7.17E-08 | 7.97E+07 |
| T98R-14 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 52.2 | 3E-08 | 1.57E-06 | 1.74E+09 | 28.4 | 3E-08 | 8.52E-07 | 9.47E+08 |
| T98R-16 | 11.1 | 5E-07 | 5.53E-06 | 2.21E+07 | 8.2 | 3E-07 | 2.47E-06 | 2.74E+07 | 8.2 | 3E-08 | 2.45E-07 | 2.72E+08 | 16.0 | 3E-08 | 4.79E-07 | 5.32E+08 |
| T98R-18 | 9.3 | 5E-07 | 4.63E-06 | 1.85E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 18.8 | 3E-08 | 5.63E-07 | 6.26E+08 | 3.3 | 3E-08 | 9.99E-08 | 1.11E+08 |
| T98R-20 | 7.7 | 5E-07 | 3.86E-06 | 1.54E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 13.5 | 3E-08 | 4.05E-07 | 4.50E+08 | 18.3 | 3E-08 | 5.49E-07 | 6.10E+08 |
| T98R-21C | 12.1 | 5E-07 | 6.05E-06 | 2.42E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 3.9 | 3E-08 | 1.18E-07 | 1.31E+08 | 1.3 | 3E-08 | 3.90E-08 | 4.33E+07 |
| T98R-23 | 3.2 | 5E-07 | 1.59E-06 | 6.36E+06 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 15.0 | 3E-08 | 4.49E-07 | 4.99E+08 | 5.1 | 3E-08 | 1.52E-07 | 1.68E+08 |
| T98R-24 | 9.1 | 5E-07 | 4.53E-06 | 1.81E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 2.4 | 3E-08 | 7.23E-08 | 8.03E+07 | 16.0 | 3E-08 | 4.81E-07 | 5.35E+08 |
| T98R-25 | 5.7 | 5E-07 | 2.83E-06 | 1.13E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 8.4 | 3E-08 | 2.51E-07 | 2.79E+08 |
| T98R-31C | 8.4 | 5E-07 | 4.20E-06 | 1.68E+07 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 5.1 | 3E-08 | 1.55E-07 | 1.72E+08 | 0.8 | 3E-08 | 2.40E-08 | 2.67E+07 |
| TOB96-01-05 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 6.0 | 3E-08 | 1.79E-07 | 1.98E+08 |
| TOB96-02-06 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 1.0 | 3E-08 | 3.00E-08 | 3.33E+07 |
| TOB96-04 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| TOB96-11-04 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| TOB96-12-04 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| TOB96-13 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| TOB96-18 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 2.1 | 3E-08 | 6.15E-08 | 6.83E+07 |
| TOB97-07-24 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| W01 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| W02 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |
| W03 | 0.0 | 5E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-07 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 | 0.0 | 3E-08 | 0.00E+00 | 0.00E+00 |

| Hole ID | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| | sum(Bn*Kn)/Bt | Bt/sum(Bn/Kn) | |
| T18-01D | 1.3E-07 | 3.7E-08 | 3.4 |
| T18-01S | n/a | n/a | n/a |
| T18-01TP | n/a | n/a | n/a |
| T18-02D | 1.1E-07 | 3.8E-08 | 3.0 |
| T18-02S | n/a | n/a | n/a |
| T18-02TP | n/a | n/a | n/a |
| T18-03S | n/a | n/a | n/a |
| T18-03TP | n/a | n/a | n/a |
| T18-04S | n/a | n/a | n/a |
| T18-04TP | n/a | n/a | n/a |
| T18-05D | 7.4E-08 | 3.3E-08 | 2.2 |
| T18-05S | n/a | n/a | n/a |
| T18-05TP | n/a | n/a | n/a |
| T18-06TP | n/a | n/a | n/a |
| T18-07S | n/a | n/a | n/a |
| T18-07TP | n/a | n/a | n/a |
| T18-08S | n/a | n/a | n/a |
| T18-08TP | n/a | n/a | n/a |
| T18-09S | n/a | n/a | n/a |
| T18-09TP | n/a | n/a | n/a |
| T18-10S | n/a | n/a | n/a |
| T18-10TP | n/a | n/a | n/a |
| T18-11S | n/a | n/a | n/a |
| T18-11TP | n/a | n/a | n/a |
| T18-12S | n/a | n/a | n/a |
| T18-12TP | n/a | n/a | n/a |
| T18-13S | n/a | n/a | n/a |
| T81R-108 | 6.2E-08 | 3.4E-08 | 1.8 |
| T92R-39C | 2.2E-07 | 7.0E-08 | 3.2 |
| T92R-42 | 1.3E-07 | 4.6E-08 | 2.9 |
| T92R-43 | 1.5E-07 | 4.5E-08 | 3.4 |
| T93D-45 | 2.0E-07 | 6.2E-08 | 3.2 |
| T93D-47 | 1.3E-07 | 4.5E-08 | 2.9 |
| T93D-53 | 1.3E-07 | 4.0E-08 | 3.3 |
| T93R-02 | 1.7E-07 | 5.1E-08 | 3.4 |
| T93R-03 | 8.8E-08 | 3.5E-08 | 2.5 |
| T93R-04 | 1.2E-07 | 4.4E-08 | 2.8 |
| T93R-05 | 1.0E-07 | 3.6E-08 | 2.9 |
| T93R-06C | 1.3E-07 | 3.9E-08 | 3.4 |
| T93R-08C | 2.1E-07 | 6.1E-08 | 3.5 |
| T93R-09 | 1.1E-07 | 4.0E-08 | 2.6 |
| T93R-10 | 1.9E-07 | 6.0E-08 | 3.1 |
| T93R-12 | 1.0E-07 | 3.5E-08 | 2.9 |
| T93R-13 | 3.0E-08 | 3.0E-08 | 1.0 |
| T93R-14 | 1.5E-07 | 5.1E-08 | 3.0 |
| T93R-15 | n/a | n/a | n/a |
| T93R-16 | n/a | n/a | n/a |
| T93R-17 | 1.0E-07 | 3.7E-08 | 2.7 |
| T93R-18 | 3.0E-08 | 3.0E-08 | 1.0 |
| T93R-19 | n/a | n/a | n/a |
| T93R-51 | 7.2E-08 | 3.5E-08 | 2.1 |
| T94R-01 | 2.0E-07 | 6.1E-08 | 3.3 |
| T94R-02 | n/a | n/a | n/a |
| T94R-03 | 2.3E-07 | 7.5E-08 | 3.1 |
| T94R-04C | 1.6E-07 | 4.4E-08 | 3.5 |
| T94R-05 | 1.9E-07 | 5.9E-08 | 3.2 |
| T94R-06 | 6.3E-08 | 3.3E-08 | 1.9 |
| T94R-07 | 9.5E-08 | 3.6E-08 | 2.7 |
| T94R-08 | 5.6E-08 | 3.3E-08 | 1.7 |
| T94R-09 | n/a | n/a | n/a |
| T94R-10C | 9.3E-08 | 3.4E-08 | 2.7 |
| T94R-11 | n/a | n/a | n/a |
| T94R-12 | 7.5E-08 | 3.4E-08 | 2.2 |
| T94R-13 | n/a | n/a | n/a |
| T95R-06 | n/a | n/a | n/a |
| T95R-07C | 1.4E-07 | 3.9E-08 | 3.7 |
| T95R-09 | 3.0E-08 | 3.0E-08 | 1.0 |
| T95R-10 | 2.1E-07 | 6.6E-08 | 3.1 |

**ENTER K VALUES FOR EACH LITHO FOR CALCULATIONS.**

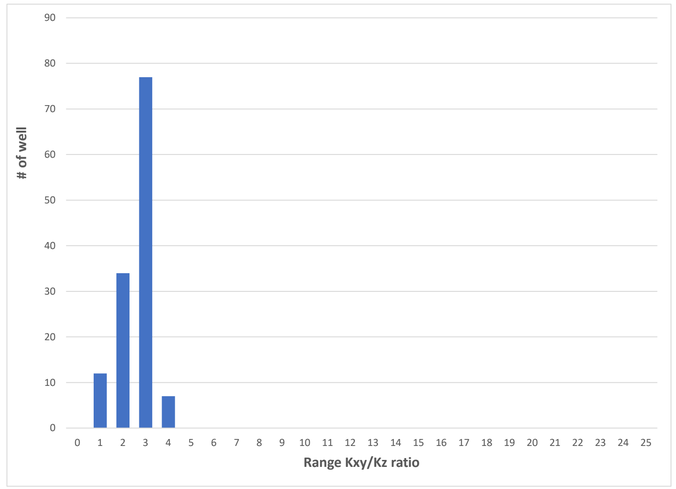
(if Kn set to 0, interval n is excluded)

| List | K assumptions |
|---|---|
| COAL | 5.0E-07 |
| SDST | 3.0E-07 |
| SLTS | 3.00E-08 |
| MDST | 3.0E-08 |

| | | |
|---|---|---|
| **Option1** | coal arythm mean | 1.00E-06 |
| | sst arythm mean | 2.00E-06 |
| | SLTS harm mean | 2.00E-08 |
| | SST harm mean | 2.00E-08 |
| **Option2** | coal geomean | 5.00E-07 |
| | sst geomean | 3.00E-07 |
| | SLTS geomean | 3.00E-08 |
| | SST geomean | 3.00E-08 |

| Stats | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| Count | 221 | 221 | 221 |
| min | 3.0E-08 | 3.0E-08 | 1.00 |
| max | 3.6E-07 | 2.3E-07 | 4.67 |
| average | 1.5E-07 | 4.9E-08 | 3.02 |
| median | 1.4E-07 | 4.3E-08 | 3.15 |
| harmean | 1.1E-07 | 4.4E-08 | 2.73 |
| geomean | 1.3E-07 | 4.6E-08 | 2.90 |

| Bin | Kxy/Kv |
|---|---|
| 0 | 0 |
| 1 | 12 |
| 2 | 34 |
| 3 | 77 |
| 4 | 7 |
| 5 | 0 |
| 6 | 0 |
| 7 | 0 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |
| 11 | 0 |
| 12 | 0 |
| 13 | 0 |
| 14 | 0 |
| 15 | 0 |
| 16 | 0 |
| 17 | 0 |
| 18 | 0 |
| 19 | 0 |
| 20 | 0 |
| 21 | 0 |
| 22 | 0 |
| 23 | 0 |
| 24 | 0 |
| 25 | 0 |



Kyxz per well

| Hole ID | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| | sum(Bn*Kn)/Bt | Bt/sum(Bn/Kn) | |
| T95R-11 | 8.5E-08 | 3.5E-08 | 2.4 |
| T95R-13 | 9.7E-08 | 3.5E-08 | 2.7 |
| T95R-14 | 8.3E-08 | 3.5E-08 | 2.4 |
| T95R-15C | 1.1E-07 | 3.7E-08 | 2.9 |
| T95R-17 | 1.3E-07 | 4.5E-08 | 2.9 |
| T95R-19C | 1.2E-07 | 3.7E-08 | 3.3 |
| T95R-20 | n/a | n/a | n/a |
| T95R-21 | 1.1E-07 | 3.6E-08 | 3.0 |
| T95R-22C | 1.2E-07 | 3.7E-08 | 3.2 |
| T95R-24 | 1.2E-07 | 3.8E-08 | 3.2 |
| T95R-25 | 2.3E-07 | 8.0E-08 | 2.9 |
| T95R-26 | 3.0E-08 | 3.0E-08 | 1.0 |
| T95R-28C | 7.7E-08 | 3.3E-08 | 2.3 |
| T95R-30 | n/a | n/a | n/a |
| T95R-31 | 1.8E-07 | 5.4E-08 | 3.3 |
| T95R-32 | 9.2E-08 | 3.7E-08 | 2.5 |
| T95R-34 | 9.7E-08 | 3.6E-08 | 2.7 |
| T95R-35C | 1.7E-07 | 5.4E-08 | 3.1 |
| T95R-36 | 1.7E-07 | 5.4E-08 | 3.1 |
| T95R-38C | 1.7E-07 | 4.5E-08 | 3.7 |
| T95R-39C | 9.1E-08 | 3.5E-08 | 2.6 |
| T95R-40 | 1.8E-07 | 4.3E-08 | 4.3 |
| T95R-43 | 2.7E-07 | 1.3E-07 | 2.1 |
| T95R-44 | n/a | n/a | n/a |
| T95R-45 | n/a | n/a | n/a |
| T95R-46 | 1.6E-07 | 4.6E-08 | 3.4 |
| T95R-50C | 2.6E-07 | 9.5E-08 | 2.7 |
| T95R-60 | 1.5E-07 | 4.2E-08 | 3.5 |
| T95R-61 | 1.9E-07 | 5.7E-08 | 3.4 |
| T95R-62 | 1.1E-07 | 3.9E-08 | 2.9 |
| T95R-63 | 1.5E-07 | 4.1E-08 | 3.5 |
| T95R-64 | 2.2E-07 | 7.1E-08 | 3.1 |
| T95R-65 | 9.2E-08 | 3.6E-08 | 2.6 |
| T95R-66 | 2.0E-07 | 6.7E-08 | 3.0 |
| T95R-67 | 1.8E-07 | 5.1E-08 | 3.6 |
| T95R-68 | 1.6E-07 | 4.9E-08 | 3.4 |
| T95R-69 | 2.1E-07 | 6.0E-08 | 3.4 |
| T95R-70 | 2.7E-07 | 1.4E-07 | 1.9 |
| T95R-71 | 2.2E-07 | 6.6E-08 | 3.3 |
| T95R-74 | 2.6E-07 | 9.7E-08 | 2.7 |
| T95R-76 | 2.0E-07 | 5.6E-08 | 3.5 |
| T95R-77 | 5.5E-08 | 3.3E-08 | 1.7 |
| T95R-78 | 2.4E-07 | 9.4E-08 | 2.5 |
| T95R-79 | 1.5E-07 | 4.5E-08 | 3.3 |
| T95R-80 | 2.2E-07 | 6.8E-08 | 3.2 |
| T95R-81 | 1.4E-07 | 4.3E-08 | 3.2 |
| T96R-01 | 1.4E-07 | 4.3E-08 | 3.1 |
| T96R-02 | 4.7E-08 | 3.2E-08 | 1.5 |
| T96R-03 | 1.4E-07 | 4.4E-08 | 3.1 |
| T96R-04C | 2.0E-07 | 5.2E-08 | 3.8 |
| T96R-05C | 1.2E-07 | 3.7E-08 | 3.2 |
| T96R-06 | 2.0E-07 | 5.9E-08 | 3.4 |
| T96R-07C | 1.8E-07 | 4.3E-08 | 4.2 |
| T96R-08 | 1.8E-07 | 5.7E-08 | 3.2 |
| T96R-10 | 2.6E-07 | 9.1E-08 | 2.9 |
| T96R-105 | 2.9E-07 | 2.3E-07 | 1.3 |
| T96R-11 | 2.0E-07 | 6.3E-08 | 3.2 |
| T96R-110 | 1.2E-07 | 3.7E-08 | 3.4 |
| T96R-119 | 1.7E-07 | 5.5E-08 | 3.1 |
| T96R-120 | 1.4E-07 | 4.4E-08 | 3.2 |
| T96R-121 | 2.1E-07 | 6.2E-08 | 3.3 |
| T96R-124 | 1.4E-07 | 4.0E-08 | 3.5 |
| T96R-125 | 2.7E-07 | 8.3E-08 | 3.2 |
| T96R-126 | 1.6E-07 | 4.5E-08 | 3.5 |
| T96R-127 | 2.2E-07 | 6.3E-08 | 3.6 |
| T96R-128 | 4.1E-08 | 3.1E-08 | 1.3 |
| T96R-129 | 1.2E-07 | 3.6E-08 | 3.2 |
| T96R-12C | 1.9E-07 | 4.4E-08 | 4.3 |
| T96R-130 | 1.3E-07 | 4.2E-08 | 3.0 |
| T96R-131 | 1.2E-07 | 3.9E-08 | 3.2 |
| T96R-137 | 9.1E-08 | 3.4E-08 | 2.7 |

Kyxz per well

| Hole ID | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| | sum(Bn*Kn)/Bt | Bt/sum(Bn/Kn) | |
| T96R-13C | 1.7E-07 | 4.2E-08 | 4.1 |
| T96R-14 | 1.4E-07 | 4.3E-08 | 3.2 |
| T96R-15 | 1.9E-07 | 5.6E-08 | 3.4 |
| T96R-16 | 2.1E-07 | 6.3E-08 | 3.3 |
| T96R-17C | 2.1E-07 | 4.6E-08 | 4.5 |
| T96R-18C | 2.4E-07 | 5.2E-08 | 4.6 |
| T96R-19 | 1.9E-07 | 5.6E-08 | 3.4 |
| T96R-20C | 1.8E-07 | 4.3E-08 | 4.2 |
| T96R-21 | 1.9E-07 | 5.6E-08 | 3.4 |
| T96R-22 | 1.6E-07 | 4.6E-08 | 3.4 |
| T96R-23C | 6.6E-08 | 3.3E-08 | 2.0 |
| T96R-24 | 1.7E-07 | 4.9E-08 | 3.6 |
| T96R-25 | 1.1E-07 | 3.5E-08 | 3.0 |
| T96R-26 | 1.4E-07 | 4.4E-08 | 3.2 |
| T96R-27 | 1.7E-07 | 4.9E-08 | 3.4 |
| T96R-28C | 8.3E-08 | 3.4E-08 | 2.5 |
| T96R-29 | 1.7E-07 | 5.0E-08 | 3.5 |
| T96R-30 | 1.7E-07 | 5.0E-08 | 3.5 |
| T96R-31 | 2.2E-07 | 6.3E-08 | 3.5 |
| T96R-32 | 2.0E-07 | 5.7E-08 | 3.5 |
| T96R-33 | 1.5E-07 | 4.4E-08 | 3.5 |
| T96R-34 | 1.8E-07 | 5.3E-08 | 3.4 |
| T96R-35 | 1.0E-07 | 3.8E-08 | 2.7 |
| T96R-37 | 1.6E-07 | 4.5E-08 | 3.6 |
| T96R-38 | 1.6E-07 | 5.2E-08 | 3.2 |
| T96R-39 | 1.8E-07 | 5.8E-08 | 3.1 |
| T96R-41 | 1.9E-07 | 6.0E-08 | 3.2 |
| T96R-42C | 5.6E-08 | 3.2E-08 | 1.7 |
| T96R-43 | 1.3E-07 | 3.7E-08 | 3.4 |
| T96R-45 | 5.0E-08 | 3.2E-08 | 1.5 |
| T96R-46 | 1.7E-07 | 5.3E-08 | 3.2 |
| T96R-47 | 1.6E-07 | 4.9E-08 | 3.3 |
| T96R-49 | 1.1E-07 | 4.0E-08 | 2.7 |
| T96R-50 | 2.6E-07 | 7.4E-08 | 3.5 |
| T96R-51 | 1.2E-07 | 4.2E-08 | 2.9 |
| T96R-52 | 1.8E-07 | 5.2E-08 | 3.5 |
| T96R-56C | 9.4E-08 | 3.5E-08 | 2.7 |
| T96R-58 | 1.3E-07 | 4.0E-08 | 3.2 |
| T96R-59 | 2.2E-07 | 7.6E-08 | 2.9 |
| T96R-60 | 2.0E-07 | 5.5E-08 | 3.6 |
| T96R-61 | 1.3E-07 | 4.1E-08 | 3.2 |
| T96R-63 | 1.6E-07 | 4.8E-08 | 3.4 |
| T96R-64 | 2.5E-07 | 9.0E-08 | 2.8 |
| T96R-65C | 1.0E-07 | 3.5E-08 | 2.9 |
| T96R-67 | 2.0E-07 | 6.4E-08 | 3.2 |
| T96R-69 | 9.5E-08 | 3.7E-08 | 2.6 |
| T96R-70 | 2.2E-07 | 6.9E-08 | 3.2 |
| T96R-72 | 1.2E-07 | 4.3E-08 | 2.8 |
| T96R-73 | 2.5E-07 | 9.3E-08 | 2.7 |
| T96R-75 | 2.3E-07 | 6.3E-08 | 3.6 |
| T96R-76 | 1.8E-07 | 4.3E-08 | 4.2 |
| T96R-77 | 2.1E-07 | 7.2E-08 | 2.9 |
| T96R-78 | 1.2E-07 | 3.9E-08 | 3.0 |
| T96R-79 | 2.3E-07 | 8.7E-08 | 2.7 |
| T96R-82 | 1.2E-07 | 3.9E-08 | 3.2 |
| T96R-83 | n/a | n/a | n/a |
| T96R-84 | 2.0E-07 | 6.5E-08 | 3.1 |
| T96R-86 | 1.8E-07 | 4.7E-08 | 3.8 |
| T96R-87 | 2.0E-07 | 6.0E-08 | 3.3 |
| T96R-91 | 2.1E-07 | 7.1E-08 | 2.9 |
| T96R-92 | 2.0E-07 | 5.5E-08 | 3.6 |
| T96R-99 | 2.3E-07 | 7.0E-08 | 3.2 |
| T97R-100C | 1.1E-07 | 3.7E-08 | 3.0 |
| T97R-101 | 1.3E-07 | 4.2E-08 | 3.1 |
| T97R-102 | 1.3E-07 | 4.1E-08 | 3.2 |
| T97R-103 | 5.9E-08 | 3.2E-08 | 1.9 |
| T97R-104 | 1.1E-07 | 3.5E-08 | 3.0 |
| T97R-105 | 2.0E-07 | 5.2E-08 | 3.9 |
| T97R-106 | 6.3E-08 | 3.3E-08 | 1.9 |
| T97R-107 | 1.1E-07 | 3.8E-08 | 2.9 |
| T97R-108C | 1.2E-07 | 3.7E-08 | 3.3 |
| T97R-109 | 1.1E-07 | 3.9E-08 | 2.9 |
| T97R-110 | 1.3E-07 | 3.8E-08 | 3.5 |
| T97R-111 | 7.7E-08 | 3.3E-08 | 2.3 |
| T97R-112 | 8.2E-08 | 3.6E-08 | 2.3 |
| T97R-113 | 1.0E-07 | 3.7E-08 | 2.8 |
| T97R-114 | 7.2E-08 | 3.4E-08 | 2.1 |
| T97R-115 | 1.2E-07 | 3.8E-08 | 3.1 |
| T97R-116 | 3.1E-08 | 3.0E-08 | 1.0 |

Kyxz per well

| Hole ID | Kxy | Kz | Kxy/Kv |
|---|---|---|---|
| | sum(Bn*Kn)/Bt | Bt/sum(Bn/Kn) | |
| T97R-117 | 5.9E-08 | 3.3E-08 | 1.8 |
| T97R-118 | 1.4E-07 | 4.4E-08 | 3.2 |
| T97R-119 | 8.8E-08 | 3.5E-08 | 2.5 |
| T97R-120 | 1.1E-07 | 3.5E-08 | 3.0 |
| T97R-121 | 1.0E-07 | 3.7E-08 | 2.8 |
| T97R-65 | 2.5E-07 | 9.3E-08 | 2.7 |
| T97R-66 | 1.0E-07 | 3.5E-08 | 3.0 |
| T97R-67 | 1.8E-07 | 5.1E-08 | 3.6 |
| T97R-69 | 1.0E-07 | 3.6E-08 | 2.8 |
| T97R-70 | 1.6E-07 | 4.0E-08 | 3.9 |
| T97R-71 | 1.5E-07 | 4.2E-08 | 3.5 |
| T97R-75 | 1.0E-07 | 3.7E-08 | 2.8 |
| T97R-78 | 1.3E-07 | 3.9E-08 | 3.2 |
| T97R-80 | 9.7E-08 | 3.5E-08 | 2.7 |
| T97R-84 | 1.3E-07 | 4.0E-08 | 3.4 |
| T97R-87 | 7.9E-08 | 3.3E-08 | 2.4 |
| T97R-88 | 6.2E-08 | 3.2E-08 | 1.9 |
| T97R-90 | 1.6E-07 | 4.3E-08 | 3.6 |
| T97R-91 | 1.5E-07 | 4.2E-08 | 3.6 |
| T97R-94 | 2.3E-07 | 5.7E-08 | 4.0 |
| T97R-95C | 1.4E-07 | 4.0E-08 | 3.5 |
| T97R-96 | 7.0E-08 | 3.4E-08 | 2.1 |
| T97R-97 | 2.3E-07 | 4.9E-08 | 4.6 |
| T97R-99 | 9.2E-08 | 3.4E-08 | 2.7 |
| T98R-03C | 2.8E-07 | 6.0E-08 | 4.7 |
| T98R-07C | 3.4E-07 | 8.3E-08 | 4.1 |
| T98R-09C | 1.0E-07 | 3.5E-08 | 2.9 |
| T98R-13C | 2.9E-07 | 6.3E-08 | 4.6 |
| T98R-14 | 3.0E-08 | 3.0E-08 | 1.0 |
| T98R-16 | 2.0E-07 | 5.1E-08 | 4.0 |
| T98R-18 | 1.7E-07 | 4.2E-08 | 4.1 |
| T98R-20 | 1.2E-07 | 3.7E-08 | 3.3 |
| T98R-21C | 3.6E-07 | 8.7E-08 | 4.1 |
| T98R-23 | 9.4E-08 | 3.4E-08 | 2.7 |
| T98R-24 | 1.8E-07 | 4.3E-08 | 4.3 |
| T98R-25 | 2.2E-07 | 4.8E-08 | 4.5 |
| T98R-31C | 3.1E-07 | 6.7E-08 | 4.6 |
| TOB96-01-05 | 3.0E-08 | 3.0E-08 | 1.0 |
| TOB96-02-06 | 3.0E-08 | 3.0E-08 | 1.0 |
| TOB96-04 | n/a | n/a | n/a |
| TOB96-11-04 | n/a | n/a | n/a |
| TOB96-12-04 | n/a | n/a | n/a |
| TOB96-13 | n/a | n/a | n/a |
| TOB96-18 | 3.0E-08 | 3.0E-08 | 1.0 |
| TOB97-07-24 | n/a | n/a | n/a |
| W01 | n/a | n/a | n/a |
| W02 | n/a | n/a | n/a |
| W03 | n/a | n/a | n/a |

# Appendix C – Groundwater Levels Measurements

# # of observations per events (including dry/artesian obs)

| Event | OVB | | | | | BDR | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tenas | Goathorn | North | Access Road | Rail Loadout | Tenas | Goathorn | North | Access Rd | Rail Loadout |
| Nov-1989 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| Aug/Sep 1993 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| Aug-1994 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Oct-1995 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Sep/Oct 1996 | 6 | 0 | 0 | 0 | 0 | 7 | 5 | 0 | 0 | 0 |
| Aug/Sep 1997 | 8 | 6 | 1 | 0 | 0 | 10 | 23 | 8 | 0 | 0 |
| Jul-2017 | 6 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Aug-2017 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Sep-2017 | 5 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Jan-2018 | 6 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Mar/Apr 2018 | 13 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 |
| Jun-2018 | 12 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| Sep-2018 | 14 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| Nov-2018 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec-2018 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jan-2019 | 17 | 0 | 0 | 2 | 0 | 10 | 0 | 0 | 0 | 0 |
| Feb-2019 | 17 | 0 | 0 | 2 | 0 | 9 | 0 | 0 | 0 | 0 |
| Mar/Apr 2019 | 24 | 0 | 0 | 4 | 4 | 26 | 0 | 0 | 0 | 0 |
| May/Jun 2019 | 18 | 0 | 0 | 2 | 2 | 13 | 0 | 0 | 0 | 0 |
| Aug-2019 | 18 | 0 | 0 | 2 | 0 | 13 | 0 | 0 | 0 | 0 |
| Sep-2019 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-2019 | 4 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 0 |
| **TOTAL** | **168** | **6** | **2** | **19** | **6** | **145** | **28** | **22** | **0** | **0** |

# # of observations per events (excluding dry/artesian obs "no-depth value")

| Event | OVB | | | | | BDR | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tenas | Goathorn | North | Access Road | Rail Loadout | Tenas | Goathorn | North | Access Rd | Rail Loadout |
| Nov-1989 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| Aug/Sep 1993 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| Aug-1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oct-1995 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Sep/Oct 1996 | 4 | 0 | 0 | 0 | 0 | 3 | 5 | 0 | 0 | 0 |
| Aug/Sep 1997 | 5 | 6 | 0 | 0 | 0 | 10 | 21 | 8 | 0 | 0 |
| Jul-2017 | 3 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Aug-2017 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Sep-2017 | 3 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Jan-2018 | 3 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| Mar/Apr 2018 | 8 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 |
| Jun-2018 | 7 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| Sep-2018 | 7 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 |
| Nov-2018 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec-2018 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jan-2019 | 9 | 0 | 0 | 2 | 0 | 7 | 0 | 0 | 0 | 0 |
| Feb-2019 | 15 | 0 | 0 | 2 | 0 | 9 | 0 | 0 | 0 | 0 |
| Mar/Apr 2019 | 13 | 0 | 0 | 4 | 4 | 25 | 0 | 0 | 0 | 0 |
| May/Jun 2019 | 9 | 0 | 0 | 2 | 2 | 11 | 0 | 0 | 0 | 0 |
| Aug-2019 | 9 | 0 | 0 | 2 | 0 | 12 | 0 | 0 | 0 | 0 |
| Sep-2019 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-2019 | 3 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 0 |
| **TOTAL** | **98** | **6** | **0** | **19** | **6** | **129** | **26** | **22** | **0** | **0** |

## Groundwater Level Statistics

| Area | Lithologies | Hole ID | Period | Comment | # Obs | # Value [(1)] | min | avg | max | stdev |
|---|---|---|---|---|---|---|---|---|---|---|
| Tenas | Overburden | T18-02S (GEO11) | Mar-Aug19 | dry or almost dry | 7 | 2 | 821.24 | 821.25 | 821.26 | 0.01 |
| | | T18-04S (W1S) | Apr-Aug19 | - | 7 | 6 | 939.45 | 940.15 | 940.95 | 0.58 |
| | | T18-06D (W2) | Apr-Aug19 | - | 7 | 7 | 800.79 | 801.25 | 801.60 | 0.31 |
| | | T18-08S (W3S) | Apr-Aug19 | - | 9 | 9 | 769.99 | 770.08 | 770.23 | 0.08 |
| | | T18-11S (GEO22) | Apr-Aug19 | dry | 7 | 0 | - | - | - | - |
| | | T18-13S (GEO13) | Apr-Aug19 | dry | 7 | 0 | - | - | - | - |
| | | TOB96-01-05 | 96 to Aug19 | - | 12 | 12 | 918.50 | 920.57 | 922.27 | 1.51 |
| | | TOB96-02-06 | 96 to Aug19 | - | 15 | 14 | 849.72 | 850.92 | 852.27 | 0.83 |
| | | TOB96-02-20 | 96 to Aug19 | dry or almost dry | 11 | 3 | 833.44 | 834.42 | 835.56 | 1.07 |
| | | TOB96-11-04 | 96 to Aug19 | - | 12 | 11 | 824.13 | 824.84 | 825.75 | 0.56 |
| | | TOB96-11-19 | 96 to Aug19 | dry | 12 | 0 | - | - | - | - |
| | | TOB96-12-04 | 96-97 | - | 2 | 2 | 924.01 | 924.06 | 924.10 | 0.06 |
| | | TOB97-06-21 | 97 to Aug19 | dry | 9 | 0 | - | - | - | - |
| | | TOB97-07-24 | 97 to Aug19 | dry | 9 | 0 | - | - | - | - |
| | | T19-18S | Jan-Nov19 | - | 10 | 5 | 786.74 | 787.04 | 787.60 | 0.33 |
| | | T19-19S | Jan19-Aug19 | dry | 6 | 0 | - | - | - | - |
| | | T19-20S | Jan-Nov19 | dry | 7 | 1 | 845.51 | 845.51 | 845.51 | - |
| | | T19-26S | Feb-Nov19 | - | 13 | 5 | 772.60 | 772.77 | 772.88 | 0.11 |
| | | T19-27S | Feb-Nov19 | - | 7 | 7 | 768.16 | 770.05 | 780.90 | 4.79 |
| | Bedrock | T18-01D (ARD02) | Mar18-Aug19 | - | 9 | 9 | 944.46 | 946.03 | 946.90 | 1.13 |
| | | T18-04D (W1D) | Apr18-Aug9 | artesian | 7 | 6 | 939.58 | 943.18 | 947.22 | 3.18 |
| | | T18-08D (W3D) | Apr18-Aug19 | - | 7 | 7 | 762.13 | 763.01 | 765.04 | 1.05 |
| | | T95R-15C | 96 to Aug19 | occasionally artesian | 15 | 10 | 879.96 | 880.92 | 881.21 | 0.38 |
| | | T95R-39C | 94-95 | artesian, flowing | 2 | 0 | - | - | - | - |
| | | T95R-40 | 95 to Aug19 | - | 13 | 13 | 892.23 | 892.45 | 893.12 | 0.23 |
| | | T95R-64 | 95 to Aug19 | - | 16 | 16 | 933.87 | 934.54 | 934.77 | 0.21 |
| | | T96R-16-19 | 95 to Aug19 | - | 12 | 12 | 1010.24 | 1010.68 | 1011.05 | 0.23 |
| | | T96R-16-28 | 95 to Aug19 | - | 12 | 12 | 1010.67 | 1011.10 | 1011.48 | 0.23 |
| | | T96R-34-67 | 96-97 | artesian | 2 | 1 | 934.33 | 934.33 | 934.33 | - |
| | | T96R-34-87 | 96 to Sep18 | artesian | 13 | 9 | 934.09 | 934.16 | 934.26 | 0.05 |
| | | T96R-56C-83 | 96-97 | occasionally artesian | 2 | 1 | 944.00 | 944.00 | 944.00 | - |
| | | T96TP-01-10 | 96 | - | 1 | 1 | 994.86 | 994.86 | 994.86 | - |
| | | T96TP-02-07 | 97 | - | 1 | 1 | 999.17 | 999.17 | 999.17 | - |
| | | T97R-108C-70 | 97 | - | 1 | 1 | 816.94 | 816.94 | 816.94 | - |
| | | T19-21S | Jan-Nov19 | - | 9 | 6 | 806.79 | 806.90 | 806.98 | 0.07 |
| | | T19-22S | Feb-Nov19 | - | 10 | 7 | 800.50 | 802.42 | 803.13 | 0.92 |
| | | T19-34S | Feb-Nov19 | - | 8 | 6 | 808.96 | 809.03 | 809.10 | 0.06 |
| | | T19-35S | Mar-Nov19 | - | 7 | 6 | 805.66 | 805.87 | 806.15 | 0.21 |
| Access Road | Overburden | T18-14S | Nov18 to Nov19 | - | 10 | 10 | 677.08 | 677.39 | 677.60 | 0.19 |
| | | T18-15S | Nov18 to Nov19 | - | 10 | 10 | 704.06 | 704.14 | 704.29 | 0.08 |
| | | T19-28S | 2019 (dates not available) | - | 2 | 2 | 702.90 | 703.40 | 703.90 | 0.71 |
| | | T18-30S | 2019 (dates not available) | - | 2 | 2 | 693.10 | 694.20 | 695.30 | 1.56 |
| | | T19-31S | 2019 (dates not available) | dry | 1 | 0 | - | - | - | - |
| Rail Loadout | Ovrburden | T19-36 | Mar-May19 | - | 3 | 3 | 512.31 | 512.72 | 512.97 | 0.36 |
| | | T19-37 | Mar-May19 | - | 3 | 3 | 512.92 | 513.13 | 513.28 | 0.19 |
| Goathorn | Overburden | TOB97-05-06 | 97 | - | 1 | 1 | 756.82 | 756.82 | 756.82 | n/a |
| | | TOB97-04-07 | 97 | - | 1 | 1 | 678.95 | 678.95 | 678.95 | n/a |
| | | T97RP-03-08 | 97 | - | 1 | 1 | 759.96 | 759.96 | 759.96 | n/a |
| | | T97RP-02-12 | 97 | - | 1 | 1 | 753.07 | 753.07 | 753.07 | n/a |
| | | T97RP-01-13 | 97 | - | 1 | 1 | 743.63 | 743.63 | 743.63 | n/a |
| | | T97RP-01-04 | 97 | - | 1 | 1 | 744.29 | 744.29 | 744.29 | n/a |
| | Bedrock | T96R-113-43 | 96-97 | - | 2 | 2 | 764.19 | 764.46 | 764.73 | 0.38 |
| | | T96R-113-79 | 96-97 | - | 2 | 2 | 757.59 | 758.87 | 760.15 | 1.81 |
| | | T96R-40-117 | 96-97 | - | 2 | 2 | 795.16 | 795.99 | 796.82 | 1.17 |
| | | T96R-40-87 | 96-97 | - | 2 | 2 | 814.13 | 815.06 | 815.99 | 1.32 |
| | | T96R-44-54 | 96-97 | - | 2 | 2 | 751.08 | 751.10 | 751.12 | 0.03 |
| | | T974-21-87 | 97 | - | 1 | 1 | 658.22 | 658.22 | 658.22 | n/a |
| | | T97R-12-75 | 97 | - | 1 | 1 | 786.42 | 786.42 | 786.42 | n/a |
| | | T97R-15-29 | 97 | artesian | 1 | 0 | n/a | n/a | n/a | n/a |
| | | T97R-15-52 | 97 | - | 1 | 1 | 739.93 | 739.93 | 739.93 | n/a |
| | | T97R-17-104 | 97 | - | 1 | 1 | 824.19 | 824.19 | 824.19 | n/a |
| | | T97R-17-79 | 97 | - | 1 | 1 | 824.14 | 824.14 | 824.14 | n/a |
| | | T97R-20-131 | 97 | - | 1 | 1 | 706.91 | 706.91 | 706.91 | n/a |
| | | T97R-20-40 | 97 | - | 1 | 1 | 707.91 | 707.91 | 707.91 | n/a |
| | | T97R-20-83 | 97 | - | 1 | 1 | 709.14 | 709.14 | 709.14 | n/a |
| | | T97R-21-41 | 97 | - | 1 | 1 | 689.91 | 689.91 | 689.91 | n/a |
| | | T97R-23-69 | 97 | - | 1 | 1 | 640.88 | 640.88 | 640.88 | n/a |
| | | T97R-33-20 | 97 | artesian | 1 | 0 | n/a | n/a | n/a | n/a |
| | | T97R-33-55 | 97 | - | 1 | 1 | 753.50 | 753.50 | 753.50 | n/a |
| | | T97R-33-78 | 97 | - | 1 | 1 | 753.75 | 753.75 | 753.75 | n/a |
| | | T97R-36-140 | 97 | - | 1 | 1 | 684.74 | 684.74 | 684.74 | n/a |
| | | T97R-36W | 97 | - | 1 | 1 | 706.72 | 706.72 | 706.72 | n/a |
| | | T97R-49-63 | 97 | - | 2 | 2 | 675.19 | 680.13 | 685.06 | 6.98 |
| North | Overburden | T93R-29A | 93-97 | dry | 2 | 0 | n/a | n/a | n/a | n/a |
| | Bedrock | T93R-28A | 93-97 | - | 2 | 2 | 765.20 | 771.57 | 777.94 | 9.01 |
| | | T93R-28B | 93-97 | - | 2 | 2 | 766.06 | 770.89 | 775.72 | 6.83 |
| | | T93R-29B | 93-97 | - | 2 | 2 | 750.39 | 762.12 | 773.84 | 16.58 |
| | | T93R-30 | 93-97 | - | 2 | 2 | 843.76 | 843.93 | 844.10 | 0.24 |
| | | TW604A | 89-97 | - | 3 | 3 | 787.39 | 788.59 | 789.87 | 1.24 |
| | | TW905A | 89-93 | - | 2 | 2 | 787.69 | 787.99 | 788.28 | 0.42 |

Note:
Historical measurements in TW905B (North area) were inconsistent therfore removed from the dataset.

| Vertical Gradient | Comment | Holde ID1 (shallow well) | Area | Screen mid | Type | Unit | Details | Date | GW Elev | Holde ID2 (deep well) | Area | Screen mid | Type | Unit | Details | Date | GW Elev |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | | - | - | *masl* | - | - | - | *dd-mm-yy* | *masl* | - | - | *masl* | - | - | - | *dd-mm-yy* | *masl* |
| -0.003 | upward | T18-04S (W1S) | Tenas | 926.58 | OVB | na | Gravelly Fat Clay (Till?) and Volc. | 28-Apr-18 | 939.45 | T18-04D (W1D) | Tenas | 880.14 | BDR | na | Till | 27-Apr-18 | 939.58 |
| -0.017 | 0.003 to 0.1 | | | | | | | 19-Jun-18 | 939.65 | | | | | | | 28-Jun-18 | 940.46 |
| -0.029 | avg 0.06 | | | | | | | 6-Sep-18 | 939.91 | | | | | | | 13-Sep-18 | 941.27 |
| n/a | | | | | | | | 7-Jan-19 | > 938.18 | | | | | | | 7-Jan-19 | > 938.09 |
| -0.121 | | | | | | | | 2-Apr-19 | 940.51 | | | | | | | 2-Apr-19 | 946.14 |
| -0.085 | | | | | | | | 31-May-19 | 940.45 | | | | | | | 8-Jun-19 | 944.40 |
| -0.135 | | | | | | | | 29-Aug-19 | 940.95 | | | | | | | 29-Aug-19 | 947.22 |
| 1.589 | Downward / Perched | T18-08S (W3S) | Tenas | 761.97 | OVB | na | Sand lense in Till | 28-Apr-18 | 770.14 | T18-08D (W3D) | Tenas | 757.27 | BDR | na | Volcanics | 23-Apr-18 | 762.67 |
| 1.581 | Disconnected | | | | | | | 18-Jun-18 | 770.02 | | | | | | | 18-Jun-18 | 762.59 |
| 1.694 | | | | | | | | 8-Sep-18 | 770.13 | | | | | | | 8-Sep-18 | 762.17 |
| 1.609 | | | | | | | | 4-Jan-19 | 770.23 | | | | | | | 4-Jan-19 | 762.67 |
| 1.672 | | | | | | | | 30-Mar-19 | 769.99 | | | | | | | 30-Mar-19 | 762.13 |
| 1.331 | | | | | | | | 31-May-19 | 770.08 | | | | | | | 31-May-19 | 763.83 |
| 1.072 | | | | | | | | 27-Aug-19 | 770.08 | | | | | | | 27-Aug-19 | 765.04 |
| -0.043 | Upward | T96R-16-19 | Tenas | 996.43 | BDR | Ut l | Coal (#1) | 18-Sep-96 | 1010.82 | T96R-16-28 | Tenas | 986.9 | BDR | na | Un-named lower coal | 18-Sep-96 | 1011.23 |
| -0.040 | 0.04 to 0.046 | | | | | | | 22-Sep-97 | 1010.78 | | | | | | | 22-Aug-97 | 1011.16 |
| -0.046 | avg 0.04 | | | | | | | 25-Jul-17 | 1010.59 | | | | | | | 25-Jul-17 | 1011.03 |
| -0.044 | | | | | | | | 27-Sep-17 | 1010.55 | | | | | | | 27-Sep-17 | 1010.96 |
| -0.045 | | | | | | | | 16-Jan-18 | 1010.85 | | | | | | | 16-Jan-18 | 1011.28 |
| -0.043 | | | | | | | | 30-Mar-18 | 1010.81 | | | | | | | 30-Mar-18 | 1011.22 |
| -0.046 | | | | | | | | 27-Jun-18 | 1010.94 | | | | | | | 27-Jun-18 | 1011.38 |
| -0.045 | | | | | | | | 6-Sep-18 | 1010.24 | | | | | | | 6-Sep-18 | 1010.67 |
| -0.044 | | | | | | | | 5-Jan-19 | 1010.50 | | | | | | | 5-Jan-19 | 1010.92 |
| -0.043 | | | | | | | | 3-Apr-19 | 1010.58 | | | | | | | 3-Apr-19 | 1010.99 |
| -0.046 | | | | | | | | 1-Jun-19 | 1011.05 | | | | | | | 1-Jun-19 | 1011.48 |
| -0.045 | | | | | | | | 31-Aug-19 | 1010.50 | | | | | | | 31-Aug-19 | 1010.92 |
| n/a | Slightly upward | T96R-34-67 | Tenas | 867.17 | BDR | na | Coal (upper ) | 18-Sep-96 | > 934.02 | T96R-34-87 | Tenas | 850.42 | BDR | Ut l | Coal (#1), 1/1U? | 18-Sep-96 | > 934.02 |
| 0.004 | | | | | | | | 22-Aug-97 | 934.33 | | | | | | | 22-Aug-97 | 934.26 |
| 1.175 | Downward / Perched | TOB96-02-06 | Tenas | 848.96 | OVB | na | Till | 20-Sep-96 | 852.01 | TOB96-02-20 | Tenas | 834.96 | OVB | na | Sand and gravel | 20-Sep-96 | 835.56 |
| n/a | Disconnected | | | | | | | 28-Sep-17 | 850.23 | | | | | | | 28-Sep-17 | < 833.46 |
| n/a | | | | | | | | 16-Jan-18 | 851.22 | | | | | | | 16-Jan-18 | < 833.46 |
| n/a | | | | | | | | 26-Mar-18 | 851.11 | | | | | | | 26-Mar-18 | < 833.46 |
| 1.314 | | | | | | | | 20-Jun-18 | 851.83 | | | | | | | 20-Jun-18 | 833.44 |
| n/a | | | | | | | | 10-Sep-18 | 850.44 | | | | | | | 10-Sep-18 | < 833.46 |
| n/a | Downward / Perched | TOB96-11-04 | Tenas | 824.36 | OVB | na | Clay | 20-Sep-96 | < 822.86 | TOB96-11-19 | Tenas | 807.91 | OVB | na | Fine sand | 20-Sep-96 | < 807.16 |
| n/a | Disconnected | | | | | | | 23-Aug-97 | 825.31 | | | | | | | 22-Aug-97 | < 807.16 |
| n/a | | | | | | | | 26-Jul-17 | 825.75 | | | | | | | 26-Jul-17 | < 807.16 |
| n/a | | | | | | | | 27-Sep-17 | 825.69 | | | | | | | 27-Sep-17 | < 807.16 |
| n/a | | | | | | | | 15-Jan-18 | 825.03 | | | | | | | 15-Jan-18 | < 807.16 |
| n/a | | | | | | | | 26-Mar-18 | 824.36 | | | | | | | 26-Mar-18 | < 807.16 |
| n/a | | | | | | | | 21-Jun-18 | 824.88 | | | | | | | 21-Jun-18 | < 807.16 |
| n/a | | | | | | | | 6-Sep-18 | 824.48 | | | | | | | 6-Sep-18 | < 807.16 |
| n/a | | | | | | | | 8-Jan-19 | 824.34 | | | | | | | 8-Jan-19 | < 807.16 |
| n/a | | | | | | | | 30-Mar-19 | 824.13 | | | | | | | 30-Mar-19 | < 807.16 |
| n/a | | | | | | | | 30-May-19 | 824.43 | | | | | | | 28-May-19 | < 807.16 |
| n/a | | | | | | | | 28-Aug-19 | 824.80 | | | | | | | 28-Aug-19 | < 807.16 |
| 0.191 | Downward | T96R-113-43 | Goathorn | 732.24 | BDR | Ut lll | Coal (#4-5) | 19-Sep-96 | 764.19 | T96R-113-79 | Goathorn | 697.74 | BDR | Ut lll | Coal (#2) | 19-Sep-96 | 757.59 |
| 0.133 | avg 0.14 | | | | | | | 20-Aug-97 | 764.73 | | | | | | | 20-Aug-97 | 760.15 |
| 0.662 | Downward / Perched? | T96R-40-87 | Goathorn | 749.55 | BDR | Ut lll | Coal ( #4), 5? | 19-Sep-96 | 815.99 | T96R-40-117 | Goathorn | 720.6 | BDR | Ut lll | Coal (#2) | 19-Sep-96 | 796.82 |
| 0.655 | avg 0.74 | | | | | | | 20-Aug-97 | 814.13 | | | | | | | 20-Aug-97 | 795.16 |
| n/a | - | T97R-15-29 | Goathorn | 712.31 | BDR | Ut lll | Coal (#4-5) | 20-Aug-97 | > 739.81 | T97R-15-52 | Goathorn | 690.51 | BDR | Ut lll | Coal (#3) | 20-Aug-97 | 739.93 |
| -0.002 | Slightly upward | T97R-17-79 | Goathorn | 772.1 | BDR | Ut lll | Coal (#4-5) | 20-Aug-97 | 824.14 | T97R-17-104 | Goathorn | 745.05 | BDR | Ut lll | Coal (#2) | 20-Aug-97 | 824.19 |
| -0.029 | Upward | T97R-20-40 | Goathorn | 676.16 | BDR | Ut lll | Coal (#8) | 21-Aug-97 | 707.91 | T97R-20-83 | Goathorn | 633.11 | BDR | Ut lll | Coal (#4-5) | 21-Aug-97 | 709.14 |
| 0.328 | Downward | T97R-36W | Goathorn | 638.71 | BDR | na | Various | 21-Aug-97 | 706.72 | T97R-36-140 | Goathorn | 571.78 | BDR | na | Lower Mdstn | 21-Aug-97 | 684.74 |
| 0.069 | Downward | T97RP-01-04 | Goathorn | 741.59 | OVB | na | Silty clay till fill | 25-Sep-97 | 744.29 | T97RP-01-13 | Goathorn | 732.04 | OVB | na | Silty clay till fill | 25-Sep-97 | 743.63 |
| 0.551 | Two regimes? | T93R-28A | North | 736.59 | BDR | na | Coal (#6) | 23-Aug-93 | 777.94 | T93R-28B | North | 715.02 | BDR | Ut lll | Coal (#2) | 28-Sep-93 | 766.06 |
| -0.488 | Or typo error? | | | | | | | 28-Sep-97 | 765.20 | | | | | | | 23-Aug-97 | 775.72 |
| n/a | - | T93R-29A | North | 819.69 | OVB | na | Till | 28-Sep-93 | < 816.19 | T93R-29B | North | 737.99 | BDR | Ut l | Coal (#1) | 28-Sep-93 | 750.39 |
| n/a | | | | | | | | 23-Aug-97 | < 816.19 | | | | | | | 23-Aug-97 | 773.84 |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 24-Mar-18 | 11.00 | 946.49 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 21-Jun-18 | 10.61 | 946.88 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 6-Sep-18 | 10.76 | 946.73 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 8-Jan-19 | 10.67 | 946.82 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 7-Feb-19 | 10.64 | 946.85 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 10-Feb-19 | 10.60 | 946.90 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 30-Mar-19 | 13.01 | 944.48 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 1-Jun-19 | 12.85 | 944.64 | Tenas | BDR | na | Sandstone |
| T18-01D (ARD02) | 6050689 | 617841 | 956.50 | 0.99 | 69.80 | 72.90 | 885.15 | 31-Aug-19 | 13.04 | 944.46 | Tenas | BDR | na | Sandstone |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 26-Mar-18 | 14.46 | 821.26 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 27-Jun-18 | 14.48 | 821.24 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 8-Sep-18 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 10-Jan-19 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 2-Apr-19 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 6-Jun-19 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-02S (GEO11) | 6051995 | 618921 | 835.22 | 0.50 | 11.00 | 14.00 | 822.72 | 30-Aug-19 | dry | < 821.22 | Tenas | OVB | na | Till? Silty SAND with trace clay and trace cobbles |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 1.47 | 10.10 | 13.10 | 926.58 | 28-Apr-18 | 0.20 | 939.45 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 1.54 | 10.10 | 13.10 | 926.58 | 19-Jun-18 | 0.07 | 939.65 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 1.91 | 10.10 | 13.10 | 926.58 | 6-Sep-18 | 0.18 | 939.91 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 2.28 | 10.10 | 13.10 | 926.58 | 7-Jan-19 | artesian | > 938.18 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 2.65 | 10.10 | 13.10 | 926.58 | 2-Apr-19 | 0.32 | 940.51 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 3.02 | 10.10 | 13.10 | 926.58 | 31-May-19 | 0.75 | 940.45 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04S (W1S) | 6051115 | 615955 | 938.18 | 3.39 | 10.10 | 13.10 | 926.58 | 29-Aug-19 | 0.62 | 940.95 | Tenas | OVB | na | Gravelly Fat Clay (Till?) and Volc. |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 1.73 | 56.40 | 59.50 | 880.14 | 27-Apr-18 | 0.24 | 939.58 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 2.46 | 56.40 | 59.50 | 880.14 | 28-Jun-18 | 0.09 | 940.46 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 2.46 | 56.40 | 59.50 | 880.14 | 13-Sep-18 | -0.72 | 941.27 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 2.95 | 56.40 | 59.50 | 880.14 | 7-Jan-19 | artesian | > 938.09 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 3.31 | 56.40 | 59.50 | 880.14 | 2-Apr-19 | -4.74 | 946.14 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 3.68 | 56.40 | 59.50 | 880.14 | 8-Jun-19 | -2.63 | 944.40 | Tenas | BDR | na | Volcanics |
| T18-04D (W1D) | 6051115 | 615955 | 938.09 | 4.04 | 56.40 | 59.50 | 880.14 | 29-Aug-19 | -5.09 | 947.22 | Tenas | BDR | na | Volcanics |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 24-Apr-18 | 51.30 | 801.10 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 10-Sep-18 | 50.80 | 801.60 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 10-Sep-18 | 50.80 | 801.60 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 5-Jan-19 | 51.23 | 801.18 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 1-Apr-19 | 51.61 | 800.79 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 1-Jun-19 | 51.36 | 801.04 | Tenas | OVB | na | Cobbles? |
| T18-06D (W2) | 6052647 | 616245 | 851.60 | 0.80 | 114.80 | 117.80 | 735.30 | 28-Aug-19 | 50.94 | 801.46 | Tenas | OVB | na | Cobbles? |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 28-Apr-18 | 34.38 | 770.14 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 18-Jun-18 | 34.50 | 770.02 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 8-Sep-18 | 34.39 | 770.13 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 4-Jan-19 | 34.29 | 770.23 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 7-Feb-19 | 34.51 | 770.01 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 10-Feb-19 | 34.48 | 770.04 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 30-Mar-19 | 34.53 | 769.99 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 31-May-19 | 34.44 | 770.08 | Tenas | OVB | na | Sand lense in Till |
| T18-08S (W3S) | 6053379 | 618515 | 803.52 | 1.00 | 40.00 | 43.10 | 761.97 | 27-Aug-19 | 34.44 | 770.08 | Tenas | OVB | na | Sand lense in Till |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 23-Apr-18 | 41.85 | 762.67 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 18-Jun-18 | 41.93 | 762.59 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 8-Sep-18 | 42.35 | 762.17 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 4-Jan-19 | 41.85 | 762.67 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 30-Mar-19 | 42.39 | 762.13 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 31-May-19 | 40.70 | 763.83 | Tenas | BDR | na | Volcanics |
| T18-08D (W3D) | 6053379 | 618515 | 803.52 | 1.00 | 44.70 | 47.80 | 757.27 | 27-Aug-19 | 39.48 | 765.04 | Tenas | BDR | na | Volcanics |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 3-Apr-18 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 25-Jun-18 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 8-Sep-18 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 4-Jan-19 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 1-Apr-19 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 31-May-19 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-11S (GEO22) | 6054253 | 617697 | 790.23 | 0.75 | 7.50 | 10.50 | 781.23 | 31-Aug-19 | dry | < 779.73 | Tenas | OVB | na | Till? Sandy CLAY with Trace Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 2-Apr-18 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 25-Jun-18 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 8-Sep-18 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 4-Jan-19 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 1-Apr-19 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 30-May-19 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |
| T18-13S (GEO13) | 6053408 | 617809 | 814.36 | 0.87 | 14.90 | 17.90 | 797.96 | 28-Aug-19 | dry | < 796.46 | Tenas | OVB | na | Till? Gravely CLAY with Some Cobbles |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T93R-28A | 6059121 | 617859 | 789.74 | 0.95 | 51.00 | 55.30 | 736.59 | 23-Aug-93 | 12.75 | 777.94 | North | BDR | na | Coal (#6) |
| T93R-28A | 6059121 | 617859 | 789.74 | 0.95 | 51.00 | 55.30 | 736.59 | 28-Sep-97 | 25.49 | 765.20 | North | BDR | na | Coal (#6) |
| T93R-28B | 6059121 | 617859 | 790.32 | 0.52 | 72.50 | 78.10 | 715.02 | 28-Sep-93 | 24.78 | 766.06 | North | BDR | Ut III | Coal (#2) |
| T93R-28B | 6059121 | 617859 | 790.32 | 0.52 | 72.50 | 78.10 | 715.02 | 23-Aug-97 | 15.12 | 775.72 | North | BDR | Ut III | Coal (#2) |
| T93R-29A | 6059169 | 617057 | 849.69 | 0.76 | 26.50 | 33.50 | 819.69 | 28-Sep-93 | dry | < 816.19 | North | OVB | na | Till |
| T93R-29A | 6059169 | 617057 | 849.69 | 0.76 | 26.50 | 33.50 | 819.69 | 23-Aug-97 | dry | < 816.19 | North | OVB | na | Till |
| T93R-29B | 6059169 | 617057 | 849.69 | 0.70 | 109.10 | 114.30 | 737.99 | 28-Sep-93 | 100.00 | 750.39 | North | BDR | Ut I | Coal (#1) |
| T93R-29B | 6059169 | 617057 | 849.69 | 0.70 | 109.10 | 114.30 | 737.99 | 23-Aug-97 | 76.55 | 773.84 | North | BDR | Ut I | Coal (#1) |
| T93R-30 | 6059770 | 616666 | 902.16 | 0.48 | 100.60 | 106.70 | 798.51 | 28-Sep-93 | 58.88 | 843.76 | North | BDR | Ut I | Coal (#1) |
| T93R-30 | 6059770 | 616666 | 902.16 | 0.48 | 100.60 | 106.70 | 798.51 | 23-Aug-97 | 58.54 | 844.10 | North | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 26-Oct-96 | artesian | > 880.2 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 23-Aug-97 | 1.32 | 879.96 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 26-Jul-17 | 0.45 | 880.83 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 26-Sep-17 | 0.24 | 881.04 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 15-Jan-18 | frozen | n/a | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.08 | 48.00 | 63.00 | 824.70 | 28-Mar-18 | 0.24 | 881.04 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 20-Apr-18 | 1.23 | 880.61 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 19-Jun-18 | 0.71 | 881.13 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 11-Sep-18 | frozen | n/a | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 4-Oct-18 | frozen | n/a | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 16-Oct-18 | 0.65 | 881.19 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 9-Jan-19 | artesian | > 880.2 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 5-Apr-19 | 0.63 | 881.21 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 7-Jun-19 | 0.66 | 881.18 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-15C | 6051998 | 617062 | 880.20 | 1.64 | 48.00 | 63.00 | 824.70 | 31-Aug-19 | 0.82 | 881.02 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-39C | 6050869 | 617336 | 981.03 | 0.80 | 51.20 | 58.40 | 926.23 | 22-Aug-94 | artesian | > 981.03 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-39C | 6050869 | 617336 | 981.03 | 0.80 | 51.20 | 58.40 | 926.23 | 27-Oct-95 | artesian | > 981.03 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.35 | 42.00 | 53.00 | 852.68 | 27-Oct-95 | 7.88 | 892.65 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.35 | 42.00 | 53.00 | 852.68 | 23-Aug-97 | 7.41 | 893.12 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 25-Jul-17 | 7.95 | 892.50 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 17-Aug-17 | 8.16 | 892.29 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 29-Sep-17 | 8.03 | 892.41 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 18-Jan-18 | 7.95 | 892.49 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 3-Apr-18 | 7.91 | 892.53 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 27-Jun-18 | 8.11 | 892.33 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 15-Sep-18 | 8.17 | 892.27 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 10-Jan-19 | 8.02 | 892.42 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 2-Apr-19 | 8.08 | 892.36 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 4-Jun-19 | 8.13 | 892.32 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-40 | 6051461 | 618188 | 900.18 | 0.26 | 42.00 | 53.00 | 852.68 | 30-Aug-19 | 8.21 | 892.23 | Tenas | BDR | Ut I | Coal (#1) |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.20 | 85.00 | 94.00 | 851.24 | 26-Oct-95 | 8.07 | 933.87 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.20 | 85.00 | 94.00 | 851.24 | 22-Aug-97 | 7.56 | 934.38 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 25-Jul-17 | 7.54 | 934.44 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 17-Aug-17 | 7.53 | 934.45 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 26-Sep-17 | 7.35 | 934.63 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 15-Jan-18 | 7.28 | 934.70 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 31-Mar-18 | 7.20 | 934.77 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 21-Jun-18 | 7.43 | 934.54 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 13-Sep-18 | 7.51 | 934.46 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 11-Jan-19 | 7.35 | 934.62 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 7-Feb-19 | 7.36 | 934.62 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 10-Feb-19 | 7.32 | 934.65 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 4-Mar-19 | 7.37 | 934.60 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 6-Apr-19 | 7.32 | 934.65 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 8-Jun-19 | 7.37 | 934.60 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T95R-64 | 6050597 | 618278 | 940.74 | 1.23 | 85.00 | 94.00 | 851.24 | 31-Aug-19 | 7.36 | 934.62 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-113-43 | 6054134 | 621254 | 771.74 | 0.35 | 36.50 | 42.50 | 732.24 | 19-Sep-96 | 7.90 | 764.19 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T96R-113-43 | 6054134 | 621254 | 771.74 | 0.35 | 36.50 | 42.50 | 732.24 | 20-Aug-97 | 7.36 | 764.73 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T96R-113-79 | 6054134 | 621254 | 771.74 | 0.35 | 75.50 | 78.50 | 694.74 | 19-Sep-96 | 14.50 | 757.59 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-113-79 | 6054134 | 621254 | 771.74 | 0.35 | 75.50 | 78.50 | 694.74 | 20-Aug-97 | 11.94 | 760.15 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.65 | 13.10 | 19.10 | 996.43 | 18-Sep-96 | 2.36 | 1010.82 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.65 | 13.10 | 19.10 | 996.43 | 22-Sep-97 | 2.40 | 1010.78 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 25-Jul-17 | 2.69 | 1010.59 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 27-Sep-17 | 2.74 | 1010.55 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 16-Jan-18 | 2.43 | 1010.85 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 30-Mar-18 | 2.47 | 1010.81 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 27-Jun-18 | 2.34 | 1010.94 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 6-Sep-18 | 3.04 | 1010.24 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 5-Jan-19 | 2.79 | 1010.50 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 3-Apr-19 | 2.70 | 1010.58 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 1-Jun-19 | 2.24 | 1011.05 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-19 | 6050613 | 616954 | 1012.53 | 0.75 | 13.10 | 19.10 | 996.43 | 31-Aug-19 | 2.79 | 1010.50 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.74 | 24.50 | 27.50 | 986.90 | 18-Sep-96 | 2.41 | 1011.23 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.74 | 24.50 | 27.50 | 986.90 | 22-Aug-97 | 2.48 | 1011.16 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 25-Jul-17 | 2.69 | 1011.03 | Tenas | BDR | na | Un-named lower coal |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 27-Sep-17 | 2.76 | 1010.96 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 16-Jan-18 | 2.45 | 1011.28 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 30-Mar-18 | 2.50 | 1011.22 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 27-Jun-18 | 2.34 | 1011.38 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 6-Sep-18 | 3.05 | 1010.67 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 5-Jan-19 | 2.81 | 1010.92 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 3-Apr-19 | 2.73 | 1010.99 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 1-Jun-19 | 2.24 | 1011.48 | Tenas | BDR | na | Un-named lower coal |
| T96R-16-28 | 6050613 | 616954 | 1012.90 | 0.82 | 24.50 | 27.50 | 986.90 | 31-Aug-19 | 2.80 | 1010.92 | Tenas | BDR | na | Un-named lower coal |
| T96R-34-67 | 6051180 | 617691 | 934.02 | 0.94 | 66.20 | 67.50 | 867.17 | 18-Sep-96 | artesian | > 934.02 | Tenas | BDR | na | Coal (upper ) |
| T96R-34-67 | 6051180 | 617691 | 934.02 | 0.94 | 66.20 | 67.50 | 867.17 | 22-Aug-97 | 0.63 | 934.33 | Tenas | BDR | na | Coal (upper ) |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 18-Sep-96 | artesian | > 934.02 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 22-Aug-97 | 0.73 | 934.26 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 25-Jul-17 | 0.85 | 934.15 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 16-Aug-17 | 0.88 | 934.11 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 27-Sep-17 | 0.83 | 934.17 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 17-Jan-18 | frozen | n/a | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 28-Mar-18 | 0.86 | 934.13 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 20-Jun-18 | 0.78 | 934.21 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 12-Sep-18 | 0.81 | 934.18 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 9-Jan-19 | artesian | > 934.02 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 4-Apr-19 | 0.90 | 934.09 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 5-Jun-19 | n/a | n/a | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-34-87 | 6051180 | 617691 | 934.02 | 0.97 | 80.60 | 86.60 | 850.42 | 30-Aug-19 | 0.87 | 934.13 | Tenas | BDR | Ut I | Coal (#1), 1/1U? |
| T96R-40-117 | 6053367 | 621435 | 833.50 | 0.78 | 108.40 | 117.40 | 720.60 | 19-Sep-96 | 37.46 | 796.82 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-40-117 | 6053367 | 621435 | 833.50 | 0.78 | 108.40 | 117.40 | 720.60 | 20-Aug-97 | 39.12 | 795.16 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-40-87 | 6053367 | 621435 | 833.55 | 0.80 | 81.00 | 87.00 | 749.55 | 19-Sep-96 | 18.36 | 815.99 | Goathorn | BDR | Ut III | Coal ( #4), 5? |
| T96R-40-87 | 6053367 | 621435 | 833.55 | 0.80 | 81.00 | 87.00 | 749.55 | 20-Aug-97 | 20.22 | 814.13 | Goathorn | BDR | Ut III | Coal ( #4), 5? |
| T96R-44-54 | 6054247 | 620908 | 764.94 | 0.62 | 50.50 | 53.50 | 712.94 | 19-Sep-96 | 14.44 | 751.12 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-44-54 | 6054247 | 620908 | 764.94 | 0.62 | 50.50 | 53.50 | 712.94 | 20-Aug-97 | 14.48 | 751.08 | Goathorn | BDR | Ut III | Coal (#2) |
| T96R-56C-83 | 6050370 | 618588 | 944.08 | 1.18 | 74.90 | 82.60 | 865.33 | 18-Sep-96 | artesian | > 944.08 | Tenas | BDR | Ut I | Coal (#1) |
| T96R-56C-83 | 6050370 | 618588 | 944.08 | 1.18 | 74.90 | 82.60 | 865.33 | 22-Aug-97 | 1.26 | 944.00 | Tenas | BDR | Ut I | Coal (#1) |
| T96TP-01-10 | 6050718 | 617276 | 995.70 | 0.80 | 8.50 | 10.00 | 986.45 | 19-Sep-96 | 1.64 | 994.86 | Tenas | BDR | na | Coal (C) |
| T96TP-02-07 | 6050655 | 617201 | 1001.60 | 0.80 | 2.00 | 7.00 | 997.10 | 20-Aug-97 | 3.23 | 999.17 | Tenas | BDR | Ut I | Coal (#1) |
| T974-21-87 | 6055299 | 620884 | 690.64 | 0.97 | 81.70 | 87.70 | 605.94 | 21-Aug-97 | 33.39 | 658.22 | Goathorn | BDR | Ut I | Coal (#1) |
| T97R-108C-70 | 6052532 | 617380 | 834.48 | 0.62 | 61.00 | 70.00 | 768.98 | 26-Sep-97 | 18.16 | 816.94 | Tenas | BDR | Ut I | Coal (#1) |
| T97R-12-75 | 6053796 | 621298 | 792.54 | 0.65 | 68.00 | 74.80 | 721.14 | 20-Aug-97 | 6.77 | 786.42 | Goathorn | BDR | Ut III | Coal (#2) |
| T97R-15-29 | 6054655 | 621062 | 739.81 | 2.15 | 26.00 | 29.00 | 712.31 | 20-Aug-97 | artesian | > 739.81 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T97R-15-52 | 6054655 | 621062 | 739.81 | 0.60 | 47.00 | 51.60 | 690.51 | 20-Aug-97 | 0.48 | 739.93 | Goathorn | BDR | Ut III | Coal (#3) |
| T97R-17-104 | 6052878 | 621462 | 846.30 | 0.55 | 98.50 | 104.00 | 745.05 | 20-Aug-97 | 22.66 | 824.19 | Goathorn | BDR | Ut III | Coal (#2) |
| T97R-17-79 | 6052878 | 621462 | 846.30 | 0.52 | 69.70 | 78.70 | 772.10 | 20-Aug-97 | 22.68 | 824.14 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T97R-20-131 | 6055114 | 621360 | 713.61 | 0.89 | 127.00 | 131.00 | 584.61 | 21-Aug-97 | 7.59 | 706.91 | Goathorn | BDR | Ut III | Coal (#2) |
| T97R-20-40 | 6055114 | 621360 | 713.61 | 0.82 | 35.20 | 39.70 | 676.16 | 21-Aug-97 | 6.52 | 707.91 | Goathorn | BDR | Ut III | Coal (#8) |
| T97R-20-83 | 6055114 | 621360 | 713.46 | 0.97 | 77.20 | 83.50 | 633.11 | 21-Aug-97 | 5.29 | 709.14 | Goathorn | BDR | Ut III | Coal (#4-5) |
| T97R-21-41 | 6055299 | 620884 | 690.64 | 0.87 | 37.70 | 49.70 | 646.94 | 21-Aug-97 | 1.60 | 689.91 | Goathorn | BDR | Ut I | Coal (#?) |
| T97R-23-69 | 6055588 | 620717 | 679.72 | 0.60 | 61.50 | 68.50 | 614.72 | 21-Aug-97 | 39.44 | 640.88 | Goathorn | BDR | Ut I | Coal (#1) |
| T97R-33-20 | 6054236 | 621053 | 767.66 | 0.60 | 12.50 | 15.50 | 753.66 | 21-Aug-97 | artesian | > 767.66 | Goathorn | BDR | Ut III | Upper Sndstn |
| T97R-33-55 | 6054236 | 621053 | 767.66 | 0.80 | 50.70 | 53.70 | 715.46 | 21-Aug-97 | 14.96 | 753.50 | Goathorn | BDR | Ut III | Sndstn #3 |
| T97R-33-78 | 6054236 | 621053 | 767.66 | 0.92 | 75.10 | 78.10 | 691.06 | 21-Aug-97 | 14.83 | 753.75 | Goathorn | BDR | Ut III | Lower Mdstn |
| T97R-36-140 | 6055272 | 621430 | 710.28 | 0.86 | 137.00 | 140.00 | 571.78 | 21-Aug-97 | 26.40 | 684.74 | Goathorn | BDR | na | Lower Mdstn |
| T97R-36W | 6055272 | 621430 | 710.71 | 0.45 | 11.50 | 132.50 | 638.71 | 21-Aug-97 | 4.44 | 706.72 | Goathorn | BDR | na | Various |
| T97R-49-63 | 6055515 | 621377 | 701.94 | 0.60 | 60.00 | 63.00 | 640.44 | 21-Aug-97 | 27.35 | 675.19 | Goathorn | BDR | Ut III | Sndstn #3 |
| T97R-49-63 | 6055515 | 621377 | 701.94 | 0.60 | 60.00 | 63.00 | 640.44 | 27-Aug-97 | 17.48 | 685.06 | Goathorn | BDR | Ut III | Sndstn #3 |
| T97RP-01-04 | 6054364 | 620705 | 744.49 | 0.66 | 1.30 | 4.50 | 741.59 | 25-Sep-97 | 0.86 | 744.29 | Goathorn | OVB | na | Silty clay till fill |
| T97RP-01-13 | 6054364 | 620705 | 744.49 | 0.66 | 11.50 | 13.00 | 732.24 | 25-Sep-97 | 1.52 | 743.63 | Goathorn | OVB | na | Silty clay till fill |
| T97RP-02-12 | 6054362 | 620887 | 758.56 | 0.60 | 10.80 | 12.30 | 747.01 | 25-Sep-97 | 6.09 | 753.07 | Goathorn | OVB | na | Silty clay till fill |
| T97RP-03-08 | 6054325 | 621236 | 764.04 | 0.70 | 5.50 | 8.50 | 757.04 | 25-Sep-97 | 4.78 | 759.96 | Goathorn | OVB | na | Silty clay till fill |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.52 | 1.60 | 4.60 | 919.77 | 20-Sep-96 | 1.45 | 921.94 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.52 | 1.60 | 4.60 | 919.77 | 22-Aug-97 | 1.12 | 922.27 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 25-Jul-17 | 2.70 | 920.92 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 28-Sep-17 | 3.68 | 919.95 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 18-Jan-18 | 1.92 | 921.70 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 29-Mar-18 | 1.37 | 922.25 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 21-Jun-18 | 1.96 | 921.66 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 13-Sep-18 | 4.88 | 918.74 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 11-Jan-19 | 5.12 | 918.50 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 3-Apr-19 | 4.70 | 918.92 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 6-Jun-19 | 2.36 | 921.26 | Tenas | OVB | na | Till |
| TOB96-01-05 | 6050602 | 619014 | 922.87 | 0.75 | 1.60 | 4.60 | 919.77 | 31-Aug-19 | 4.93 | 918.69 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.57 | 3.00 | 6.00 | 848.96 | 20-Sep-96 | 2.02 | 852.01 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.57 | 3.00 | 6.00 | 848.96 | 23-Aug-97 | 1.76 | 852.27 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 26-Jul-17 | 2.93 | 850.91 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 28-Sep-17 | 3.61 | 850.23 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 16-Jan-18 | 2.63 | 851.22 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 26-Mar-18 | 2.73 | 851.11 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 29-Mar-18 | 2.81 | 851.03 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 20-Jun-18 | 2.01 | 851.83 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 22-Jun-10 | 2.06 | 851.78 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 10-Sep-18 | 3.40 | 850.44 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 8-Jan-19 | 3.96 | 849.88 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 29-Mar-19 | 2.81 | n/a | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 5-Apr-19 | 4.12 | 849.72 | Tenas | OVB | na | Till |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 6-Jun-19 | 3.62 | 850.22 | Tenas | OVB | na | Till |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| TOB96-02-06 | 6051947 | 618466 | 853.46 | 0.38 | 3.00 | 6.00 | 848.96 | 30-Aug-19 | 3.62 | 850.22 | Tenas | OVB | na | Till |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.52 | 17.00 | 20.00 | 834.96 | 20-Sep-96 | 18.42 | 835.56 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.52 | 17.00 | 20.00 | 834.96 | 23-Sep-97 | 19.71 | 834.27 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 28-Sep-17 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 16-Jan-18 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 26-Mar-18 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 20-Jun-18 | 20.36 | 833.44 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 10-Sep-18 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 8-Jan-19 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 5-Apr-19 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 6-Jun-19 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-02-20 | 6051947 | 618466 | 853.46 | 0.34 | 17.00 | 20.00 | 834.96 | 30-Aug-19 | dry | < 833.46 | Tenas | OVB | na | Sand and gravel |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.72 | 1.50 | 4.50 | 824.36 | 20-Sep-96 | dry | < 822.86 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.72 | 1.50 | 4.50 | 824.36 | 23-Aug-97 | 2.77 | 825.31 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 26-Jul-17 | 2.48 | 825.75 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 27-Sep-17 | 2.54 | 825.69 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 15-Jan-18 | 3.20 | 825.03 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 26-Mar-18 | 3.87 | 824.36 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 21-Jun-18 | 3.35 | 824.88 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 6-Sep-18 | 3.75 | 824.48 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 8-Jan-19 | 3.89 | 824.34 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 30-Mar-19 | 4.10 | 824.13 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 30-May-19 | 3.80 | 824.43 | Tenas | OVB | na | Clay |
| TOB96-11-04 | 6052818 | 617724 | 827.36 | 0.87 | 1.50 | 4.50 | 824.36 | 28-Aug-19 | 3.44 | 824.80 | Tenas | OVB | na | Clay |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.68 | 18.70 | 20.20 | 807.91 | 20-Sep-96 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.68 | 18.70 | 20.20 | 807.91 | 22-Aug-97 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 26-Jul-17 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 27-Sep-17 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 15-Jan-18 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 26-Mar-18 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 21-Jun-18 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 6-Sep-18 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 8-Jan-19 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 30-Mar-19 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 28-May-19 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-11-19 | 6052818 | 617724 | 827.36 | 0.31 | 18.70 | 20.20 | 807.91 | 28-Aug-19 | dry | < 807.16 | Tenas | OVB | na | Fine sand |
| TOB96-12-04 | 6051377 | 616082 | 926.02 | 0.70 | 1.00 | 4.00 | 923.52 | 30-Sep-96 | 2.71 | 924.01 | Tenas | OVB | na | Till |
| TOB96-12-04 | 6051377 | 616082 | 926.02 | 0.70 | 1.00 | 4.00 | 923.52 | 22-Aug-97 | 2.62 | 924.10 | Tenas | OVB | na | Till |
| TOB97-04-07 | 6055616 | 622328 | 684.25 | 0.54 | 4.50 | 7.50 | 678.25 | 26-Sep-97 | 5.84 | 678.95 | Goathorn | OVB | na | Silt till |
| TOB97-05-06 | 6054474 | 621931 | 759.37 | 0.83 | 2.80 | 5.90 | 755.02 | 26-Sep-97 | 3.38 | 756.82 | Goathorn | OVB | na | Till |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.70 | 18.00 | 21.00 | 835.08 | 22-Aug-97 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 26-Jul-17 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 19-Jan-18 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 22-Jun-18 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 10-Sep-18 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 5-Jan-19 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 1-Apr-19 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 1-Jun-19 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-06-21 | 6052496 | 616652 | 854.58 | 0.74 | 18.00 | 21.00 | 835.08 | 28-Aug-19 | dry | < 833.58 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.60 | 21.00 | 24.00 | 788.55 | 22-Aug-97 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 26-Jul-17 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 26-Mar-18 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 25-Jun-18 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 8-Sep-18 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 4-Jan-19 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 1-Apr-19 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 30-May-19 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TOB97-07-24 | 6053579 | 617887 | 811.05 | 0.90 | 21.00 | 24.00 | 788.55 | 28-Aug-19 | dry | < 787.05 | Tenas | OVB | na | Sand |
| TW604A | 6060134 | 618624 | 812.64 | 0.68 | 24.80 | 32.60 | 783.94 | 12-Nov-89 | 23.45 | 789.87 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW604A | 6060134 | 618624 | 812.64 | 0.68 | 24.80 | 32.60 | 783.94 | 29-Sep-93 | 25.93 | 787.39 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW604A | 6060134 | 618624 | 812.64 | 0.68 | 24.80 | 32.60 | 783.94 | 23-Aug-97 | 24.81 | 788.51 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905A | 6059904 | 618544 | 812.64 | 0.68 | 17.80 | 26.00 | 790.74 | 12-Nov-89 | 25.63 | 787.69 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905A | 6059904 | 618544 | 812.64 | 0.68 | 17.80 | 26.00 | 790.74 | 29-Sep-93 | 25.04 | 788.28 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 12-Nov-89 | 24.40 | 788.92 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 12-Nov-89 | 26.53 | 786.79 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 12-Nov-89 | 14.24 | 799.08 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 28-Sep-93 | 13.94 | 799.38 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 29-Sep-93 | 24.06 | 789.26 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 29-Sep-93 | 25.93 | 787.39 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 23-Aug-97 | 23.42 | 789.90 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 23-Aug-97 | 24.32 | 789.00 | North | BDR | na | Coal (#6 mid), Mdstn |
| TW905B | 6059901 | 618547 | 812.64 | 0.68 | 48.90 | 58.30 | 759.04 | 23-Aug-97 | 14.12 | 799.20 | North | BDR | na | Coal (#6 mid), Mdstn |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 17-Jan-19 | 15.70 | n/a | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 18-Jan-19 | 15.06 | n/a | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 10-Feb-19 | 25.47 | n/a | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 13-Feb-19 | 25.92 | n/a | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 24-Feb-19 | 27.35 | n/a | Tenas | OVB | | Clayey Sand |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 11-Mar-19 | 30.43 | 786.87 | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 3-Apr-19 | 29.69 | 787.60 | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 28-May-19 | 30.25 | 787.04 | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 31-Aug-19 | 30.56 | 786.74 | Tenas | OVB | | Clayey Sand |
| T19-18S | 6052454 | 619237 | 816.44 | 0.85 | 34.10 | 35.60 | 781.59 | 28-Nov-19 | 30.32 | 786.97 | Tenas | OVB | | Clayey Sand |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 22-Jan-19 | 44.40 | n/a | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 10-Feb-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 10-Mar-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 6-Apr-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 27-May-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-19S | 6052171 | 618775 | 840.44 | 0.90 | 43.50 | 45.00 | 796.19 | 31-Aug-19 | dry | < 795.44 | Tenas | OVB | | Clayey Sand (and Siltstone?) |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 22-Jan-19 | 14.79 | 845.51 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 10-Feb-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 9-Mar-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 4-Apr-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 27-May-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 31-Aug-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-20S | 6052440 | 616824 | 859.49 | 0.81 | 28.70 | 30.20 | 830.04 | 22-Nov-19 | dry | < 829.29 | Tenas | OVB | | Lean Clay with Sand |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 29-Jan-19 | 6.44 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 10-Feb-19 | 19.85 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 24-Feb-19 | 24.94 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 9-Mar-19 | 28.35 | 806.94 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 12-Mar-19 | 28.32 | 806.98 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 3-Apr-19 | 28.34 | 806.96 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 25-May-19 | 28.40 | 806.89 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 31-Aug-19 | 28.50 | 806.79 | Tenas | BDR | | Weathered Siltstone |
| T19-21S | 6052746 | 616976 | 834.33 | 0.96 | 56.70 | 58.20 | 776.88 | 22-Nov-19 | 28.43 | 806.86 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 10-Feb-19 | 12.64 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 24-Feb-19 | 16.69 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 8-Mar-19 | 26.59 | 800.50 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 11-Mar-19 | 24.89 | 802.20 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 12-Mar-19 | 24.83 | 802.26 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 30-Mar-19 | 24.22 | 802.87 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 1-Apr-19 | 24.20 | 802.89 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 23-May-19 | 2.06 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 28-Aug-19 | 24.03 | 803.07 | Tenas | BDR | | Weathered Siltstone |
| T19-22S | 6052847 | 617705 | 826.20 | 0.89 | 27.80 | 29.30 | 797.65 | 28-Nov-19 | 23.96 | 803.13 | Tenas | BDR | | Weathered Siltstone |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 7-Feb-19 | 14.13 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 7-Feb-19 | 14.65 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 10-Feb-19 | 28.28 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 11-Feb-19 | 30.18 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 12-Feb-19 | 31.06 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 13-Feb-19 | 31.94 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 15-Feb-19 | 33.05 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 24-Feb-19 | 35.35 | n/a | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 11-Mar-19 | 35.52 | 772.83 | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 2-Apr-19 | 35.46 | 772.88 | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 24-May-19 | 35.55 | 772.79 | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 28-Aug-19 | 35.74 | 772.60 | Tenas | OVB | | Clayey Sand |
| T19-26S | 6053665 | 617469 | 807.43 | 0.91 | 50.80 | 52.30 | 755.88 | 23-Nov-19 | 35.61 | 772.73 | Tenas | OVB | | Clayey Sand |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 15-Feb-19 | 28.27 | 780.90 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 24-Feb-19 | 40.99 | 768.18 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 10-Mar-19 | 40.89 | 768.28 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 1-Apr-19 | 41.01 | 768.16 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 24-May-19 | 40.96 | 768.21 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 28-Aug-19 | 40.94 | 768.23 | Tenas | OVB | | Silty Sand with Gravel |
| T19-27S | 6053726 | 617883 | 808.26 | 0.91 | 43.00 | 44.50 | 764.51 | 23-Nov-19 | 40.78 | 768.39 | Tenas | OVB | | Silty Sand with Gravel |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 28-Feb-19 | 10.70 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 1-Mar-19 | 14.07 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 9-Mar-19 | 28.86 | 809.04 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 11-Mar-19 | 28.80 | 809.10 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 6-Apr-19 | 28.84 | 809.06 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 28-May-19 | 28.94 | 808.96 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 27-Aug-19 | 28.94 | 808.96 | Tenas | BDR | | Weathered Siltstone |
| T19-34S | 6052399 | 618256 | 837.04 | 0.86 | 35.10 | 36.60 | 801.19 | 28-Nov-19 | 28.84 | 809.06 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 1-Mar-19 | 20.26 | n/a | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 8-Mar-19 | 23.47 | 806.15 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 12-Mar-19 | 23.56 | 806.06 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 5-Apr-19 | 23.72 | 805.90 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 23-May-19 | 23.87 | 805.75 | Tenas | BDR | | Weathered Siltstone |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 27-Aug-19 | 23.95 | 805.67 | Tenas | BDR | | Weathered Siltstone |

| ID | Northing | Easting | G.Surf Elev. | Stick-up | Screen Top | Screen Btm | Screen Mid | Date | GW Depth | GW Elev | Area | Type | Unit | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | *UTM NAD83 9N* | *UTM NAD83 9N* | *masl* | *m* | *mgbs* | *mbgs* | *masl* | *dd-mm-yy* | *mb toc* | *masl* | - | - | - | - |
| T19-35S | 6052834 | 618228 | 828.72 | 0.90 | 28.30 | 29.80 | 799.67 | 28-Nov-19 | 23.96 | 805.66 | Tenas | BDR | | Weathered Siltstone |
| T19-36 | 6058365 | 629737 | 515.35 | 0.88 | 3.70 | 5.20 | 510.90 | 12-Mar-19 | 3.93 | 512.31 | Rail Loadout | OVB | | Sand and Gravel |
| T19-36 | 6058365 | 629737 | 515.35 | 0.88 | 3.70 | 5.20 | 510.90 | 15-Apr-19 | 3.36 | 512.88 | Rail Loadout | OVB | | Sand and Gravel |
| T19-36 | 6058365 | 629737 | 515.35 | 0.88 | 3.70 | 5.20 | 510.90 | 21-May-19 | 3.27 | 512.97 | Rail Loadout | OVB | | Sand and Gravel |
| T19-37 | 6058215 | 629955 | 516.39 | 0.87 | 3.40 | 5.00 | 512.19 | 12-Mar-19 | 4.34 | 512.92 | Rail Loadout | OVB | | Sand and Gravel |
| T19-37 | 6058215 | 629955 | 516.39 | 0.87 | 3.40 | 5.00 | 512.19 | 15-Apr-19 | 4.07 | 513.19 | Rail Loadout | OVB | | Sand and Gravel |
| T19-37 | 6058215 | 629955 | 516.39 | 0.87 | 3.40 | 5.00 | 512.19 | 21-May-19 | 3.99 | 513.28 | Rail Loadout | OVB | | Sand and Gravel |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 13-Nov-18 | 6.21 | 677.54 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 12-Dec-18 | 6.23 | 677.52 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 16-Jan-19 | 6.28 | 677.47 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 22-Feb-19 | 6.32 | 677.43 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 22-Mar-19 | 6.36 | 677.39 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 18-Apr-19 | 6.15 | 677.60 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 29-May-19 | 6.18 | 677.57 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 23-Aug-19 | 6.52 | 677.23 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 26-Sep-19 | 6.67 | 677.08 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-14S | 6055570 | 620514 | 682.97 | 0.78 | 6.70 | 8.20 | 675.52 | 13-Nov-19 | 6.66 | 677.09 | Access Road | OVB | | Silty Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 13-Nov-18 | 13.44 | 704.11 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 12-Dec-18 | 13.46 | 704.09 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 16-Jan-19 | 13.48 | 704.07 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 22-Feb-19 | 13.49 | 704.06 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 22-Mar-19 | 13.49 | 704.06 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 18-Apr-19 | 13.28 | 704.27 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 29-May-19 | 13.26 | 704.29 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 23-Aug-19 | 13.41 | 704.14 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 26-Sep-19 | 13.44 | 704.11 | Access Road | OVB | | Sand with Gravel/Till |
| T18-15S | 6054948 | 620563 | 716.75 | 0.80 | 11.30 | 14.30 | 703.95 | 13-Nov-19 | 13.37 | 704.18 | Access Road | OVB | | Sand with Gravel/Till |
| T19-28S | 6054651 | 620005 | 710.20 | | | | | n/a | 6.50 | 703.90 | Access Road | OVB | | Till |
| T19-28S | 6054651 | 620005 | 710.20 | | | | | n/a | 7.50 | 702.90 | Access Road | OVB | | Till |
| T18-30S | 6054456 | 620050 | 706.70 | | | | | n/a | 11.40 | 695.30 | Access Road | OVB | | Clayey Silt (Fill) |
| T18-30S | 6054456 | 620050 | 706.70 | | | | | n/a | 13.60 | 693.10 | Access Road | OVB | | Clayey Silt (Fill) |
| T19-31S | 6054334 | 620048 | 704.90 | | | | | n/a | dry | < 697.3 | Access Road | OVB | | Gravelly Silt (Fill) |

# Appendix D – Groundwater Quality

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | - | - | - | T95R-64-0817 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 | T95R-64 |
| | | | | | Geol | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR |
| | | | | | Date Sampled | 27-Oct-1995[4] | 28-Oct-1996 | 22-Aug-1997 | 17-Aug-2017 | 26-Sep-2017 | 15-Jan-2018 | 31-Mar-2018 | 21-Jun-2018 | 13-Sep-2018 | 11-Jan-2019 | 6-Apr-2019 | 6-Jun-2019 |
| | | | | | ALS Sample ID (2017-2018) | - | - | - | L1977808-4 | L2000339-2 | L2047836-7 | L2078247-7 | L2117455-5 | L2164994-3 | L2220048-2 | L2255482-3 | L2288655-1 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | 95-04060-3 | 96-04300-3 | 97-04136-25 | - | - | - | - | - | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | - | - | - | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 1450.00 | 1305.00 | 1342.00 | 1330.00 | 1220.00 | 1270.00 | 1280.00 | 1200.00 | 1330.00 | 1250.00 | 1290.00 | 1250.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 1640.00 | 1304.00 | 1176.00 | 1303.00 | 1322.00 | 1279.00 | 1293.00 | 1312.00 | 1277.00 | 1285.00 | 1332.00 | 1282.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 63.10 | 56.40 | 61.80 | 56.80 | 57.20 | 53.50 | 56.60 | 58.10 | 52.80 | 52.00 | 55.60 | 53.90 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.56 | 7.48 | 7.49 | 8.19 | 8.17 | 8.09 | 8.59 | 8.75 | 8.40 | 7.89 | 8.23 | 8.56 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 7.03 | 7.70 | 7.56 | 7.35 | 7.50 | 7.12 | 7.68 | 7.39 | 7.51 | 7.63 | 7.77 | 7.41 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 84.00 | 1.00 | 8.00 | 5.00 | 3.00 | 3.00 | 3.00 | 7.30 | 3.00 | 3.00 | 3.00 | 3.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 879.00 | 782.00 | 827.00 | 845.00 | 823.00 | 838.00 | 818.00 | 779.00 | 830.00 | 820.00 | 794.00 | 812.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | - | - | - | 4.82 | 4.22 | 1.79 | 0.83 | 3.48 | 2.96 | 1.55 | 0.55 | 3.18 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | - | - | - | 2.90 | 3.10 | - | 1.00 | 1.00 | 1.00 | 5.60 | 1.0 | 1.0 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 975.00 | 920.00 | 973.00 | 739.00 | 716.00 | 756.00 | 697.00 | 653.00 | 741.00 | 729.00 | 750.00 | 675.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 0.50 | 0.50 | 0.50 | 39.40 | 44.60 | 1.00 | 61.20 | 48.80 | 29.40 | 1.00 | 1.00 | 64.40 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | - | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 0.10 | 0.10 | 0.10 | 22.30 | - | - | - | - | - | - | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 800.00 | 755.00 | 798.00 | 778.00 | 761.00 | 756.00 | 759.00 | 702.00 | 770.00 | 729.00 | 750.00 | 739.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.31 | 0.32 | 0.24 | 0.35 | 0.34 | 0.37 | 0.36 | 0.34 | 0.35 | 0.36 | 0.34 | 0.38 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | - | - | - | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 3.00 | 1.10 | 0.60 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 1.34 | - | - | 1.49 | 1.48 | 1.58 | 1.46 | 1.52 | 1.47 | 1.53 | 1.53 | 1.66 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | - | - | - | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | - | - | - | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.15 | 0.01 | - | 0.37 | 0.37 | 0.37 | 0.35 | 0.43 | 0.39 | 0.38 | 0.38 | 0.38 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0010 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.05 | 0.01 | 0.02 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.07 | 0.02 | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 12.40 | 0.40 | 0.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | - | - | - | 0.50 | 0.50 | 0.50 | 0.50 | 0.87 | 0.50 | 0.50 | 0.90 | 0.50 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | - | - | - | 0.50 | 0.50 | 0.50 | 0.50 | 0.79 | 0.58 | 0.50 | 0.54 | 0.50 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 1.86 | 0.23 | 0.18 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.24 | 0.40 | - | 0.45 | 0.41 | 0.43 | 0.37 | 0.40 | 0.42 | 0.40 | 0.48 | 0.40 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.14 | 0.23 | 0.38 | 0.15 | 0.13 | 0.15 | 0.12 | 0.13 | 0.14 | 0.13 | 0.14 | 0.14 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 21.60 | 21.00 | 0.11 | 20.70 | 19.50 | 20.60 | 18.10 | 17.90 | 18.80 | 18.90 | 19.60 | 18.30 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.07 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 21.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 2.43 | 0.73 | 0.00 | 0.65 | 0.47 | 0.42 | 0.36 | 0.47 | 0.39 | 0.37 | 0.39 | 0.36 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | - | 0.06 | 1.01 | 0.06 | 0.06 | 0.07 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 3.10 | 2.11 | 0.01 | 1.98 | 1.85 | 1.94 | 1.72 | 1.83 | 1.79 | 1.89 | 1.87 | 1.78 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.24 | 0.10 | 0.06 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 2.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.01 | 0.00 | 0.05 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 3.80 | 1.59 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 1.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 356.00 | 317.00 | 338.00 | 327.00 | 325.00 | 302.00 | 267.00 | 294.00 | 294.00 | 299.00 | 322.00 | 289.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | - | 0.01 | 0.01 | 0.05 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.03 | 0.02 | 0.08 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Dissolved Metals** | | | n.g. | n.g. | **Dissolved Metals** | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.04 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.40 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.20 | 0.37 | 0.44 | 0.43 | 0.44 | 0.43 | 0.40 | 0.44 | 0.45 | 0.43 | 0.50 | 0.47 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.12 | 0.08 | 0.03 | 0.13 | 0.14 | 0.14 | 0.13 | 0.13 | 0.13 | 0.12 | 0.14 | 0.14 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.003 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 20.800 | 19.500 | 21.200 | 19.600 | 19.800 | 18.300 | 19.600 | 20.000 | 18.100 | 17.900 | 19.200 | 18.500 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.002 | 0.001 | 0.006 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.003 | 0.002 | 0.004 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.001 | 0.000 | 0.003 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.11 | 0.01 | 0.01 | 0.56 | 0.41 | 0.39 | 0.38 | 0.17 | 0.36 | 0.34 | 0.34 | 0.36 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | - | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.05 | 0.06 | 0.06 | 0.06 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 2.70 | 1.86 | 2.14 | 1.92 | 1.91 | 1.89 | 1.89 | 1.98 | 1.83 | 1.78 | 1.83 | 1.88 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.19 | 0.07 | 0.04 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0001 | 0.0001 | 0.0500 | 0.0002 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.003 | 0.000 | 0.003 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.005 | 0.001 | 0.017 | 0.005 | 0.005 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.900 | 1.410 | 1.520 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0002 | 0.0002 | 0.0002 | 0.0010 | 0.0010 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 4.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 349.00 | 298.00 | 314.00 | 367.00 | 334.00 | 303.00 | 310.00 | 330.00 | 310.00 | 296.00 | 326.00 | 307.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | - | 0.00 | 0.00 | 0.05 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | - | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | - | - | - | - | - | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | - | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | - | - | - | - | - | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T96R-34-87 | T96R-34-87 | T96R-34-87 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | - | - | - | T95R-40-0817 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | T95R-40 | - | - | 96R-34-87-081 |
| | | | | | Geol | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR |
| | | | | | Date Sampled | 27-Oct-1995 | 28-Oct-1996 | 23-Aug-1997 | 17-Aug-2017 | 29-Sep-2017 | 18-Jan-2018 | 3-Apr-2018 | 27-Jun-2018 | 15-Sep-2018 | 10-Jan-2019 | 2-Apr-2019 | 4-Jun-2019 | 18-Sep-1996 | 22-Aug-1997 | 16-Aug-2017 |
| | | | | | ALS Sample ID (2017-2018) | - | - | - | L1977808-3 | L2000339-9 | L2047836-2 | L2078247-4 | L2122028-3 | L2166287-3 | L2220047-4 | L2254339-6 | L2287158-2 | - | - | L1977808-2 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | 95-04060-4 | 96-04300-4 | 97-04136-37 | - | - | - | - | - | - | - | - | - | 96-03529-6 | 97-04136-35 | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | - | - | - | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | - | - | 5.00 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 2800.00 | 2836.00 | 2883.00 | 2790.00 | 2600.00 | 2680.00 | 2640.00 | 2780.00 | 2630.00 | 2600.00 | 2580.00 | 2650.00 | 1310.00 | 1400.00 | 1320.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 3385.00 | 2770.00 | 2470.00 | 2840.00 | 2560.00 | 2687.00 | 2726.00 | 2831.00 | 2650.00 | 2710.00 | 2921.00 | 2712.00 | 1290.00 | 1278.00 | 1312.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 131.00 | 110.00 | 116.00 | 113.00 | 102.00 | 103.00 | 103.00 | 92.60 | 95.60 | 99.50 | 108.00 | 97.30 | 46.30 | 43.60 | 44.00 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.48 | 7.37 | 7.48 | 8.08 | 7.81 | 7.67 | 8.44 | 8.36 | 8.42 | 7.58 | 7.98 | 8.46 | 7.55 | 7.39 | 8.15 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 6.99 | 7.20 | 7.29 | 7.18 | 7.30 | 7.11 | 7.67 | 7.33 | 7.22 | 7.42 | 7.60 | 7.16 | 7.46 | 7.50 | 7.33 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 57.00 | 7.00 | 7.00 | 11.60 | 5.30 | 688.00 | 3.00 | 51.30 | 28.40 | 92.70 | 71.80 | 13.00 | 31.00 | 3.00 | 10.40 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 1850.00 | 1769.00 | 1910.00 | 1750.00 | 1680.00 | 1810.00 | 1800.00 | 1790.00 | 1760.00 | 1800.00 | 1890.00 | 1750.00 | 818.00 | 838.00 | 834.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | - | - | - | 4.21 | 3.81 | 489.00 | 3.38 | 47.30 | 8.68 | 23.30 | 22.70 | 5.31 | - | - | 1.55 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | - | - | - | 11.30 | 21.50 | - | 1.00 | 1.00 | 17.20 | 22.00 | 17.20 | 1.0 | - | - | 3.70 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 2140.00 | 2103.00 | 2155.00 | 1660.00 | 1630.00 | 1690.00 | 1610.00 | 1640.00 | 1580.00 | 1570.00 | 1610.00 | 1470.00 | 928.00 | 995.00 | 753.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 0.50 | 0.50 | 0.50 | 1.00 | 67.40 | 1.00 | 78.20 | 1.00 | 42.80 | 1.00 | 1.00 | 162.00 | 0.50 | 0.50 | 1.00 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | - | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 0.10 | 0.10 | 0.10 | 33.70 | - | - | - | - | - | - | - | - | 0.10 | 0.10 | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 1760.00 | 1725.00 | 1768.00 | 1660.00 | 1700.00 | 1690.00 | 1690.00 | 1640.00 | 1630.00 | 1570.00 | 1610.00 | 1630.00 | 761.00 | 816.00 | 753.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.64 | 0.68 | 0.50 | 0.67 | 0.64 | 0.70 | 0.68 | 0.63 | 0.66 | 0.70 | 0.70 | 0.71 | 0.41 | 0.32 | 0.37 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | - | - | - | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - | - | 0.25 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 9.80 | 9.20 | 9.40 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 2.10 | 0.50 | 2.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 0.68 | - | - | 0.43 | 0.49 | 0.59 | 0.51 | 0.55 | 0.52 | 0.59 | 0.51 | 0.55 | - | - | 1.53 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | - | - | - | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | - | - | 0.03 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | - | - | - | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | - | - | 0.01 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.01 | 0.01 | - | 0.80 | 0.76 | 1.04 | 0.71 | 1.15 | 0.72 | 0.70 | 0.75 | 0.72 | - | - | 0.38 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.03 | 0.03 | 0.03 | 0.01 | 0.00 | - | 0.00 | 0.03 | 0.02 | 0.05 | 0.01 | 0.01 | 0.02 | 0.01 | 0.00 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.07 | 0.04 | 0.04 | 0.04 | 0.03 | 0.20 | 0.03 | 0.11 | 0.03 | 0.02 | 0.04 | 0.03 | 0.06 | 0.02 | 0.01 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 7.90 | 0.10 | 0.10 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.80 | 0.10 | 1.50 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | - | - | - | 0.50 | 0.50 | 1.11 | 0.56 | 2.51 | 0.54 | 0.50 | 0.50 | 0.81 | - | - | 0.50 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | - | - | - | 1.06 | 0.50 | 64.80 | 1.10 | 8.48 | 1.10 | 0.81 | 1.49 | 0.75 | - | - | 0.50 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 0.97 | 0.19 | 0.08 | 0.06 | 0.03 | 9.42 | 0.02 | 0.33 | 0.79 | 5.96 | 4.11 | 0.22 | 0.79 | 0.07 | 0.09 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 2.05 | 3.57 | 3.77 | 4.19 | 3.17 | 5.01 | 3.15 | 3.92 | 3.52 | 3.46 | 4.53 | 3.15 | 0.82 | 0.89 | 0.96 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.39 | 0.37 | 0.34 | 0.34 | 0.32 | 0.38 | 0.30 | 0.35 | 0.29 | 0.32 | 0.33 | 0.31 | 0.45 | 0.17 | 0.18 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 40.90 | 35.00 | 35.20 | 35.60 | 31.30 | 40.70 | 30.70 | 33.10 | 27.70 | 32.70 | 35.80 | 29.00 | 15.90 | 14.00 | 19.60 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 1.31 | 0.26 | 1.00 | 0.76 | 0.41 | 8.39 | 0.46 | 1.32 | 0.85 | 2.19 | 2.97 | 0.60 | 1.28 | 0.66 | 0.53 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | - | 0.11 | 0.11 | 0.11 | 0.10 | 0.12 | 0.09 | 0.11 | 0.10 | 0.11 | 0.11 | 0.10 | 0.05 | 0.05 | 0.05 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 7.60 | 6.84 | 6.69 | 6.70 | 5.96 | 9.75 | 6.07 | 6.93 | 6.19 | 7.54 | 7.47 | 5.51 | 2.45 | 2.08 | 2.15 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.29 | 0.15 | 0.06 | 0.04 | 0.03 | 0.15 | 0.03 | 0.06 | 0.03 | 0.04 | 0.07 | 0.03 | 0.06 | 0.01 | 0.02 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.01 | 0.00 | 0.02 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 5.50 | 3.70 | 3.39 | 3.40 | 2.90 | 4.00 | 3.00 | 3.90 | 2.80 | 3.20 | 3.60 | 2.90 | 1.98 | 1.68 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 733.00 | 701.00 | 778.00 | 776.00 | 746.00 | 698.00 | 615.00 | 771.00 | 663.00 | 738.00 | 754.00 | 649.00 | 326.00 | 342.00 | 331.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | - | 0.02 | 0.01 | 0.05 | 0.05 | 0.04 | 0.01 | 0.01 | 0.01 | 0.04 | 0.02 | 0.02 | 0.01 | 0.01 | 0.05 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.01 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.02 | 0.04 | 0.05 | 0.01 | 0.01 | 0.04 | 0.01 | 0.03 | 0.01 | 0.02 | 0.02 | 0.01 | 0.03 | 0.06 | 0.01 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.06 | 0.02 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.06 | 0.32 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.60 | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.003 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.010 | 0.006 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 2.02 | 3.50 | 3.63 | 4.06 | 3.02 | 3.69 | 3.18 | 3.32 | 3.19 | 3.50 | 3.71 | 3.62 | 0.80 | 0.88 | 0.91 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.36 | 0.24 | 0.32 | 0.31 | 0.33 | 0.36 | 0.34 | 0.33 | 0.29 | 0.32 | 0.33 | 0.29 | 0.36 | 0.06 | 0.16 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.003 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 40.000 | 32.900 | 35.200 | 35.100 | 30.900 | 30.800 | 31.400 | 27.500 | 28.300 | 29.900 | 31.600 | 29.600 | 15.000 | 14.000 | 14.200 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.003 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 | 0.001 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.001 | 0.001 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.01 | 0.01 | 0.01 | 0.68 | 0.32 | 0.03 | 0.40 | 0.26 | 0.50 | 0.56 | 0.55 | 0.43 | 0.13 | 0.30 | 0.46 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | - | 0.10 | 0.11 | 0.11 | 0.10 | 0.10 | 0.10 | 0.09 | 0.09 | 0.10 | 0.11 | 0.09 | 0.05 | 0.04 | 0.05 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 7.50 | 6.75 | 6.69 | 6.29 | 5.99 | 6.33 | 6.05 | 5.79 | 6.04 | 6.06 | 6.97 | 5.69 | 2.15 | 2.08 | 2.09 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.27 | 0.08 | 0.01 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.04 | 0.00 | 0.01 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0001 | 0.0001 | 0.0500 | 0.0002 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0500 | 0.0002 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.006 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.005 | 0.001 | 0.001 | 0.005 | 0.005 | 0.001 | 0.001 | 0.003 | 0.001 | 0.003 | 0.005 | 0.001 | 0.001 | 0.001 | 0.005 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 4.900 | 3.700 | 3.390 | 3.200 | 3.100 | 3.300 | 3.100 | 3.100 | 2.800 | 2.900 | 3.500 | 3.100 | 1.960 | 1.630 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0020 | 0.0002 | 0.0002 | 0.0010 | 0.0010 | 0.0001 | 0.0001 | 0.0003 | 0.0001 | 0.0003 | 0.0003 | 0.0001 | 0.0002 | 0.0002 | 0.0010 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 708.00 | 665.00 | 778.00 | 795.00 | 731.00 | 703.00 | 709.00 | 691.00 | 657.00 | 684.00 | 769.00 | 668.00 | 326.00 | 323.00 | 371.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | - | 0.00 | 0.00 | 0.05 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.05 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | - | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - | - |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000040 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | - | - | - | - | - | 0.000015 | 0.000041 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - | - | - |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000016 | 0.000010 | - | - | - |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | - | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - | - |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | - | - | - | - | - | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000021 | 0.000020 | - | - | - |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | - | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | - | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T95R-15C | T95R-15C | T95R-15C | T95R-15C | T95R-15C | T95R-15C | T95R-15C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | T96R-34-87 | - | - | - | | T95R-15C | T95R-15C | T95R-15C |
| | | | | | Geol | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR |
| | | | | | Date Sampled | 27-Sep-2017 | 2-Apr-2018 | 20-Jun-2018 | 12-Sep-2018 | 9-Jan-2019 | 4-Apr-2019 | 5-Jun-2019 | 26-Oct-1995 | 28-Oct-1996 | 23-Aug-1997 | 9-Nov-2016 | 26-Sep-2017 | 20-Apr-2018 | 20-Jun-2018 |
| | | | | | ALS Sample ID (2017-2018) | L2000339-3 | L2078247-8 | L2117455-3 | L2164994-2 | L2220048-3 | L2254339-2 | L2287159-3 | - | - | - | - | L2000339-1 | L2085540-1 | L2117455-2 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | QA4704 | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | 95-04060-1 | 96-04300-2 | 97-04136-41 | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 5.00 | 5.00 | 5.00 | 5.00 | 5.0 | 49.90 | 6.30 | - | - | - | 5.00 | 5.00 | 5.00 | 5.00 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 1280.00 | 1340.00 | 1310.00 | 1470.00 | 1830.00 | 1600.00 | 1690.00 | 1440.00 | 1375.00 | 1414.00 | 1340.00 | 1260.00 | 1300.00 | 1250.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 1414.00 | 1379.00 | 1453.00 | 1415.00 | 1896.00 | 1697.00 | 1744.00 | 1665.00 | 1355.00 | 987.00 | | 1370.00 | 1602.00 | 1370.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 42.00 | 41.70 | 41.50 | 35.70 | 43.10 | 39.80 | 39.30 | 23.70 | 20.60 | 21.20 | 22.80 | 18.30 | 17.80 | 17.40 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.98 | 8.58 | 8.65 | 8.46 | 7.90 | 8.09 | 8.61 | 8.13 | 8.14 | 8.12 | 8.60 | 8.48 | 8.82 | 8.79 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 7.50 | 7.68 | 7.47 | 7.50 | 7.64 | 7.75 | 7.42 | 7.34 | 8.20 | 8.25 | - | 8.20 | 8.40 | 8.31 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 4.70 | 3.00 | 13.50 | 13.40 | 44.60 | 48.00 | 9.90 | 604.00 | 0.40 | 2.00 | 120.00 | 5.30 | 3.00 | 3.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 862.00 | 871.00 | 838.00 | 869.00 | 1220.00 | 1100.00 | 1090.00 | 853.00 | 821.00 | 858.00 | 820.00 | 867.00 | 837.00 | 803.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 2.45 | 0.98 | 2.94 | 11.90 | 12.90 | 75.10 | 10.60 | - | - | - | 120.00 | 3.11 | 0.50 | 1.80 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 8.80 | 1.00 | 1.00 | 1.00 | 7.00 | 6.60 | 1.00 | - | - | - | 0.50 | 1.00 | - | 1.00 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 759.00 | 740.00 | 762.00 | 803.00 | 1100.00 | 883.00 | 969.00 | 989.00 | 954.00 | 1009.00 | 872.00 | 698.00 | 609.00 | 698.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 44.80 | 72.40 | 43.40 | 37.40 | 1.00 | 7.20 | 75.80 | 0.50 | 0.50 | 0.50 | 26.60 | 63.80 | 60.40 | 58.00 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 22.40 | - | - | - | - | - | - | 0.10 | 0.10 | 0.10 | 22.20 | 31.90 | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 804.00 | 813.00 | 805.00 | 840.00 | 1100.00 | 890.00 | 1050.00 | 811.00 | 783.00 | 828.00 | 759.00 | 762.00 | 670.00 | 756.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.37 | 0.40 | 0.40 | 0.40 | 0.49 | 0.42 | 0.47 | 0.26 | 0.28 | 0.22 | 0.33 | 0.25 | 0.25 | 0.28 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | 0.25 | 0.25 | 0.25 | 0.25 | 0.50 | 0.50 | 0.25 | - | - | - | - | 0.25 | 0.25 | 0.25 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 2.50 | 2.50 | 2.50 | 2.50 | 5.00 | 5.00 | 2.50 | 1.90 | 2.20 | 2.20 | 3.00 | 2.50 | 2.50 | 2.70 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 1.51 | 1.46 | 1.49 | 1.43 | 1.49 | 1.04 | 1.36 | 2.16 | - | - | 2.20 | 2.24 | 2.14 | 2.30 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.03 | 0.03 | 0.03 | 0.03 | 0.05 | 0.05 | 0.03 | - | - | - | 0.02 | 0.03 | 0.03 | 0.03 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | - | - | - | 0.01 | 0.01 | 0.01 | 0.01 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.42 | 0.40 | 0.46 | 0.49 | 0.52 | 0.70 | 0.48 | 0.00 | 0.01 | - | 0.45 | 0.28 | 0.27 | 0.77 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | - | - | - | - | - | - | 0.00 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.02 | 0.01 | 0.04 | 0.04 | 0.04 | - | 0.03 | - | 0.01 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.02 | 0.01 | 0.02 | 0.03 | 0.04 | 0.08 | 0.03 | 0.30 | 0.04 | 0.05 | 0.13 | 0.04 | 0.04 | 0.05 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 1.50 | 1.50 | 1.50 | 1.50 | 8.40 | 3.00 | 1.50 | 2.40 | 0.30 | 0.40 | 1.01 | 1.50 | 1.50 | 1.50 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 0.50 | 0.50 | 0.53 | 1.37 | 0.65 | 7.55 | 1.57 | - | - | - | 0.84 | 0.50 | 0.62 | 1.71 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 0.50 | 0.50 | 0.67 | 1.16 | 1.11 | 10.40 | 2.10 | - | - | - | 0.50 | 0.80 | 0.54 | 2.71 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 0.02 | 0.01 | 0.05 | 0.27 | 0.29 | 2.26 | 0.33 | 9.48 | 0.05 | 0.05 | 1.57 | 0.11 | 0.02 | 0.05 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.85 | 0.78 | 0.94 | 0.95 | 1.04 | 0.95 | 1.00 | 0.53 | 0.33 | 0.30 | 0.38 | 0.29 | 0.29 | 0.30 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.17 | 0.16 | 0.16 | 0.18 | 0.17 | 0.17 | 0.17 | 0.19 | 0.24 | 0.16 | 0.14 | 0.15 | 0.12 | 0.12 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 14.50 | 13.20 | 21.00 | 13.80 | 15.70 | 13.10 | 12.60 | - | 6.99 | 6.54 | 6.63 | 5.59 | 5.12 | 5.10 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 0.59 | 0.45 | 0.81 | 1.43 | 0.77 | 3.69 | 0.85 | 24.70 | 0.05 | 0.09 | 3.01 | 0.17 | 0.07 | 0.15 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.05 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.04 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 2.05 | 1.72 | 1.92 | 2.10 | 2.73 | 2.75 | 2.22 | - | 1.20 | 1.18 | 1.53 | 1.07 | 0.97 | 0.90 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 | 0.17 | 0.04 | 0.79 | 0.00 | 0.00 | 0.08 | 0.01 | 0.00 | 0.00 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | - | 1.26 | 1.29 | 1.20 | 2.00 | 2.00 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 353.00 | 284.00 | 311.00 | 345.00 | 467.00 | 427.00 | 425.00 | - | 361.00 | 372.00 | 356.00 | 372.00 | 305.00 | 287.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.01 | | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.05 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.01 | - | 0.01 | 0.02 | 0.01 | 0.05 | 0.01 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.03 | 0.00 | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.01 | 0.11 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.09 | 0.11 | 0.70 | 0.03 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.89 | 0.83 | 0.90 | 0.93 | 1.08 | 0.82 | 1.03 | 0.23 | 0.33 | 0.31 | 0.29 | 0.30 | 0.30 | 0.31 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.17 | 0.17 | 0.15 | 0.14 | 0.17 | 0.16 | 0.16 | 0.13 | 0.15 | 0.03 | 0.14 | 0.14 | 0.13 | 0.12 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 13.400 | 13.400 | 13.200 | 11.100 | 13.300 | 12.000 | 12.200 | - | 6.410 | 6.540 | 5.430 | 5.620 | 5.550 | 5.340 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.002 | 0.001 | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.024 | 0.001 | 0.001 | 0.001 | 0.001 | 0.003 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.002 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.42 | 0.38 | 0.37 | 0.39 | 0.50 | 0.71 | 0.61 | 1.03 | 0.01 | 0.01 | 0.08 | 0.06 | 0.07 | 0.06 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.05 | 0.04 | 0.05 | 0.04 | 0.05 | 0.05 | 0.04 | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 2.07 | 2.03 | 2.05 | 1.94 | 2.37 | 2.41 | 2.16 | - | 1.12 | 1.18 | 1.05 | 1.04 | 0.96 | 0.98 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.13 | 0.04 | 0.11 | 0.00 | 0.00 | 1.00 | 0.01 | 0.00 | 0.00 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0500 | 0.0000 | 0.0002 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.004 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.003 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.005 | 0.001 | 0.001 | 0.001 | 0.001 | 0.003 | 0.001 | 0.005 | 0.001 | 0.001 | 0.000 | 0.005 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | - | 1.190 | 1.150 | 1.020 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0010 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0010 | 0.0001 | 0.0001 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 358.00 | 337.00 | 346.00 | 336.00 | 442.00 | 448.00 | 417.00 | - | 332.00 | 342.00 | 333.00 | 357.00 | 321.00 | 313.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | | | 0.01 | | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | - | 0.00 | 0.00 | 0.01 | 0.05 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - | - | - | - | 0.000005 | 0.000005 |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - | - | - | - | - | 0.000015 | 0.000015 |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - | - | - | - | 0.000005 | 0.000005 |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - | - | - | 0.000050 | 0.000050 |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - | - | - | 0.000050 | 0.000050 |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - | - | - | 0.000050 | 0.000050 |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | - | - | - | - | - | 0.000020 | 0.000020 |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - | - | - | - | 0.000010 | 0.000010 |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - | - | - | - | 0.000050 | 0.000050 |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T95R-15C | T95R-15C | T95R-15C | T95R-15C | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W1 Shallow | W1 Shallow | W1 Shallow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | T95R-15C | T95R-15C | T95R-15C | T95R-15C | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W3 Deep | W1 Shallow | W1 Shallow | W1 Shallow |
| | | | | | Geol | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | OVB | OVB | OVB |
| | | | | | Date Sampled | 11-Sep-2018 | 9-Jan-2019 | 5-Apr-2019 | 7-Jun-2019 | 25-Apr-2018 | 25-Jun-2018 | 15-Sep-2018 | 14-Jan-2019 | 5-Apr-2019 | 7-Jun-2019 | 30-Aug-2019 | 23-Nov-2019 | 27-Apr-2018 | 28-Jun-2018 | 11-Sep-2018 |
| | | | | | ALS Sample ID (2017-2018) | L2163047-1 | L2220048-4 | L2255482-7 | L2288653-1 | L2085540-2 | L2120097-2 | L2166287-4 | L2222626-1 | L2255482-8 | L2288653-2 | L2340452-2 | L2387383-6 | L2087343-1 | L2122028-2 | L2163047-3 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 5.00 | 5.00 | 5.00 | 5.00 | 9.50 | 13.30 | 9.90 | 11.10 | 7.70 | 8.30 | 6.30 | 7.80 | 9.30 | 6.60 | 6.20 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 1330.00 | 1280.00 | 1320.00 | 1300.00 | 752.00 | 627.00 | 682.00 | 645.00 | 580.00 | 567.00 | 580.00 | 682.00 | 764.00 | 760.00 | 748.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 1326.00 | 1310.00 | 1366.00 | 1323.00 | 722.00 | 546.00 | 754.00 | 701.00 | 584.00 | 557.00 | 618.00 | 661.00 | 789.00 | 752.00 | 751.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 15.00 | 16.50 | 16.60 | 17.30 | 138.00 | 112.00 | 129.00 | 127.00 | 83.40 | 79.80 | 66.00 | 106.00 | 11.40 | 10.80 | 9.72 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 8.69 | 8.42 | 8.60 | 8.60 | 8.38 | 7.83 | 8.16 | 8.45 | 8.23 | 8.27 | 8.53 | 8.14 | 8.74 | 8.86 | 8.80 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 8.18 | 8.41 | 8.59 | 8.27 | 8.20 | 7.65 | 8.26 | 7.74 | 8.17 | 7.79 | 8.03 | 7.78 | 9.10 | 8.85 | 8.99 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 3.00 | 34.40 | 12.20 | 4.20 | 70.50 | 9.90 | 8.00 | 14.00 | 46.20 | 7.20 | 196.00 | 55.50 | 41.30 | 3.00 | 17.10 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 793.00 | 848.00 | 801.00 | 850.00 | 595.00 | 504.00 | 500.00 | 420.00 | 365.00 | 409.00 | 373.00 | 460.00 | 494.00 | 459.00 | 466.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 0.23 | 53.50 | 9.90 | 4.42 | 8.02 | 5.54 | 2.32 | 5.23 | 29.00 | 3.04 | 22.60 | 31.00 | 173.00 | 4.13 | 6.29 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 1.00 | 1.00 | 1.00 | 1.00 | - | 8.60 | 1.90 | 1.90 | 1.20 | 1.00 | 1.00 | 3.10 | - | 1.00 | 1.00 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 739.00 | 718.00 | 734.00 | 692.00 | 238.00 | 247.00 | 283.00 | 265.00 | 257.00 | 248.00 | 240.00 | 295.00 | 318.00 | 310.00 | 321.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 51.00 | 18.40 | 36.60 | 83.00 | 8.20 | 1.00 | 13.40 | 16.20 | 1.00 | 17.60 | 14.20 | 13.60 | 26.60 | 25.80 | 30.60 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 790.00 | 736.00 | 770.00 | 775.00 | 246.00 | 247.00 | 296.00 | 281.00 | 257.00 | 266.00 | 254.00 | 309.00 | 344.00 | 336.00 | 351.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.01 | 0.26 | 0.23 | 0.25 | 0.47 | 0.40 | 0.36 | 0.30 | 0.12 | 0.04 | 0.08 | 0.09 | 0.06 | 0.05 | 0.06 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | 0.25 | 0.25 | 0.25 | 0.25 | 0.30 | 0.07 | 0.25 | 0.05 | 0.05 | 0.05 | 0.05 | 0.07 | 0.25 | 0.05 | 0.25 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 2.50 | 2.50 | 2.50 | 2.50 | 15.10 | 7.63 | 7.30 | 4.27 | 3.42 | 3.05 | 2.70 | 5.62 | 2.50 | 0.50 | 2.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 2.47 | 2.33 | 2.23 | 2.40 | 0.41 | 0.41 | 0.42 | 0.48 | 0.32 | 0.34 | 0.34 | 0.43 | 0.80 | 0.87 | 0.98 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.01 | 0.03 | 0.03 | 0.53 | 0.89 | 0.59 | 0.05 | 0.03 | 0.01 | 0.03 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.28 | 0.28 | 0.28 | 0.27 | 12.10 | 7.12 | 2.23 | 1.60 | 1.99 | 3.40 | 0.93 | 0.83 | 0.48 | 0.11 | 0.58 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | 0.03 | 0.03 | 0.03 | 0.03 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.01 | 0.01 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.04 | 0.04 | 0.04 | 0.04 | - | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | - | 0.02 | 0.06 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.04 | 0.05 | 0.05 | 0.04 | 0.02 | 0.07 | 0.00 | 0.03 | 0.03 | 0.01 | 0.02 | 0.02 | 0.10 | 0.02 | 0.10 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 1.50 | 1.50 | 1.50 | 1.50 | 141.00 | 76.90 | 84.70 | 59.20 | 51.30 | 53.70 | 51.30 | 75.80 | 62.30 | 62.60 | 66.00 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 1.10 | 0.75 | 0.84 | 0.57 | 38.70 | 27.70 | 23.90 | 11.70 | 7.14 | 10.60 | 12.40 | 18.30 | 2.91 | 2.56 | 3.84 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 0.58 | 1.86 | 1.27 | 0.50 | 47.10 | 31.00 | 15.50 | 7.02 | 6.12 | 9.93 | 3.85 | 21.40 | 6.62 | 2.58 | 5.91 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 0.01 | 1.05 | 0.59 | 0.08 | 0.10 | 0.02 | 0.04 | 0.37 | 0.27 | 0.03 | 0.30 | 0.24 | 5.32 | 0.13 | 0.38 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.31 | 0.33 | 0.36 | 0.29 | 0.05 | 0.02 | 0.03 | 0.03 | 0.05 | 0.03 | 0.07 | 0.07 | 0.10 | 0.03 | 0.03 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.12 | 0.13 | 0.15 | 0.14 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.19 | 0.23 | 0.22 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 4.79 | 5.95 | 5.80 | 5.56 | 42.00 | 28.90 | 32.90 | 25.60 | 29.50 | 19.90 | 18.80 | 32.00 | 4.49 | 3.16 | 3.28 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.02 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 0.06 | 1.18 | 0.40 | 0.14 | 0.17 | 0.09 | 0.12 | 0.54 | 0.37 | 0.08 | 0.22 | 0.27 | 4.36 | 0.11 | 0.34 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.04 | 0.04 | 0.05 | 0.05 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 0.85 | 1.29 | 1.11 | 1.01 | 9.61 | 7.21 | 9.18 | 7.59 | 6.86 | 6.73 | 6.12 | 9.30 | 2.45 | 0.63 | 0.70 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.00 | 0.03 | 0.01 | 0.00 | 0.28 | 0.21 | 0.22 | 0.21 | 0.13 | 0.09 | 0.09 | 0.19 | 0.16 | 0.02 | 0.04 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 2.00 | 2.00 | 2.00 | 2.00 | 3.30 | 2.90 | 2.50 | 2.10 | 2.00 | 2.00 | 2.00 | 2.40 | 2.20 | 2.00 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 294.00 | 325.00 | 340.00 | 325.00 | 115.00 | 112.00 | 132.00 | 117.00 | 118.00 | 101.00 | 107.00 | 113.00 | 177.00 | 194.00 | 187.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.05 | 0.01 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.01 | 0.01 | 0.03 | 0.03 | 0.01 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.01 | 0.02 | 0.01 | 0.02 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.32 | 0.31 | 0.35 | 0.31 | 0.04 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.02 | 0.03 | 0.02 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.11 | 0.12 | 0.13 | 0.14 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.19 | 0.21 | 0.20 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 4.590 | 5.110 | 5.080 | 5.370 | 40.600 | 31.400 | 36.100 | 33.800 | 22.300 | 20.600 | 16.500 | 28.100 | 3.490 | 3.320 | 3.020 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.004 | 0.015 | 0.014 | 0.003 | 0.002 | 0.001 | 0.003 | 0.003 | 0.001 | 0.002 | 0.002 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.06 | 0.07 | 0.06 | 0.07 | 0.04 | 0.05 | 0.06 | 0.16 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.04 | 0.04 | 0.05 | 0.05 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 0.86 | 0.91 | 0.94 | 0.94 | 8.82 | 8.13 | 9.40 | 10.40 | 6.71 | 6.89 | 6.04 | 8.82 | 0.64 | 0.61 | 0.53 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.24 | 0.22 | 0.34 | 0.11 | 0.07 | 0.06 | 0.15 | 0.02 | 0.01 | 0.01 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.009 | 0.007 | 0.006 | 0.007 | 0.011 | 0.010 | 0.012 | 0.007 | 0.009 | 0.008 | 0.008 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.005 | 0.003 | 0.003 | 0.003 | 0.002 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.000 | 2.000 | 2.000 | 2.000 | 3.600 | 3.000 | 2.600 | 2.600 | 2.000 | 2.000 | 2.000 | 2.200 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0003 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 314.00 | 298.00 | 327.00 | 316.00 | 113.00 | 116.00 | 126.00 | 138.00 | 118.00 | 104.00 | 107.00 | 109.00 | 183.00 | 194.00 | 181.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | 0.000054 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | 0.000060 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | 0.000065 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | 0.000094 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | 0.000048 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | 0.000029 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | 0.000085 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | 0.000008 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | 0.000184 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | 0.000048 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | 0.000020 | 0.000022 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | - |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | 0.000237 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000030 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000080 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | W1 Shallow | W1 Shallow | W1 Shallow | W1 Shallow | W1 Shallow | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | T0B96-02-06 | T0B96-02-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | W1 Shallow | W1 Shallow | W1 Shallow | W1 Shallow | W1 Shallow | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | W1 Deep | - | T0B96-02-06 |
| | | | | | Geol | OVB | OVB | OVB | OVB | OVB | BDR | BDR | BDR | BDR | BDR | BDR | BDR | BDR | OVB | OVB |
| | | | | | Date Sampled | 10-Jan-2019 | 6-Apr-2019 | 4-Jun-2019 | 29-Aug-2019 | 21-Nov-2019 | 28-Apr-2018 | 28-Jun-2018 | 11-Sep-2018 | 10-Jan-2019 | 6-Apr-2019 | 4-Jun-2019 | 29-Aug-2019 | 24-Nov-2019 | 20-Sep-1996 | 23-Aug-1997 |
| | | | | | ALS Sample ID (2017-2018) | L2220047-3 | L2255482-4 | L2287158-1 | L2339588-1 | L2387383-4 | L2087343-2 | L2122028-1 | L2163047-2 | L2220047-1 | L2255482-5 | L2287159-2 | L2340452-1 | L2387383-2 | - | - |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | - | - | - | - | - | - | 96-03529-14 | 97-04136-38 |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 14.70 | 7.30 | 6.90 | 5.00 | 15.10 | 8.50 | 5.50 | 5.00 | 23.10 | 7.20 | 8.20 | 6.90 | 5.00 | - | - |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 738.00 | 758.00 | 752.00 | 775.00 | 767.00 | 1040.00 | 1070.00 | 1050.00 | 933.00 | 1060.00 | 1040.00 | 1080.00 | 1070.00 | 630.00 | 568.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 770.00 | 787.00 | 756.00 | 798.00 | 745.00 | 1212.00 | 1057.00 | 1045.00 | 966.00 | 1096.00 | 1053.00 | 1111.00 | 1061.00 | 570.00 | 560.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 12.20 | 11.00 | 10.10 | 10.90 | 11.40 | 6.38 | 4.68 | 3.88 | 4.29 | 4.20 | 4.03 | 3.87 | 3.97 | 338.00 | 289.00 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 8.80 | 8.77 | 8.80 | 8.85 | 8.74 | 8.92 | 8.96 | 9.01 | 9.15 | 8.95 | 8.97 | 9.01 | 9.04 | 7.87 | 7.12 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 8.33 | 9.60 | 8.96 | 9.08 | 8.87 | 9.30 | 9.10 | 9.25 | 8.97 | 9.64 | 9.16 | 9.17 | 9.18 | 7.58 | 7.36 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 32.70 | 111.00 | 59.40 | 49.60 | 33.10 | 266.00 | 34.70 | 20.50 | 17.50 | 73.80 | 53.40 | 253.00 | 182.00 | 63.00 | 37.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 574.00 | 462.00 | 529.00 | 545.00 | 491.00 | 901.00 | 697.00 | 651.00 | 621.00 | 628.00 | 673.00 | 834.00 | 711.00 | 340.00 | 311.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 164.00 | 62.50 | 160.00 | 166.00 | 88.70 | 730.00 | 56.20 | 30.90 | 26.20 | 106.00 | 77.30 | 858.00 | 254.00 | - | - |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | - | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | - | - |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 300.00 | 306.00 | 325.00 | 329.00 | 318.00 | 468.00 | 465.00 | 456.00 | 377.00 | 471.00 | 473.00 | 465.00 | 461.00 | 386.00 | 380.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 26.20 | 24.20 | 27.00 | 29.20 | 26.20 | 56.40 | 58.80 | 66.80 | 70.40 | 57.80 | 49.80 | 65.60 | 63.00 | 0.50 | 0.50 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.10 | 0.10 |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 326.00 | 331.00 | 352.00 | 358.00 | 344.00 | 524.00 | 524.00 | 522.00 | 447.00 | 529.00 | 523.00 | 530.00 | 524.00 | 317.00 | 312.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.06 | 0.06 | 0.07 | 0.05 | 0.05 | 0.10 | 0.10 | 0.11 | 0.07 | 0.10 | 0.11 | 0.13 | 0.12 | 0.05 | 0.01 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | - | - |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 0.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 0.90 | 0.91 | 0.85 | 0.85 | 0.89 | 5.06 | 5.12 | 5.55 | 3.85 | 5.40 | 4.72 | 5.12 | 5.32 | - | - |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | - | - |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | - | - |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.18 | 0.34 | 0.24 | 0.11 | 0.18 | 0.19 | 0.16 | 0.15 | 0.25 | 0.23 | 0.44 | 0.35 | 0.20 | - | - |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | - | 0.02 | 0.03 | 0.10 | 0.04 | 0.06 | 0.03 | 0.06 | - | - |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | - | 0.04 | 0.04 | 0.12 | 0.07 | 0.06 | - | 0.07 | 0.01 | 0.00 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.09 | 0.06 | 0.09 | 0.09 | 0.06 | 0.10 | 0.05 | 0.04 | 0.11 | 0.07 | 0.09 | 0.10 | 0.08 | 0.06 | 0.04 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 70.20 | 62.00 | 56.00 | 58.80 | 73.50 | 47.40 | 54.30 | 52.60 | 48.20 | 46.90 | 46.90 | 46.70 | 48.70 | 13.40 | 9.10 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 2.85 | 3.45 | 3.84 | 5.06 | 3.10 | 2.99 | 3.86 | 2.99 | 4.05 | 5.68 | 4.44 | 4.23 | 4.39 | - | - |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 3.70 | 4.91 | 4.06 | 7.03 | 3.35 | 3.58 | 3.88 | 3.00 | 4.17 | 5.77 | 6.19 | 4.93 | 4.10 | - | - |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 4.22 | 0.58 | 4.19 | 3.98 | 2.32 | 9.96 | 1.21 | 0.58 | 0.57 | 1.55 | 1.36 | 6.33 | 3.59 | 1.30 | 0.18 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.07 | 41.30 | 1.30 | 1.72 | 0.13 | 0.15 | 0.03 | 0.03 | 0.02 | 0.04 | 0.07 | 0.12 | 0.08 | 0.16 | 0.14 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.20 | 0.22 | 0.24 | 0.22 | 0.20 | 0.30 | 0.35 | 0.33 | 0.30 | 0.35 | 0.30 | 0.27 | 0.33 | 0.09 | 0.01 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 4.77 | 4.08 | 4.26 | 4.39 | 4.55 | 3.13 | 1.61 | 1.34 | 1.55 | 1.52 | 1.61 | 2.06 | 1.60 | 90.60 | 86.00 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 3.81 | 0.75 | 3.94 | 3.55 | 2.19 | 3.21 | 0.38 | 0.19 | 0.25 | 0.52 | 0.94 | 2.13 | 1.17 | 1.77 | 0.27 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.09 | 0.09 | 0.09 | 0.07 | 0.09 | 0.08 | 0.09 | 0.09 | 0.00 | 0.00 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 2.33 | 0.88 | 2.07 | 2.14 | 1.59 | 2.92 | 0.50 | 0.33 | 0.35 | 0.56 | 0.53 | 1.93 | 1.06 | 27.20 | 23.90 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.14 | 0.05 | 0.14 | 0.13 | 0.08 | 0.13 | 0.02 | 0.02 | 0.02 | 0.03 | 0.04 | 0.10 | 0.05 | 0.12 | 0.05 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.70 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.03 | 0.75 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 190.00 | 205.00 | 190.00 | 191.00 | 181.00 | 259.00 | 279.00 | 255.00 | 246.00 | 256.00 | 247.00 | 234.00 | 240.00 | 11.40 | 8.11 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.04 | 0.02 | 0.07 | 0.05 | 0.03 | 0.02 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 | 0.02 | 0.03 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.02 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.03 | 0.01 | 0.01 | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.28 | 0.01 | 0.00 | 0.00 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.000 | 0.000 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.02 | 0.15 | 0.02 | 0.05 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.03 | 0.03 | 0.14 | 0.14 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.19 | 0.23 | 0.19 | 0.23 | 0.20 | 0.29 | 0.32 | 0.30 | 0.30 | 0.33 | 0.30 | 0.27 | 0.31 | 0.04 | 0.01 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 3.780 | 3.360 | 3.120 | 3.310 | 3.480 | 2.040 | 1.490 | 1.240 | 1.400 | 1.320 | 1.280 | 1.180 | 1.240 | 90.600 | 79.200 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.019 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.005 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.003 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.05 | 0.03 | 0.03 | 0.03 | 0.03 | 0.09 | 0.03 | 0.01 | 0.01 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.09 | 0.09 | 0.08 | 0.07 | 0.10 | 0.07 | 0.08 | 0.09 | 0.00 | 0.00 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 0.66 | 0.63 | 0.57 | 0.65 | 0.65 | 0.31 | 0.23 | 0.19 | 0.19 | 0.22 | 0.20 | 0.22 | 0.21 | 27.20 | 22.10 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 | 0.00 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.010 | 0.009 | 0.007 | 0.008 | 0.011 | 0.016 | 0.016 | 0.017 | 0.008 | 0.015 | 0.013 | 0.013 | 0.014 | 0.000 | 0.000 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.027 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 0.860 | 0.650 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0010 | 0.0004 | 0.0001 | 0.0004 | 0.0001 | 0.0002 | 0.0002 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 174.00 | 198.00 | 183.00 | 199.00 | 174.00 | 268.00 | 271.00 | 250.00 | 234.00 | 260.00 | 238.00 | 229.00 | 233.00 | 11.40 | 7.80 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.00 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - | - |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | - |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | - | - |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | - |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | - |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-20 | T0B96-02-20 | T0B96-02-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | - | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-06 | T0B96-02-20 | T0B96-02-20 | T0B96-02-20 |
| | | | | | Geol | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB |
| | | | | | Date Sampled | 10-Nov-2016 | 28-Sep-2017 | 16-Jan-2018 | 29-Mar-2018 | 22-Jun-2018 | 12-Sep-2018 | 8-Jan-2019 | 5-Apr-2019 | 6-Jun-2019 | 20-Sep-1996 | 23-Aug-1997 | 22-Jun-2018 |
| | | | | | ALS Sample ID (2017-2018) | - | L2000339-4 | L2047836-5 | L2078247-6 | L2120097-4 | L2164994-1 | L2218463-4 | L2255482-6 | L2288655-2 | - | - | L2120097-3 |
| | | | | | Maxxam Sample ID (2016) | QA4706 | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | - | - | 96-03529-16 | 97-04136-39 | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | - | - | 5.00 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 484.00 | 535.00 | 553.00 | 510.00 | 573.00 | 600.00 | 569.00 | 558.00 | 570.00 | 621.00 | 532.00 | 439.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | - | 557.00 | 555.00 | 559.00 | 587.00 | 587.00 | 565.00 | 595.00 | 586.00 | 560.00 | 500.00 | 395.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 389.00 | 314.00 | 297.00 | 311.00 | 308.00 | 312.00 | 328.00 | 325.00 | 321.00 | 246.00 | 271.00 | 200.00 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 8.05 | 7.79 | 8.04 | 8.22 | 7.99 | 7.72 | 7.78 | 8.10 | 8.08 | 8.14 | 7.67 | 7.97 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | - | 7.50 | 7.20 | 7.73 | 7.42 | 7.72 | 7.66 | 7.74 | 7.31 | 7.90 | 7.93 | 7.53 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 2670.00 | 35.50 | 6.10 | 3.00 | 3.70 | 3.00 | 6.00 | 14.60 | 15.10 | 26640.00 | 8060.00 | 378.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 314.00 | 329.00 | 327.00 | 318.00 | 334.00 | 335.00 | 324.00 | 306.00 | 336.00 | 357.00 | 290.00 | 248.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 1950.00 | 19.90 | 4.83 | 2.00 | 0.74 | 0.57 | 2.42 | 6.07 | 8.33 | | | 229.00 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 0.99 | 10.20 | - | 1.00 | 7.10 | 1.00 | 18.50 | 4.20 | 4.50 | - | - | 5.80 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 320.00 | 301.00 | 321.00 | 267.00 | 317.00 | 338.00 | 321.00 | 304.00 | 277.00 | 395.00 | 351.00 | 234.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 0.50 | 2.00 | - | - | - | - | - | - | 1.0 | 0.10 | 0.10 | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 263.00 | 301.00 | 321.00 | 267.00 | 317.00 | 338.00 | 321.00 | 304.00 | 277.00 | 324.00 | 288.00 | 234.00 |
| **Anions and Nitrogen** | | | n.g. | n.g. | **Anions and Nitrogen** | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.19 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.33 | 0.04 | 0.03 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | - | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | - | - | 0.05 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 1.10 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.60 | 0.50 | 0.77 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 0.14 | 0.10 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 | - | - | 0.10 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.02 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 | 0.02 | 0.02 | - | - | 0.07 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.48 | 0.04 | 0.03 | 0.23 | 0.16 | 0.28 | 0.03 | 0.06 | 0.07 | - | - | 0.76 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.0010 | 0.0010 | - | - | 0.00 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | - | 0.00 | - | 0.00 | 0.00 | 0.01 | 0.0020 | 0.0020 | 0.00 | 0.01 | 0.01 | 0.00 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.85 | 0.02 | 0.00 | 0.01 | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 | 13.70 | 6.42 | 1.21 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 10.80 | 9.77 | 10.40 | 9.28 | 9.61 | 9.15 | 11.10 | 9.86 | 11.60 | 19.50 | 9.90 | 9.98 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 1.95 | 1.88 | 1.36 | 3.78 | 2.29 | 2.72 | 1.30 | 3.89 | 1.48 | - | - | 4.21 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 1.92 | 1.25 | 1.18 | 2.21 | 1.85 | 1.43 | 1.05 | 1.42 | 1.32 | - | - | 24.60 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 16.70 | 1.19 | 0.19 | 0.06 | 0.05 | 0.05 | 0.14 | 0.40 | 0.83 | 116.00 | 65.40 | 7.95 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.03 | 0.01 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 1.01 | 0.14 | 0.13 | 0.10 | 0.11 | 0.14 | 0.13 | 0.15 | 0.14 | 4.94 | 1.37 | 0.30 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.05 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.05 | 0.13 | 0.10 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 106.00 | 85.40 | 92.70 | 77.70 | 80.80 | 87.40 | 80.70 | 88.60 | 81.30 | 343.00 | 154.00 | 93.40 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.08 | 0.01 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.13 | 0.01 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.21 | 0.03 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 20.00 | 0.85 | 0.14 | 0.06 | 0.07 | 0.07 | 0.08 | 0.28 | 0.61 | 521.00 | 143.00 | 17.00 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.11 | 0.02 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.02 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.05 | 0.01 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 30.40 | 24.90 | 25.30 | 21.50 | 24.00 | 24.40 | 24.90 | 26.80 | 23.90 | 145.00 | 54.60 | 25.10 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 4.46 | 0.48 | 0.11 | 0.03 | 0.01 | 0.02 | 0.03 | 0.11 | 0.15 | 8.36 | 3.94 | 0.75 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.02 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 3.96 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 22.80 | 8.60 | 2.50 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 13.60 | 7.90 | 7.80 | 6.60 | 7.70 | 7.50 | 8.10 | 8.30 | 7.30 | 63.50 | 11.50 | 8.60 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | 0.01 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.04 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.20 | 0.51 | 0.05 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.16 | 0.02 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.11 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 1.11 | 0.49 | 0.07 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.00 | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 1.00 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.004 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.11 | 0.12 | 0.12 | 0.11 | 0.12 | 0.13 | 0.13 | 0.14 | 0.14 | 0.17 | 1.07 | 0.09 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.05 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.01 | 0.01 | 0.10 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 78.200 | 84.900 | 80.900 | 85.100 | 82.700 | 84.900 | 90.000 | 85.300 | 86.100 | 62.200 | 69.700 | 49.800 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.007 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.006 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.009 | 0.001 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.01 | 0.05 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.01 | 0.01 | 0.03 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.01 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 22.40 | 24.80 | 23.20 | 23.90 | 24.70 | 24.40 | 25.20 | 27.20 | 25.80 | 21.90 | 23.50 | 18.50 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.18 | 0.00 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.001 | 0.005 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.019 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 0.794 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 1.160 | 0.690 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0004 | 0.0010 | 0.0005 | 0.0006 | 0.0008 | 0.0010 | 0.0004 | 0.0005 | 0.0010 | 0.0002 | 0.0002 | 0.0008 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 12.10 | 7.70 | 8.20 | 8.00 | 8.00 | 7.90 | 7.30 | 8.10 | 7.30 | 53.70 | 9.46 | 7.90 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | 0.01 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.01 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.24 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | - | - | 0.000005 | - | - | - | - | 0.000005 | - | - | - |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | - | - | 0.000015 | - | - | - | - | 0.000015 | - | - | - |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | - | - | 0.000005 | - | - | - | - | 0.000005 | - | - | - |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | - | - | 0.000050 | - | - | - | - | 0.000050 | - | - | - |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | - | - | 0.000050 | - | - | - | - | 0.000050 | - | - | - |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | - | - | 0.000050 | - | - | - | - | 0.000050 | - | - | - |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | - | - | 0.000020 | - | - | - | - | 0.000020 | - | - | - |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | - | - | 0.000010 | - | - | - | - | 0.000010 | - | - | - |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | - | - | 0.000050 | - | - | - | - | 0.000050 | - | - | - |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | - | - | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | T0B96-11-04 | - | - | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 | T0B96-01-05 |
| | | | | | Geol | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB |
| | | | | | Date Sampled | 23-Aug-1997 | 10-Nov-2016 | 27-Sep-2017 | 18-Jan-2018 | 5-Apr-2018 | 25-Jun-2018 | 10-Sep-2018 | 11-Jan-2019 | 1-Apr-2019 | 5-Jun-2019 | 20-Sep-1996 | 22-Aug-1997 | 19-Jan-2018 | 31-Mar-2018 | 21-Jun-2018 | 21-Jun-2018 |
| | | | | | ALS Sample ID (2017-2018) | - | - | L2000339-5 | L2047836-6 | L2078247-3 | L2120097-5 | L2163047-4 | L2220048-1 | L2254339-3 | L2287159-4 | - | - | L2047836-8 | L2078247-5 | L2117455-4 | L2117455-4 |
| | | | | | Maxxam Sample ID (2016) | - | QA4705 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | 97-04136-40 | - | - | - | - | - | - | - | - | - | 96-03529-13 | 97-04136-32 | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | - | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | - | - | 6.20 | 13.70 | 6.60 | 6.60 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 760.00 | 729.00 | 695.00 | 650.00 | 647.00 | 697.00 | 668.00 | 666.00 | 639.00 | 587.00 | 373.00 | 403.00 | 392.00 | 225.00 | 365.00 | 365.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 670.00 | - | 781.00 | 709.00 | 638.00 | 737.00 | 672.00 | 661.00 | 665.00 | 645.00 | 430.00 | 413.00 | 472.00 | 518.00 | 430.00 | 430.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 381.00 | 423.00 | 405.00 | 339.00 | 354.00 | 363.00 | 364.00 | 382.00 | 375.00 | 356.00 | 181.00 | 189.00 | 154.00 | 74.20 | 175.00 | 175.00 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.57 | 8.16 | 7.85 | 8.18 | 8.35 | 8.14 | 8.37 | 8.26 | 8.36 | 8.36 | 7.18 | 6.70 | 7.66 | 7.87 | 8.46 | 8.46 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 7.58 | - | 7.70 | 7.68 | 7.88 | 7.70 | 8.20 | 7.37 | 8.47 | 7.91 | 7.08 | 7.23 | 7.20 | 7.02 | 7.00 | 7.00 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 27.00 | 385.00 | 21.90 | 14.10 | 25.80 | 21.70 | 44.10 | 69.00 | 32.20 | 3.50 | 170.00 | 418.00 | 43.50 | 3.00 | 10.90 | 10.90 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 427.00 | 420.00 | 390.00 | 367.00 | 345.00 | 373.00 | 389.00 | 384.00 | 387.00 | 344.00 | 199.00 | 220.00 | 261.00 | 167.00 | 251.00 | 251.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | - | 288.00 | 20.20 | 7.74 | 19.80 | 10.00 | 22.80 | 48.50 | 22.10 | 6.31 | | | 47.10 | 21.00 | 10.20 | 10.20 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | - | 7.87 | 10.80 | - | 1.00 | 4.80 | 1.00 | 1.00 | 1.00 | 1.00 | - | - | - | 2.60 | 1.00 | 1.0 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 492.00 | 492.00 | 407.00 | 380.00 | 340.00 | 369.00 | 372.00 | 377.00 | 347.00 | 314.00 | 232.00 | 263.00 | 220.00 | 127.00 | 208.00 | 208.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 0.50 | 0.50 | 1.00 | 1.00 | 9.40 | 8.80 | 11.80 | 1.00 | 7.20 | 2.60 | 0.50 | 0.50 | 1.00 | 1.00 | 8.60 | 8.60 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | 0.10 | 0.50 | 2.00 | - | - | - | - | - | - | - | 0.10 | - | - | - | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 404.00 | 403.00 | 407.00 | 380.00 | 350.00 | 378.00 | 384.00 | 377.00 | 354.00 | 317.00 | 190.00 | 216.00 | 220.00 | 127.00 | 217.00 | 217.00 |
| **Anions and Nitrogen** | | | n.g. | n.g. | **Anions and Nitrogen** | | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.02 | 0.09 | 0.02 | 0.01 | 0.01 | 0.01 | - | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.02 | 0.02 | 0.01 | 0.01 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | - | - | 0.25 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.25 | - | - | - | 0.05 | 0.05 | 0.05 | 0.05 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 0.50 | 1.10 | 2.50 | 0.50 | 0.54 | 0.50 | 0.50 | 0.50 | 2.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | - | 0.10 | 0.10 | 0.11 | 0.10 | 0.11 | 0.11 | 0.11 | 0.10 | 0.11 | - | - | 0.14 | 0.09 | 0.13 | 0.13 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | - | 0.02 | 0.13 | 0.15 | 0.17 | 0.13 | 0.20 | 0.18 | 0.14 | 0.14 | - | - | 0.01 | 0.01 | 0.01 | 0.01 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | - | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | - | 0.28 | 0.74 | 0.32 | 0.57 | 0.50 | - | 0.32 | 0.42 | 0.28 | - | - | 0.68 | 0.37 | 0.26 | 0.26 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | - | - | - | - | 0.00 | 0.00 | - | - | 0.00 | - | - | - | - | 0.00 | 0.00 | 0.00 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.02 | - | 0.00 | - | 0.01 | 0.02 | - | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | - | 0.01 | 0.00 | 0.00 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.06 | 0.22 | 0.06 | 0.06 | 0.05 | 0.20 | - | 0.05 | 0.03 | 0.02 | 0.09 | 0.40 | 0.11 | 0.03 | 0.02 | 0.02 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 36.80 | 21.70 | 20.80 | 22.40 | 24.10 | 23.10 | 26.50 | 28.20 | 25.90 | 24.80 | 5.80 | 9.30 | 4.27 | 1.37 | 2.20 | 2.20 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | - | 2.42 | 3.25 | 1.71 | 2.47 | 1.92 | - | - | - | - | - | - | 10.40 | 7.42 | 7.91 | 7.91 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | - | 2.16 | 4.63 | 2.87 | 3.51 | 3.93 | - | - | - | 1.88 | - | - | 11.60 | 8.91 | 7.38 | 7.38 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 0.64 | 5.27 | 2.81 | 1.31 | 1.27 | 0.75 | - | 0.46 | 0.43 | 0.41 | 3.82 | 4.41 | 0.84 | 1.05 | 0.96 | 0.96 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.15 | 0.19 | 0.14 | 0.10 | 0.09 | 0.08 | - | 0.10 | 0.25 | 0.08 | 0.34 | 0.50 | 0.26 | 0.07 | 0.24 | 0.24 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.01 | 0.05 | 0.10 | 0.10 | 0.10 | 0.10 | - | 0.10 | 0.10 | 0.10 | 0.09 | 0.01 | 0.10 | 0.10 | 0.10 | 0.10 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 75.00 | 75.10 | 69.80 | 66.50 | 55.30 | 59.00 | - | 59.40 | 64.70 | 53.70 | 52.50 | 60.50 | 45.30 | 18.00 | 42.30 | 42.30 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.01 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 1.18 | 5.89 | 2.39 | 1.00 | 1.13 | 0.80 | - | 0.42 | 0.39 | 0.32 | 5.05 | 19.10 | 0.62 | 1.03 | 0.50 | 0.50 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.01 | 0.01 | 0.05 | 0.01 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 60.60 | 57.30 | 55.50 | 49.70 | 46.10 | 49.50 | - | 56.90 | 51.90 | 46.30 | 14.70 | 19.00 | 11.10 | 4.48 | 11.50 | 11.50 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.13 | 0.24 | 0.07 | 0.04 | 0.06 | 0.05 | - | 0.02 | 0.03 | 0.02 | 0.35 | 0.24 | 1.07 | 0.09 | 0.86 | 0.86 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.05 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 1.91 | 2.04 | 2.80 | 2.00 | 2.00 | 2.00 | - | 2.00 | 2.00 | 2.00 | 0.97 | 1.98 | 2.00 | 2.00 | 2.00 | 2.00 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 25.20 | 19.80 | 19.40 | 16.60 | 16.20 | 17.50 | - | 20.90 | 19.50 | 17.30 | 18.30 | 14.00 | 32.70 | 19.20 | 30.80 | 30.80 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | - | 0.01 | - | 0.00 | 0.00 | 0.00 | - | 0.01 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.02 | 0.07 | 0.06 | 0.02 | 0.03 | 0.02 | - | 0.02 | 0.01 | 0.01 | 0.07 | 0.04 | 0.01 | 0.01 | 0.02 | 0.02 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.04 | 0.03 | 0.02 | 0.01 | 0.01 | 0.01 | - | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Dissolved Metals** | | | n.g. | n.g. | **Dissolved Metals** | | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | - | - | - | 0.01 | 0.00 | 0.01 | 0.02 | 0.02 | 0.01 | 0.01 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | - | - | - | 0.001 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.12 | 0.09 | 0.10 | 0.08 | 0.07 | 0.08 | - | - | - | 0.07 | 0.28 | 0.20 | 0.25 | 0.07 | 0.25 | 0.25 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.01 | 0.05 | 0.10 | 0.10 | 0.10 | 0.10 | - | - | - | 0.10 | 0.01 | 0.01 | 0.10 | 0.10 | 0.10 | 0.10 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | - | - | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 74.500 | 69.400 | 69.800 | 58.800 | 62.500 | 60.600 | 61.700 | - | - | 58.800 | 50.500 | 52.400 | 43.500 | 21.000 | 47.900 | 47.900 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | - | - | - | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.004 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | - | - | - | 0.000 | 0.004 | 0.003 | 0.001 | 0.000 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.003 | 0.000 | 0.001 | 0.001 | 0.001 | 0.006 | - | - | - | 0.001 | 0.000 | 0.002 | 0.002 | 0.003 | 0.002 | 0.002 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.01 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | - | - | - | 0.03 | 0.01 | 0.01 | 0.03 | 0.04 | 0.03 | 0.03 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.00 | 0.01 | 0.05 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 47.40 | 54.70 | 56.10 | 46.70 | 48.00 | 51.30 | 50.90 | - | - | 50.80 | 13.20 | 14.00 | 11.00 | 5.26 | 13.60 | 13.60 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.02 | 0.12 | 0.01 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.21 | 0.04 | 0.92 | 0.09 | 0.57 | 0.57 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0001 | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | - | - | - | 0.0000 | 0.0001 | 0.0500 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.000 | 0.002 | 0.001 | 0.004 | 0.002 | 0.002 | - | - | - | 0.002 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.022 | 0.001 | 0.005 | 0.001 | 0.001 | 0.001 | - | - | - | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 1.740 | 1.030 | 2.000 | 2.000 | 2.000 | 2.000 | - | - | - | 2.000 | 0.370 | 0.270 | 2.000 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0002 | 0.0001 | 0.0010 | 0.0004 | 0.0007 | 0.0005 | - | - | - | 0.0008 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 17.00 | 19.40 | 19.20 | 17.10 | 19.20 | 18.80 | - | - | - | 18.10 | 12.50 | 12.40 | 33.90 | 25.20 | 31.90 | 31.90 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | - | 0.01 | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.00 | 0.01 | 0.05 | 0.01 | 0.01 | 0.01 | - | - | - | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | - | - | - | 0.01 | 0.00 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000005 | - | - | |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000015 | - | - | |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000005 | - | - | |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000050 | - | - | |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000050 | - | - | |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000050 | - | - | |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000020 | - | - | |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | - | - | - | - | - | - | - | - | - | - | - | 0.000010 | - | - | |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | - | - | - | - | - | - | - | - | - | - | - | 0.000050 | - | - | |

Concentration above BC WQG DWS

| Parameter | Units | Detection Limits[1] | BC WQG DWS screening parameter | BC WQG DWS Value | Well ID | T0B96-01-05 | T0B96-01-05 | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W3 Shallow | W2 | W2 | W2 | W2 | W2 | W2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | T0B96-01-05 | T0B96-01-05 | W3-S | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W3 SHALLOW | W2 | W2 | W2 | W2 | W2 | W2 |
| | | | | | Geol | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB | OVB |
| | | | | | Date Sampled | 4-Apr-2019 | 7-Jun-2019 | 6-Apr-2018 | 18-Jun-2018 | 8-Sep-2018 | 4-Jan-2019 | 30-Mar-2019 | 31-May-2019 | 27-Aug-2019 | 20-Nov-2019 | 5-Apr-2018 | 22-Jun-2018 | 10-Sep-2018 | 5-Jan-2019 | 1-Apr-2019 | 1-Jun-2019 |
| | | | | | ALS Sample ID (2017-2018) | L2254339-1 | L2288655-3 | L2078247-1 | L2117455-1 | L2163047-6 | L2218463-5 | L2254339-9 | L2284065-2 | L2339589-2 | L2387383-5 | L2078247-2 | L2120097-6 | L2163047-5 | L2218463-2 | L2254339-4 | L2284065-1 |
| | | | | | Maxxam Sample ID (2016) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | Chemex Lab Sample ID (1995-1997) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Physical Tests** | | | | | **Physical Tests** | | | | | | | | | | | | | | | | |
| Colour | CU | 5 | n.g. | n.g. | Colour | 18.40 | 9.00 | 7.50 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 41.30 | 44.70 | 42.30 | 41.40 | 42.50 | 36.10 |
| Conductivity (lab) | uS/cm | 2.0 | n.g. | n.g. | Conductivity (lab) | 300.00 | 363.00 | 495.00 | 495.00 | 510.00 | 509.00 | 498.00 | 525.00 | 519.00 | 520.00 | 494.00 | 548.00 | 534.00 | 537.00 | 531.00 | 552.00 |
| Specific Conductivity (field) | uS/cm | 1.0 | n.g. | n.g. | Specific Conductivity (field) | 375.00 | 367.00 | 535.00 | 535.00 | 516.00 | 506.00 | 516.00 | 518.00 | 521.00 | 512.00 | 523.00 | 535.00 | 535.00 | 533.00 | 563.00 | 540.00 |
| Hardness (as $CaCO_3$)- total | mg/L | 0.5 | n.g. | n.g. | Hardness (as $CaCO_3$)- total | 108.00 | 155.00 | 108.00 | 113.00 | 110.00 | 115.00 | 117.00 | 121.00 | 111.00 | 102.00 | 57.90 | 59.90 | 69.20 | 73.40 | 73.60 | 71.60 |
| pH (lab) | pH | 0.10 | n.g. | n.g. | pH (lab) | 7.78 | 8.34 | 8.50 | 8.52 | 8.50 | 8.39 | 8.42 | 8.53 | 8.56 | 8.46 | 8.43 | 8.49 | 8.60 | 8.46 | 8.48 | 8.54 |
| pH (field) | pH | 0.10 | n.g. | n.g. | pH (field) | 7.59 | 7.07 | 8.71 | 8.45 | 8.34 | 7.75 | 9.15 | 8.36 | 8.33 | 8.33 | 8.78 | 8.39 | 8.51 | 7.91 | 8.99 | 8.46 |
| Total Suspended Solids | mg/L | 3.0 | n.g. | n.g. | Total Suspended Solids | 36.20 | 9.10 | 3.00 | 5.30 | 78.10 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 80.60 | 28.70 | 14.30 | 11.40 | 5.80 | 680.00 |
| Total Dissolved Solids[2] | mg/L | 10.0 | n.g. | n.g. | Total Dissolved Solids[2] | 275.00 | 243.00 | 356.00 | 388.00 | 402.00 | 356.00 | 408.00 | 332.00 | 336.00 | 330.00 | 381.00 | 366.00 | 365.00 | 343.00 | 358.00 | 361.00 |
| Turbidity (lab) | NTU | 0.10 | raw with | 50 | Turbidity (lab) | 76.30 | 6.53 | 2.02 | 2.00 | 19.10 | 0.93 | 1.49 | 0.20 | 0.30 | 0.32 | 76.30 | 22.80 | 5.74 | 5.19 | 0.60 | 415.00 |
| **Alkalinity and Acidity** | | | n.g. | n.g. | **Alkalinity and Acidity** | | | | | | | | | | | | | | | | |
| Acidity (as CaCO3) | mg/L | 1.0 | n.g. | n.g. | Acidity (as CaCO3) | 4.00 | 5.10 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Bicarbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Bicarbonate (as | 156.00 | 215.00 | 220.00 | 226.00 | 231.00 | 234.00 | 225.00 | 278.00 | 237.00 | 255.00 | 227.00 | 266.00 | 282.00 | 283.00 | 283.00 | 289.00 |
| Alkalinity, Carbonate (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Carbonate (as | 1.00 | 6.80 | 15.40 | 12.80 | 14.00 | 9.40 | 5.80 | 14.80 | 13.60 | 15.80 | 9.80 | 13.40 | 19.60 | 10.60 | 8.80 | 11.40 |
| Alkalinity, Hydroxide (as | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Hydroxide (as | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alkalinity, Phenolphthalein (as | mg/L | 2.0 | n.g. | n.g. | Alkalinity, Phenolphthalein | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alkalinity, Total (as $CaCO_3$) | mg/L | 1.0 | n.g. | n.g. | Alkalinity, Total (as $CaCO_3$) | 156.00 | 221.00 | 235.00 | 239.00 | 245.00 | 243.00 | 230.00 | 293.00 | 250.00 | 271.00 | 237.00 | 280.00 | 301.00 | 294.00 | 292.00 | 300.00 |
| **Anions and Nitrogen** | | | | | **Anions and Nitrogen** | | | | | | | | | | | | | | | | |
| Ammonia, Total (as N) | mg/L | 0.0050 | n.g. | n.g. | Ammonia, Total (as N) | 0.01 | 0.01 | 0.21 | 0.19 | 0.17 | 0.17 | 0.16 | 0.18 | 0.17 | 0.26 | 0.01 | 0.45 | 0.59 | 0.65 | 0.62 | 0.63 |
| Bromide (Br) | mg/L | 0.050 | n.g. | n.g. | Bromide (Br) | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.08 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Chloride (Cl) | mg/L | 0.50 | AO, Cl | 250 | Chloride (Cl) | 0.50 | 0.50 | 4.38 | 3.35 | 2.95 | 2.49 | 2.14 | 2.15 | 2.00 | 2.40 | 7.28 | 3.24 | 3.18 | 2.95 | 2.76 | 2.69 |
| Fluoride (F) | mg/L | 0.020 | MAC, F | 1.5 | Fluoride (F) | 0.09 | 0.15 | 0.20 | 0.19 | 0.21 | 0.19 | 0.17 | 0.20 | 0.16 | 0.20 | 0.32 | 0.38 | 0.37 | 0.34 | 0.32 | 0.33 |
| Nitrate (as N) | mg/L | 0.0050 | MAC, nitrate-N | 10 | Nitrate (as N) | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Nitrite (as N) | mg/L | 0.0010 | MAC, nitrite-N | 1.0 | Nitrite (as N) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Nitrogen | mg/L | 0.050 | n.g. | n.g. | Total Nitrogen | 0.31 | 0.40 | 9.19 | 2.68 | 2.49 | 6.99 | 5.29 | 3.05 | 1.00 | 1.71 | 5.80 | 1.45 | 0.92 | 0.87 | 0.96 | 0.95 |
| Orthophosphate-Dissolved (as P | mg/L | 0.001 | n.g. | n.g. | Orthophosphate-Dissolved (as | 0.00 | 0.0010 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.42 | 0.78 | 0.86 | 0.83 | 0.87 | 0.80 |
| Phosphorus (P)-Total Dissolved | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.01 | 0.00 | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 | 0.72 | 0.76 | 0.93 | 0.91 | 0.88 | 0.79 |
| Phosphorus (P)-Total | mg/L | 0.0020 | n.g. | n.g. | Phosphorus (P)-Total | 0.04 | 0.02 | 0.03 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.79 | 0.71 | 0.94 | 0.91 | 0.92 | 0.94 |
| Sulfate ($SO_4$) | mg/L | 0.50 | AO, SO4 | 500 | Sulfate ($SO_4$) | 8.19 | 6.02 | 45.40 | 41.80 | 43.70 | 41.80 | 38.50 | 40.40 | 38.50 | 41.70 | 41.90 | 13.30 | 9.56 | 9.16 | 6.50 | 12.30 |
| **Inorganic/Organic Carbon** | | | n.g. | n.g. | **Inorganic/Organic Carbon** | | | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 0.5 | n.g. | n.g. | Dissolved Organic Carbon | 9.06 | 8.30 | 15.40 | 9.43 | 22.80 | 20.30 | 5.07 | 6.71 | 2.33 | 5.15 | 20.80 | 14.20 | 9.31 | 8.83 | 9.21 | 8.60 |
| Total Organic Carbon | mg/L | 0.50 | n.g. | n.g. | Total Organic Carbon | 9.68 | 8.01 | 26.70 | 10.90 | 9.86 | 23.40 | 4.54 | 9.14 | 11.40 | 13.60 | 17.80 | 11.80 | 8.58 | 8.27 | 8.35 | 11.40 |
| **Total Metals** | | | n.g. | n.g. | **Total Metals** | | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | 0.0050 | n.g. | n.g. | Aluminum (Al)-Total | 7.80 | 1.19 | 0.04 | 0.06 | 0.29 | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | 2.41 | 30.00 | 0.11 | 0.10 | 0.03 | 11.70 |
| Antimony (Sb)-Total | mg/L | 0.00050 | n.g. | n.g. | Antimony (Sb)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Total | mg/L | 0.00050 | n.g. | n.g. | Arsenic (As)-Total | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| Barium (Ba)-Total | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Total | 0.36 | 0.21 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.32 | 0.04 | 0.04 | 0.07 | 0.20 |
| Beryllium (Be)-Total | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Total | mg/L | 0.10 | n.g. | n.g. | Boron (B)-Total | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Cadmium (Cd)-Total | mg/L | 0.000010 | n.g. | n.g. | Cadmium (Cd)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca)-Total | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Total | 44.10 | 42.40 | 24.90 | 26.00 | 26.90 | 25.80 | 26.50 | 25.50 | 25.70 | 25.90 | 19.30 | 139.00 | 20.20 | 19.90 | 21.00 | 30.50 |
| Chromium (Cr)-Total | mg/L | 0.0010 | n.g. | n.g. | Chromium (Cr)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cobalt (Co)-Total | mg/L | 0.00030 | n.g. | n.g. | Cobalt (Co)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| Copper (Cu)-Total | mg/L | 0.0010 | n.g. | n.g. | Copper (Cu)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 |
| Iron (Fe)-Total | mg/L | 0.030 | n.g. | n.g. | Iron (Fe)-Total | 6.31 | 0.52 | 0.09 | 0.11 | 0.19 | 0.06 | 0.08 | 0.05 | 0.05 | 0.06 | 1.44 | 18.20 | 0.18 | 0.18 | 0.12 | 4.24 |
| Lead (Pb)-Total | mg/L | 0.00050 | n.g. | n.g. | Lead (Pb)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Lithium (Li)-Total | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 |
| Magnesium (Mg)-Total | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Total | 14.10 | 11.00 | 9.08 | 10.70 | 11.30 | 11.30 | 11.10 | 11.50 | 11.80 | 10.90 | 3.38 | 11.30 | 4.37 | 4.45 | 4.38 | 10.80 |
| Manganese (Mn)-Total | mg/L | 0.00030 | n.g. | n.g. | Manganese (Mn)-Total | 0.17 | 1.38 | 0.08 | 0.07 | 0.08 | 0.06 | 0.05 | 0.05 | 0.05 | 0.06 | 0.13 | 2.70 | 0.16 | 0.17 | 0.18 | 0.30 |
| Mercury (Hg)-Total | mg/L | 0.000010 | n.g. | n.g. | Mercury (Hg)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Molybdenum (Mo)-Total | mg/L | 0.0010 | n.g. | n.g. | Molybdenum (Mo)-Total | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Nickel (Ni)-Total | mg/L | 0.0010 | n.g. | n.g. | Nickel (Ni)-Total | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| Potassium (K)-Total | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Total | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.40 | 2.00 | 2.00 | 2.00 | 2.90 |
| Selenium (Se)-Total | mg/L | 0.00010 | n.g. | n.g. | Selenium (Se)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Silver (Ag)-Total | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Total | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Total | 30.00 | 19.20 | 70.60 | 82.30 | 83.10 | 85.10 | 83.10 | 83.30 | 85.50 | 80.20 | 86.80 | 112.00 | 105.00 | 111.00 | 111.00 | 116.00 |
| Thallium (Tl)-Total | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Total | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Total | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Total | 0.05 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.14 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Total | mg/L | 0.00020 | n.g. | n.g. | Uranium (U)-Total | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Total | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Total | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.05 | 0.00 | 0.00 | 0.00 | 0.01 |
| Zinc (Zn)-Total | mg/L | 0.0050 | n.g. | n.g. | Zinc (Zn)-Total | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.11 | 0.01 | 0.01 | 0.01 | 0.08 |
| **Dissolved Metals** | | | | | **Dissolved Metals** | | | | | | | | | | | | | | | | |
| Aluminum (Al)-Dissolved | mg/L | 0.0050 | MAC Al-tot | 9.5 | Aluminum (Al)-Dissolved | 0.10 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 |
| Antimony (Sb)-Dissolved | mg/L | 0.00050 | MAC Sb-tot | 0.006 | Antimony (Sb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Arsenic (As)-Dissolved | mg/L | 0.00050 | MAC, As-tot | 0.01 | Arsenic (As)-Dissolved | 0.001 | 0.001 | 0.005 | 0.007 | 0.006 | 0.007 | 0.008 | 0.007 | 0.007 | 0.006 | 0.008 | 0.008 | 0.010 | 0.010 | 0.012 | 0.010 |
| Barium (Ba)-Dissolved | mg/L | 0.020 | n.g. | n.g. | Barium (Ba)-Dissolved | 0.14 | 0.21 | 0.04 | 0.05 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.02 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| Beryllium (Be)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Beryllium (Be)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Boron (B)-Dissolved | mg/L | 0.10 | MAC, B-tot | 5.0 | Boron (B)-Dissolved | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Cadmium (Cd)-Dissolved | mg/L | 0.000010 | MAC, Cd-tot | 0.005 | Cadmium (Cd)-Dissolved | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Calcium (Ca)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Calcium (Ca)-Dissolved | 29.300 | 42.800 | 26.400 | 27.200 | 26.100 | 27.100 | 27.200 | 28.500 | 25.400 | 24.000 | 18.100 | 18.200 | 20.600 | 22.000 | 22.000 | 20.800 |
| Chromium (Cr)-Dissolved | mg/L | 0.0010 | MAC, Cr-tot | 0.05 | Chromium (Cr)-Dissolved | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Cobalt (Co)-Dissolved | mg/L | 0.00030 | MAC, Co-tot | 0.001 | Cobalt (Co)-Dissolved | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Copper (Cu)-Dissolved | mg/L | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | Copper (Cu)-Dissolved | 0.003 | 0.005 | 0.003 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Iron (Fe)-Dissolved | mg/L | 0.030 | AO, Fe-tot | 0.30 | Iron (Fe)-Dissolved | 0.23 | 0.03 | 0.03 | 0.05 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.03 | 0.06 | 0.09 | 0.10 | 0.10 | 0.05 |
| Lead (Pb)-Dissolved | mg/L | 0.00050 | MAC, Pb-tot | 0.005 | Lead (Pb)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithium (Li)-Dissolved | mg/L | 0.0050 | n.g. | n.g. | Lithium (Li)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Magnesium (Mg)-Dissolved | mg/L | 0.10 | n.g. | n.g. | Magnesium (Mg)-Dissolved | 8.52 | 11.70 | 10.10 | 10.90 | 10.80 | 11.40 | 11.90 | 12.00 | 11.60 | 10.30 | 3.08 | 3.53 | 4.31 | 4.45 | 4.54 | 4.78 |
| Manganese (Mn)-Dissolved | mg/L | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | Manganese (Mn)-Dissolved | 0.01 | 1.37 | 0.08 | 0.07 | 0.06 | 0.06 | 0.05 | 0.05 | 0.05 | 0.05 | 0.09 | 0.14 | 0.16 | 0.17 | 0.17 | 0.14 |
| Mercury (Hg)-Dissolved | mg/L | 0.000010 | MAC, Hg-tot | 0.001 | Mercury (Hg)-Dissolved | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Molybdenum (Mo)-Dissolved | mg/L | 0.0010 | MAC, Mo-tot | 0.088 | Molybdenum (Mo)-Dissolved | 0.001 | 0.001 | 0.010 | 0.012 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.012 | 0.017 | 0.012 | 0.014 | 0.014 | 0.020 |
| Nickel (Ni)-Dissolved | mg/L | 0.0010 | MAC, Ni-tot | 0.08 | Nickel (Ni)-Dissolved | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Potassium (K)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Potassium (K)-Dissolved | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 |
| Selenium (Se)-Dissolved | mg/L | 0.00010 | MAC, Se-tot | 0.01 | Selenium (Se)-Dissolved | 0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0004 | 0.0005 | 0.0002 |
| Silver (Ag)-Dissolved | mg/L | 0.000020 | n.g. | n.g. | Silver (Ag)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sodium (Na)-Dissolved | mg/L | 2.0 | n.g. | n.g. | Sodium (Na)-Dissolved | 27.00 | 19.90 | 87.20 | 84.90 | 83.60 | 77.60 | 85.90 | 102.00 | 85.40 | 77.30 | 111.00 | 111.00 | 112.00 | 102.00 | 113.00 | 132.00 |
| Thallium (Tl)-Dissolved | mg/L | 0.00020 | n.g. | n.g. | Thallium (Tl)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tin (Sn)-Dissolved | mg/L | 0.00050 | n.g. | n.g. | Tin (Sn)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Titanium (Ti)-Dissolved | mg/L | 0.010 | n.g. | n.g. | Titanium (Ti)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Uranium (U)-Dissolved | mg/L | 0.00020 | MAC, U-tot | 0.02 | Uranium (U)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vanadium (V)-Dissolved | mg/L | 0.0010 | n.g. | n.g. | Vanadium (V)-Dissolved | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zinc (Zn)-Dissolved | mg/L | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | Zinc (Zn)-Dissolved | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Polycyclic Aromatic** | | | n.g. | n.g. | **Polycyclic Aromatic** | | | | | | | | | | | | | | | | |
| Acenaphthene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Acenaphthylene | mg/L | 0.000010 | n.g. | n.g. | Acenaphthylene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Acridene | mg/L | 0.000010 | n.g. | n.g. | Acridene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Anthracene | mg/L | 0.000010 | n.g. | n.g. | Anthracene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Benz(a)anthracene | mg/L | 0.000010 | n.g. | n.g. | Benz(a)anthracene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Benzo(a)pyrene | mg/L | 0.000005 | n.g. | n.g. | Benzo(a)pyrene | - | 0.000005 | 0.000005 | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | 0.000005 | 0.000005 |
| Benzo(b&j)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(b&j)fluoranthene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Benzo(b+j+k)fluoranthene | mg/L | 0.000015 | n.g. | n.g. | Benzo(b+j+k)fluoranthene | - | 0.000015 | 0.000015 | - | - | - | - | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | 0.000015 | - | 0.000015 | 0.000015 |
| Benzo(g,h,i)perylene | mg/L | 0.000010 | n.g. | n.g. | Benzo(g,h,i)perylene | - | 0.000011 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Benzo(k)fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Benzo(k)fluoranthene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Chrysene | mg/L | 0.000010 | n.g. | n.g. | Chrysene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Dibenz(a,h)anthracene | mg/L | 0.000005 | n.g. | n.g. | Dibenz(a,h)anthracene | - | 0.000005 | 0.000005 | - | - | - | - | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | 0.000005 | - | 0.000005 | 0.000005 |
| Fluoranthene | mg/L | 0.000010 | n.g. | n.g. | Fluoranthene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Fluorene | mg/L | 0.000010 | n.g. | n.g. | Fluorene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Indeno(1,2,3-c,d)pyrene | mg/L | 0.000010 | n.g. | n.g. | Indeno(1,2,3-c,d)pyrene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| 1-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 1-Methylnaphthalene | - | 0.000050 | 0.000050 | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | 0.000050 | 0.000050 |
| 2-Methylnaphthalene | mg/L | 0.000050 | n.g. | n.g. | 2-Methylnaphthalene | - | 0.000050 | 0.000050 | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | 0.000050 | 0.000050 |
| Naphthalene | mg/L | 0.000050 | n.g. | n.g. | Naphthalene | - | 0.000050 | 0.000050 | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000053 | 0.000050 | 0.000050 | - | 0.000050 | 0.000050 |
| Phenanthrene | mg/L | 0.000020 | n.g. | n.g. | Phenanthrene | - | 0.000020 | 0.000020 | - | - | - | - | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | 0.000020 | - | 0.000020 | 0.000020 |
| Pyrene | mg/L | 0.000010 | n.g. | n.g. | Pyrene | - | 0.000010 | 0.000010 | - | - | - | - | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | 0.000010 | - | 0.000010 | 0.000010 |
| Quinoline | mg/L | 0.000050 | n.g. | n.g. | Quinoline | - | 0.000050 | 0.000050 | - | - | - | - | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | 0.000050 | - | 0.000050 | 0.000050 |

# Appendix E - Liner Seepage Assessment and Preliminary Cost Estimate for Tenas Management Ponds

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**FINAL**

# Technical Memo

March 3, 2022

| | |
|---|---|
| **To** | Dan Farmer, P.Eng., Allegiance Coal Limited |
| **From** | Kyle Scale, P.Eng., Ph.D.; Calvin Boese, P.Eng., M.Sc. |
| **Subject** | Liner Design and Construction Methodology for Tenas Management Ponds |
| **Client** | Telkwa Coal Ltd. |
| **Project** | 2CT025.008.0300 |

## 1 Introduction

Telkwa Coal Ltd. (TCL) has retained SRK Consulting (Canada) Inc. (SRK) to design and provide a preliminary construction methodology for a liner system that will reduce seepage rates from the Tenas Management Ponds to below allowable thresholds defined in SRK's site water balance (SRK, 2020a). This liner assessment was initially conducted on four liner alternatives in the preliminary seepage assessment (Section 4.4.1); however, based on the performance and estimated costs, one of these liner alternatives was advanced to a focused seepage assessment (Section 4.4.2). The construction methodology for the selected liner alternative is detailed in Section 0 at an early design stage level.

This technical memo is divided into sections describing the Liner Design, Seepage Modeling, Construction Methodology, and Recommendations. The *Liner Design* section provides background on the seepage design criteria from SRK's site water balance, geometry of the PAG management ponds, and details the liner materials and liner system configurations. The *Seepage Modeling* section details the cross sections that serve as a basis for the seepage models, the assumptions and calibration of these models, and presents the results of the seepage assessment and presents a recommended liner option. The *Construction Methodology* section outlines the assumptions, material characteristics, execution of the liner system at an early design stage level, and quality control. The technical memo concludes with the *Recommendations* section, presenting SRK's recommendations for field and laboratory testing, construction methodology, and quality control of the recommended liner system.

# 2 Background

The Tenas Project is in central British Columbia, approximately 15 km south of Smithers and 2 km southwest of Telkwa. The Project site is located south of the Tenas River and the boundaries of the Project encompass the lower reaches of the Telkwa River, Goathorn Creek, and Pine Creek. The Tenas Project's total mine life is anticipated to be 22 years, including one year of pre-stripping and construction followed by 21 years of production. The mine plan was designed and scheduled in a manner that allows potentially-acid generating (PAG) rock to be deposited into management ponds (MP), including the East Management Pond (EMP), West Management Pond (WMP), and North Management Pond (NMP). These MP are above-ground PAG rock storage facilitates. The WMP consists of a portion that is an excavated pit (*Tenas Pit Phase 9*), referred to herein as '*In Pit*', and the remaining portion outside the pit referred to herein as '*Ex Pit*'.

Environmental containment is to be achieved with liner systems that are constructed along the bottom of the ponds and the upstream slopes of the perimeter dams.

# 3 Liner Design Basis

The following subsections describe the seepage design criteria, pond geometry, material properties, and liner configurations.

## 3.1 Seepage Design Criteria

A preliminary water balance provided design targets for the liner seepage analyses that evaluated seepage rates through the bottom of the MP and upstream slopes of the perimeter dams. The maximum allowable seepage through the MP catchments was determined to be 2,800 $m^3$/day from the site wide water balance (SRK, 2020a). This value represents the maximum seepage rate allowed to maintain a positive water balance over the PAG rock (e.g. maintain a minimum 1 m capping of ponded water).

This value is conservatively based on the "*10 Year Dry*" scenario. For the average year scenario, the allowable seepage rate through the management pond catchments increases to 4,260 $m^3$/day. For reference, the water quality target from the Definitive Feasibility Study (DFS) model was 1,700 $m^3$/day.

## 3.2 Pond Geometry and Potential Seepage Areas

Design elevations for the dam crests, freeboard, and areas pertinent to the seepage assessments are included in Table 1. Design revision 1 includes added capacity to account for the reduction in MP storage capacity due to the incorporation of a 1 m thick soil over-liner as the liner protective component (discussed in Section 4.4.2). This revision included raising the dam crests and freeboard elevations for the EMP, NMP, and WMP (Ex-Pit).

**Table 1: Model Geometry for the TCL Management Ponds**

| Design Revision | Management Pond | Area Pond[1] ($m^2$) | Area Upstream Dam Slopes[1] ($m^2$) | Cumulative Area[1] ($m^2$) | Dam Crest Elev. (masl) | Freeboard Elev. (masl) |
|---|---|---|---|---|---|---|
| 0 | EMP | 901,000 | 163,000 | 1,064,000 | 850 | 849 |
| | WMP (Ex Pit) | 371,600 | 122,000 | 493,600 | 850 | 849 |
| | WMP (In Pit) | 440,400 | n/a | 440,400 | n/a | n/a |
| | NMP | 76,900 | 184,500 | 261,400 | 830 | 829 |
| 1 | EMP | 961,939 | 180,136 | 1,142,075 | 852 | 851 |
| | WMP (Ex Pit) | 361,874 | 141,148 | 503,022 | 852 | 851 |
| | WMP (In Pit) | 533,548 | n/a | 533,548 | n/a | n/a |
| | NMP | 210,190 | 83,017 | 293,207 | 831 | 830 |

**Notes:**
(1) MP surfaces areas contributing to seepage through the liner system.
(2) Model geometry for Design Revision 1 provided by Telkwa on November 17, 2020.

## 3.3 Material Properties

Table 2 lists the materials that were modeled in the seepage assessment for the various liner design options. The high case for the native soils represents an increase of the base case hydraulic conductivities by a factor of 2.7 (SRK, 2020b).

**Table 2: Materials Considered for the Liner Seepage Assessment**

| Material | Hydraulic Conductivity, k (m/s) | |
|---|---|---|
| | Base Case | High Case |
| Native soil (EMP)[1] | 3.0E-6 | 8.1E-6 |
| Native soil (NMP)[1] | 1.9E-6 | 5.1E-6 |
| Bentonite[2] | 5.0E-11 | - |
| Soil-bentonite mixture[2] | 1.0E-9 | - |
| Soil-bentonite mixture (optimized)[2] | 1.0E-10 | - |
| Skilhorn clay[3] | 5.9E-9 | - |
| Clay-bentonite mixture[2] | 8.6E-10 | - |
| Skeena Sedimentary Rock[4] | 3.62E-7 | - |

**Notes:**
(1) Values for native soil derived from calibration with the site wide FEFLOW® groundwater model.
(2) Values for bentonite, soil-bentonite mixtures, and clay-bentonite mixtures assumed based on experience with previous projects.
(3) Values for Skilhorn measured in laboratory falling head hydraulic conductivity testing performed with a flexible wall permeameter.
(4) Values for Skeena sedimentary rock (bedrock) obtained from FEFLOW® groundwater model.

A hydraulic conductivity of 1.0E-9 m/s for the soil-bentonite mixture was calculated for a 5% (by volume) soil-bentonite mixture based an assumed hydraulic conductivity for bentonite of 5E-11 m/s. However, recent laboratory testing performed by Golder Associates on available bentonite are showing the hydraulic conductivity to be 3E-12 m/s. The calculated hydraulic conductivity of the soil-bentonite mixture, using the recent lab test value, equates to 6E-11 m/s. Based on the lab data and previous experience with a similar northern project, it is anticipated that a hydraulic conductivity value of 1E-10 m/s can be achieved and was therefore considered in the liner option assessment as an optimized value.

# 4 Seepage Model Development

Two-dimensional liner seepage analyses were carried out with GeoStudio's SEEP/W modeling software (Version 11.0.1.21429). The following subsections detail the cross-sections, model assumptions and calibration, and results of the seepage assessment.

## 4.1 Cross Sections

The cross sections shown in Figure 1 were developed into seepage models for the NMP, EMP, and WMP based on site topography, bedrock elevations, and perimeter dam designs. These cross sections were chosen along alignments that intersect the lowest topography in each pond as well as nearby creeks (*topographic lows*). Section 1 (1'-1') was used to develop the model for the NMP; Section 2 (2'-2') was used to develop the model for the EMP; and Sections 3 (3'-3') and 4 (4'-4') were used to develop models for the WMP.

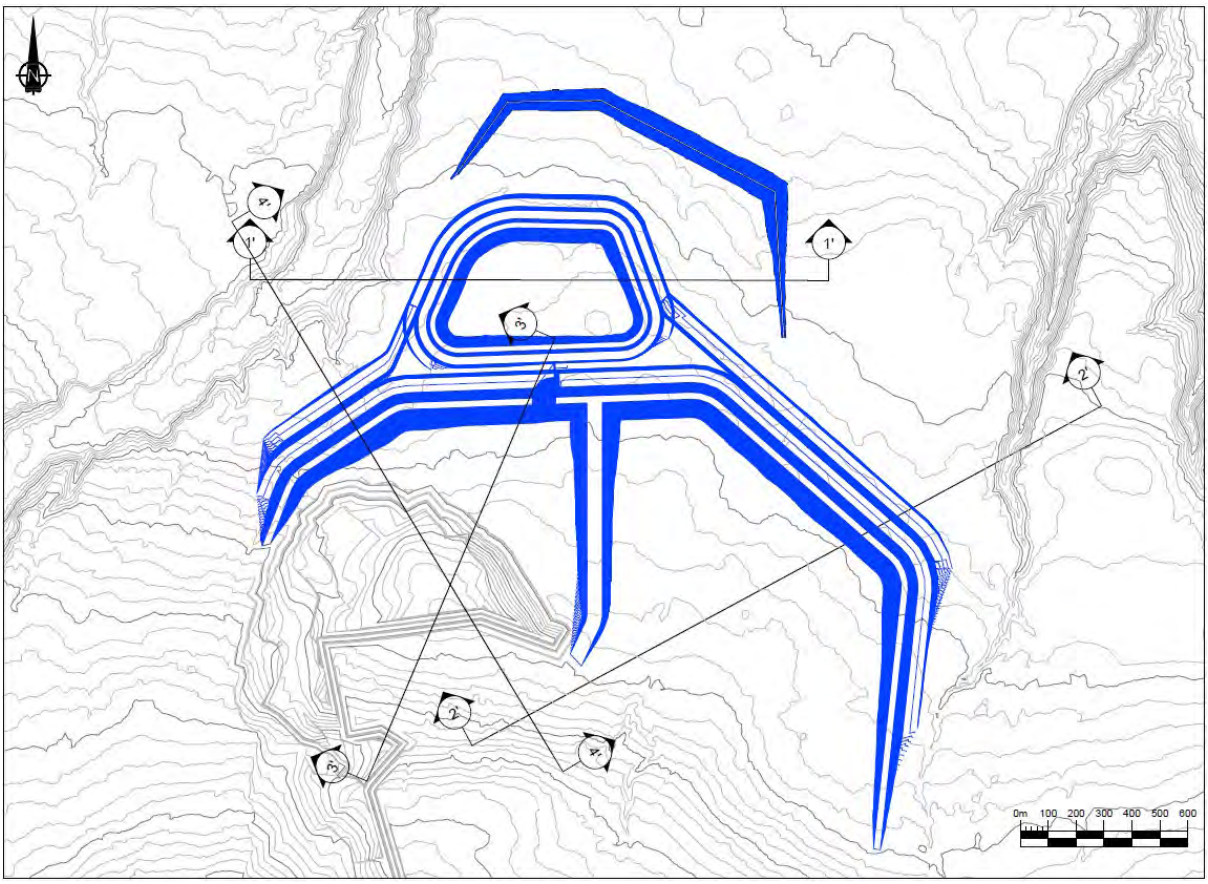



**Figure 1: Cross sections of the North Management Pond (Section 1'-1'), the East Management Pond (Section 2'-2'), and the West Management Pond (Sections 3'-3' and 4'-4') that served as the basis for the seepage models**

## 4.2 Model Assumptions

The seepage models for the EMP, WMP, and NMP were developed based on cross sections that included the site topography, bedrock elevations, and designs of the perimeter dams. For the preliminary seepage assessment only Section 1 for the NMP and Section 2 for the EMP were evaluated. At this early stage, seepage through the WMP was assumed to be equivalent to seepage through the EMP.

The seepage assessment for revision 1 included two additional sections for the WMP that spanned the *In Pit* and *Ex Pit* portions. Seepage through unlined portions of the WMP *In Pit* were determined using FEFLOW® groundwater modeling software by applying a total head of 851 masl (*the dam freeboard elevation*). The WMP *In Pit* portion is assumed to be graded at 2.5H:1V from the *Ex Pit* portion towards the south-southwest. This produces a portion of the north slope that is comprised of overburden and a portion that is a bedrock pit wall. The sub-vertical bedrock cliff at the south of the model is unlined in Model Scenarios 1 to 8 and is re-sloped to 2.5H:1V and lined in Scenarios 9 to 16. These scenarios are discussed in Section 4.4.

Seepage models developed for the preliminary and revision 1 seepage assessments consider the uppermost soil layer to be unsaturated and the underlying soil (below the estimated water table) to be saturated.

## 4.3 Calibration

The site wide groundwater model was developed with FEFLOW® groundwater modeling software. This model utilized data from recent and historic drilling campaigns to distribute the native ground in the vicinity of the MP into *Silty Clay* and *Sand & Gravel*, with hydraulic conductivities of 2E-7 and 3E-6 m/s, respectively. These materials were used as a basis to calibrate the two-dimensional liner seepage models.

To accomplish this calibration, the hydraulic conductivity of the materials in the unlined two-dimensional seepage models were toggled until the seepage rates matched the rates measured with FEFLOW®. For the purposes of this calibration, the resulting material at the EMP and WMP were *Sand & Gravel*, with a hydraulic conductivity of 3E-6 m/s, and the material at the NMP was 40% *Clay* and 60% *Sand & Gravel,* with a hydraulic conductivity of 1.88E-6 m/s.

## 4.4 Liner Configurations

Four liner configurations were modeled as part of the preliminary seepage assessment (Design Revision 0) and one of these configurations was advanced to the focused seepage assessment (Design Revision 1).

### 4.4.1 Preliminary Seepage Assessment (Design Revision 0)

The liner options that were modeled in the two-dimensional SEEP/W (2020) for the preliminary seepage assessment are listed below:

1. Native soil with bentonite disked into the surface at 0.15 or 0.30 m.
2. Clay from Skilhorn Quarry placed to a depth of 1 to 2 m.
3. Clay from Skilhorn Quarry placed to a depth of 1 m with bentonite disked to a depth of 0.15 or 0.30 m.
4. Bentonite placed to a thickness of 0.15 or 0.30 m and covered with a minimum 0.15 m of native soil.

### 4.4.2 Focused Seepage Assessment 1 (Design Revision 1)

The soil-bentonite liner system (Option 1 from Design Revision 0) was progressed to a focused liner seepage assessment in 0.15 m, 0.30 m, 0.45 m, and 0.56 m thicknesses with the optimized bentonite hydraulic conductivity of 1E-10 m/s. Table 3**Error! Reference source not found.** presents the various configurations of the soil-bentonite liner system that were assessed.

Each configuration considers the WMP *Ex Pit* portion to be lined. Configurations 1 to 8 consider the overburden pit slope of the WMP *In Pit* portion to be lined. Configurations 9 to 16 consider the subvertical bedrock cliff to be re-sloped to 2.5H:1V. These configurations were modeled with the base and high case hydraulic conductivity values listed in Table 2.

**Table 3: Soil-Bentonite Liner Systems Assessed as Part of the Focused Seepage Modeling**

| Configuration | Case | SB Thickness (m) | NMP | EMP | WMP Liner Configurations | | |
|---|---|---|---|---|---|---|---|
| | | | | | OVB Slope Liner | In-Pit Liner | BR Pit Wall Resloped |
| **1** | BC | 0.15 | Y | Y | Y | N | N |
| **2** | BC | 0.30 | Y | Y | Y | N | N |
| **3** | BC | 0.45 | Y | Y | Y | N | N |
| **4** | BC | 0.56 | Y | Y | Y | N | N |
| **5** | HC | 0.15 | Y | Y | Y | N | N |
| **6** | HC | 0.30 | Y | Y | Y | N | N |
| **7** | HC | 0.45 | Y | Y | Y | Y | N |
| **8** | HC | 0.56 | Y | Y | Y | Y | N |
| **9** | BC | 0.15 | Y | Y | Y | Y | N |
| **10** | BC | 0.30 | Y | Y | Y | Y | N |
| **11** | BC | 0.45 | Y | Y | Y | Y | N |
| **12** | BC | 0.56 | Y | Y | Y | Y | N |
| **13** | HC | 0.15 | Y | Y | Y | Y | Y |
| **14** | HC | 0.30 | Y | Y | Y | Y | Y |
| **15** | HC | 0.45 | Y | Y | Y | Y | Y |
| **16** | HC | 0.56 | Y | Y | Y | Y | Y |

**Notes:**
(1) BC = Base Case; HC = High Case; MP = Management Pond; BR = Bedrock; OVB = Overburden; SB = Soil-Bentonite.
(2) For the High Case, the hydraulic conductivity of the underlying soils has been increased by a factor of 2.7.
(3) The Soil-Bentonite material assumes an optimized hydraulic conductivity of 1E-10 m/s.

# 5 Seepage Model Results

Seepage rates were quantified through the surface areas corresponding to the upstream perimeter dam slopes and MP pond bottoms. Results of the preliminary seepage modeling (Design Revision 0) are presented in Section 5.1 and results of the focused seepage modeling (Design Revision 1) are presented in Section 5.2.

## 5.1 Results of the Preliminary Seepage Modeling (Design Revision 0)

Preliminary seepage modeling was conducted with the geometry shown in Table 1 for *Design Revision 0.* Only Section 1 for the NMP and Section 2 for the EMP were modeled at this stage and the *In Pit* portion of the WMP was not independently assessed. Based on FEFLOW® groundwater modeling, with a scenario considering a 0.5 m thick compacted clay liner, the seepage from the *Ex Pit* portion of the WMP would be 483 $m^3$/day. This seepage rate was factored into the seepage results calculated for the various liner systems with SEEP/W (2020).

Results of the two-dimensional liner seepage assessment are shown in Table 4 and plotted in Figure 2. Seven liner alternatives provided a seepage rate < 2,800 $m^3$/day, which corresponds to the maximum allowable seepage rate for the *10 Year Dry* scenario. Four of these alternatives barely met the design criteria. However, the design criteria was easily achieved for bentonite placed to a thickness of 0.15 or 0.30 m covered with a minimum 0.15 m of native soil, and the optimized native soil with bentonite disked into the surface at 0.15 m (soil-bentonite). Each of the liner alternatives listed below provide a seepage rate ≤ 4,260 $m^3$/day, which corresponds to the *Average Year* scenario.

**Table 4: Results from the Two-dimensional Liner Seepage Assessment for the Various Liner Configurations Modeled in SEEP/W**

| Model | Seepage ($m^3$/day) | Seepage < 2800 $m^3$/day (Y/N) |
|---|---|---|
| No Liner | 6,992 | N |
| 0.15m Soil-Bentonite | 3,226 | N |
| 0.15m Soil-Bentonite (Optimized) | 1,606 | Y |
| 0.3m Soil-Bentonite | 2,779 | Y |
| 1m Skilhorn Clay | 3,201 | N |
| 2m Skilhorn Clay | 2,779 | Y |
| 1m Skilhorn Clay + 0.15m Clay-Bentonite | 2,788 | Y |
| 1m Skilhorn Clay + 0.30m Clay-Bentonite | 2,580 | Y |
| 0.15m Bentonite | 1,204 | Y |
| 0.30m Bentonite | 843 | Y |

**Notes:**
(1) Seepage limit based on the 10 Year Dry scenario developed in the site water balance is 2,800 $m^3$/day.
(2) Seepage limit based on the Average Year scenario developed in the site water balance is 4,260 $m^3$/day.

Results of the two-dimensional liner seepage assessment are plotted in Figure 2.

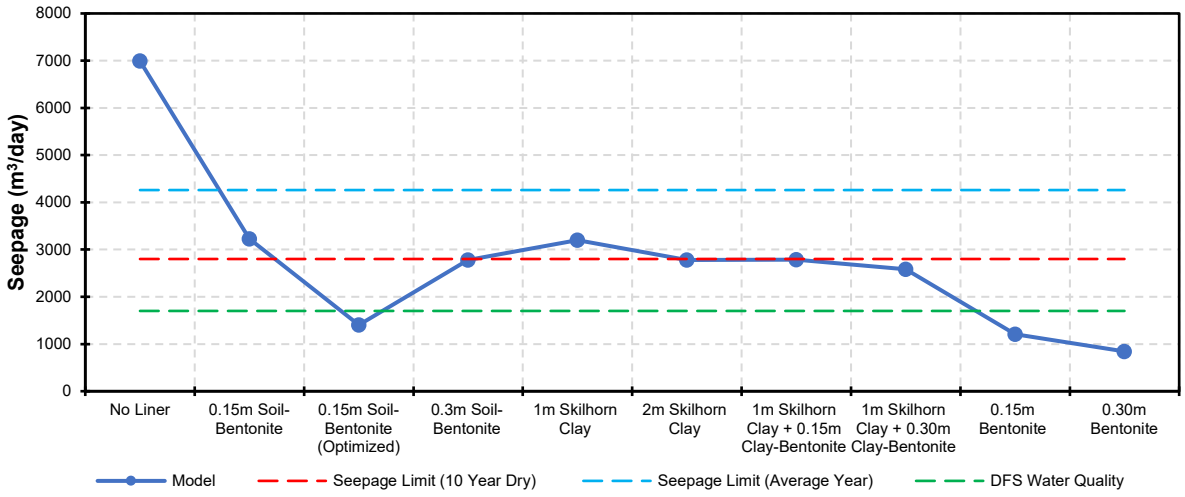



**Figure 2: Results of the Preliminary Liner Seepage Assessment (Design Revision 0) for the Various Liner Configurations Modeled in SEEP/W**

From these scenarios, the 0.15 m soil-bentonite liner system with the optimized bentonite hydraulic conductivity of 1E-10 m/s was advanced to the focused seepage modeling (Design Revision 1). The alternatives for the 0.15 m and 0.30 m pure bentonite were not advanced due to the costs being significantly higher compared to the other liner systems.

## 5.2 Results of the Focused Seepage Modeling (Design Revision 1)

The 0.15 m soil-bentonite liner system with the optimized bentonite hydraulic conductivity of 1E-10 m/s was subjected to a more detailed assessment as part of the focused seepage modeling (Design Revision 1). Additional 0.30 m, 0.45 m, and 0.56 m soil-bentonite liner systems with the optimized bentonite hydraulic conductivity of 1E-10 m/s were also incorporated into the focused seepage modeling. These seepage models were developed with the geometry shown in Table 1 for *Design Revision 1*.

### 5.2.1 WMP Liner Assessment

For the focused seepage modeling, two cross sections were modeled for the WMP (Section 3 and Section 4), in addition to the sections for the NMP and EMP. The new cross sections spanned the WMP *In Pit* and *Ex Pit* portions.

The results of the focused seepage assessment for all MPs with the geometry shown in Table 1 for *Design Revision 1* are listed in Table 5 and shown in Figure 3. The seepage rates for the WMP *In Pit* and *Ex Pit* portions are the average of Sections 3 and 4. As noted in Section 4.4.2, Configurations 1 to 8 consider the overburden pit slope of the WMP *In Pit* portion to be lined. Configurations 9 to 16 consider the subvertical bedrock cliff to be re-sloped to 2.5H:1V.

**Table 5: Results of the Focused Liner Seepage Assessment for the NMP, EMP, and WMP *In Pit* and *Ex Pit* Conducted using the Geometry from Design Revision 1**

| Liner | Case | SB Thickness (m) | WMP Liner Configurations | | | Seepage Rates ($m^3$/day) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | OVB Slope Liner | In-Pit Liner | BR Pit Wall Slope Liner | EMP | NMP | WMP (In-Pit) | WMP (Ex-Pit) | Cumulative |
| **1** | BC | 0.15 | Y | N | N | 738 | 296 | 591 | 706 | 2331 |
| **2** | BC | 0.30 | Y | N | N | 458 | 161 | 665 | 384 | 1667 |
| **3** | BC | 0.45 | Y | N | N | 334 | 109 | 710 | 267 | 1419 |
| **4** | BC | 0.56 | Y | N | N | 277 | 87 | 720 | 215 | 1299 |
| **5** | HC | 0.15 | Y | N | N | 978 | 320 | 1346 | 764 | 3408 |
| **6** | HC | 0.30 | Y | N | N | 536 | 164 | 1395 | 397 | 2492 |
| **7** | HC | 0.45 | Y | N | N | 366 | 112 | 1429 | 277 | 2184 |
| **8** | HC | 0.56 | Y | N | N | 296 | 90 | 1436 | 223 | 2044 |
| **9** | BC | 0.15 | Y | Y | Y | 738 | 296 | 234 | 748 | 2017 |
| **10** | BC | 0.30 | Y | Y | Y | 458 | 161 | 197 | 392 | 1207 |
| **11** | BC | 0.45 | Y | Y | Y | 334 | 109 | 179 | 269 | 891 |
| **12** | BC | 0.56 | Y | Y | Y | 277 | 87 | 186 | 216 | 766 |
| **13** | HC | 0.15 | Y | Y | Y | 978 | 320 | 384 | 759 | 2441 |
| **14** | HC | 0.30 | Y | Y | Y | 536 | 164 | 273 | 385 | 1358 |
| **15** | HC | 0.45 | Y | Y | Y | 366 | 112 | 226 | 265 | 969 |
| **16** | HC | 0.56 | Y | Y | Y | 296 | 90 | 226 | 216 | 827 |

**Notes:**
(1) BC = Base Case; HC = High Case; MP = Management Pond; BR = Bedrock; OVB = Overburden; SB = Soil-Bentonite
(2) For the High Case, the hydraulic conductivity of the underlying soils has been increased by a factor of 2.7.
(3) The Soil-Bentonite material assumes an optimized hydraulic conductivity of 1E-10 m/s.

The results of the focused seepage assessment for all MPs with the geometry shown in Table 1 for *Design Revision 1* are shown in Figure 3.

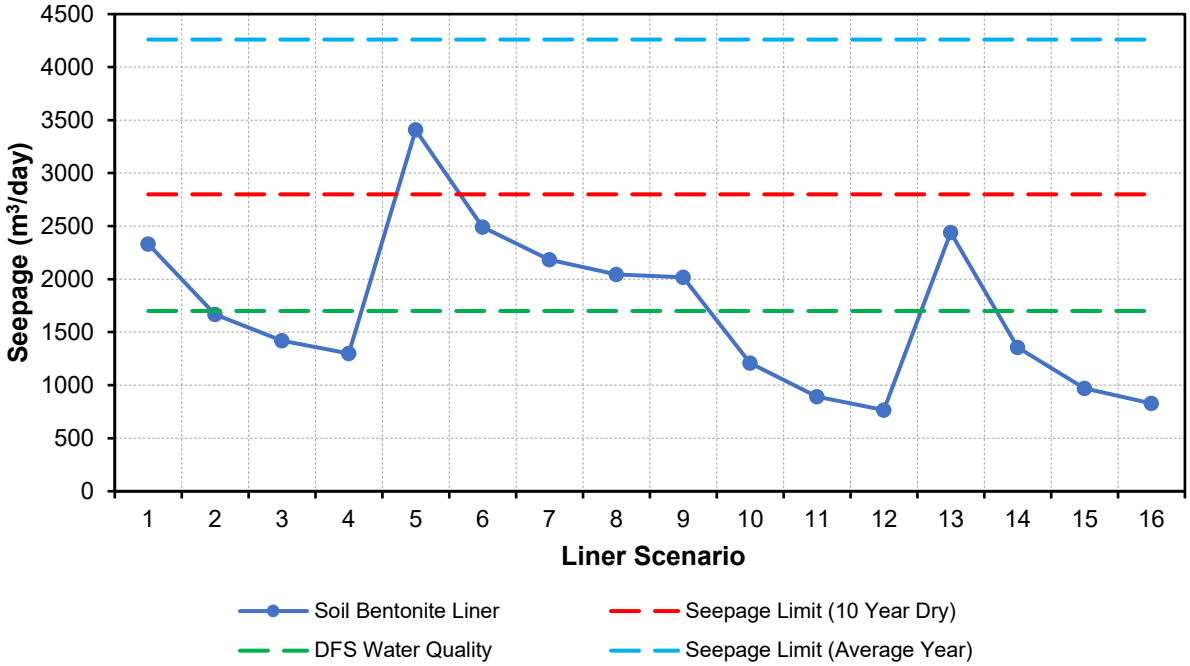



**Figure 3: Results of the Focused Liner Seepage Assessment (Design Revision 1) for the Various Soil-bentonite Liner Configurations Modeled in SEEP/W**

Each of the liner alternatives listed above provide a seepage rate ≤ 4,260 $m^3$/day, which corresponds to the *Average Year* scenario. The 0.3 m, 0.45 m, and 0.56 m soil-bentonite liner systems provide seepage rates < 2,800 $m^3$/day for both the base and high cases, which corresponds to the maximum allowable seepage rate for the *10 Year Dry* scenario.

## 5.3 Recommended Liner Design

The recommended liner design is the 0.45 m soil-bentonite liner constructed in the NMP, EMP and over the *Ex Pit* portion of and the overburden pit slope of the WMP. This liner system provides a seepage rate ≤ 2,800 $m^3$/day for both the base and high cases, which corresponds to the maximum allowable seepage rate for the *10 Year Dry* scenario.

# 6 Construction Methodology

The following section details a preliminary construction methodology for the recommended 0.45 m soil-bentonite liner system that will be constructed in three 0.15 m lifts. This construction methodology was completed at an early design stage level and will be refined in greater detail in detailed design engineering.

## 6.1 Assumptions

It is assumed that construction of the embankments and buttresses are to be completed to the specifications in SRK (2021).

Table 6 lists the lined areas for the various MP that were evaluated in the preliminary cost estimate.

**Table 6: Lined Areas for the Various Liner Alternatives**

| Design Revision[1] | Management Pond | Area Pond ($m^2$) | Area Upstream Dam Slopes ($m^2$) | Cumulative Area ($m^2$) |
|---|---|---|---|---|
| 1 | EMP | 961,939 | 180,136 | 1,142,075 |
| | WMP[2] (Ex Pit) | 361,874 | 141,148 | 503,022 |
| | NMP | 210,190 | 83,017 | 293,207 |

**Notes:**
(1) Model geometry for Design Revision 1 provided by Telkwa on November 17, 2020.
(2) Lining of the WMP *In Pit* portion is not being considered for the construction methodology

Plan view of the areas requiring soil-bentonite liner is shown in Figure 4.

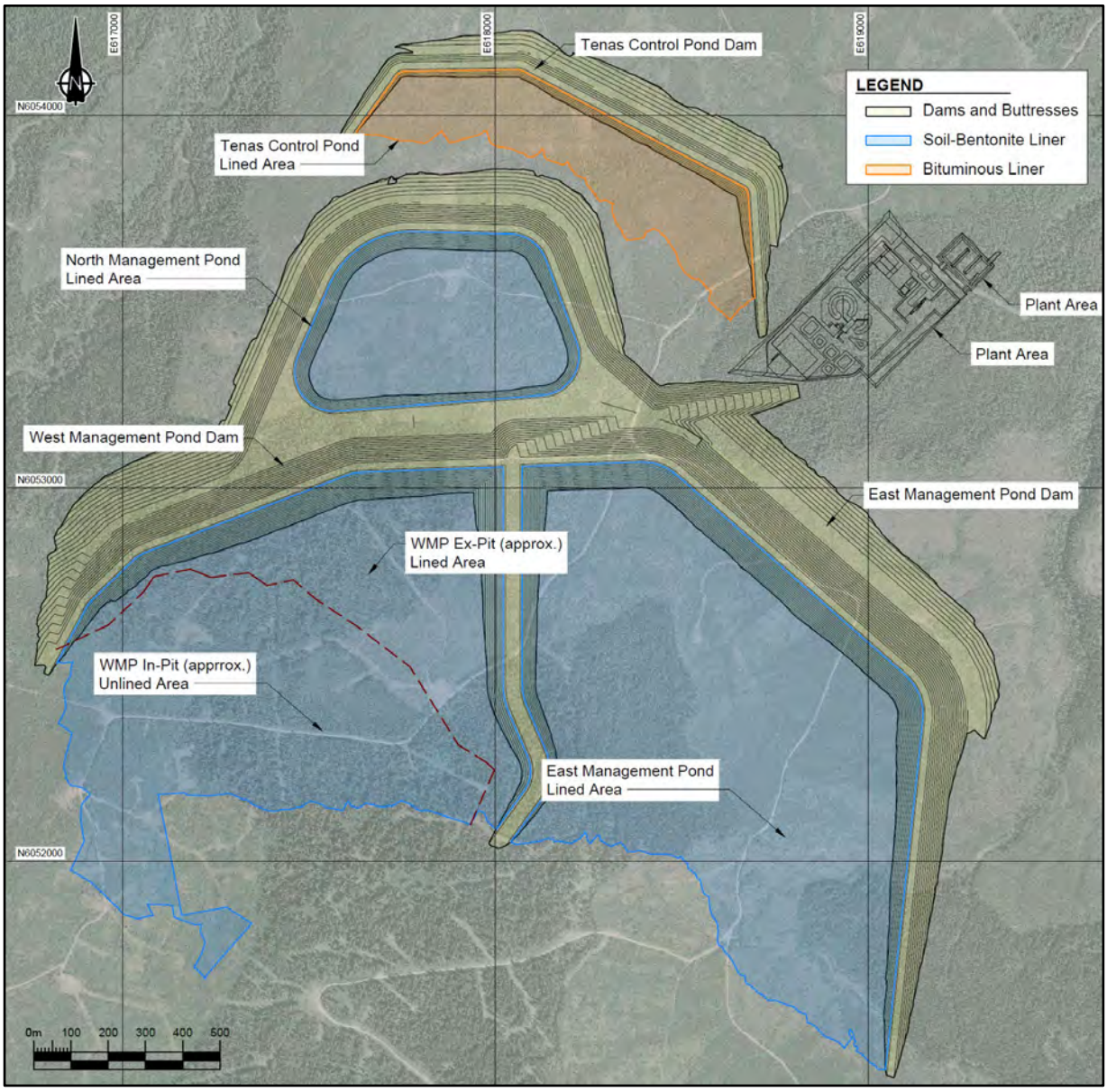



**Figure 4: Plan view of the lined surface areas of the Tenas Control Pond and PAG management ponds at the Tenas Project**

## 6.2 Material Characteristics

The blend of materials used for the soil-bentonite liner system (surface soils and bentonite) depend on the parameters adopted in the design, specifically the geotechnical parameters and hydraulic conductivity. The material characteristics and its adequacy to quality standards will need to be proven in laboratory testing and in the field.

Field obtained geotechnical parameters should be equal to or better than those adopted in the design. The *in-situ* hydraulic conductivity of the soil-bentonite liner should have a hydraulic conductivity ≤ $1x10^{-10}$ m/s; therefore, a correct characterization of the geotechnical parameters (particle-size distribution and clay/bentonite content) and parameters associated with the condition of permeability (degree of compaction, *in-situ* hydraulic conductivity) will be required. Additional characteristic parameters are recommended to be evaluated during the construction works to check compliance with minimum material requirements during construction.

### 6.2.1 On-Site Soil

The selected area for the MP is located at the north and north-east of the projected Tenas open pit. The overburden material is composed principally of a very stiff to hard lean clay (CL), with low to medium plasticity, with intervals of high plasticity clay (CH), clayey silty sand (SC or SM) or gravel (GC or GM) at various depths (with an overburden total thickness equal or higher than 30 m in most of the extension).

Fine-grained and coarse-grained native soil utilized for the soil-bentonite liner system will be exposed during foundation preparation (described in Section 6.3.3). Coarser-grained granular particles such as cobbles and boulders should be removed. The native soil should be subjected to field and laboratory testing to verify the proportion of bentonite required to meet the target hydraulic conductivity ≤ $1x10^{-10}$ m/s, which served as the basis of the liner design.

## 6.3 Execution of the Liner System

### 6.3.1 General

During the construction procedure (cleaning, excavation, embankment construction and operations), additional information related to foundation characteristics and slope materials can be obtained. This information can continue to inform and help to develop processes.

### 6.3.2 Equipment

Equipment options that can be considered for construction of the soil-bentonite liner system include haul trucks, haul trucks equipped with truck mounted spreaders or tractors pulling trailer mounted spreaders, smooth-drum and/or padfoot vibrating compactors, tractors (equipped with or) pulling trailer mounted rotovators or disc harrows, dozers, or graders. The most suitable equipment will be selected by Telkwa Coal based on the soil characteristics and construction requirements.

### 6.3.3 Foundation Preparation

In preparation for construction of the soil-bentonite liner system, clearing and grubbing should be completed until surface soils, trunks, roots, and topsoil materials have been removed and no appreciable content of organic matter remains:

- Clearing involves cutting of tree stumps and brush, and removal of snow and ice.
- Grubbing involves removal of tree stumps, shrubs, grasses, including their complete root system.

The terrain slope should be uniform for consistent pre-disking and subsequent application & mixing of bentonite.

### 6.3.4 Placement, Disking, and Compaction

In this section, preliminary placement, disking, and compaction specifications are provided. These will be further studied and updated during detailed design engineering.

#### Previous Studies

Placement, discing, and compaction equipment and use shall be determined from field studies in trial pads. From these studies, the optimum combination of type of equipment and operation shall be specified. The feasibility of pre-disking the upstream dam surface area shall be assessed on a trial embankment. However, it may be determined that instead of pre-disking, the upstream dam face should be scarified with a toothed excavator bucket or alternative methods.

#### Pre-Disking

Construction of the soil-bentonite liner system involves pre-disking the uppermost 0.15 m of soil to ensure hydraulic connectivity of the native soils and bentonite. This will take place following inspection and approval of preliminary foundation preparation (clearing and grubbing). The field engineer shall carry out visual inspection and approval of the pre-disked surface prior to advancing to bentonite placement. The number of passes required for pre-disking to is dependent on the prepared foundation conditions and selection of equipment.

#### Placement, Disking, and Compaction

Bentonite will be spread onto the uppermost 0.15 m of pre-disked surface soil. Spreading the bentonite may be accomplished from a haul truck mounted cement spreader or a tractor pulling a trailer mounted spreader. Equipment to consider for spreading bentonite are the Stoltz Site Spreader® mounted on a CAT® haul truck. The number of passes to dispense a sufficient quantity of bentonite is dependent on the selection of equipment. For the upstream dam faces it may be necessary to utilize an excavator to roughly dispense the bentonite from 1 $m^3$ bags, followed by manual smoothing/raking of the bentonite by laborers using manual tools such as rakes and shovels.

Following spreading of the bentonite, disking will be undertaken to mix the pre-disked native soil and bentonite. The maximum disking depth per pass is 0.15 m; hence, survey control will need to be achieved using either GPS, rod & level (horizontal levelling), or Total Station. The number of passes of the disking equipment to achieve adequate mixing will be based on the selection of equipment and informed by field studies on trial pads.

To achieve the 0.45 m soil-bentonite liner, 0.15 m layers of local material will need to be placed prior to the second and third additions of bentonite. Placement of the native soil can be completed by hauling native soil with a haul truck, dumping the material in local stockpiles, and then spreading the soil to the target 0.15 m lift thickness with a dozer or grader. For each 0.15 m lift of the soil-bentonite liner system, bentonite will be spread onto the 0.15 m of native soil followed by disking to mix the native soil and bentonite, and compaction.

Compaction of each 0.15 m lift of the 0.45 m soil bentonite liner system will be accomplished with a vibratory smooth drum or sheepsfoot roller. The number of passes of the compactor will be dependent on dry density targets defined in the detailed design engineering and selection of equipment.

Grab samples of the surface soil, bentonite, and soil-bentonite mixture shall be collected and subjected to the testing procedures recommended in Section 6.4.2. Testing of the compacted soil-bentonite liner system *in-situ* shall be undertaken with the testing procedures recommended in Section 6.4.

### 6.3.5 Protective Component

Prior to placement of PAG material, the soil-bentonite liner system will require a protective component to protect the liners from being punctured by large waste rock, which could damage the integrity and functionality of the liner system. Two options were evaluated for this protective layer:

1. Placement of a 1 m thick over-liner layer of locally stockpiled soil.
2. Deployment of a 16 oz. non-woven geotextile.

A protective layer of 16 oz. non-woven geotextile was selected to be placed on top of the liner instead of a soil over-liner. Aside from being the lower cost of the two alternatives, the non-woven geotextile does not reduce the storage capacity of the MPs.

## 6.4 Quality Control and Quality Assurance

The development of an adequate geotechnical campaign, technical specifications for construction and quality controls mitigate the risk of requiring a re-design during construction. The definition of ranges for acceptable parameters ensures flexibility in design tolerances and enables foreseeing actions on possible variabilities in material quality. The design of adequate construction methodologies and its correct control can help prevent contingent quality defects due to negligence and the additional associated costs.

### 6.4.1 Weather Considerations

Weather and runoff conditions during construction can significantly affect the water content of the surface soil material or create hydraulic conditions different from those assumed, which could in turn cause changes in the liner design. For this reason, the project must be continuously evaluated to make sure that the conditions found during construction are compatible with the final design.

### 6.4.2 Recommended Testing

It will be necessary to maintain density control and verify the in-situ hydraulic conductivity of the soil-bentonite liner system to ensure the liner will perform to specification. This will involve a combination of laboratory testing on grab samples collected in the field and *in-situ* (field based) testing.

#### Routine Tests

The following routine testing and visual-manual inspection shall be performed to establish the soil type and *in-situ* condition:

- Natural moisture content testing according to standard ASTM D2216;
- Particle size distribution curves shall be obtained according to standards ASTM D0422 (granular material) and ASTM D2487 (fine material). These shall be obtained for samples of surface soils, bentonite, and soil-bentonite liner material; and
- Permeability tests shall be performed according to standards ASTM D2434 (granular material) and ASTM D5084 (fine material).

### 6.4.3 Compaction

The *in-situ* soil density can be measured by two methods:

- Sand-cone method (ASTM D1556): an excavation is made, and the weight of the extracted material is determined. The excavation volume is computed by filling the hole with sand using a calibrated recipient; and
- Nuclear methods (ASTM D2922, ASTM D3017): based on the interaction between gamma radiation and existing electrons in the soil particles. The difference between energy emitted and received is measured, which is proportional to the soil density.

A systematic on-site control program of the degree of compaction must be elaborated and implemented to determine the density and moisture content of the compacted material and compare the results with the specified limits.

The degree of compaction grade shall be verified in each lift. Control of the fill material shall be carried out continuously by visual inspection of the operations (unloading, spreading, humidification, mixing and compaction).

The number of control tests shall be determined for the detailed level design. No new lift shall be spread until the degree of compaction (moisture and density) has been tested and accepted.

### 6.4.4 Permeability Tests

The soil permeability governs the hydraulic performance of the soil-bentonite liner system. Permeability shall be verified by the use of trial pads, either prior to or during construction, by a Double Ring Infiltrometer, Guelph infiltrometer or *in situ* tests (ASTM D5126).

Permeability results for the soil bentonite liner must be less than or equal to $1x10^{-10}$ m/s in accordance with hypotheses made during the geotechnical design of the embankment.

# 7 Recommendations

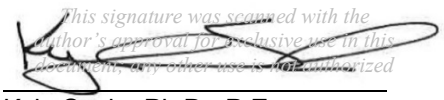
- A 0.45 m soil-bentonite liner system with a hydraulic conductivity of 1E-10 m/s would be sufficient to reduce total seepage below the 2,800 $m^3$/day design criteria target for both the base and high cases.
- To perform a laboratory study to determine the optimal proportion of bentonite-soil blend to produce a soil-bentonite mixture with a hydraulic conductivity ≤ 1E-10 m/s.
- To perform field trials to refine the construction methodology and equipment selection, and verify the soil-bentonite liner system performs to specification with an *in-situ* hydraulic conductivity ≤ 1E-10 m/s.
- The preliminary construction methodology for the recommended 0.45 m soil-bentonite liner system will be constructed in three 0.15 m lifts:
  - Preliminary foundation preparation (clearing & grubbing) followed by pre-disking the native soil;
  - Spreading bentonite to meet the target ≤ $1x10^{-10}$ m/s hydraulic conductivity, disking the first 0.15 m lift of soil-bentonite, and compaction;
  - Placement of 0.15 m lifts of native soil, with each lift followed by application of bentonite to meet the target ≤ $1x10^{-10}$ m/s hydraulic conductivity, disking the 0.15 m lifts of soil-bentonite, and subsequent compaction.
- Quality control and quality assurance procedures should be implemented to mitigate the risk of redesign and prevent quality defects. This includes proper oversight of weather and implementation of routine testing to establish the soil type and *in-situ* condition, as well as maintaining control of the degree of compaction and permeability of the soil-bentonite liner system.

# 8 Closure

This technical memo, “Liner System Seepage Assessment and Construction Methodology for Tenas Management Ponds”, was prepared by SRK Consulting (Canada) Inc. to provide recommendations for a liner system that will reduce seepage rates from the Tenas Management Ponds to below allowable thresholds defined in SRK’s site water balance (SRK, 2020a).

We trust the information included meets your present requirements. If you have any questions regarding the analyses or if you require additional information, please do not hesitate to contact the undersigned.

SRK Consulting (Canada) Inc.

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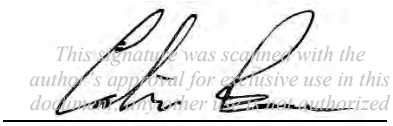


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# References

SRK, 2020a. Tenas Project Water and Load Balance Report. Report prepared for Telkwa Coal Limited. Project no. 2CT025.008.

SRK, 2020b. 2020 EA Groundwater Technical Report. Report prepared for Telkwa Coal Limited. Project no. 2CT025.008.

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# Appendix F – Estimation of Seepages Underneath the Bituminous Geomembrane of the Control Pond

# LEAKAGE RATE A THROUGH A COMPOSITE LINER

*Source:Giroud, J.P., 1997, "Equations for Calculating the Rate of Liquid Migration Through Composite Liners Due to Geomembrane Defects", Geosynthetics International, Vol. 4, Nos. 3-4, pp. 335-348.*

## INPUTS

**A, Geomembrane area (m2)**

**n, Number of defects per considered geomembrane area (A)**

| Feature | (A) Footprint | (n) Defect density | | | |
|---|---|---|---|---|---|
| | | Excellent | Good | Fair | poor |
| | m2 | *1/acre* | *4/acre* | *10/acre* | *20/acre* |
| - | - | *1* | *4* | *10* | *20* |
| Control Po | 386000 | 96 | 382 | 954 | 1908 |

**$C_{qo}$ or $C_{q\infty}$ , Contact quality factor**

| | Good contact | Poor contact |
|---|---|---|
| $C_{qo}$ | 0.21 | 1.15 |
| Cq ∞ | 0.52 | 1.22 |

$C_{q0}$ => circular, square, rectangular

$C_{q\infty}$ => infinite length

**h. hydraulic heads**

h = 10 m

Note: Limitation of Giroud equation Semi-Prmb => head above geomembrane must be <=3m.

If head above the liner is >3m, the leakage rate is overpredicted (Source: Paul Hubbard, Car

**ts. Thickness of the low-permeability soil component of the composite liner**

ts = 7 m

*CCL, compacted clay liner => typically between 0.3 to 1.5m*

*GCL, geosytnthetic clay liner => typicallybetween 5 and 100mm*

**ks, Permeability of the low-permeability soil (m/s)**

ks = 7.0E-07 m/s Base Case (geomean of the mixed grain till)

ks = 1.9E-06 m/s High Case (base case ks x 2.7)

*ks must be equal or less to kg (see limitations to Giroud equations)*

*kg 5.9E-07 => Calculation kg assumes geomembrane defect is circular*

*k of CCL typically between 1E-10 and 1E-9 m/s*

*k of GCL typically between 5-12 and 5E-11 m/s*

**d, Diameter of circular defect (m)**

d = 3.5 mm 3.5E-03 m

*(min. 0.5mm / max.25mm)*

**case 1**: Typical for liner performance evaluation => defect area of 0.1 $cm^2$
(equivalent to defect diameter of 3.5 mm)

**Case 2**: Conservative design => defect area of 1 $cm^2$
(equivalent to defect diameter of 11.284 mm)

**b, Width of defect (m) for an infinitely long defect**

square defect with side le 3.5E-03 m

infinitely long defect with 3.5E-03 m

**b and B, Width and Length (m) for a recta** m

Rectangular defect with w 3.5E-03 m

Rectangular defect with le 7.0E-03

## CALCULATIONS

**Case 1: Circular defect with diameter (d)**

$$Q = 0.976\ C_{qo}\left[1+0.1(h/t_s)^{0.95}\right] d^{0.2}\ h^{0.9}\ k_s^{0.74}$$

**Q, Leakage rate through the geomembrane defects**

**Unit $m^3/d$**

| | Q per defect x # defect | | | |
|---|---|---|---|---|
| | Excellent | Good | Fair | poor |
| Base Cas | **139** | 551 | 1377 | 2754 |
| High Cas | **289** | 1150 | 2872 | 5744 |

**Case 2: Square defect with side length (b)**

$$Q = C_{qo}\ [1+0.1\ (h/t_s)^{0.95}]\ b^{0.2}\ h^{0.9}\ k_s^{0.74}$$

**Q, Leakage rate through the geomembrane defects**

**Unit $m^3/d$**

| | Q per defect x # defect | | | |
|---|---|---|---|---|
| | Excellent | Good | Fair | poor |
| Base Cas | 142 | 565 | 1411 | 2822 |
| High Cas | 296 | 1178 | 2942 | 5885 |

**Case 3: Infinitely long defect with width (b)**

$$Q^* = C_{q\infty}\ [1+0.2\ (h/t_s)^{0.95}]\ b^{0.1}\ h^{0.45}\ k_s^{0.87}$$

**Q, Leakage rate through the geomembrane defects**

**Unit $m^3/d$**

| | Q per defect x # defect | | | |
|---|---|---|---|---|
| | Excellent | Good | Fair | poor |
| Base Cas | 39 | 155 | 388 | 777 |
| High Cas | 93 | 369 | 921 | 1843 |

**Case 4: Rectangular defect with width (b) and length (B)**

$$Q = C_{qo}\ [1+0.1\ (h/t_s)^{0.95}]\ b^{0.2}\ h^{0.9}\ k_s^{0.74} + C_{q\infty}\ [1+0.2\ (h/t_s)^{0.95}]\ (B-b)\ b^{0.1}\ h^{0.45}\ k_s^{0.87}$$

**Q, Leakage rate through the geomembrane defects**

**Unit $m^3/d$**

| | Q per defect x # defect | | | |
|---|---|---|---|---|
| | Excellent | Good | Fair | poor |
| Base Cas | 142 | 565 | 1412 | 2825 |
| High Cas | 296 | 1180 | 2946 | 5891 |

**Limitations of Giroud (1997) equations**

- If the defects is circular, the defect diameter should be no less than 0.5mm and not greate
- Do not use for very small defects (d<0.5mm because capillarity may prevent free flow;
- In the case of defects that are not circular, it is proposed to use these limitations for the defect width.
- The liquid head on top of the geomembrane should be equal or less than 3m
- The K of the low-permeability soil underlying the geomembrane shoul be equal to or less than a certain value kg
- Limitations to diameter width and groundwater head are linked to the experimental data that were used to deveop the semi-empirical equations

**Conversion factors**

1 m2 = 2.5E-04 acre

## LEAKAGE RATE COMPOSITE LINER (BGM + S/B LINER)

### CALCULATIONS

*Source: Leakage Control using Geomembrane Liners J.P. Giroud. Soils and Rocks, São Paulo, 39(3): 213-235, September-December, 2016.*

**Case 1: Circular defect with diameter of d**

$$Q = 0.21\left[1+0.1\left(\frac{h}{t}\right)^{0.95}\right]a^{0.1}h^{0.9}k^{0.74} \qquad (4)$$

$$k_G = \left\{\frac{0.3891\, d^{1.8}}{C_{qo}\left[1+0.1\left(\frac{h}{t_s}\right)^{0.95}\right]h^{0.4}}\right\}^{1/0.74}$$

$C_{qo}$ = 0.21

### INPUTS

Instructions => Enter value in yellow cell to modify calculations

| Feature | A ($m^2$) | k (m/s) | h (m) | ts (m) | kg (m/s) | Q ( $m^3$/d) Number of defects per acre: Excellent 1 | Good 2 | Fair 10 | poor 20 |
|---|---|---|---|---|---|---|---|---|---|
| EMP | 1,127,069 | 4.1E-10 | 25 | 0.15 | *2.1E-07* | 57.4 | **114.9** | 573.6 | 1147.0 |
| | | | | 0.30 | *4.7E-07* | 31.7 | **63.5** | 316.8 | 633.5 |
| | | | | 0.45 | *7.3E-07* | 22.9 | **45.8** | 228.7 | 457.4 |
| | | | | 0.56 | *9.2E-07* | 19.4 | **38.8** | 193.6 | 387.0 |
| ***Assumption that*** | 286,995 | 4.1E-10 | 20 | 0.15 | *3.1E-07* | 9.8 | **19.7** | 98.4 | 196.6 |
| | | | | 0.30 | *6.8E-07* | 5.5 | **11.0** | 55.1 | 110.1 |
| | | | | 0.45 | *1.0E-06* | 4.0 | **8.0** | 40.2 | 80.4 |
| | | | | 0.56 | *1.3E-06* | 3.4 | **6.9** | 34.3 | 68.5 |
| TCP | 368,603 | 4.1E-10 | 10 | 0.15 | *9.9E-07* | 3.8 | **7.6** | 37.9 | 75.7 |
| | | | | 0.30 | *2.0E-06* | 2.3 | **4.5** | 22.5 | 44.9 |
| | | | | 0.45 | *2.9E-06* | 1.7 | **3.4** | 17.2 | 34.3 |
| | | | | 0.56 | *3.4E-06* | 1.5 | **3.0** | 15.1 | 30.1 |
| WMP ex-pit | 491,397 | 4.1E-10 | 30 | 0.15 | *1.5E-07* | 34.8 | **69.3** | 346.5 | 692.7 |
| | | | | 0.30 | *3.5E-07* | 19.0 | **37.9** | 189.6 | 379.0 |
| | | | | 0.45 | *5.5E-07* | 13.6 | **27.2** | 135.8 | 271.4 |
| | | | | 0.56 | *6.9E-07* | 11.5 | **22.9** | 114.3 | 228.4 |
| WMP in-pit ovb | 123,239 | 4.1E-10 | 30 | 0.15 | *1.5E-07* | 8.8 | **17.4** | 87.0 | 174.0 |
| | | | | 0.30 | *3.5E-07* | 4.8 | **9.5** | 47.6 | 95.2 |
| | | | | 0.45 | *5.5E-07* | 3.5 | **6.8** | 34.1 | 68.2 |
| | | | | 0.56 | *6.9E-07* | 2.9 | **5.7** | 28.7 | 57.4 |
| WMP in-pit rock | 471,130 | 4.1E-10 | 30 | 0.15 | *1.5E-07* | 33.4 | **66.4** | 332.2 | 664.2 |
| | | | | 0.30 | *3.5E-07* | 18.3 | **36.4** | 181.8 | 363.4 |
| | | | | 0.45 | *5.5E-07* | 13.1 | **26.0** | 130.2 | 260.2 |
| | | | | 0.56 | *6.9E-07* | 11.0 | **21.9** | 109.6 | 219.0 |

**NOTES:**

$Q_r$ , Leakage rate through the geomembrane defects

n, defect density (number of defects per acre)

h, hydrauli head

A, liner footprint

ts, thickness of the low-permeability soil component of the composite liner

ks, permeabiliyy of the low-permeability soil component of the composite liner

ks must be equal or less to kg (see limitations to Giroud equations). Calculation kg assumes geomembrane defect is circular.

k of CCL typically between 1E-10 and 1E-9 m/s

k of GCL typically between 5-12 and 5E-11 m/s

**Limitations of Giroud (1997) equations**

- if the defects is circular, the defect diameter should be no less than 0.5mm and not greater than 25mm. Do not use for very small defects (d<0.5mm because capillarity may prevent free flow.
- The liquid head on top of the geomembrane should be equal or less than 3m. If head above the liner is >3m, the leakage rate is overpredicted (Source: Paul Hubbard, Cardiff)
- The K of the low-permeability soil underlying the geomembrane shoul be equal to or less than a certain value kg
- Limitations to diameter width and groundwater head are linked to the experimental data that were used to deveop the semi-empirical equations.

**GENERAL PROPERTIES APPLIED TO ALL CASES:**

**Table 1 Giroud 1997: Contact quality factor Cqo or Cq ∞**

| | Good contact | Poor contact |
|---|---|---|
| $C_{qo}$ | 0.21 | 1.15 |
| Cq ∞ | 0.52 | 1.22 |

Cq0 => circular, square, rectangular

Cq ∞ => infinite length

**Cqo or Cq ∞ , Contact quality factor**

| | |
|---|---|
| Cqo | 0.21 |
| Cq ∞ | 0.52 |

**r, Radius of circular defect (m)**

r 5.65 mm a 100 $mm^2$

(diam. min. 0.5mm / max.25mm)

Giroud 2016: over the years, the practice for engineers as well as researchers has been to consider 2 holes per acre with a hole size of 100 $mm^2$.

**Conversion factors**

1 $m^2$ = 2.5E-04 acre

## SCENARIOS

### Leakage rate ($m^3/d$) for designs with bituminous geomembrane on top of a soil-bentonite liner

| Liner design | TCP | EMP | NMP | WMP ex-pit | WMP in-pit ovb | WMP in-pit rock |
|---|---|---|---|---|---|---|
| B0.15 | 8 | 115 | 20 | 69 | 17 | 66 |
| B0.30 | 5 | 63 | 11 | 38 | 10 | 36 |
| B0.45 | 3 | 46 | 8 | 27 | 7 | 26 |
| B0.56 | 3 | 39 | 7 | 23 | 6 | 22 |

**Mitigation #1 and #2**

Notes:
- Liner design notation: Letter B signifies that a bituminouS liner is placed on top of a soil-bentonite (s/b) liner, the value indicates the thickness in meter of the s/b liner
- nr, option not requested by TCL

### Leakage rate ($m^3/d$) for designs with a soil-bentonite liner (i.e., no BGM) placed on top of overburden or weathered bedrock

| Liner design | TCP | EMP | NMP | WMP ex-pit | WMP in-pit | WMP in-pit ovb | WMP in-pit rock |
|---|---|---|---|---|---|---|---|
| 0.15 | na | 738 | 371 | 762 | 403 | 85 | 318 |
| 0.30 | na | 458 | 198 | 400 | 312 | 66 | 246 |
| 0.45 | na | 334 | 109 | 269 | 186 | 39 | 147 |
| 0.56 | na | 277 | 87 | 216 | 179 | 38 | 141 |

Distribution of leakages in the WMP in-pit between OVB and BDR is based on footprint's proportions (21% OVB, 79% BDR)

Notes:
- Liner design notation: Letter B signifies that a bituminoUS liner is placed on top of a soil-bentonite (s/b) liner, the value indicates the thickness in meter of the s/b liner
- na, not available

### Leakage estimations ($m^3/d$) with variable designs

***Assumption that all MPs are 100% lined (i.e., seepage controlled by the liners)***

| Scenarios | WMP Ex Pit Lined | | WMP Inpit OVB Lined | | WMP Inpit Rock Lined | | Total Q ($m^3/d$) | |
|---|---|---|---|---|---|---|---|---|
| | Design | Q ($m^3/d$) | Design | Q ($m^3/d$) | Design | Q ($m^3/d$) | | |
| **Post EA1** | 0.30 | 400 | B0.30 | 10 | 0.15 | 318 | **728** | |
| **Post EA2** | 0.30 | 400 | 0.30 | 66 | 0.15 | 318 | **784** | |
| Post EA3 | 0.30 | 400 | 0.45 | 39 | 0.15 | 318 | **757** | |
| Post EA4 | 0.30 | 400 | 0.56 | 38 | 0.15 | 318 | **756** | |
| Post EA5 | B0.30 | 38 | B0.30 | 10 | 0.15 | 318 | **366** | |
| Post EA6 | B0.30 | 38 | 0.30 | 66 | 0.15 | 318 | **422** | |
| Post EA7 | B0.30 | 38 | 0.45 | 39 | 0.15 | 318 | **395** | Mitigation #1 |
| Post EA8 | B0.30 | 38 | 0.56 | 38 | 0.15 | 318 | **394** | |
| Post EA9 | 0.45 | 269 | B0.30 | 10 | 0.15 | 318 | **597** | |
| Post EA10 | 0.45 | 269 | 0.30 | 66 | 0.15 | 318 | **653** | |
| Post EA11 | 0.45 | 269 | 0.45 | 39 | 0.15 | 318 | **626** | |
| Post EA12 | 0.45 | 269 | 0.56 | 38 | 0.15 | 318 | **625** | |
| Post EA13 | 0.56 | 216 | B0.30 | 10 | 0.15 | 318 | **544** | Mitigation #2 |
| Post EA14 | 0.56 | 216 | 0.30 | 66 | 0.15 | 318 | **600** | |
| Post EA15 | 0.56 | 216 | 0.45 | 39 | 0.15 | 318 | **573** | |
| Post EA16 | 0.56 | 216 | 0.56 | 38 | 0.15 | 318 | **572** | |
| Post EA17 | 0.30 | 400 | B0.30 | 10 | B0.15 | 66 | **476** | |
| Post EA18 | 0.30 | 400 | 0.30 | 66 | B0.15 | 66 | **532** | |
| Post EA19 | 0.30 | 400 | 0.45 | 39 | B0.15 | 66 | **506** | |
| Post EA20 | 0.30 | 400 | 0.56 | 38 | B0.15 | 66 | **504** | |
| Post EA21 | B0.30 | 38 | B0.30 | 10 | B0.15 | 66 | **114** | |
| Post EA22 | B0.30 | 38 | 0.30 | 66 | B0.15 | 66 | **170** | |
| Post EA23 | B0.30 | 38 | 0.45 | 39 | B0.15 | 66 | **143** | |
| Post EA24 | B0.30 | 38 | 0.56 | 38 | B0.15 | 66 | **142** | |
| Post EA25 | 0.45 | 269 | B0.30 | 10 | B0.15 | 66 | **345** | |
| Post EA26 | 0.45 | 269 | 0.30 | 66 | B0.15 | 66 | **401** | |
| Post EA27 | 0.45 | 269 | 0.45 | 39 | B0.15 | 66 | **375** | |
| Post EA28 | 0.45 | 269 | 0.56 | 38 | B0.15 | 66 | **373** | |
| Post EA29 | 0.56 | 216 | B0.30 | 10 | B0.15 | 66 | **292** | |
| Post EA30 | 0.56 | 216 | 0.30 | 66 | B0.15 | 66 | **348** | |
| Post EA31 | 0.56 | 216 | 0.45 | 39 | B0.15 | 66 | **322** | |
| Post EA32 | 0.56 | 216 | 0.56 | 38 | B0.15 | 66 | **320** | |
| Post EA33 | 0.30 | 400 | B0.30 | 10 | 0.30 | 246 | **656** | |
| Post EA34 | 0.30 | 400 | 0.30 | 66 | 0.30 | 246 | **712** | |
| Post EA35 | 0.30 | 400 | 0.45 | 39 | 0.30 | 246 | **686** | |
| Post EA36 | 0.30 | 400 | 0.56 | 38 | 0.30 | 246 | **684** | |
| Post EA37 | B0.30 | 38 | B0.30 | 10 | 0.30 | 246 | **294** | |
| Post EA38 | B0.30 | 38 | 0.30 | 66 | 0.30 | 246 | **350** | |
| Post EA39 | B0.30 | 38 | 0.45 | 39 | 0.30 | 246 | **323** | |
| Post EA40 | B0.30 | 38 | 0.56 | 38 | 0.30 | 246 | **322** | |
| Post EA41 | 0.45 | 269 | B0.30 | 10 | 0.30 | 246 | **525** | |
| Post EA42 | 0.45 | 269 | 0.30 | 66 | 0.30 | 246 | **581** | |
| Post EA43 | 0.45 | 269 | 0.45 | 39 | 0.30 | 246 | **555** | |
| Post EA44 | 0.45 | 269 | 0.56 | 38 | 0.30 | 246 | **553** | |
| Post EA45 | 0.56 | 216 | B0.30 | 10 | 0.30 | 246 | **472** | |
| Post EA46 | 0.56 | 216 | 0.30 | 66 | 0.30 | 246 | **528** | |
| Post EA47 | 0.56 | 216 | 0.45 | 39 | 0.30 | 246 | **502** | |
| Post EA48 | 0.56 | 216 | 0.56 | 38 | 0.30 | 246 | **500** | |
| Post EA49 | 0.30 | 400 | B0.30 | 10 | B0.30 | 36 | **446** | |
| Post EA50 | 0.30 | 400 | 0.30 | 66 | B0.30 | 36 | **502** | |
| Post EA51 | 0.30 | 400 | 0.45 | 39 | B0.30 | 36 | **475** | |
| Post EA52 | 0.30 | 400 | 0.56 | 38 | B0.30 | 36 | **474** | |
| Post EA53 | B0.30 | 38 | B0.30 | 10 | B0.30 | 36 | **84** | |
| Post EA54 | B0.30 | 38 | 0.30 | 66 | B0.30 | 36 | **140** | |
| Post EA55 | B0.30 | 38 | 0.45 | 39 | B0.30 | 36 | **113** | |
| Post EA56 | B0.30 | 38 | 0.56 | 38 | B0.30 | 36 | **112** | |
| Post EA57 | 0.45 | 269 | B0.30 | 10 | B0.30 | 36 | **315** | |
| Post EA58 | 0.45 | 269 | 0.30 | 66 | B0.30 | 36 | **371** | |
| Post EA59 | 0.45 | 269 | 0.45 | 39 | B0.30 | 36 | **344** | |
| Post EA60 | 0.45 | 269 | 0.56 | 38 | B0.30 | 36 | **343** | |
| Post EA61 | 0.56 | 216 | B0.30 | 10 | B0.30 | 36 | **262** | |
| Post EA62 | 0.56 | 216 | 0.30 | 66 | B0.30 | 36 | **318** | |
| Post EA63 | 0.56 | 216 | 0.45 | 39 | B0.30 | 36 | **291** | |
| Post EA64 | 0.56 | 216 | 0.56 | 38 | B0.30 | 36 | **290** | |

# Appendix G - Model Calibration

| row list model | 13 |
|---|---|
| Model ID | 06-13-lc |

**Hydraulic Head Data**
(Measured between the 6th and 15th of September 2018)

| Observed Label | Unit | Observed (m) | Calculated (m) | Diff Calc-Obs | Squared Error | Absolute Error |
|---|---|---|---|---|---|---|
| T95R-15C | BDR, Coal (#1) | 881.14 | 869.17 | -12.0 | 143.2 | -12.0 |
| T95R-64 | BDR, Coal (#1), 1/1U? | 934.62 | 937.42 | 2.8 | 7.8 | 2.8 |
| T95R-40 | BDR, Coal (#1) | 892.33 | 889.92 | -2.4 | 5.8 | -2.4 |
| T96R-16-19 | BDR, Coal (#1) | 1010.65 | 979.99 | -30.7 | 940.3 | -30.7 |
| T96R-16-28 | BDR, Un-named lower coal | 1011.08 | 976.35 | -34.7 | 1206.2 | -34.7 |
| T96R-34-87 | BDR, Coal (#1), 1/1U? | 934.11 | 915.06 | -19.1 | 362.9 | -19.1 |
| T18-01D (ARD02) | BDR, Sandstone | 945.1 | 939.41 | -5.7 | 32.3 | -5.7 |
| T18-04D (W1D) | BDR, Volcanics | 945.92 | 926.46 | -19.5 | 378.7 | -19.5 |
| T18-08D (W3D) | BDR, Volcanics | 763.42 | 793.26 | 29.8 | 890.5 | 29.8 |
| T19-21S | BDR, Weathered Siltstone | 806.88 | 802.36 | -4.5 | 20.4 | -4.5 |
| T19-22S | BDR, Weathered Siltstone | 802.98 | 806.94 | 4.0 | 15.7 | 4.0 |
| T19-26S | OVB, Clayey Sand | 772.76 | 776.67 | 3.9 | 15.3 | 3.9 |
| T19-34S | BDR, Weathered Siltstone | 808.99 | 826.34 | 17.3 | 300.9 | 17.3 |
| T19-35S | BDR, Weathered Siltstone | 805.77 | 809.62 | 3.8 | 14.8 | 3.8 |
| TOB96-01-05 | OVB, Till | 919.34 | 932.54 | 13.2 | 174.3 | 13.2 |
| TOB96-02-06 | OVB, Till | 850.01 | 845.42 | -4.6 | 21.0 | -4.6 |
| TOB96-11-04 | OVB, Clay | 824.42 | 808.83 | -15.6 | 243.2 | -15.6 |
| T18-04S (W1S) | OVB, Gravelly Fat Clay (Till?) and Volc. | 940.64 | 927.21 | -13.4 | 180.3 | -13.4 |
| T18-06D (W2) | OVB, Cobbles? | 801.12 | 809.05 | 7.9 | 62.8 | 7.9 |
| T18-08S (W3S) | OVB, Sand lense in Till | 770.1 | 793.27 | 23.2 | 536.8 | 23.2 |
| T18-14S | OVB, Silty Sand with Gravel/Till | 677.42 | 673.53 | -3.9 | 15.2 | -3.9 |
| T18-15S | OVB, Sand with Gravel/Till | 704.14 | 687.73 | -16.4 | 269.2 | -16.4 |
| T19-18S | OVB, Clayey Sand | 787.13 | 801.32 | 14.2 | 201.2 | 14.2 |
| T19-27S | OVB, Silty Sand with Gravel | 768.2 | 780.47 | 12.3 | 150.7 | 12.3 |
| T19-36 | OVB, Sand and Gravel | 512.64 | 524.25 | 11.6 | 134.8 | 11.6 |
| T19-37 | OVB, Sand and Gravel | 513.1 | 526.02 | 12.9 | 166.9 | 12.9 |
| TOB96-02-20 | OVB, Sand and gravel | < 833.46 | 845.23 | well not dry | | |
| TOB97-06-21 | OVB, Sand | < 833.58 | 814.73 | dry well | | |
| TOB97-07-24 | OVB, Sand | < 787.05 | 784.50 | dry well | | |
| TOB96-11-19 | OVB, Fine sand | < 807.16 | 808.94 | well not dry | | |
| T18-02S (GEO11) | OVB, Till? Silty SAND with trace clay and trace cob | < 821.22 | 828.58 | well not dry | | |
| T18-11S (GEO22) | OVB, Till? Sandy CLAY with Trace Cobbles | < 779.73 | 759.05 | dry well | | |
| T18-13S (GEO13) | OVB, Till? Gravely CLAY with Some Cobbles | < 796.46 | 788.98 | dry well | | |
| T19-19S | OVB, Clayey Sand (and Siltstone?) | < 795.44 | 823.57 | well not dry | | |
| T19-20S | OVB, Lean Clay with Sand | < 829.29 | 819.47 | dry well | | |

| Hydraulic Head Calibration Statistics | |
|---|---|
| **ME** | -1.0 |
| **Max. AE** | 34.7 |
| **AME** | 13.1 |
| **RMSE** | 15.80 |
| **NRMSE** | 3.17% |
| **R2** | 1.0 |

Hydraulic Head Calibration Statistics
- Mean Error = -1.0 m
- Maximum Absolute Error = 34.7 m
- Absolute Mean Error = 13.1 m
- Root Mean Squared Error = 15.8 m
- Norm. Root Mean Squared Error = 3.2%
- Coeff. of Determ. ($R^2$) = 0.99

| Baseflow Calibration Statistics | |
|---|---|
| **ME** | -1.6 |
| **Max. AE** | 13.0 |
| **AME** | 6.0 |
| **RMSE** | 7.4 |
| **NRMSE** | 3.59% |
| **R2** | 1.0 |

Baseflow Calibration Statistics
- Mean Error = -1.6 L/s
- Maximum Absolute Error = 13.0 L/s
- Absolute Mean Error = 6.0 L/s
- Root Mean Squared Error = 7.4 L/s
- Norm. Root Mean Squared Error = 3.6%
- Coeff. of Determ. ($R^2$) = 1.00

**BUDGET**

| Selection ID | Dirichlet + Cauchy + sink IN ($m^3/d$) | Dirichlet + Cauchy IN + Sink OUT ($m^3/d$) | Dirichlet IN ($m^3/d$) | Dirichlet OUT ($m^3/d$) | Neumann IN ($m^3/d$) | Neumann OUT ($m^3/d$) | Cauchy IN ($m^3/d$) | Cauchy OUT ($m^3/d$) | Well IN ($m^3/d$) | Well OUT ($m^3/d$) | Source/sink IN ($m^3/d$) | Source/sink OUT ($m^3/d$) | Storage Capture(-)/Release(+) IN ($m^3/d$) | Storage Capture(-)/Release(+) OUT ($m^3/d$) | Internal Transfer (Porous Medium) IN (m3/d) | Internal Transfer (Porous Medium) OUT (m3/d) | Imbalance Rate In (+) / Out (-) (m3/d) | Internal Transfer (Discrete Features) IN (m3/d) | Internal Transfer (Discrete Features) OUT (m3/d) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CabinetCk_at_GoathornCk | 783.310 | 8432.735 | 0.000 | 8432.735 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 783.310 | 0.000 | 3.914 | 4.037 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| FourCk_at_GoathornCk | 103.767 | 1488.703 | 0.000 | 1488.703 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 103.767 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GoathonCk_at_CabinetCk | 664.327 | 6253.404 | 0.000 | 6253.404 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 664.327 | 0.000 | 0.814 | 0.705 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Goathorn_Ck_at_FourCk | 1567.126 | 17228.538 | 0.000 | 17228.538 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1567.126 | 0.000 | 5.458 | 4.932 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GoathornCk_at_TenasCk | 1758.826 | 20119.544 | 51.773 | 20119.544 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1707.053 | 0.000 | 5.458 | 4.933 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GoathornCk_at_08EE008 | 1702.425 | 19982.790 | 0.000 | 19982.790 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1702.425 | 0.000 | 5.458 | 4.933 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| GoathornCk_at_TelkwaRv | 3814.225 | 29477.819 | 1086.340 | 29477.819 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2727.885 | 0.000 | 5.683 | 5.289 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TenasCk_at_GoathornCk | 2048.955 | 9073.124 | 1034.567 | 9073.124 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1014.388 | 0.000 | 0.224 | 0.356 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TelkwaRv_at_BulkleyRv | 4257.840 | 35315.657 | 1201.343 | 35315.657 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3056.498 | 0.000 | 8.050 | 6.583 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BulkleyRv_at_TelkwaRv | 1072.215 | 10286.165 | 168.837 | 10286.165 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 903.377 | 0.000 | 2.952 | 3.669 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| All_Ck_Rv_nodes | 5346.496 | 45601.822 | 1386.521 | 45601.822 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3959.975 | 0.000 | 11.002 | 10.252 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Domain | 45599.632 | 45601.822 | 1386.521 | 45601.822 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 44213.111 | 0.000 | 133.894 | 132.024 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Baseflow Data (L/s)**

*(NOMENCLATURE: <0 outflow / >0 Inflow to the model)*

| Location | Selection Label | Total watershed ($km^2$) | Mdl watershed ($km^2$) | Estim. | Calc | Stats | |
|---|---|---|---|---|---|---|---|
| | | | | Target (L/s) | Calc. (L/s) | Squared Error | Absolute Error |
| Cabinet Creek | CabinetCk_at_GoathornCk | 54.1 | 54.1 | 97.9 | 97.6 | 1.0E-01 | -0.33% |
| Four Creek | FourCk_at_GoathornCk | 14.1 | 14.1 | 25.6 | 17.2 | 7.0E+01 | -32.72% |
| Tenas Creek | TenasCk_at_GoathornCk | 58.6 | 58.6 | 106.0 | 93.0 | 1.7E+02 | -12.27% |
| Goathorn Creek | GoathonCk_at_CabinetCk | 50.3 | 40.6 | 73.4 | 72.4 | 1.1E+00 | -1.45% |
| | Goathorn_Ck_at_FourCk | 116.7 | 106.9 | 193.6 | 199.4 | 3.4E+01 | 3.02% |
| | GoathornCk_at_08EE008 | 133.5 | 123.7 | 223.9 | 231.3 | 5.5E+01 | 3.30% |
| Telkwa River | TelkwaRv_at_BulkleyRv | 834.3 | 197.9 | 358.2 | 394.8 | not applicable | not applicable |
| Bulkey River | BulkleyRv_at_TelkwaRv | 12400.0 | 280.2 | 507.2 | 511.9 | not applicable | not applicable |

Note:
Goathorn Ck @ Telkwa River = 192.8 km2
Model represents only about 2% of the Bulkey watershed

# Appendix H – Analysis of the Potential Groundwater Quality at Post-closure in the Private Wells Area

**Estimation groundwater quality downgradient of the Project (WQS09), along pathways towards private wells - Base Case**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
(2) **[ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
Ci,, concentration of from mine feature i (source terms).
Pi,, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05l-lc (PostClosure) - Base Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 95.6% | 4.4% | 13.4% | 30.9% | 55.3% | na | na | 0.5% |
| WQS09 (TCL 25y) | 95.2% | 4.8% | 12.2% | 28.2% | 50.5% | 8.6% | na | 0.4% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | Base Case Source Terms (Source: Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm) | | | | | | | | | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Post-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 0.68 | 0.75 | 0.55 | 0.55 | 0.39 | 0.39 | 1.20 | 1.20 | 0.05 | 0.05 | 0.86 | 0.89 | 0.54 | 0.54 | 2.43 | 2.43 | 0.54 | 0.54 | 2.42 | 2.42 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.035 | 0.053 | 0.065 | 0.064 | 0.003 | 0.003 | 0.080 | 0.080 | 0.007 | 0.007 | 0.170 | 0.170 | 0.129 | 0.129 | 1.398 | 1.398 | 0.128 | 0.128 | 1.392 | 1.393 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 2.5000 | 3.5000 | 0.6900 | 0.7000 | 0.5500 | 0.5500 | 2.4000 | 2.4000 | 0.0080 | 0.0079 | 0.0230 | 0.0230 | 0.0747 | 0.0748 | 0.0938 | 0.0939 | 0.0848 | 0.0890 | 0.1038 | 0.1080 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0590 | 0.0820 | 0.0160 | 0.0170 | 0.0130 | 0.0130 | 0.0560 | 0.0570 | 0.0002 | 0.0002 | 0.0019 | 0.0019 | 0.0026 | 0.0026 | 0.0064 | 0.0064 | 0.0028 | 0.0029 | 0.0066 | 0.0068 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 20.00 | 21.00 | 10.00 | 10.00 | 13.00 | 13.00 | 33.00 | 33.00 | 1.30 | 1.30 | 4.80 | 4.90 | 11.89 | 11.89 | 6.78 | 6.78 | 11.92 | 11.93 | 6.83 | 6.83 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.0710 | 0.0720 | 0.0300 | 0.0300 | 0.0500 | 0.0500 | 0.1300 | 0.1300 | 0.0035 | 0.0035 | 0.0074 | 0.0073 | 0.0088 | 0.0088 | 0.0122 | 0.0122 | 0.0091 | 0.0091 | 0.0125 | 0.0125 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.00720 | 0.00880 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00009 | 0.00009 | 0.00002 | 0.00002 | 0.00018 | 0.00019 | 0.00048 | 0.00048 | 0.00048 | 0.00048 | 0.00051 | 0.00052 | 0.00051 | 0.00052 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.00680 | 0.00830 | 0.00370 | 0.00370 | 0.00150 | 0.00150 | 0.00760 | 0.00760 | 0.00150 | 0.00140 | 0.00740 | 0.00730 | 0.00090 | 0.00090 | 0.00080 | 0.00080 | 0.00092 | 0.00093 | 0.00083 | 0.00083 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.037 | 0.043 | 0.030 | 0.030 | 0.012 | 0.012 | 0.046 | 0.046 | 0.010 | 0.010 | 0.059 | 0.060 | 0.090 | 0.090 | 0.317 | 0.317 | 0.090 | 0.090 | 0.316 | 0.316 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.28 | 0.35 | 0.16 | 0.16 | 0.06 | 0.06 | 0.33 | 0.33 | 0.06 | 0.06 | 0.32 | 0.32 | 0.11 | 0.11 | 0.16 | 0.16 | 0.11 | 0.11 | 0.16 | 0.16 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.000260 | 0.000280 | 0.000120 | 0.000120 | 0.000100 | 0.000100 | 0.000350 | 0.000360 | 0.000057 | 0.000056 | 0.000140 | 0.000140 | 0.000031 | 0.000031 | 0.000022 | 0.000022 | 0.000032 | 0.000032 | 0.000023 | 0.000023 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 39.00 | 46.00 | 21.00 | 21.00 | 8.30 | 8.30 | 40.00 | 40.00 | 11.00 | 11.00 | 41.00 | 41.00 | 49.16 | 49.16 | 14.70 | 14.70 | 49.12 | 49.15 | 14.80 | 14.83 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0008 | 0.0010 | 0.0005 | 0.0005 | 0.0002 | 0.0002 | 0.0011 | 0.0011 | 0.0002 | 0.0002 | 0.0009 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.01200 | 0.01500 | 0.00640 | 0.00650 | 0.00260 | 0.00260 | 0.01400 | 0.01400 | 0.00250 | 0.00240 | 0.01300 | 0.01300 | 0.00070 | 0.00070 | 0.00070 | 0.00070 | 0.00075 | 0.00076 | 0.00075 | 0.00076 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0024 | 0.0028 | 0.0013 | 0.0013 | 0.0006 | 0.0006 | 0.0026 | 0.0026 | 0.0006 | 0.0006 | 0.0024 | 0.0024 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.033 | 0.035 | 0.018 | 0.018 | 0.019 | 0.019 | 0.055 | 0.056 | 0.003 | 0.003 | 0.019 | 0.019 | 0.030 | 0.030 | 0.064 | 0.064 | 0.030 | 0.030 | 0.064 | 0.064 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00039 | 0.00045 | 0.00024 | 0.00024 | 0.00013 | 0.00013 | 0.00054 | 0.00054 | 0.00008 | 0.00008 | 0.00041 | 0.00041 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.1400 | 0.1700 | 0.0760 | 0.0760 | 0.0320 | 0.0320 | 0.1600 | 0.1600 | 0.0290 | 0.0280 | 0.1500 | 0.1500 | 0.0075 | 0.0075 | 0.0526 | 0.0526 | 0.0080 | 0.0082 | 0.0530 | 0.0531 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 69.00 | 85.00 | 37.00 | 37.00 | 14.00 | 14.00 | 77.00 | 77.00 | 15.00 | 15.00 | 75.00 | 75.00 | 15.49 | 15.49 | 4.13 | 4.13 | 15.71 | 15.78 | 4.40 | 4.46 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.01400 | 0.01600 | 0.00890 | 0.00900 | 0.00570 | 0.00570 | 0.02200 | 0.02200 | 0.00210 | 0.00210 | 0.01400 | 0.01400 | 0.05047 | 0.05047 | 0.01673 | 0.01673 | 0.05032 | 0.05033 | 0.01672 | 0.01673 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.000180 | 0.000190 | 0.000081 | 0.000082 | 0.000081 | 0.000082 | 0.000260 | 0.000260 | 0.000042 | 0.000042 | 0.000065 | 0.000064 | 0.000013 | 0.000013 | 0.000013 | 0.000013 | 0.000013 | 0.000013 | 0.000013 | 0.000013 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0220 | 0.0270 | 0.0120 | 0.0120 | 0.0047 | 0.0048 | 0.0240 | 0.0240 | 0.0052 | 0.0050 | 0.0230 | 0.0230 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0190 | 0.0240 | 0.0100 | 0.0100 | 0.0042 | 0.0042 | 0.0220 | 0.0220 | 0.0040 | 0.0039 | 0.0210 | 0.0200 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 12.0 | 15.0 | 6.6 | 6.6 | 2.5 | 2.5 | 14.0 | 14.0 | 2.6 | 2.5 | 13.0 | 13.0 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.01600 | 0.01900 | 0.00830 | 0.00840 | 0.00340 | 0.00340 | 0.01800 | 0.01800 | 0.00330 | 0.00320 | 0.01700 | 0.01600 | 0.00073 | 0.00073 | 0.00067 | 0.00067 | 0.00079 | 0.00080 | 0.00073 | 0.00074 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.000150 | 0.000160 | 0.000069 | 0.000070 | 0.000075 | 0.000076 | 0.000230 | 0.000230 | 0.000037 | 0.000037 | 0.000042 | 0.000041 | 0.000026 | 0.000026 | 0.000026 | 0.000026 | 0.000027 | 0.000027 | 0.000027 | 0.000027 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 11.0 | 17.0 | 23.0 | 23.0 | 1.6 | 1.6 | 30.0 | 30.0 | 1.3 | 1.3 | 58.0 | 61.0 | 19.9 | 19.9 | 302.0 | 302.0 | 19.9 | 19.9 | 300.8 | 300.8 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.01100 | 0.01400 | 0.00590 | 0.00590 | 0.00250 | 0.00250 | 0.01300 | 0.01300 | 0.00230 | 0.00220 | 0.01200 | 0.01200 | 0.00087 | 0.00087 | 0.00087 | 0.00087 | 0.00091 | 0.00092 | 0.00091 | 0.00092 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00380 | 0.00460 | 0.00210 | 0.00210 | 0.00083 | 0.00084 | 0.00430 | 0.00430 | 0.00080 | 0.00078 | 0.00410 | 0.00410 | 0.00122 | 0.00122 | 0.00051 | 0.00051 | 0.00123 | 0.00123 | 0.00053 | 0.00053 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0010 | 0.0012 | 0.0006 | 0.0006 | 0.0003 | 0.0003 | 0.0012 | 0.0012 | 0.0002 | 0.0002 | 0.0011 | 0.0011 | 0.0010 | 0.0010 | 0.0005 | 0.0005 | 0.0010 | 0.0010 | 0.0005 | 0.0005 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0040 | 0.0048 | 0.0025 | 0.0025 | 0.0009 | 0.0009 | 0.0047 | 0.0047 | 0.0009 | 0.0009 | 0.0050 | 0.0051 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

**Estimation groundwater quality downgradient of the Project (WQS09), along pathways towards private wells - HighCase**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
(2) **[ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
$C_{i,}$, concentration of from mine feature i (source terms).
$P_{i,}$, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05l-hc (PostClosure) - High Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP-In | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 91.9% | 8.1% | 7.4% | 18.8% | 67.3% | na | na | 6.6% |
| WQS09 (TCL 25y) | 91.1% | 8.9% | 6.7% | 17.0% | 61.1% | 9.2% | na | 6.0% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | High Case Source Terms (Source: Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm) | | | | | | | | | | | | High Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Post-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 29.02 | 28.34 | 11.73 | 11.75 | 6.09 | 6.15 | 37.98 | 38.15 | 6.56 | 6.36 | 30.41 | 30.21 | 2.89 | 2.90 | 4.70 | 4.71 | 3.10 | 3.10 | 4.90 | 4.91 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.049 | 0.085 | 0.069 | 0.069 | 0.004 | 0.004 | 0.082 | 0.082 | 0.007 | 0.007 | 0.166 | 0.172 | 0.127 | 0.127 | 1.347 | 1.347 | 0.126 | 0.127 | 1.336 | 1.337 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 1.8826 | 3.2811 | 0.1686 | 0.1713 | 0.3718 | 0.3755 | 1.2846 | 1.2939 | 0.0075 | 0.0074 | 0.0213 | 0.0217 | 0.0818 | 0.0824 | 0.1001 | 0.1007 | 0.0966 | 0.1086 | 0.1148 | 0.1268 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0434 | 0.0759 | 0.0044 | 0.0045 | 0.0085 | 0.0086 | 0.0302 | 0.0304 | 0.0001 | 0.0001 | 0.0018 | 0.0019 | 0.0027 | 0.0028 | 0.0064 | 0.0064 | 0.0031 | 0.0034 | 0.0067 | 0.0070 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.017 | 0.017 | 0.002 | 0.002 | 0.017 | 0.017 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 664.31 | 632.36 | 250.86 | 251.42 | 150.16 | 151.68 | 879.71 | 883.88 | 145.05 | 140.81 | 637.48 | 632.73 | 65.86 | 66.09 | 60.94 | 61.17 | 70.77 | 70.74 | 65.90 | 65.86 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.1692 | 0.1175 | 0.0211 | 0.0214 | 0.0944 | 0.0954 | 0.2852 | 0.2873 | 0.0036 | 0.0036 | 0.0073 | 0.0073 | 0.0218 | 0.0220 | 0.0251 | 0.0253 | 0.0230 | 0.0227 | 0.0263 | 0.0260 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.01381 | 0.01307 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00009 | 0.00009 | 0.00002 | 0.00002 | 0.00018 | 0.00019 | 0.00047 | 0.00047 | 0.00047 | 0.00047 | 0.00058 | 0.00057 | 0.00058 | 0.00057 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.01319 | 0.01249 | 0.00489 | 0.00490 | 0.00300 | 0.00303 | 0.01707 | 0.01715 | 0.00298 | 0.00290 | 0.01220 | 0.01212 | 0.00172 | 0.00172 | 0.00163 | 0.00163 | 0.00181 | 0.00181 | 0.00172 | 0.00172 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.056 | 0.062 | 0.032 | 0.032 | 0.018 | 0.018 | 0.061 | 0.062 | 0.010 | 0.010 | 0.059 | 0.060 | 0.089 | 0.089 | 0.307 | 0.307 | 0.089 | 0.089 | 0.305 | 0.305 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.48 | 0.47 | 0.20 | 0.20 | 0.10 | 0.10 | 0.63 | 0.64 | 0.11 | 0.10 | 0.52 | 0.52 | 0.13 | 0.13 | 0.19 | 0.19 | 0.14 | 0.14 | 0.19 | 0.19 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.001817 | 0.001335 | 0.000285 | 0.000288 | 0.000702 | 0.000710 | 0.002498 | 0.002515 | 0.000317 | 0.000314 | 0.000262 | 0.000260 | 0.000170 | 0.000171 | 0.000162 | 0.000163 | 0.000184 | 0.000181 | 0.000175 | 0.000172 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 61.02 | 60.69 | 23.15 | 23.18 | 12.98 | 13.09 | 67.65 | 67.93 | 15.12 | 14.84 | 54.61 | 54.41 | 50.40 | 50.42 | 17.29 | 17.31 | 50.49 | 50.50 | 17.65 | 17.66 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0042 | 0.0033 | 0.0009 | 0.0009 | 0.0015 | 0.0015 | 0.0058 | 0.0058 | 0.0008 | 0.0008 | 0.0014 | 0.0014 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.02194 | 0.02099 | 0.00840 | 0.00841 | 0.00476 | 0.00481 | 0.02869 | 0.02882 | 0.00496 | 0.00482 | 0.02146 | 0.02130 | 0.00209 | 0.00209 | 0.00209 | 0.00209 | 0.00225 | 0.00225 | 0.00225 | 0.00225 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0031 | 0.0030 | 0.0011 | 0.0011 | 0.0007 | 0.0007 | 0.0035 | 0.0035 | 0.0007 | 0.0007 | 0.0025 | 0.0025 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.071 | 0.056 | 0.016 | 0.016 | 0.035 | 0.036 | 0.117 | 0.118 | 0.003 | 0.003 | 0.019 | 0.019 | 0.035 | 0.035 | 0.067 | 0.067 | 0.035 | 0.035 | 0.067 | 0.067 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00121 | 0.00094 | 0.00025 | 0.00026 | 0.00045 | 0.00046 | 0.00168 | 0.00169 | 0.00021 | 0.00021 | 0.00035 | 0.00035 | 0.00056 | 0.00056 | 0.00056 | 0.00056 | 0.00057 | 0.00057 | 0.00057 | 0.00057 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.2405 | 0.2338 | 0.0963 | 0.0965 | 0.0512 | 0.0517 | 0.3166 | 0.3180 | 0.0538 | 0.0522 | 0.2494 | 0.2478 | 0.0226 | 0.0227 | 0.0660 | 0.0661 | 0.0244 | 0.0244 | 0.0674 | 0.0674 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 117.84 | 115.75 | 47.36 | 47.44 | 23.18 | 23.41 | 150.18 | 150.83 | 27.84 | 27.03 | 123.84 | 122.95 | 22.21 | 22.24 | 11.29 | 11.33 | 22.99 | 23.01 | 12.17 | 12.19 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.06990 | 0.05394 | 0.01432 | 0.01444 | 0.02697 | 0.02724 | 0.10213 | 0.10281 | 0.01045 | 0.01036 | 0.01915 | 0.01931 | 0.05405 | 0.05410 | 0.02163 | 0.02167 | 0.05418 | 0.05409 | 0.02202 | 0.02194 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.003018 | 0.002150 | 0.000404 | 0.000410 | 0.001216 | 0.001229 | 0.004146 | 0.004176 | 0.000517 | 0.000515 | 0.000181 | 0.000178 | 0.000254 | 0.000256 | 0.000254 | 0.000256 | 0.000276 | 0.000271 | 0.000276 | 0.000271 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0371 | 0.0365 | 0.0147 | 0.0147 | 0.0074 | 0.0075 | 0.0457 | 0.0459 | 0.0089 | 0.0086 | 0.0377 | 0.0374 | 0.0038 | 0.0038 | 0.0038 | 0.0038 | 0.0041 | 0.0041 | 0.0041 | 0.0041 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0341 | 0.0329 | 0.0133 | 0.0133 | 0.0073 | 0.0073 | 0.0446 | 0.0448 | 0.0077 | 0.0075 | 0.0342 | 0.0339 | 0.0037 | 0.0037 | 0.0037 | 0.0037 | 0.0040 | 0.0040 | 0.0040 | 0.0040 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 20.4 | 20.1 | 8.4 | 8.4 | 3.9 | 4.0 | 26.2 | 26.4 | 4.8 | 4.6 | 22.1 | 22.0 | 3.5 | 3.5 | 3.5 | 3.5 | 3.6 | 3.6 | 3.6 | 3.6 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.02758 | 0.02660 | 0.01076 | 0.01078 | 0.00588 | 0.00594 | 0.03594 | 0.03610 | 0.00627 | 0.00609 | 0.02775 | 0.02754 | 0.00246 | 0.00247 | 0.00240 | 0.00241 | 0.00266 | 0.00266 | 0.00260 | 0.00261 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.002976 | 0.002110 | 0.000388 | 0.000394 | 0.001208 | 0.001220 | 0.004091 | 0.004121 | 0.000507 | 0.000506 | 0.000138 | 0.000136 | 0.000264 | 0.000266 | 0.000264 | 0.000266 | 0.000286 | 0.000281 | 0.000286 | 0.000281 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 53.5 | 54.4 | 28.9 | 28.9 | 17.1 | 17.3 | 84.6 | 84.9 | 7.8 | 7.8 | 60.1 | 62.5 | 23.7 | 23.7 | 294.7 | 294.8 | 23.9 | 24.0 | 292.8 | 292.8 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.02089 | 0.01974 | 0.00775 | 0.00777 | 0.00480 | 0.00484 | 0.02748 | 0.02761 | 0.00461 | 0.00448 | 0.01953 | 0.01939 | 0.00219 | 0.00220 | 0.00219 | 0.00220 | 0.00234 | 0.00234 | 0.00234 | 0.00234 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00430 | 0.00340 | 0.00095 | 0.00095 | 0.00153 | 0.00154 | 0.00585 | 0.00589 | 0.00079 | 0.00078 | 0.00148 | 0.00148 | 0.00140 | 0.00141 | 0.00073 | 0.00073 | 0.00143 | 0.00142 | 0.00075 | 0.00075 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0081 | 0.0072 | 0.0025 | 0.0025 | 0.0023 | 0.0023 | 0.0108 | 0.0108 | 0.0017 | 0.0016 | 0.0055 | 0.0054 | 0.0016 | 0.0016 | 0.0012 | 0.0012 | 0.0016 | 0.0016 | 0.0012 | 0.0012 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0233 | 0.0219 | 0.0084 | 0.0084 | 0.0057 | 0.0057 | 0.0302 | 0.0304 | 0.0051 | 0.0050 | 0.0202 | 0.0201 | 0.0065 | 0.0065 | 0.0065 | 0.0065 | 0.0066 | 0.0066 | 0.0066 | 0.0066 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

**Estimation groundwater quality downgradient of the Project and along pathways towards private wells - Base Case**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQ509. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
(2) **[ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
Ci,, concentration of from mine feature i (source terms).
Pi,, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05z-lc (PostClosure) - Base Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 96.8% | 3.2% | 8.2% | 26.0% | 65.0% | na | na | 0.8% |
| WQS09 (TCL 25y) | 96.8% | 3.2% | 8.1% | 25.8% | 64.5% | 0.7% | na | 0.8% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | Base Case Source Terms Sources: Control Pond = Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm NMP, EMP, WMP, Pit = Results_MPSeepage_WaterQuality_EAModel_rev07_20220209.xlsm | | | | | | | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Posz-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 0.68 | 0.75 | 8.00 | 8.00 | 2.70 | 2.70 | 20.00 | 20.00 | 22.00 | 22.00 | 22.00 | 22.00 | 0.97 | 0.97 | 2.89 | 2.89 | 0.97 | 0.97 | 2.89 | 2.89 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.035 | 0.053 | 0.069 | 0.069 | 0.004 | 0.004 | 0.083 | 0.082 | 0.170 | 0.170 | 0.170 | 0.170 | 0.130 | 0.130 | 1.415 | 1.415 | 0.130 | 0.130 | 1.415 | 1.415 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 2.5000 | 3.5000 | 0.1900 | 0.1900 | 0.4200 | 0.4300 | 2.6000 | 2.6000 | 0.0210 | 0.0220 | 0.0210 | 0.0220 | 0.0631 | 0.0632 | 0.0824 | 0.0825 | 0.0637 | 0.0640 | 0.0830 | 0.0833 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0590 | 0.0820 | 0.0049 | 0.0050 | 0.0097 | 0.0098 | 0.0600 | 0.0600 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0023 | 0.0023 | 0.0062 | 0.0062 | 0.0023 | 0.0023 | 0.0062 | 0.0062 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 20.00 | 21.00 | 180.00 | 190.00 | 76.00 | 77.00 | 520.00 | 520.00 | 510.00 | 500.00 | 510.00 | 500.00 | 23.07 | 23.11 | 17.90 | 17.93 | 23.07 | 23.11 | 17.90 | 17.93 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.0710 | 0.0720 | 0.0091 | 0.0092 | 0.0270 | 0.0270 | 0.0460 | 0.0460 | 0.0069 | 0.0069 | 0.0069 | 0.0069 | 0.0060 | 0.0061 | 0.0095 | 0.0095 | 0.0061 | 0.0061 | 0.0095 | 0.0095 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.00720 | 0.00880 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00010 | 0.00010 | 0.00018 | 0.00019 | 0.00018 | 0.00019 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.00680 | 0.00830 | 0.00035 | 0.00035 | 0.00015 | 0.00016 | 0.00082 | 0.00082 | 0.00081 | 0.00082 | 0.00081 | 0.00082 | 0.00070 | 0.00070 | 0.00060 | 0.00060 | 0.00070 | 0.00070 | 0.00060 | 0.00060 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.037 | 0.043 | 0.029 | 0.029 | 0.011 | 0.011 | 0.049 | 0.049 | 0.059 | 0.061 | 0.059 | 0.061 | 0.091 | 0.091 | 0.321 | 0.321 | 0.091 | 0.091 | 0.321 | 0.321 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.28 | 0.35 | 0.12 | 0.12 | 0.04 | 0.04 | 0.30 | 0.30 | 0.33 | 0.33 | 0.33 | 0.33 | 0.10 | 0.10 | 0.16 | 0.16 | 0.10 | 0.10 | 0.16 | 0.16 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.000260 | 0.000280 | 0.000049 | 0.000049 | 0.000055 | 0.000056 | 0.000240 | 0.000240 | 0.000100 | 0.000100 | 0.000100 | 0.000100 | 0.000026 | 0.000026 | 0.000017 | 0.000017 | 0.000026 | 0.000026 | 0.000017 | 0.000017 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 39.00 | 46.00 | 7.80 | 7.80 | 3.40 | 3.50 | 13.00 | 13.00 | 16.00 | 16.00 | 16.00 | 16.00 | 48.86 | 48.87 | 13.97 | 13.97 | 48.86 | 48.86 | 13.98 | 13.98 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0008 | 0.0010 | 0.0012 | 0.0012 | 0.0004 | 0.0004 | 0.0029 | 0.0029 | 0.0032 | 0.0032 | 0.0032 | 0.0032 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.01200 | 0.01500 | 0.00040 | 0.00040 | 0.00024 | 0.00025 | 0.00140 | 0.00140 | 0.00094 | 0.00094 | 0.00094 | 0.00094 | 0.00032 | 0.00032 | 0.00032 | 0.00032 | 0.00033 | 0.00033 | 0.00033 | 0.00033 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0024 | 0.0028 | 0.0015 | 0.0015 | 0.0006 | 0.0006 | 0.0038 | 0.0038 | 0.0040 | 0.0040 | 0.0040 | 0.0040 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.033 | 0.035 | 0.011 | 0.011 | 0.013 | 0.013 | 0.039 | 0.040 | 0.019 | 0.019 | 0.019 | 0.019 | 0.030 | 0.030 | 0.064 | 0.064 | 0.030 | 0.030 | 0.064 | 0.064 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00039 | 0.00045 | 0.00018 | 0.00018 | 0.00008 | 0.00008 | 0.00049 | 0.00049 | 0.00046 | 0.00046 | 0.00046 | 0.00046 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.1400 | 0.1700 | 0.0750 | 0.0750 | 0.0270 | 0.0270 | 0.1900 | 0.1900 | 0.2100 | 0.2100 | 0.2100 | 0.2100 | 0.0072 | 0.0072 | 0.0528 | 0.0528 | 0.0072 | 0.0072 | 0.0529 | 0.0529 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 69.00 | 85.00 | 5.90 | 5.90 | 2.30 | 2.30 | 14.00 | 14.00 | 15.00 | 15.00 | 15.00 | 15.00 | 13.69 | 13.69 | 2.18 | 2.18 | 13.70 | 13.70 | 2.20 | 2.20 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.01400 | 0.01600 | 0.01800 | 0.01800 | 0.01100 | 0.01200 | 0.07500 | 0.07500 | 0.04500 | 0.04500 | 0.04500 | 0.04500 | 0.05214 | 0.05215 | 0.01798 | 0.01798 | 0.05213 | 0.05214 | 0.01798 | 0.01798 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.000180 | 0.000190 | 0.000032 | 0.000033 | 0.000043 | 0.000044 | 0.000170 | 0.000180 | 0.000061 | 0.000061 | 0.000061 | 0.000061 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0220 | 0.0270 | 0.0023 | 0.0023 | 0.0011 | 0.0011 | 0.0052 | 0.0052 | 0.0056 | 0.0055 | 0.0056 | 0.0055 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0190 | 0.0240 | 0.0016 | 0.0016 | 0.0008 | 0.0008 | 0.0053 | 0.0053 | 0.0042 | 0.0041 | 0.0042 | 0.0041 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 12.0 | 15.0 | 8.4 | 8.5 | 2.8 | 2.8 | 21.0 | 21.0 | 24.0 | 23.0 | 24.0 | 23.0 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.01600 | 0.01900 | 0.00340 | 0.00340 | 0.00120 | 0.00130 | 0.00880 | 0.00880 | 0.00930 | 0.00920 | 0.00930 | 0.00920 | 0.00040 | 0.00040 | 0.00034 | 0.00034 | 0.00040 | 0.00040 | 0.00034 | 0.00034 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.000150 | 0.000160 | 0.000024 | 0.000024 | 0.000040 | 0.000040 | 0.000150 | 0.000150 | 0.000037 | 0.000037 | 0.000037 | 0.000037 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 11.0 | 17.0 | 220.0 | 220.0 | 67.0 | 68.0 | 540.0 | 540.0 | 620.0 | 620.0 | 620.0 | 620.0 | 31.8 | 31.8 | 317.5 | 317.5 | 31.8 | 31.8 | 317.4 | 317.4 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.01100 | 0.01400 | 0.00430 | 0.00430 | 0.00170 | 0.00170 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.00076 | 0.00076 | 0.00076 | 0.00076 | 0.00077 | 0.00077 | 0.00077 | 0.00077 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00380 | 0.00460 | 0.00130 | 0.00130 | 0.00046 | 0.00047 | 0.00330 | 0.00330 | 0.00350 | 0.00350 | 0.00350 | 0.00350 | 0.00118 | 0.00118 | 0.00046 | 0.00046 | 0.00118 | 0.00118 | 0.00046 | 0.00047 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0010 | 0.0012 | 0.0034 | 0.0034 | 0.0012 | 0.0012 | 0.0087 | 0.0087 | 0.0094 | 0.0094 | 0.0094 | 0.0094 | 0.0012 | 0.0012 | 0.0007 | 0.0007 | 0.0012 | 0.0012 | 0.0007 | 0.0007 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0040 | 0.0048 | 0.0031 | 0.0031 | 0.0013 | 0.0014 | 0.0084 | 0.0085 | 0.0079 | 0.0079 | 0.0079 | 0.0079 | 0.0050 | 0.0050 | 0.0050 | 0.0050 | 0.0050 | 0.0050 | 0.0050 | 0.0050 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

**Estimation groundwater quality downgradient of the Project and along pathways towards private wells - High Case**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
**(2) [ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
$C_i$,, concentration of from mine feature i (source terms).
$P_i$,, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05z-hc (PostClosure) - High Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 96.1% | 3.9% | 6.7% | 22.2% | 54.8% | na | 5.0% | 11.2% |
| WQS09 (TCL 25y) | 96.1% | 3.9% | 6.7% | 22.0% | 54.5% | 0.6% | 5.0% | 11.2% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | High Case Source Terms Sources: Control Pond = Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm NMP, EMP, WMP, Pit = Results_MPSeepage_WaterQuality_EAModel_rev07_20220209.xlsm | | | | | | | | | | High Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Posz-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 29.02 | 28.34 | 16.00 | 16.00 | 6.10 | 6.20 | 42.00 | 42.00 | 43.00 | 42.00 | 43.00 | 42.00 | 1.77 | 1.76 | 3.67 | 3.66 | 1.69 | 1.69 | 3.59 | 3.59 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.049 | 0.085 | 0.069 | 0.069 | 0.004 | 0.004 | 0.083 | 0.082 | 0.170 | 0.170 | 0.170 | 0.170 | 0.130 | 0.130 | 1.406 | 1.406 | 0.130 | 0.130 | 1.405 | 1.405 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 1.8826 | 3.2811 | 0.1900 | 0.1900 | 0.4200 | 0.4300 | 2.6000 | 2.6000 | 0.0210 | 0.0220 | 0.0210 | 0.0220 | 0.0648 | 0.0649 | 0.0840 | 0.0841 | 0.0652 | 0.0656 | 0.0844 | 0.0848 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0434 | 0.0759 | 0.0049 | 0.0050 | 0.0097 | 0.0098 | 0.0600 | 0.0600 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0024 | 0.0024 | 0.0062 | 0.0062 | 0.0024 | 0.0024 | 0.0062 | 0.0062 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 664.31 | 632.36 | 380.00 | 380.00 | 200.00 | 200.00 | 1200.00 | 1200.00 | 1000.00 | 990.00 | 1000.00 | 990.00 | 45.71 | 45.64 | 40.57 | 40.50 | 43.89 | 43.84 | 38.75 | 38.70 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.1692 | 0.1175 | 0.0150 | 0.0150 | 0.0510 | 0.0520 | 0.0860 | 0.0870 | 0.0073 | 0.0073 | 0.0073 | 0.0073 | 0.0072 | 0.0072 | 0.0106 | 0.0107 | 0.0072 | 0.0072 | 0.0107 | 0.0107 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.01381 | 0.01307 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00010 | 0.00010 | 0.00018 | 0.00019 | 0.00018 | 0.00019 | 0.00048 | 0.00048 | 0.00048 | 0.00048 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.01319 | 0.01249 | 0.00071 | 0.00071 | 0.00083 | 0.00084 | 0.00330 | 0.00330 | 0.00130 | 0.00130 | 0.00130 | 0.00130 | 0.00076 | 0.00076 | 0.00066 | 0.00066 | 0.00076 | 0.00076 | 0.00066 | 0.00066 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.056 | 0.062 | 0.031 | 0.031 | 0.015 | 0.015 | 0.061 | 0.061 | 0.059 | 0.060 | 0.059 | 0.060 | 0.091 | 0.091 | 0.319 | 0.319 | 0.091 | 0.091 | 0.319 | 0.319 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.48 | 0.47 | 0.23 | 0.23 | 0.10 | 0.10 | 0.64 | 0.64 | 0.62 | 0.61 | 0.62 | 0.61 | 0.12 | 0.12 | 0.17 | 0.17 | 0.11 | 0.11 | 0.17 | 0.17 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.001817 | 0.001335 | 0.000250 | 0.000250 | 0.000660 | 0.000660 | 0.002300 | 0.002300 | 0.000190 | 0.000190 | 0.000190 | 0.000190 | 0.000077 | 0.000077 | 0.000068 | 0.000068 | 0.000077 | 0.000077 | 0.000068 | 0.000068 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 61.02 | 60.69 | 7.80 | 7.80 | 4.40 | 4.40 | 16.00 | 16.00 | 15.00 | 15.00 | 15.00 | 15.00 | 48.69 | 48.69 | 14.05 | 14.05 | 48.66 | 48.66 | 14.03 | 14.03 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0042 | 0.0033 | 0.0023 | 0.0024 | 0.0014 | 0.0014 | 0.0077 | 0.0077 | 0.0059 | 0.0059 | 0.0059 | 0.0059 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.02194 | 0.02099 | 0.00097 | 0.00098 | 0.00130 | 0.00130 | 0.00540 | 0.00540 | 0.00170 | 0.00170 | 0.00170 | 0.00170 | 0.00043 | 0.00043 | 0.00043 | 0.00043 | 0.00043 | 0.00043 | 0.00043 | 0.00043 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0031 | 0.0030 | 0.0029 | 0.0029 | 0.0018 | 0.0019 | 0.0095 | 0.0095 | 0.0073 | 0.0072 | 0.0073 | 0.0072 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.071 | 0.056 | 0.014 | 0.014 | 0.024 | 0.025 | 0.067 | 0.068 | 0.019 | 0.019 | 0.019 | 0.019 | 0.031 | 0.031 | 0.064 | 0.064 | 0.031 | 0.031 | 0.064 | 0.064 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00121 | 0.00094 | 0.00037 | 0.00038 | 0.00042 | 0.00043 | 0.00180 | 0.00180 | 0.00074 | 0.00075 | 0.00074 | 0.00075 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.2405 | 0.2338 | 0.1500 | 0.1500 | 0.0640 | 0.0640 | 0.4200 | 0.4200 | 0.4000 | 0.4000 | 0.4000 | 0.4000 | 0.0152 | 0.0152 | 0.0605 | 0.0605 | 0.0144 | 0.0144 | 0.0598 | 0.0598 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 117.84 | 115.75 | 12.00 | 12.00 | 9.40 | 9.50 | 44.00 | 44.00 | 27.00 | 27.00 | 27.00 | 27.00 | 14.49 | 14.49 | 3.07 | 3.07 | 14.46 | 14.46 | 3.04 | 3.04 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.06990 | 0.05394 | 0.03700 | 0.03700 | 0.04100 | 0.04100 | 0.20000 | 0.21000 | 0.08100 | 0.08100 | 0.08100 | 0.08100 | 0.05532 | 0.05553 | 0.02140 | 0.02161 | 0.05516 | 0.05537 | 0.02125 | 0.02146 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.003018 | 0.002150 | 0.000210 | 0.000210 | 0.000600 | 0.000610 | 0.002100 | 0.002100 | 0.000120 | 0.000120 | 0.000120 | 0.000120 | 0.000056 | 0.000056 | 0.000056 | 0.000056 | 0.000057 | 0.000057 | 0.000057 | 0.000057 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0371 | 0.0365 | 0.0040 | 0.0041 | 0.0023 | 0.0023 | 0.0110 | 0.0110 | 0.0097 | 0.0096 | 0.0097 | 0.0096 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0341 | 0.0329 | 0.0034 | 0.0034 | 0.0030 | 0.0030 | 0.0150 | 0.0150 | 0.0078 | 0.0078 | 0.0078 | 0.0078 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 20.4 | 20.1 | 17.0 | 17.0 | 6.6 | 6.6 | 45.0 | 46.0 | 46.0 | 46.0 | 46.0 | 46.0 | 3.3 | 3.3 | 3.3 | 3.3 | 3.2 | 3.2 | 3.2 | 3.2 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.02758 | 0.02660 | 0.00690 | 0.00690 | 0.00340 | 0.00350 | 0.02100 | 0.02100 | 0.01800 | 0.01800 | 0.01800 | 0.01800 | 0.00080 | 0.00081 | 0.00074 | 0.00074 | 0.00078 | 0.00078 | 0.00071 | 0.00071 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.002976 | 0.002110 | 0.000190 | 0.000200 | 0.000600 | 0.000600 | 0.002000 | 0.002000 | 0.000066 | 0.000066 | 0.000066 | 0.000066 | 0.000068 | 0.000068 | 0.000068 | 0.000068 | 0.000069 | 0.000069 | 0.000069 | 0.000069 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 53.5 | 54.4 | 420.0 | 420.0 | 150.0 | 150.0 | 1100.0 | 1100.0 | 1200.0 | 1200.0 | 1200.0 | 1200.0 | 52.7 | 52.7 | 336.3 | 336.3 | 50.4 | 50.4 | 333.9 | 333.9 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.02089 | 0.01974 | 0.00880 | 0.00880 | 0.00460 | 0.00460 | 0.02700 | 0.02700 | 0.02300 | 0.02300 | 0.02300 | 0.02300 | 0.00127 | 0.00127 | 0.00127 | 0.00127 | 0.00123 | 0.00123 | 0.00123 | 0.00123 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00430 | 0.00340 | 0.00260 | 0.00260 | 0.00150 | 0.00160 | 0.00850 | 0.00860 | 0.00680 | 0.00670 | 0.00680 | 0.00670 | 0.00134 | 0.00134 | 0.00063 | 0.00063 | 0.00133 | 0.00133 | 0.00062 | 0.00062 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0081 | 0.0072 | 0.0068 | 0.0068 | 0.0032 | 0.0032 | 0.0200 | 0.0200 | 0.0180 | 0.0180 | 0.0180 | 0.0180 | 0.0015 | 0.0015 | 0.0011 | 0.0011 | 0.0015 | 0.0015 | 0.0011 | 0.0011 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0233 | 0.0219 | 0.0059 | 0.0059 | 0.0045 | 0.0045 | 0.0220 | 0.0220 | 0.0140 | 0.0140 | 0.0140 | 0.0140 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

**Estimation groundwater quality downgradient of the Project and along pathways towards private wells - Base Case**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQ509. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
(2) **[ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
Ci,, concentration of from mine feature i (source terms).
Pi,, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05zb-lc (PostClosure) - Base Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 97.4% | 2.6% | 10.0% | 7.2% | 81.5% | na | na | 1.3% |
| WQS09 (TCL 25y) | 97.3% | 2.7% | 9.9% | 7.2% | 80.8% | 0.9% | na | 1.3% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | Base Case Source Terms Sources: Control Pond = Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm NMP, EMP, WMP, PIt = Results_MPSeepage_WaterQuality_EAModel_rev07_20220209.xlsm | | | | | | | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Posz-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 0.68 | 0.75 | 8.00 | 8.00 | 2.70 | 2.70 | 20.00 | 20.00 | 22.00 | 22.00 | 22.00 | 22.00 | 0.97 | 0.97 | 2.90 | 2.90 | 0.97 | 0.97 | 2.90 | 2.90 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.035 | 0.053 | 0.069 | 0.069 | 0.004 | 0.004 | 0.083 | 0.082 | 0.170 | 0.170 | 0.170 | 0.170 | 0.131 | 0.131 | 1.424 | 1.424 | 0.131 | 0.131 | 1.423 | 1.423 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 2.5000 | 3.5000 | 0.1900 | 0.1900 | 0.4200 | 0.4300 | 2.6000 | 2.6000 | 0.0210 | 0.0220 | 0.0210 | 0.0220 | 0.0621 | 0.0621 | 0.0815 | 0.0816 | 0.0627 | 0.0629 | 0.0821 | 0.0824 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0590 | 0.0820 | 0.0049 | 0.0050 | 0.0097 | 0.0098 | 0.0600 | 0.0600 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0023 | 0.0023 | 0.0062 | 0.0062 | 0.0023 | 0.0023 | 0.0062 | 0.0062 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 20.00 | 21.00 | 180.00 | 190.00 | 76.00 | 77.00 | 520.00 | 520.00 | 510.00 | 500.00 | 510.00 | 500.00 | 23.02 | 23.04 | 17.81 | 17.83 | 23.02 | 23.04 | 17.81 | 17.84 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.0710 | 0.0720 | 0.0091 | 0.0092 | 0.0270 | 0.0270 | 0.0460 | 0.0460 | 0.0069 | 0.0069 | 0.0069 | 0.0069 | 0.0059 | 0.0059 | 0.0094 | 0.0094 | 0.0060 | 0.0060 | 0.0095 | 0.0095 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.00720 | 0.00880 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00010 | 0.00010 | 0.00018 | 0.00019 | 0.00018 | 0.00019 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.00680 | 0.00830 | 0.00035 | 0.00035 | 0.00015 | 0.00016 | 0.00082 | 0.00082 | 0.00081 | 0.00082 | 0.00081 | 0.00082 | 0.00070 | 0.00070 | 0.00060 | 0.00060 | 0.00070 | 0.00070 | 0.00060 | 0.00061 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.037 | 0.043 | 0.029 | 0.029 | 0.011 | 0.011 | 0.049 | 0.049 | 0.059 | 0.061 | 0.059 | 0.061 | 0.091 | 0.091 | 0.322 | 0.322 | 0.091 | 0.091 | 0.322 | 0.322 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.28 | 0.35 | 0.12 | 0.12 | 0.04 | 0.04 | 0.30 | 0.30 | 0.33 | 0.33 | 0.33 | 0.33 | 0.10 | 0.10 | 0.16 | 0.16 | 0.10 | 0.10 | 0.16 | 0.16 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.000260 | 0.000280 | 0.000049 | 0.000049 | 0.000055 | 0.000056 | 0.000240 | 0.000240 | 0.000100 | 0.000100 | 0.000100 | 0.000100 | 0.000026 | 0.000026 | 0.000017 | 0.000017 | 0.000026 | 0.000026 | 0.000017 | 0.000017 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 39.00 | 46.00 | 7.80 | 7.80 | 3.40 | 3.50 | 13.00 | 13.00 | 16.00 | 16.00 | 16.00 | 16.00 | 49.14 | 49.14 | 14.04 | 14.04 | 49.14 | 49.14 | 14.05 | 14.05 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0008 | 0.0010 | 0.0012 | 0.0012 | 0.0004 | 0.0004 | 0.0029 | 0.0029 | 0.0032 | 0.0032 | 0.0032 | 0.0032 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.01200 | 0.01500 | 0.00040 | 0.00040 | 0.00024 | 0.00025 | 0.00140 | 0.00140 | 0.00094 | 0.00094 | 0.00094 | 0.00094 | 0.00032 | 0.00032 | 0.00032 | 0.00032 | 0.00033 | 0.00033 | 0.00033 | 0.00033 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0024 | 0.0028 | 0.0015 | 0.0015 | 0.0006 | 0.0006 | 0.0038 | 0.0038 | 0.0040 | 0.0040 | 0.0040 | 0.0040 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.033 | 0.035 | 0.011 | 0.011 | 0.013 | 0.013 | 0.039 | 0.040 | 0.019 | 0.019 | 0.019 | 0.019 | 0.030 | 0.030 | 0.064 | 0.064 | 0.030 | 0.030 | 0.064 | 0.064 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00039 | 0.00045 | 0.00018 | 0.00018 | 0.00008 | 0.00008 | 0.00049 | 0.00049 | 0.00046 | 0.00046 | 0.00046 | 0.00046 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 | 0.00050 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.1400 | 0.1700 | 0.0750 | 0.0750 | 0.0270 | 0.0270 | 0.1900 | 0.1900 | 0.2100 | 0.2100 | 0.2100 | 0.2100 | 0.0071 | 0.0071 | 0.0531 | 0.0531 | 0.0072 | 0.0072 | 0.0531 | 0.0531 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 69.00 | 85.00 | 5.90 | 5.90 | 2.30 | 2.30 | 14.00 | 14.00 | 15.00 | 15.00 | 15.00 | 15.00 | 13.76 | 13.76 | 2.19 | 2.19 | 13.78 | 13.78 | 2.21 | 2.21 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.01400 | 0.01600 | 0.01800 | 0.01800 | 0.01100 | 0.01200 | 0.07500 | 0.07500 | 0.04500 | 0.04500 | 0.04500 | 0.04500 | 0.05242 | 0.05242 | 0.01805 | 0.01805 | 0.05241 | 0.05241 | 0.01805 | 0.01805 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.000180 | 0.000190 | 0.000032 | 0.000033 | 0.000043 | 0.000044 | 0.000170 | 0.000180 | 0.000061 | 0.000061 | 0.000061 | 0.000061 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 | 0.000009 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0220 | 0.0270 | 0.0023 | 0.0023 | 0.0011 | 0.0011 | 0.0052 | 0.0052 | 0.0056 | 0.0055 | 0.0056 | 0.0055 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0190 | 0.0240 | 0.0016 | 0.0016 | 0.0008 | 0.0008 | 0.0053 | 0.0053 | 0.0042 | 0.0041 | 0.0042 | 0.0041 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 12.0 | 15.0 | 8.4 | 8.5 | 2.8 | 2.8 | 21.0 | 21.0 | 24.0 | 23.0 | 24.0 | 23.0 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.01600 | 0.01900 | 0.00340 | 0.00340 | 0.00120 | 0.00130 | 0.00880 | 0.00880 | 0.00930 | 0.00920 | 0.00930 | 0.00920 | 0.00040 | 0.00040 | 0.00034 | 0.00034 | 0.00040 | 0.00040 | 0.00034 | 0.00034 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.000150 | 0.000160 | 0.000024 | 0.000024 | 0.000040 | 0.000040 | 0.000150 | 0.000150 | 0.000037 | 0.000037 | 0.000037 | 0.000037 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 | 0.000023 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 11.0 | 17.0 | 220.0 | 220.0 | 67.0 | 68.0 | 540.0 | 540.0 | 620.0 | 620.0 | 620.0 | 620.0 | 31.9 | 31.9 | 319.2 | 319.2 | 31.9 | 31.9 | 319.1 | 319.1 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.01100 | 0.01400 | 0.00430 | 0.00430 | 0.00170 | 0.00170 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.01200 | 0.00076 | 0.00076 | 0.00076 | 0.00076 | 0.00077 | 0.00077 | 0.00077 | 0.00077 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00380 | 0.00460 | 0.00130 | 0.00130 | 0.00046 | 0.00047 | 0.00330 | 0.00330 | 0.00350 | 0.00350 | 0.00350 | 0.00350 | 0.00119 | 0.00119 | 0.00047 | 0.00047 | 0.00119 | 0.00119 | 0.00047 | 0.00047 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0010 | 0.0012 | 0.0034 | 0.0034 | 0.0012 | 0.0012 | 0.0087 | 0.0087 | 0.0094 | 0.0094 | 0.0094 | 0.0094 | 0.0012 | 0.0012 | 0.0007 | 0.0007 | 0.0012 | 0.0012 | 0.0007 | 0.0007 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0040 | 0.0048 | 0.0031 | 0.0031 | 0.0013 | 0.0014 | 0.0084 | 0.0085 | 0.0079 | 0.0079 | 0.0079 | 0.0079 | 0.0051 | 0.0051 | 0.0051 | 0.0051 | 0.0051 | 0.0051 | 0.0051 | 0.0051 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

**Estimation groundwater quality downgradient of the Project and along pathways towards private wells - High Case**

Calculation concentration of the groundwater flowing into the Telkwa River Valley:

Three private domestic wells (Goalder, Mapletoft, Baker) are shown to be within the potential paths of mine affected groundwater (i.e., based on particle paths predictions for post-closure conditions). These wells are located in the Telkwa River valley, and pumping groundwater from the fluvial aquifer at a relatively shallow depth (15 to 30m deep). To evaluate the potential maximum effects from the Project to the groundwater quality of the fluvial aquifer, it is assumed:

* The mine affected groundwater reached final discharge locations (i.e., post-closure, pseudo -steady state conditions);

* The groundwater pumped by the three private domestic wells corresponds exclusively to the groundwater coming from southern side of the Telkwa River valley, and discharging upstream of WQS09. The groundwater contributions from the northern side of the Telkwa River, and from the fluvial aquifer upstream of the project influence are not accounted;

* The mass of constituents in groundwater is conserved (i.e., transport of mine affected groundwater by advection only, no diffusion or dispersion, and conservation of mass, no natural attenuation).

(1) **[ Qw x Cw ] = [ Qb x Cb ] + [ Qm x Cm]**
(2) **[ Qm x Cm ] = [ Q1 x C1 ] + .... + [ Qi x Ci]**

For a unit volume Qw = 1, Cw can be expressed using the estimated percentage contributions relative to each sources predicted by the groundwater model (i.e., particle path analyses):

(3) **Cw = Pb x Cb + + (Pm x P1) x C1 ... + (Pm x Pi) x Ci**

Qw, groundwater flow into the Telkwa River valley.
Cw, concentration of the groundwater into the Telkwa River valley.
Qb, flow contribution from background groundwater.
Cb, concentration of background groundwater (baseline).
Pb, percentage contribution of background groundwater into the Telkwa River valley.
Qm, flow contribution from mine affected groundwater.
Cm, concentration of mine affected groundwater.
Pm, percentage contribution of mine affected groundwater into the Telkwa River valley.
Qi, flow contribution from mine feature i.
$C_i$,, concentration of from mine feature i (source terms).
$P_i$,, percentage contribution of from mine feature i to total mine affected groundwater

**Model: 08-05zb-hc (PostClosure) - High Case**

| ID | % Baseflow Bckgrnd | % Baseflow Mine | Detailed distribution of mine affected baseflow | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NMP | EMP | WMP | TCP | PL 909 | SWR 901 |
| | | | % | % | % | % | % | % |
| WQS09 | 96.8% | 3.2% | 8.2% | 5.8% | 67.4% | na | 5.1% | 13.5% |
| WQS09 (TCL 25y) | 96.7% | 3.3% | 8.2% | 5.7% | 66.9% | 0.7% | 5.1% | 13.4% |

Note: Modelled WQS09 GW'shed corresponds only to the southern contribution from the valley.

| Parameter | Detection Limit [mg/L] | BC WQG DWS Guideline | | Groundwater background (Source: GWQuality_Summary_Stats_rev08_smh.xlsx) | | | | | | | | | | High Case Source Terms Sources: Control Pond = Results_MPSeepage_WaterQuality_EAModel_rev06_07072021.xlsm NMP, EMP, WMP, Pit = Results_MPSeepage_WaterQuality_EAModel_rev07_20220209.xlsm | | | | | | | | | | High Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: Posz-closure (25 years pulse from control pond already discharged) | | | | Base Case Long-term groundwater concentrations downgradient of Project, along groundwater pathways to private wells: 1st 25 years of Post-closure period (incl. seepage from control pond ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Screening parameter | Value (mg/L) | Overburden Water Quality (mg/L) | | | | | Bedrock Water Quality (mg/L) | | | | | Control Pond | | NMP | | EMP | | WMP | | Pit lake 909masl | | Saturated WR 901masl | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | | Backgroun GWQ: overburden P50 | | Backgroun GWQ: bedrock P50 | |
| | | | | Count | Avg. | P50 | P75 | P95 | Count | Avg. | P50 | P75 | P95 | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter | Average Summer | Average Winter |
| Chloride | 0.50 | AO, Cl | 250 | 48 | 1.52 | 0.52 | 2.50 | 3.31 | 69 | 4.16 | 2.50 | 5.00 | 10.00 | 29.02 | 28.34 | 16.00 | 16.00 | 6.10 | 6.20 | 42.00 | 42.00 | 43.00 | 42.00 | 43.00 | 42.00 | 1.73 | 1.72 | 3.65 | 3.64 | 1.67 | 1.66 | 3.58 | 3.58 |
| Fluoride | 0.020 | MAC, F | 1.5 | 41 | 0.171 | 0.132 | 0.196 | 0.345 | 61 | 1.682 | 1.460 | 2.160 | 5.120 | 0.049 | 0.085 | 0.069 | 0.069 | 0.004 | 0.004 | 0.083 | 0.082 | 0.170 | 0.170 | 0.170 | 0.170 | 0.131 | 0.131 | 1.416 | 1.416 | 0.130 | 0.130 | 1.415 | 1.415 |
| Nitrate | 0.0050 | MAC, nitrate-N | 10 | 41 | 0.0399 | 0.0050 | 0.0235 | 0.1650 | 58 | 0.0705 | 0.0250 | 0.0423 | 0.1640 | 1.8826 | 3.2811 | 0.1900 | 0.1900 | 0.4200 | 0.4300 | 2.6000 | 2.6000 | 0.0210 | 0.0220 | 0.0210 | 0.0220 | 0.0628 | 0.0628 | 0.0822 | 0.0822 | 0.0632 | 0.0636 | 0.0826 | 0.0829 |
| Nitrite | 0.0010 | MAC, nitrite-N | 1.0 | 41 | 0.0016 | 0.0010 | 0.0013 | 0.0050 | 58 | 0.0072 | 0.0050 | 0.0050 | 0.0200 | 0.0434 | 0.0759 | 0.0049 | 0.0050 | 0.0097 | 0.0098 | 0.0600 | 0.0600 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0023 | 0.0023 | 0.0062 | 0.0062 | 0.0023 | 0.0023 | 0.0062 | 0.0062 |
| Orthophosphate, dissolved | 0.001 | n.g. | n.g. | 28 | 0.227 | 0.019 | 0.506 | 0.851 | 43 | 0.014 | 0.002 | 0.022 | 0.060 | 0.000 | 0.000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.018 | 0.018 | 0.002 | 0.002 | 0.018 | 0.018 | 0.002 | 0.002 |
| Sulfate | 0.50 | AO, SO4 | 500 | 48 | 18.38 | 11.35 | 26.05 | 41.87 | 69 | 23.59 | 6.00 | 51.30 | 74.88 | 664.31 | 632.36 | 380.00 | 380.00 | 200.00 | 200.00 | 1200.00 | 1200.00 | 1000.00 | 990.00 | 1000.00 | 990.00 | 44.48 | 44.42 | 39.31 | 39.25 | 42.99 | 42.94 | 37.81 | 37.76 |
| Aluminum, dissolved | 0.0050 | MAC Al-tot | 9.5 | 45 | 0.0312 | 0.0050 | 0.0064 | 0.0339 | 69 | 0.0334 | 0.0086 | 0.0149 | 0.1000 | 0.1692 | 0.1175 | 0.0150 | 0.0150 | 0.0510 | 0.0520 | 0.0860 | 0.0870 | 0.0073 | 0.0073 | 0.0073 | 0.0073 | 0.0069 | 0.0069 | 0.0104 | 0.0104 | 0.0069 | 0.0069 | 0.0104 | 0.0104 |
| Antimony, dissolved | 0.00050 | MAC Sb-tot | 0.006 | 38 | 0.00052 | 0.00050 | 0.00050 | 0.00053 | 61 | 0.02179 | 0.00050 | 0.00050 | 0.00097 | 0.01381 | 0.01307 | 0.00008 | 0.00008 | 0.00001 | 0.00001 | 0.00010 | 0.00010 | 0.00018 | 0.00019 | 0.00018 | 0.00019 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 | 0.00049 |
| Arsenic, dissolved | 0.00050 | MAC, As-tot | 0.01 | 45 | 0.00337 | 0.00070 | 0.00678 | 0.01104 | 69 | 0.00106 | 0.00060 | 0.00107 | 0.00196 | 0.01319 | 0.01249 | 0.00071 | 0.00071 | 0.00083 | 0.00084 | 0.00330 | 0.00330 | 0.00130 | 0.00130 | 0.00130 | 0.00130 | 0.00076 | 0.00076 | 0.00066 | 0.00066 | 0.00076 | 0.00076 | 0.00066 | 0.00066 |
| Barium, dissolved | 0.020 | n.g. | n.g. | 45 | 0.125 | 0.093 | 0.137 | 0.248 | 69 | 0.850 | 0.330 | 0.893 | 3.626 | 0.056 | 0.062 | 0.031 | 0.031 | 0.015 | 0.015 | 0.061 | 0.061 | 0.059 | 0.060 | 0.059 | 0.060 | 0.091 | 0.091 | 0.321 | 0.321 | 0.091 | 0.091 | 0.321 | 0.321 |
| Beryllium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0003 | 0.0001 | 0.0001 | 0.0002 | 69 | 0.0008 | 0.0001 | 0.0002 | 0.0050 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Boron, dissolved | 0.10 | MAC, B-tot | 5.0 | 45 | 0.08 | 0.10 | 0.10 | 0.10 | 69 | 0.19 | 0.16 | 0.29 | 0.34 | 0.48 | 0.47 | 0.23 | 0.23 | 0.10 | 0.10 | 0.64 | 0.64 | 0.62 | 0.61 | 0.62 | 0.61 | 0.12 | 0.12 | 0.17 | 0.17 | 0.11 | 0.11 | 0.17 | 0.17 |
| Cadmium, dissolved | 0.000010 | MAC, Cd-tot | 0.005 | 45 | 0.000122 | 0.000021 | 0.000090 | 0.000269 | 69 | 0.000216 | 0.000012 | 0.000050 | 0.001600 | 0.001817 | 0.001335 | 0.000250 | 0.000250 | 0.000660 | 0.000660 | 0.002300 | 0.002300 | 0.000190 | 0.000190 | 0.000190 | 0.000190 | 0.000074 | 0.000074 | 0.000065 | 0.000065 | 0.000074 | 0.000074 | 0.000065 | 0.000065 |
| Calcium, dissolved | 0.10 | n.g. | n.g. | 46 | 50.78 | 50.15 | 73.33 | 85.90 | 68 | 15.74 | 14.10 | 23.60 | 35.17 | 61.02 | 60.69 | 7.80 | 7.80 | 4.40 | 4.40 | 16.00 | 16.00 | 15.00 | 15.00 | 15.00 | 15.00 | 49.00 | 49.00 | 14.11 | 14.11 | 48.98 | 48.98 | 14.10 | 14.10 |
| Chromium, dissolved | 0.0010 | MAC, Cr-tot | 0.05 | 45 | 0.0015 | 0.0010 | 0.0010 | 0.0010 | 69 | 0.0011 | 0.0010 | 0.0010 | 0.0020 | 0.0042 | 0.0033 | 0.0023 | 0.0024 | 0.0014 | 0.0014 | 0.0077 | 0.0077 | 0.0059 | 0.0059 | 0.0059 | 0.0059 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Cobalt, dissolved | 0.00030 | MAC, Co-tot | 0.001 | 45 | 0.00088 | 0.00030 | 0.00050 | 0.00410 | 69 | 0.00057 | 0.00030 | 0.00050 | 0.00260 | 0.02194 | 0.02099 | 0.00097 | 0.00098 | 0.00130 | 0.00130 | 0.00540 | 0.00540 | 0.00170 | 0.00170 | 0.00170 | 0.00170 | 0.00042 | 0.00042 | 0.00042 | 0.00042 | 0.00043 | 0.00043 | 0.00043 | 0.00043 |
| Copper, dissolved | 0.0010 | MAC/AO, Cu-tot | 2.0 / 1.0 | 45 | 0.0016 | 0.0010 | 0.0015 | 0.0050 | 69 | 0.0019 | 0.0010 | 0.0010 | 0.0039 | 0.0031 | 0.0030 | 0.0029 | 0.0029 | 0.0018 | 0.0019 | 0.0095 | 0.0095 | 0.0073 | 0.0072 | 0.0073 | 0.0072 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 |
| Iron, dissolved | 0.030 | AO, Fe-tot | 0.30 | 45 | 0.043 | 0.030 | 0.050 | 0.099 | 69 | 0.203 | 0.065 | 0.379 | 0.589 | 0.071 | 0.056 | 0.014 | 0.014 | 0.024 | 0.025 | 0.067 | 0.068 | 0.019 | 0.019 | 0.019 | 0.019 | 0.031 | 0.031 | 0.065 | 0.065 | 0.031 | 0.031 | 0.065 | 0.065 |
| Lead, dissolved | 0.00050 | MAC, Pb-tot | 0.005 | 45 | 0.00203 | 0.00050 | 0.00050 | 0.00090 | 69 | 0.00137 | 0.00050 | 0.00050 | 0.00100 | 0.00121 | 0.00094 | 0.00037 | 0.00038 | 0.00042 | 0.00043 | 0.00180 | 0.00180 | 0.00074 | 0.00075 | 0.00074 | 0.00075 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 | 0.00053 |
| Lithium, dissolved | 0.0050 | n.g. | n.g. | 45 | 0.0048 | 0.0028 | 0.0042 | 0.0067 | 66 | 0.0536 | 0.0500 | 0.0770 | 0.1035 | 0.2405 | 0.2338 | 0.1500 | 0.1500 | 0.0640 | 0.0640 | 0.4200 | 0.4200 | 0.4000 | 0.4000 | 0.4000 | 0.4000 | 0.0148 | 0.0148 | 0.0604 | 0.0604 | 0.0142 | 0.0142 | 0.0598 | 0.0598 |
| Magnesium, dissolved | 0.10 | n.g. | n.g. | 46 | 20.75 | 13.80 | 25.10 | 51.20 | 68 | 2.99 | 1.92 | 6.00 | 8.58 | 117.84 | 115.75 | 12.00 | 12.00 | 9.40 | 9.50 | 44.00 | 44.00 | 27.00 | 27.00 | 27.00 | 27.00 | 14.52 | 14.52 | 3.02 | 3.02 | 14.50 | 14.50 | 3.00 | 3.00 |
| Manganese, dissolved | 0.00030 | MAC/AO, Mn-tot | 0.12 / 0.02 | 45 | 0.13352 | 0.05210 | 0.14200 | 0.57100 | 69 | 0.06061 | 0.01680 | 0.03700 | 0.25400 | 0.06990 | 0.05394 | 0.03700 | 0.03700 | 0.04100 | 0.04100 | 0.20000 | 0.21000 | 0.08100 | 0.08100 | 0.08100 | 0.08100 | 0.05543 | 0.05565 | 0.02127 | 0.02149 | 0.05530 | 0.05552 | 0.02115 | 0.02136 |
| Mercury, dissolved | 0.000010 | MAC, Hg-tot | 0.001 | 45 | 0.001131 | 0.000005 | 0.000005 | 0.000170 | 69 | 0.002928 | 0.000005 | 0.000050 | 0.030080 | 0.003018 | 0.002150 | 0.000210 | 0.000210 | 0.000600 | 0.000610 | 0.002100 | 0.002100 | 0.000120 | 0.000120 | 0.000120 | 0.000120 | 0.000053 | 0.000053 | 0.000053 | 0.000053 | 0.000053 | 0.000053 | 0.000053 | 0.000053 |
| Molybdenum, dissolved | 0.0010 | MAC, Mo-tot | 0.088 | 45 | 0.0053 | 0.0010 | 0.0112 | 0.0150 | 69 | 0.0044 | 0.0010 | 0.0076 | 0.0148 | 0.0371 | 0.0365 | 0.0040 | 0.0041 | 0.0023 | 0.0023 | 0.0110 | 0.0110 | 0.0097 | 0.0096 | 0.0097 | 0.0096 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 |
| Nickel, dissolved | 0.0010 | MAC, Ni-tot | 0.08 | 45 | 0.0026 | 0.0010 | 0.0010 | 0.0163 | 69 | 0.0021 | 0.0010 | 0.0025 | 0.0050 | 0.0341 | 0.0329 | 0.0034 | 0.0034 | 0.0030 | 0.0030 | 0.0150 | 0.0150 | 0.0078 | 0.0078 | 0.0078 | 0.0078 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 |
| Potassium, dissolved | 2.0 | n.g. | n.g. | 45 | 1.8 | 2.0 | 2.0 | 2.0 | 68 | 2.2 | 2.0 | 2.3 | 3.5 | 20.4 | 20.1 | 17.0 | 17.0 | 6.6 | 6.6 | 45.0 | 46.0 | 46.0 | 46.0 | 46.0 | 46.0 | 3.2 | 3.3 | 3.2 | 3.3 | 3.2 | 3.2 | 3.2 | 3.2 |
| Selenium, dissolved | 0.00010 | MAC, Se-tot | 0.01 | 45 | 0.00032 | 0.00020 | 0.00050 | 0.00096 | 69 | 0.00026 | 0.00014 | 0.00021 | 0.00100 | 0.02758 | 0.02660 | 0.00690 | 0.00690 | 0.00340 | 0.00350 | 0.02100 | 0.02100 | 0.01800 | 0.01800 | 0.01800 | 0.01800 | 0.00078 | 0.00078 | 0.00072 | 0.00072 | 0.00076 | 0.00076 | 0.00070 | 0.00070 |
| Silver, dissolved | 0.000020 | n.g. | n.g. | 45 | 0.000098 | 0.000020 | 0.000020 | 0.000260 | 68 | 0.059061 | 0.000020 | 0.000050 | 0.000100 | 0.002976 | 0.002110 | 0.000190 | 0.000200 | 0.000600 | 0.000600 | 0.002000 | 0.002000 | 0.000066 | 0.000066 | 0.000066 | 0.000066 | 0.000065 | 0.000065 | 0.000065 | 0.000065 | 0.000065 | 0.000065 | 0.000065 | 0.000065 |
| Sodium, dissolved | 2.0 | n.g. | n.g. | 45 | 46.0 | 19.9 | 85.4 | 111.8 | 68 | 349.4 | 315.0 | 360.3 | 723.3 | 53.5 | 54.4 | 420.0 | 420.0 | 150.0 | 150.0 | 1100.0 | 1100.0 | 1200.0 | 1200.0 | 1200.0 | 1200.0 | 51.8 | 51.8 | 337.4 | 337.4 | 49.8 | 49.8 | 335.3 | 335.3 |
| Tin, dissolved | 0.00050 | n.g. | n.g. | 36 | 0.00102 | 0.00050 | 0.00050 | 0.00490 | 51 | 0.00061 | 0.00050 | 0.00050 | 0.00053 | 0.02089 | 0.01974 | 0.00880 | 0.00880 | 0.00460 | 0.00460 | 0.02700 | 0.02700 | 0.02300 | 0.02300 | 0.02300 | 0.02300 | 0.00124 | 0.00124 | 0.00124 | 0.00124 | 0.00121 | 0.00121 | 0.00121 | 0.00121 |
| Uranium, dissolved | 0.00020 | MAC, U-tot | 0.02 | 45 | 0.00169 | 0.00114 | 0.00228 | 0.00322 | 69 | 0.02268 | 0.00040 | 0.00094 | 0.00711 | 0.00430 | 0.00340 | 0.00260 | 0.00260 | 0.00150 | 0.00160 | 0.00850 | 0.00860 | 0.00680 | 0.00670 | 0.00680 | 0.00670 | 0.00134 | 0.00134 | 0.00062 | 0.00062 | 0.00133 | 0.00133 | 0.00061 | 0.00061 |
| Vanadium, dissolved | 0.0010 | n.g. | n.g. | 45 | 0.0027 | 0.0010 | 0.0022 | 0.0050 | 69 | 0.0039 | 0.0005 | 0.0010 | 0.0300 | 0.0081 | 0.0072 | 0.0068 | 0.0068 | 0.0032 | 0.0032 | 0.0200 | 0.0200 | 0.0180 | 0.0180 | 0.0180 | 0.0180 | 0.0015 | 0.0015 | 0.0011 | 0.0011 | 0.0015 | 0.0015 | 0.0011 | 0.0011 |
| Zinc, dissolved | 0.0050 | MAC/AO, Zn-tot | 3.0 / 5.0 | 45 | 0.0110 | 0.0050 | 0.0050 | 0.0123 | 69 | 0.0067 | 0.0050 | 0.0050 | 0.0115 | 0.0233 | 0.0219 | 0.0059 | 0.0059 | 0.0045 | 0.0045 | 0.0220 | 0.0220 | 0.0140 | 0.0140 | 0.0140 | 0.0140 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0054 |

Note
MAC, maximum allowable concentration
AO, aesthetic objective
diss, dissolved
tot. total

# Appendix E Parameters of Concern for the Updated EAC Project Case (2024)

**Table A-3.1 Model Results and WQG Exceedances for Four Creek**

| Receiving Environment | | Four Creek (WQS03_DS) | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **Max Normal ST** | **P50 Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0092 | 0.99 | 0.078 | 0.0061 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 0.47 | 0.31 |
| Fluoride | mg/L | 0.059 | 0.068 | 1.4 | 0.10 | 0.068 |
| Nitrate | mg-N/L | 0.013 | 0.058 | 3.0 | 0.61 | 0.028 |
| Nitrite | mg-N/L | 0.00050 | 0.0010 | 0.020 | 0.015 | 0.0017 |
| Sulfate | mg/L | 1.9 | 28 | 310 | 33 | 3.3 |
| Aluminum, total | mg/L | 0.099 | 1.2 | 0.69 | 0.26 | 0.12 |
| Antimony, total | mg/L | 0.000050 | 0.00012 | 0.074 | 0.000087 | 0.000060 |
| Arsenic, total | mg/L | 0.00074 | 0.0011 | 0.0050 | 0.0013 | 0.00083 |
| Barium, total | mg/L | 0.071 | 0.13 | 1.0 | 0.16 | 0.090 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.000086 | 0.000056 |
| Boron, total | mg/L | 0.012 | 0.020 | 1.2 | 0.019 | 0.013 |
| Cadmium, dissolved | mg/L | 0.0000052 | 0.000012 | 0.00023 | 0.000013 | 0.0000066 |
| Chromium (Cr(VI)), total | mg/L | 0.00026 | 0.0016 | 0.0010 | 0.00052 | 0.00027 |
| Cobalt, total | mg/L | 0.000050 | 0.00047 | 0.0040 | 0.00068 | 0.00014 |
| Copper, dissolved | mg/L | 0.0014 | 0.0034 | 0.0047 | 0.0024 | 0.0015 |
| Iron, total | mg/L | 0.095 | 1.1 | 1.0 | 0.24 | 0.10 |
| Iron, dissolved | mg/L | 0.015 | 0.41 | 0.35 | 0.052 | 0.029 |
| Lead, total | mg/L | 0.000025 | 0.00028 | 0.0069 | 0.000065 | 0.000038 |
| Manganese, total | mg/L | 0.0025 | 0.024 | 1.1 | 0.013 | 0.0032 |
| Mercury, total | mg/L | 0.0000025 | 0.000013 | 0.000020 | 0.0000052 | 0.0000034 |
| Molybdenum, total | mg/L | 0.00023 | 0.00038 | 0.034 | 0.0012 | 0.00028 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0011 | 0.0047 | 0.0011 | 0.00040 |
| Selenium, total | mg/L | 0.000025 | 0.000095 | 0.0020 | 0.00081 | 0.000059 |
| Silver, total | mg/L | 0.0000050 | 0.000022 | 0.0015 | 0.0000087 | 0.0000058 |
| Strontium, dissolved | mg/L | 0.16 | 0.24 | 2.5 | 0.32 | 0.18 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.000020 | 0.000013 |
| Uranium, total | mg/L | 0.000078 | 0.00025 | 0.0085 | 0.00019 | 0.000099 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0025 | 0.014 | 0.0026 | 0.0012 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]COCs selection

**Table A-3.2 Model Results and WQG Exceedances for Goathorn Creek**

| Receiving Environment | | Goathorn Creek (WQSEA1) | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **Max Normal ST** | **P50 Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0070 | 1.6 | 0.030 | 0.0049 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 0.86 | 0.30 |
| Fluoride | mg/L | 0.032 | 0.041 | 1.2 | 0.050 | 0.035 |
| Nitrate | mg-N/L | 0.041 | 0.076 | 3.0 | 0.25 | 0.052 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.0058 | 0.0013 |
| Sulfate | mg/L | 24 | 37 | 220 | 62 | 27 |
| Aluminum, total | mg/L | 0.092 | 0.75 | 0.27 | 0.19 | 0.11 |
| Antimony, total | mg/L | 0.000073 | 0.00014 | 0.074 | 0.00013 | 0.000089 |
| Arsenic, total | mg/L | 0.00023 | 0.00068 | 0.0050 | 0.00044 | 0.00031 |
| Barium, total | mg/L | 0.058 | 0.072 | 1.0 | 0.076 | 0.061 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.000060 | 0.000051 |
| Boron, total | mg/L | 0.0050 | 0.050 | 1.2 | 0.029 | 0.0064 |
| Cadmium, dissolved | mg/L | 0.0000081 | 0.000036 | 0.00016 | 0.000016 | 0.0000099 |
| Chromium (Cr(VI)), total | mg/L | 0.00020 | 0.00091 | 0.0010 | 0.00053 | 0.00024 |
| Cobalt, total | mg/L | 0.000050 | 0.00055 | 0.0040 | 0.00039 | 0.00014 |
| Copper, dissolved | mg/L | 0.0014 | 0.0039 | 0.0013 | 0.0021 | 0.0016 |
| Iron, total | mg/L | 0.085 | 0.78 | 1.0 | 0.43 | 0.13 |
| Iron, dissolved | mg/L | 0.015 | 0.13 | 0.35 | 0.025 | 0.021 |
| Lead, total | mg/L | 0.000025 | 0.00023 | 0.0053 | 0.00021 | 0.000056 |
| Manganese, total | mg/L | 0.0059 | 0.033 | 0.91 | 0.012 | 0.0071 |
| Mercury, total | mg/L | 0.0000025 | 0.0000064 | 0.000020 | 0.0000040 | 0.0000031 |
| Molybdenum, total | mg/L | 0.00047 | 0.00062 | 0.034 | 0.0022 | 0.00067 |
| Nickel, dissolved | mg/L | 0.00025 | 0.00060 | 0.0022 | 0.00065 | 0.00035 |
| Selenium, total | mg/L | 0.000086 | 0.00020 | 0.0020 | 0.0015 | 0.00024 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000012 | 0.000010 |
| Strontium, dissolved | mg/L | 0.077 | 0.12 | 2.5 | 0.14 | 0.11 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.000014 | 0.000011 |
| Uranium, total | mg/L | 0.000054 | 0.00014 | 0.0085 | 0.00049 | 0.000087 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0021 | 0.0074 | 0.0021 | 0.0016 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]COCs selection

**Table A-3.3 Model Results and WQG Exceedances for Tenas Creek**

| Receiving Environment | | Tenas Creek (WQS04) | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **Max Normal ST** | **P50 Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 1.3 | 0.048 | 0.0041 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 0.52 | 0.29 |
| Fluoride | mg/L | 0.031 | 0.045 | 1.2 | 0.055 | 0.035 |
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 0.37 | 0.025 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.0090 | 0.0013 |
| Sulfate | mg/L | 2.6 | 7.4 | 220 | 24 | 3.2 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.35 | 0.11 | 0.069 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.074 | 0.00022 | 0.00015 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.0050 | 0.00068 | 0.00052 |
| Barium, total | mg/L | 0.034 | 0.047 | 1.0 | 0.054 | 0.035 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.000068 | 0.000052 |
| Boron, total | mg/L | 0.015 | 0.050 | 1.2 | 0.028 | 0.014 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.00017 | 0.0000069 | 0.0000034 |
| Chromium (Cr(VI)), total | mg/L | 0.00032 | 0.0018 | 0.0010 | 0.00054 | 0.00035 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.00034 | 0.00012 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0026 | 0.0015 | 0.0011 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.068 | 0.052 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | 0.028 | 0.021 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0055 | 0.000070 | 0.000035 |
| Manganese, total | mg/L | 0.0050 | 0.058 | 0.94 | 0.0084 | 0.0052 |
| Mercury, total | mg/L | 0.0000025 | 0.0000089 | 0.000020 | 0.0000041 | 0.0000031 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.00084 | 0.00013 |
| Nickel, dissolved | mg/L | 0.00025 | 0.00054 | 0.0025 | 0.00068 | 0.00035 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.00078 | 0.000064 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000014 | 0.000010 |
| Strontium, dissolved | mg/L | 0.10 | 0.14 | 2.5 | 0.14 | 0.11 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.000016 | 0.000011 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | 0.0085 | 0.00034 | 0.00011 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0071 | 0.0019 | 0.0016 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]COCs selection

**Table A-3.4 Model Results and WQG Exceedances for Telkwa River**

| Receiving Environment | | Telkwa River (WQS09) | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **Max Normal ST** | **P50 Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0095 | 1.7 | 0.0064 | 0.0040 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 0.28 | 0.26 |
| Fluoride | mg/L | 0.029 | 0.038 | 0.99 | 0.034 | 0.025 |
| Nitrate | mg-N/L | 0.013 | 0.076 | 3.0 | 0.052 | 0.029 |
| Nitrite | mg-N/L | 0.00050 | 0.0050 | 0.020 | 0.0014 | 0.0011 |
| Sulfate | mg/L | 5.6 | 9.0 | 220 | 9.5 | 6.6 |
| Aluminum, total | mg/L | 0.17 | 1.7 | 0.19 | 0.39 | 0.20 |
| Antimony, total | mg/L | 0.000050 | 0.000050 | 0.074 | 0.000063 | 0.000055 |
| Arsenic, total | mg/L | 0.00024 | 0.00055 | 0.0050 | 0.00033 | 0.00027 |
| Barium, total | mg/L | 0.040 | 0.049 | 1.0 | 0.045 | 0.041 |
| Beryllium, total | mg/L | 0.000050 | 0.000050 | 0.00013 | 0.000054 | 0.000050 |
| Boron, total | mg/L | 0.0050 | 0.050 | 1.2 | 0.0067 | 0.0054 |
| Cadmium, dissolved | mg/L | 0.0000063 | 0.0000099 | 0.00011 | 0.0000081 | 0.0000065 |
| Chromium (Cr(VI)), total | mg/L | 0.00020 | 0.0010 | 0.0010 | 0.00032 | 0.00026 |
| Cobalt, total | mg/L | 0.000050 | 0.00088 | 0.0040 | 0.00022 | 0.00015 |
| Copper, dissolved | mg/L | 0.00067 | 0.0017 | 0.00080 | 0.00088 | 0.00074 |
| Iron, total | mg/L | 0.31 | 1.5 | 1.0 | 0.42 | 0.29 |
| Iron, dissolved | mg/L | 0.076 | 0.27 | 0.35 | 0.11 | 0.070 |
| Lead, total | mg/L | 0.00014 | 0.0014 | 0.0044 | 0.00041 | 0.00020 |
| Manganese, total | mg/L | 0.020 | 0.078 | 0.79 | 0.025 | 0.020 |
| Mercury, total | mg/L | 0.0000025 | 0.0000070 | 0.000020 | 0.0000033 | 0.0000030 |
| Molybdenum, total | mg/L | 0.00053 | 0.00073 | 0.034 | 0.00069 | 0.00056 |
| Nickel, dissolved | mg/L | 0.00025 | 0.00025 | 0.0013 | 0.00034 | 0.00031 |
| Selenium, total | mg/L | 0.000080 | 0.00020 | 0.0020 | 0.00015 | 0.000091 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000011 | 0.000010 |
| Strontium, dissolved | mg/L | 0.056 | 0.091 | 2.5 | 0.11 | 0.051 |
| Thallium, total | mg/L | 0.0000050 | 0.0000050 | 0.00080 | 0.000011 | 0.000010 |
| Uranium, total | mg/L | 0.000056 | 0.000092 | 0.0085 | 0.000082 | 0.000058 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0042 | 0.0016 | 0.0015 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]COCs selection

**Table A-3.5 Model Results and WQG Exceedances for the Bulkley River (WQS11)**

| Receiving Environment | | Bulkley River (WQS11) | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **Max Normal ST** | **P50 Normal ST** |
| Ammonia, total | mg-N/L | 0.0050 | 0.017 | 1.6 | 0.0052 | 0.0040 |
| Chloride | mg/L | 0.25 | 0.86 | 150 | 0.26 | 0.25 |
| Fluoride | mg/L | 0.023 | 0.035 | 0.84 | 0.031 | 0.024 |
| Nitrate | mg-N/L | 0.013 | 0.041 | 3.0 | 0.014 | 0.013 |
| Nitrite | mg-N/L | 0.0020 | 0.0050 | 0.020 | 0.0052 | 0.0029 |
| Sulfate | mg/L | 4.0 | 5.0 | 130 | 4.8 | 4.2 |
| Aluminum, total | mg/L | 0.13 | 1.3 | 0.18 | 0.15 | 0.14 |
| Antimony, total | mg/L | 0.000050 | 0.00011 | 0.074 | 0.000052 | 0.000050 |
| Arsenic, total | mg/L | 0.00024 | 0.00070 | 0.0050 | 0.00031 | 0.00025 |
| Barium, total | mg/L | 0.026 | 0.038 | 1.0 | 0.031 | 0.030 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.000052 | 0.000050 |
| Boron, total | mg/L | 0.0050 | 0.010 | 1.2 | 0.0052 | 0.0050 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000065 | 0.000085 | 0.0000031 | 0.0000030 |
| Chromium (Cr(VI)), total | mg/L | 0.00025 | 0.0012 | 0.0010 | 0.00031 | 0.00030 |
| Cobalt, total | mg/L | 0.000050 | 0.00068 | 0.0040 | 0.00010 | 0.00010 |
| Copper, dissolved | mg/L | 0.00067 | 0.0020 | 0.0011 | 0.00073 | 0.00070 |
| Iron, total | mg/L | 0.18 | 1.3 | 1.0 | 0.19 | 0.18 |
| Iron, dissolved | mg/L | 0.024 | 0.16 | 0.35 | 0.052 | 0.034 |
| Lead, total | mg/L | 0.000095 | 0.00051 | 0.0040 | 0.00016 | 0.00011 |
| Manganese, total | mg/L | 0.016 | 0.059 | 0.73 | 0.018 | 0.015 |
| Mercury, total | mg/L | 0.0000025 | 0.0000055 | 0.000020 | 0.0000031 | 0.0000030 |
| Molybdenum, total | mg/L | 0.00037 | 0.00055 | 0.034 | 0.00042 | 0.00040 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0013 | 0.0013 | 0.00031 | 0.00030 |
| Selenium, total | mg/L | 0.000025 | 0.00020 | 0.0020 | 0.000031 | 0.000030 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000010 | 0.000010 |
| Strontium, dissolved | mg/L | 0.040 | 0.055 | 2.5 | 0.0000023 | <DL |
| Thallium, total | mg/L | 0.0000050 | 0.000014 | 0.00080 | 0.000010 | 0.000010 |
| Uranium, total | mg/L | 0.000036 | 0.000094 | 0.0085 | 0.000042 | 0.000040 |
| Zinc, dissolved | mg/L | 0.0013 | 0.0045 | 0.0039 | 0.0016 | 0.0012 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]COCs selection

**Table A-3.6 Model Results and WQG Exceedances for the Bulkley River (WQS12)**

| Receiving Environment | | Bulkley River (WQS12) | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **Max Normal ST** | **P50 Normal ST** |
| Ammonia, total | mg-N/L | 0.0050 | 0.017 | 1.6 | 0.0052 | 0.0040 |
| Chloride | mg/L | 0.25 | 0.86 | 150 | 0.28 | 0.25 |
| Fluoride | mg/L | 0.023 | 0.035 | 0.84 | 0.034 | 0.024 |
| Nitrate | mg-N/L | 0.013 | 0.041 | 3.0 | 0.020 | 0.014 |
| Nitrite | mg-N/L | 0.0020 | 0.0050 | 0.020 | 0.0049 | 0.0026 |
| Sulfate | mg/L | 4.0 | 5.0 | 130 | 5.7 | 4.5 |
| Aluminum, total | mg/L | 0.13 | 1.3 | 0.18 | 0.21 | 0.15 |
| Antimony, total | mg/L | 0.000050 | 0.00011 | 0.074 | 0.000057 | 0.000051 |
| Arsenic, total | mg/L | 0.00024 | 0.00070 | 0.0050 | 0.00032 | 0.00025 |
| Barium, total | mg/L | 0.026 | 0.038 | 1.0 | 0.035 | 0.032 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.000056 | 0.000050 |
| Boron, total | mg/L | 0.0050 | 0.010 | 1.2 | 0.0057 | 0.0051 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000065 | 0.000085 | 0.0000043 | 0.0000036 |
| Chromium (Cr(VI)), total | mg/L | 0.00025 | 0.0012 | 0.0010 | 0.00033 | 0.00030 |
| Cobalt, total | mg/L | 0.000050 | 0.00068 | 0.0040 | 0.00013 | 0.00011 |
| Copper, dissolved | mg/L | 0.00067 | 0.0020 | 0.0011 | 0.00078 | 0.00071 |
| Iron, total | mg/L | 0.18 | 1.3 | 1.0 | 0.25 | 0.20 |
| Iron, dissolved | mg/L | 0.024 | 0.16 | 0.35 | 0.064 | 0.040 |
| Lead, total | mg/L | 0.000095 | 0.00051 | 0.0040 | 0.00022 | 0.00012 |
| Manganese, total | mg/L | 0.016 | 0.059 | 0.73 | 0.020 | 0.016 |
| Mercury, total | mg/L | 0.0000025 | 0.0000055 | 0.000020 | 0.0000034 | 0.0000030 |
| Molybdenum, total | mg/L | 0.00037 | 0.00055 | 0.034 | 0.00048 | 0.00043 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0013 | 0.0013 | 0.00034 | 0.00030 |
| Selenium, total | mg/L | 0.000025 | 0.00020 | 0.0020 | 0.000051 | 0.000040 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000011 | 0.000010 |
| Strontium, dissolved | mg/L | 0.040 | 0.055 | 2.5 | 0.017 | <DL |
| Thallium, total | mg/L | 0.0000050 | 0.000014 | 0.00080 | 0.000011 | 0.000010 |
| Uranium, total | mg/L | 0.000036 | 0.000094 | 0.0085 | 0.000049 | 0.000043 |
| Zinc, dissolved | mg/L | 0.0013 | 0.0045 | 0.0039 | 0.0016 | 0.0013 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]COCs selection

**Table A-2.1 TCP surface discharge (operations), NMP surface discharge (closure) - POCs**

| | | TCP surface discharge (operations), NMP surface discharge (closure) - POCs | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Goathorn creek (WQSEA1) | | | | POCs selection | | |
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **80% WQG** | **Max TCP discharge - Normal ST** | **Max NMP discharge -Normal ST** | **Exceeds at EA1? - Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0070 | 1.6 | 1.3 | 1.7 | 0.14 | 0.030 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 6.6 | 3.1 | 0.86 |
| Fluoride | mg/L | 0.032 | 0.041 | 1.2 | 0.96 | 0.15 | 0.031 | 0.050 |
| Nitrate | mg-N/L | 0.041 | 0.076 | 3.0 | 2.4 | 13 | 1.0 | 0.25 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.30 | 0.024 | 0.0058 |
| Sulphate | mg/L | 24 | 37 | 220 | 180 | 420 | 230 | 62 |
| Aluminum, total | mg/L | 0.092 | 0.75 | 0.27 | 0.22 | 0.39 | 0.39 | 0.19 |
| Antimony, total | mg/L | 0.000073 | 0.00014 | 0.074 | 0.059 | 0.00079 | 0.00043 | 0.00013 |
| Arsenic, total | mg/L | 0.00023 | 0.00068 | 0.0050 | 0.0040 | 0.0018 | 0.00090 | 0.00044 |
| Barium, total | mg/L | 0.058 | 0.072 | 1.0 | 0.80 | 0.080 | 0.025 | 0.076 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000061 | 0.000015 | 0.000060 |
| Boron, total | mg/L | 0.0050 | 0.050 | 1.2 | 0.96 | 0.13 | 0.14 | 0.029 |
| Cadmium, dissolved | mg/L | 0.0000081 | 0.000036 | 0.00016 | 0.00013 | 0.000032 | 0.0000054 | 0.000016 |
| Chromium (Cr(VI)), total | mg/L | 0.00020 | 0.00091 | 0.0010 | 0.00080 | 0.0020 | 0.0013 | 0.00053 |
| Cobalt, total | mg/L | 0.000050 | 0.00055 | 0.0040 | 0.0032 | 0.0035 | 0.0013 | 0.00039 |
| Copper, dissolved | mg/L | 0.0014 | 0.0039 | 0.0013 | 0.0010 | 0.0017 | 0.0022 | 0.0021 |
| Iron, total | mg/L | 0.085 | 0.78 | 1.0 | 0.80 | 1.5 | 1.5 | 0.43 |
| Iron, dissolved | mg/L | 0.015 | 0.13 | 0.35 | 0.28 | 0.036 | 0.0080 | 0.025 |
| Lead, total | mg/L | 0.000025 | 0.00023 | 0.0053 | 0.0042 | 0.0016 | 0.0010 | 0.00021 |
| Manganese, total | mg/L | 0.0059 | 0.033 | 0.91 | 0.73 | 0.061 | 0.030 | 0.012 |
| Mercury, total | mg/L | 0.0000025 | 0.0000064 | 0.000020 | 0.000016 | 0.0000085 | 0.0000046 | 0.0000040 |
| Molybdenum, total | mg/L | 0.00047 | 0.00062 | 0.034 | 0.027 | 0.035 | 0.0077 | 0.0022 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0011 | 0.0022 | 0.0018 | 0.0060 | 0.0023 | 0.00065 |
| Selenium, total | mg/L | 0.000086 | 0.00020 | 0.0020 | 0.0016 | 0.024 | 0.0082 | 0.0015 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0.000027 | 0.0000084 | 0.000012 |
| Strontium, dissolved | mg/L | 0.076 | 0.11 | 2.5 | 2.0 | 0.28 | 0.25 | 0.14 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.000076 | 0.000017 | 0.000014 |
| Uranium, total | mg/L | 0.000054 | 0.00014 | 0.0085 | 0.0068 | 0.0047 | 0.0025 | 0.00049 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0021 | 0.0074 | 0.0059 | 0.0098 | 0.0019 | 0.0021 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]POPCs

**Table A-2.2 MP seepage - POCs**

| | | MP seepage - POCs | | | | | |
|---|---|---|---|---|---|---|---|
| | | Four creek (WQS03_DS) | | | | POCs selection | |
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **80% WQG** | **Max EMP - Normal ST** | **Exceeds at WQS03_DS? - Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0092 | 0.99 | 0.79 | 0.44 | 0.078 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 1.6 | 0.47 |
| Fluoride | mg/L | 0.059 | 0.068 | 1.4 | 1.1 | 0.027 | 0.10 |
| Nitrate | mg-N/L | 0.013 | 0.058 | 3.0 | 2.4 | 3.4 | 0.61 |
| Nitrite | mg-N/L | 0.00050 | 0.0010 | 0.020 | 0.016 | 0.079 | 0.015 |
| Sulphate | mg/L | 1.9 | 28 | 310 | 250 | 200 | 33 |
| Aluminum, total | mg/L | 0.099 | 1.2 | 0.69 | 0.55 | 0.018 | 0.26 |
| Antimony, total | mg/L | 0.000050 | 0.00012 | 0.074 | 0.059 | 0.00018 | 0.000087 |
| Arsenic, total | mg/L | 0.00074 | 0.0011 | 0.0050 | 0.0040 | 0.00037 | 0.0013 |
| Barium, total | mg/L | 0.071 | 0.13 | 1.0 | 0.80 | 0.032 | 0.16 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000027 | 0.000086 |
| Boron, total | mg/L | 0.012 | 0.020 | 1.2 | 0.96 | 0.032 | 0.019 |
| Cadmium, dissolved | mg/L | 0.0000052 | 0.000012 | 0.00023 | 0.00018 | 0.000059 | 0.000013 |
| Chromium (Cr(VI)), total | mg/L | 0.00026 | 0.0016 | 0.0010 | 0.00080 | 0.00023 | 0.00052 |
| Cobalt, total | mg/L | 0.000050 | 0.00047 | 0.0040 | 0.0032 | 0.0035 | 0.00068 |
| Copper, dissolved | mg/L | 0.0014 | 0.0034 | 0.0047 | 0.0038 | 0.00098 | 0.0024 |
| Iron, total | mg/L | 0.095 | 1.1 | 1.0 | 0.80 | 0.080 | 0.24 |
| Iron, dissolved | mg/L | 0.015 | 0.41 | 0.35 | 0.28 | 0.080 | 0.052 |
| Lead, total | mg/L | 0.000025 | 0.00028 | 0.0069 | 0.0055 | 0.00027 | 0.000065 |
| Manganese, total | mg/L | 0.0025 | 0.024 | 1.1 | 0.88 | 0.064 | 0.013 |
| Mercury, total | mg/L | 0.0000025 | 0.000013 | 0.000020 | 0.000016 | 0.0000030 | 0.0000052 |
| Molybdenum, total | mg/L | 0.00023 | 0.00038 | 0.034 | 0.027 | 0.0075 | 0.0012 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0018 | 0.0047 | 0.0038 | 0.0053 | 0.0011 |
| Selenium, total | mg/L | 0.000025 | 0.000095 | 0.0020 | 0.0016 | 0.0051 | 0.00081 |
| Silver, total | mg/L | 0.0000050 | 0.000022 | 0.0015 | 0.0012 | 0.000010 | 0.0000087 |
| Strontium, dissolved | mg/L | 0.17 | 0.24 | 2.5 | 2.0 | 0.17 | 0.32 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.000074 | 0.000020 |
| Uranium, total | mg/L | 0.000078 | 0.00025 | 0.0085 | 0.0068 | 0.00096 | 0.00019 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0025 | 0.014 | 0.011 | 0.0073 | 0.0026 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]POPCs

**Table A-2.3 MP seepage - POCs**

| | | MP seepage - POCs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tenas Creek (WQS04) | | | | POCs selection | | | |
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **80% WQG** | **Max NMP - Normal ST** | **Max WMP - Normal ST** | **Max TCP - Normal ST** | **Exceeds at WQS04? Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 1.3 | 1.0 | 0.30 | 0.59 | 1.7 | 0.048 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 2.3 | 3.2 | 6.6 | 0.52 |
| Fluoride | mg/L | 0.031 | 0.045 | 1.2 | 0.96 | 0.043 | 0.033 | 0.15 | 0.055 |
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 2.4 | 2.3 | 4.6 | 13 | 0.37 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.054 | 0.11 | 0.30 | 0.0090 |
| Sulphate | mg/L | 2.6 | 7.4 | 220 | 180 | 240 | 250 | 420 | 24 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.35 | 0.28 | 0.022 | 0.021 | 0.018 | 0.11 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.074 | 0.059 | 0.00033 | 0.00046 | 0.00079 | 0.00022 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.0050 | 0.0040 | 0.00065 | 0.00042 | 0.0013 | 0.00068 |
| Barium, total | mg/L | 0.034 | 0.047 | 1.0 | 0.80 | 0.059 | 0.024 | 0.074 | 0.054 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000058 | 0.000018 | 0.000061 | 0.000068 |
| Boron, total | mg/L | 0.015 | 0.050 | 1.2 | 0.96 | 0.10 | 0.14 | 0.13 | 0.028 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.00017 | 0.00014 | 0.000082 | 0.000055 | 0.000032 | 0.0000069 |
| Chromium (Cr(VI)), total | mg/L | 0.00032 | 0.0018 | 0.0010 | 0.00080 | 0.00035 | 0.00020 | 0.00077 | 0.00054 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.0032 | 0.0040 | 0.0042 | 0.0028 | 0.00034 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0026 | 0.0021 | 0.0017 | 0.0023 | 0.0017 | 0.0015 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.80 | 0.11 | 0.063 | 0.036 | 0.068 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | 0.28 | 0.11 | 0.063 | 0.036 | 0.028 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0055 | 0.0044 | 0.00045 | 0.00060 | 0.0012 | 0.000070 |
| Manganese, total | mg/L | 0.0050 | 0.058 | 0.94 | 0.75 | 0.079 | 0.074 | 0.036 | 0.0084 |
| Mercury, total | mg/L | 0.0000025 | 0.0000089 | 0.000020 | 0.000016 | 0.0000046 | 0.0000023 | 0.0000054 | 0.0000041 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.027 | 0.0100 | 0.0084 | 0.035 | 0.00084 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0025 | 0.0020 | 0.0065 | 0.0056 | 0.0060 | 0.00068 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.0016 | 0.0069 | 0.0082 | 0.024 | 0.00078 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0.000017 | 0.0000094 | 0.000027 | 0.000014 |
| Strontium, dissolved | mg/L | 0.11 | 0.13 | 2.5 | 2.0 | 0.24 | 0.27 | 0.28 | 0.14 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.00010 | 0.000067 | 0.000076 | 0.000016 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | 0.0085 | 0.0068 | 0.0019 | 0.0026 | 0.0047 | 0.00034 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0071 | 0.0057 | 0.0092 | 0.0071 | 0.0098 | 0.0019 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]POPCs

**Table A-2.4 Rail Load Out - POCs**

| | | Rail Load Out - POCs | | | | | |
|---|---|---|---|---|---|---|---|
| | | Bulkley River (WQS11) | | | | POCs selection | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max RLO discharge - Normal ST | Exceeds at WQS11? - Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 1.6 | 1.3 | 0 | 0.0052 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 0.080 | 0.26 |
| Fluoride | mg/L | 0.031 | 0.045 | 0.84 | 0.67 | 0 | 0.031 |
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 2.4 | 0 | 0.014 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0 | 0.0052 |
| Sulphate | mg/L | 2.6 | 7.4 | 130 | 100 | 68 | 4.8 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.18 | 0.14 | 0.37 | 0.15 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.074 | 0.059 | 0.0000054 | 0.000052 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.0050 | 0.0040 | 0.00051 | 0.00031 |
| Barium, total | mg/L | 0.034 | 0.047 | 1.0 | 0.80 | 0.012 | 0.031 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0 | 0.000052 |
| Boron, total | mg/L | 0.015 | 0.050 | 1.2 | 0.96 | 0.0083 | 0.0052 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.000085 | 0.000068 | 0.000091 | 0.0000031 |
| Chromium (Cr(VI)), total | mg/L | 0.00032 | 0.0018 | 0.0010 | 0.00080 | 0.0012 | 0.00031 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.0032 | 0.0014 | 0.00010 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0011 | 0.00088 | 0.00023 | 0.00073 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.80 | 1.5 | 0.19 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | 0.28 | 0.076 | 0.052 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0040 | 0.0032 | 0.00044 | 0.00016 |
| Manganese, total | mg/L | 0.0050 | 0.058 | 0.73 | 0.58 | 0.071 | 0.018 |
| Mercury, total | mg/L | 0.0000025 | 0.0000089 | 0.000020 | 0.000016 | 0.0000047 | 0.0000031 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.027 | 0.00018 | 0.00042 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0013 | 0.0010 | 0.0023 | 0.00031 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.0016 | 0.00035 | 0.000031 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0 | 0.000010 |
| Strontium, dissolved | mg/L | 0.11 | 0.13 | 2.5 | 2.0 | 0.068 | 0.0000023 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.00010 | 0.000010 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | 0.0085 | 0.0068 | 0.000031 | 0.000042 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0039 | 0.00312 | 0.0034 | 0.0016 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20250206_noblast_formitigationmemo.xlsx]POPCs

# Appendix F Stream Water Quality Exceedances for Mitigation Controls

# Appendix 6-A

## Four Creek water quality exceedances

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Figure 6A-1: Nitrite modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

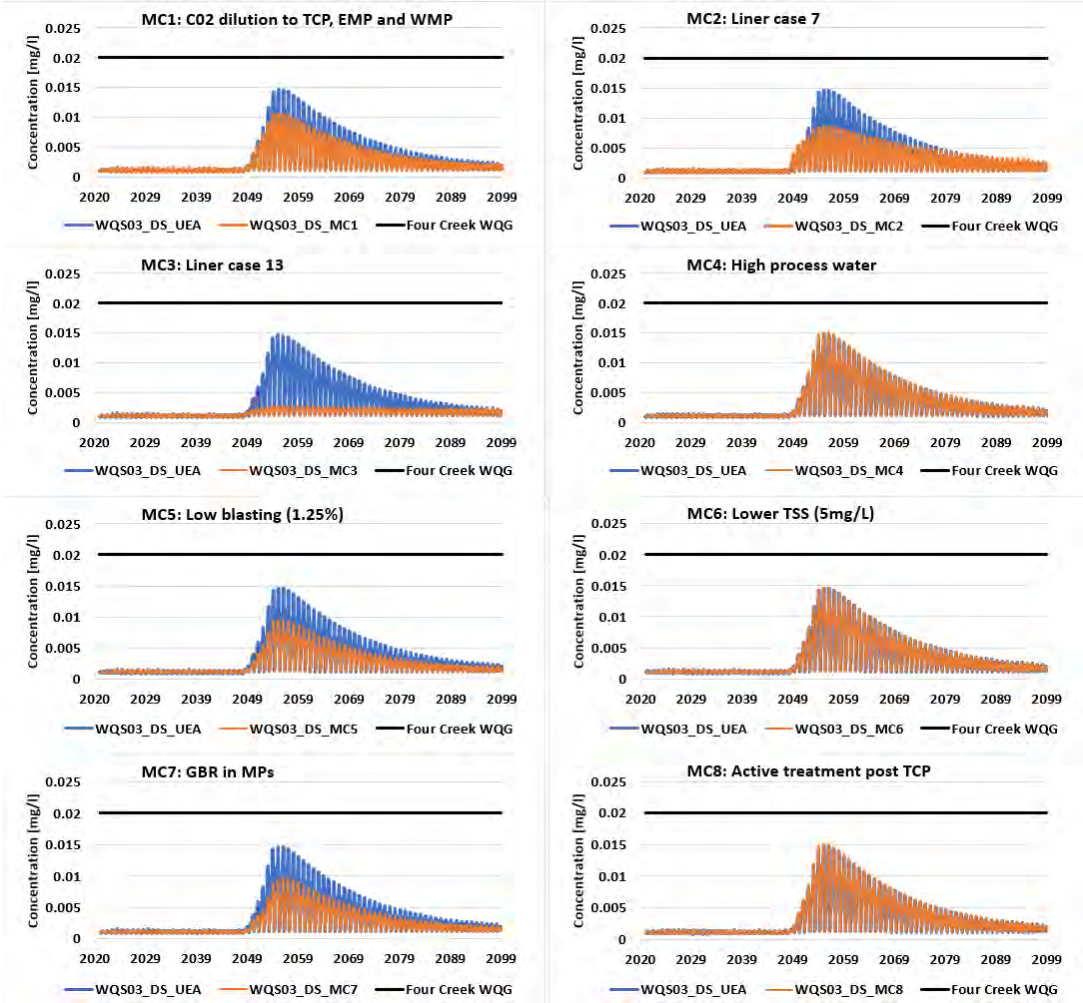


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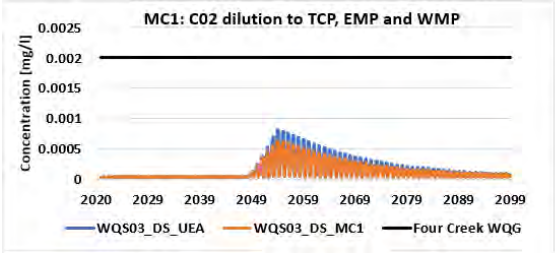
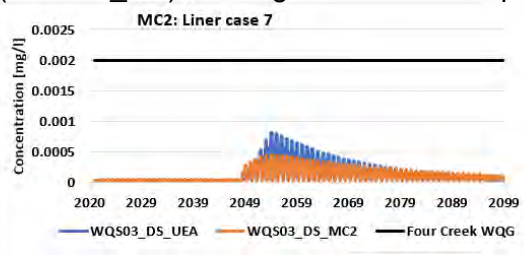
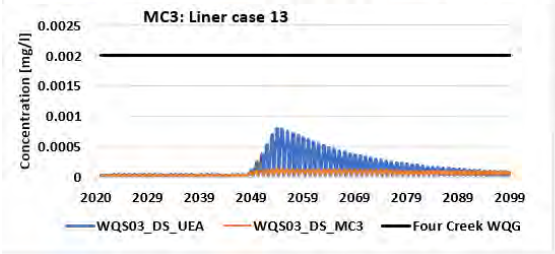
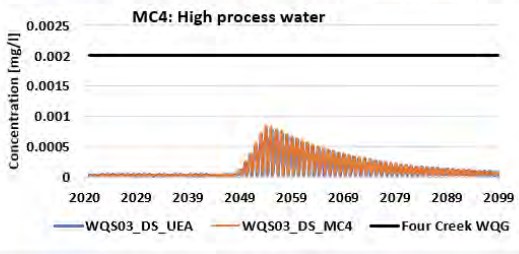
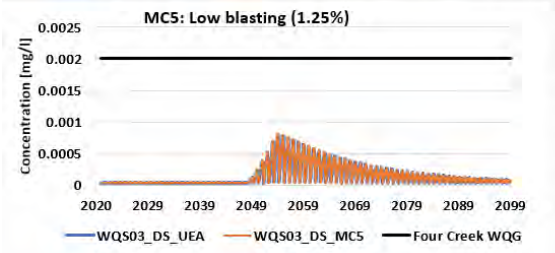
Figure 6A-2: Total Selenium modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

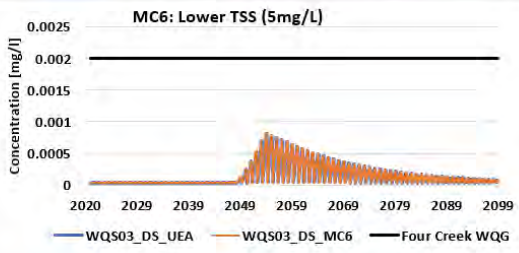


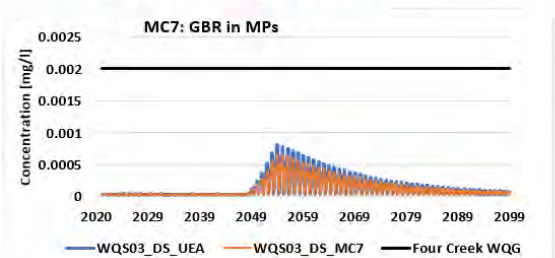



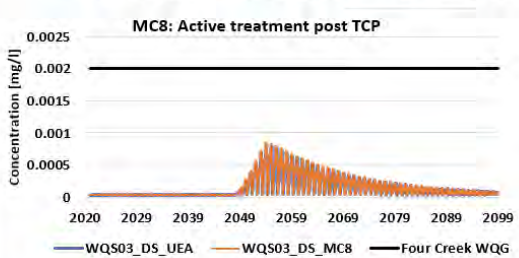




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Figure 6A-3: Sulphate modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

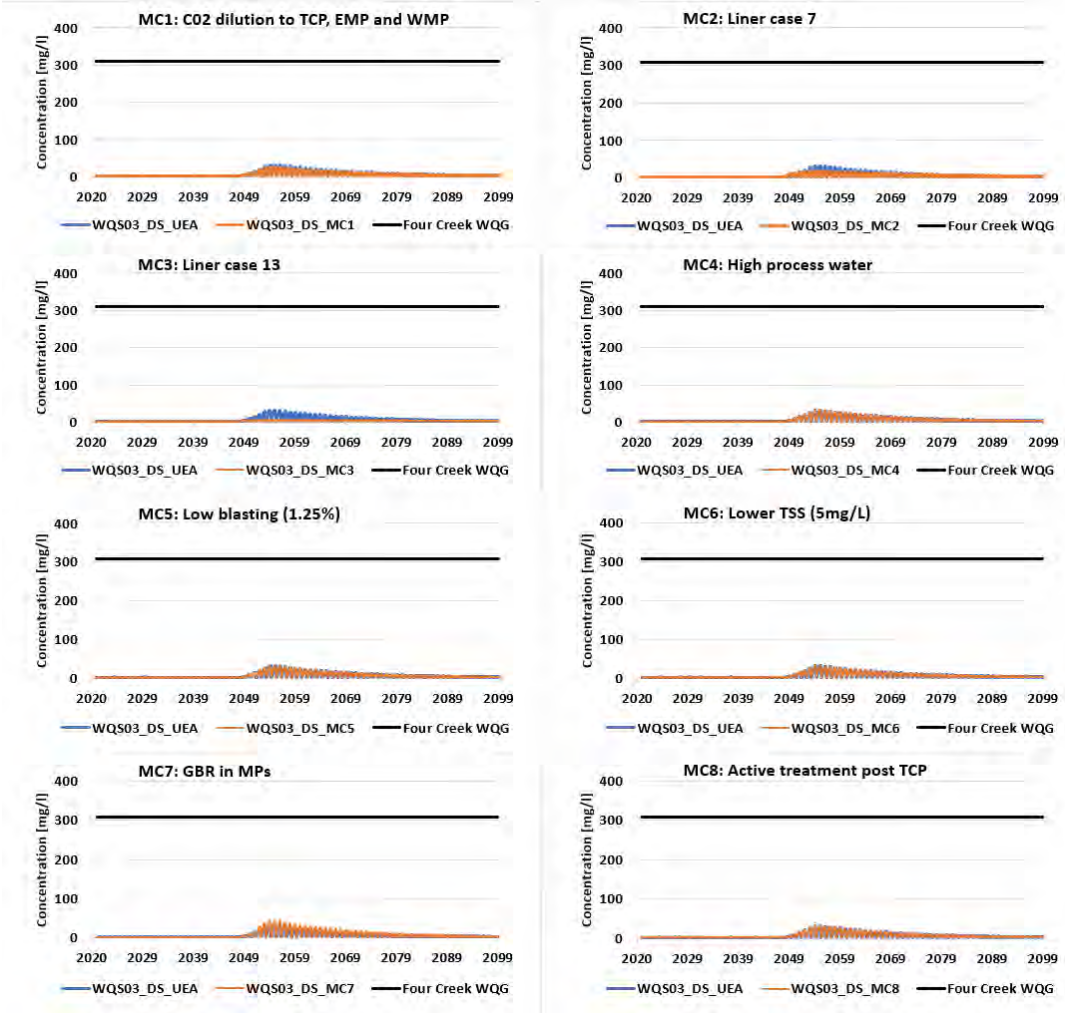


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Figure 6A-4: Total Aluminium modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

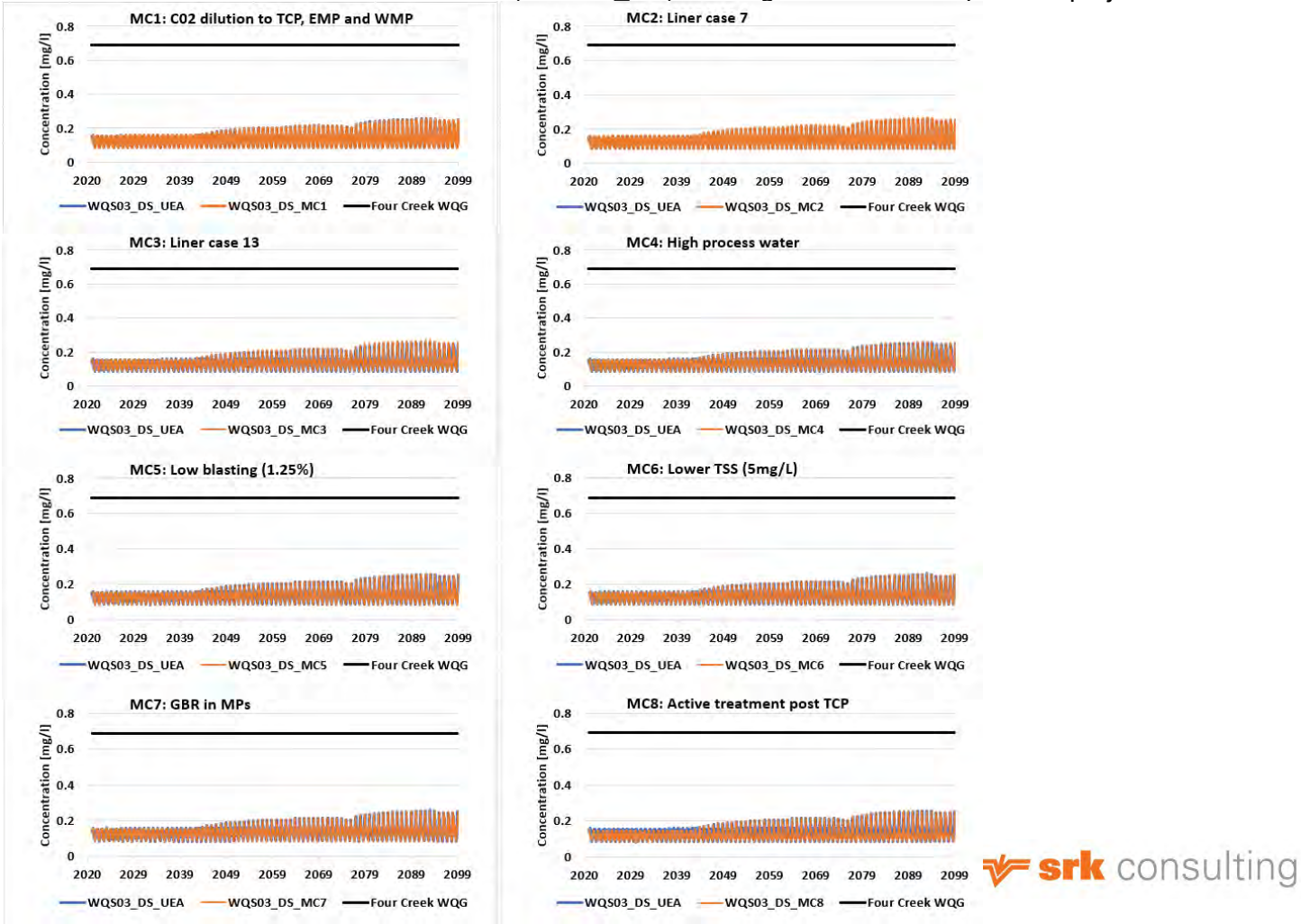


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Figure 6A-5: Nitrate modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

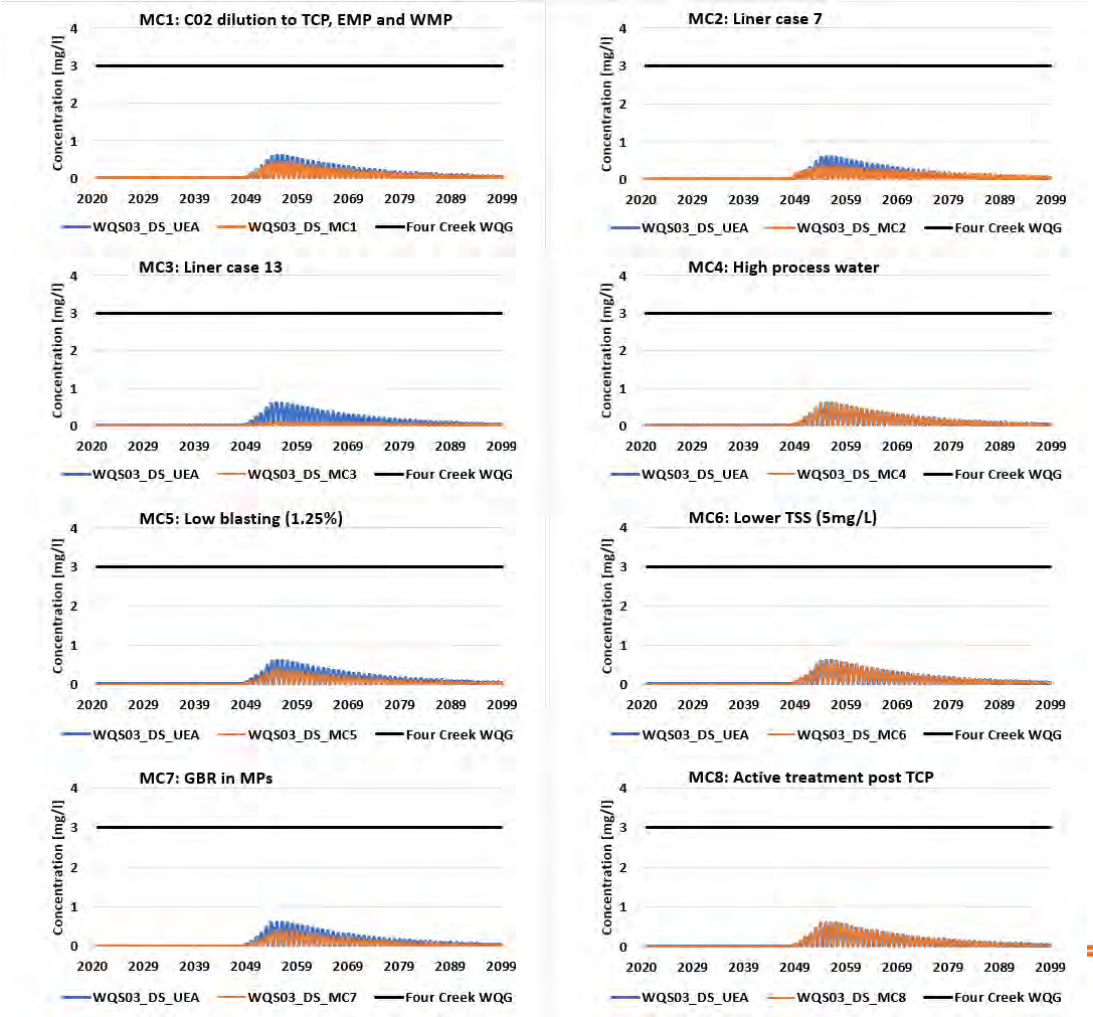


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Figure 6A-6: Dissolved Zinc modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

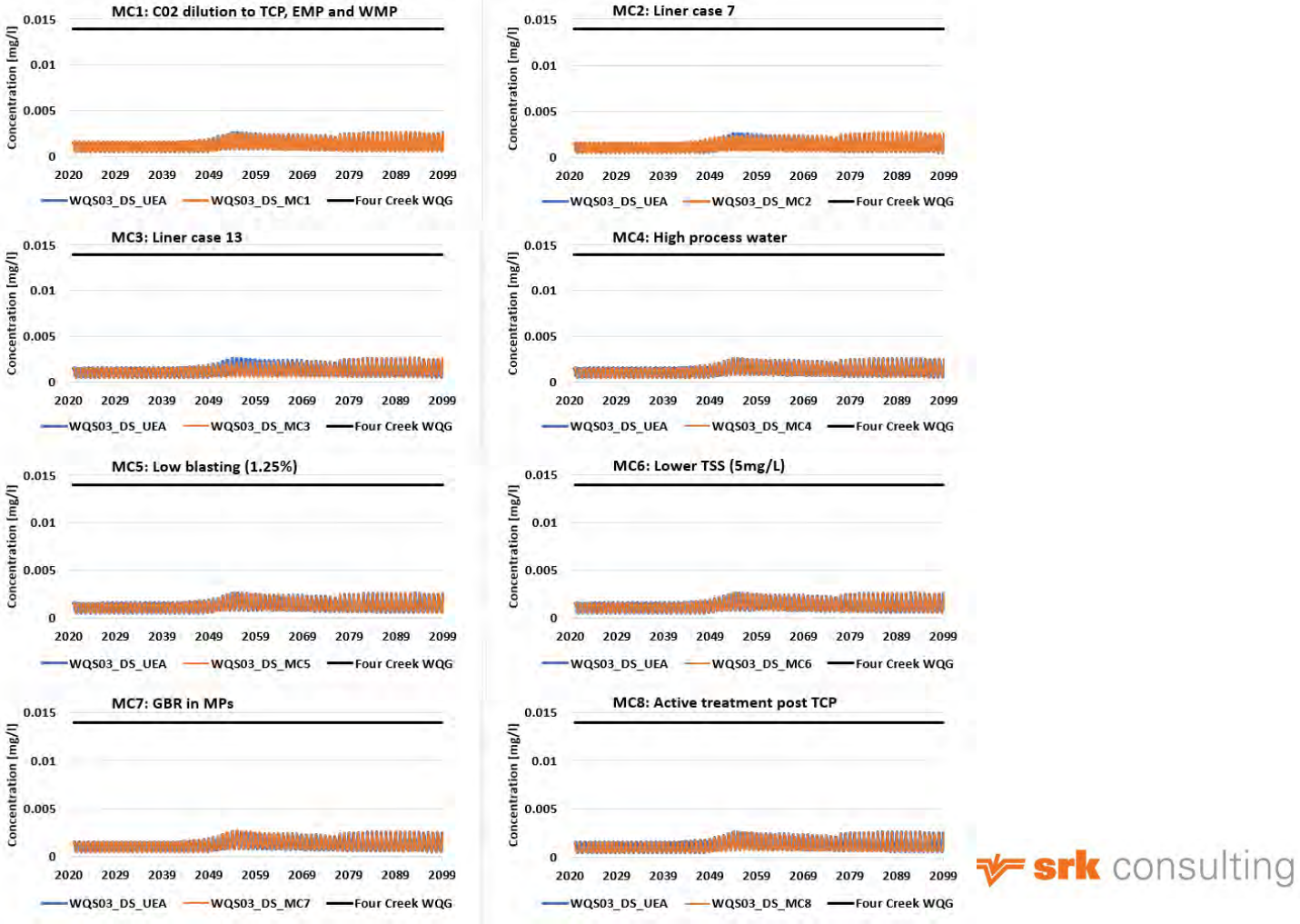


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Figure 6A-7: Dissolved Copper modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

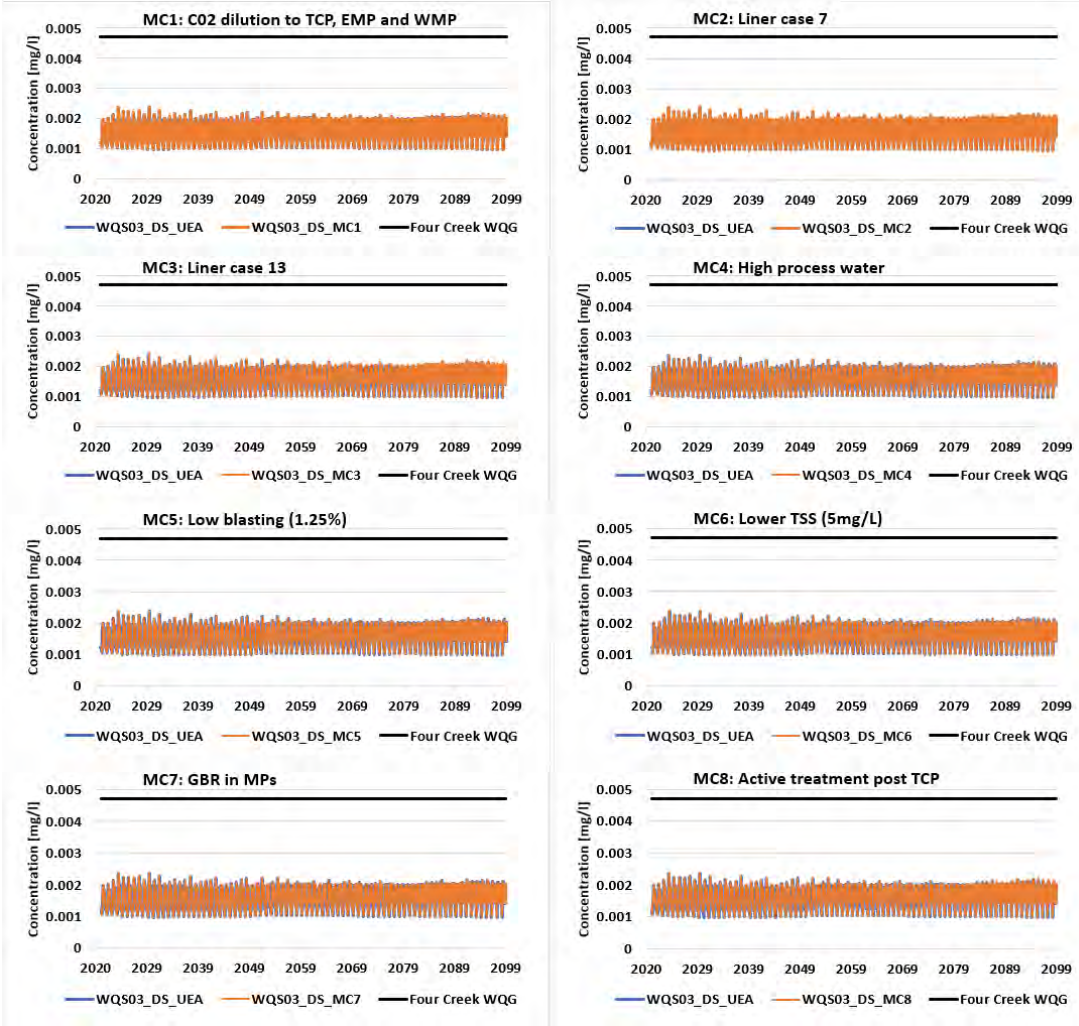


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Figure 6A-8: Dissolved Nickel modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

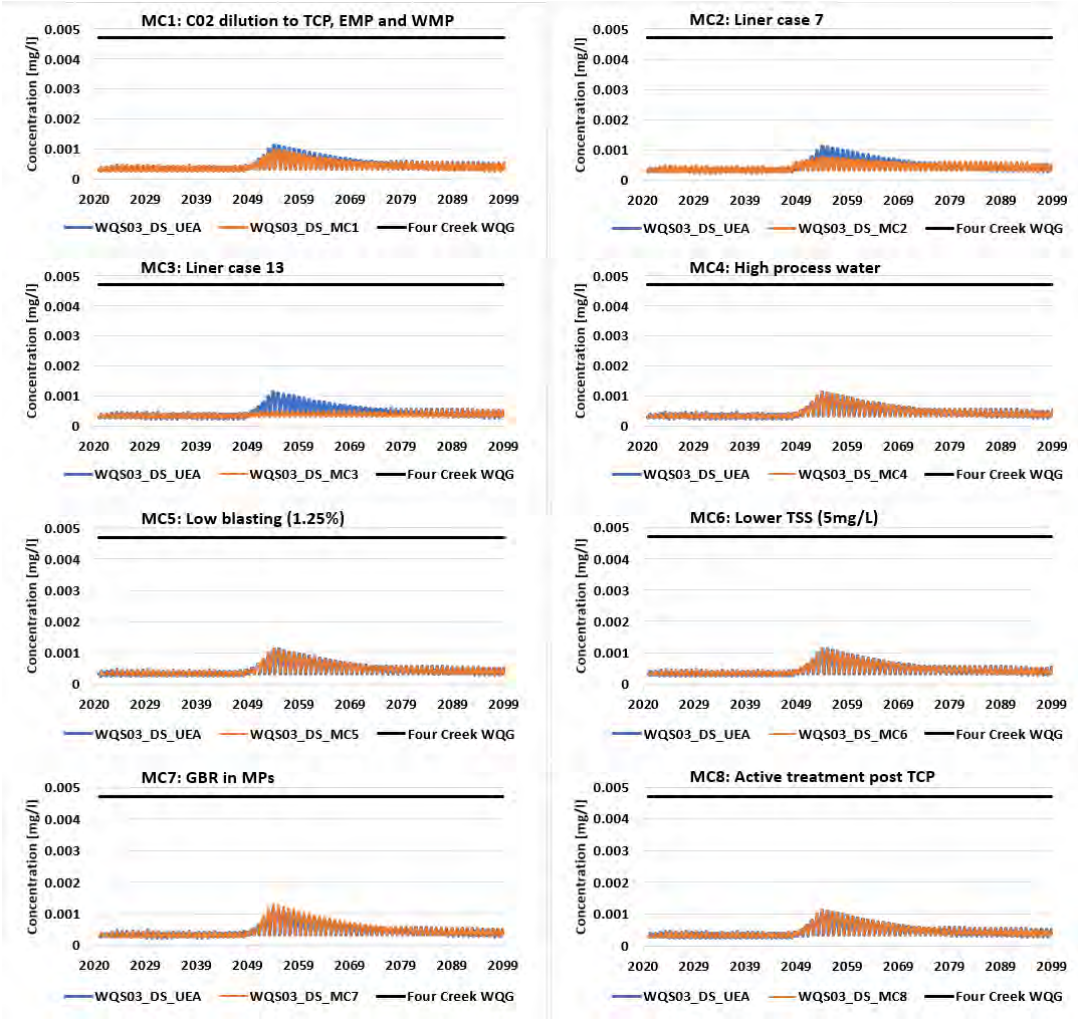


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Figure 6A-9: Total Molybdenum modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

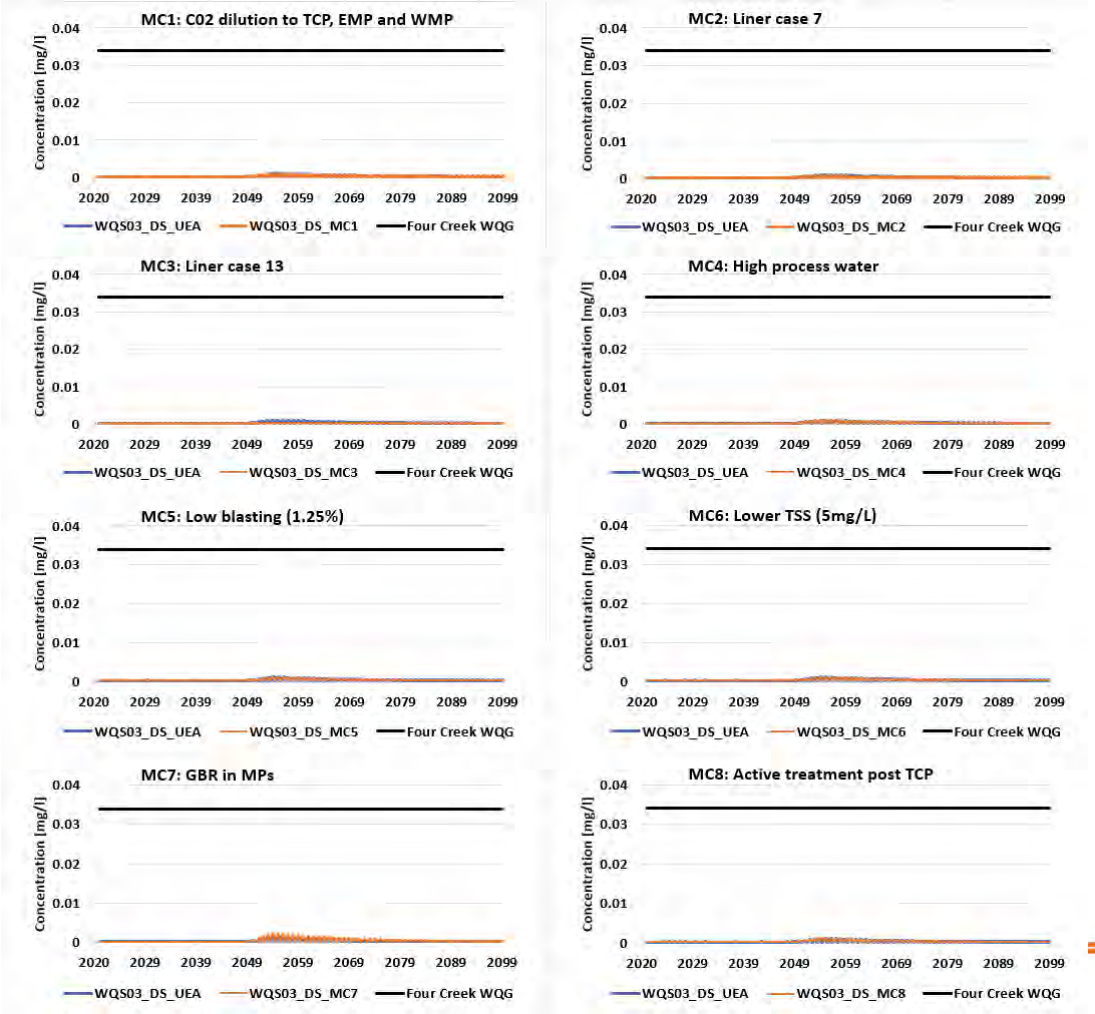


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Figure 6A-10: Total Iron modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

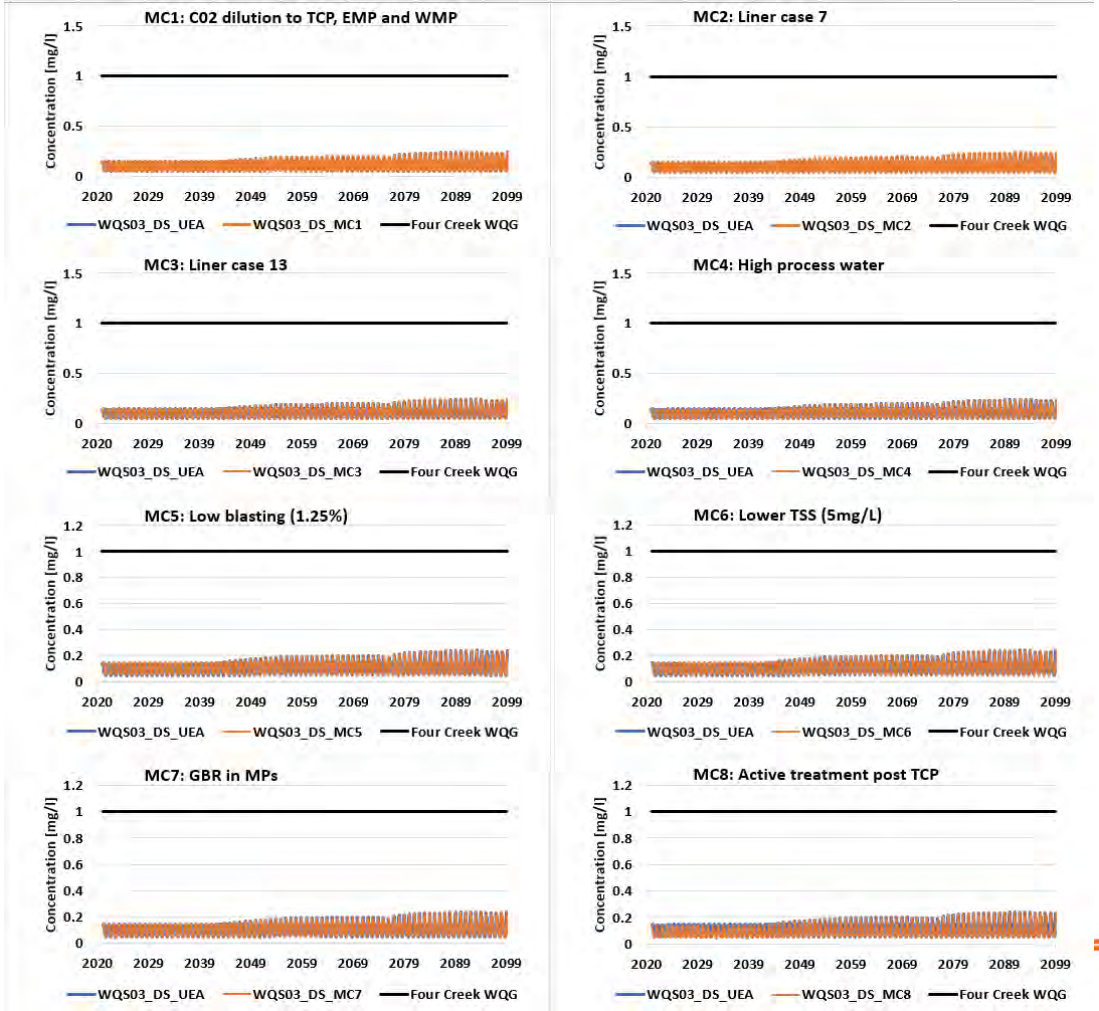


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Figure 6A-11: Total Chromium modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

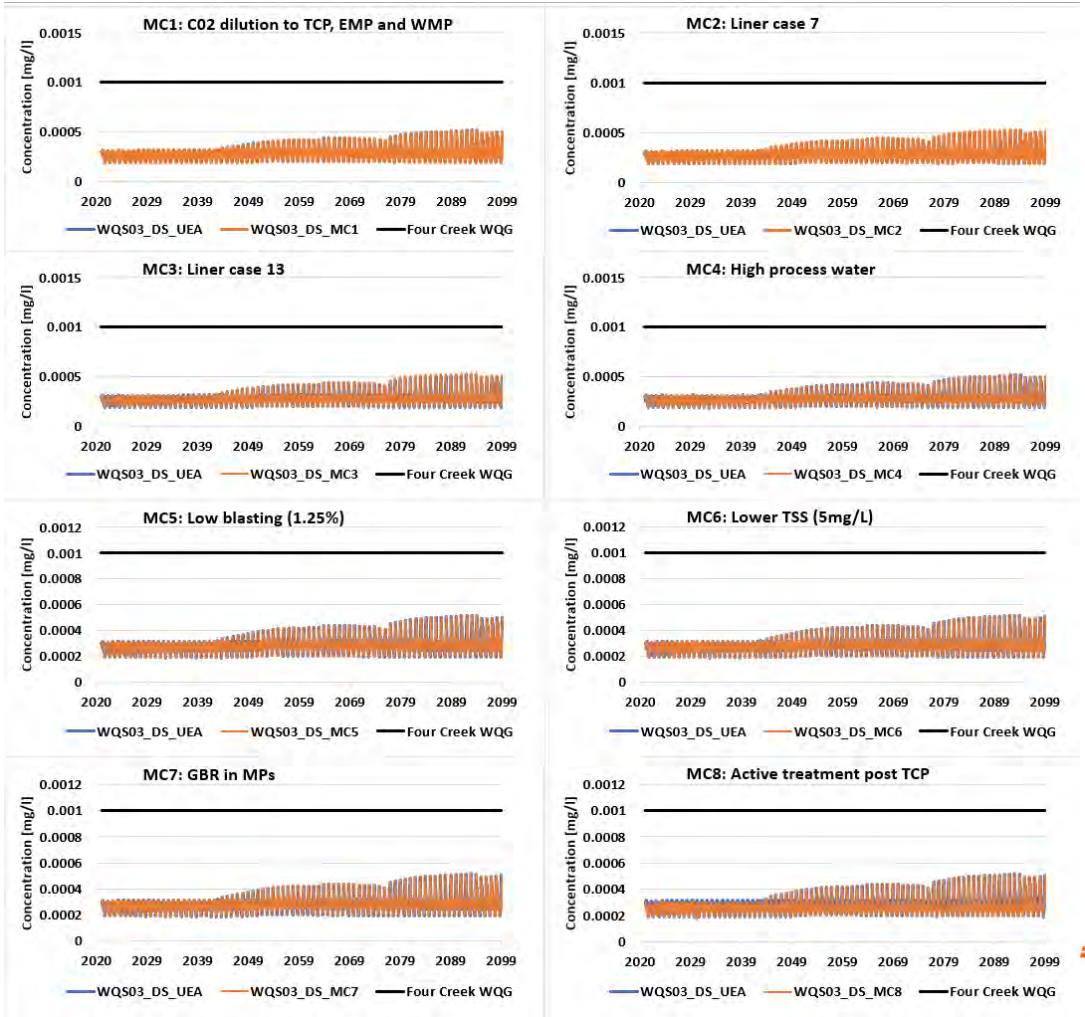
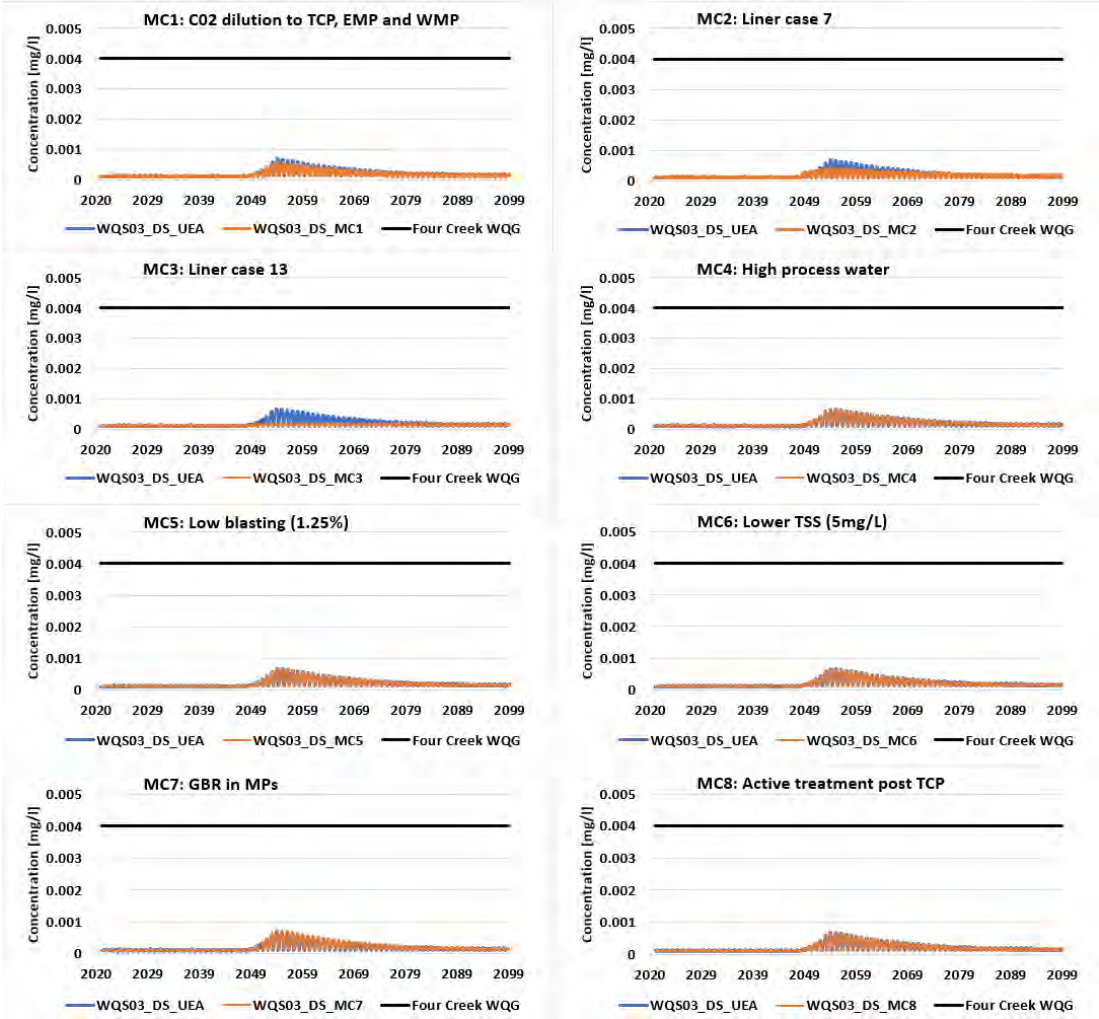


Figure 6A-12: Total Cobalt modelled concentrations in Four Creek (WQS03_DS) for mitigation cases compared to project case

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# Appendix 6-B

## Tenas Creek water quality exceedances

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Figure 6B-1: Nitrite modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

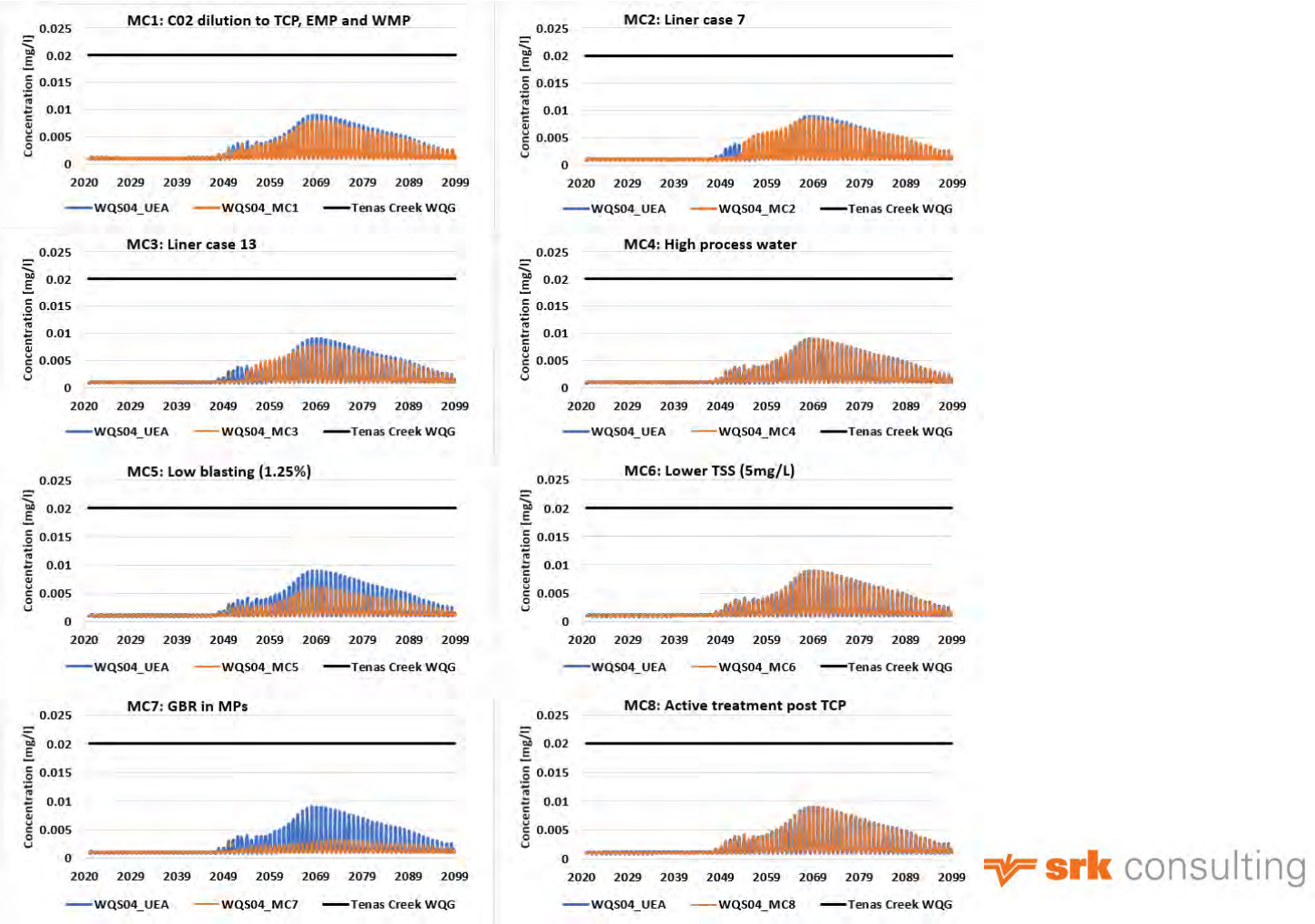


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Figure 6B-2: Total Selenium modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

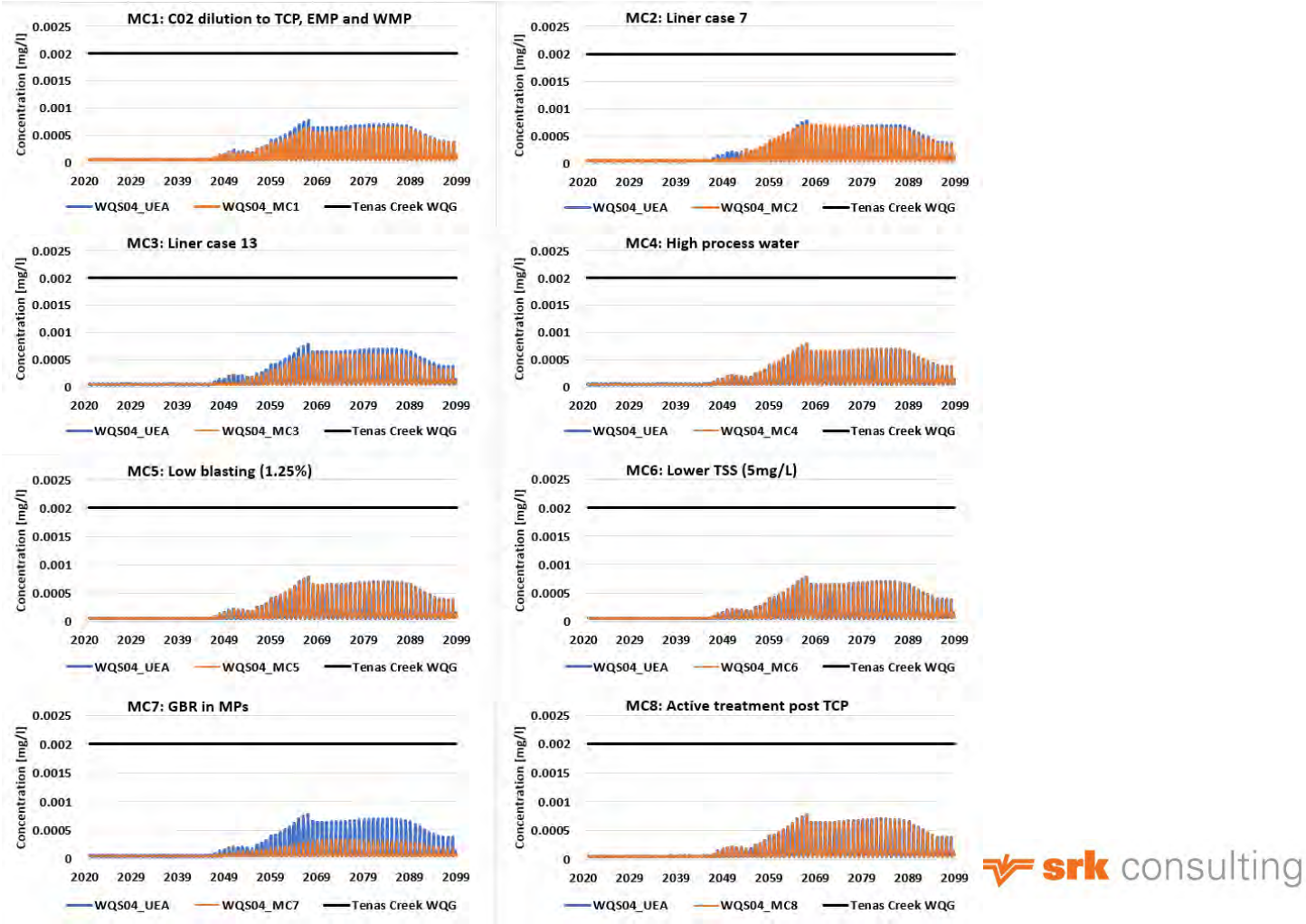


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Figure 6B-3: Sulphate modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

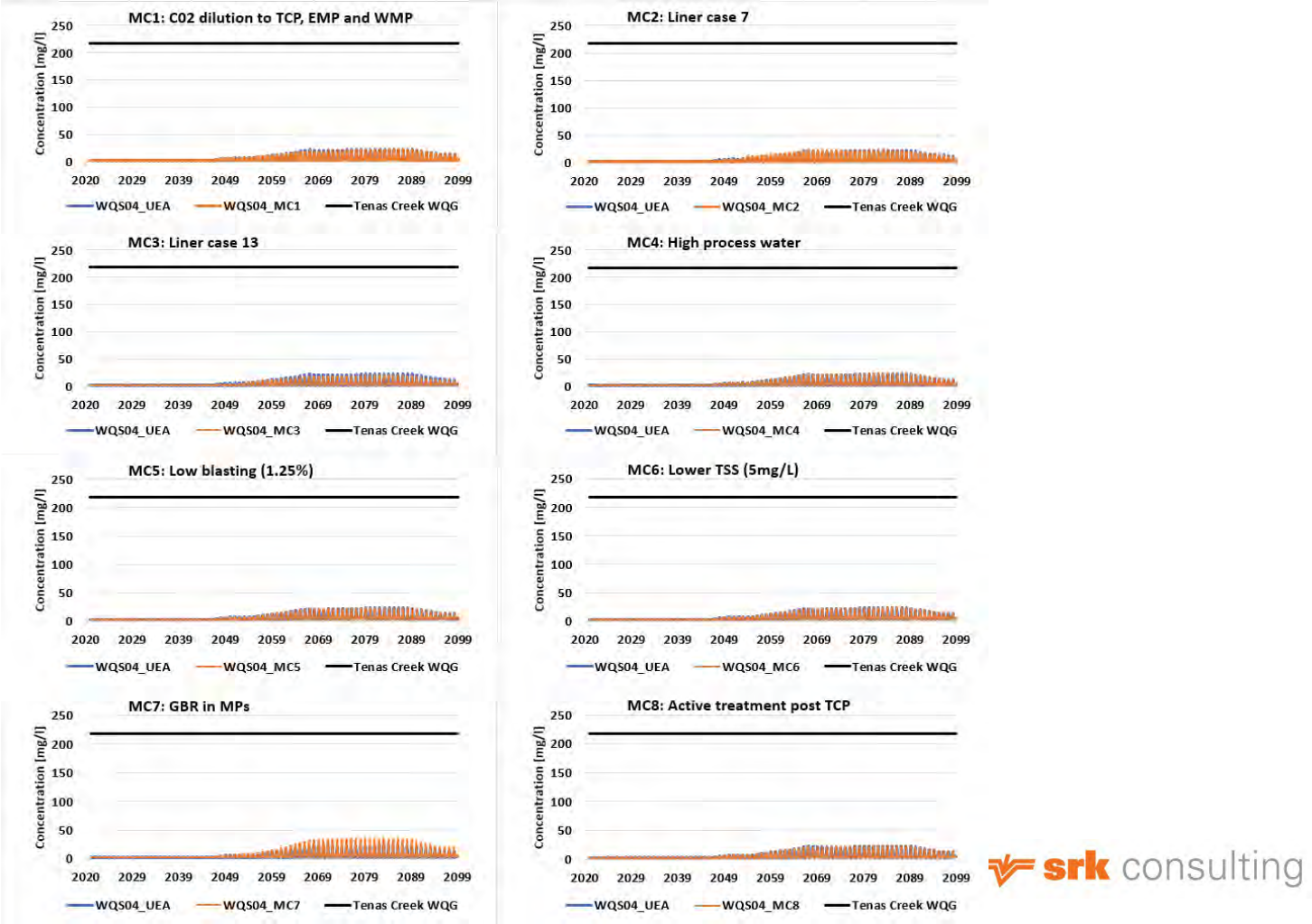


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Figure 6B-4: Total Aluminium modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

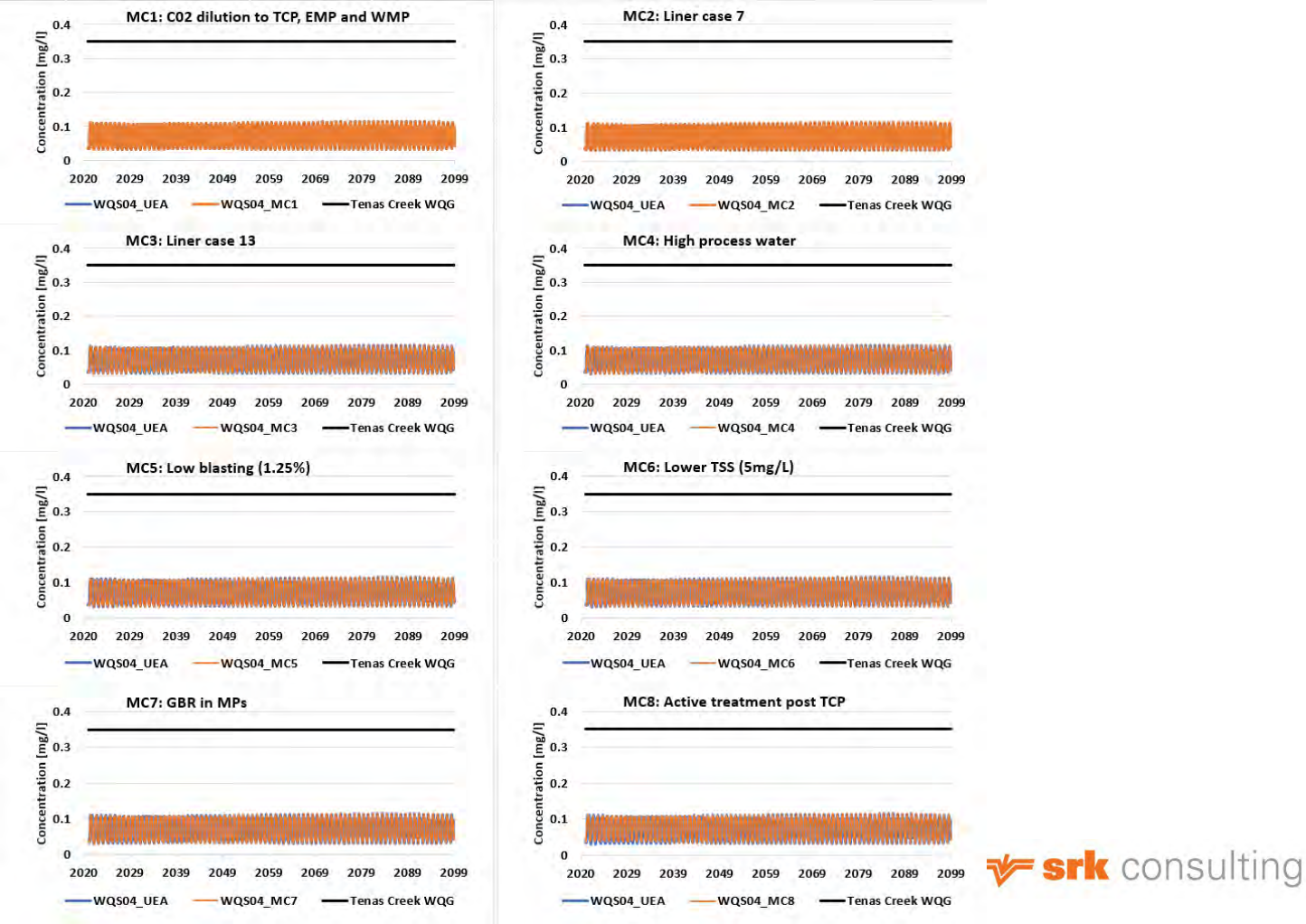


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Figure 6B-5: Nitrate modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

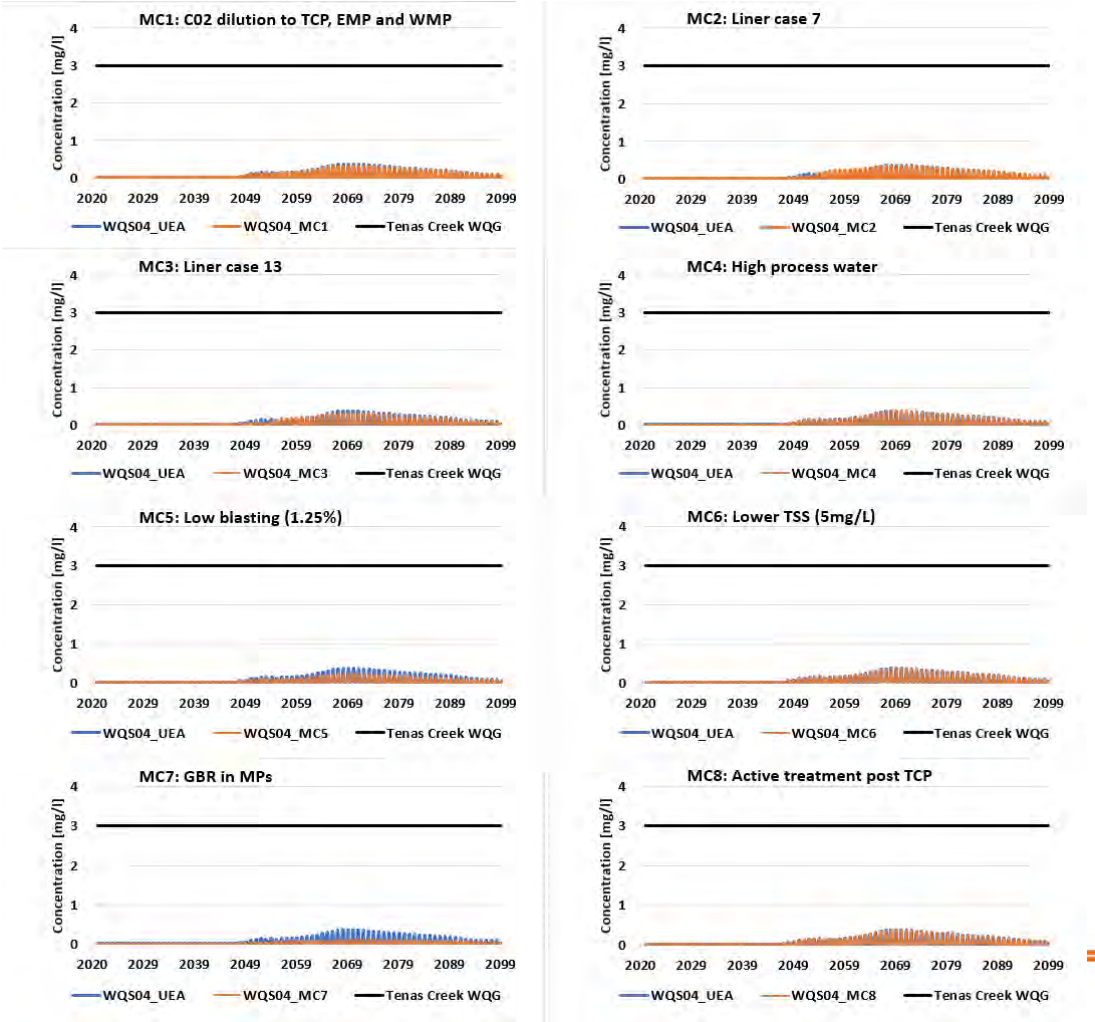


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Figure 6B-6: Dissolved Zinc modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

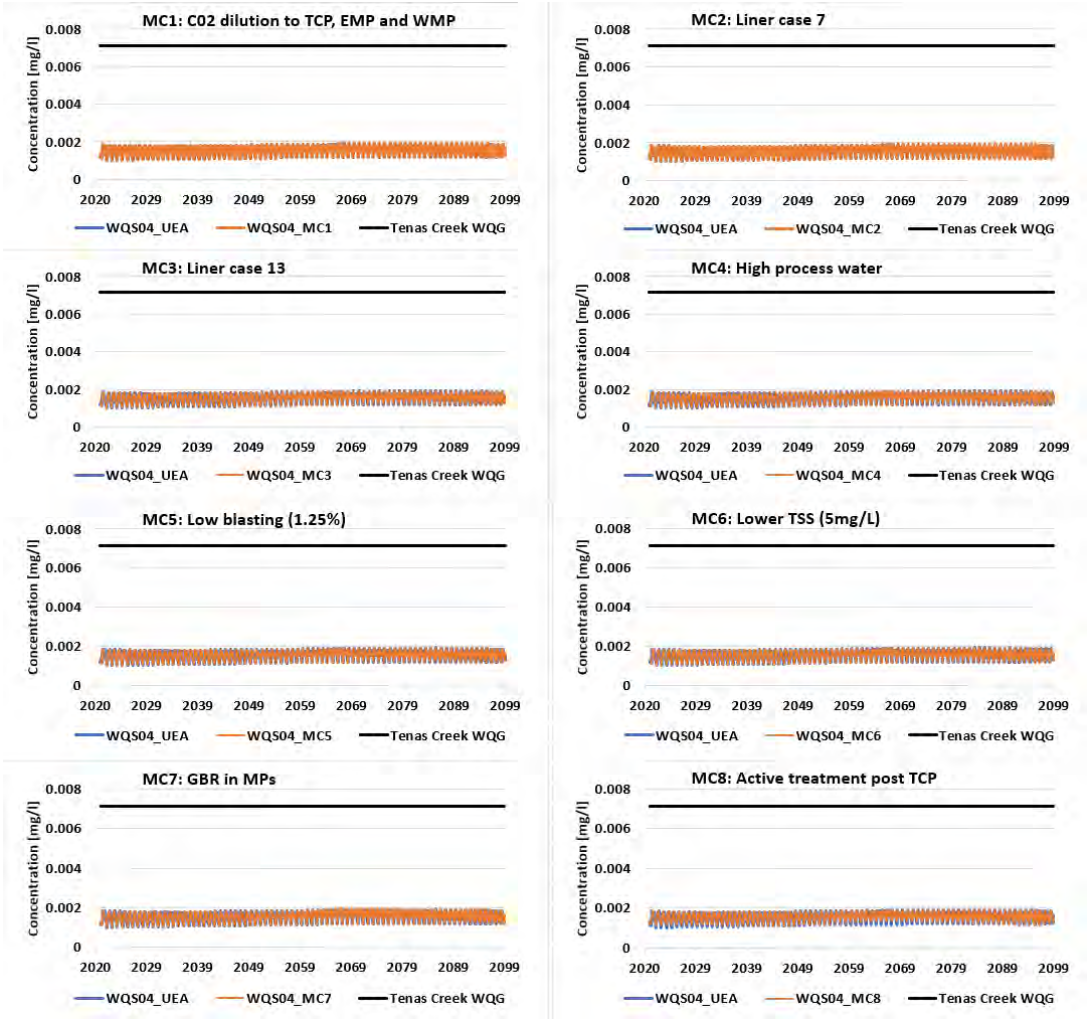


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Figure 6B-7: Dissolved Copper modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

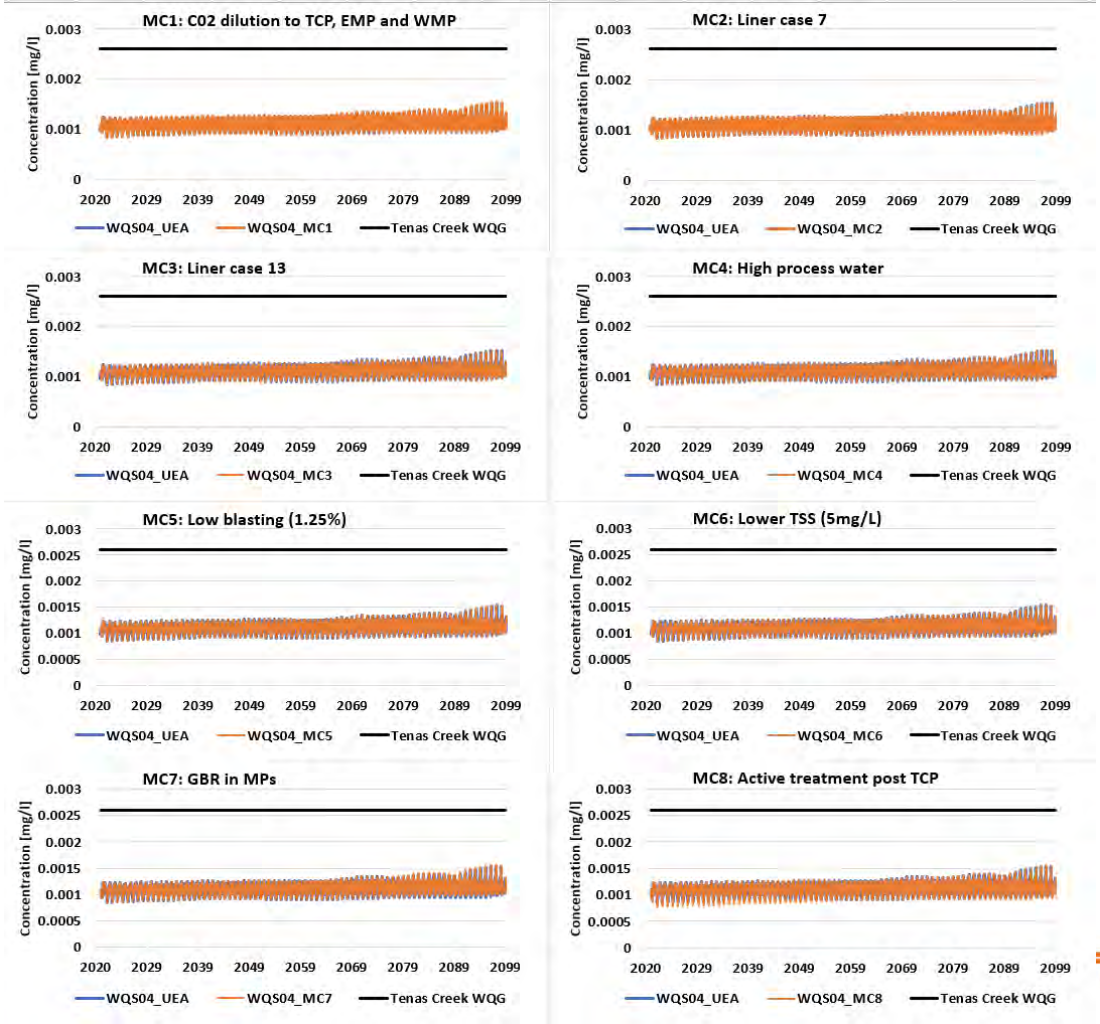


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Figure 6B-8: Dissolved Nickel modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

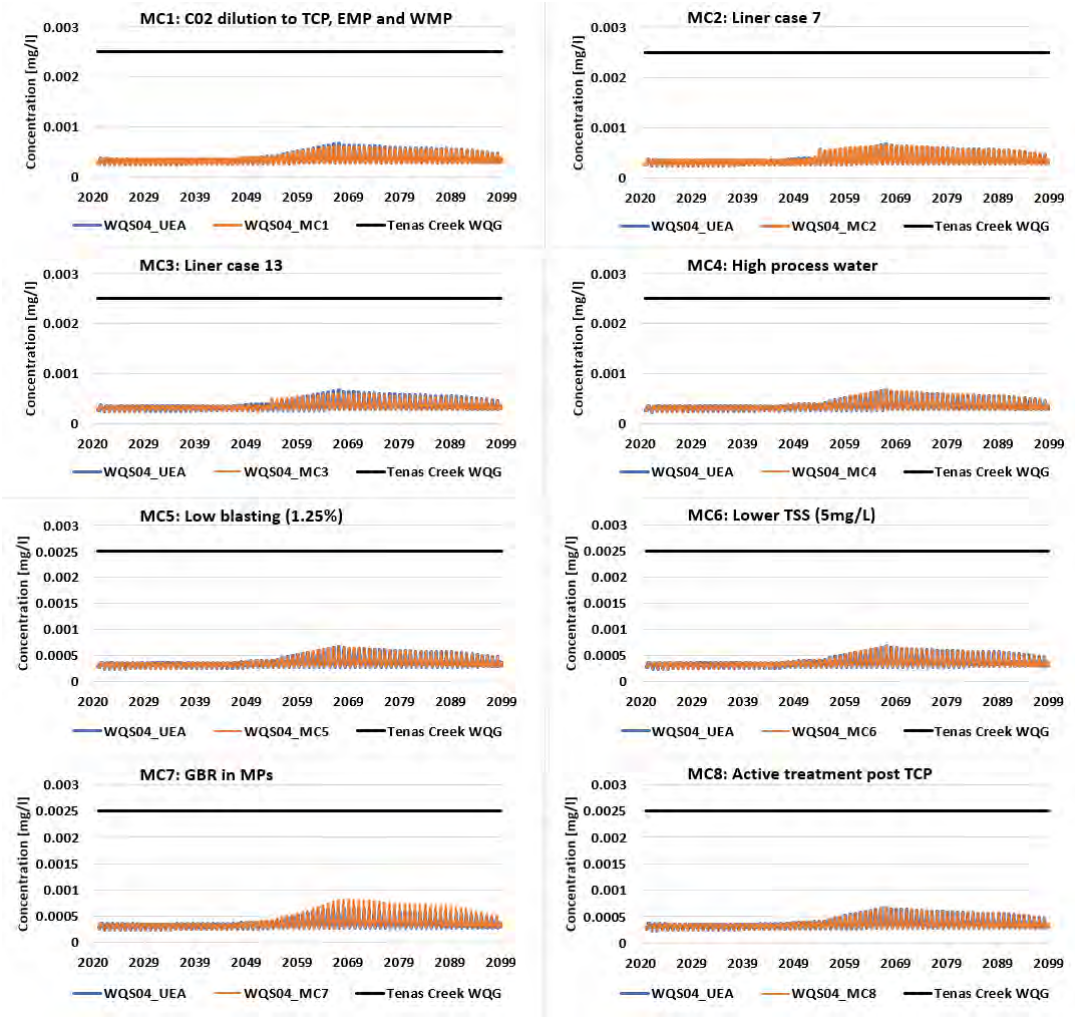

Figure 6B-9: Total Molybdenum modelled concentrations in Tenas Creek (WQS04) mitigation cases compared to project case

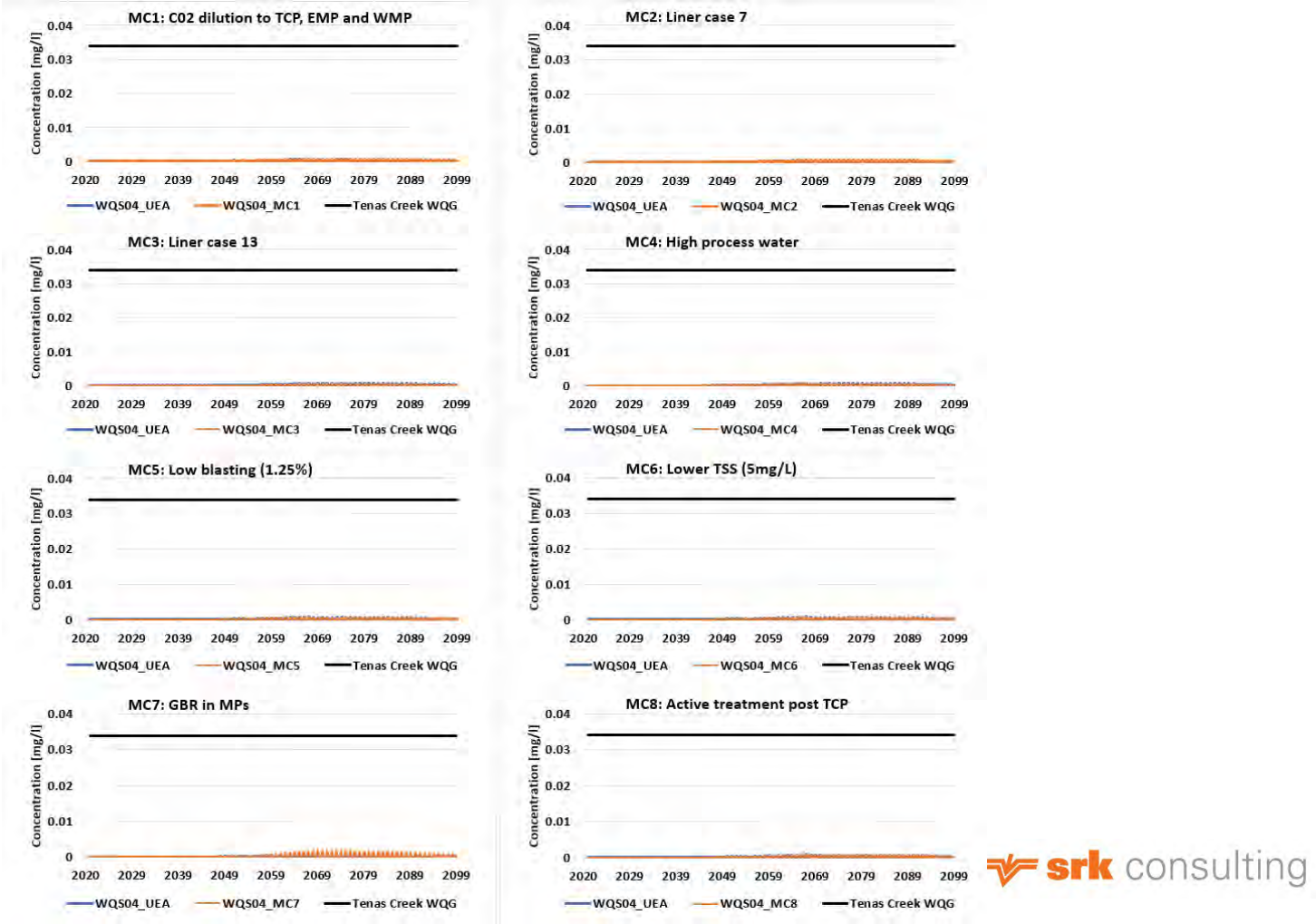


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Figure 6B-10: Total Iron modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

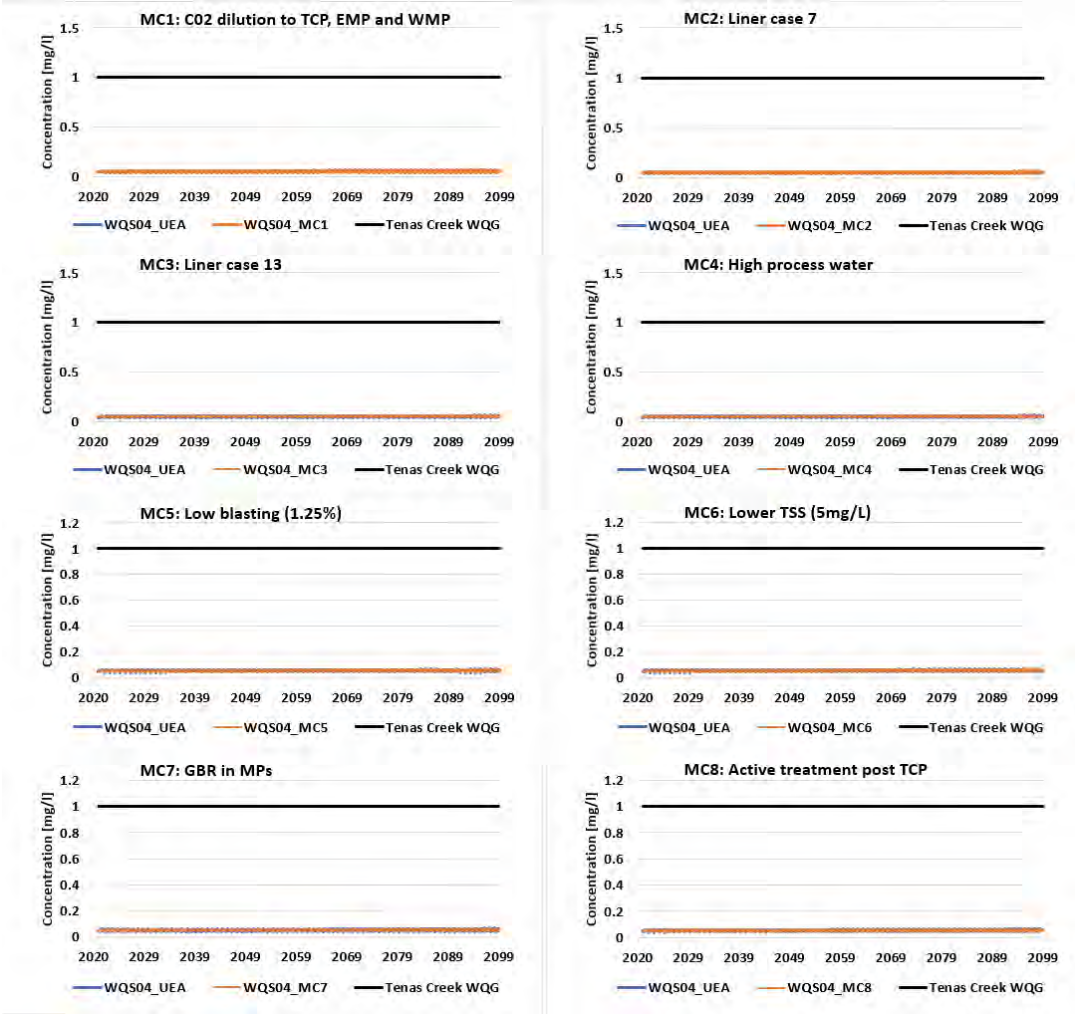


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Figure 6B-11: Total Chromium modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

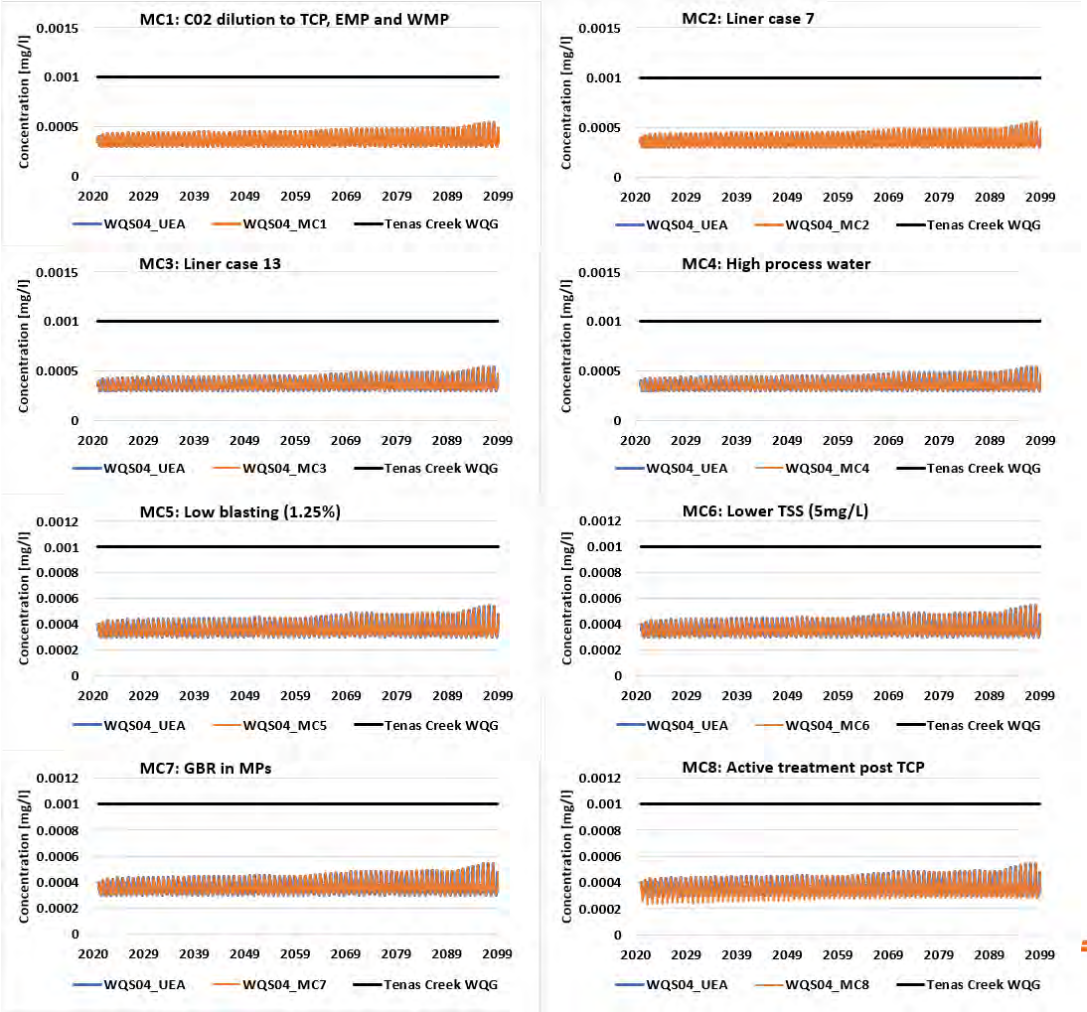


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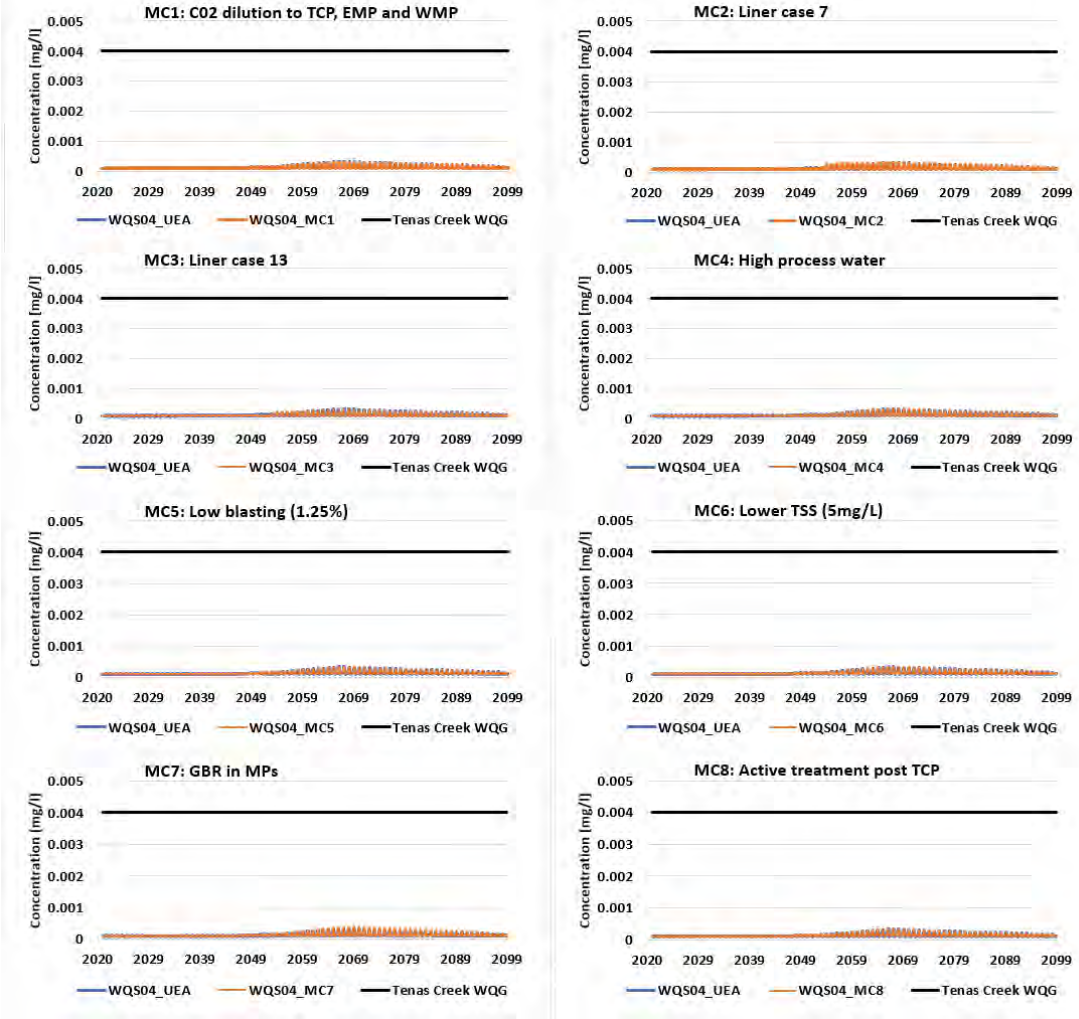
Figure 6B-12: Total Cobalt modelled concentrations in Tenas Creek (WQS04) for mitigation cases compared to project case

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# Appendix 6-C

## Goathorn Creek water quality exceedances

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Figure 6C-1: Nitrite modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

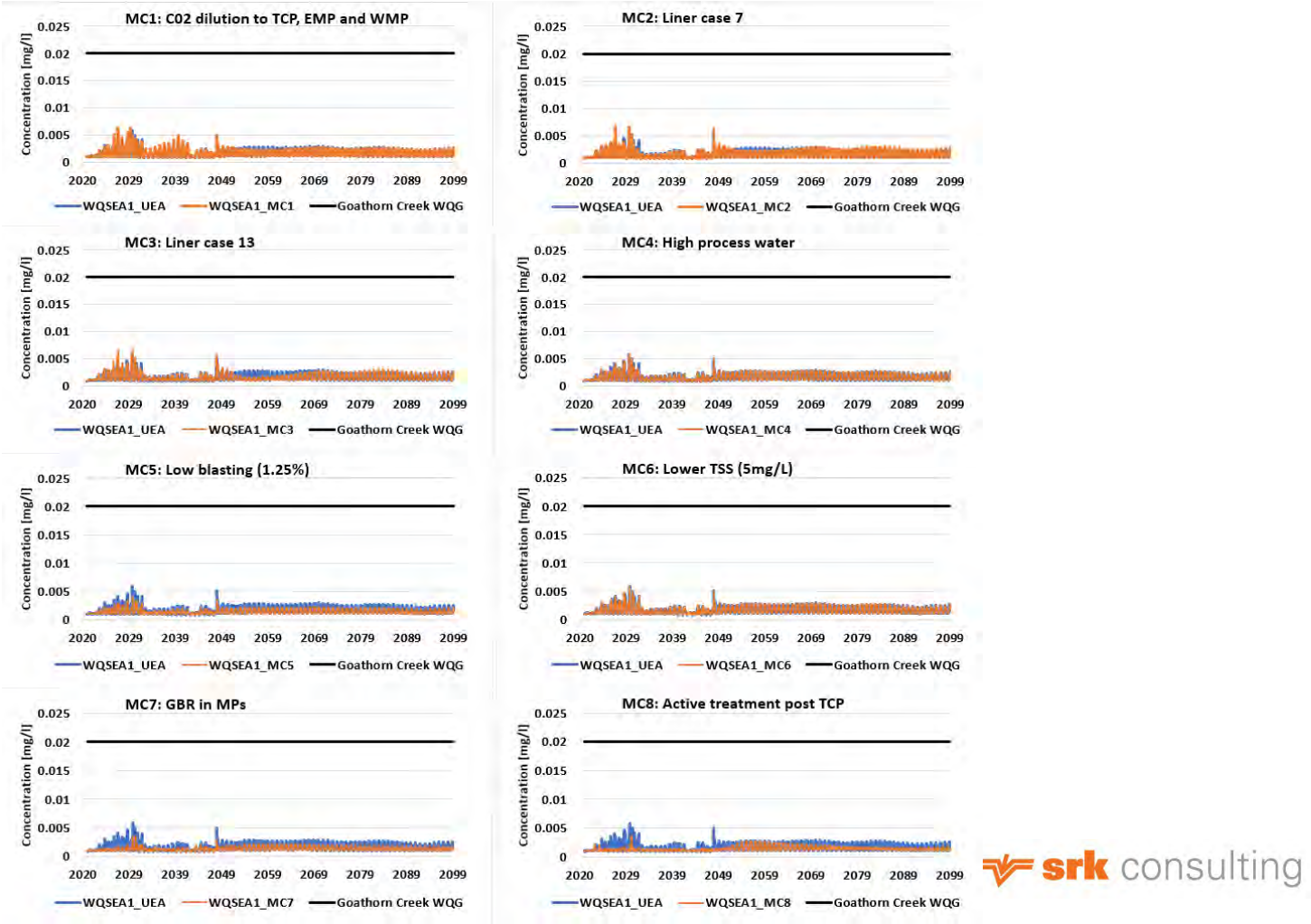


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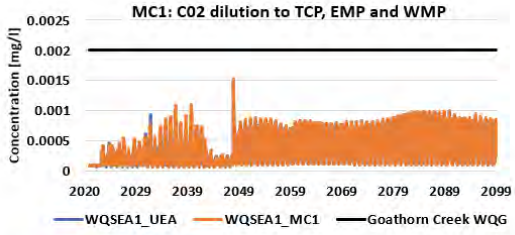
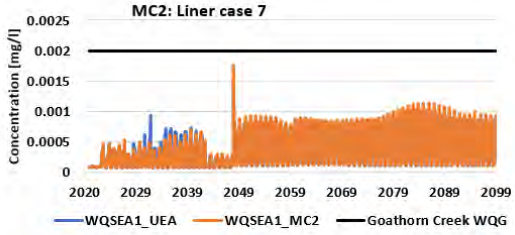
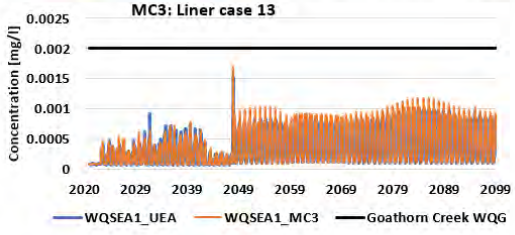
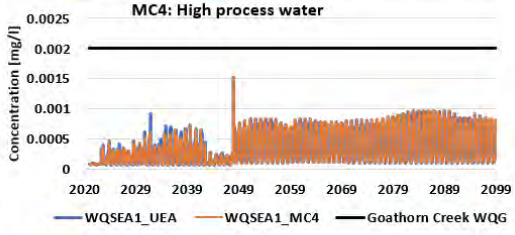
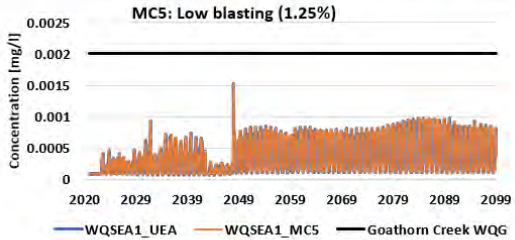
Figure 6C-2: Total Selenium modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

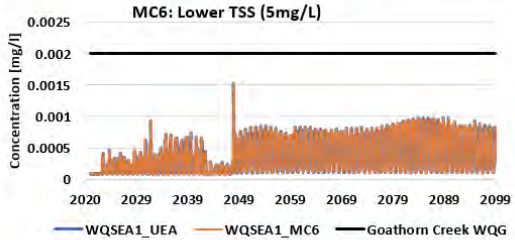


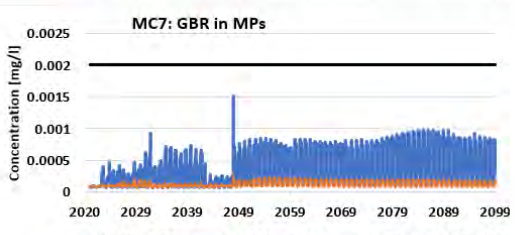



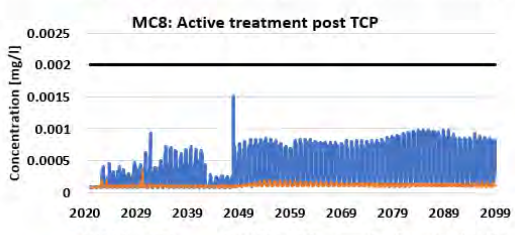




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Figure 6C-3: Sulphate modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

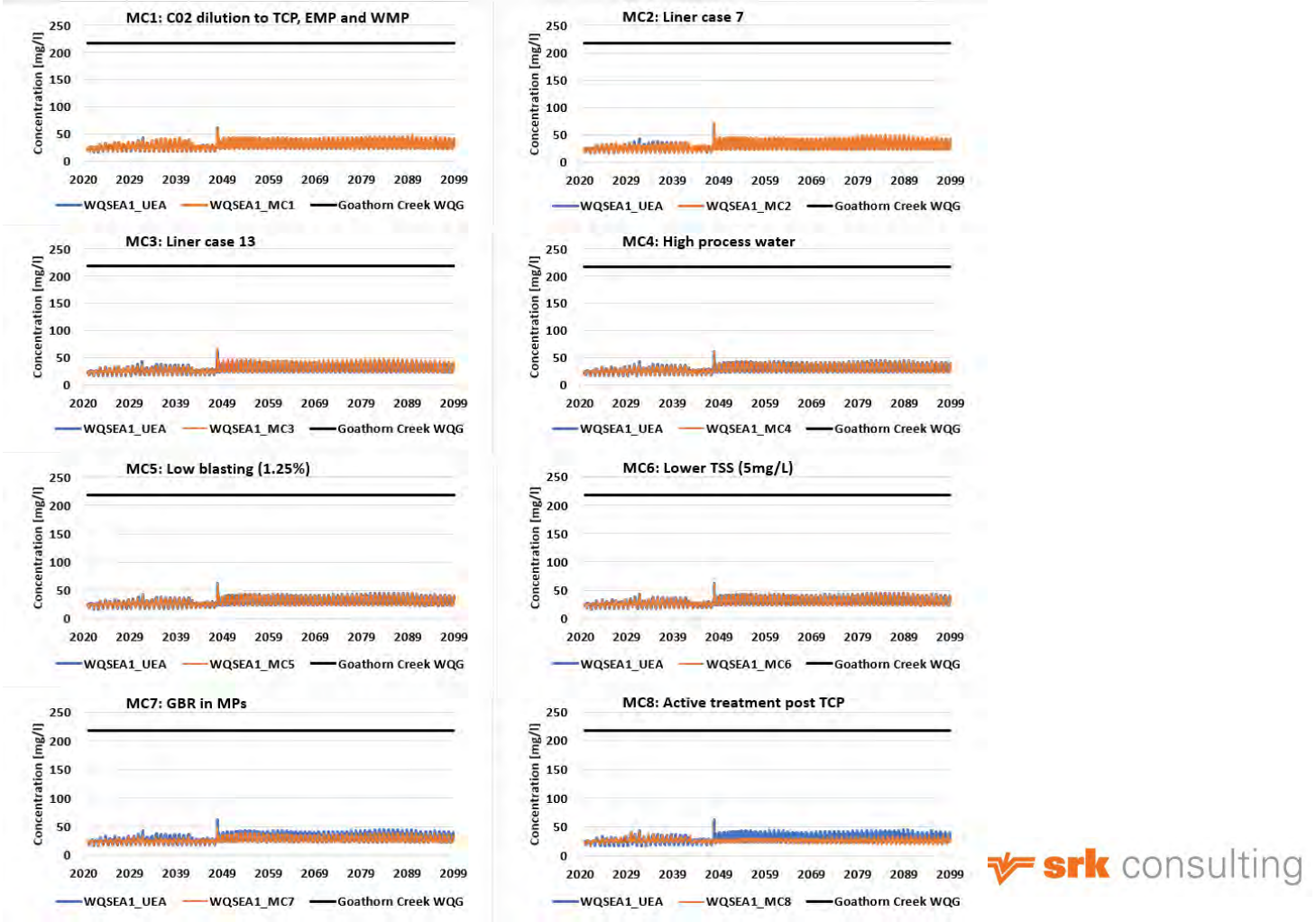


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Figure 6C-4: Total Aluminium modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

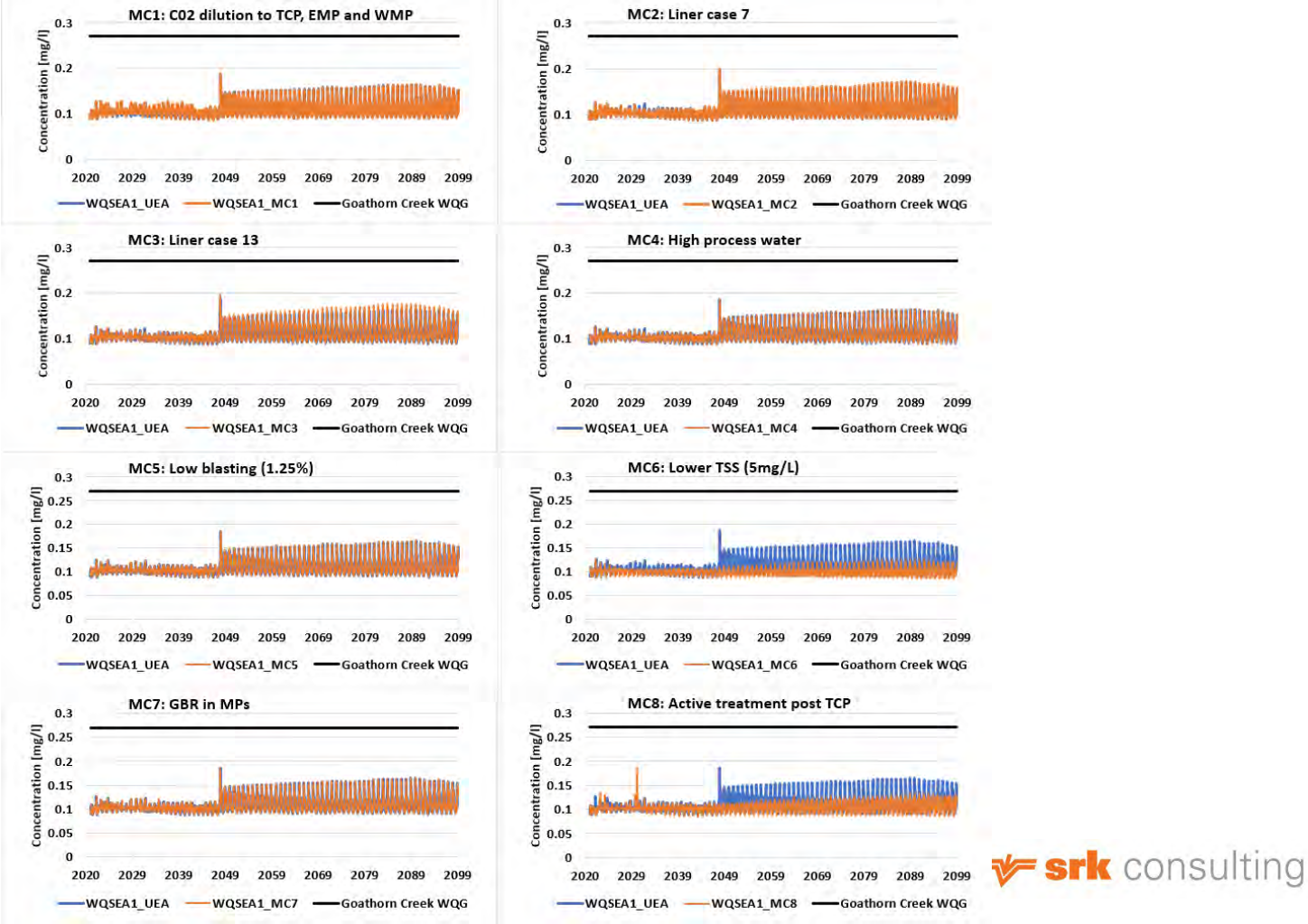


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Figure 6C-5: Nitrate modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

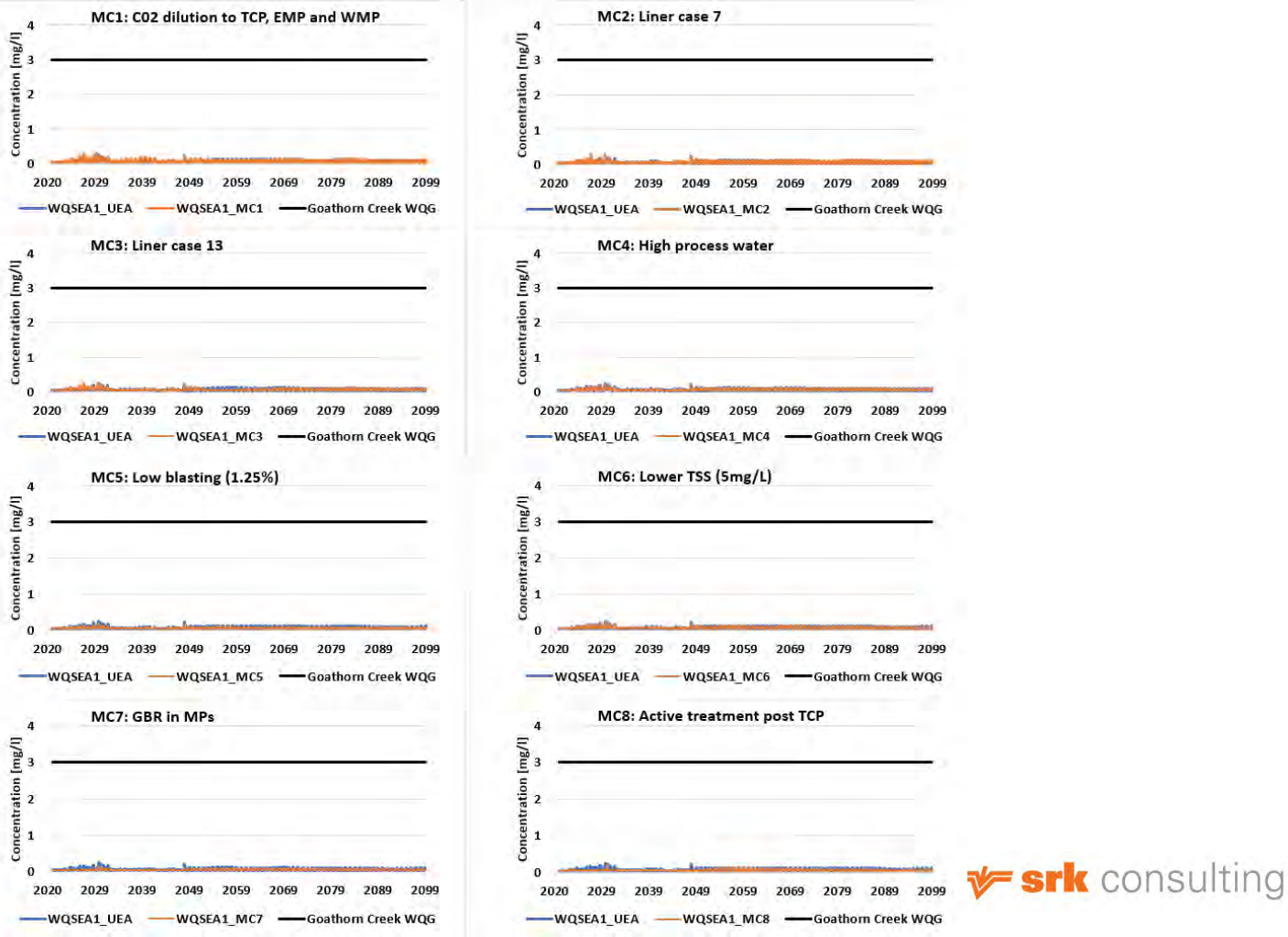


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Figure 6C-6: Dissolved Zinc modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

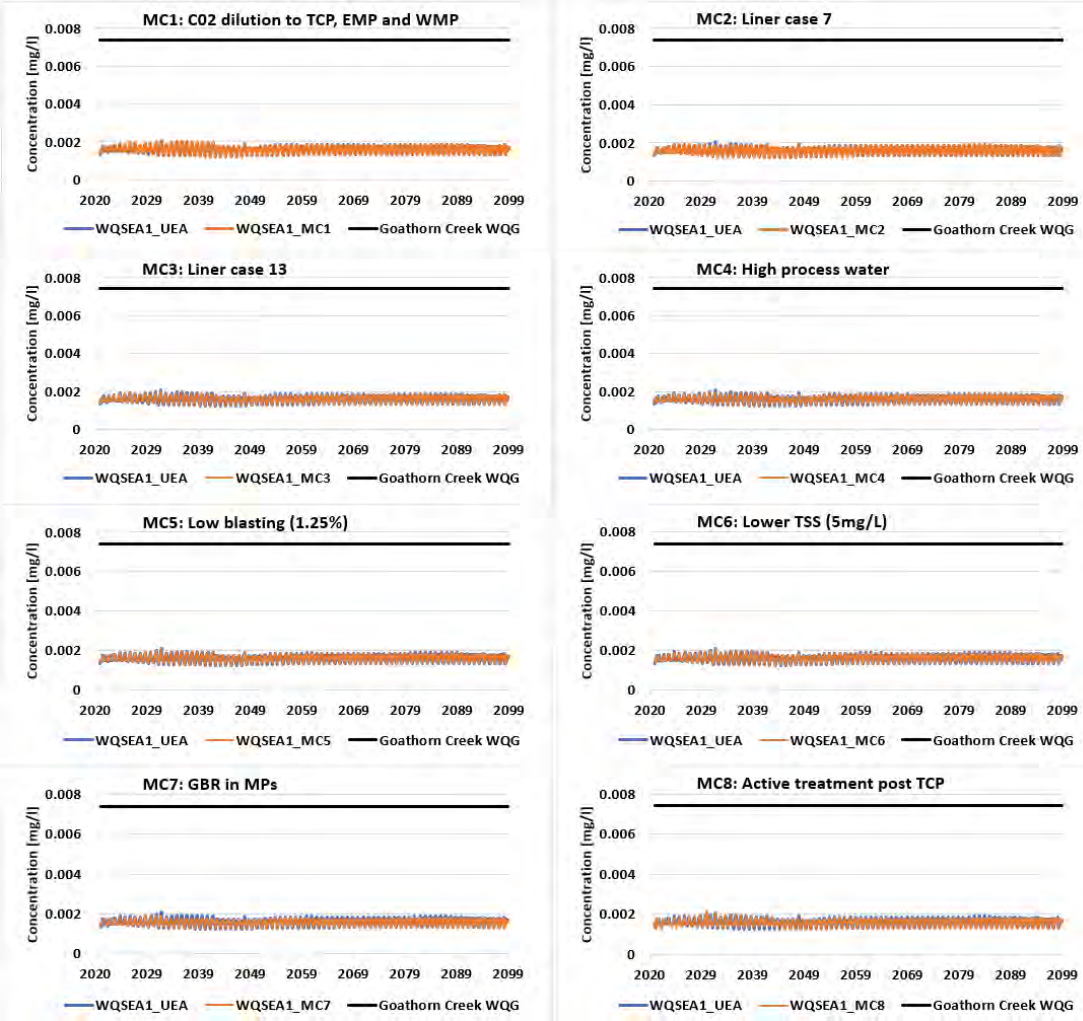


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Figure 6C-7: Dissolved Copper modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

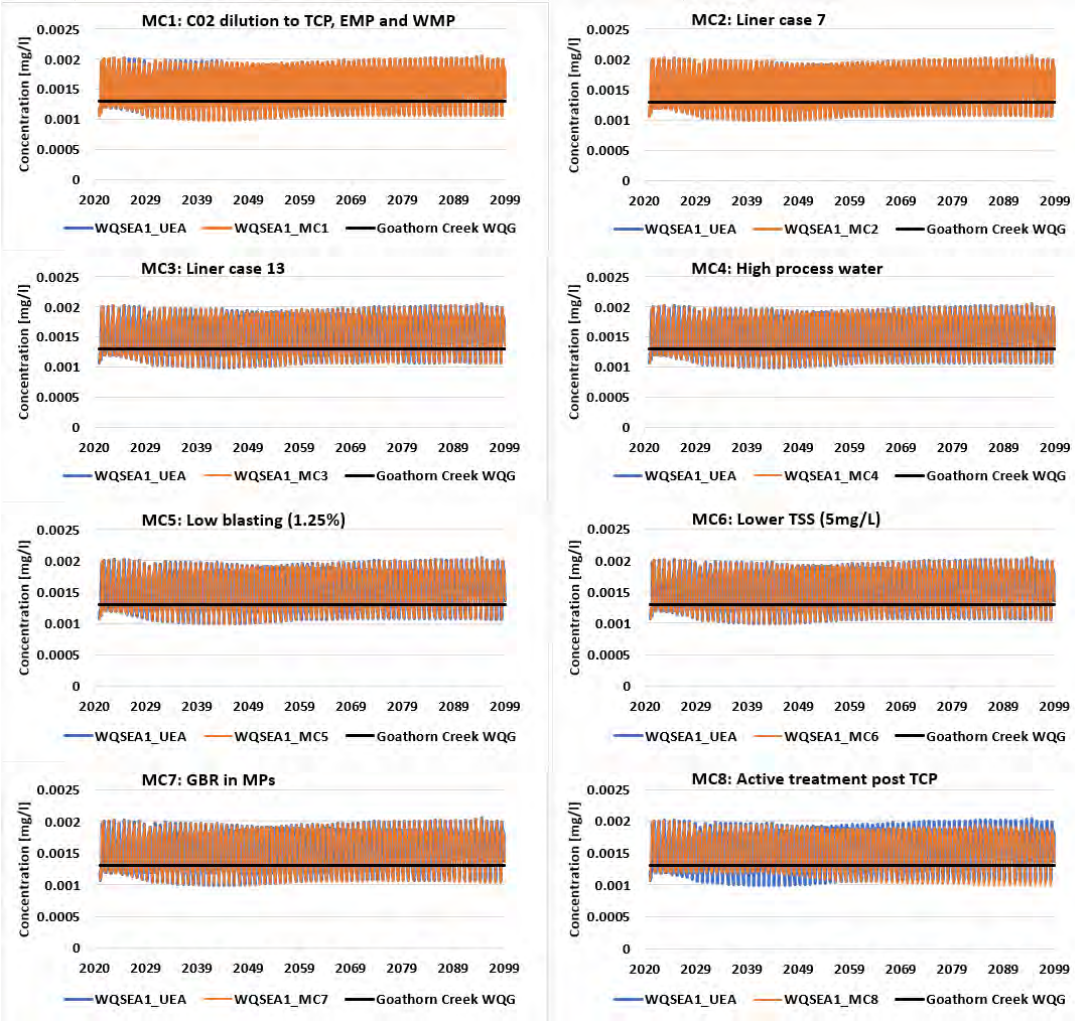


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Figure 6C-8: Dissolved Nickel modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

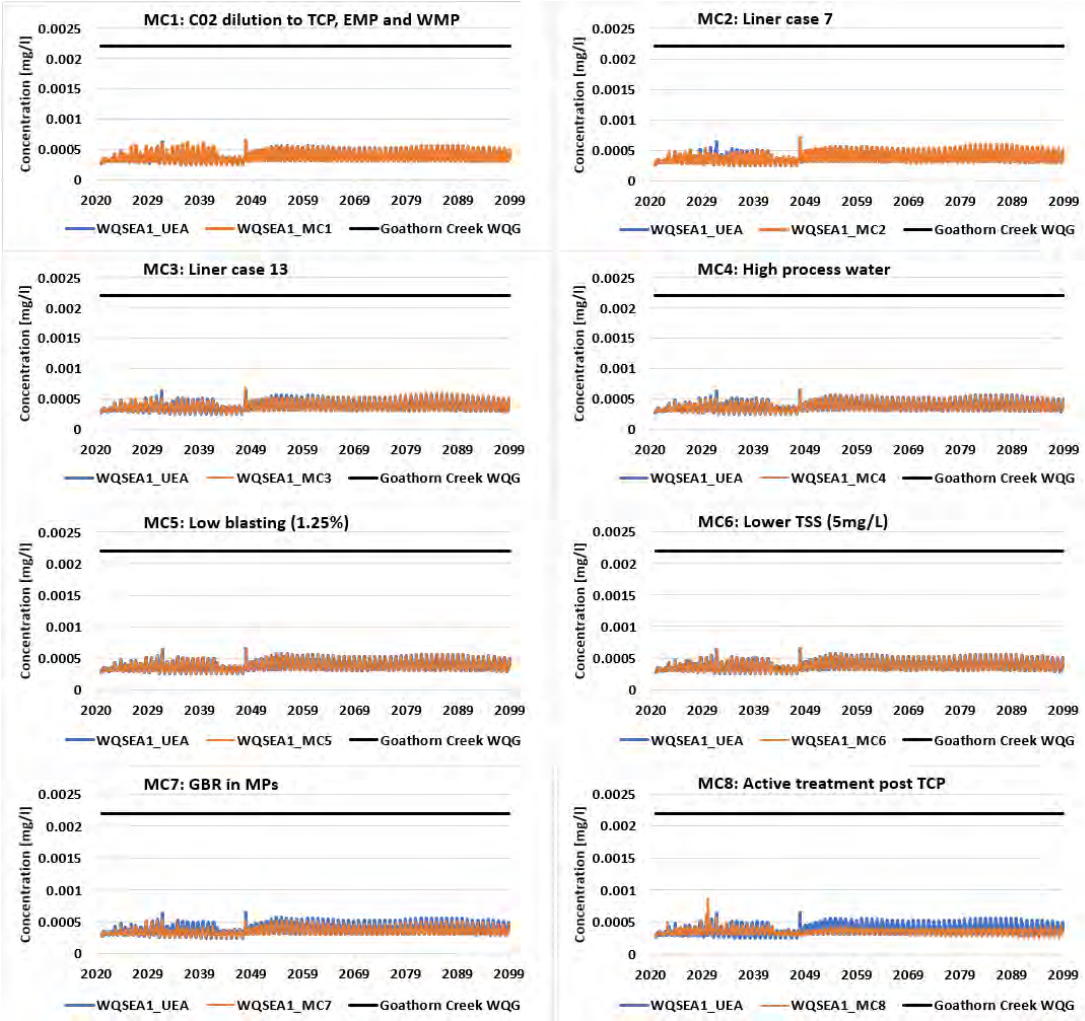


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Figure 6C-9: Total Molybdenum modelled concentrations in Goathorn Creek (WQSEA1) mitigation cases compared to project case

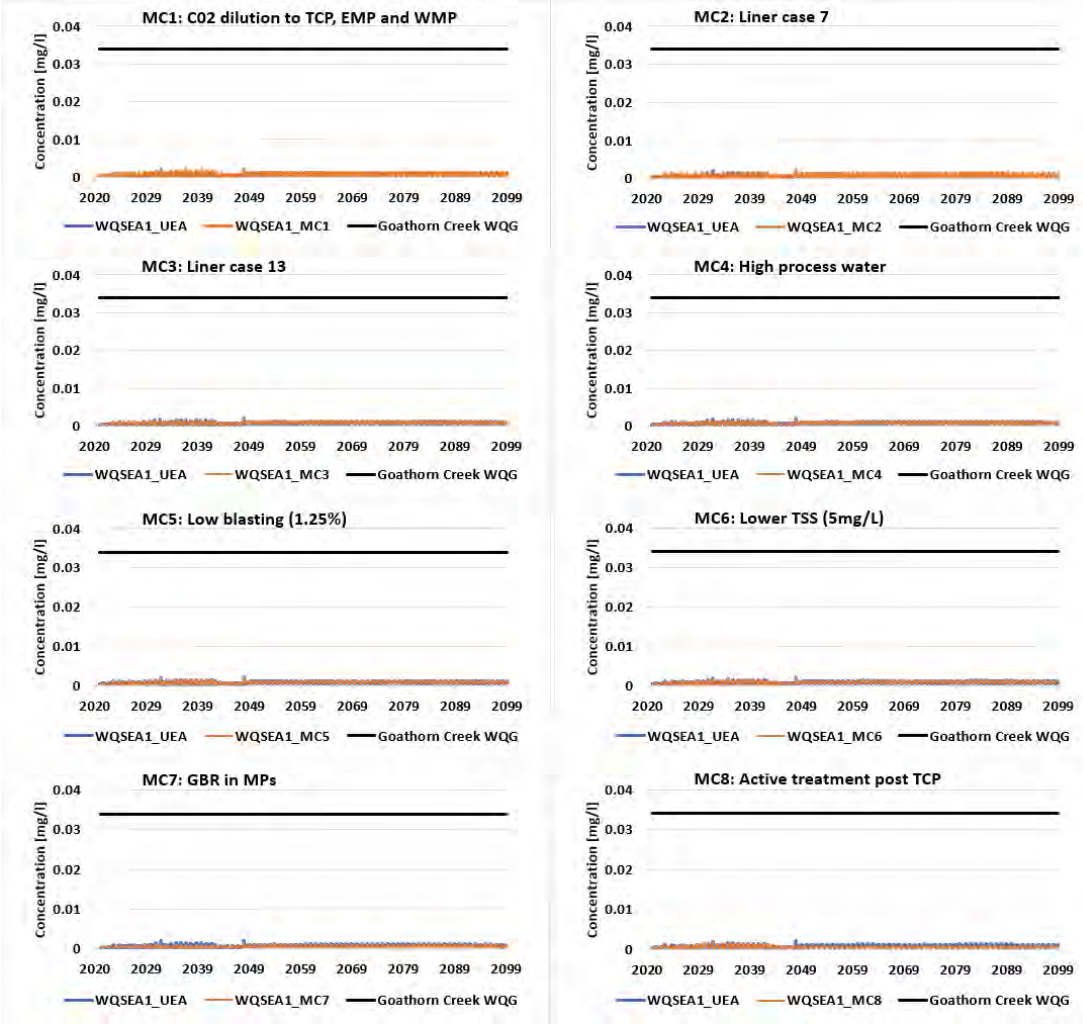


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Figure 6C-10: Total Iron modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

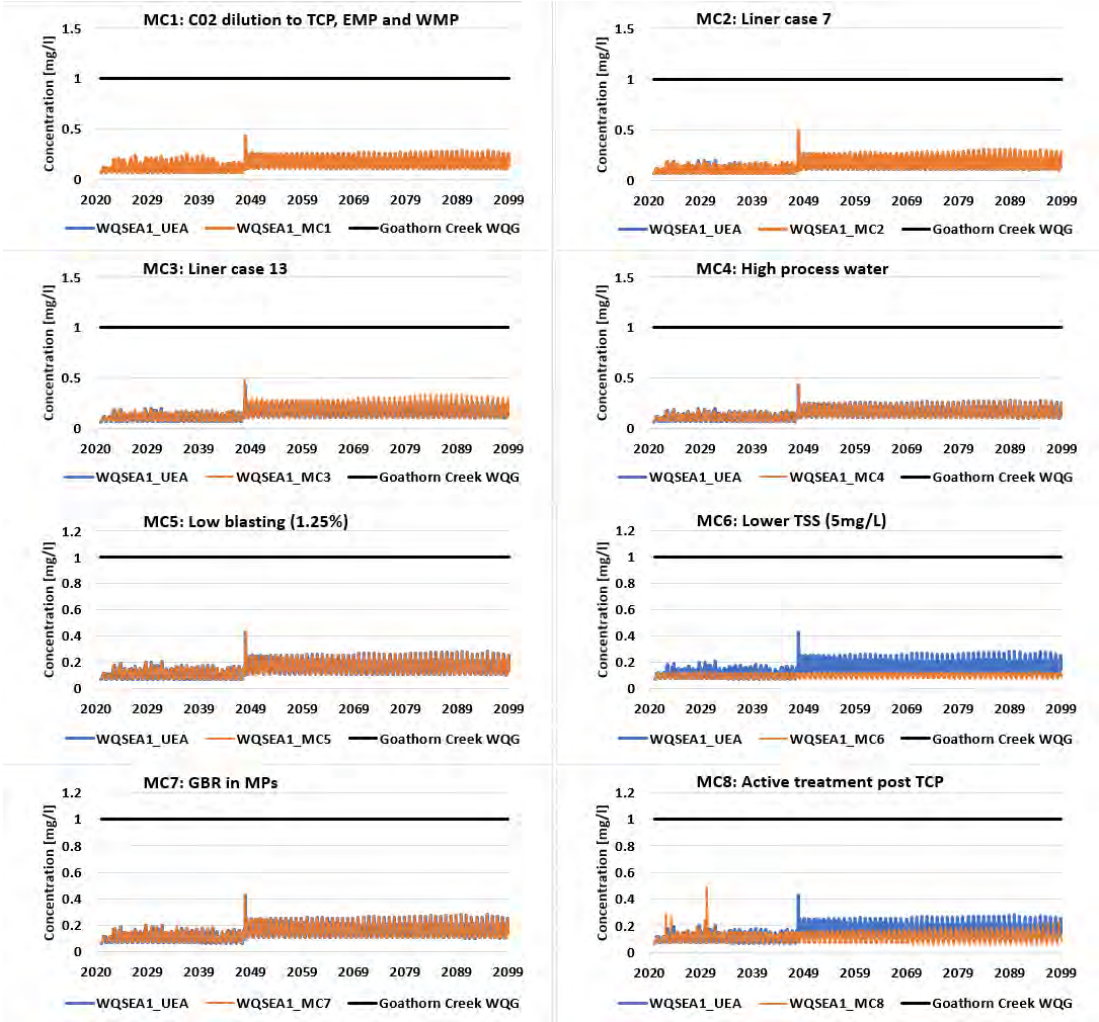


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Figure 6C-11: Total Chromium modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

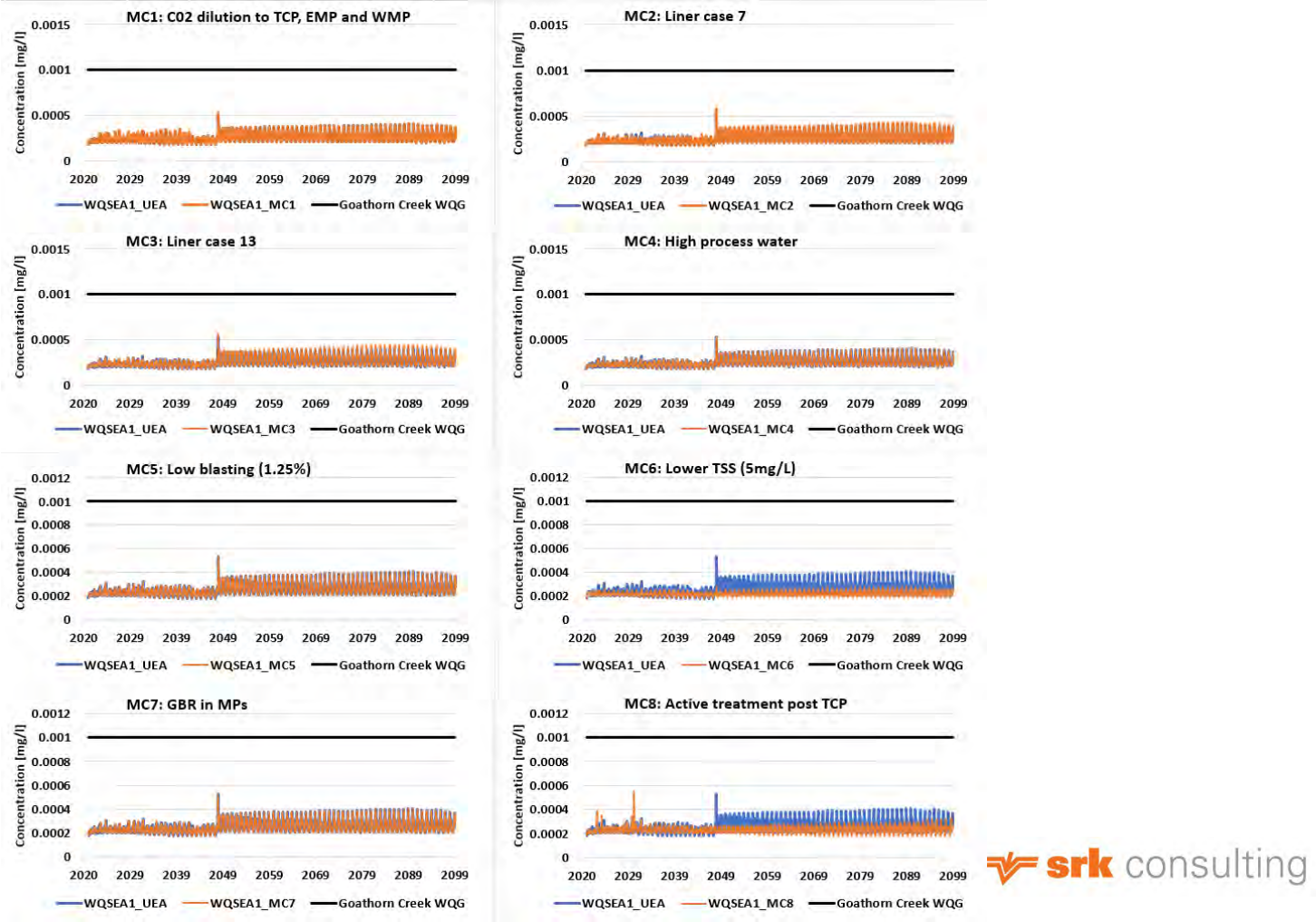


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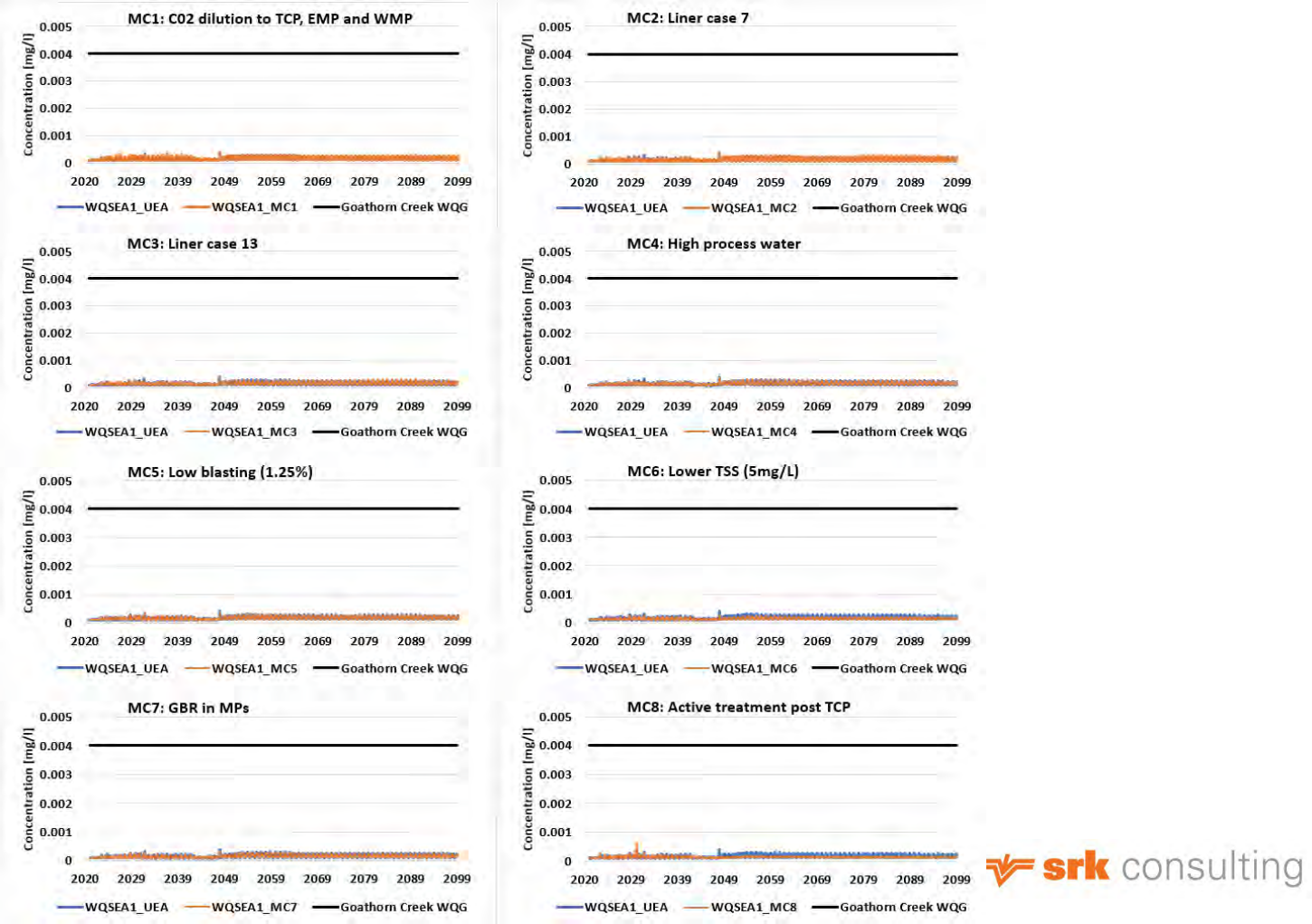
Figure 6C-12: Total Cobalt modelled concentrations in Goathorn Creek (WQSEA1) for mitigation cases compared to project case

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# Appendix G Parameters of Concern for Mitigation Controls in Surface and Groundwater Discharges

# Appendix 7-A

## Tenas Control Pond surface discharge (operations

Figure 7A-1: Nitrite modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

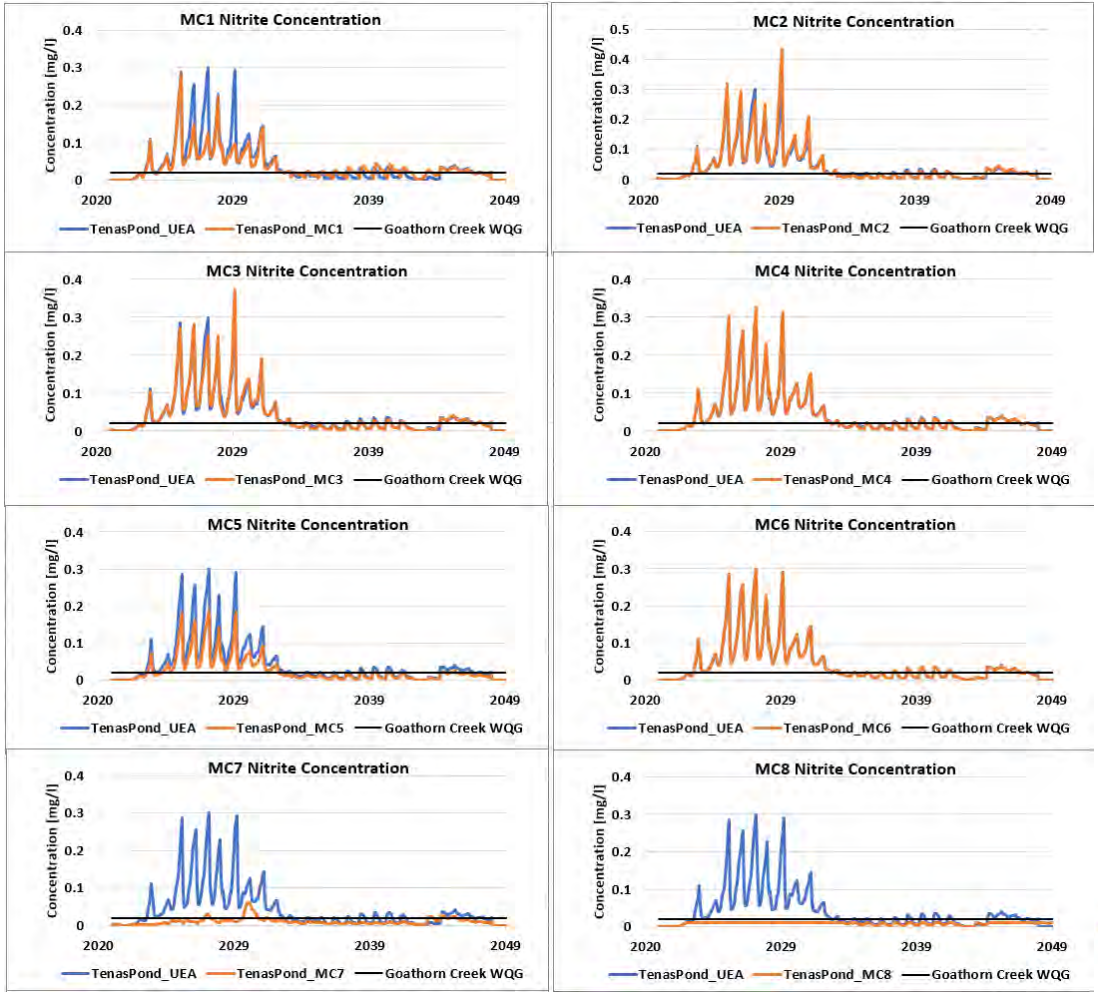


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Figure 7A-2: Total Selenium modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

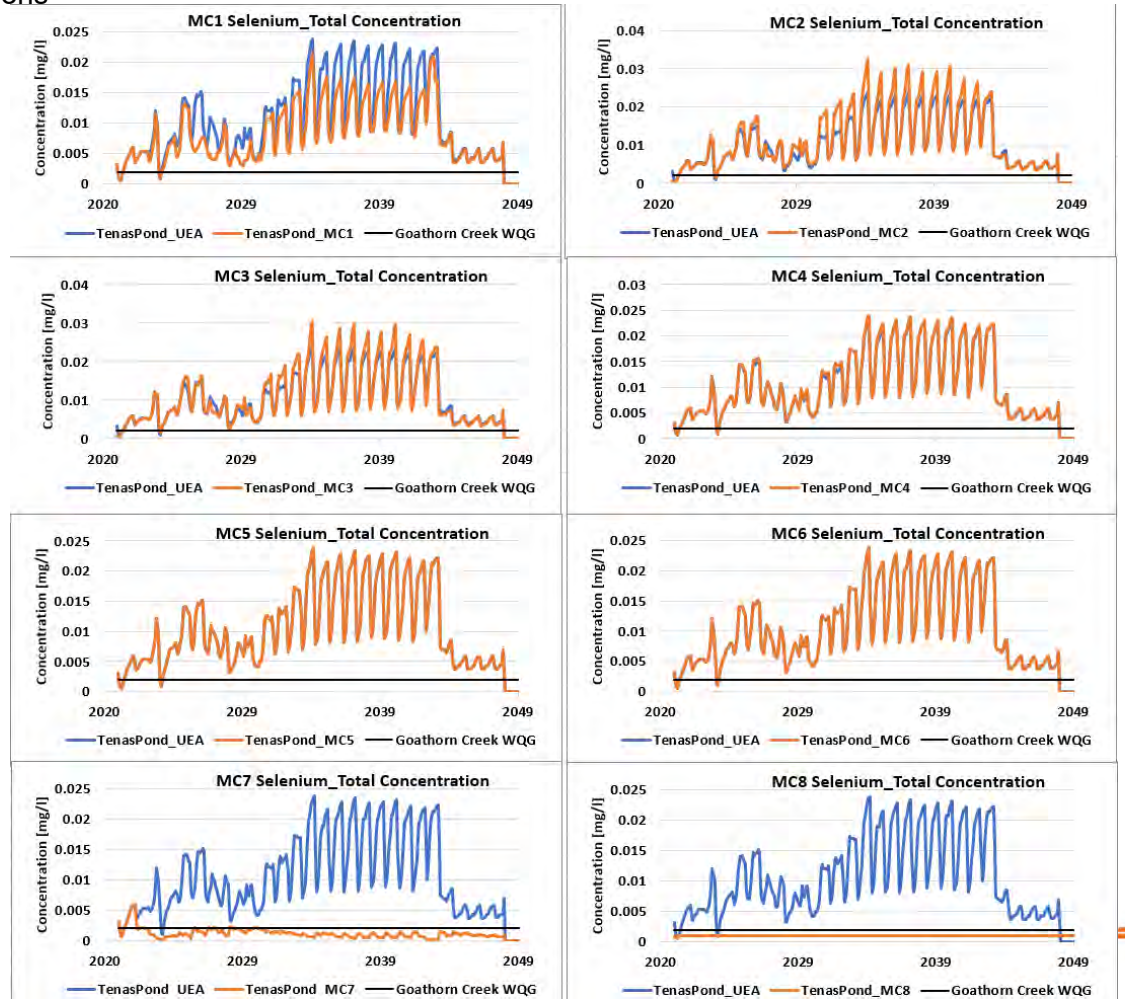


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Figure 7A-3: Sulphate modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

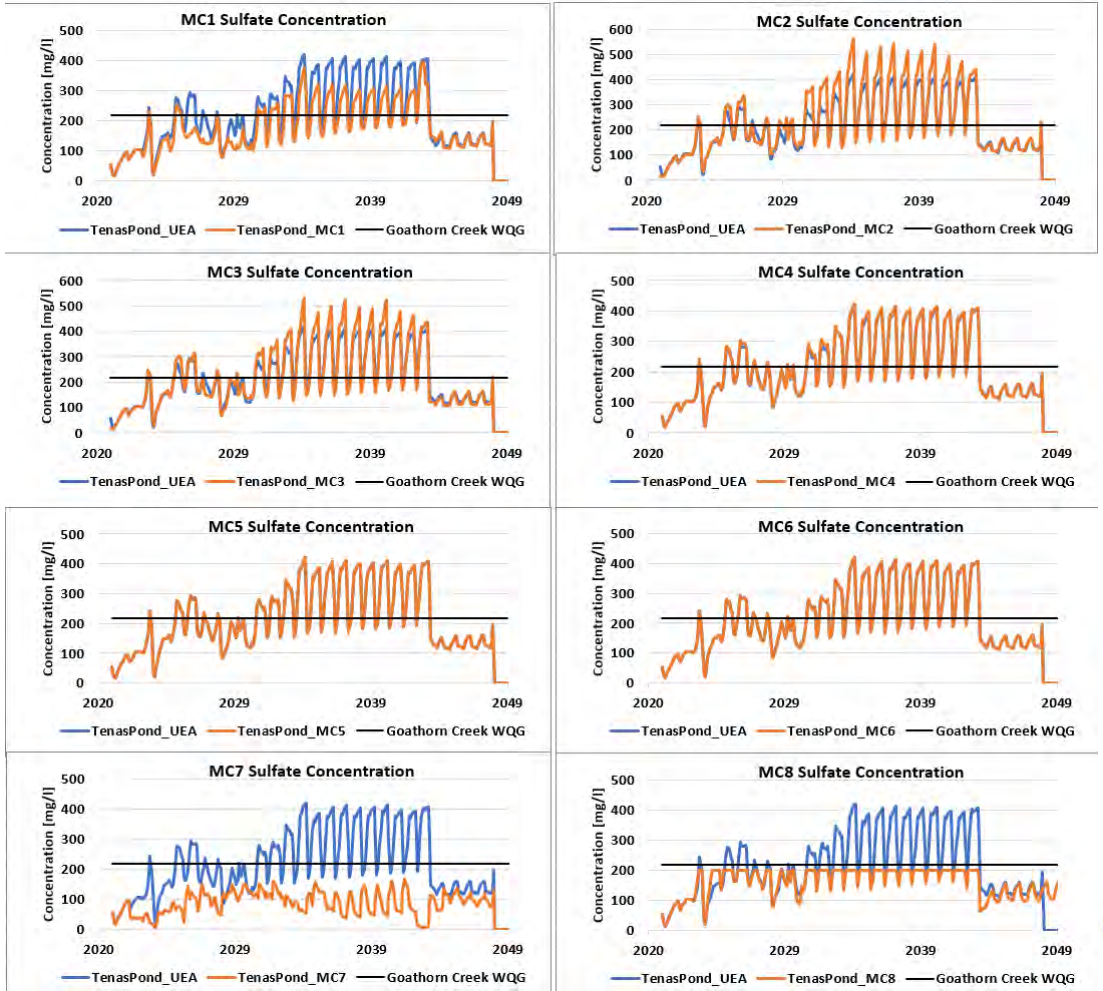


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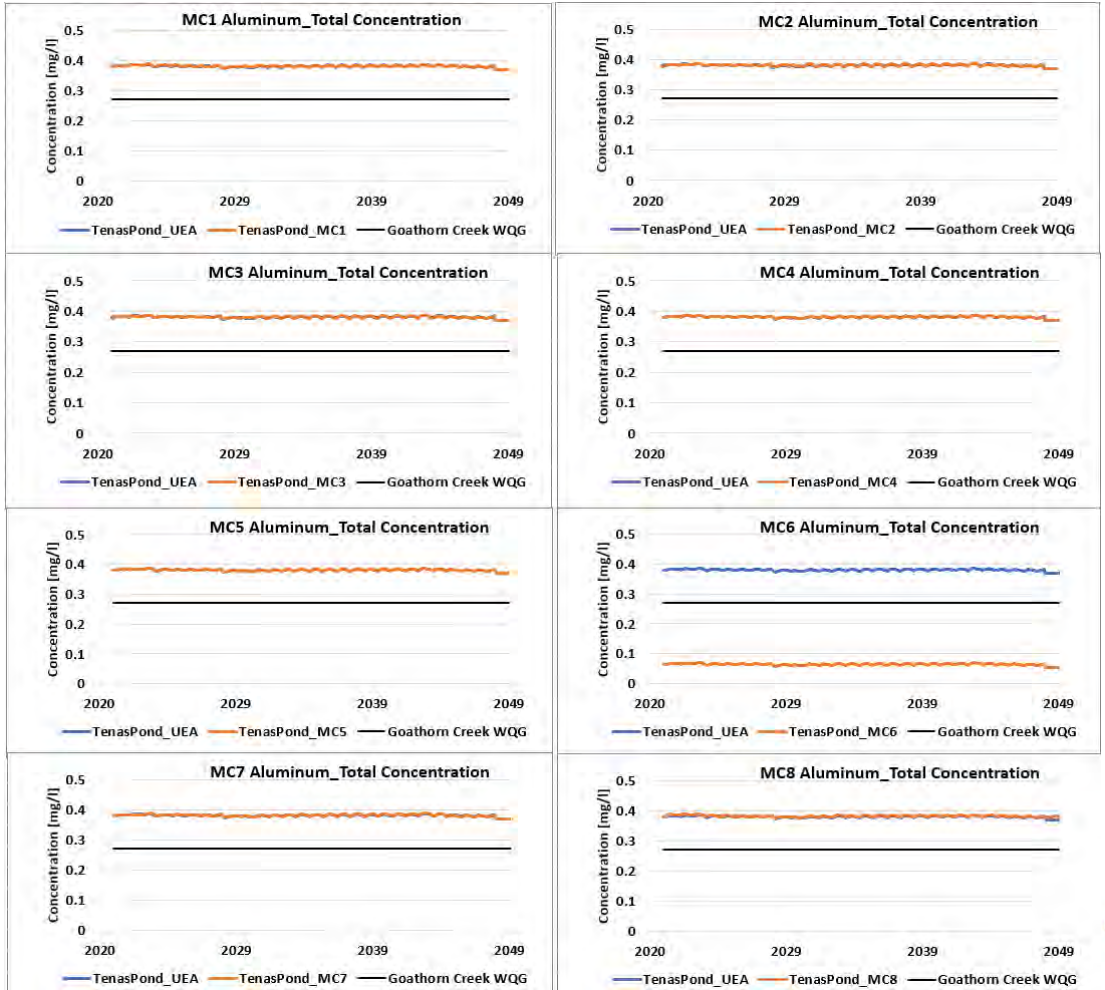
Figure 7A-4: Total Aluminium modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations




srk consulting

Figure 7A-5: Nitrate modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

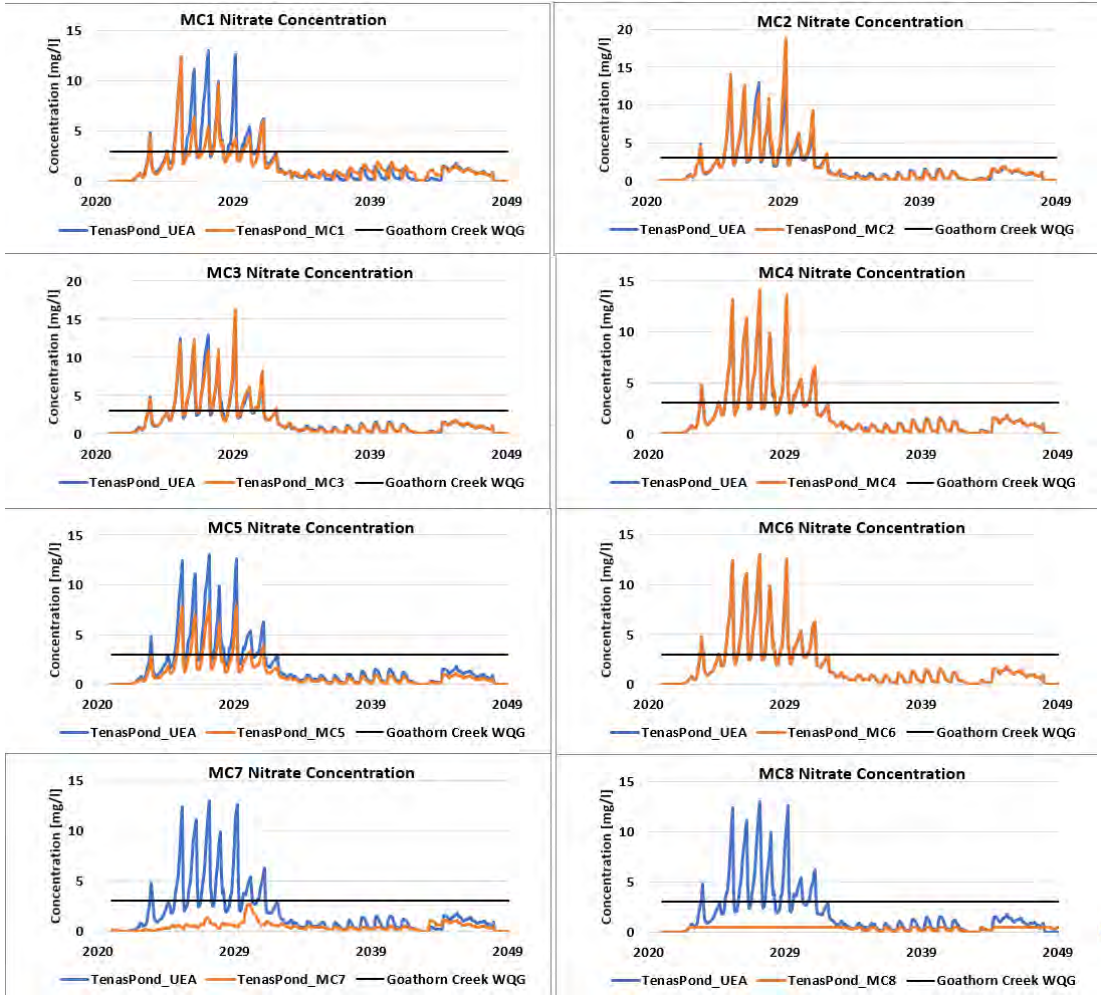



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Figure 7A-6: Dissolved Zinc modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

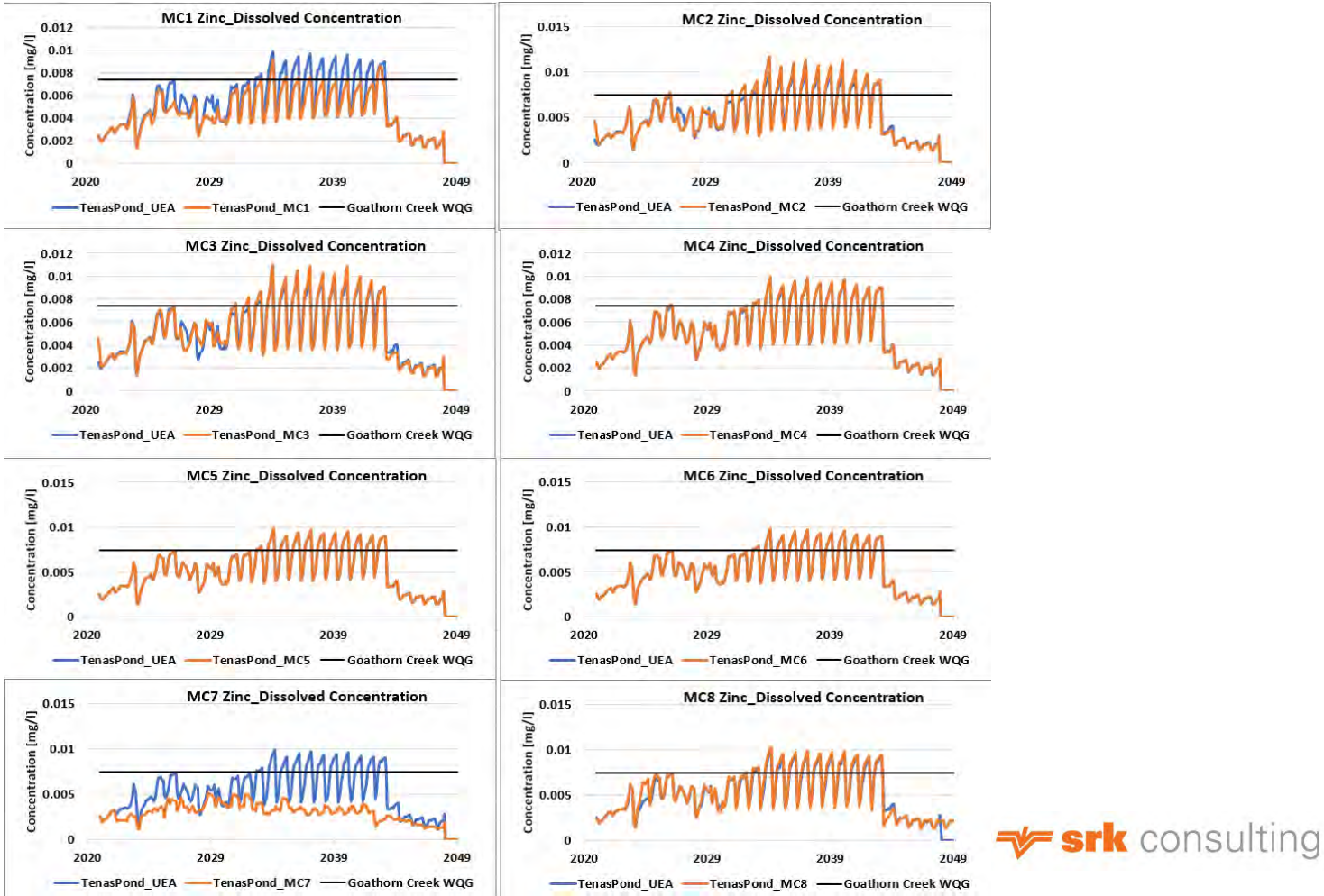


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Figure 7A-7: Dissolved Copper modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

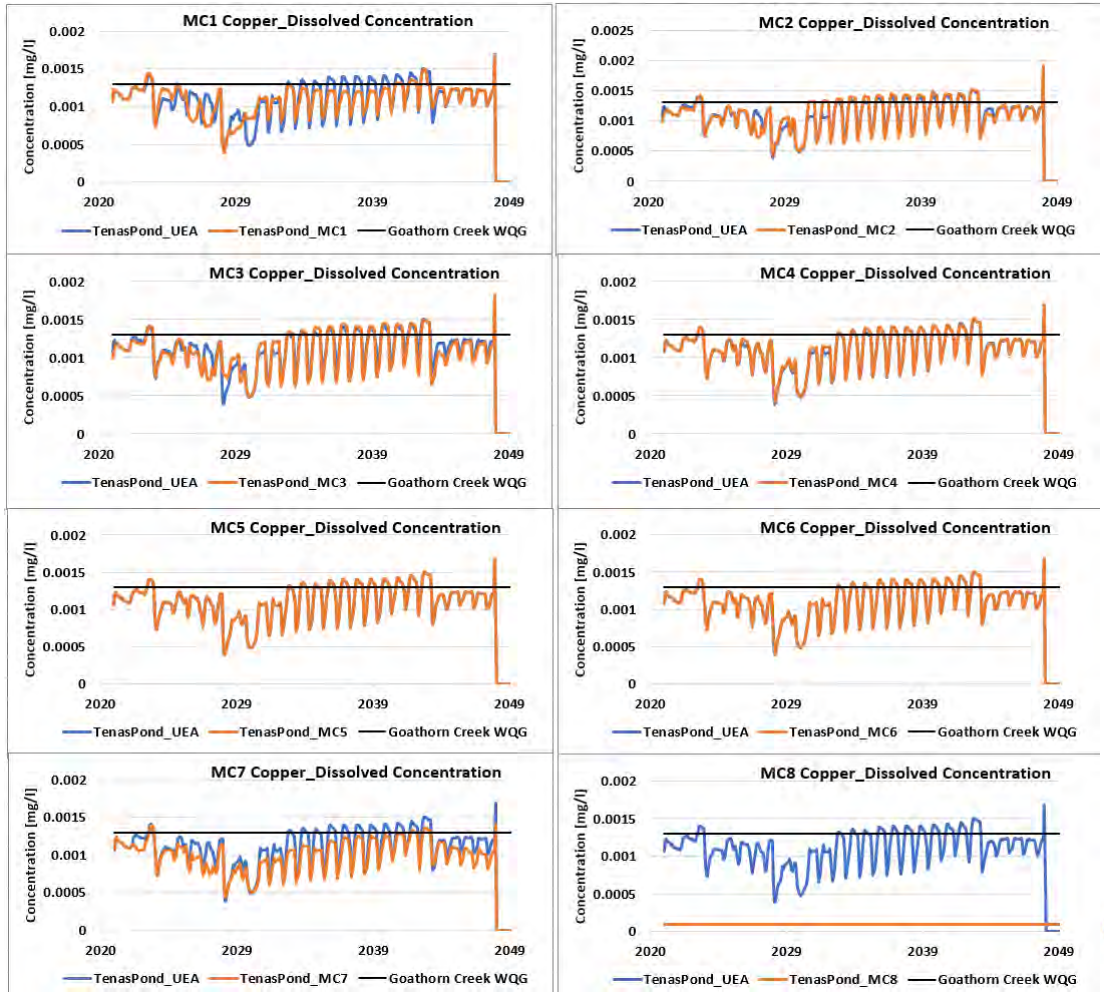


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Figure 7A-8: Dissolved Nickel modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

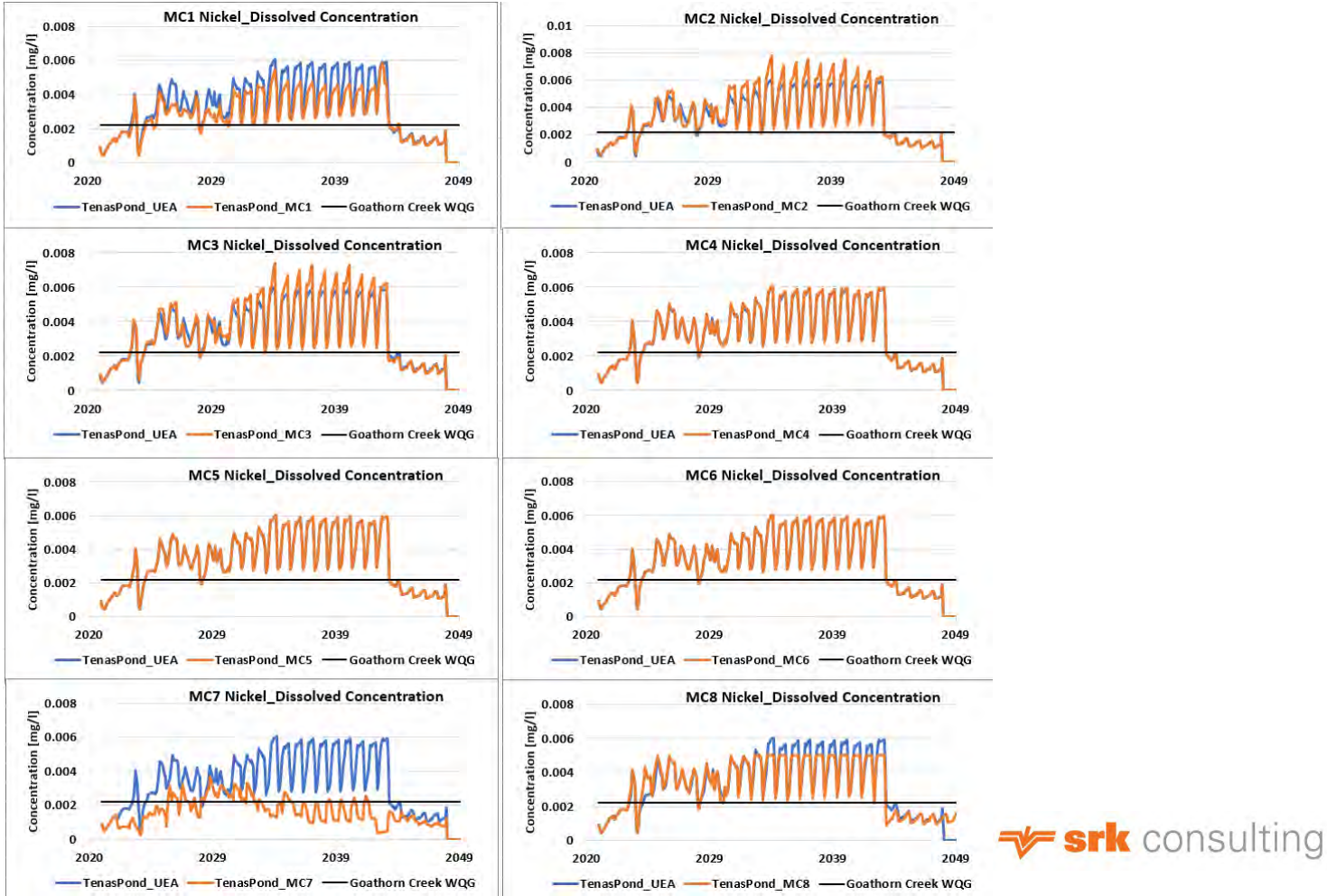


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Figure 7A-9: Total Molybdenum modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

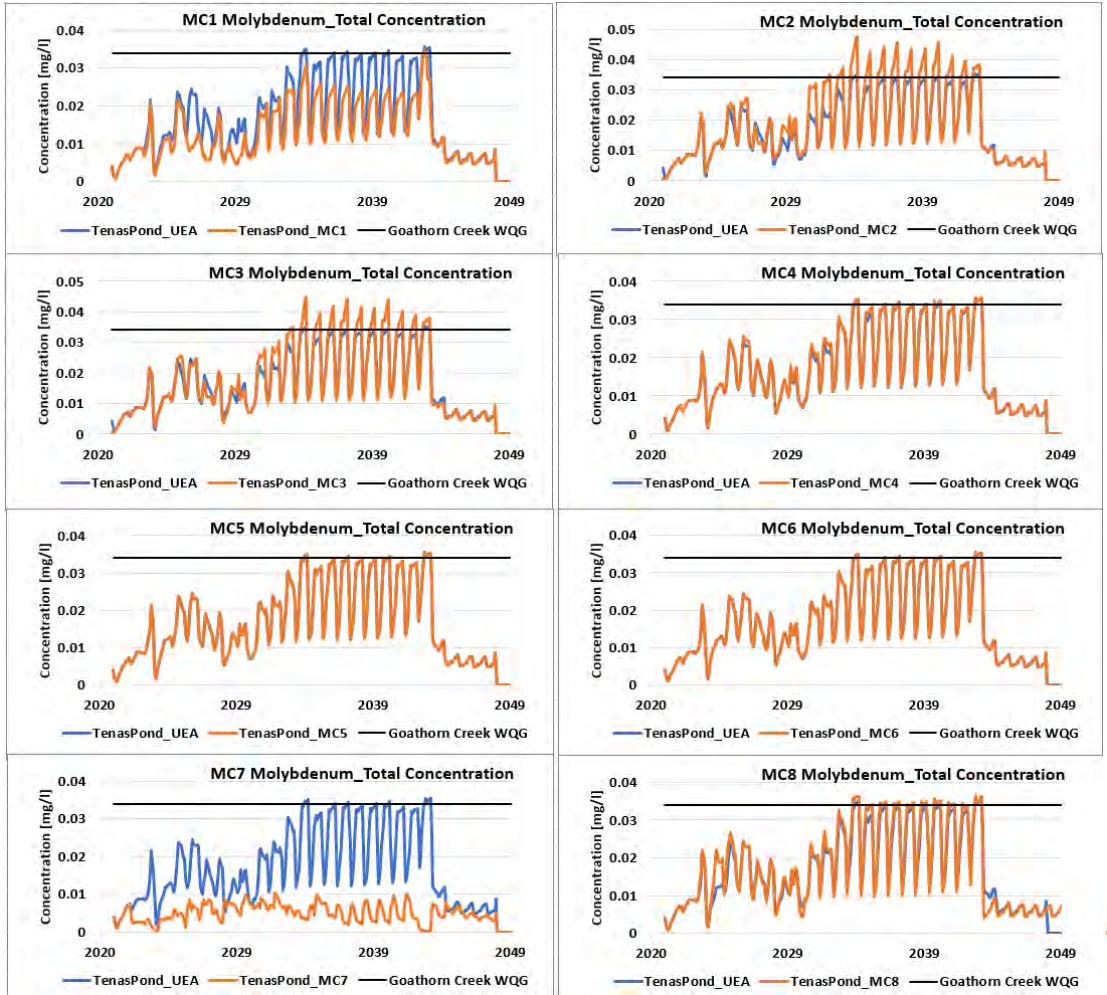


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Figure 7A-10: Total Iron modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

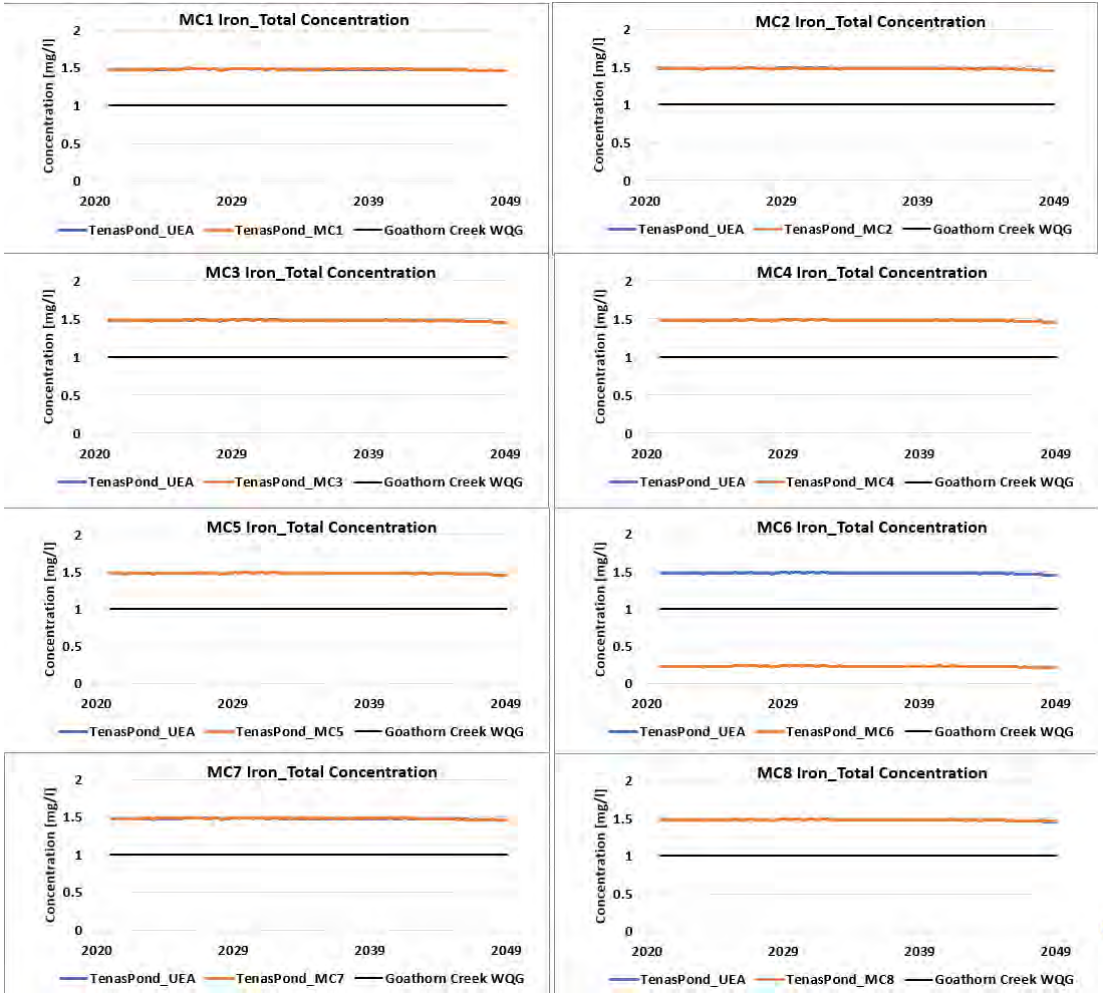


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Figure 7A-11: Total Chromium modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

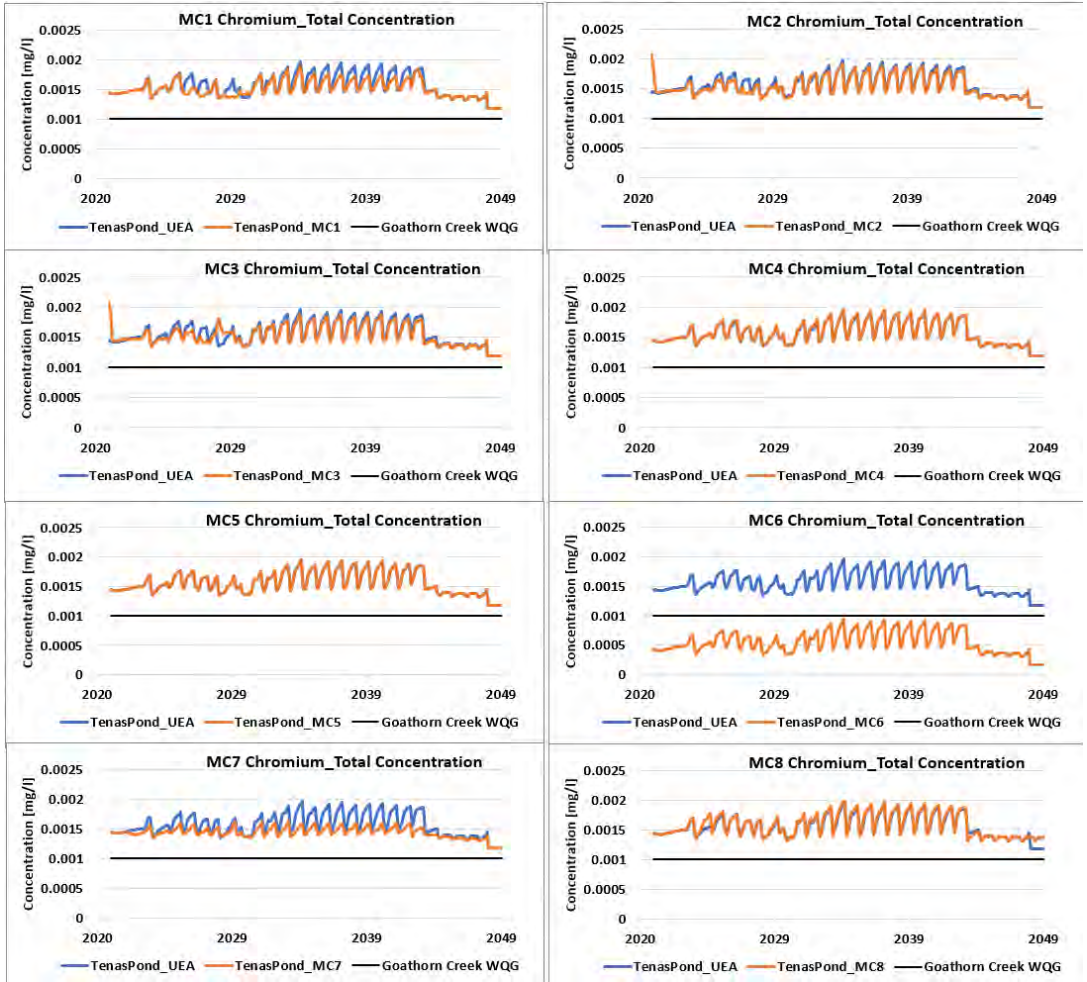


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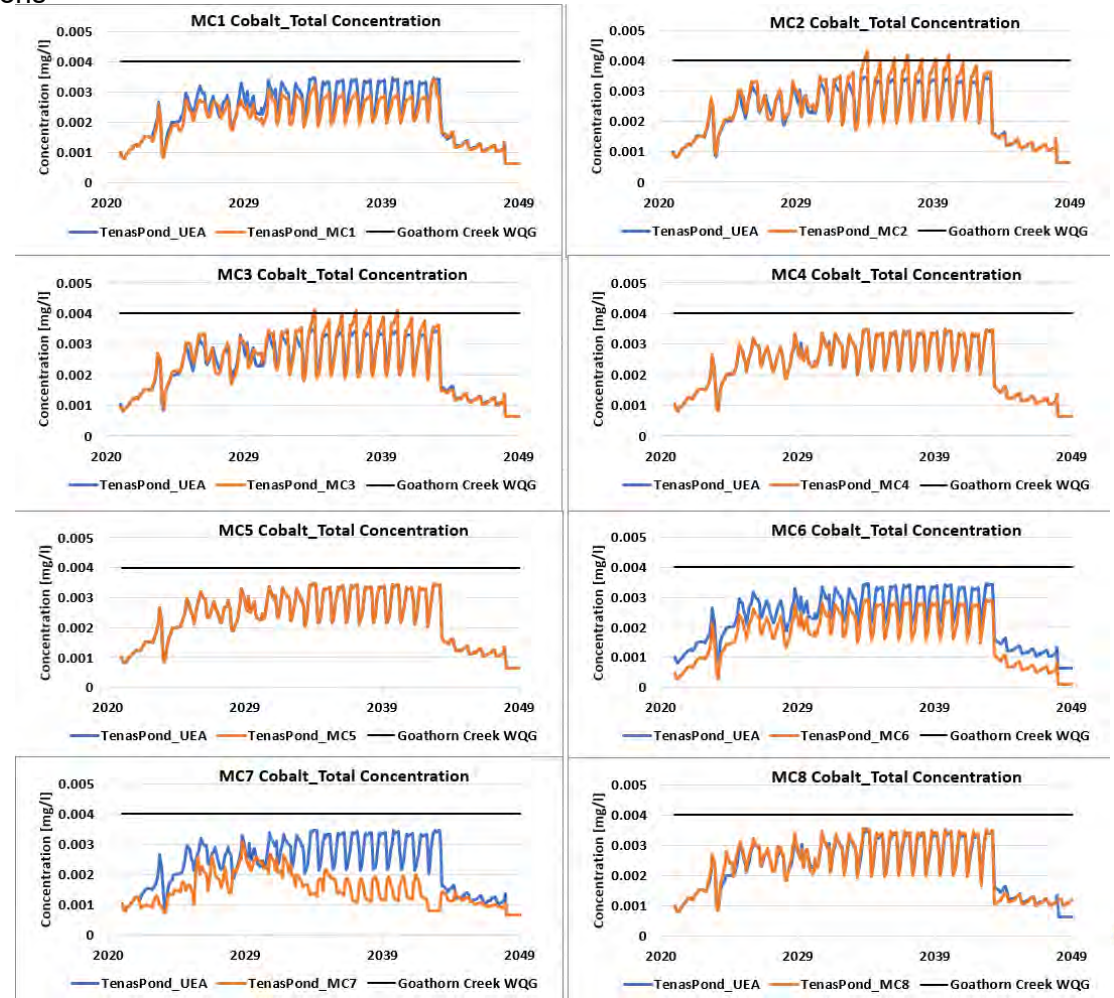
Figure 7A-12: Total Cobalt modelled concentrations in Tenas Control Pond surface discharge for mitigation cases compared to project case in Operations

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# Appendix 7-B

## North Management Pond surface discharge (Post-Closure)

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Figure 7B-1: Nitrite modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project case in Post-Closure

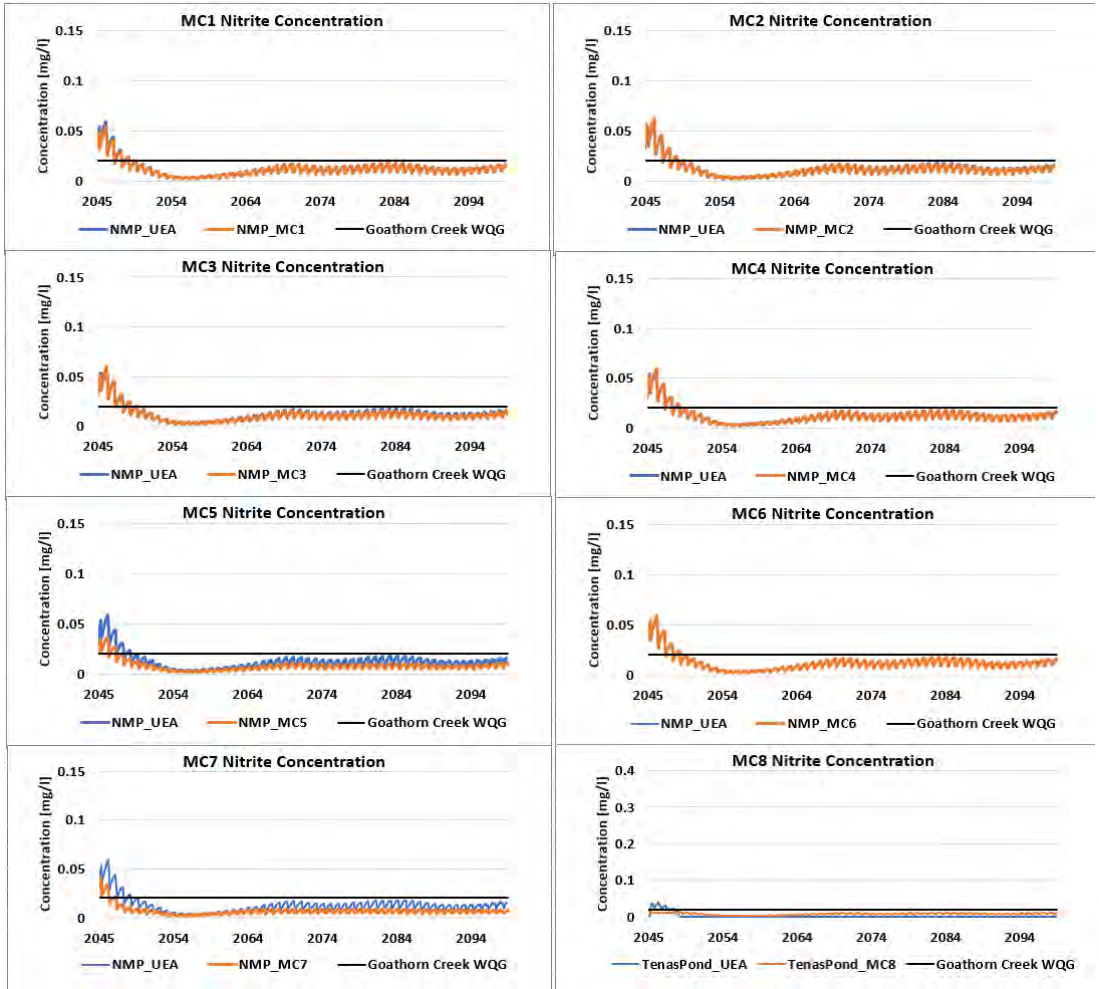


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Figure 7B-2: Total Selenium modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project cas
in Post-Closure

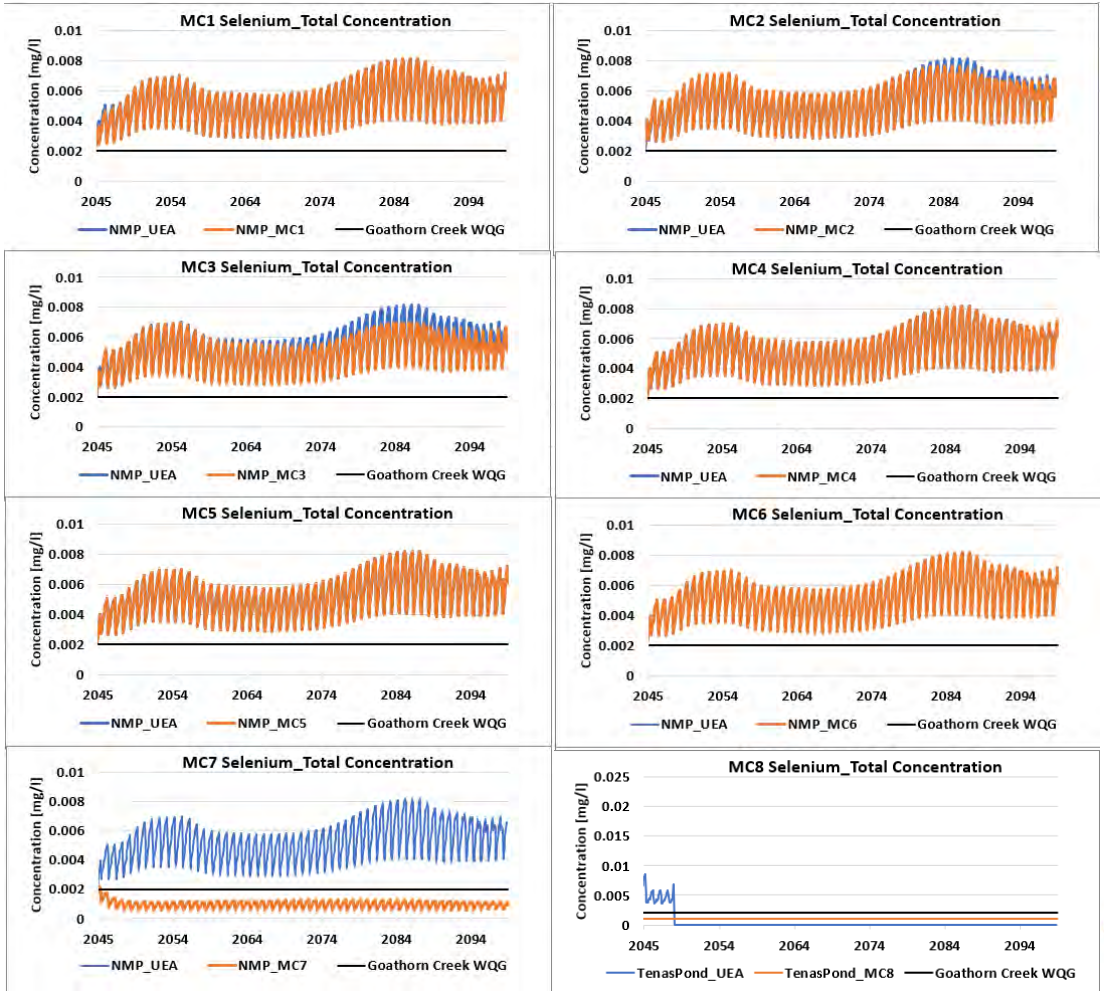


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Figure 7B-3: Sulphate modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project case in Post-Closure

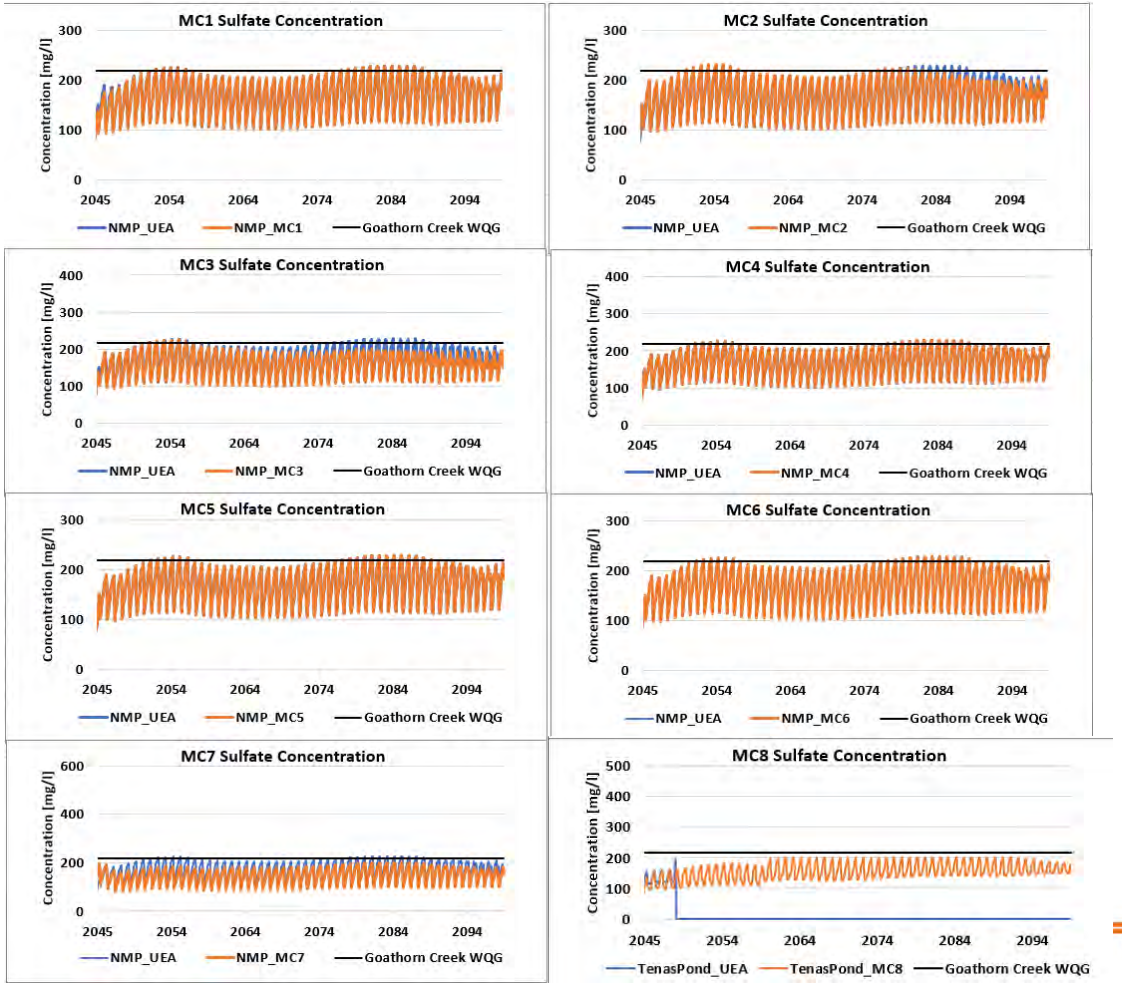


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Figure 7B-4: Total Aluminium modelled concentrations inNorth Management Pond surface discharge for mitigation cases compared to project ca
in Post-Closure

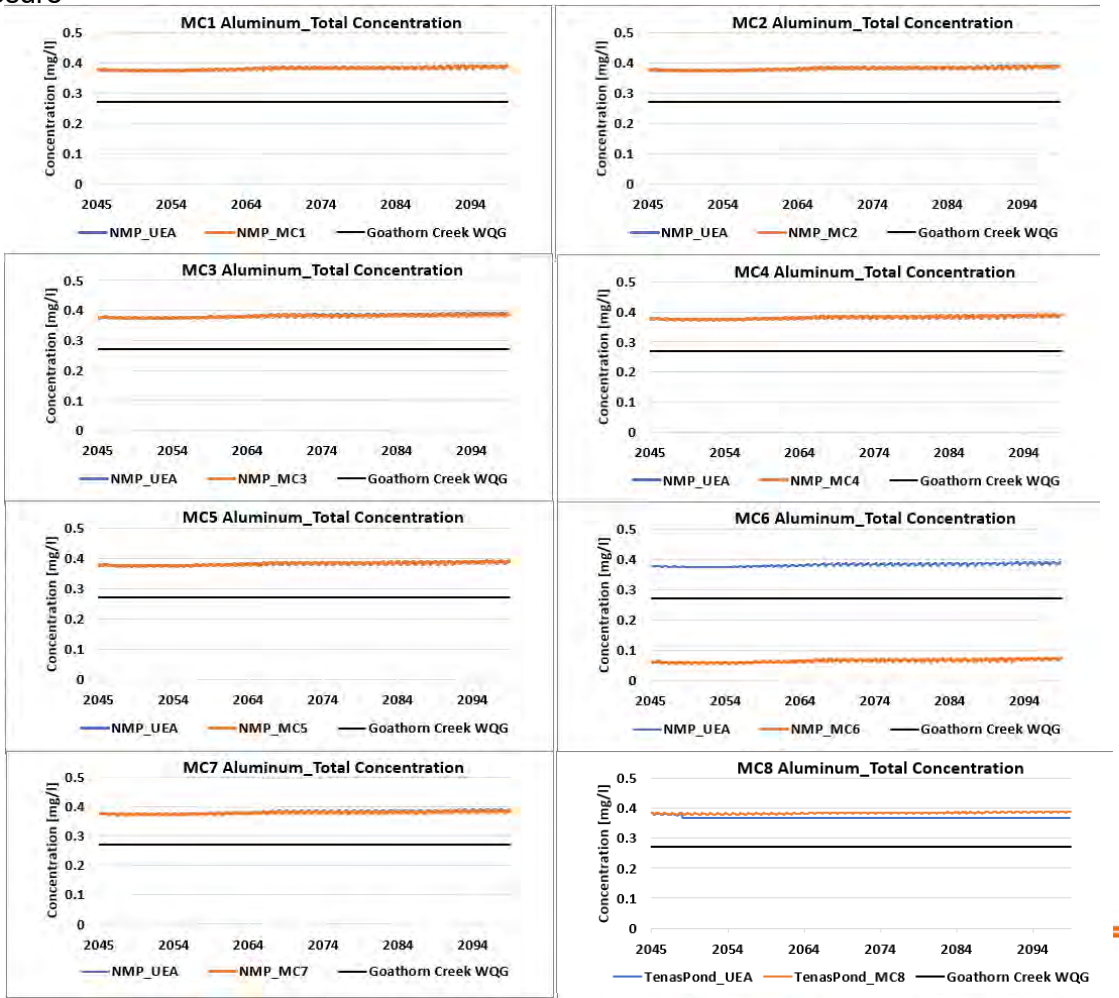


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Figure 7B-5: Nitrate modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project case in Post-Closure

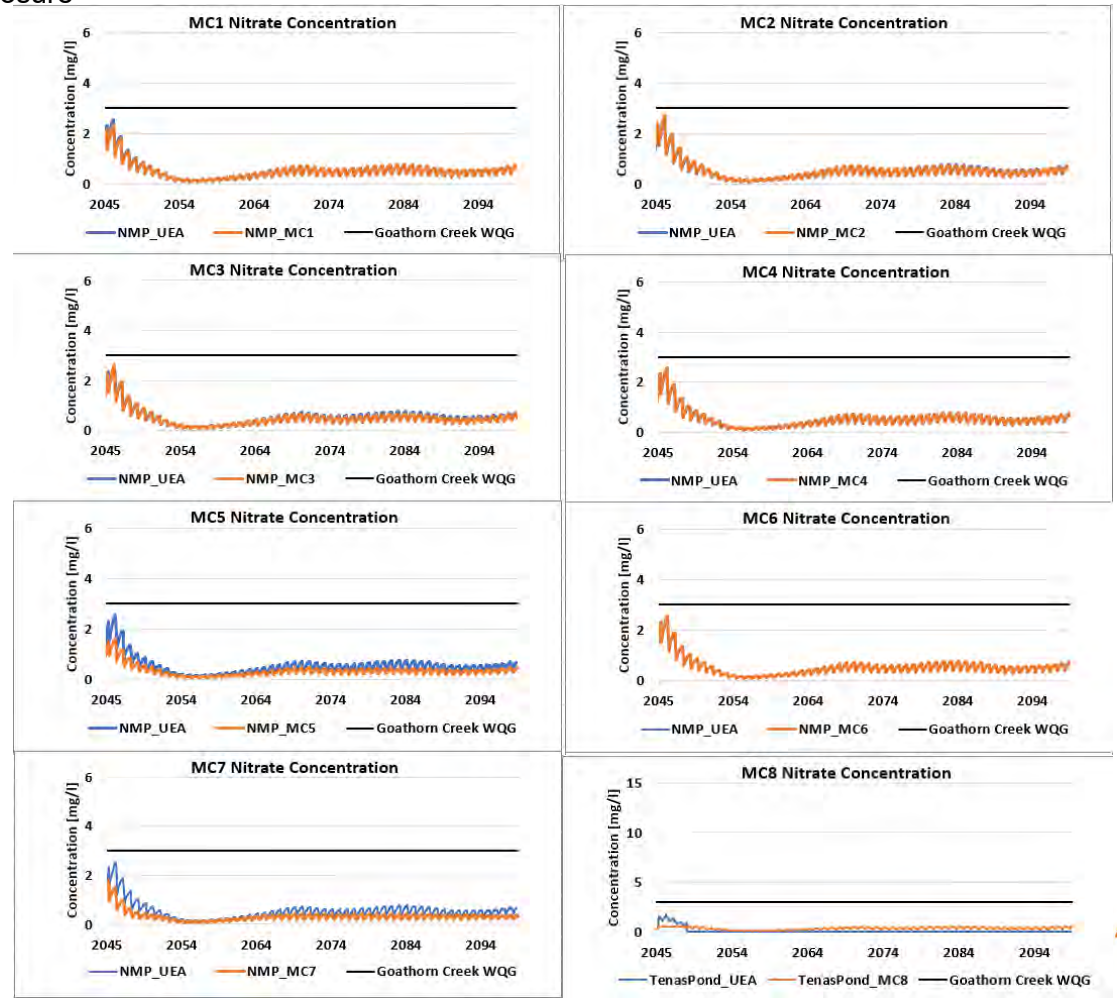


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Figure 7B-6: Dissolved Zinc modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project cas
in Post-Closure

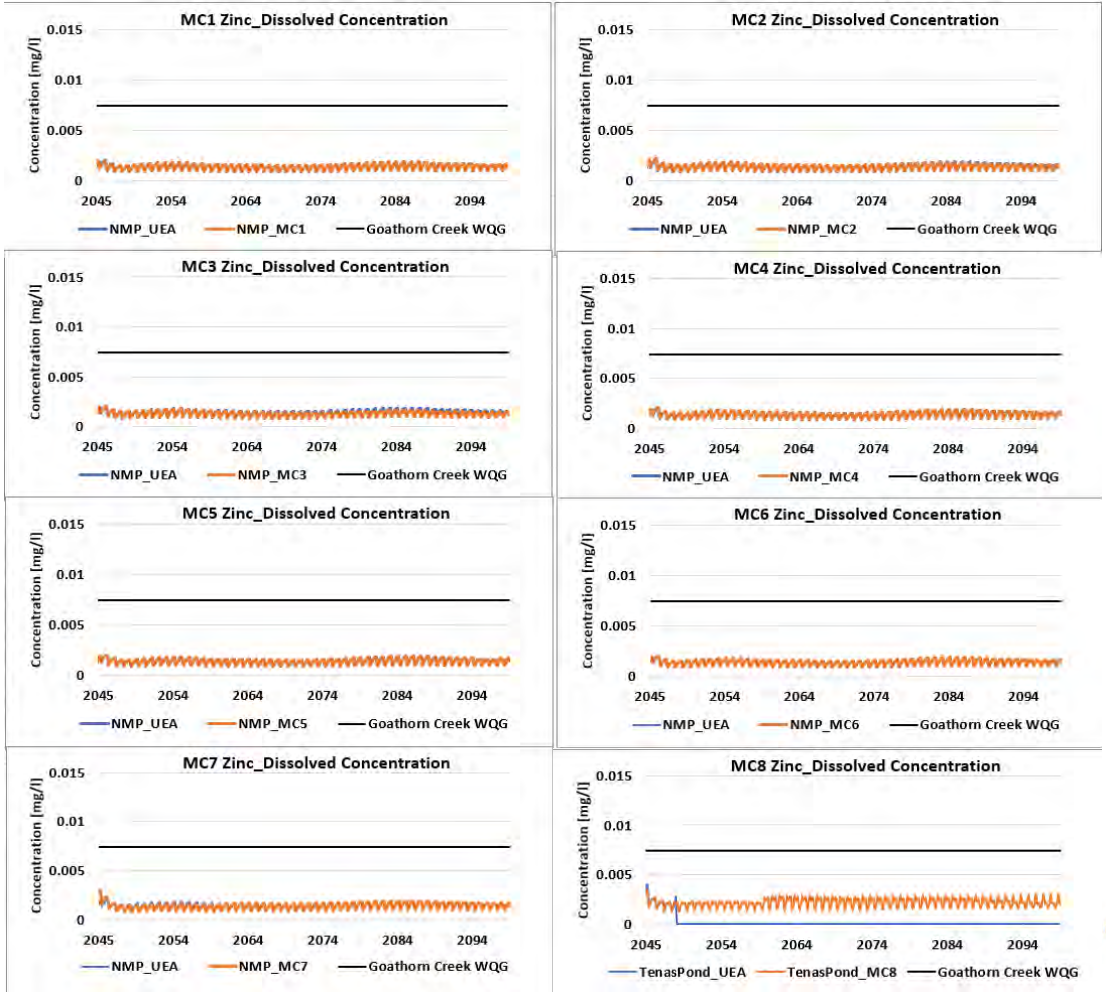


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Figure 7B-7: Dissolved Copper modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project in Post-Closure

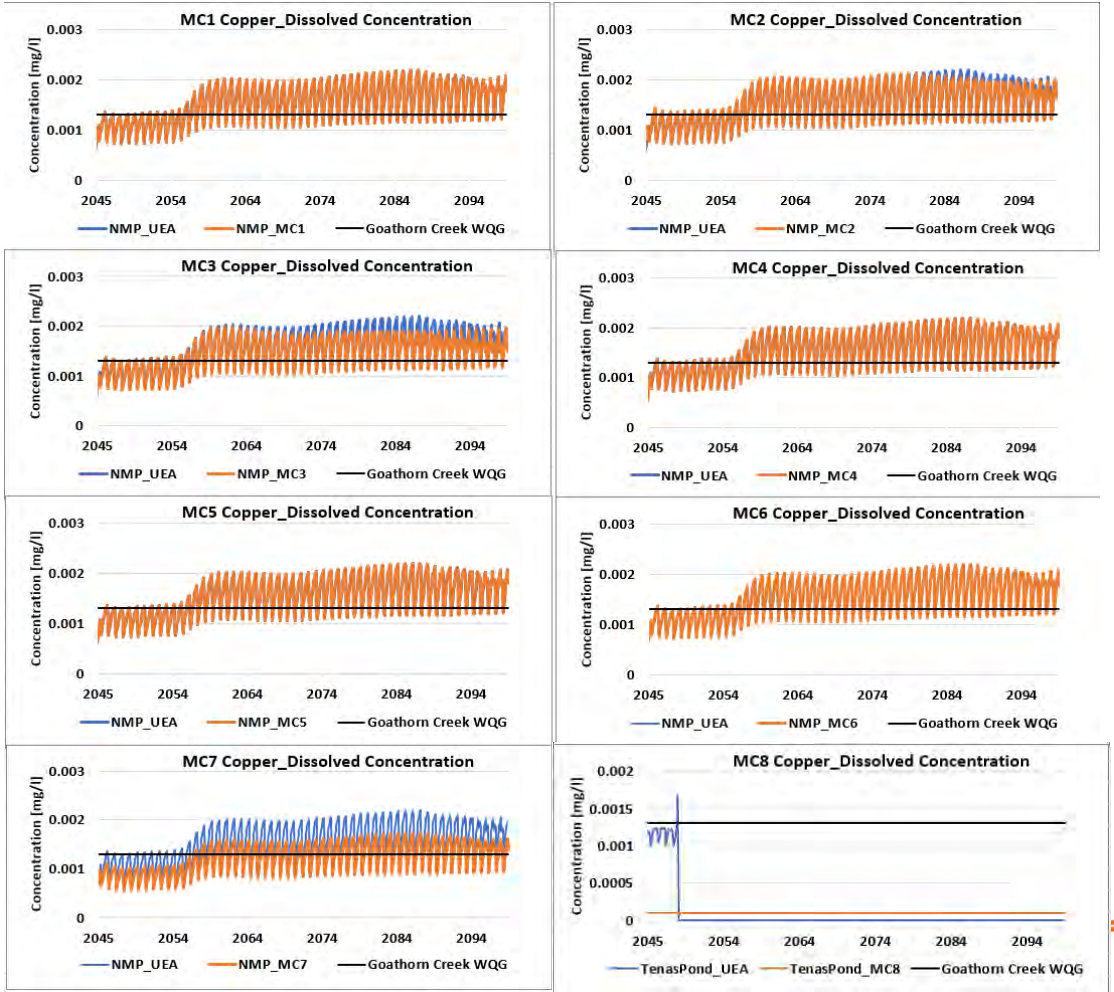


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Figure 7B-8: Dissolved Nickel modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project c
in Post-Closure

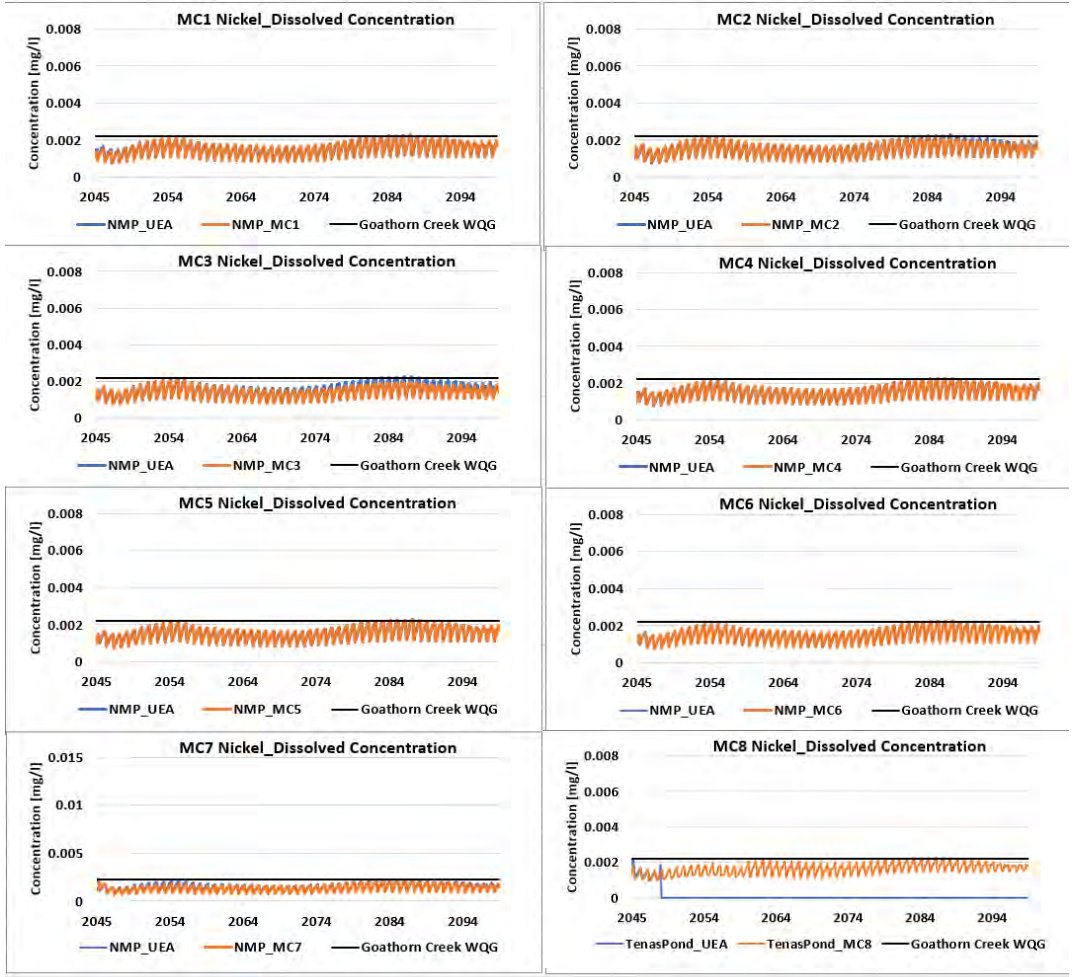


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Figure 7B-9: Total Molybdenum modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project in Post-Closure

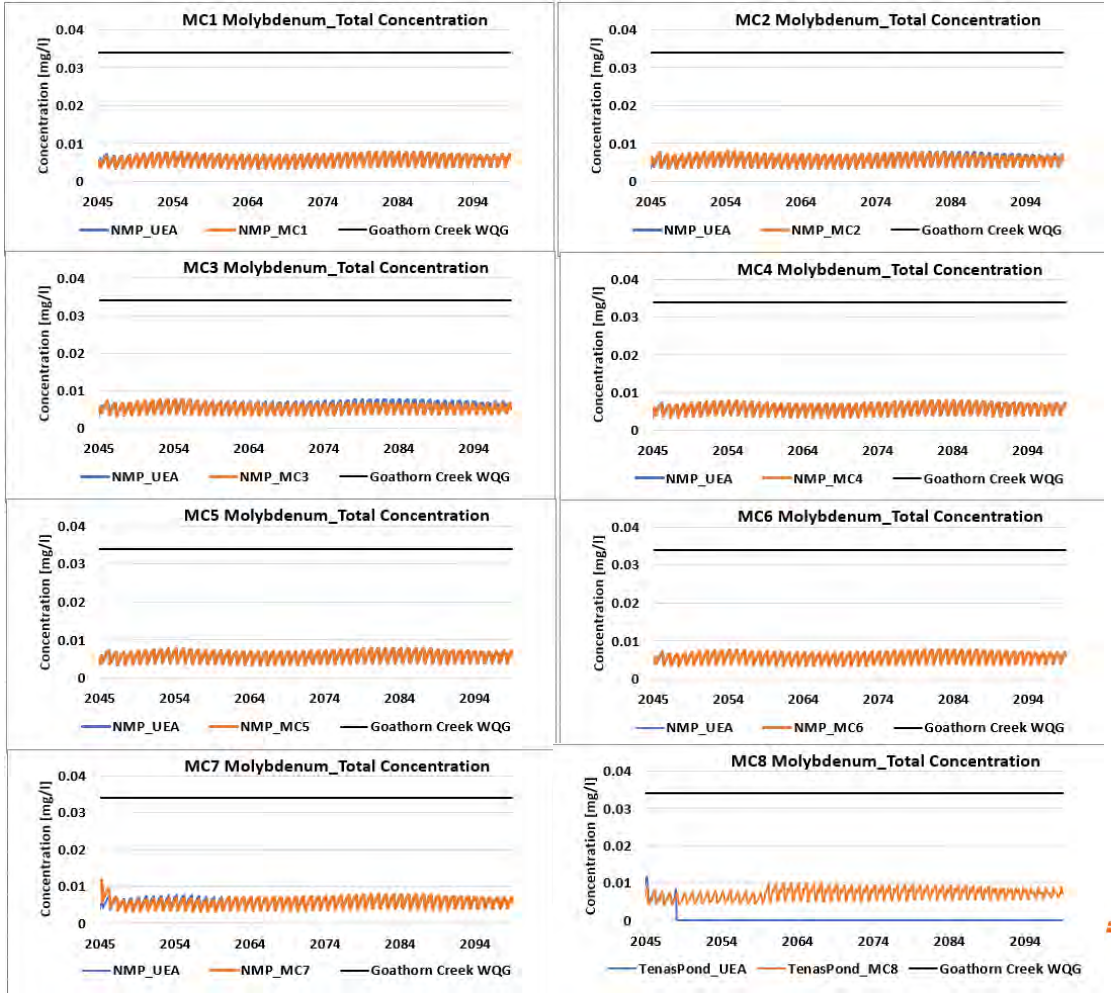


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Figure 7B-10: Total Iron modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project case in Post-Closure

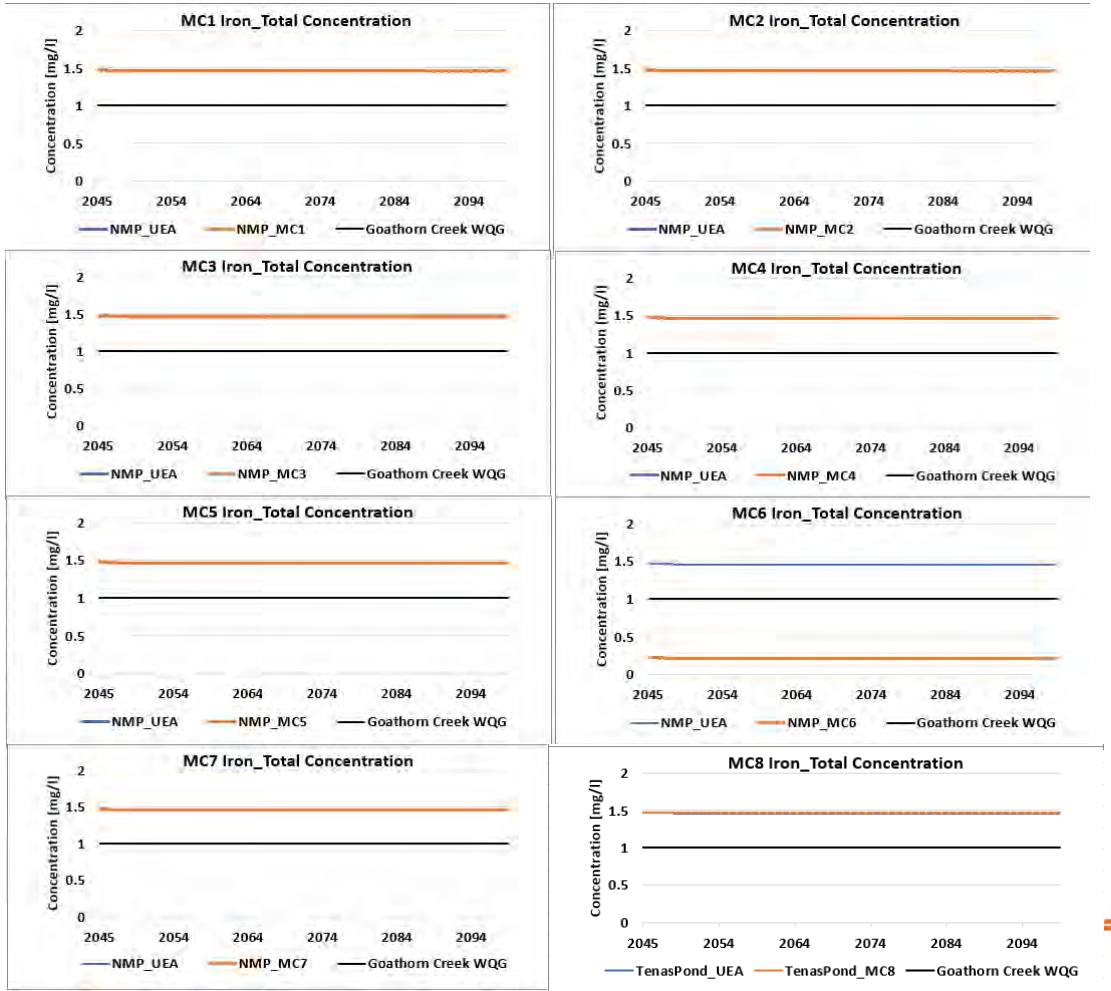


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Figure 7B-11: Total Chromium modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project c
in Post-Closure

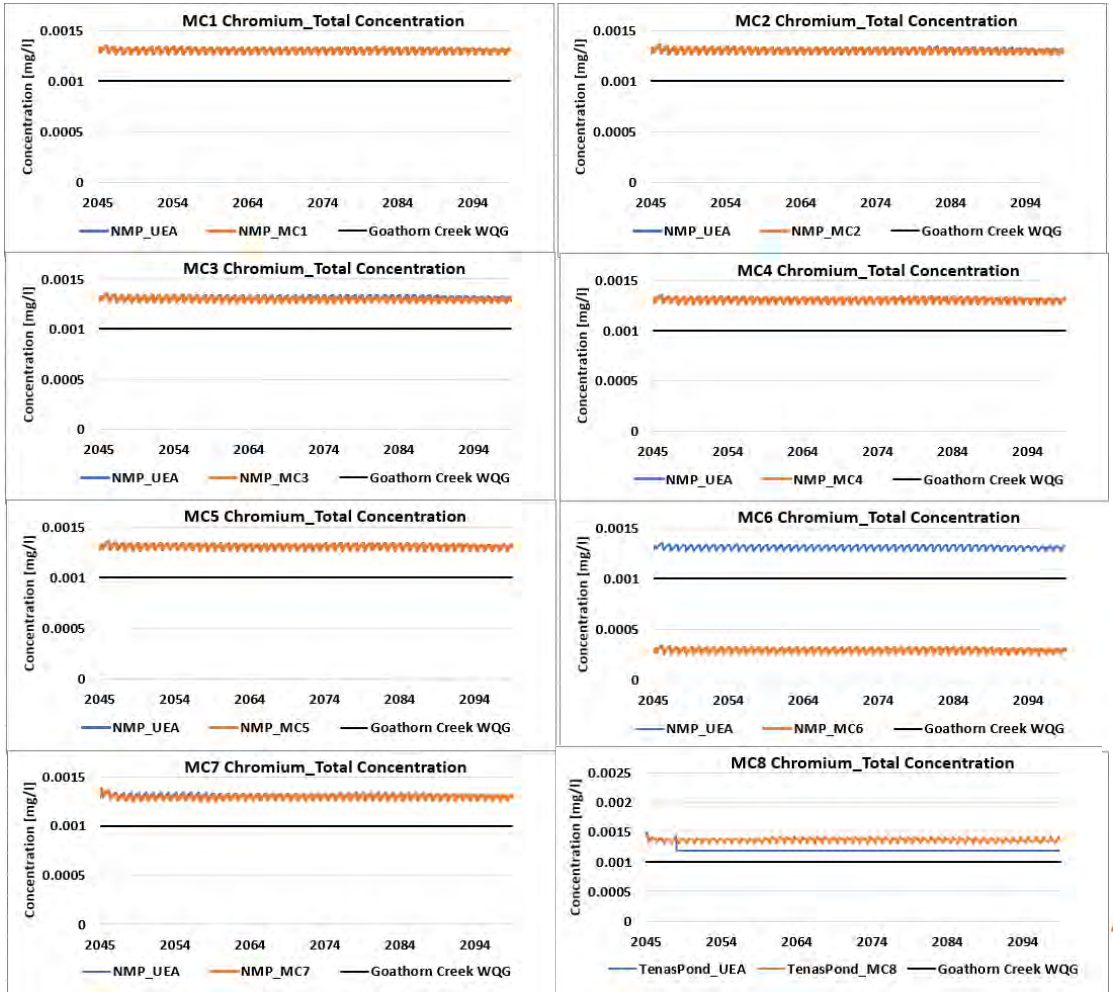


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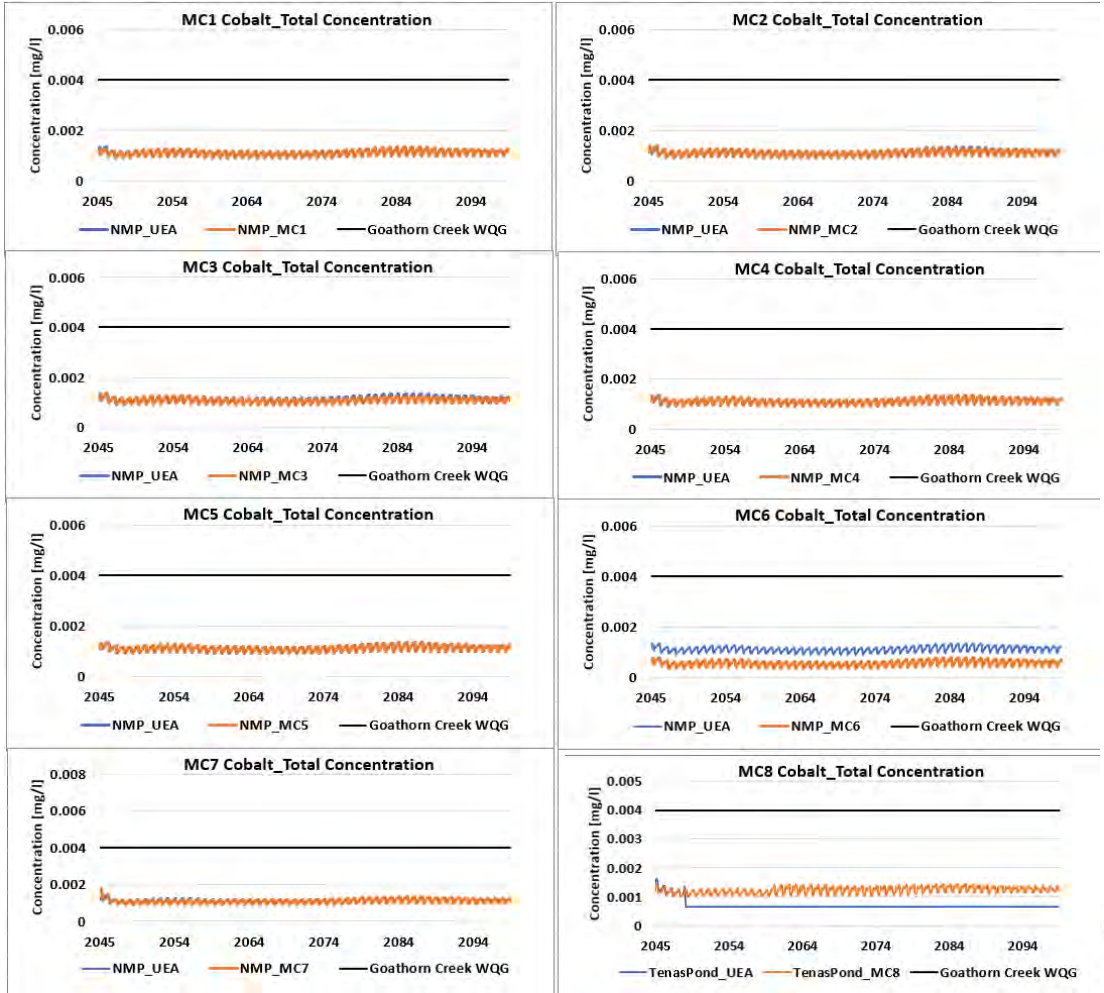
Figure 7A-12: Total Cobalt modelled concentrations in North Management Pond surface discharge for mitigation cases compared to project case in Post-Closure

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# Appendix 7-C

## Tenas Control Pond groundwater seepage (Operations and Post-Closure)

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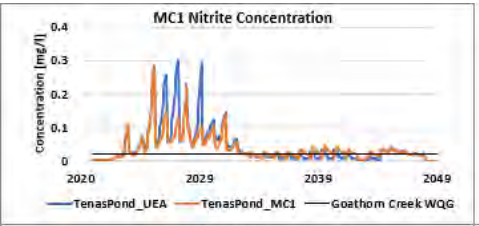
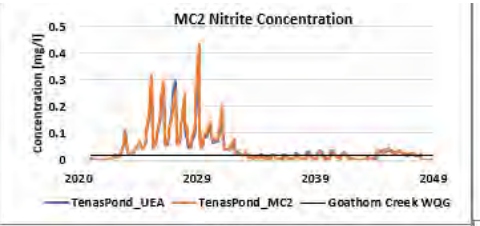
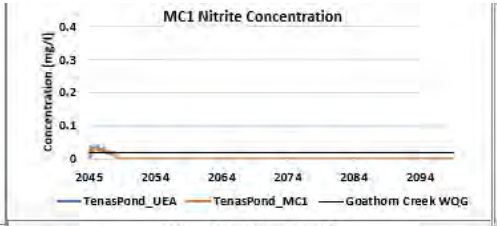
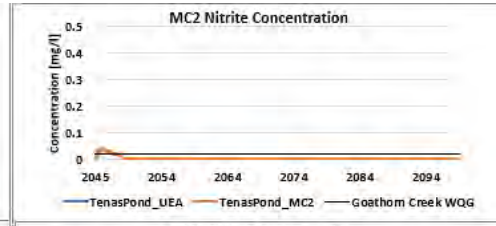
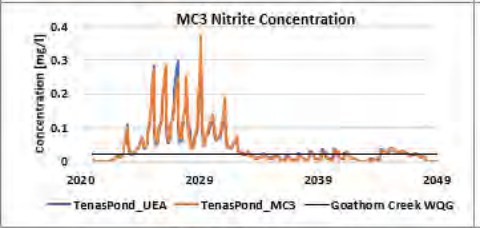
Figure 7C-1: Nitrite modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

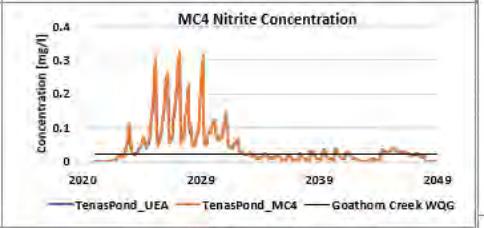


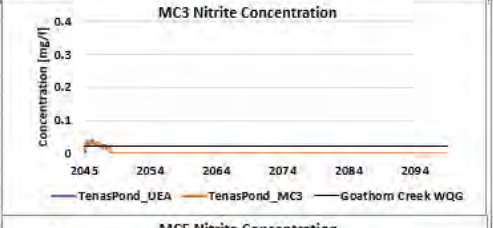



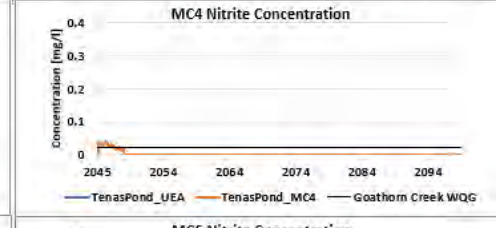



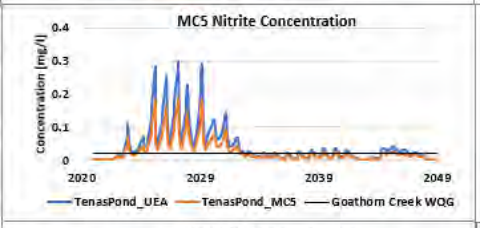



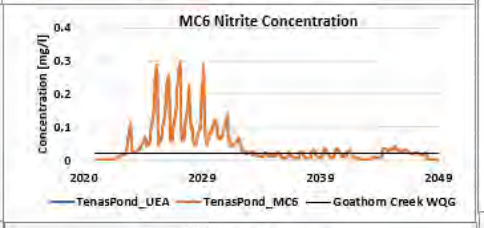



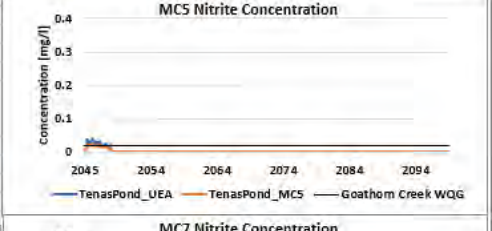



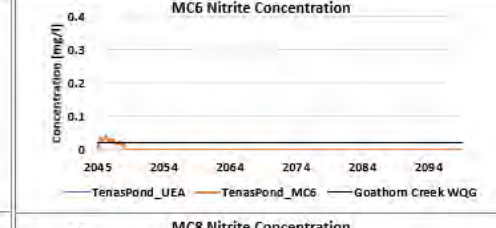



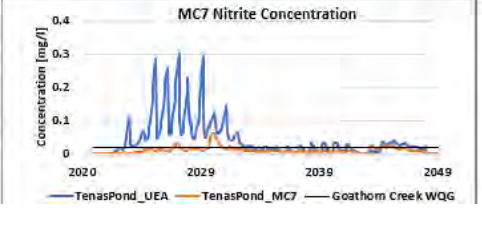



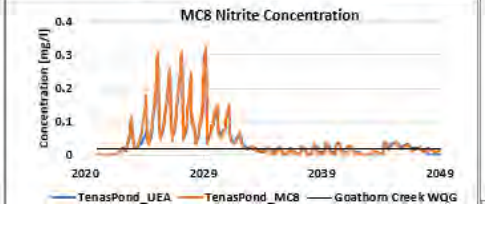



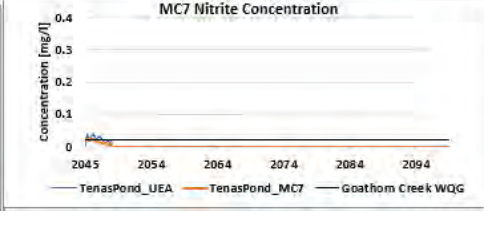



Figure 7C-2: Total Selenium modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

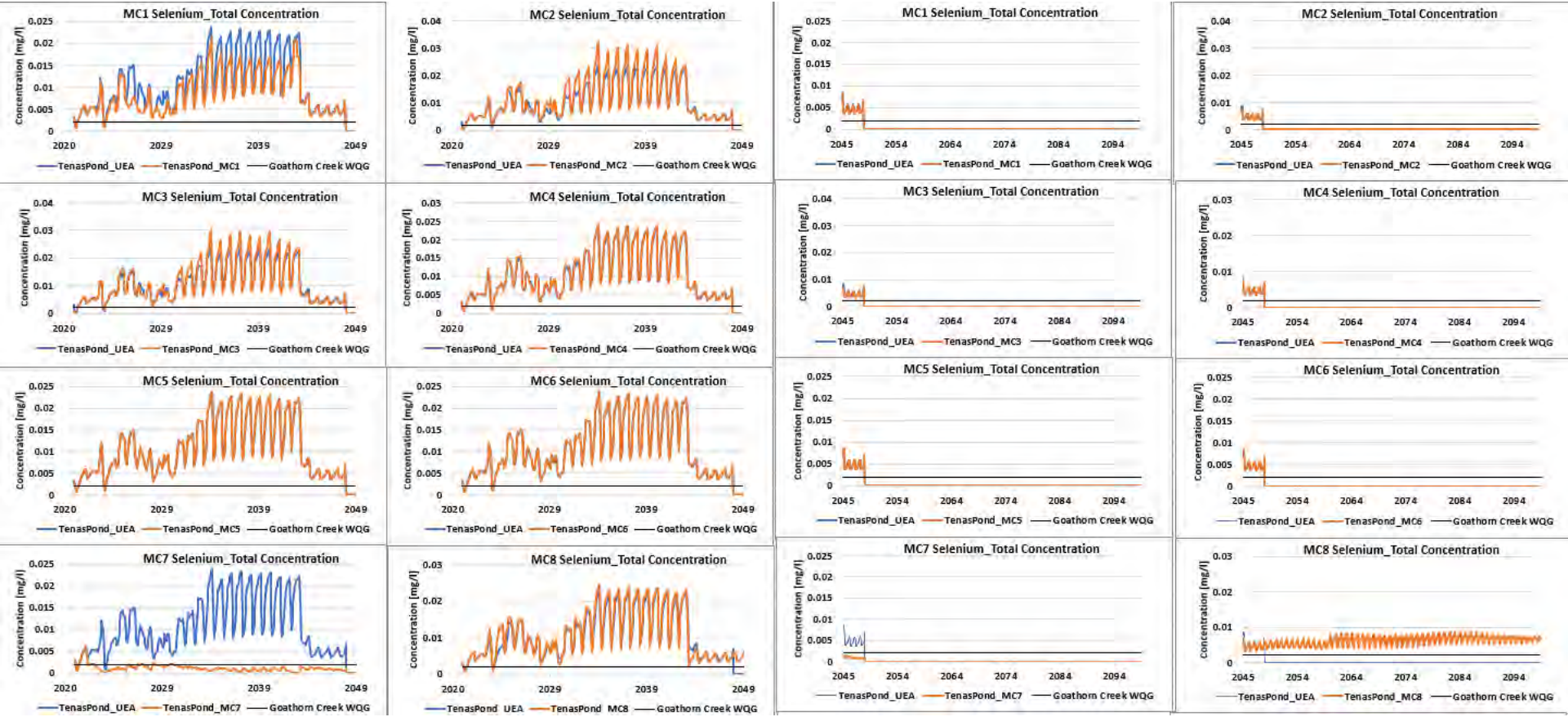



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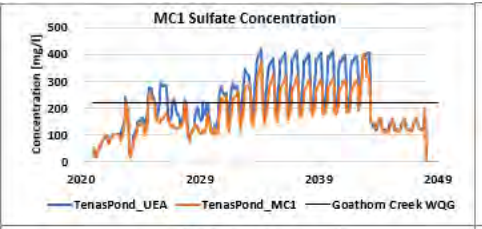
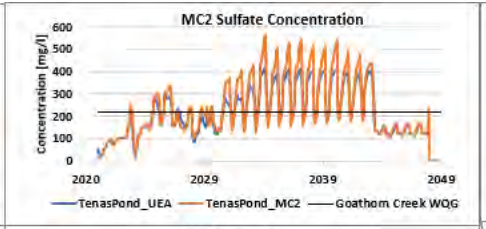
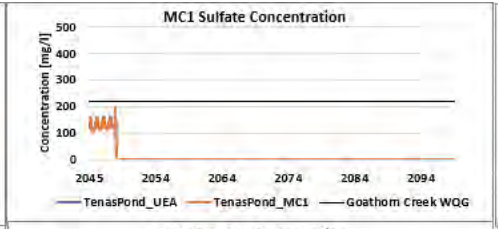
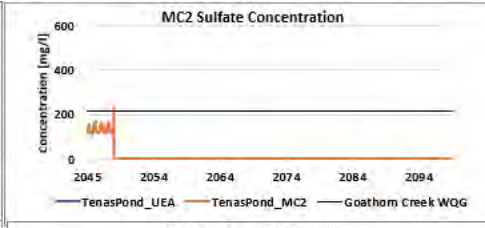
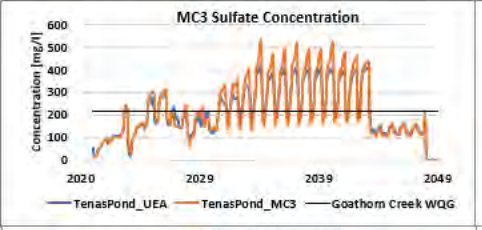
Figure 7C-3: Sulphate modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

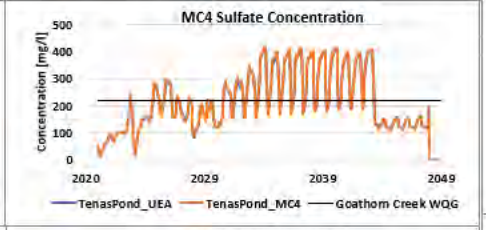


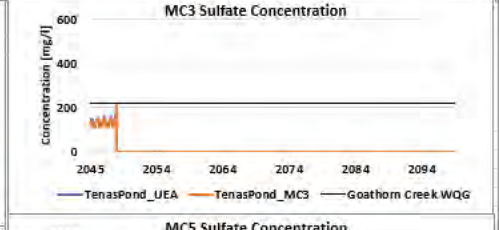



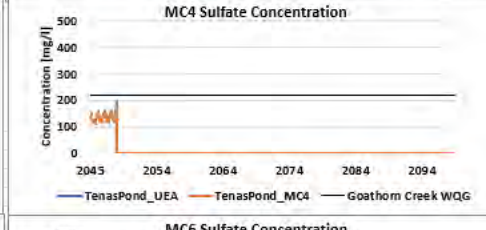



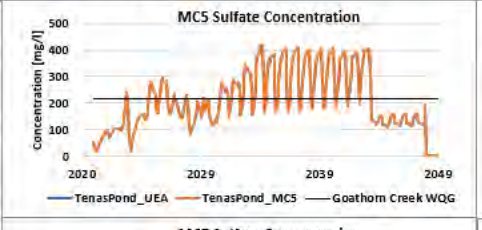



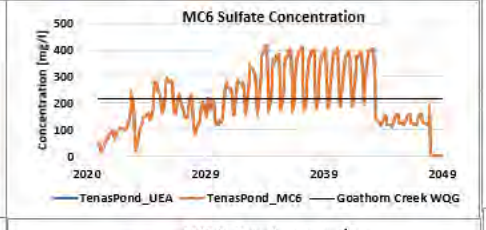



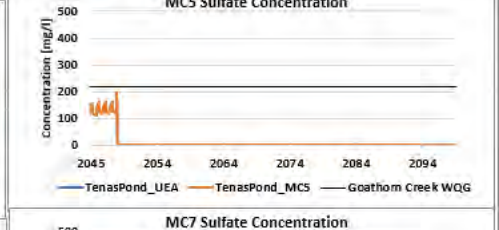



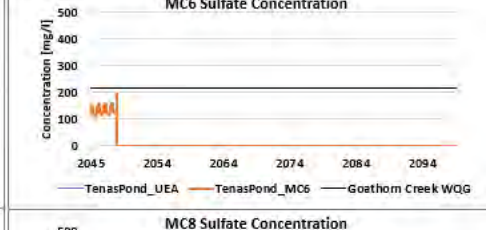



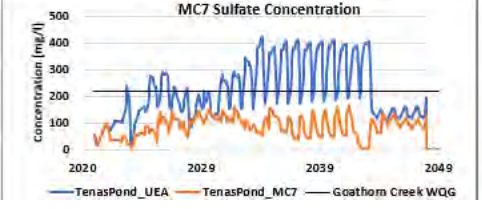



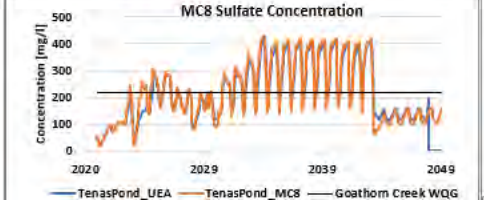



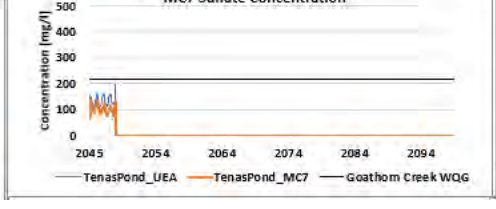



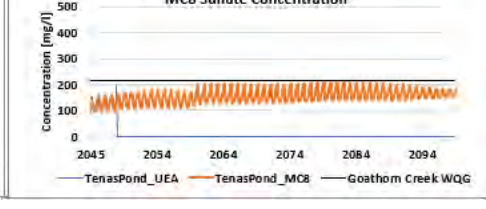
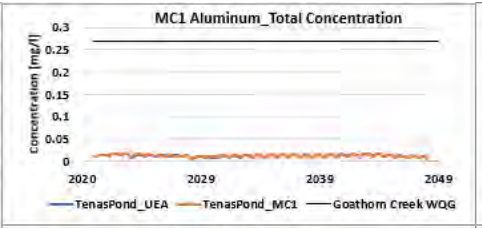
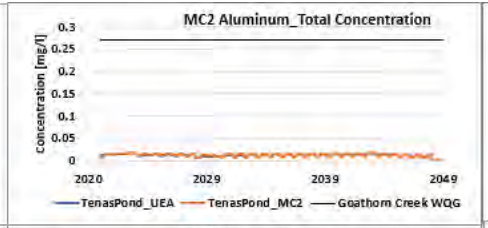
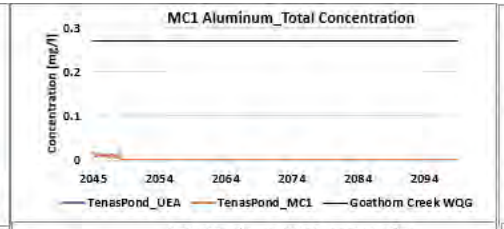
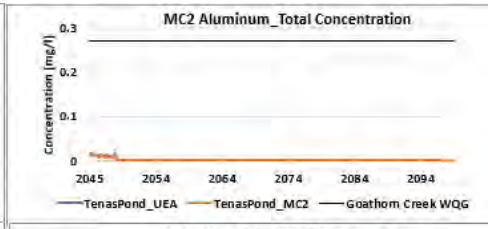



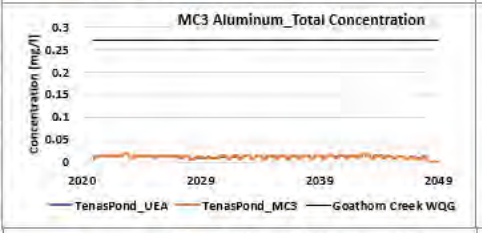
Figure 7C-4: Total Aluminium modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

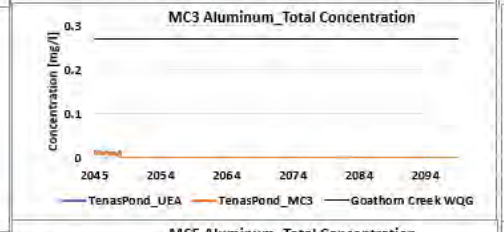


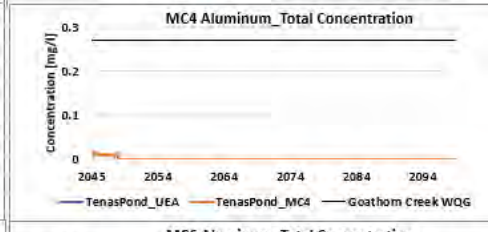



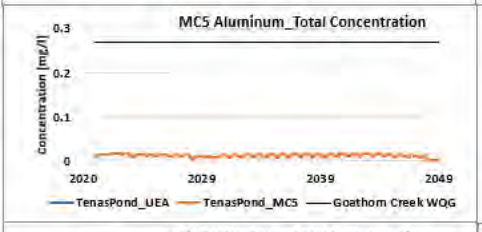



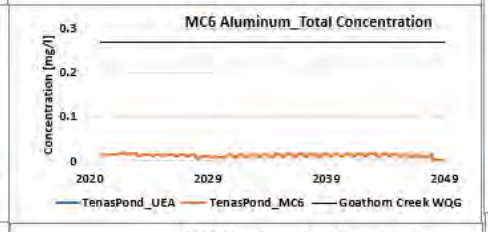



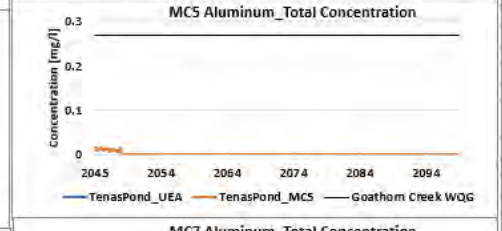



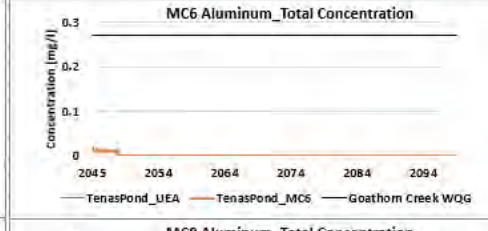


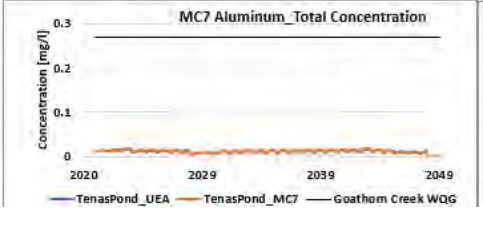



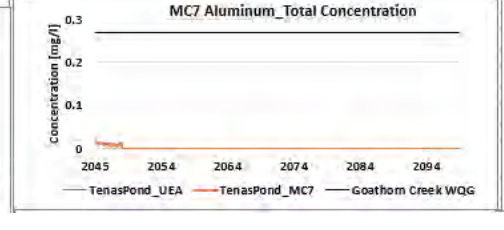





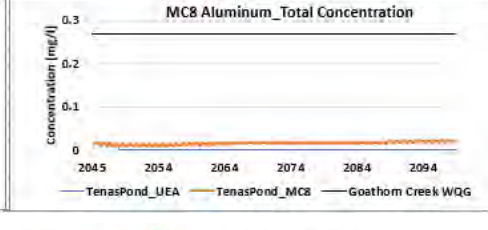
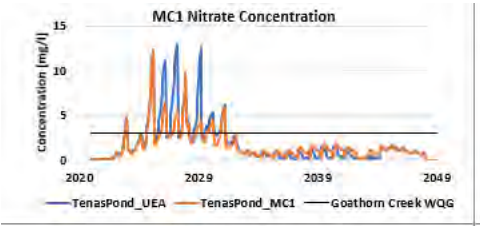
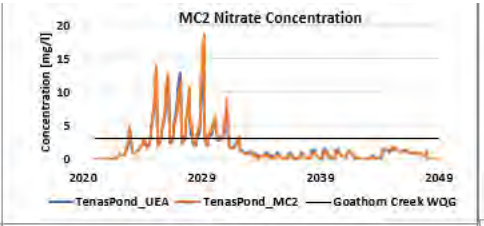
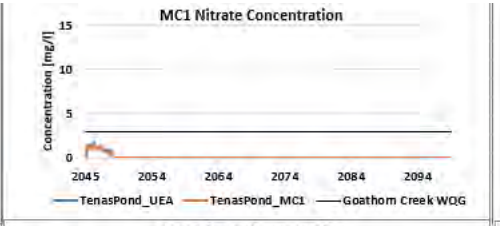
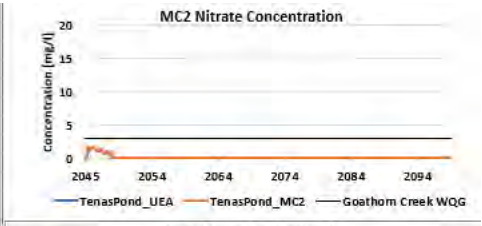



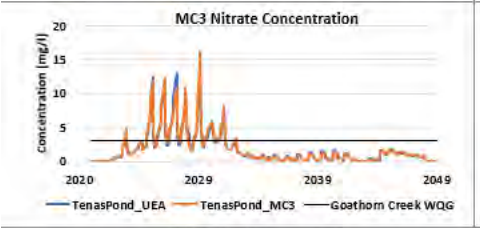
Figure 7C-5: Nitrate modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

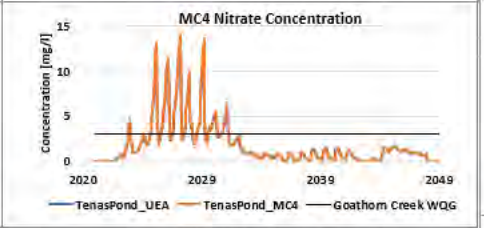


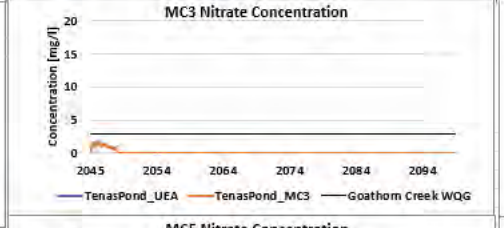



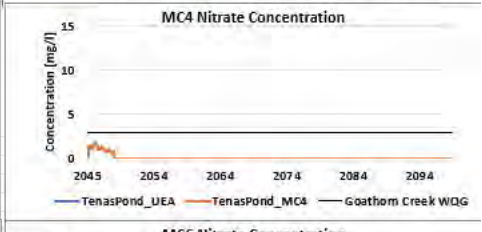



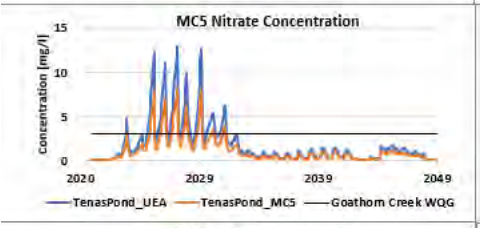



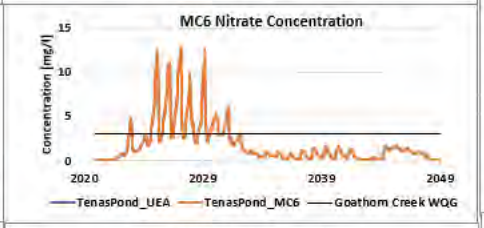



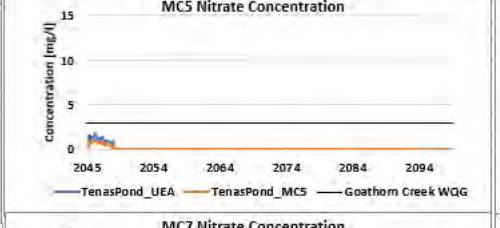



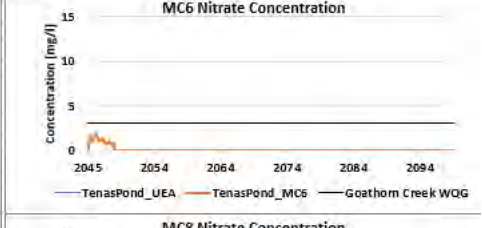



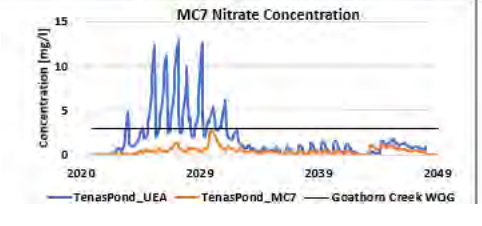



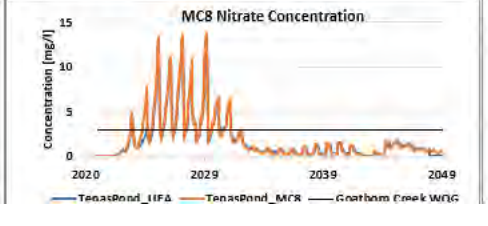



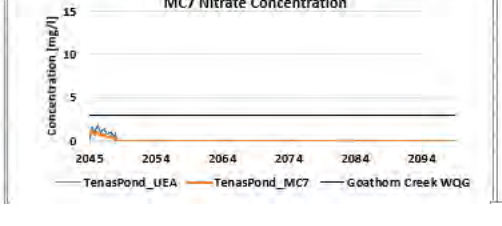



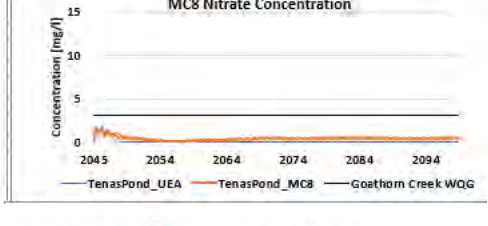




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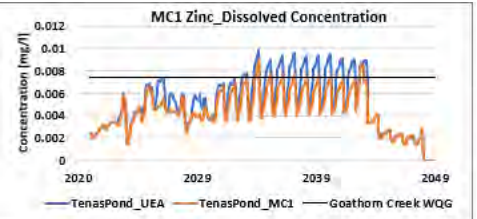
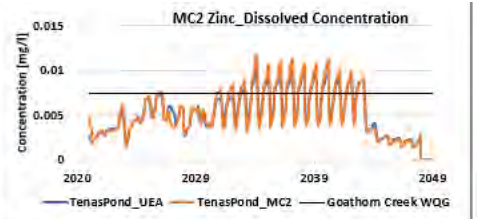
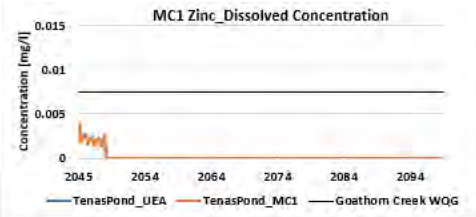
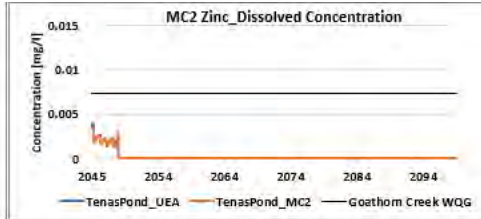
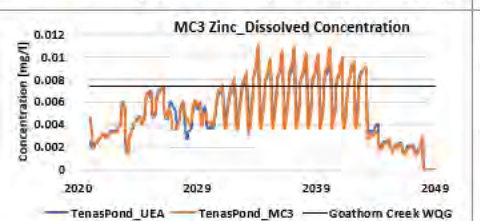
Figure 7C-6: Dissolved Zinc modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

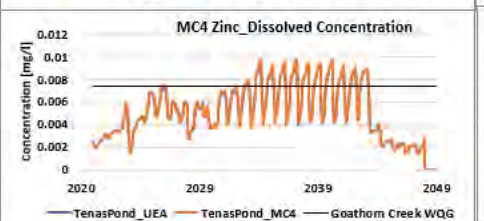


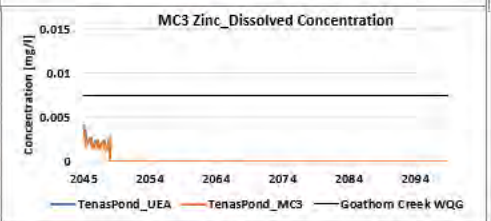



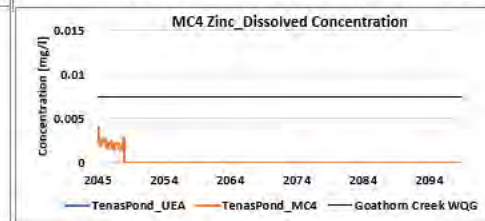



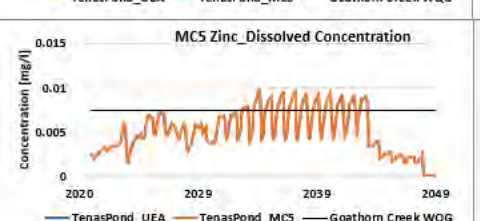



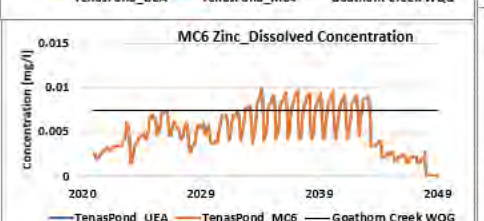



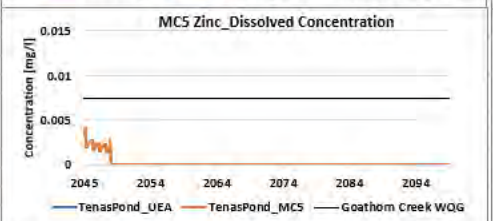



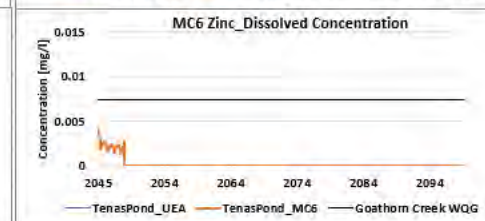



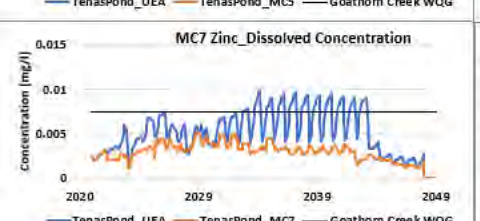



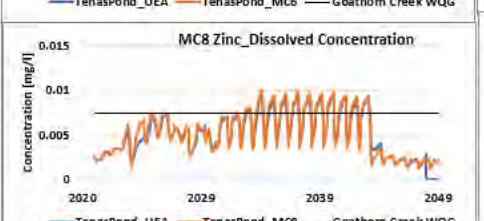



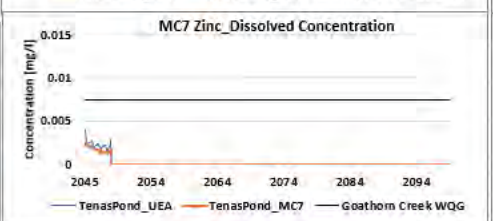



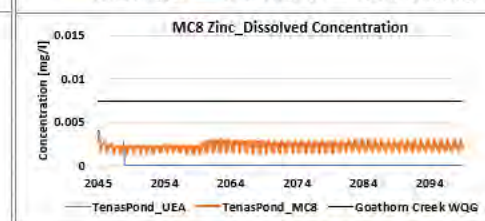




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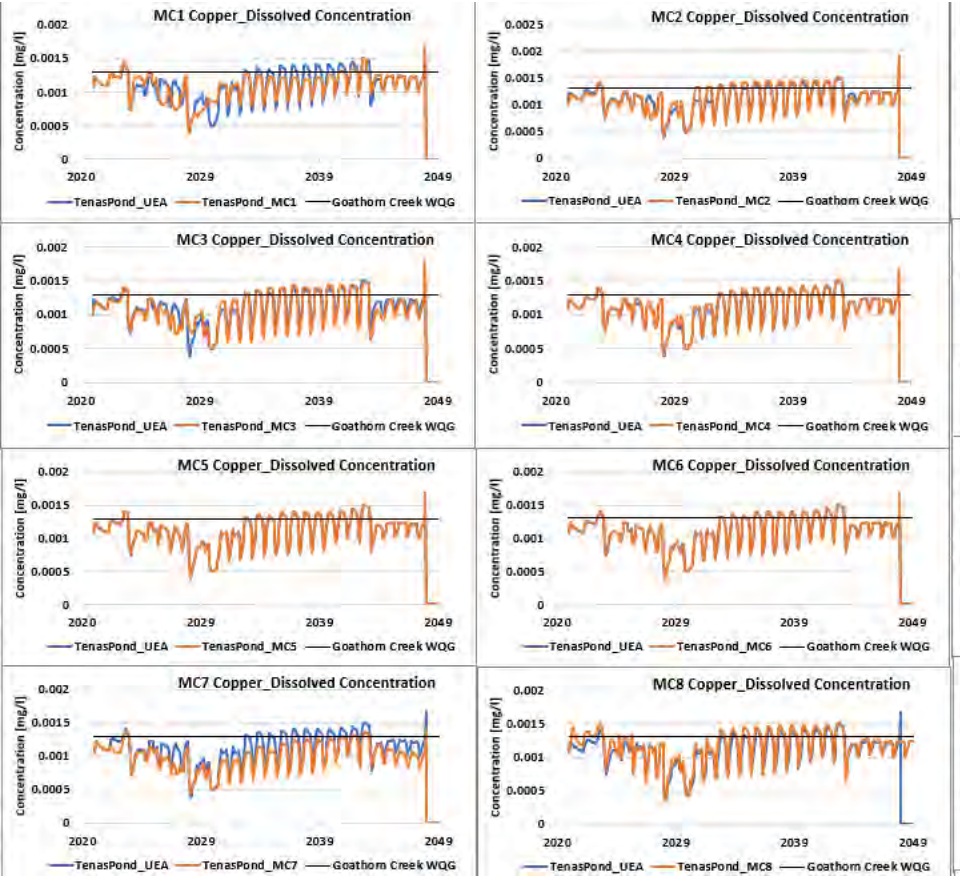
Figure 7C-7: Dissolved Copper modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure



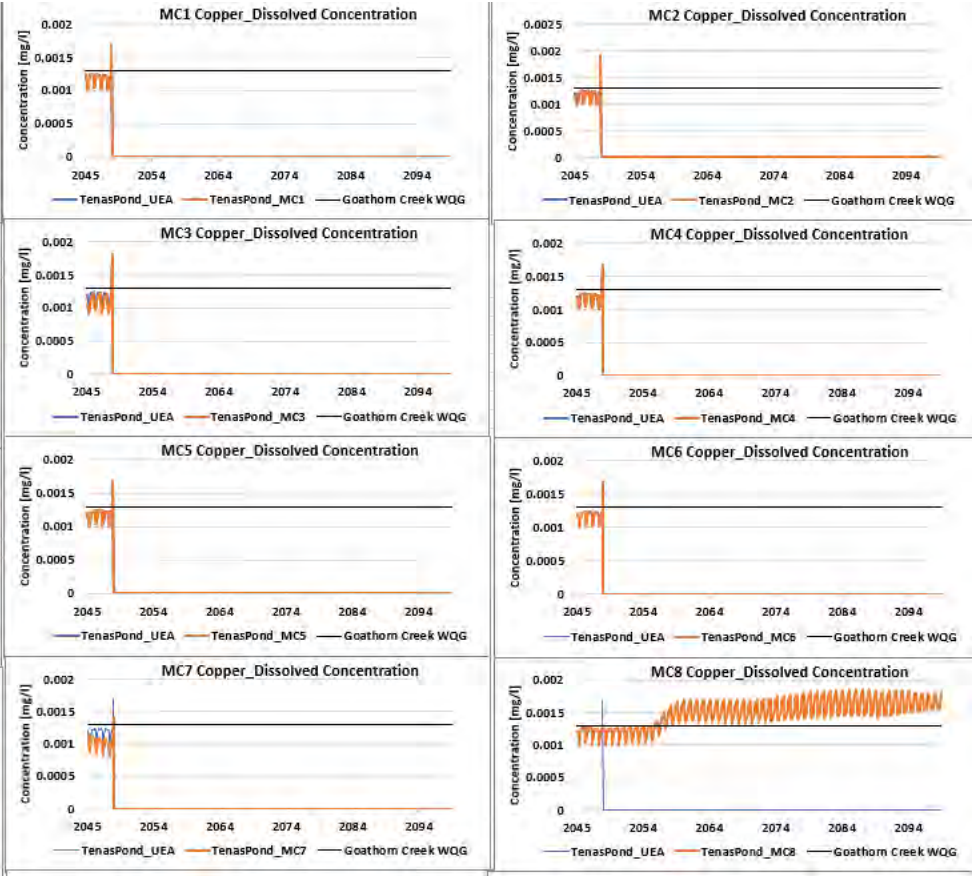




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Figure 7C-8: Dissolved Nickel modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

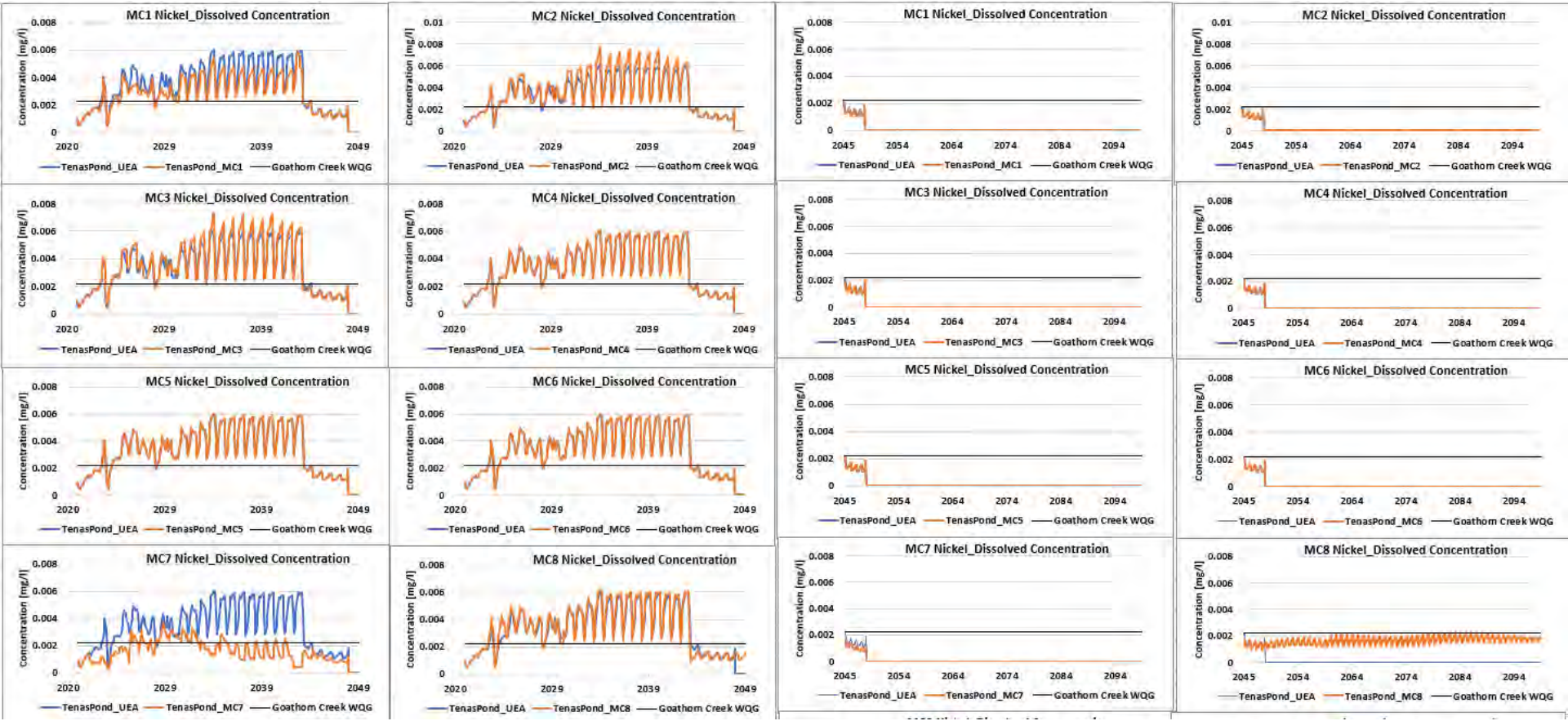


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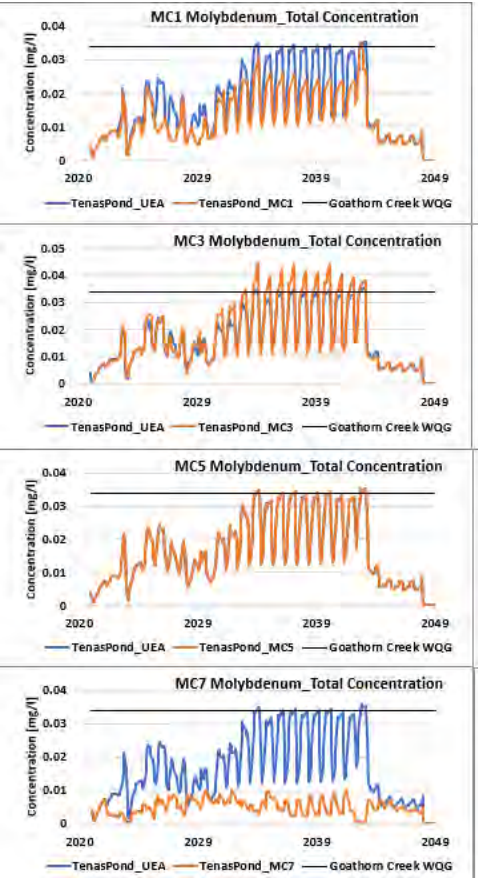
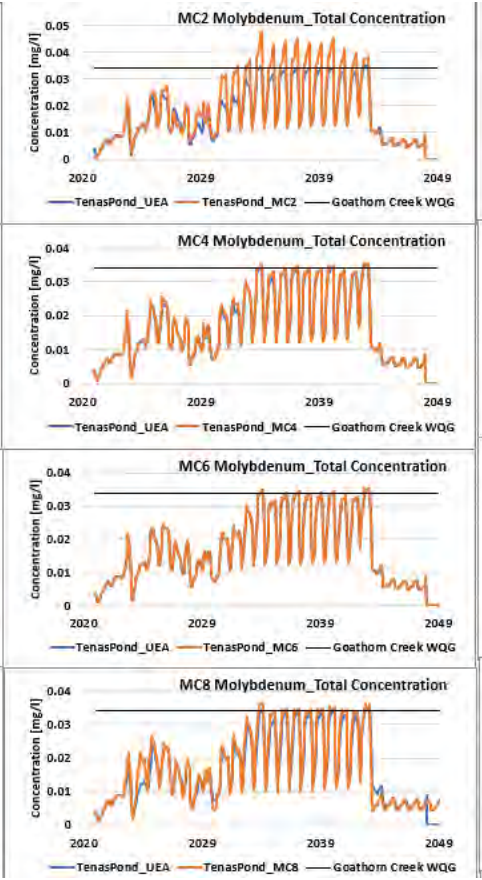
Figure 7C-9: Total Molybdenum modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure











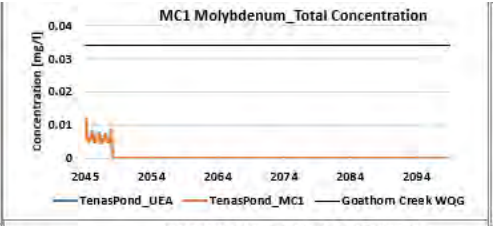


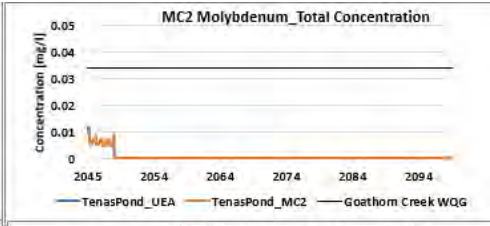


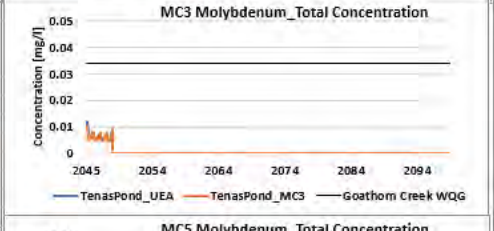


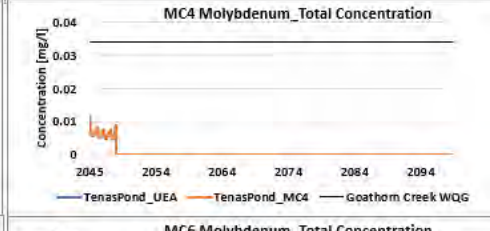


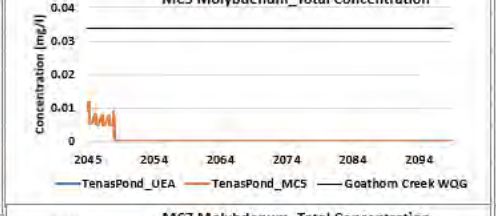


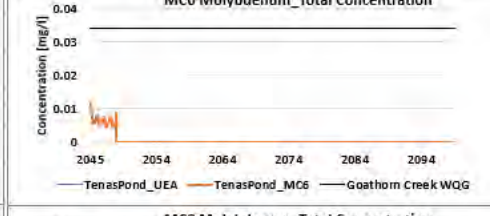



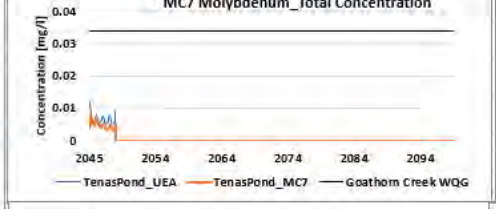



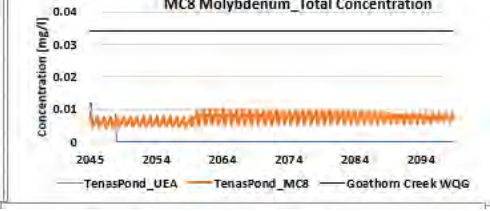
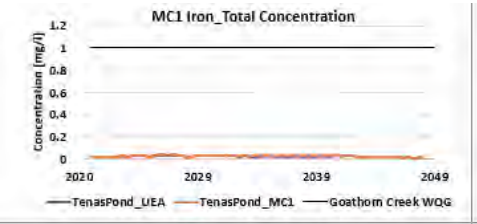
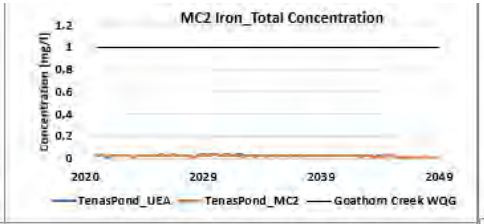
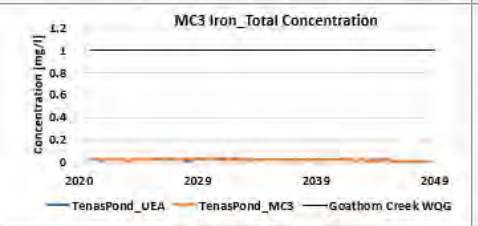
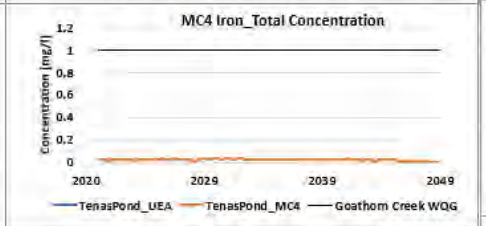



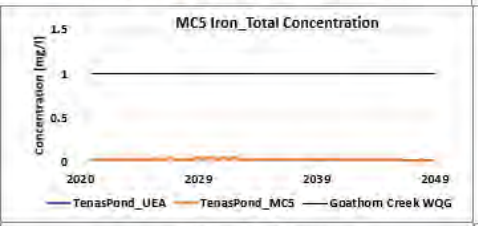
Figure 7C-10: Total Iron modelled concentrations in Tenas Control Pond surface groundwater seepage for mitigation cases compared to project cas
in Operations and Post-Closure

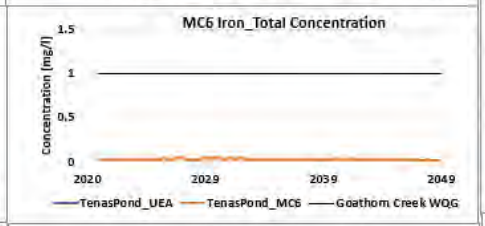


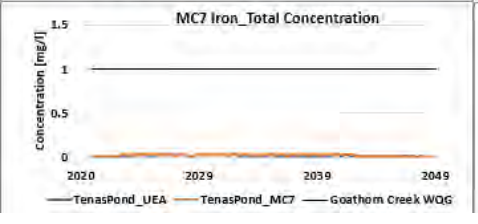



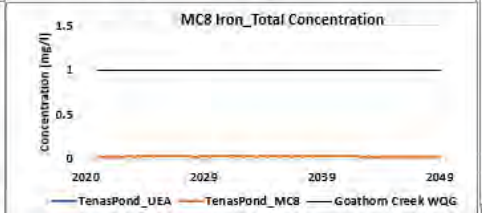



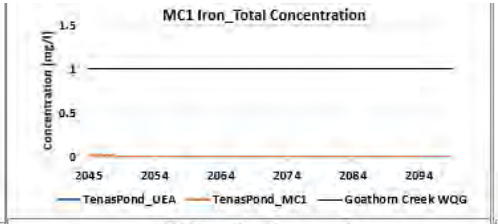



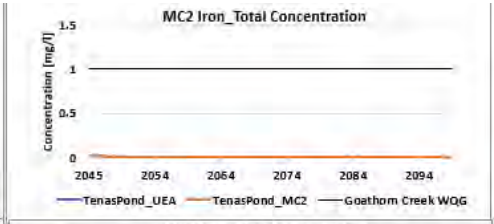



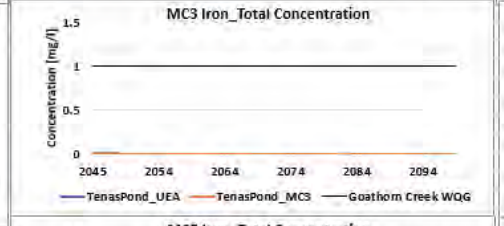



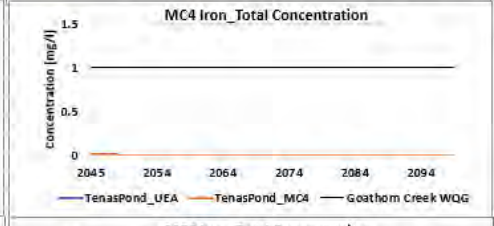



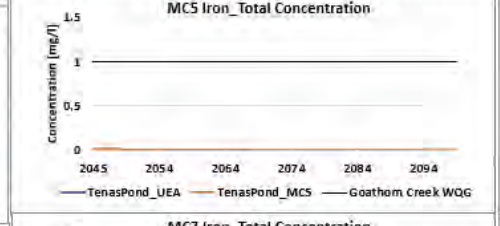



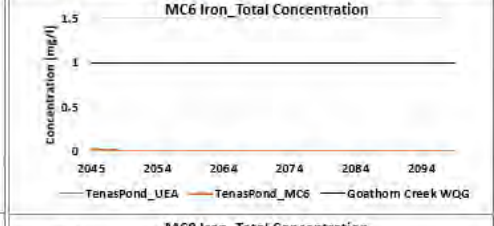



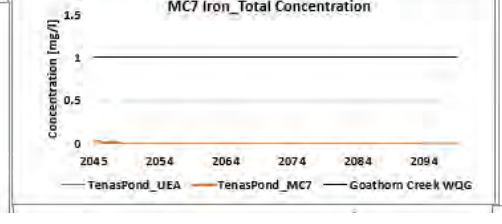



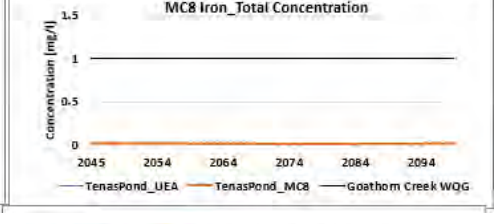
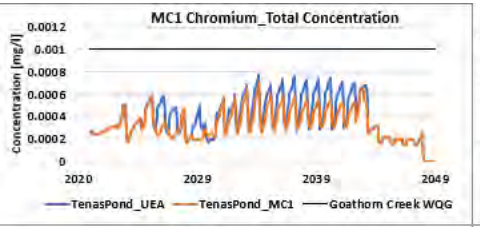
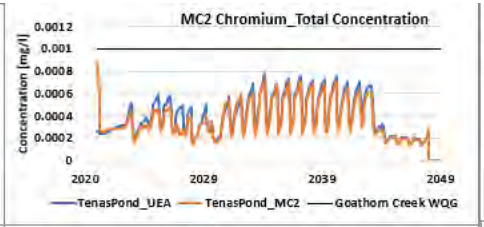
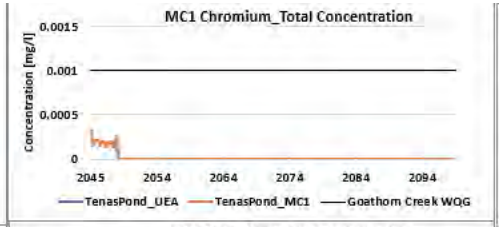
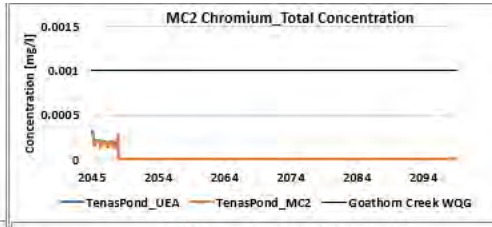



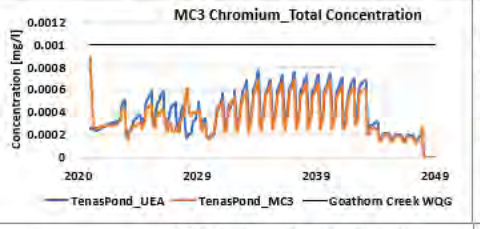
Figure 7C-11: Total Chromium modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

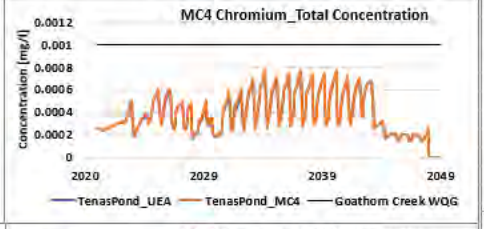


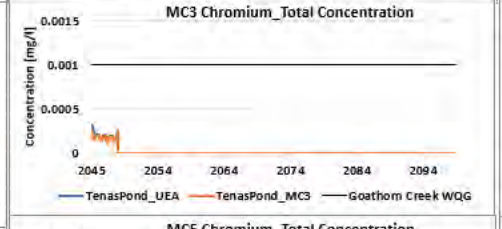



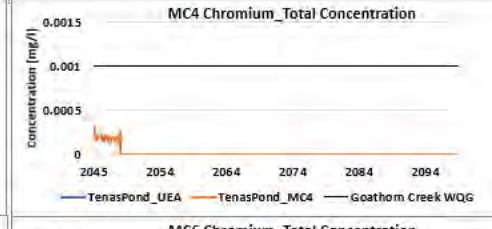



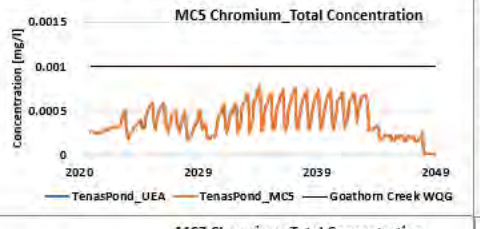



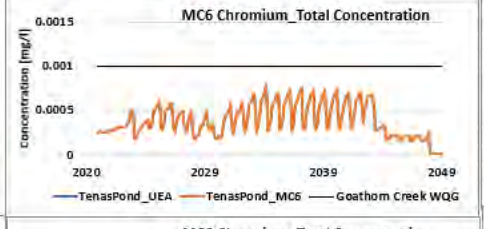



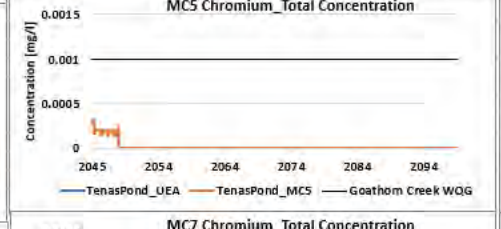



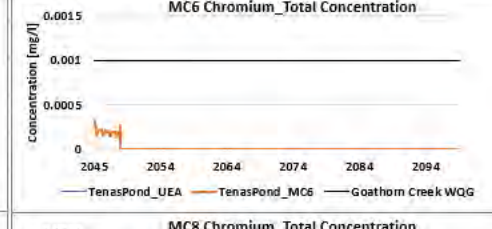



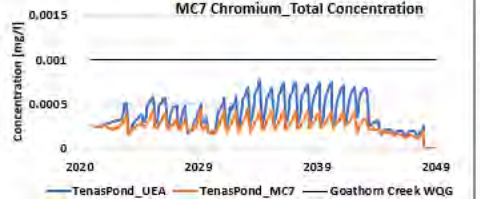



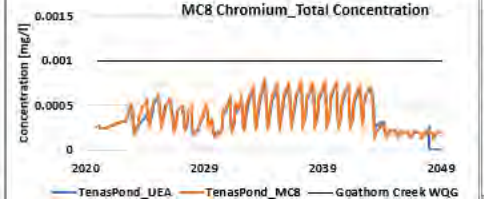



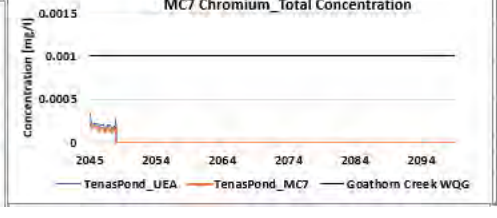



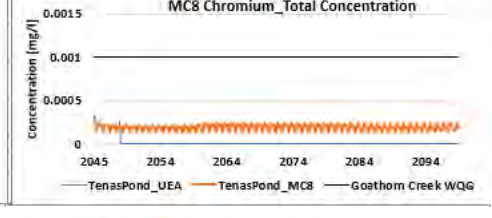
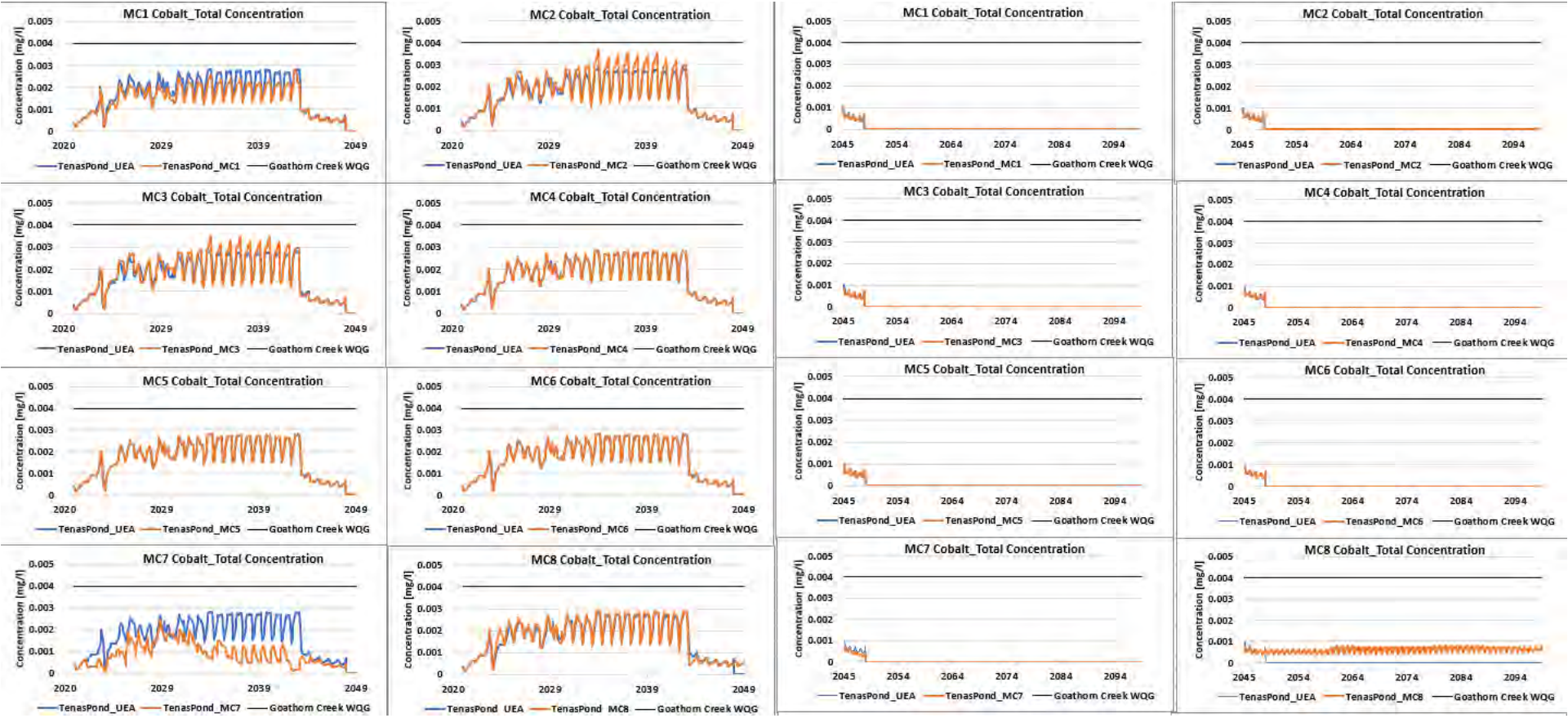



Figure 7C-12: Total Cobalt modelled concentrations in Tenas Control Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

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# Appendix 7-D

## North Management Pond groundwater seepage (Operations and Post-Closure)

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Figure 7D-1: Nitrite modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

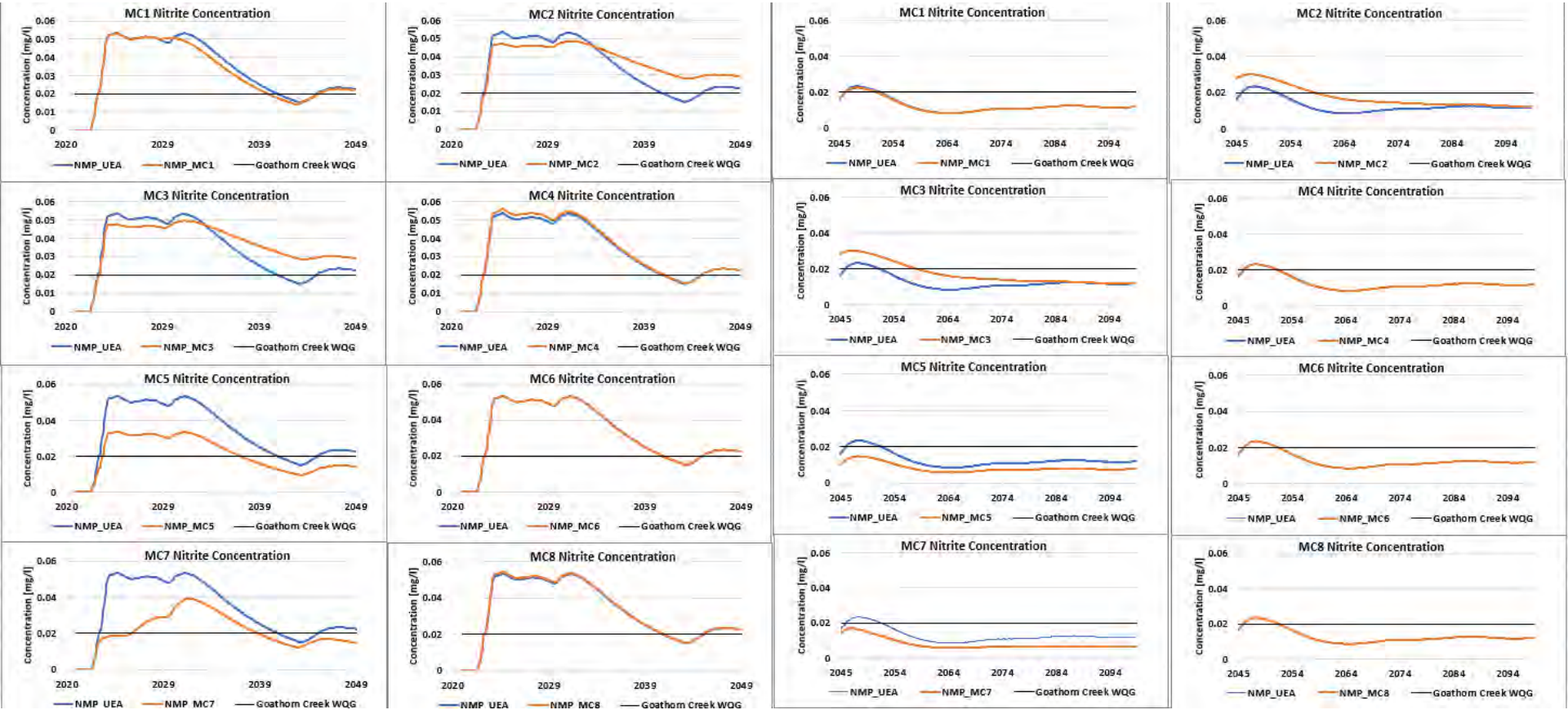


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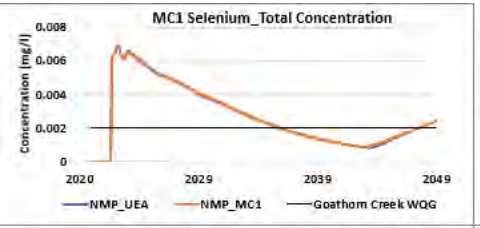
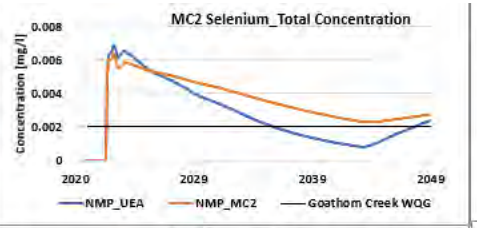
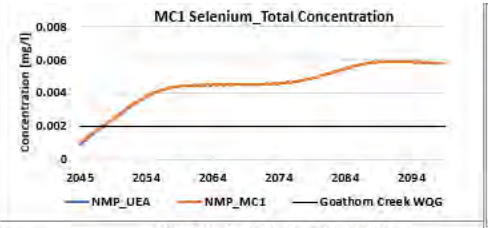
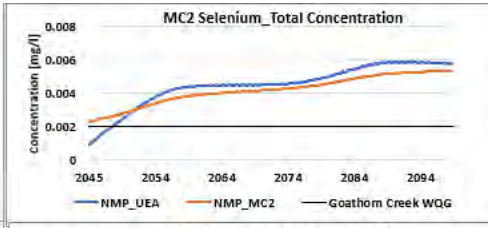
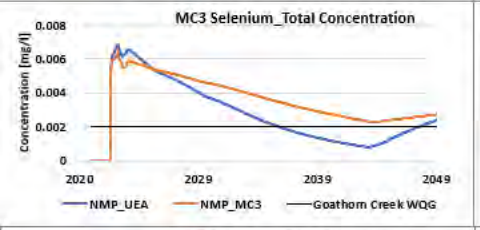
Figure 7D-2: Total Selenium modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project c
in Operations and Post-Closure

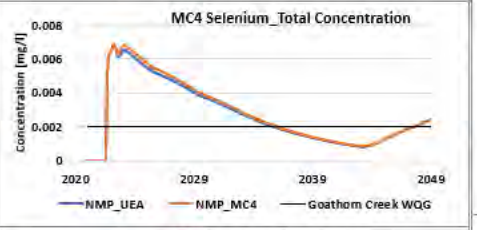


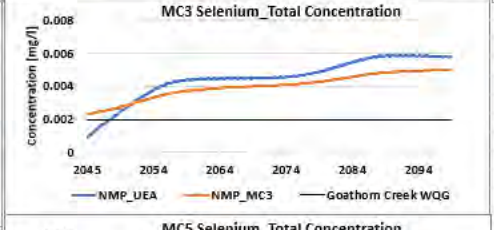



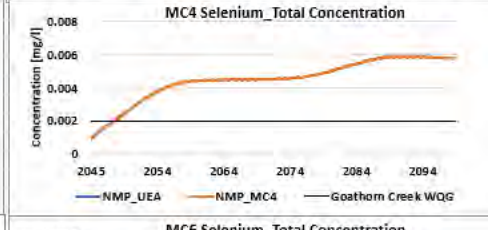



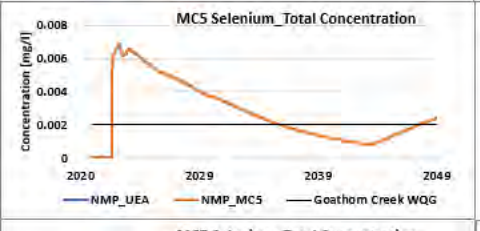



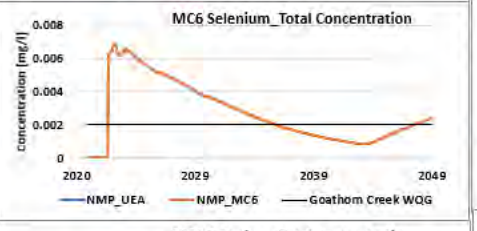



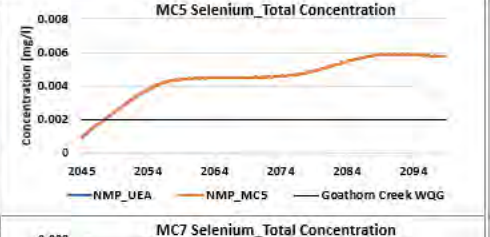



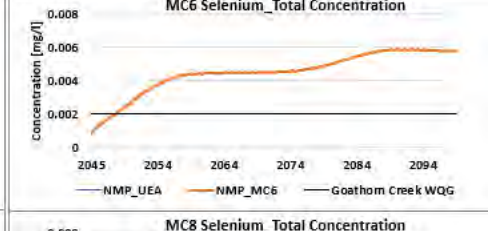



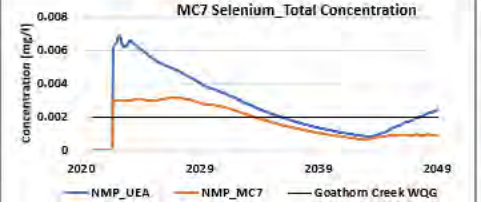



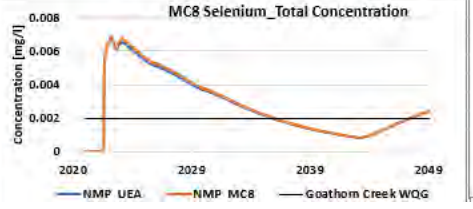



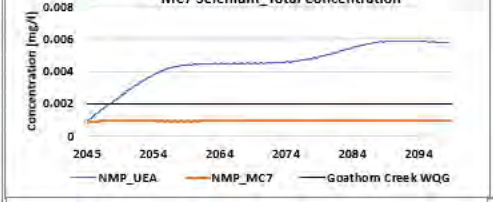



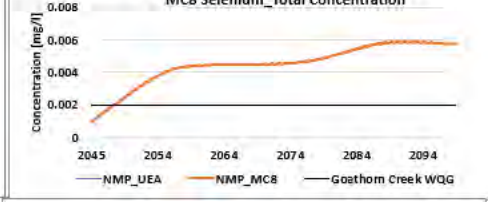
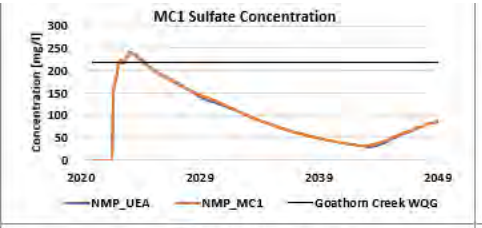
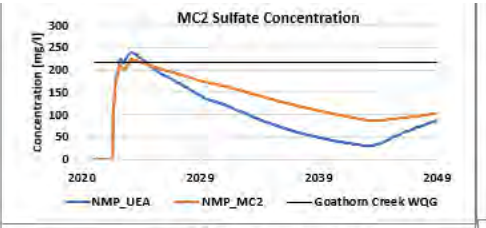
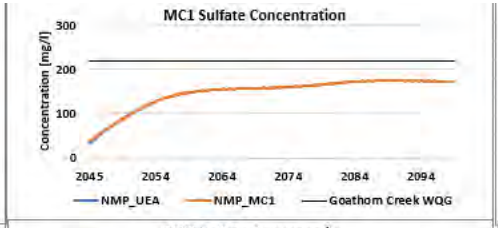
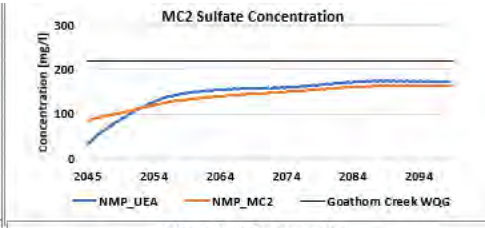



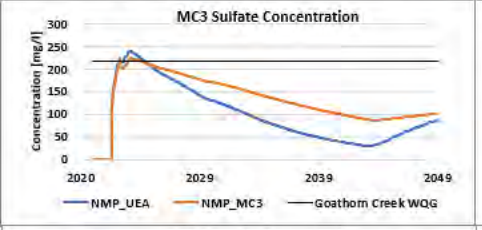
Figure 7D-3: Sulphate modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

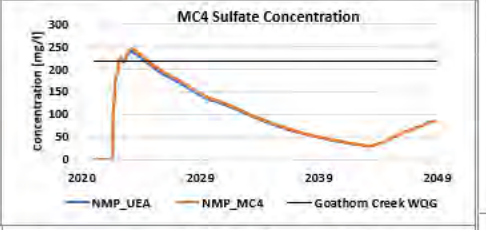


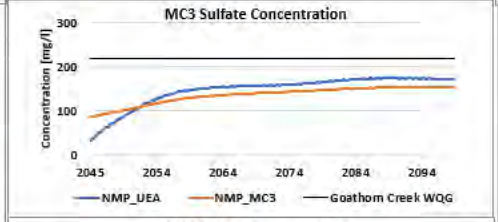



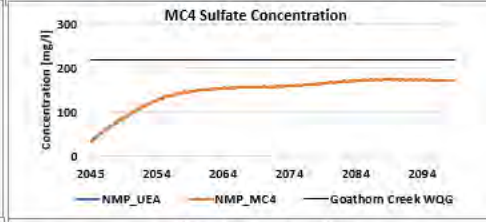



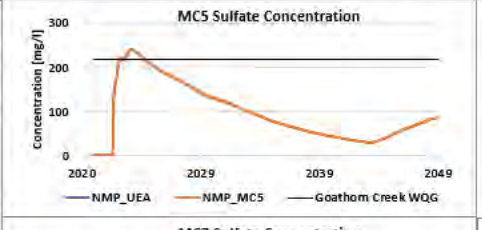



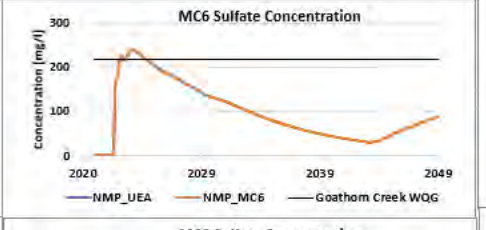



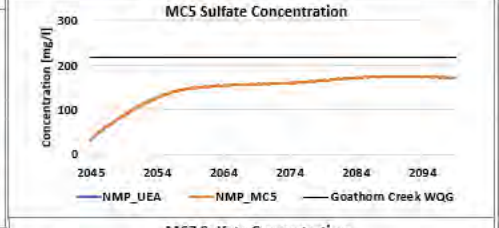



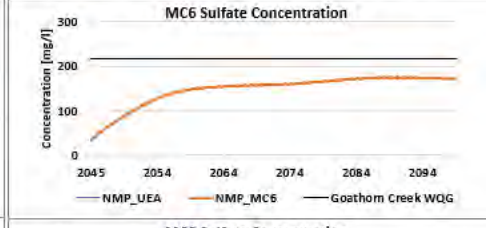



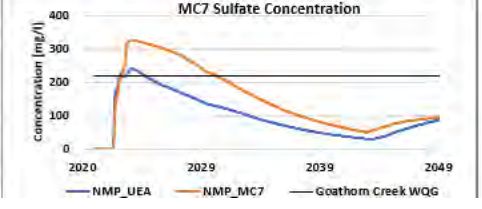



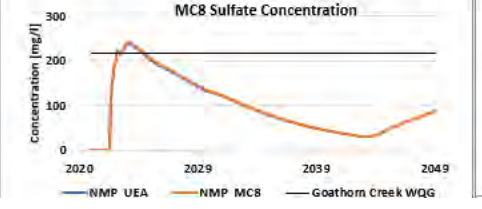



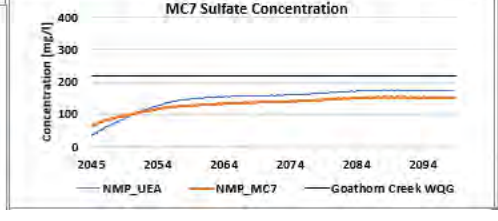



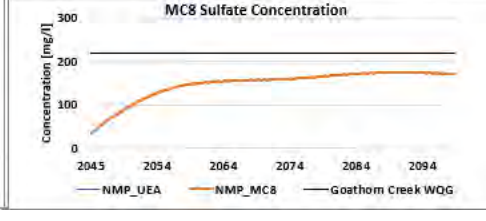
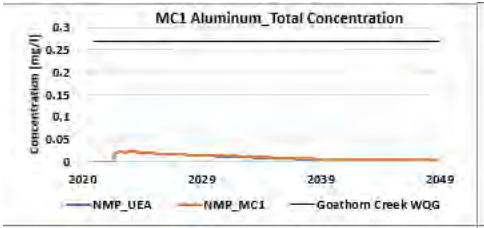
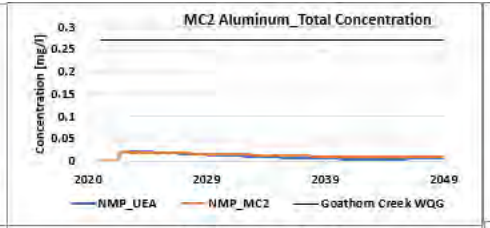
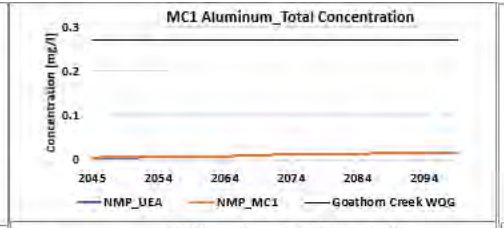
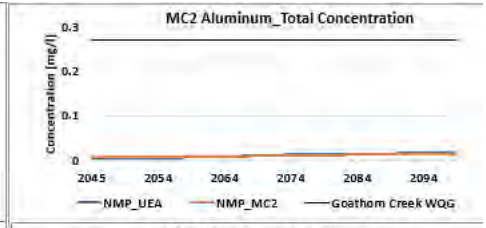



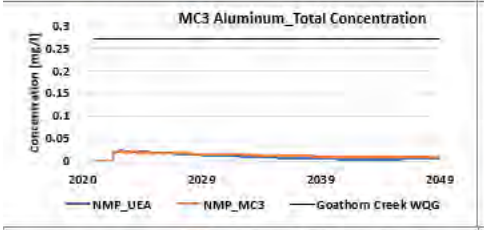
Figure 7D-4: Total Aluminium modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project c
in Operations and Post-Closure

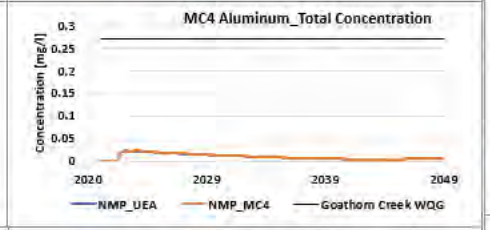


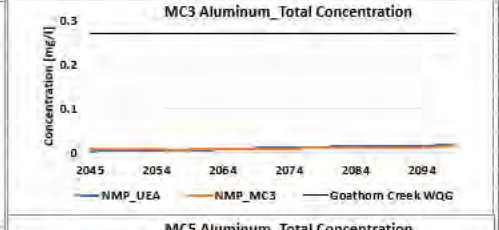



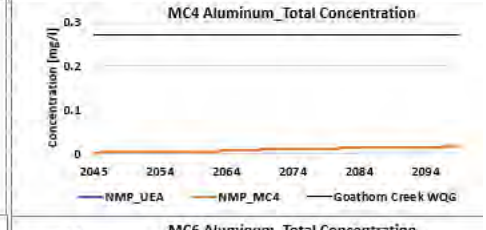



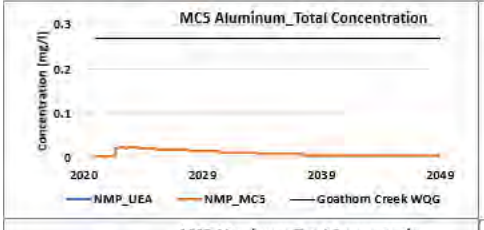



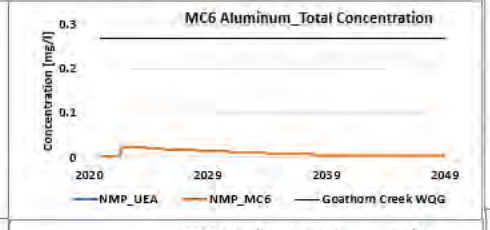



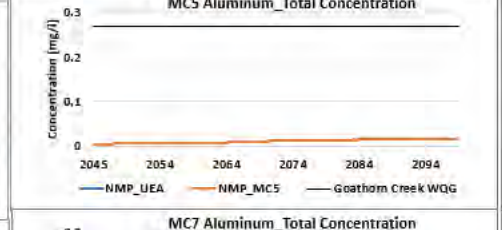



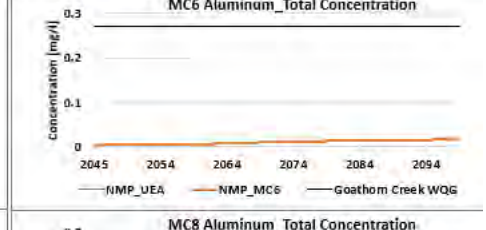



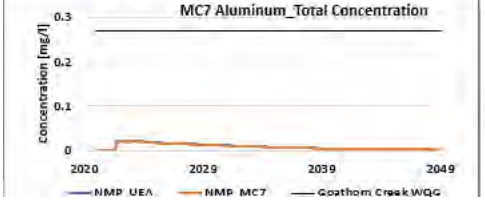



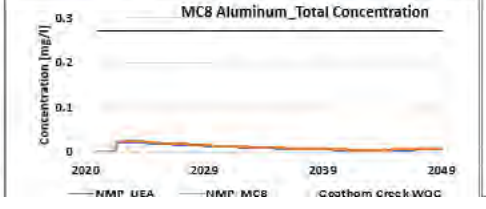



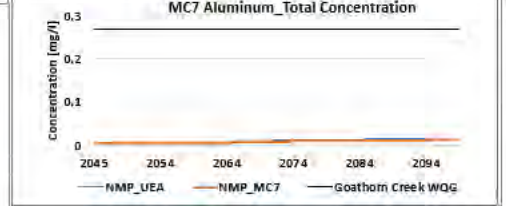



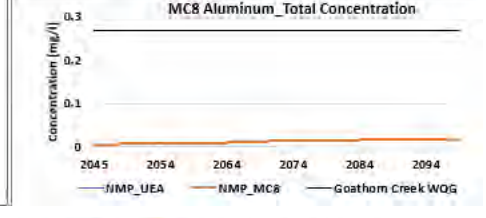



Figure 7D-5: Nitrate modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

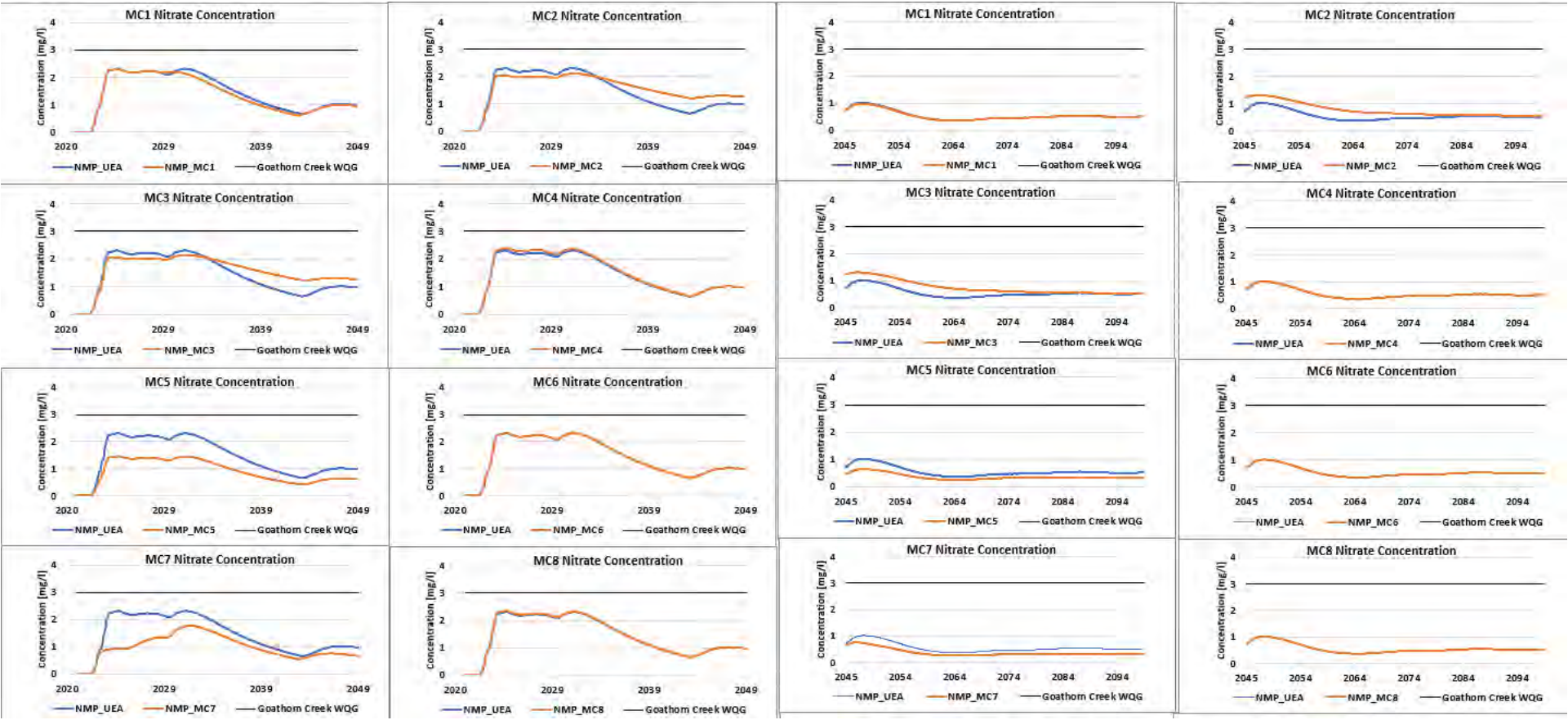



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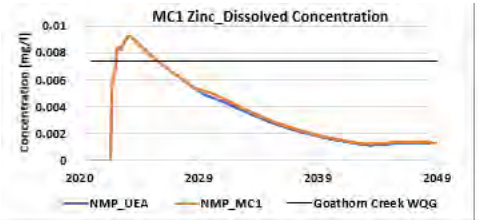
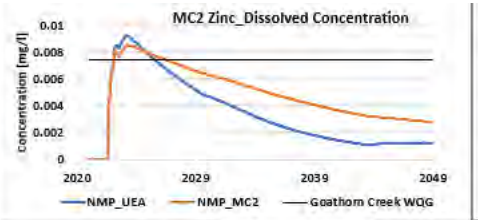
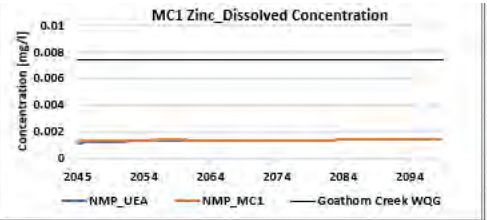
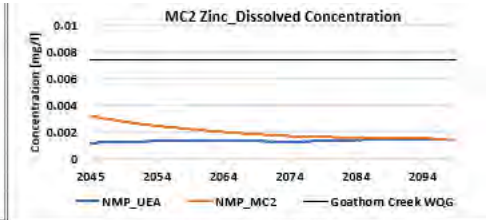
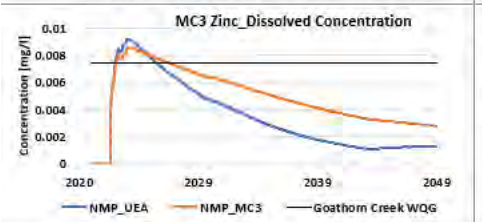
Figure 7D-6: Dissolved Zinc modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project c
in Operations and Post-Closure

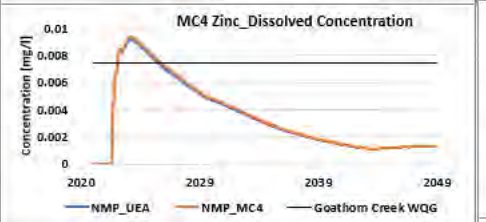


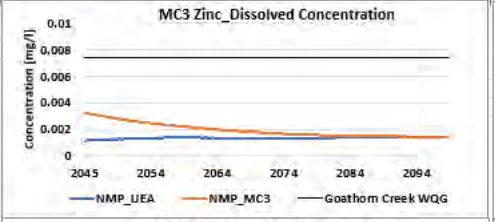



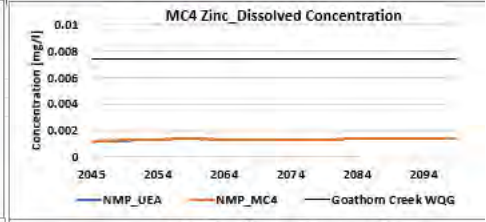



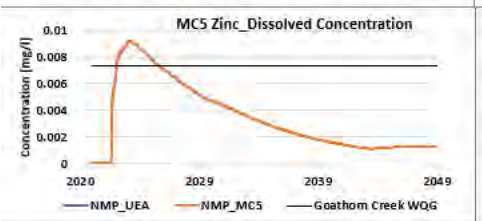



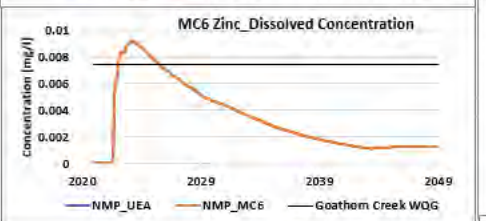



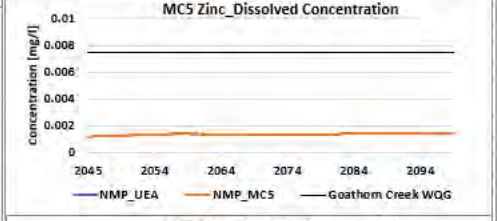



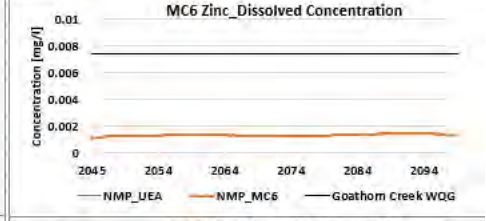



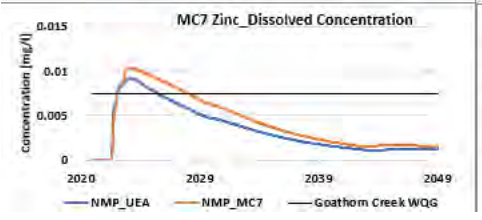



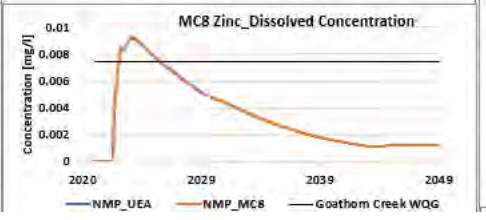



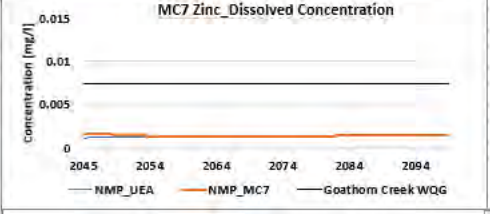



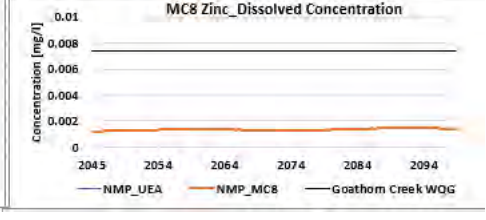



Figure 7D-7: Dissolved Copper modelled concentrations in North Management groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

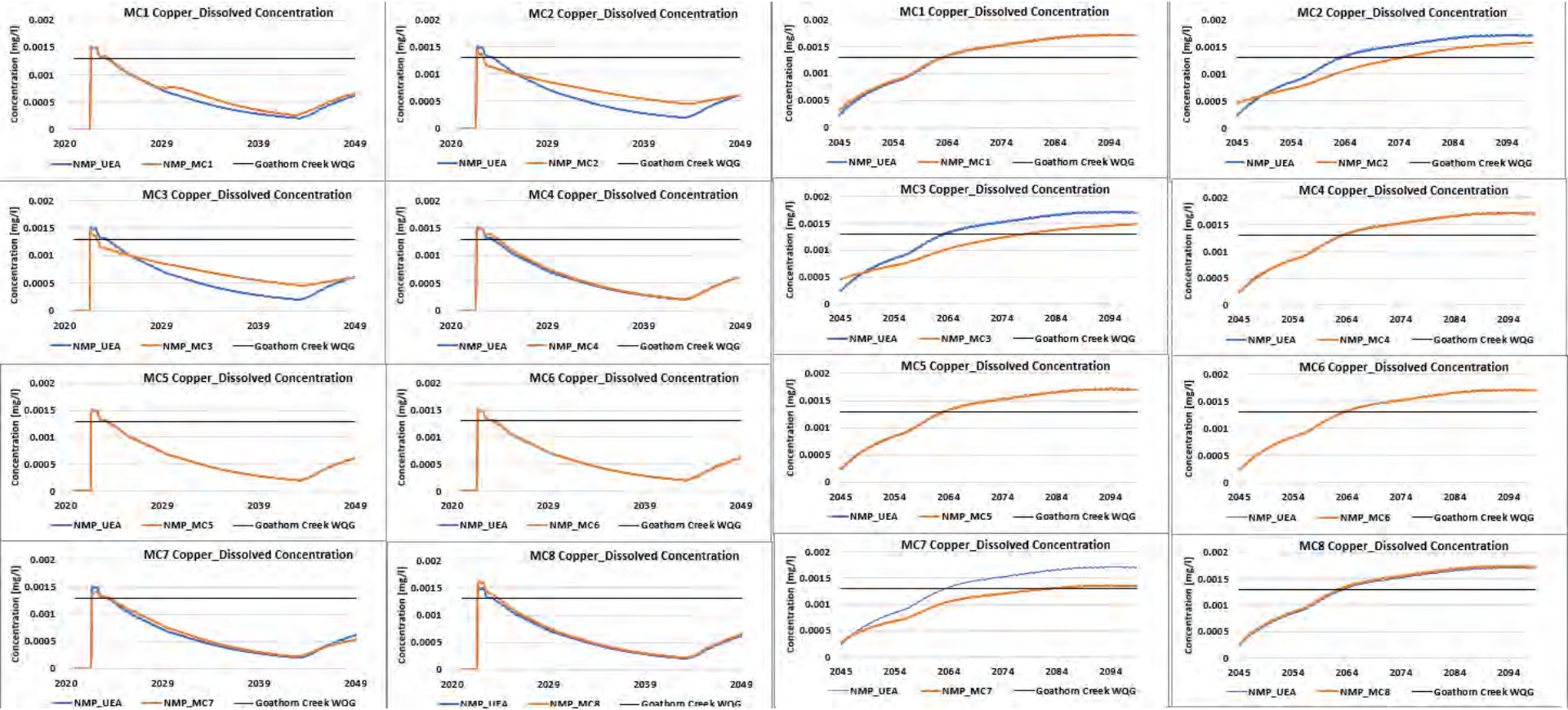



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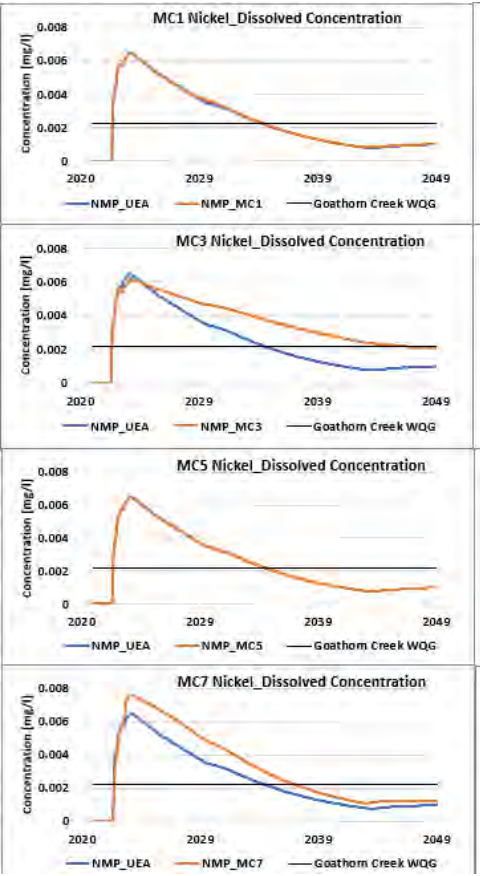
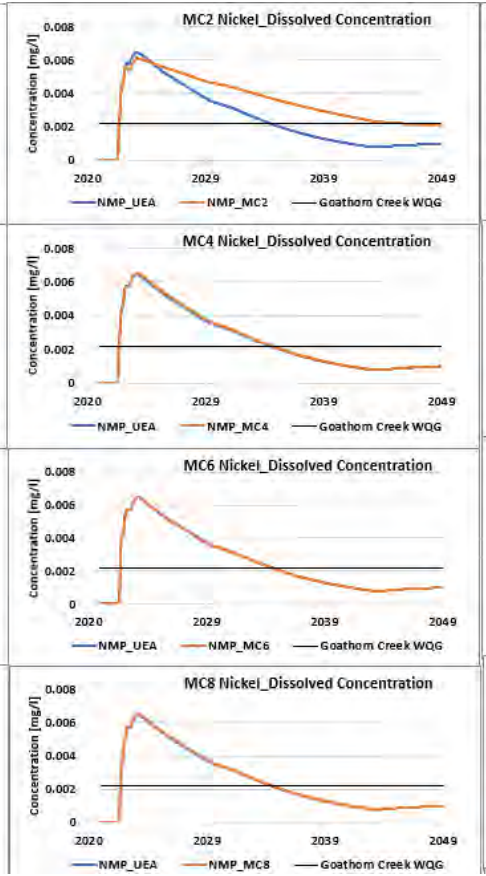
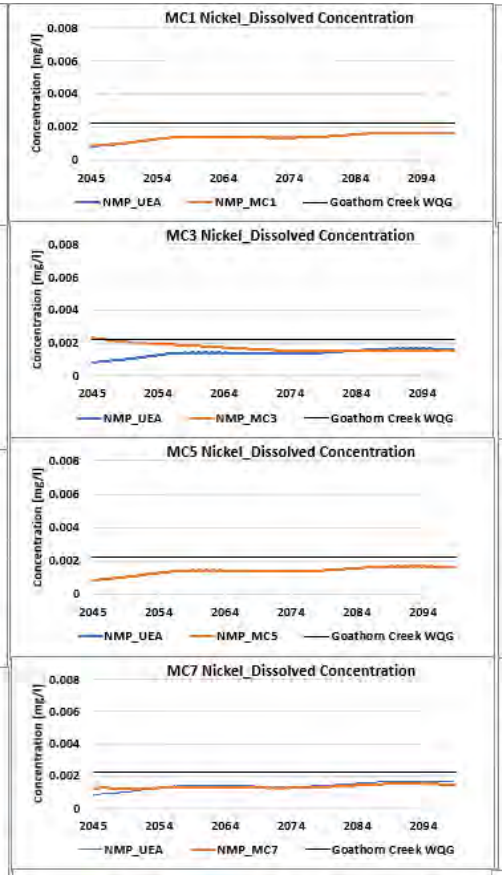
Figure 7D-8: Dissolved Nickel modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project c
in Operations and Post-Closure



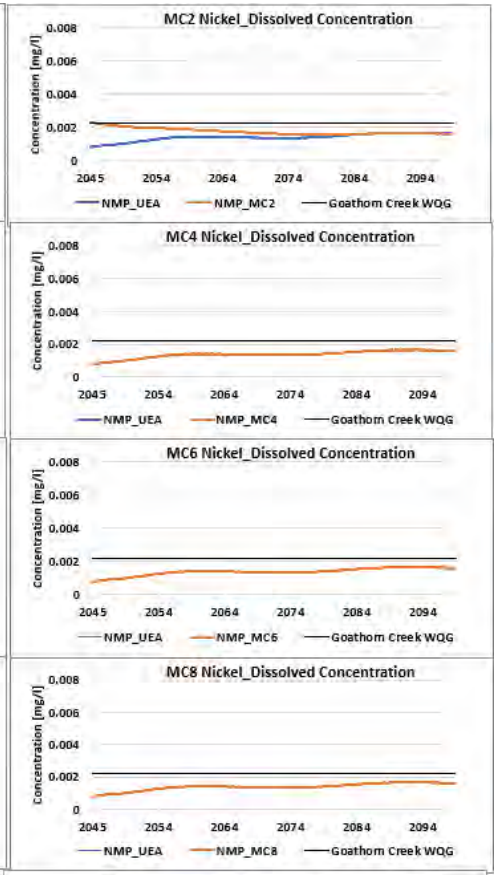
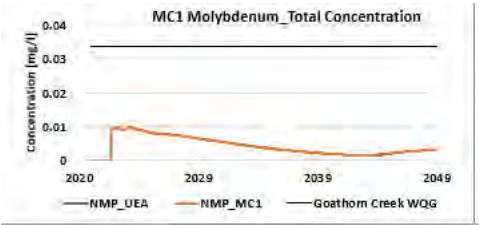
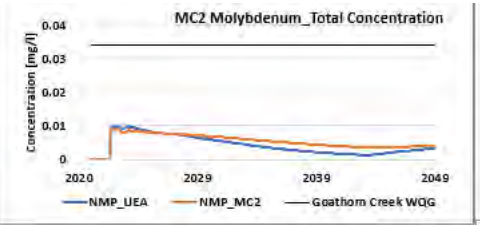
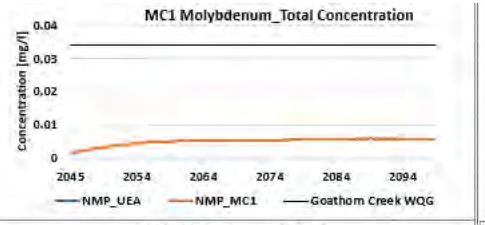
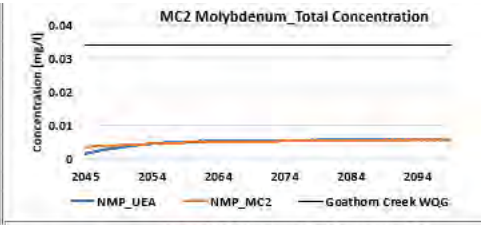



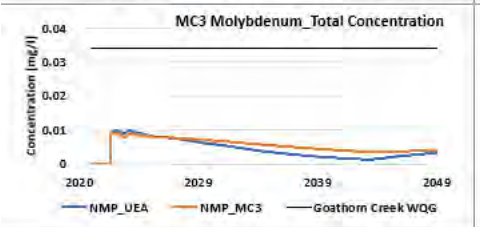
Figure 7D-9: Total Molybdenum modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project in Operations and Post-Closure

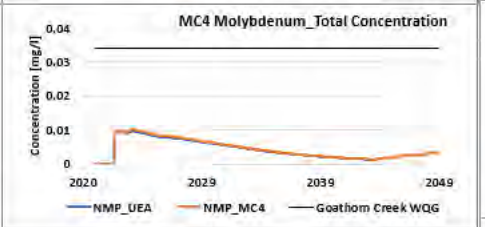


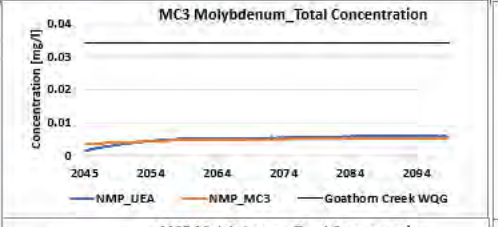



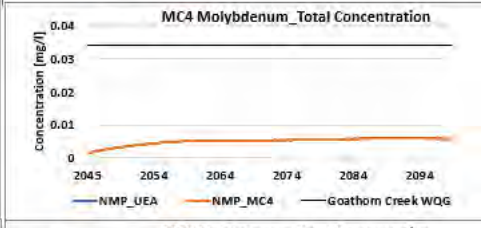



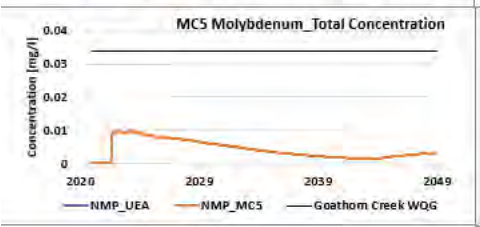



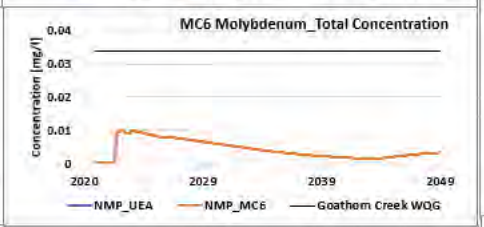



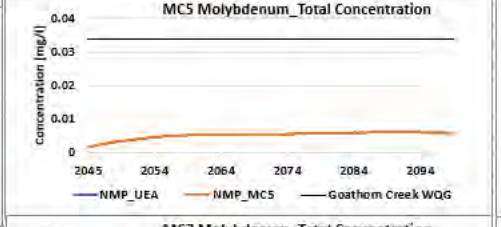



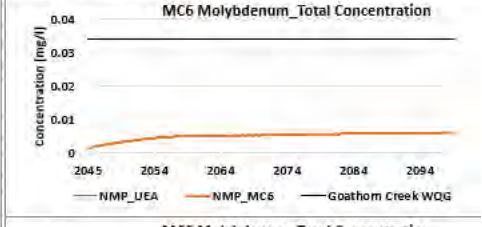



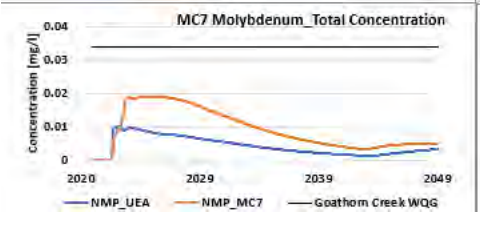



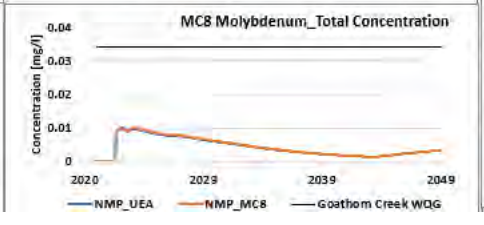



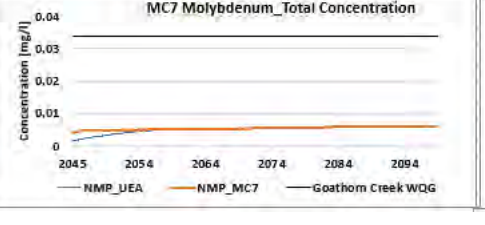



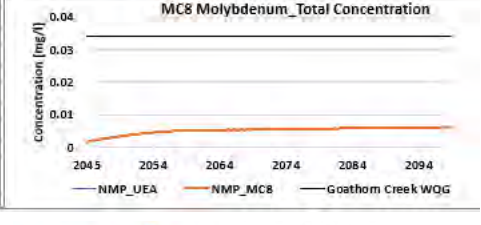
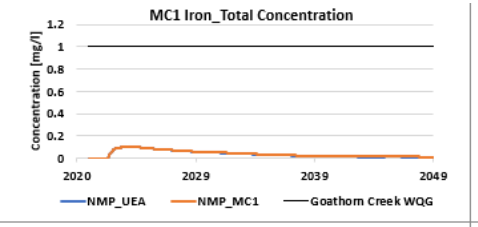
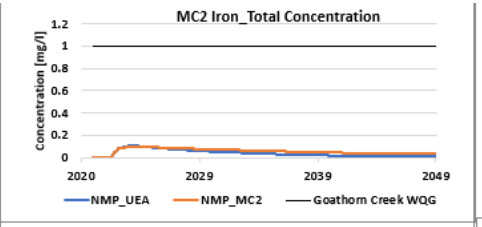
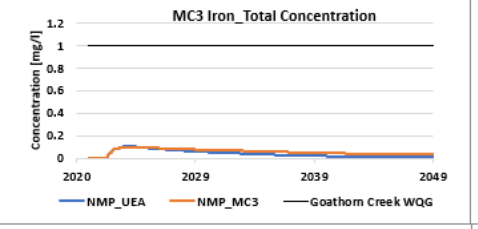
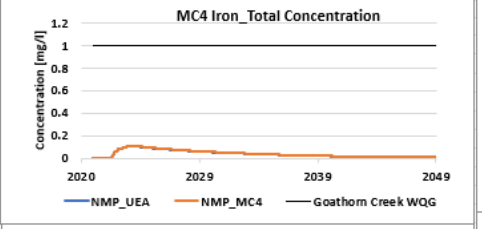



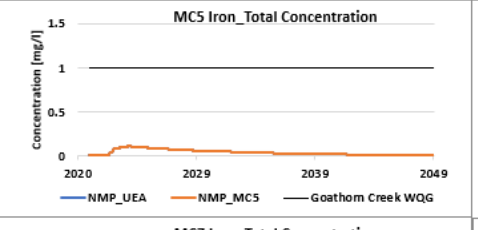
Figure 7D-10: Total Iron modelled concentrations in North Management Pond surface groundwater seepage for mitigation cases compared to projec
in Operations and Post-Closure

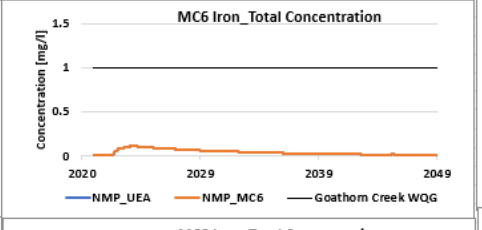


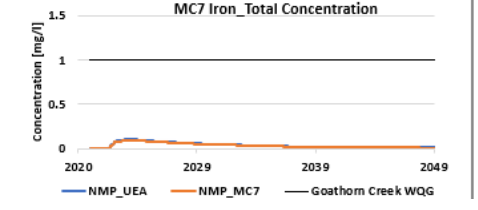



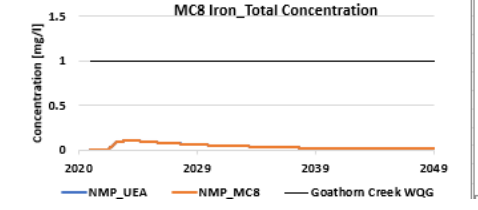



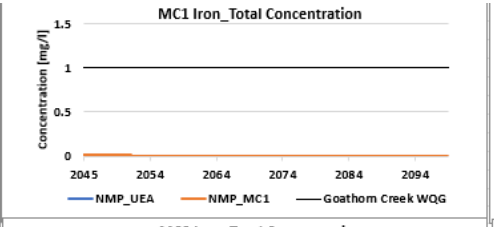



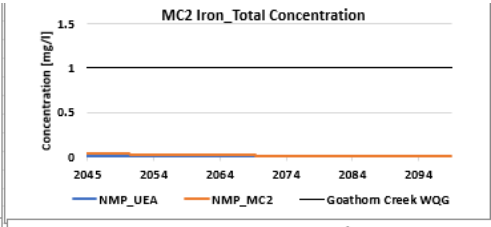



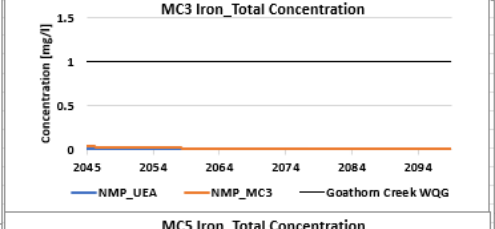



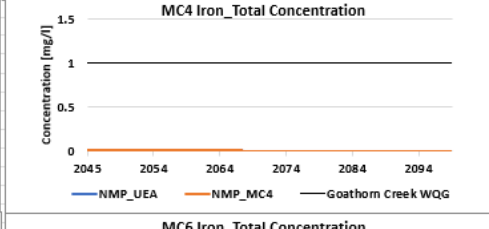



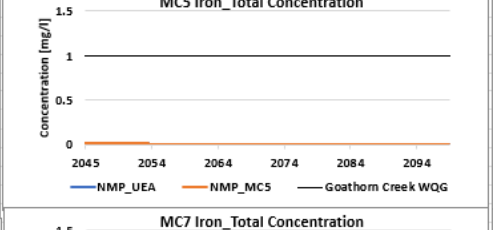



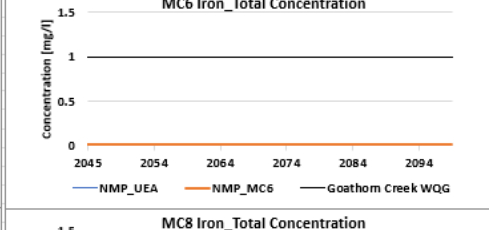



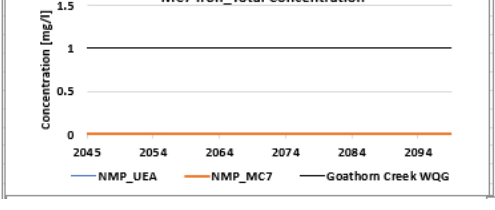



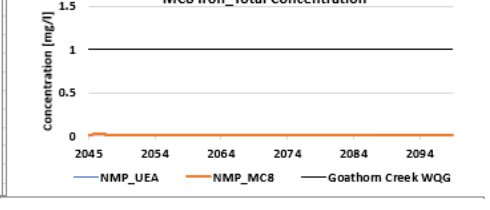




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Figure 7D-11: Total Chromium modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project in Operations and Post-Closure

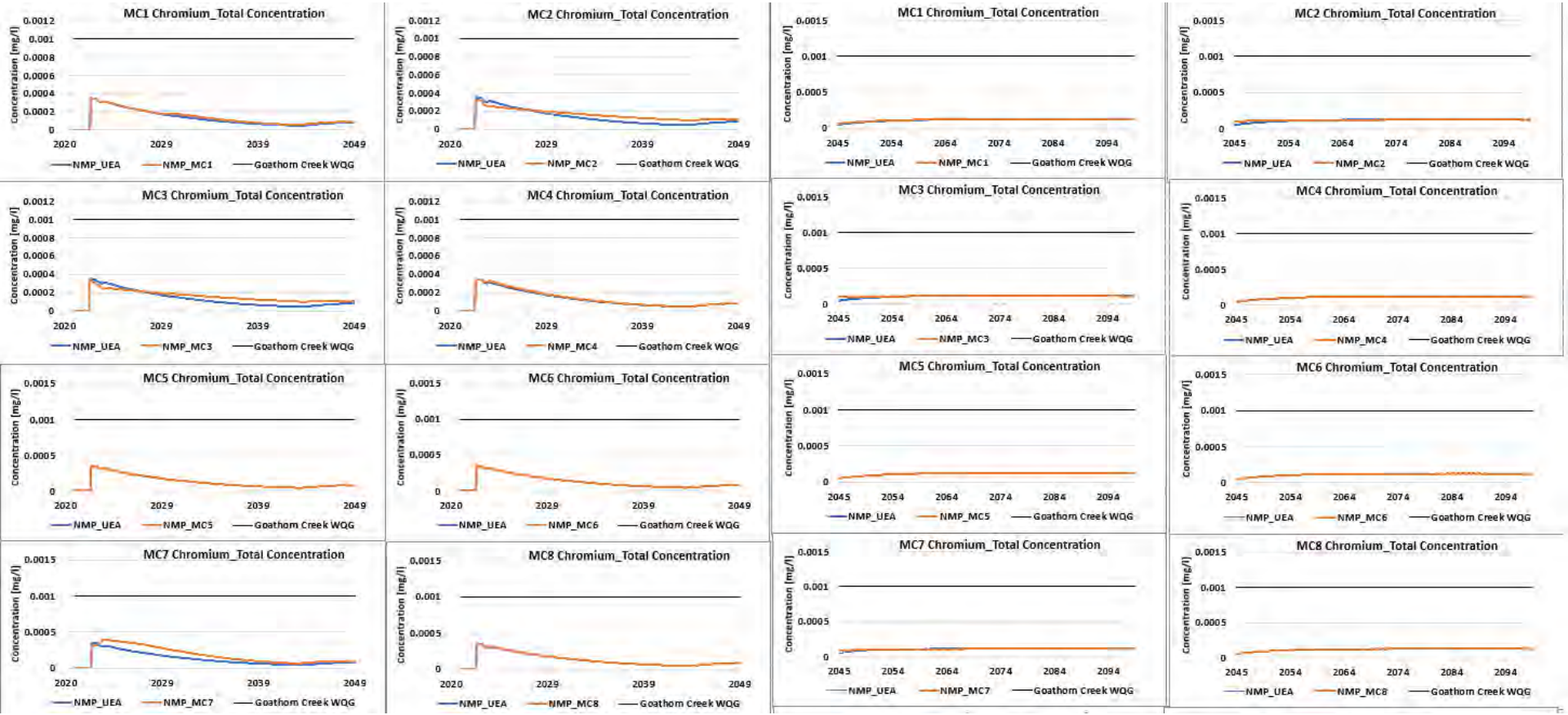


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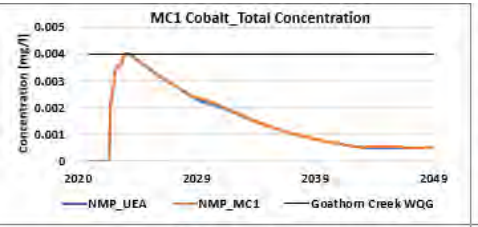
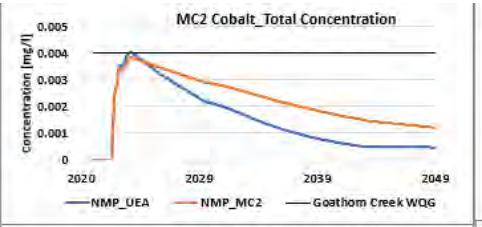
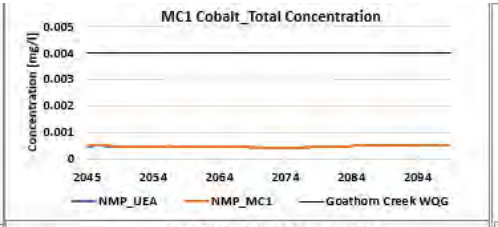
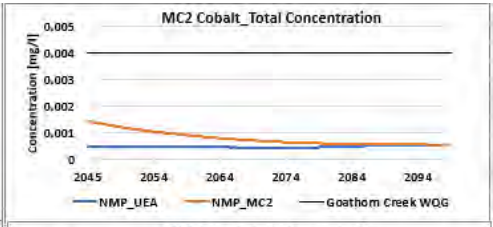
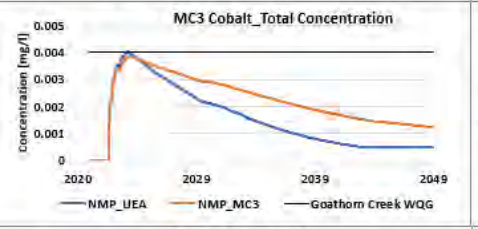
Figure 7D-12: Total Cobalt modelled concentrations in North Management Pond groundwater seepage for mitigation cases compared to project
in Operations and Post-Closure

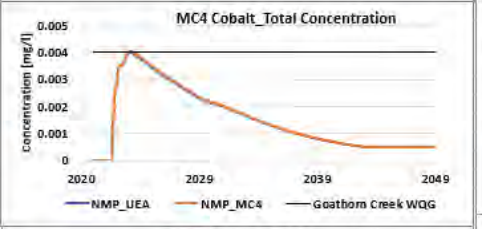


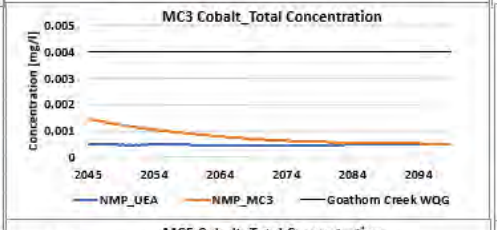



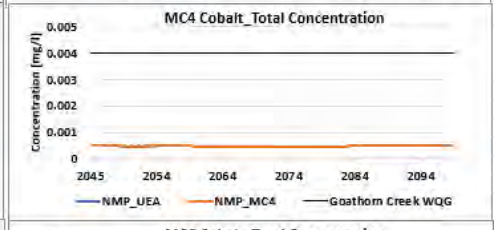



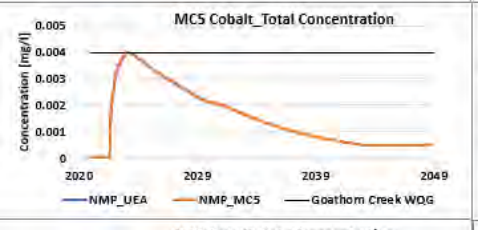



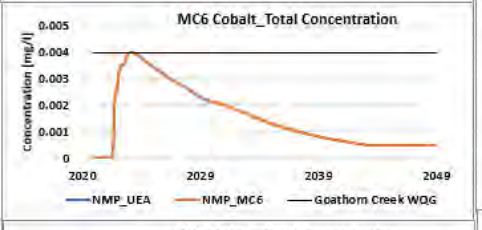



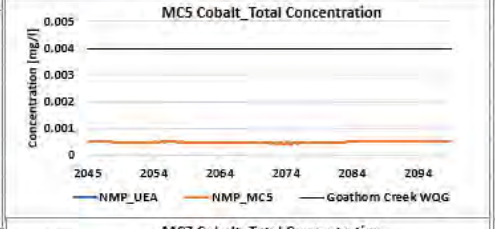



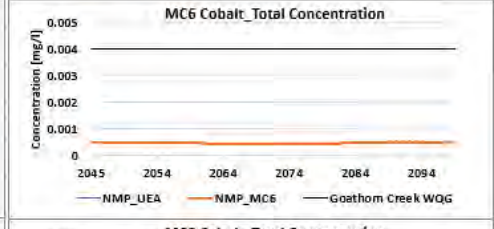



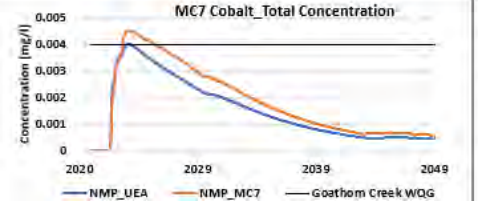



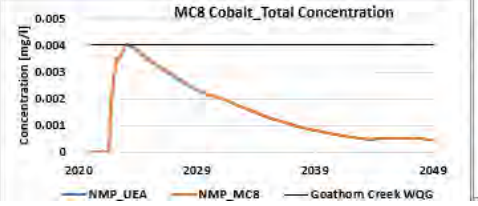



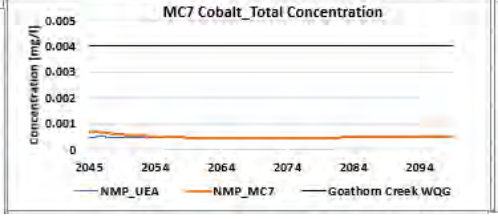



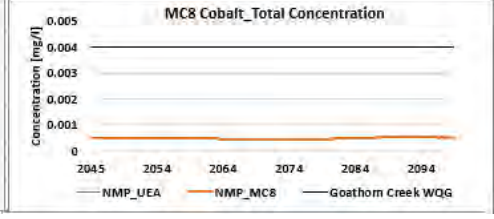



# Appendix 7-E

East Management Pond groundwater seepage (Operations and Post-Closure)

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Figure 7E-1: Nitrite modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

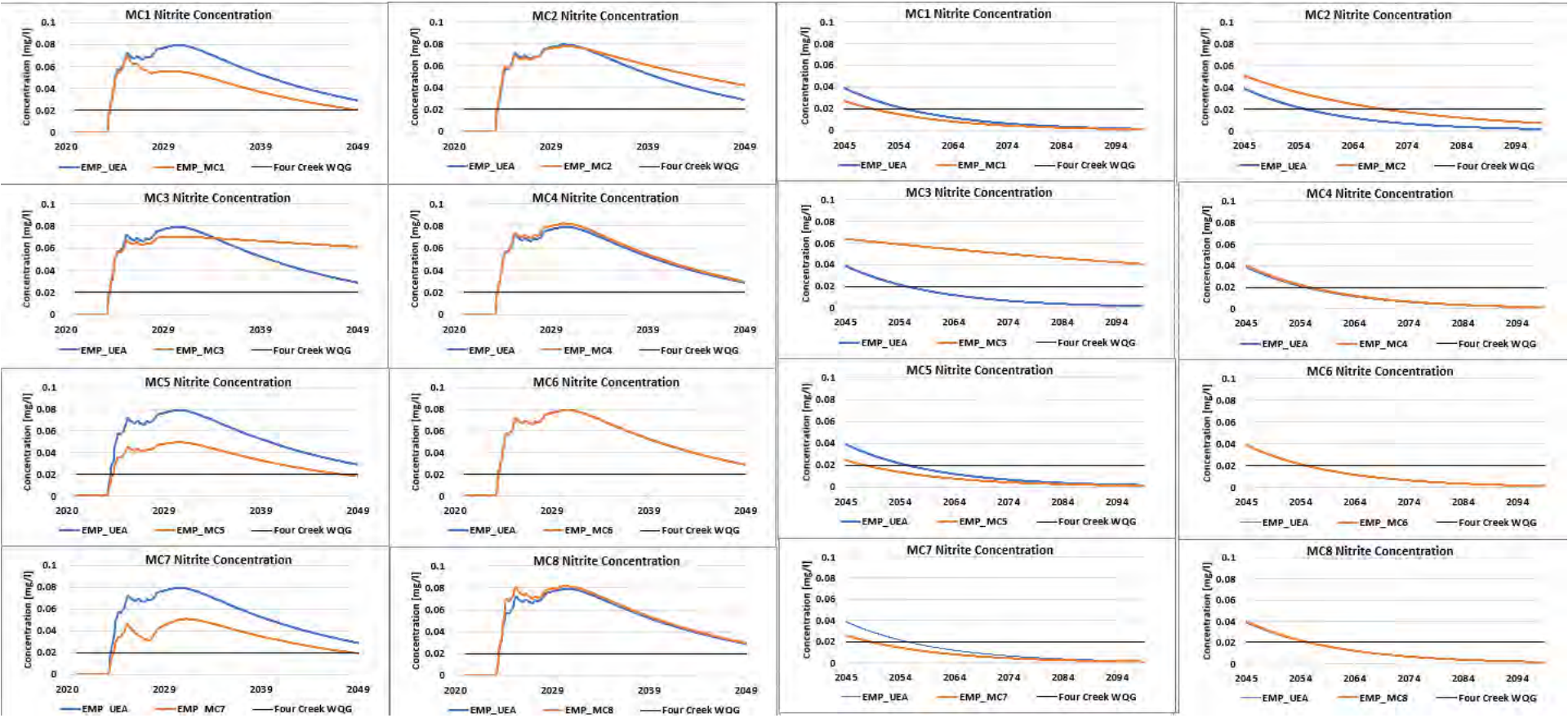


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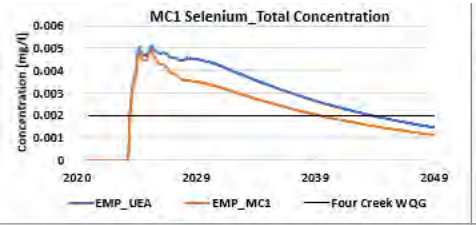
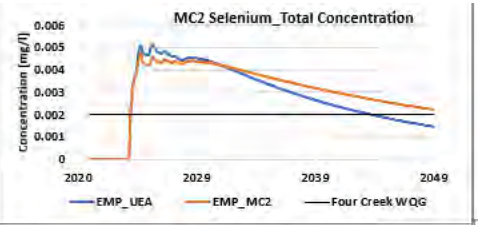
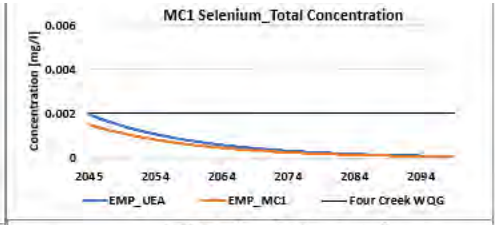
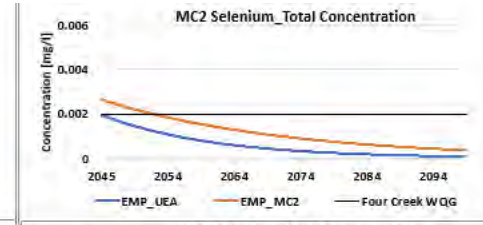
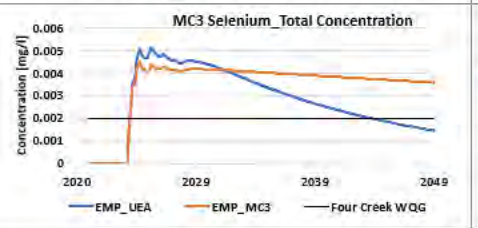
Figure 7E-2: Total Selenium modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project ca
in Operations and Post-Closure

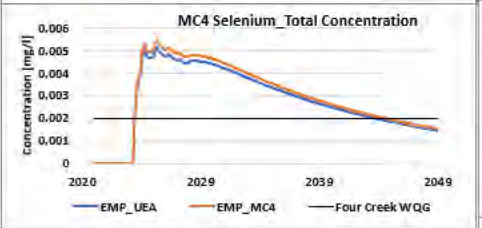


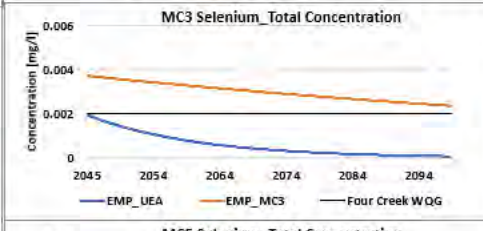



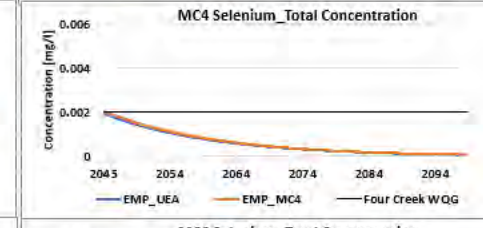



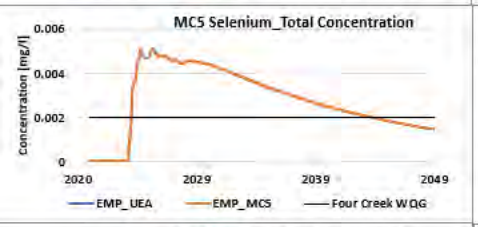



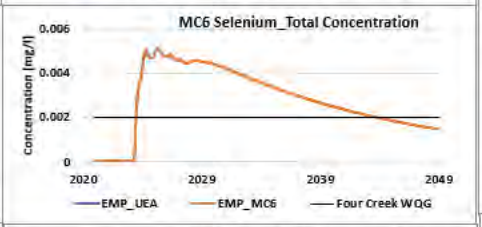



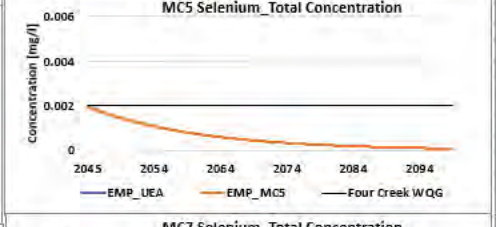



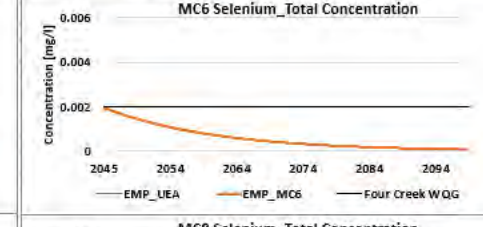



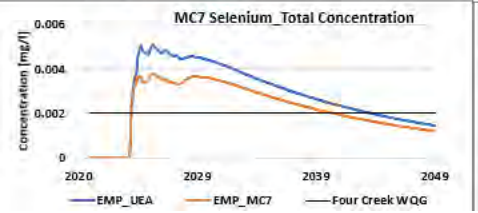



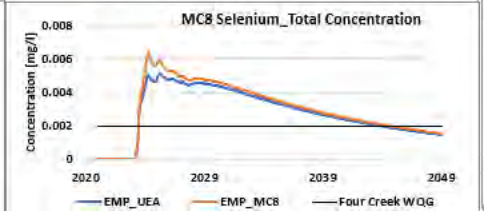



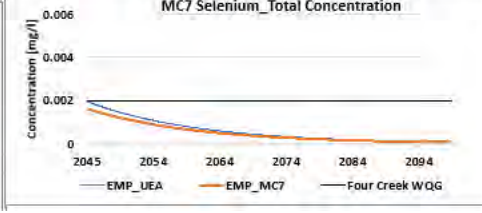



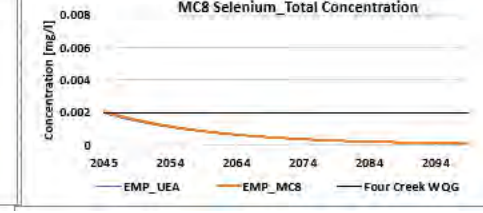
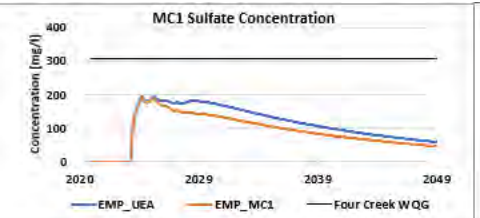
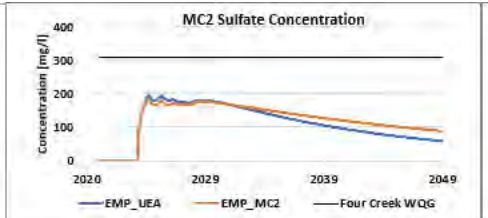
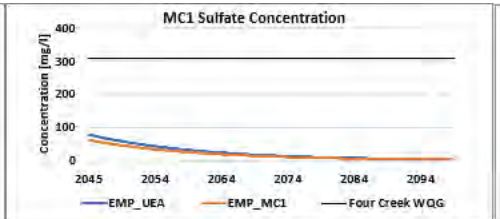
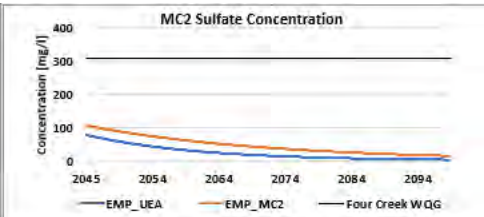



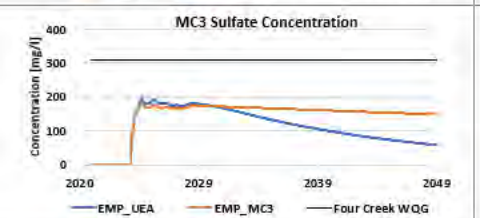
Figure 7E-3: Sulphate modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

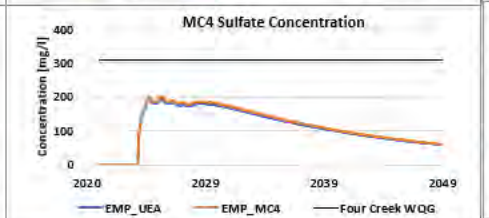


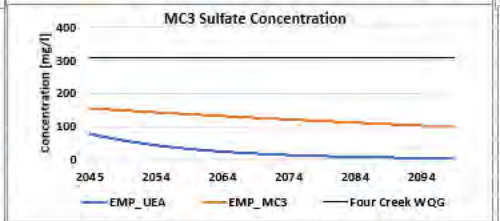



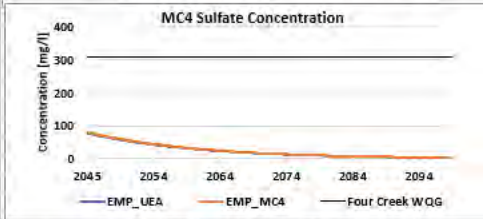



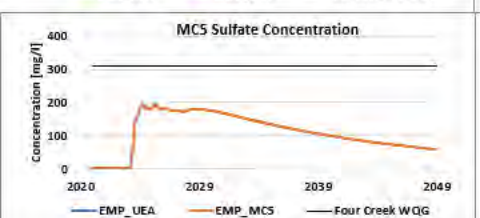



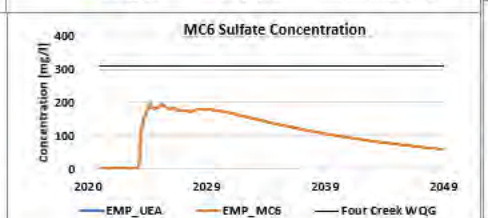



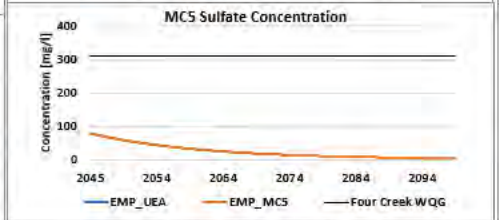



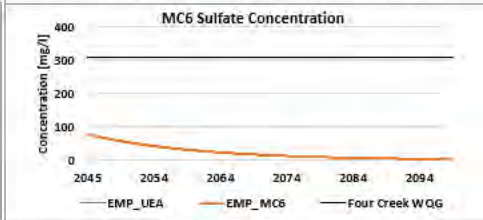



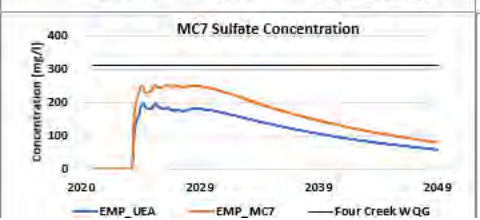



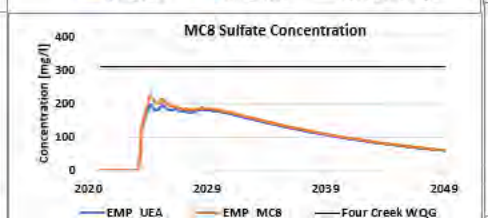



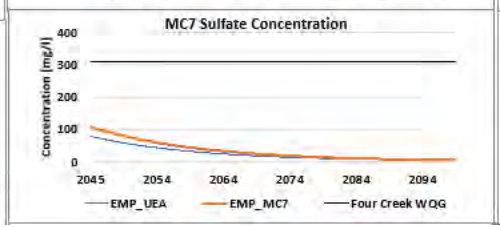



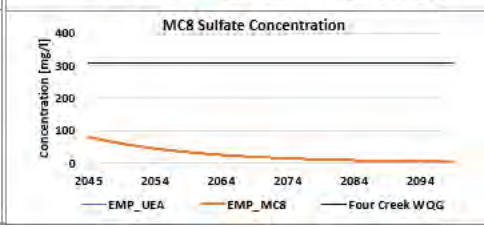



Figure 7E-4: Total Aluminium modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project ca
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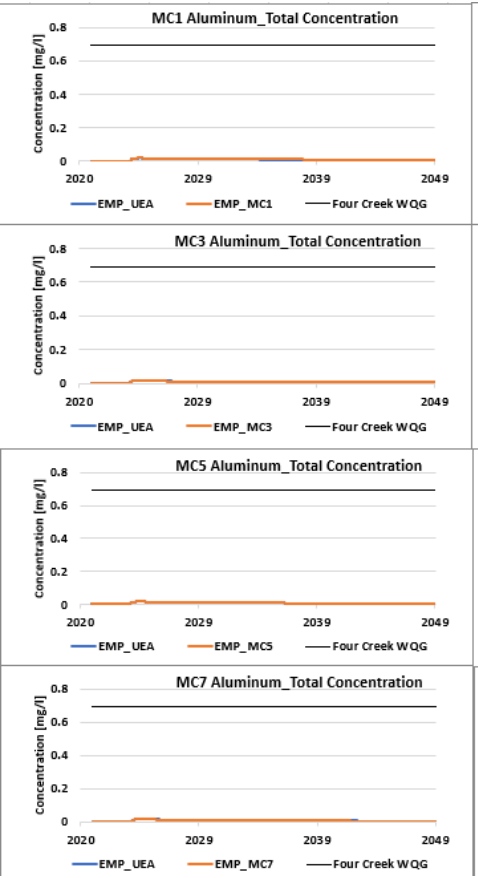


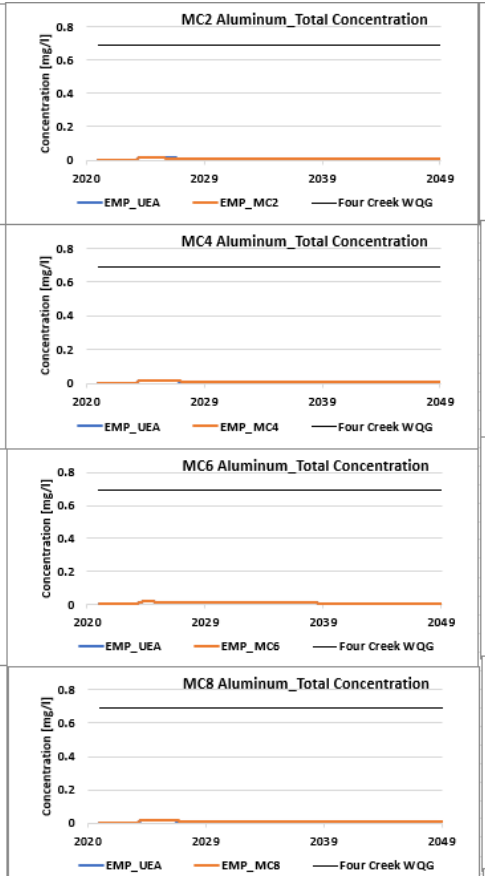




















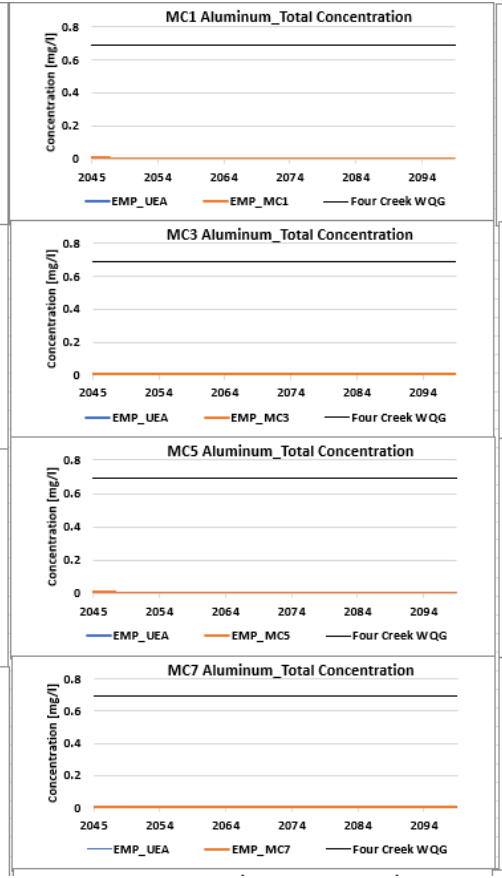


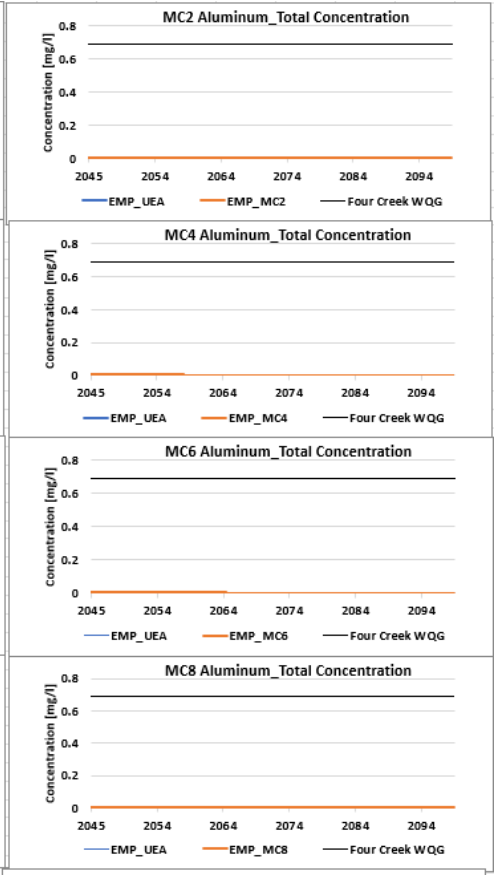

Figure 7E-5: Nitrate modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

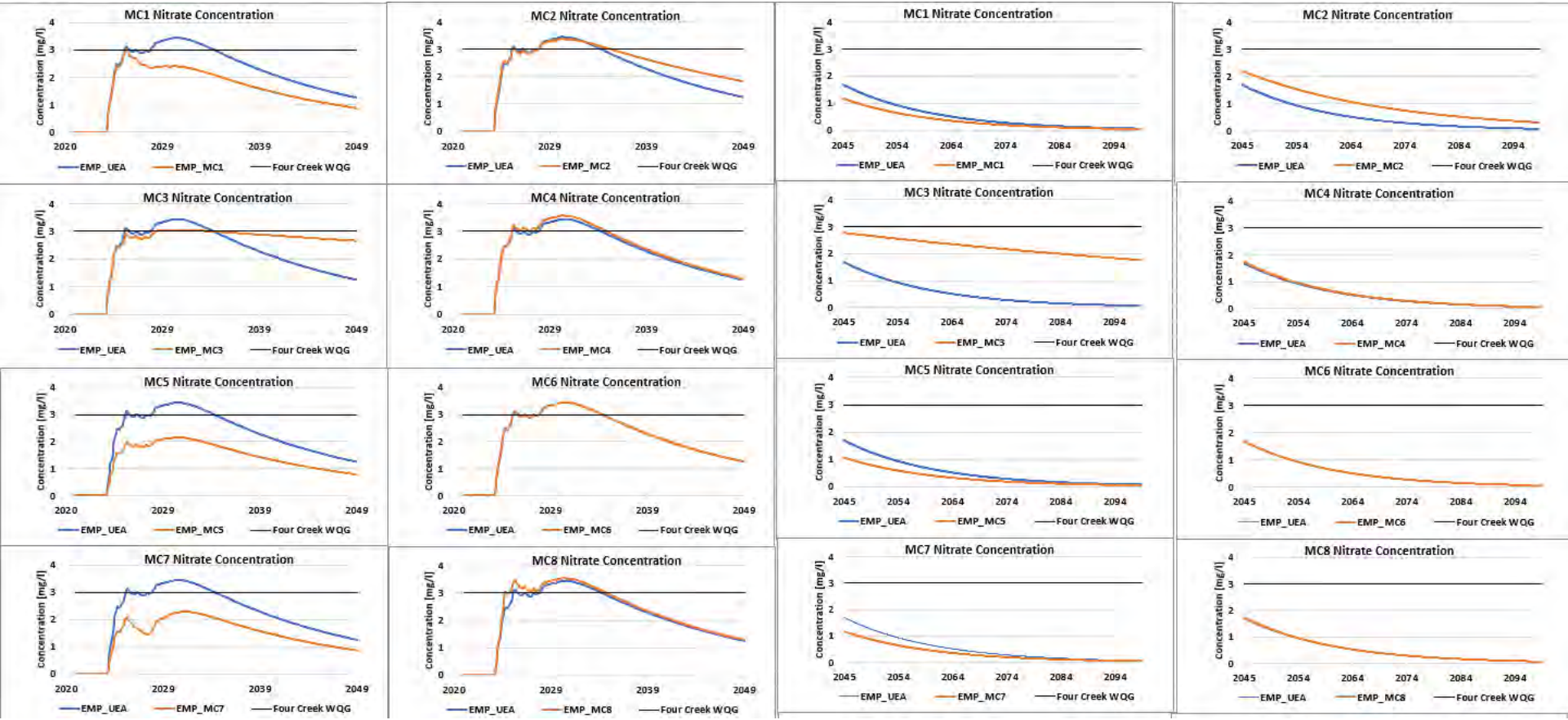


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Figure 7E-6: Dissolved Zinc modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project ca
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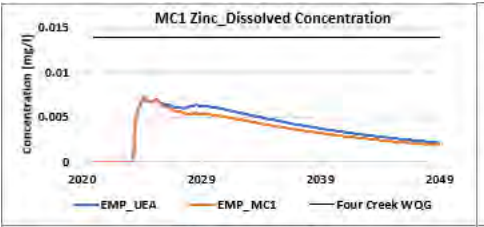


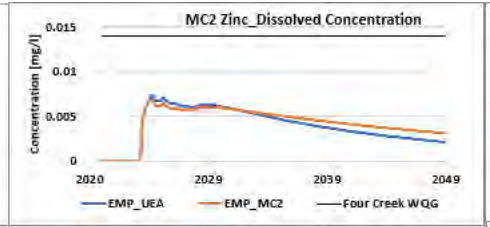


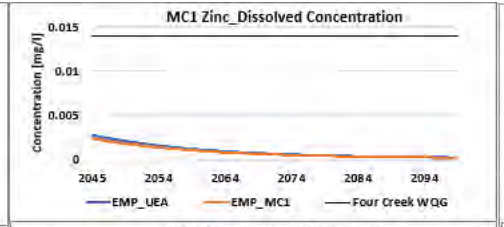


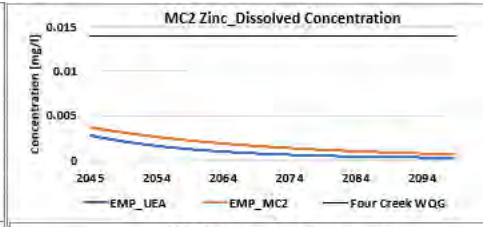


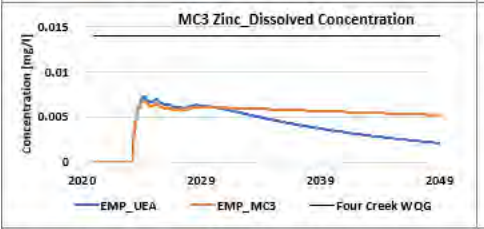


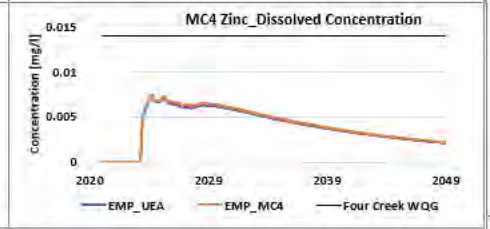


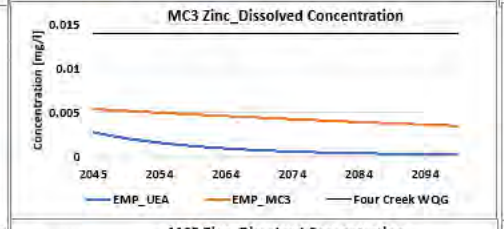


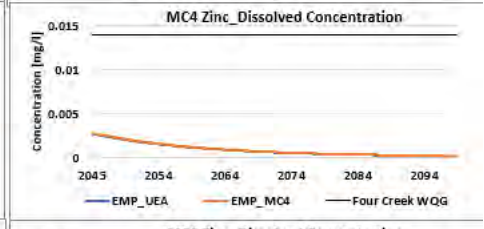

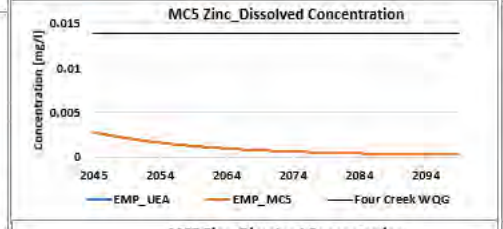


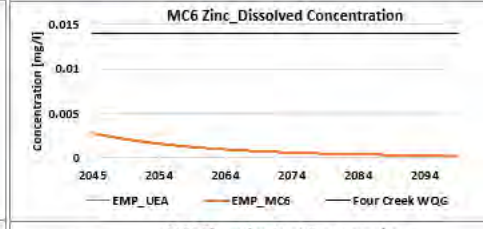


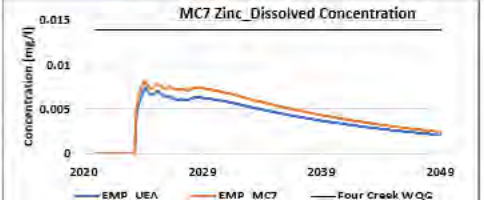


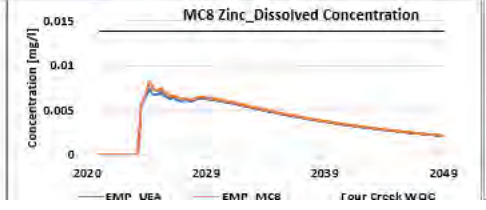


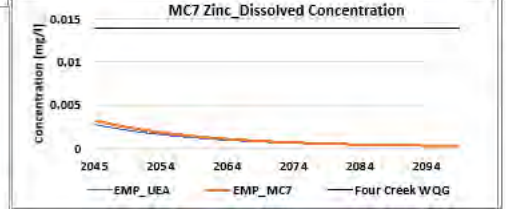


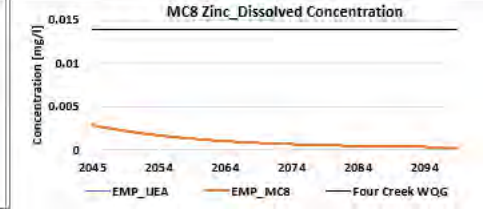


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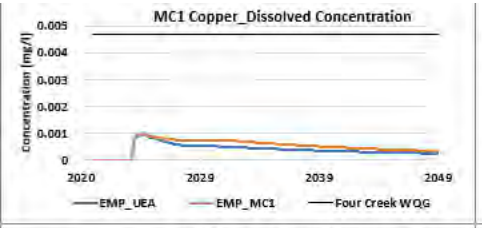
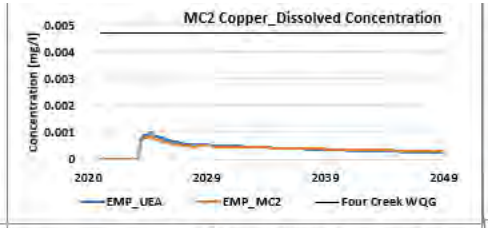
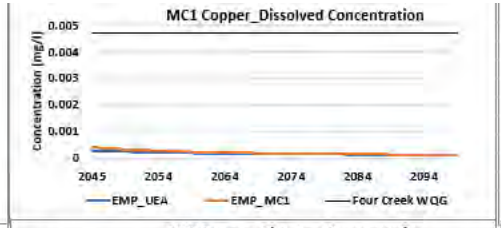
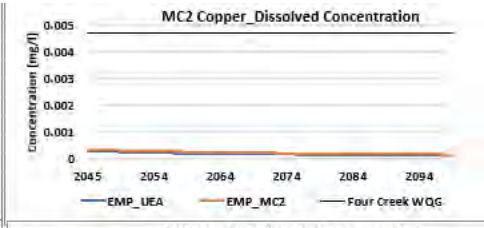
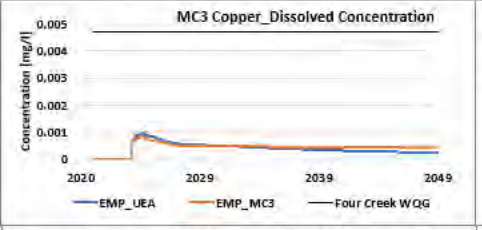
Figure 7E-7: Dissolved Copper modelled concentrations in East Management groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

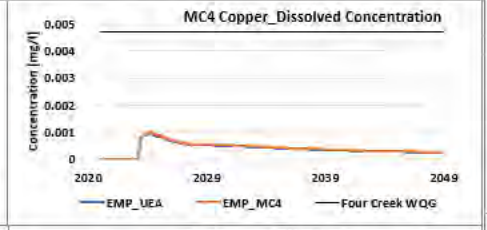


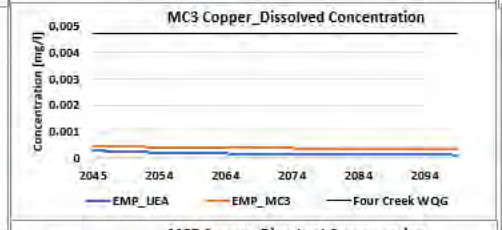



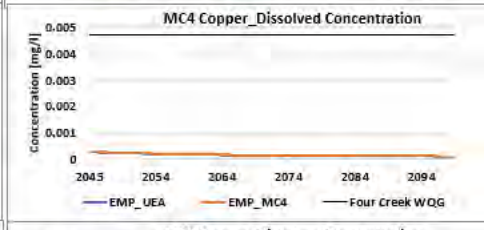



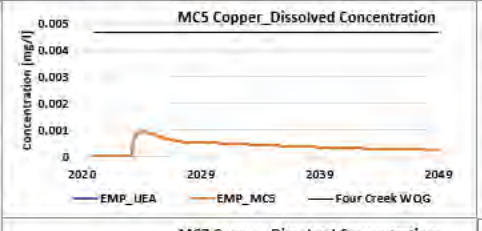



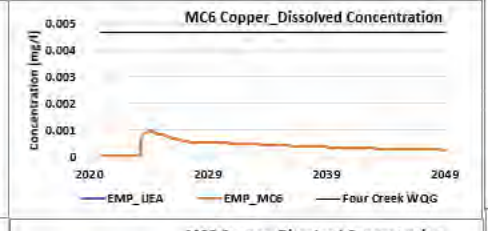



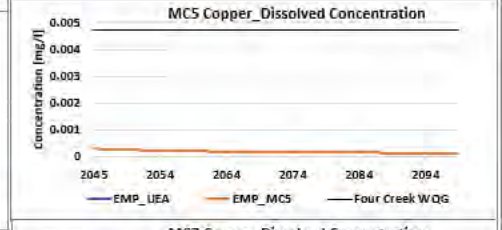



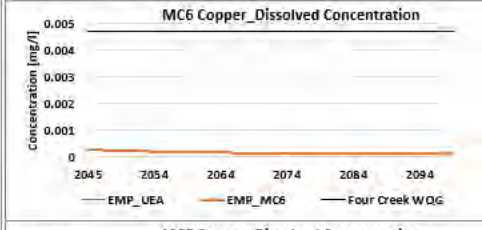



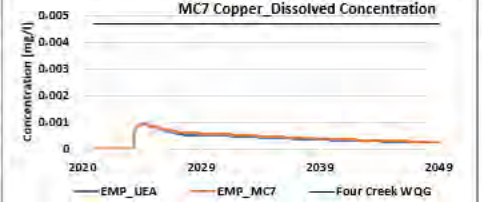



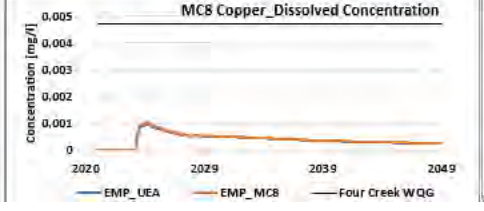



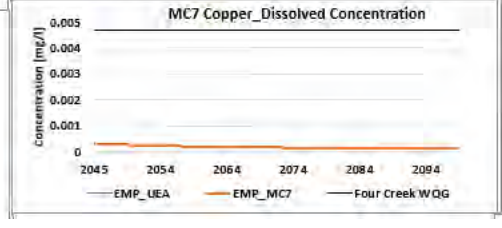



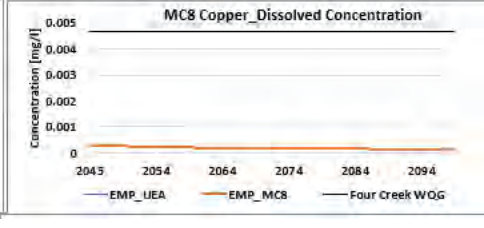
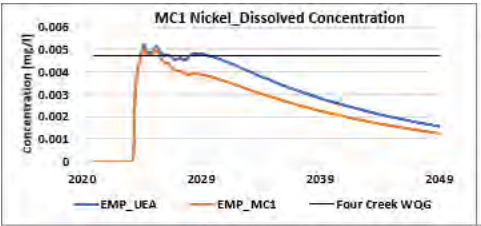
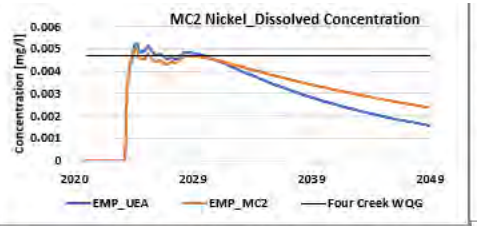
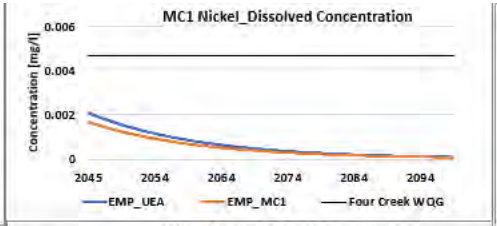
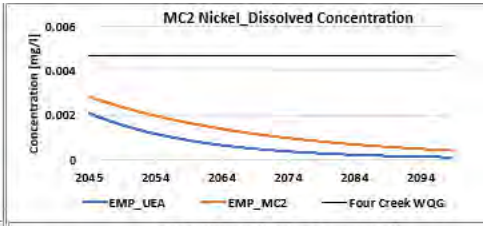



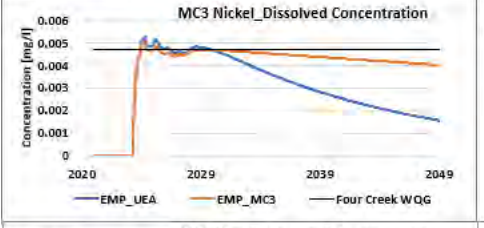
Figure 7E-8: Dissolved Nickel modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project ca
in Operations and Post-Closure

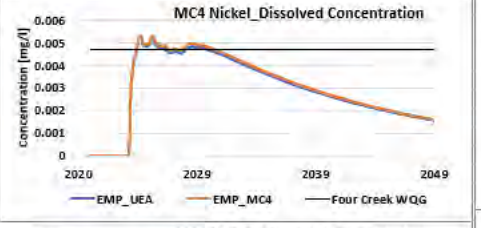


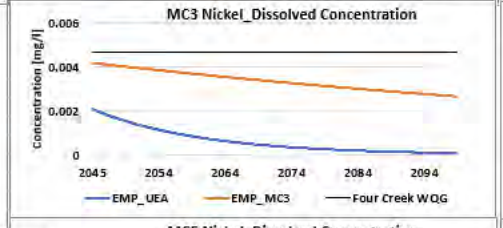



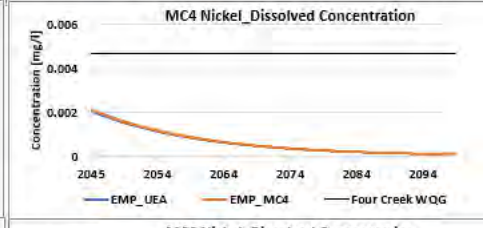



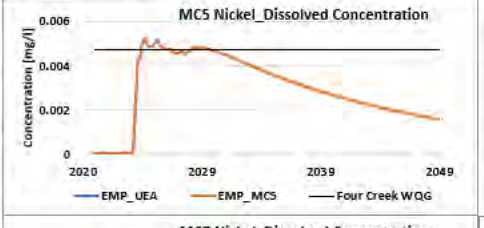



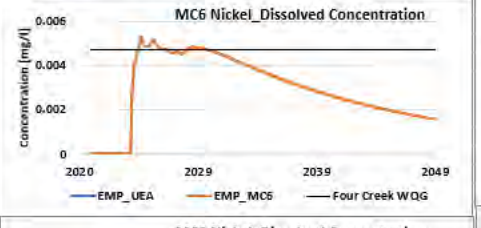



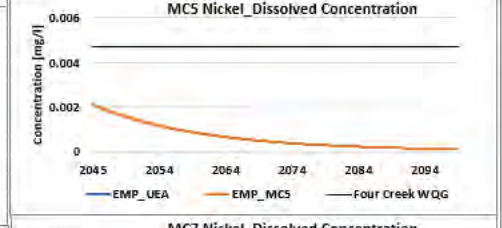



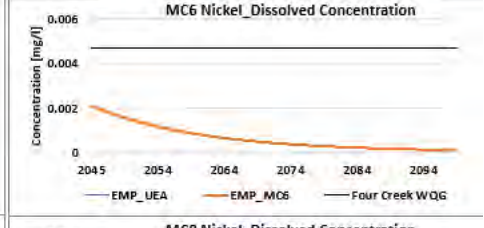



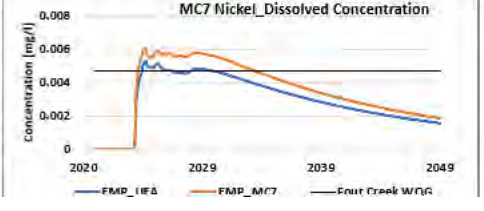



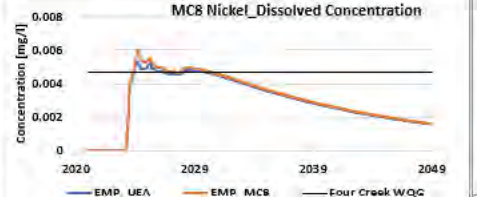



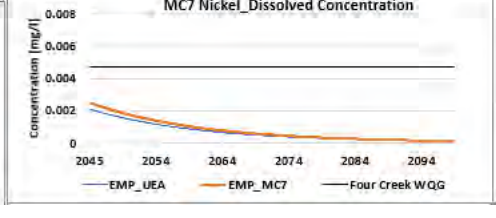



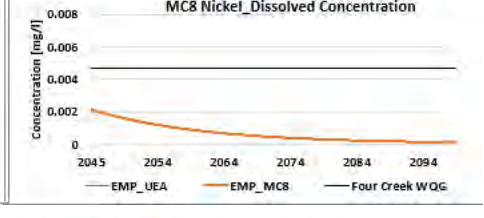
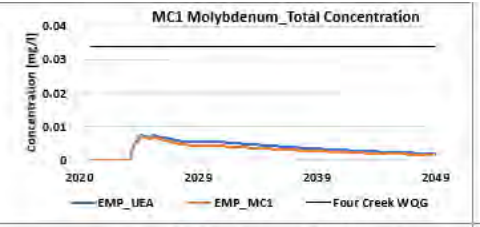
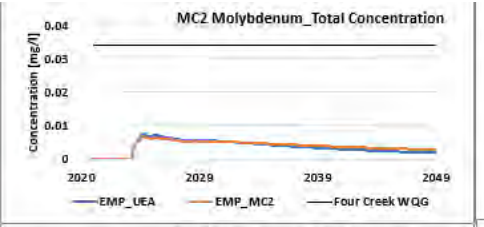
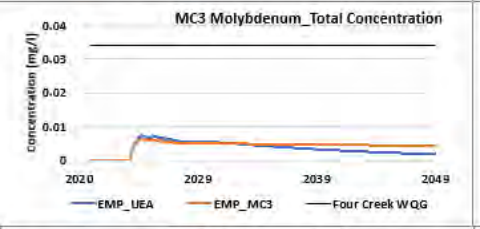
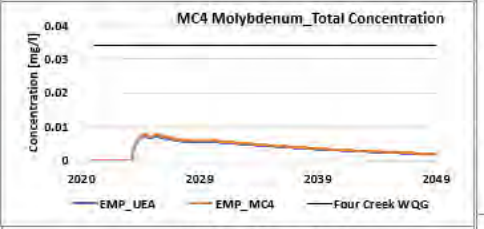



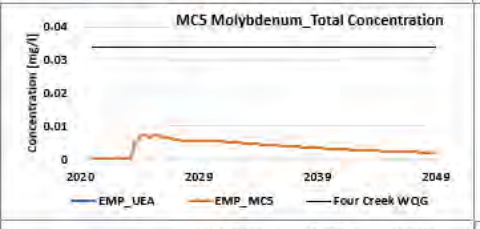
Figure 7E-9: Total Molybdenum modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project
in Operations and Post-Closure

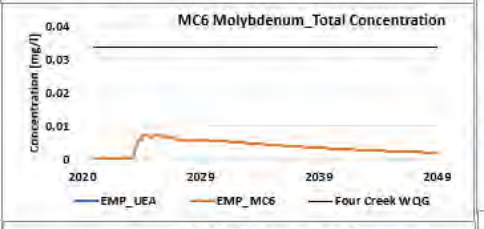


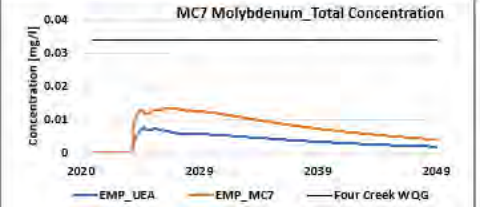



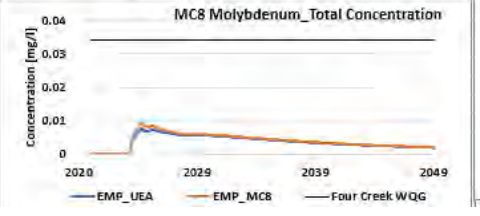



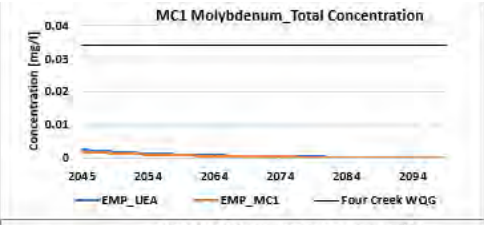



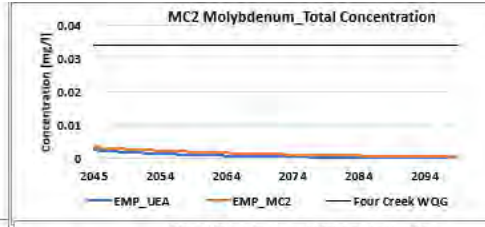



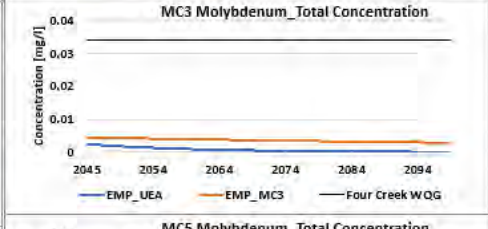



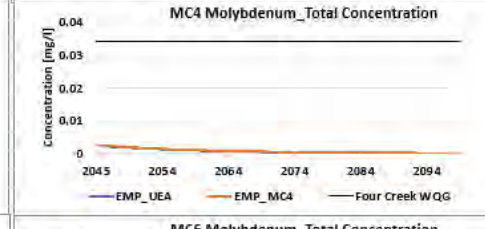



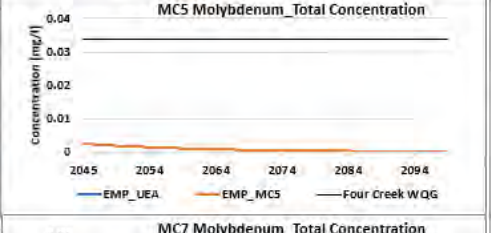



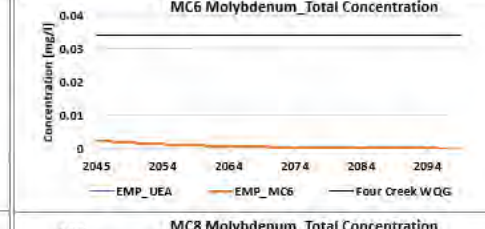



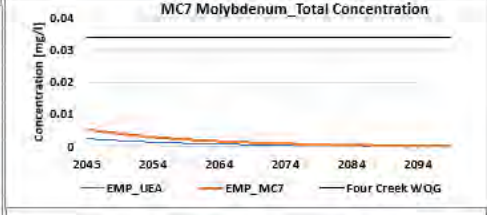



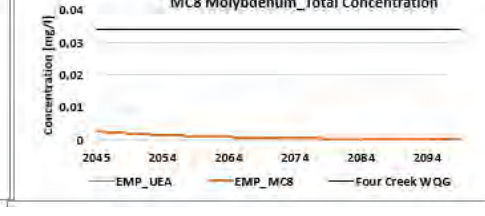
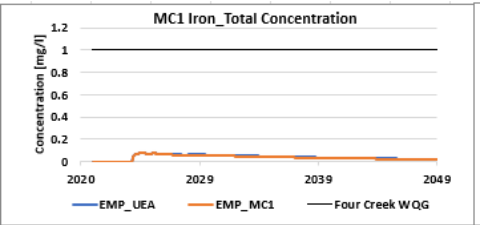
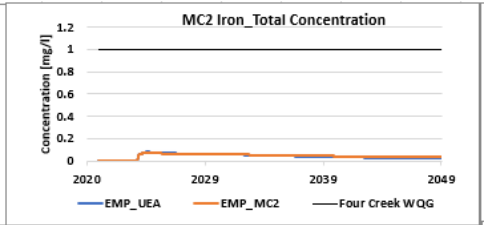
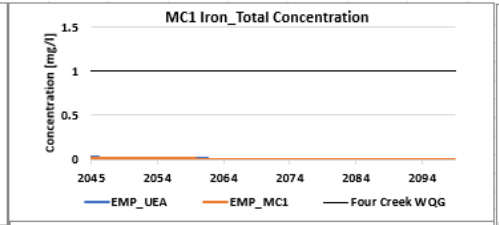
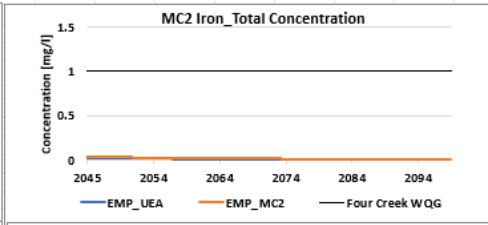



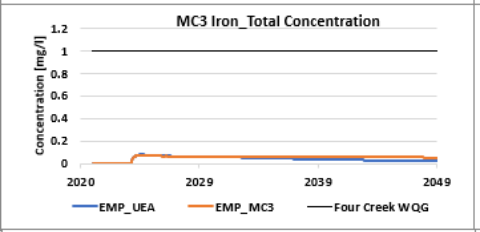
Figure 7E-10: Total Iron modelled concentrations in East Management Pond surface groundwater seepage for mitigation cases compared to project in Operations and Post-Closure

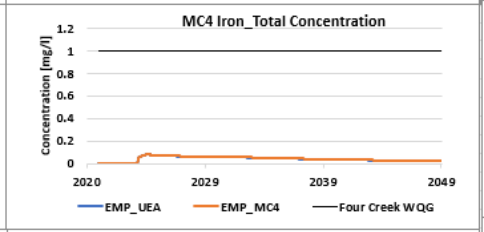


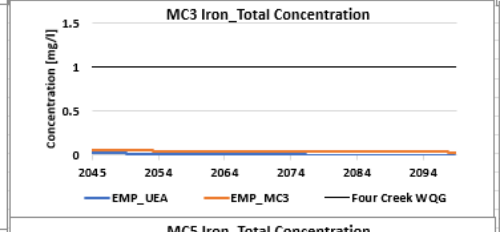



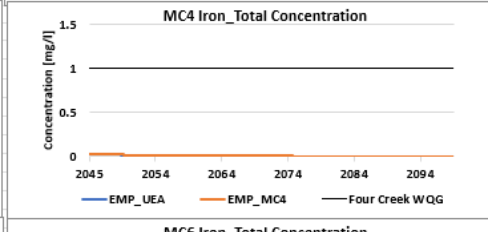



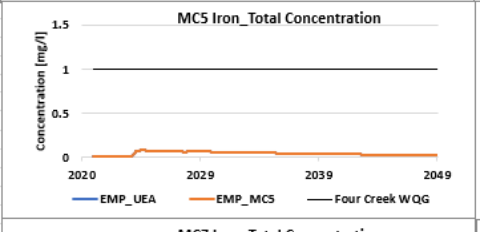



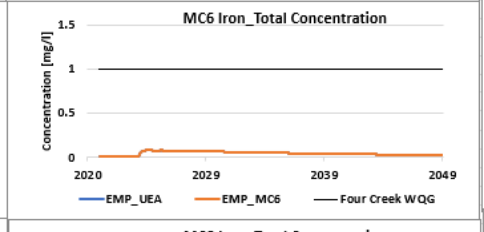



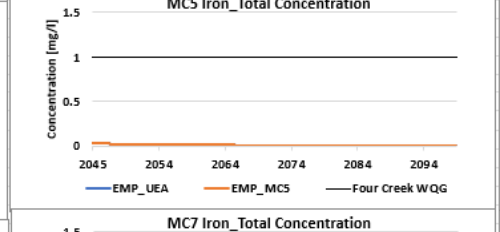



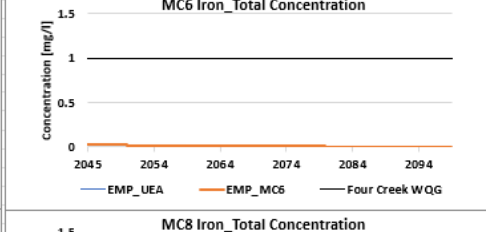



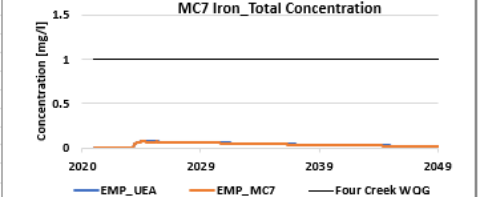



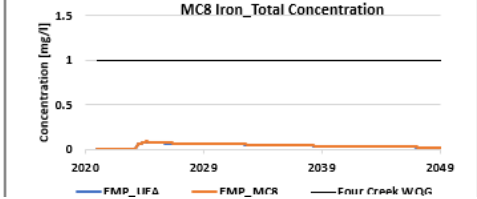



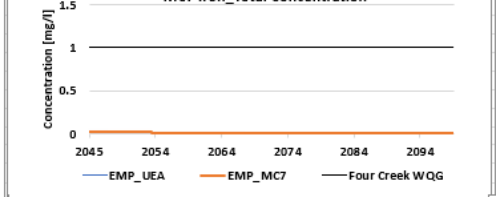



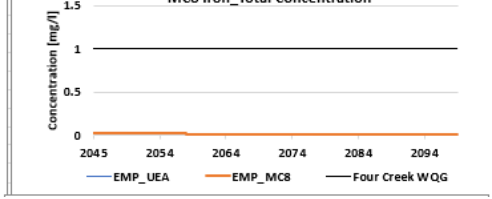
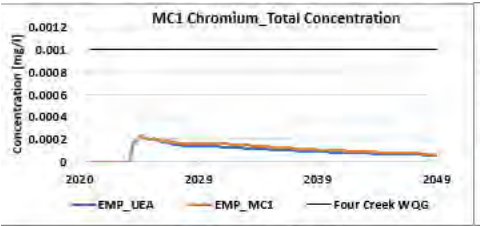
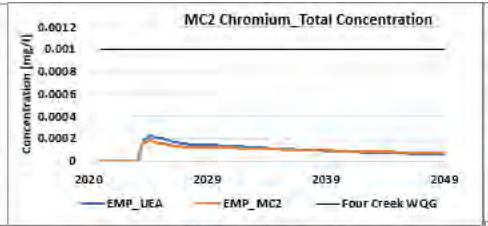
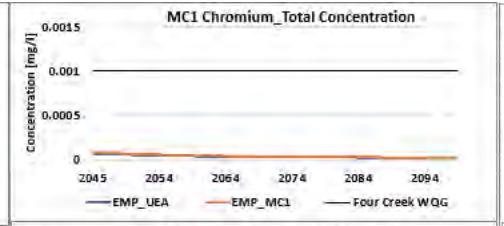
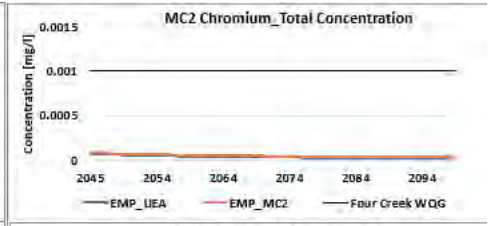



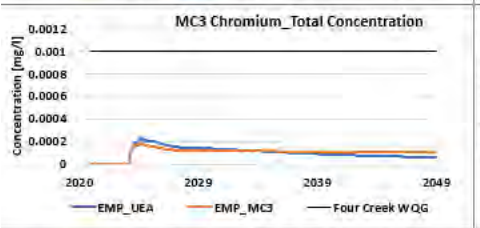
Figure 7E-11: Total Chromium modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project c
in Operations and Post-Closure

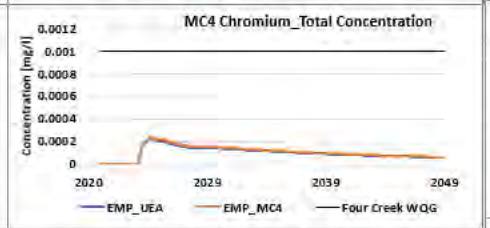


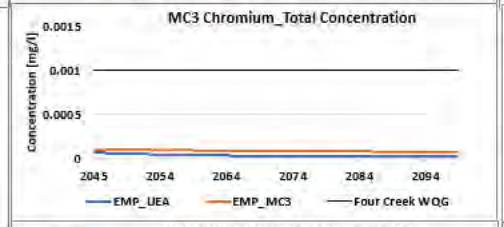



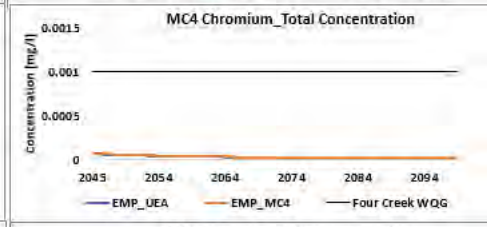



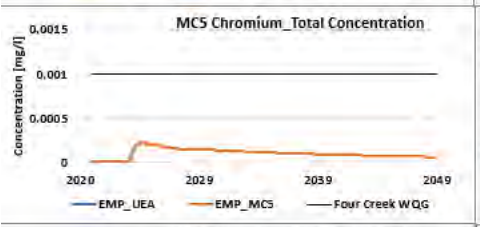



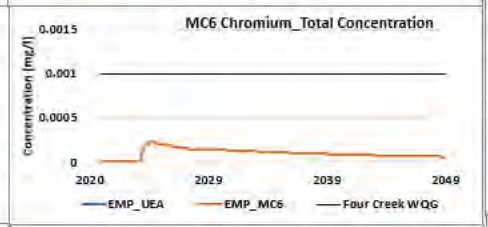



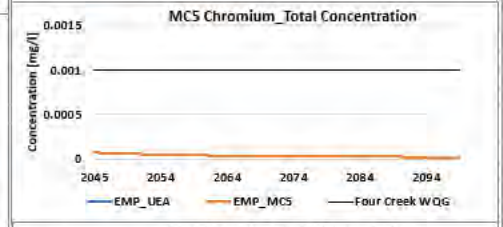



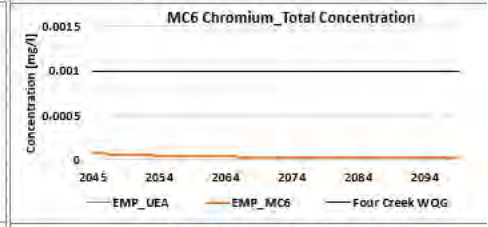



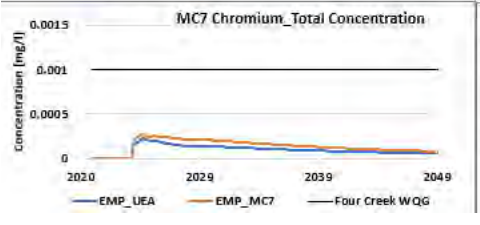



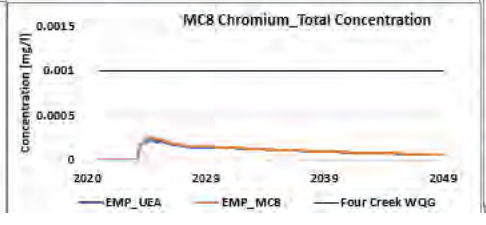



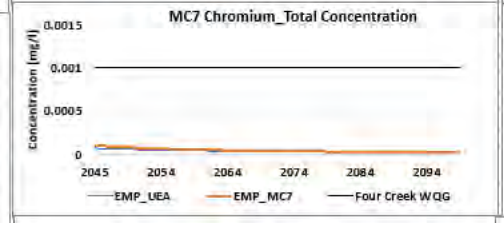



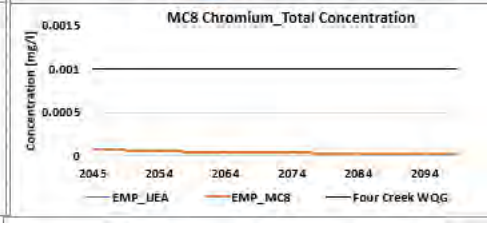
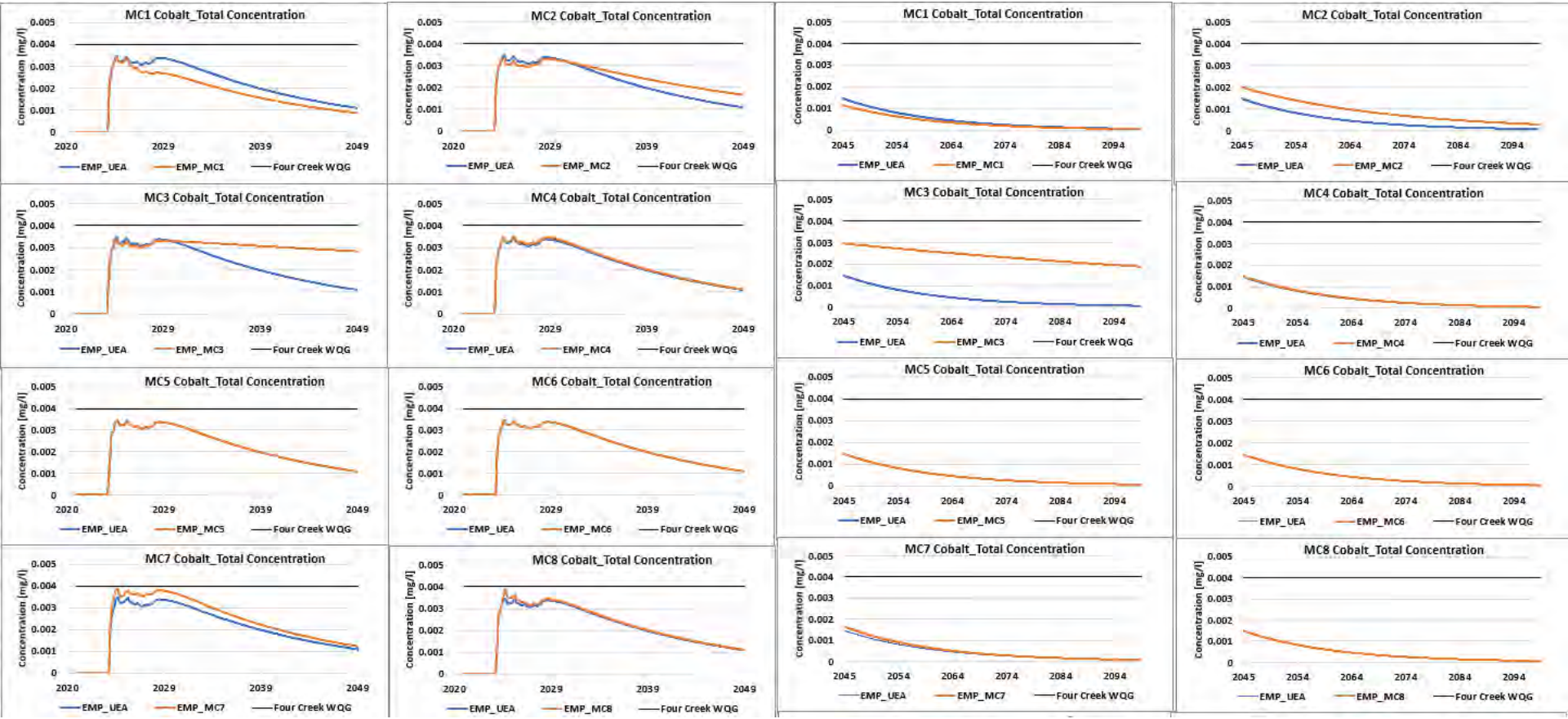



Figure 7E-12: Total Cobalt modelled concentrations in East Management Pond groundwater seepage for mitigation cases compared to project ca
in Operations and Post-Closure

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# Appendix 7-F

## West Management Pond groundwater seepage (Operations and Post-Closure)

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Figure 7F-1: Nitrite modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

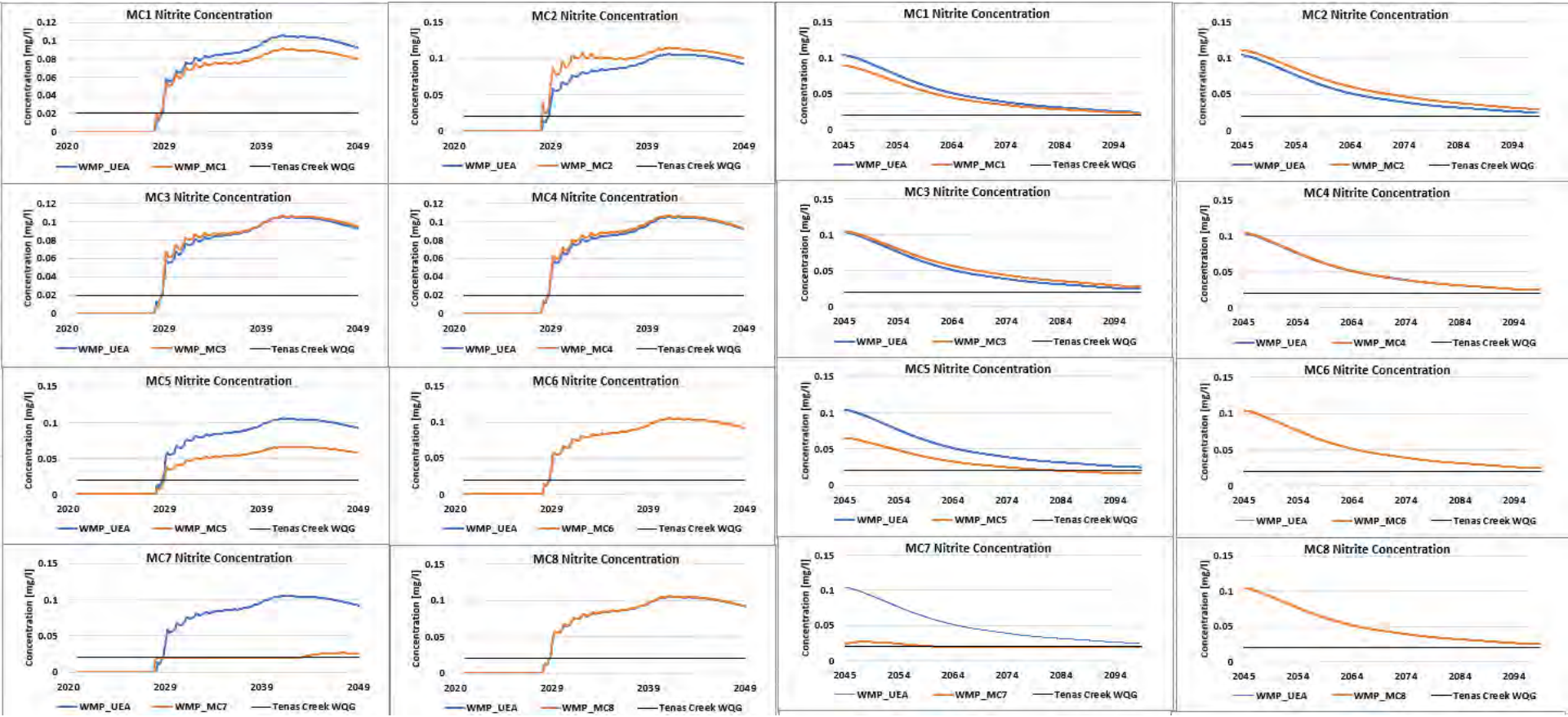


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Figure 7F-2: Total Selenium modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

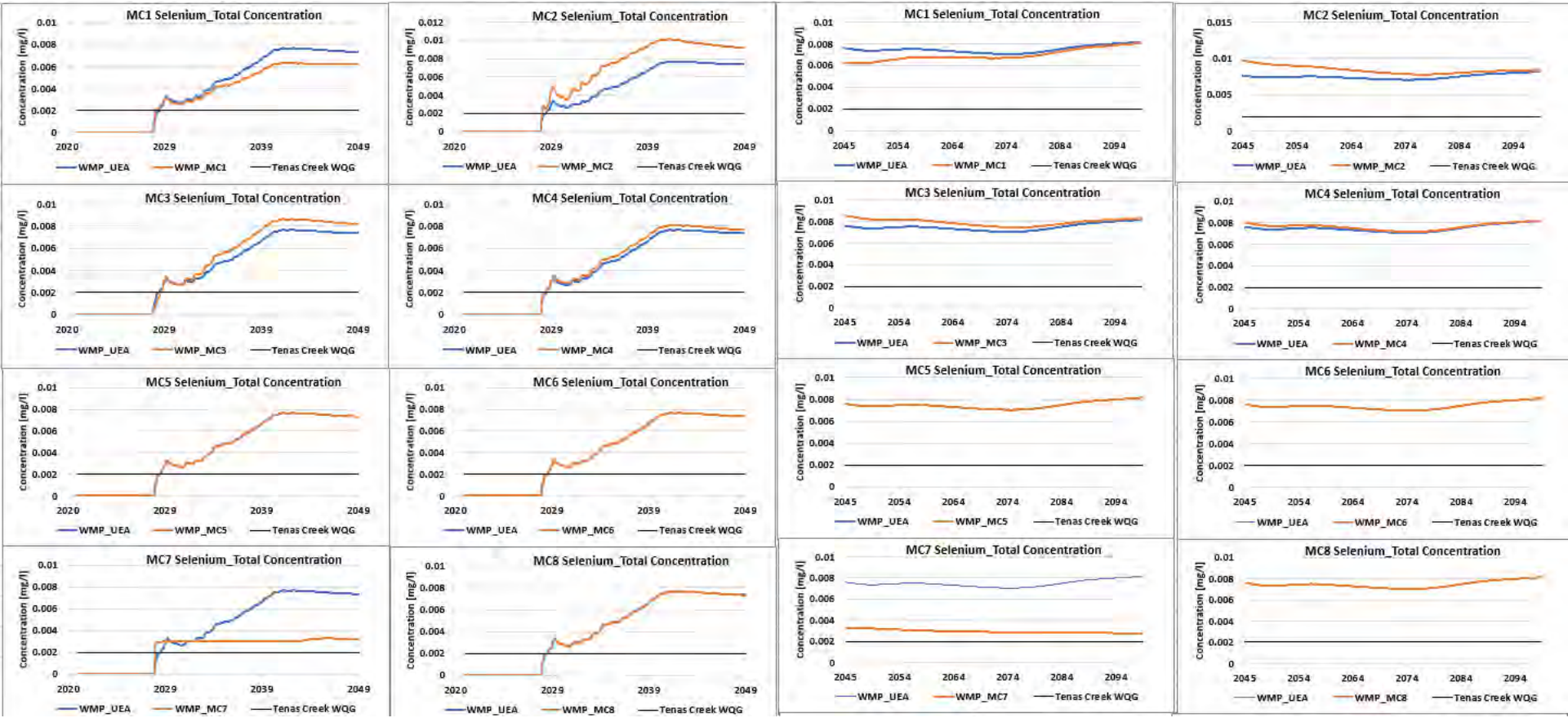


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Figure 7F-3: Sulphate modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

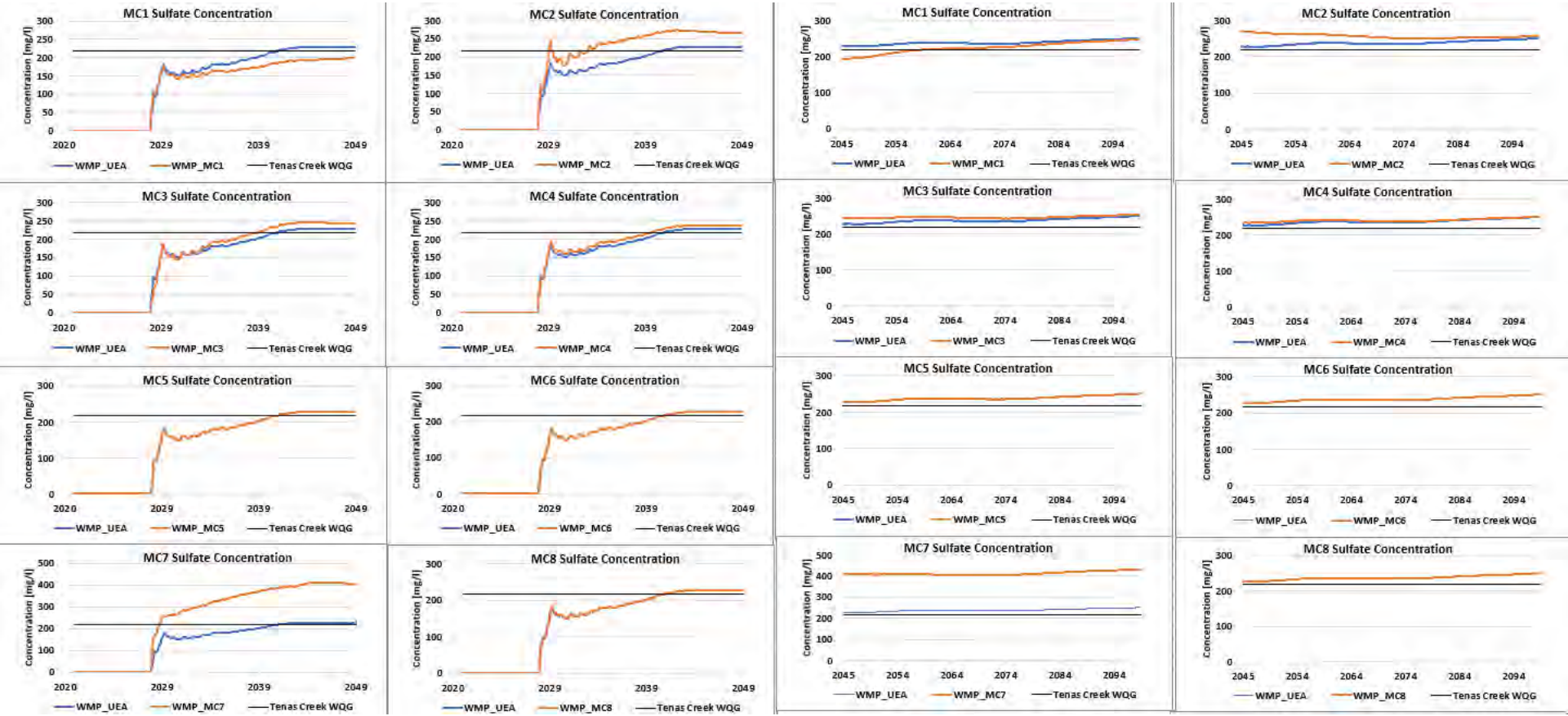


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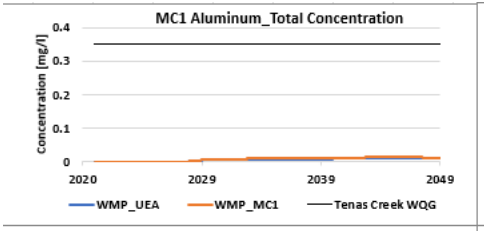
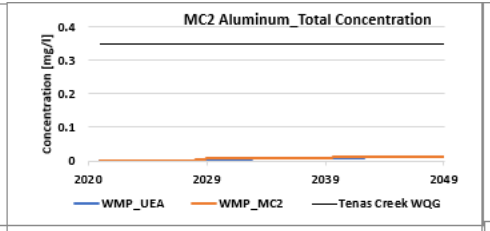
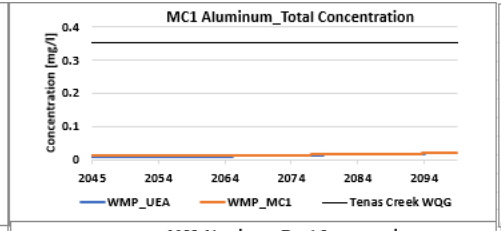
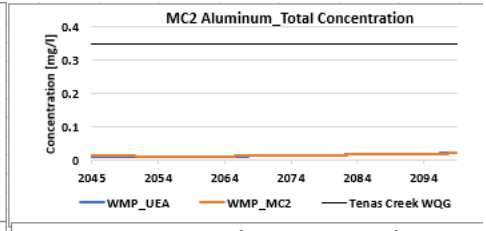
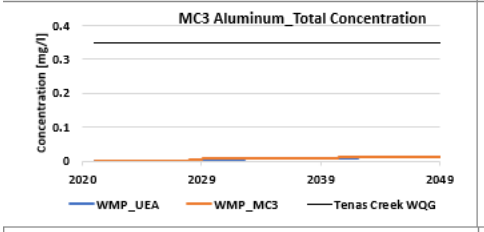
Figure 7F-4: Total Aluminium modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

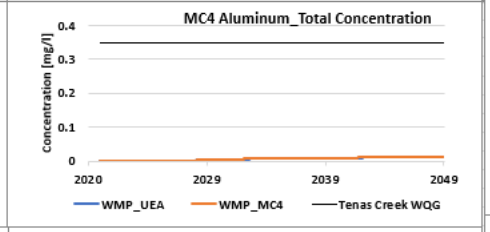


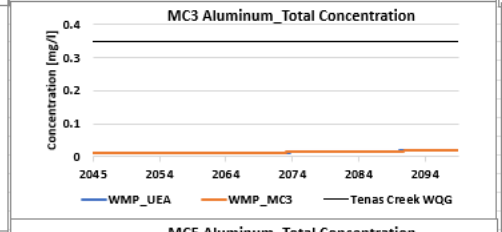



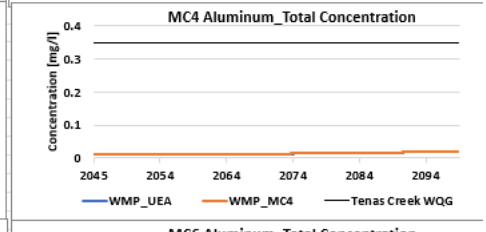



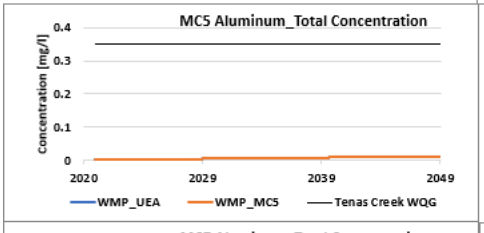



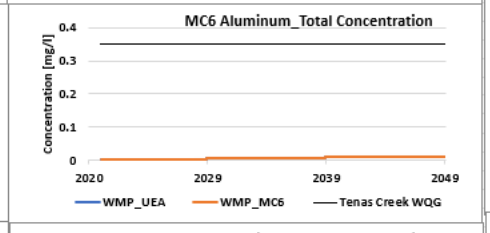



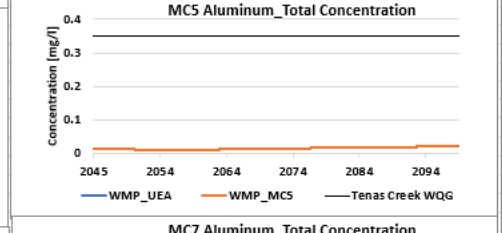



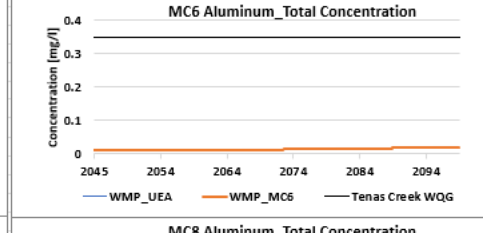



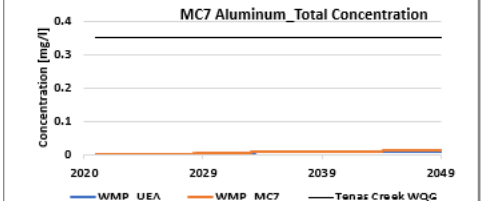



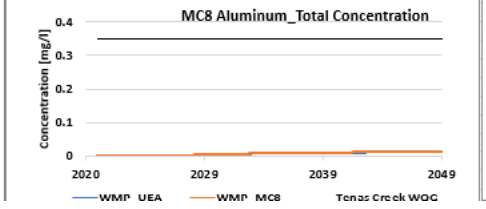



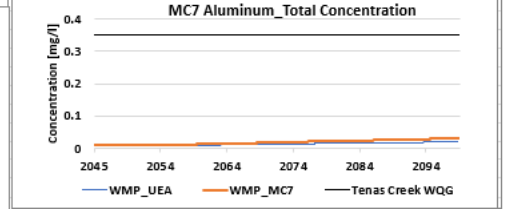



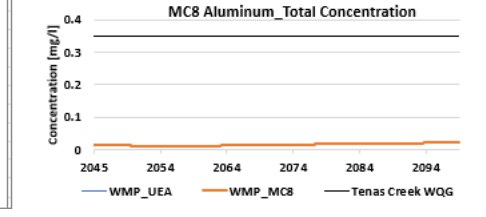




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Figure 7F-5: Nitrate modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

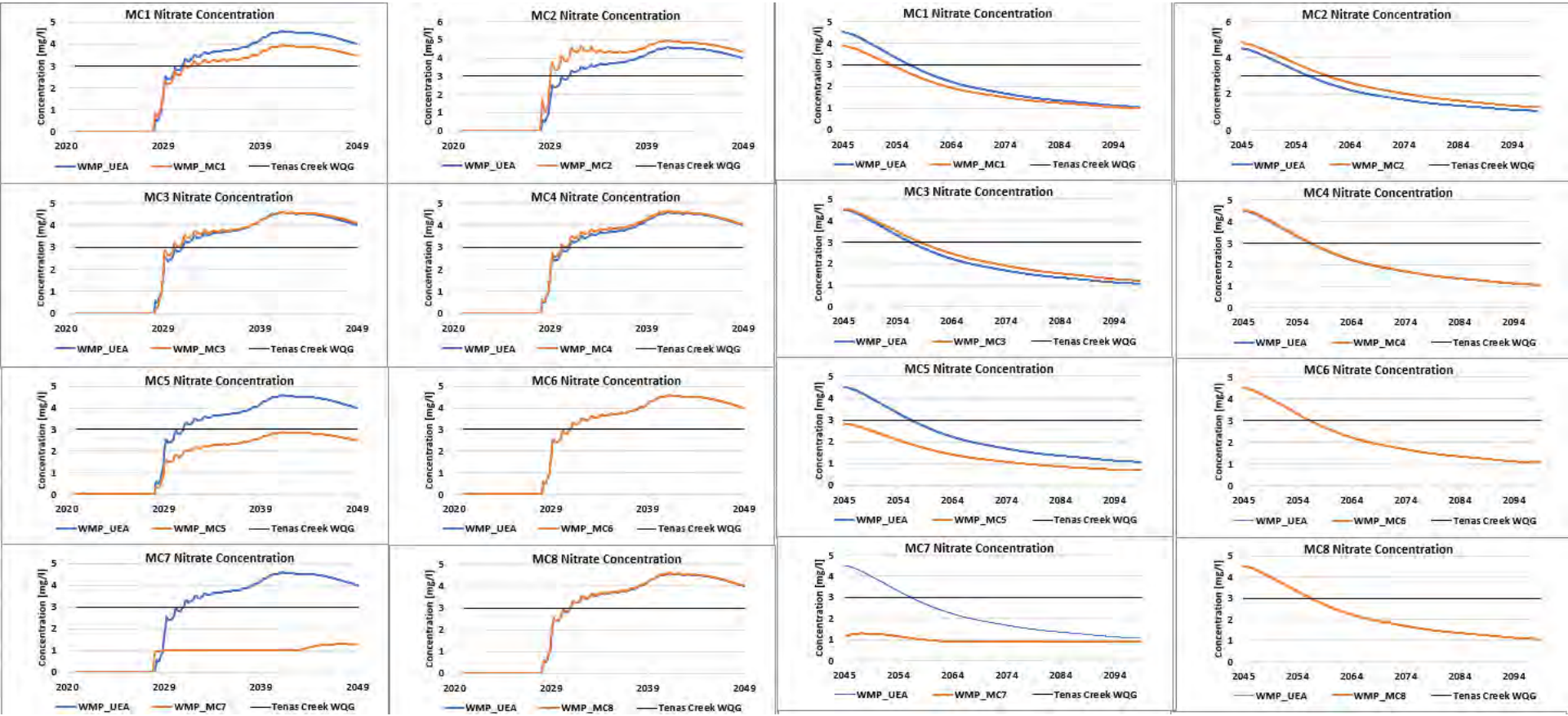


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Figure 7F-6: Dissolved Zinc modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

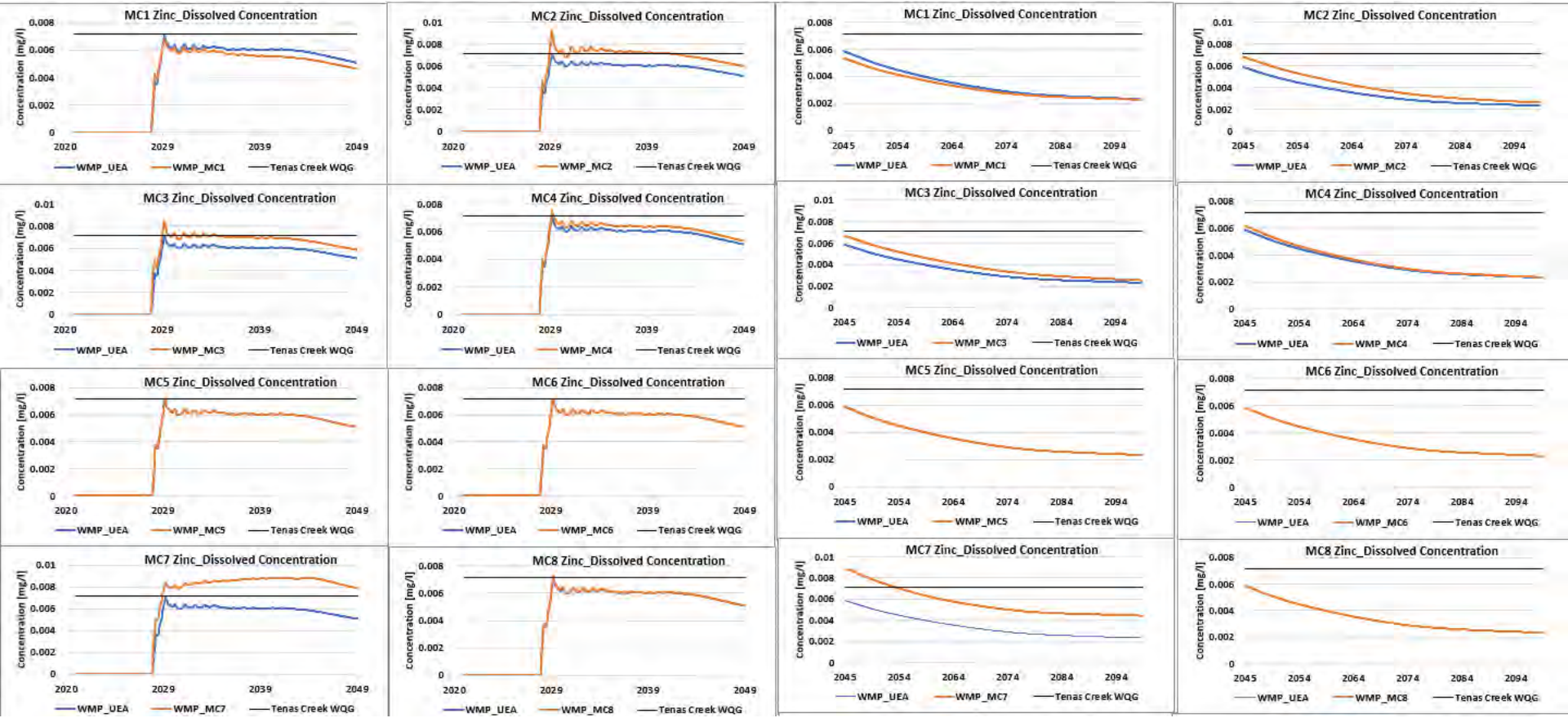


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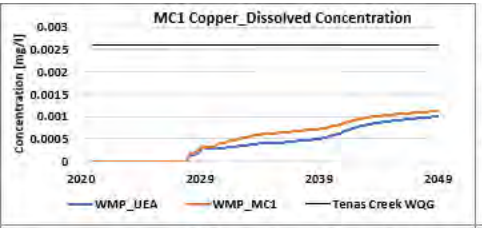
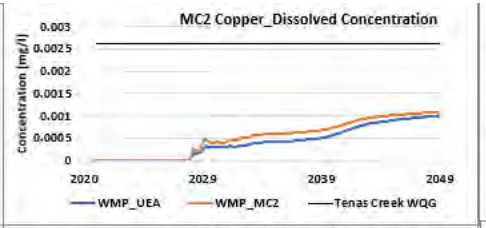
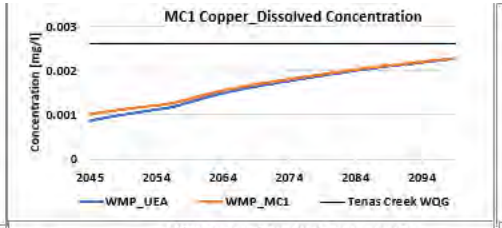
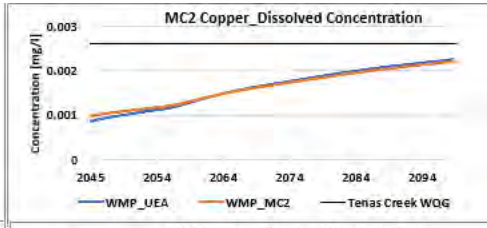
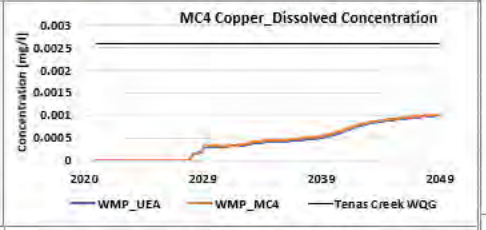
Figure 7F-7: Dissolved Copper modelled concentrations in West Management groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

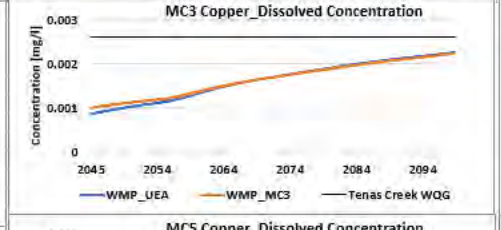


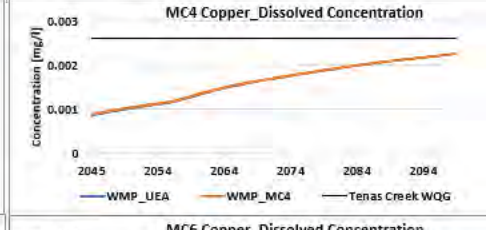



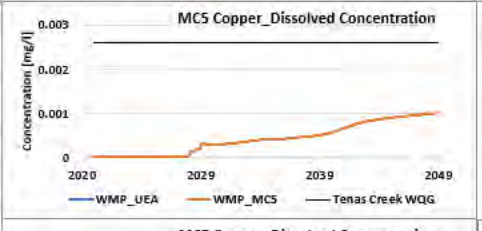



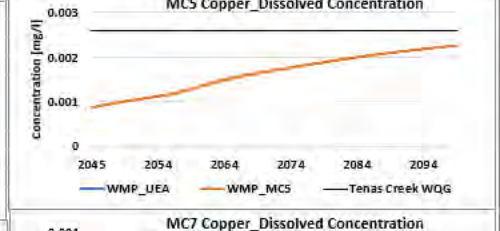



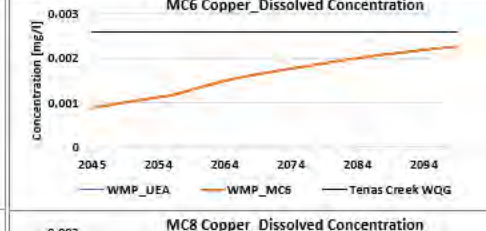


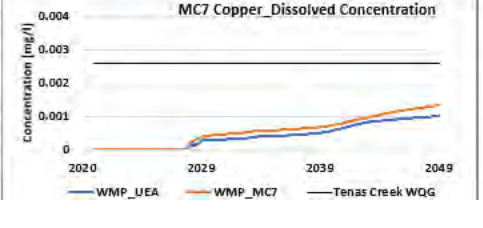



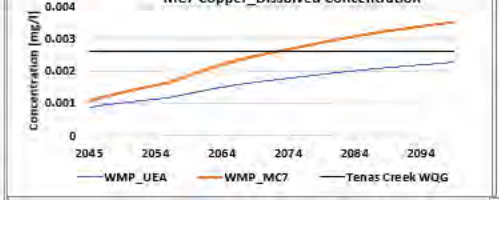







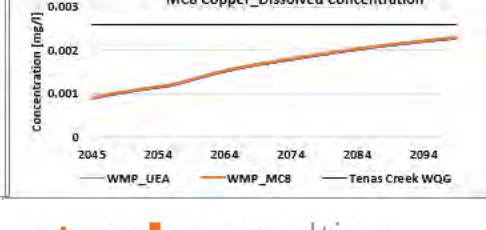



Figure 7F-8: Dissolved Nickel modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

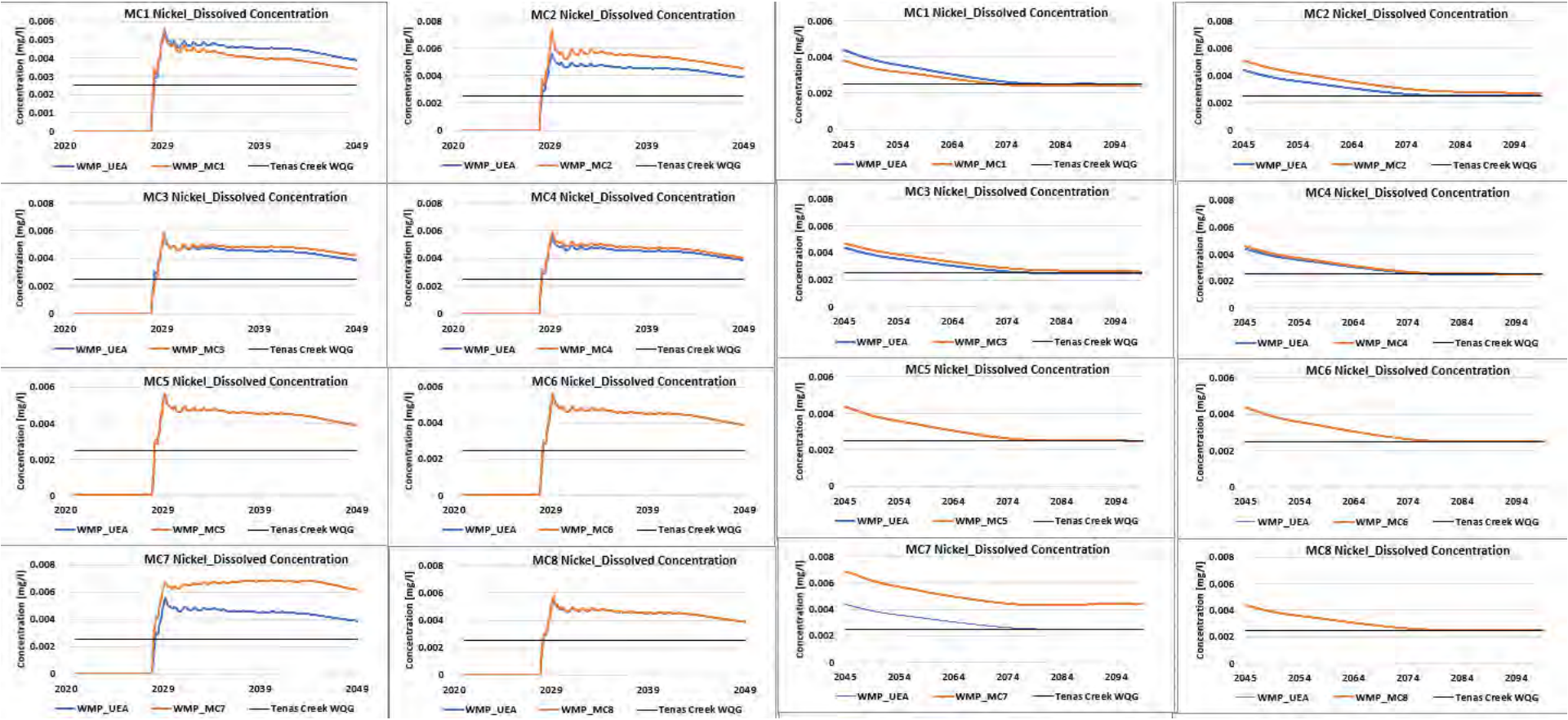



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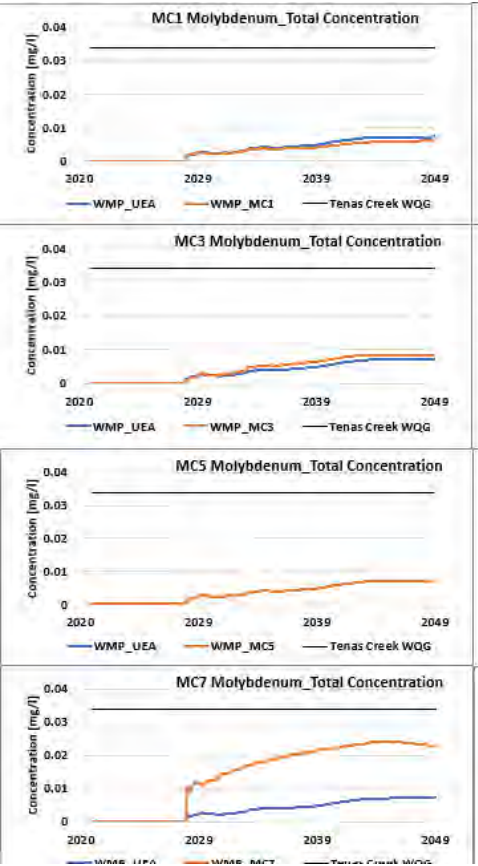
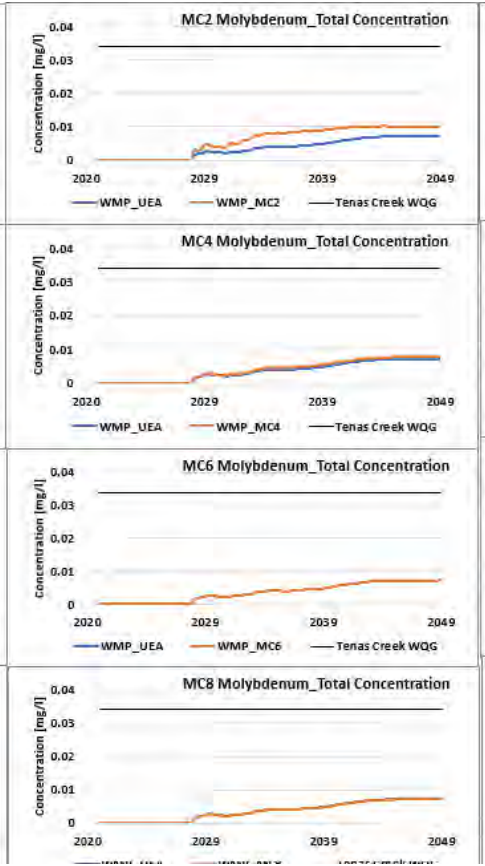
Figure 7F-9: Total Molybdenum modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure











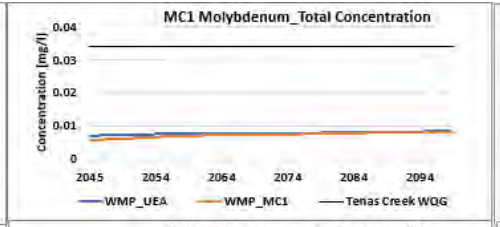


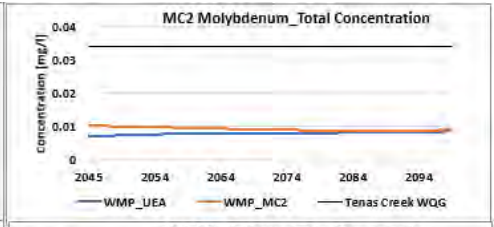


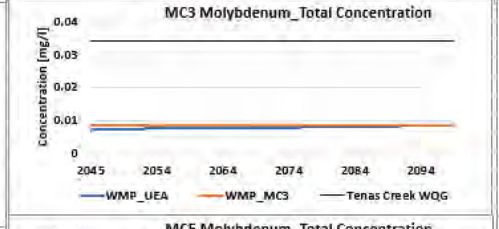


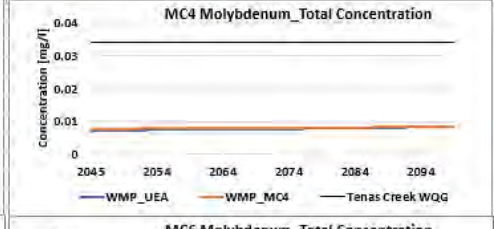


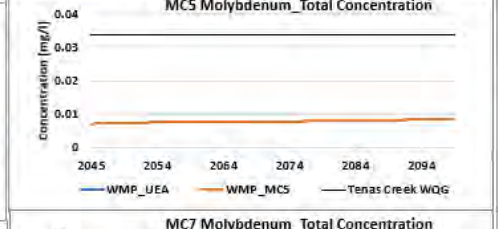


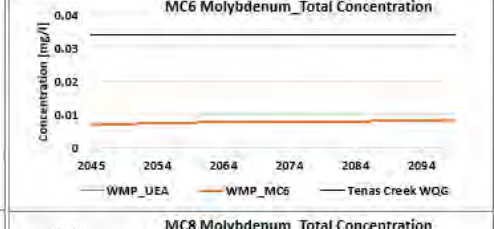



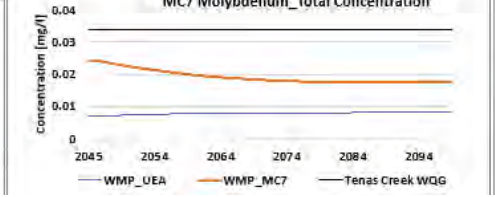



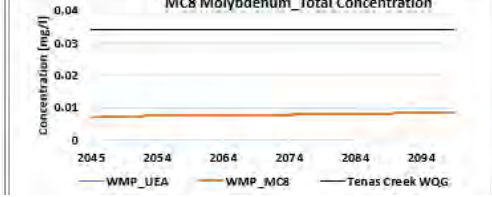
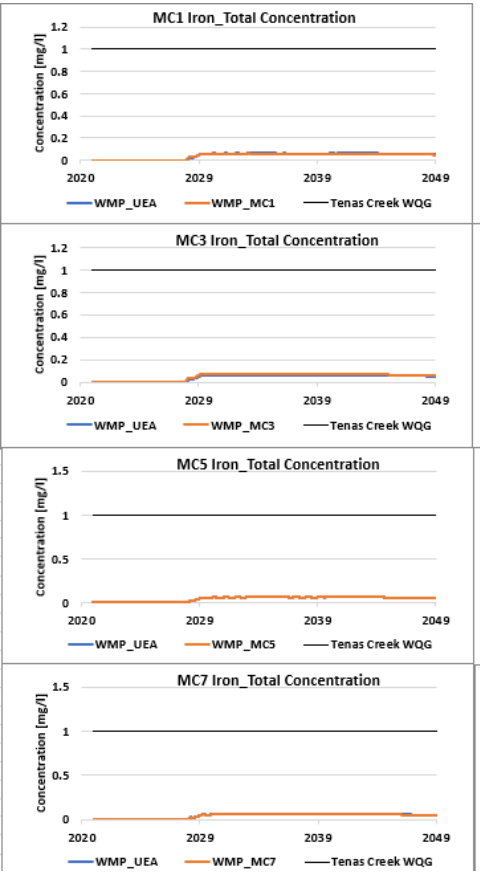
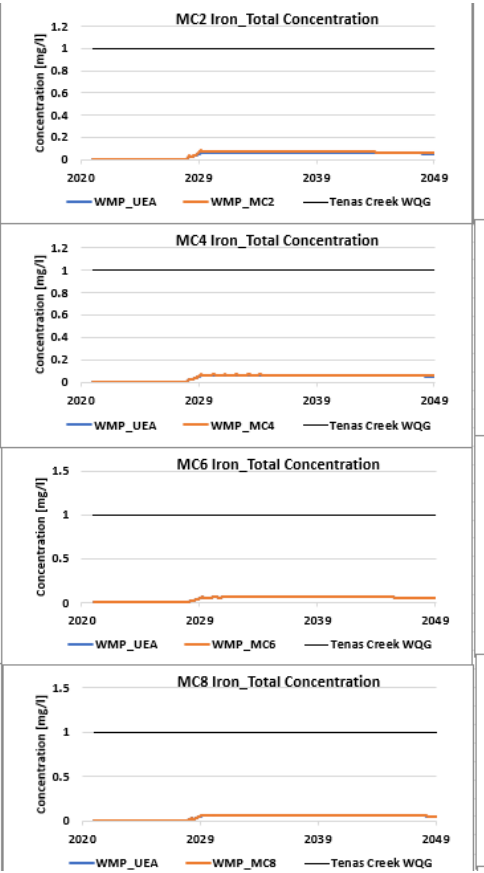



Figure 7F-10: Total Iron modelled concentrations in West Management Pond surface groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure











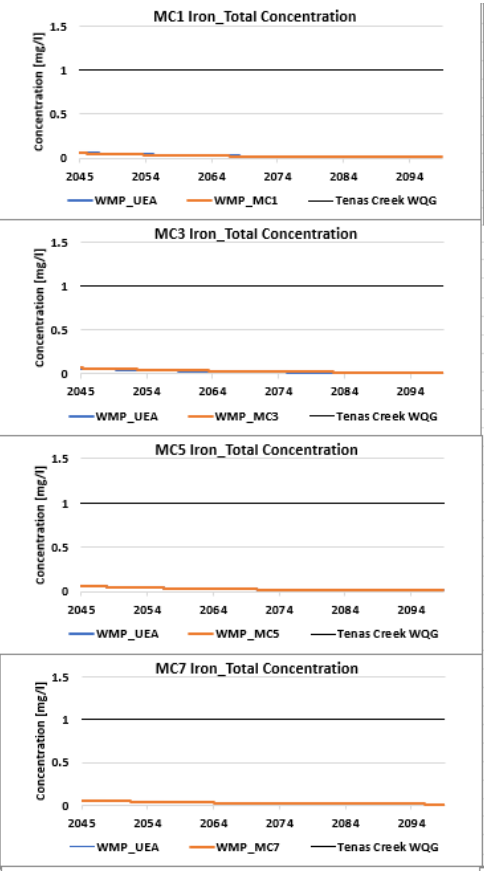










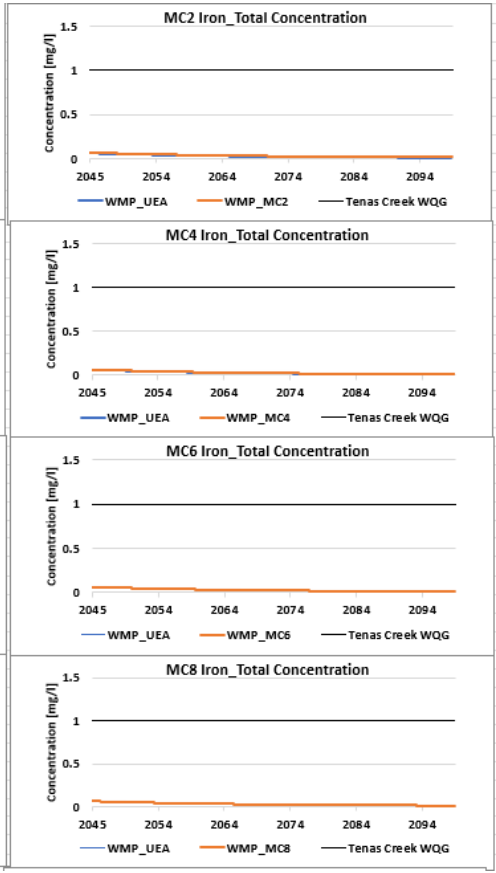
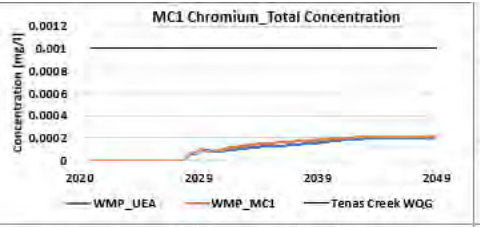
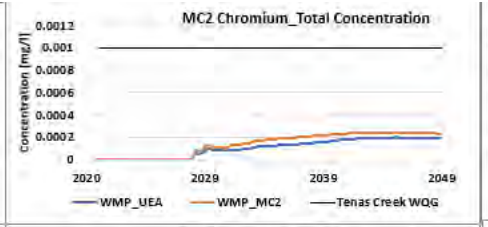
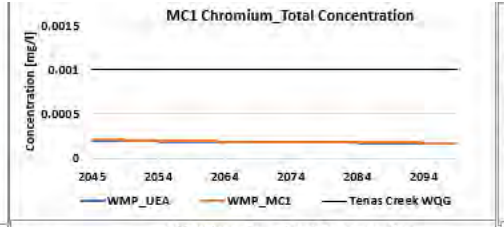
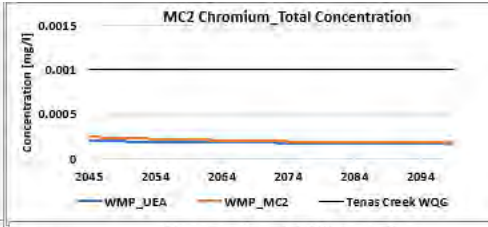



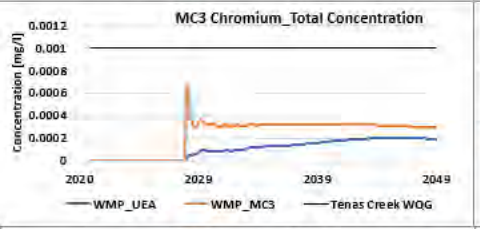
Figure 7F-11: Total Chromium modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure

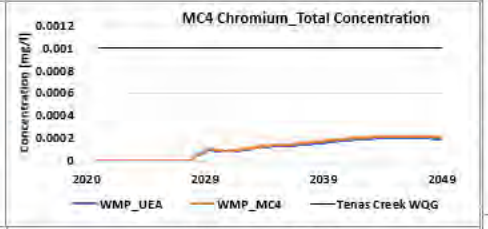


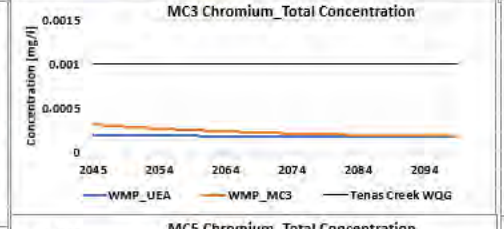



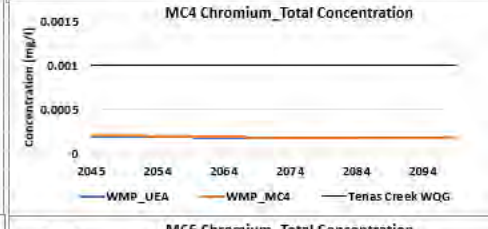



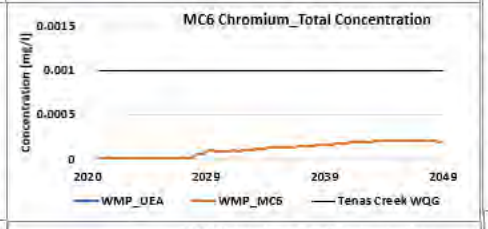



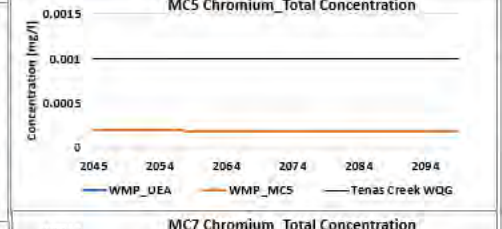



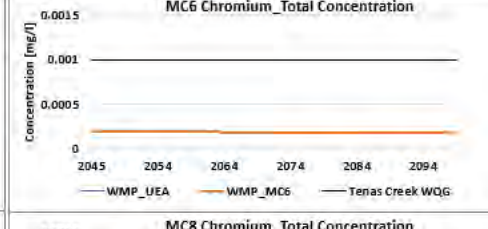



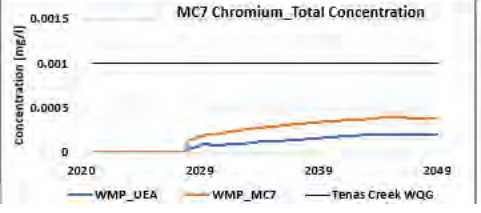



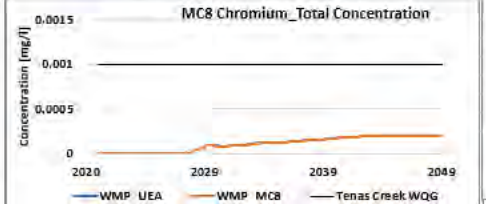



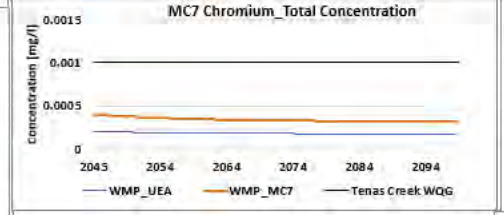


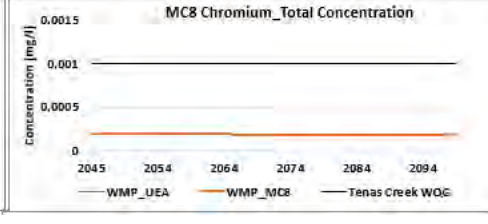
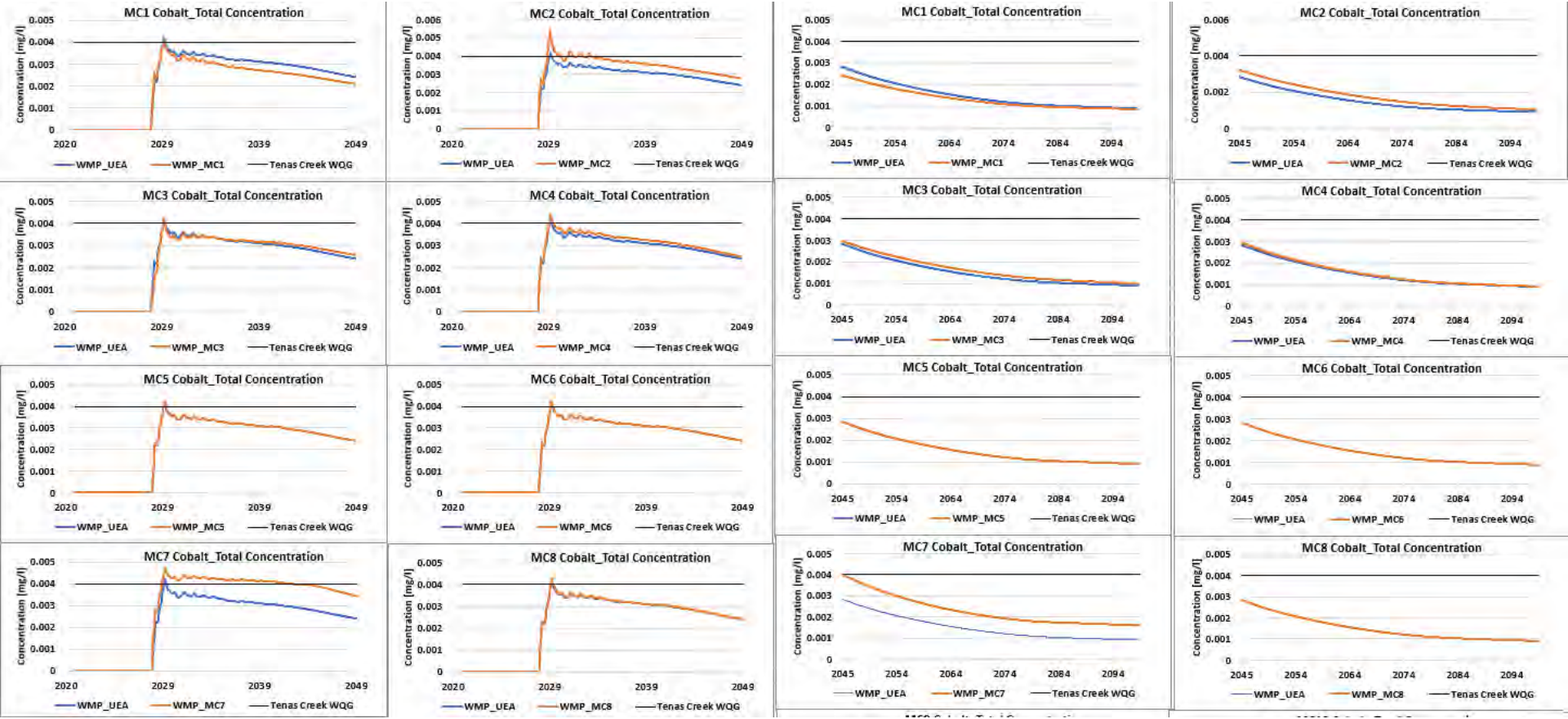



Figure 7F-12: Total Cobalt modelled concentrations in West Management Pond groundwater seepage for mitigation cases compared to project case in Operations and Post-Closure



# Appendix 7-G

## Tables for surface discharge and groundwater seepage

# Table 7G-1: Nitrite in surface discharge from Tenas Control Pond (Operations) and North Management Pond (Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| **Case** | **Tenas Control Pond** | | | **North Management Pond** | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 0.299 | 0% | 15.0 | 0.059 | 0% | 2.9 |
| **MC1** | 0.282 | -6% | 14.1 | 0.054 | -9% | 2.7 |
| **MC2** | 0.432 | +44% | 21.6 | 0.062 | +6% | 3.1 |
| **MC3** | 0.373 | +25% | 18.6 | 0.060 | +3% | 3.0 |
| **MC4** | 0.326 | +9% | 16.3 | 0.0590 | +1% | 2.9 |
| **MC5** | 0.188 | -37% | 9.4 | 0.0368 | -37% | 1.8 |
| **MC6** | 0.299 | 0% | 15.0 | 0.0586 | 0% | 2.9 |
| **MC7** | 0.061 | -80% | 3.1 | 0.0408 | -30% | 2.0 |
| **MC8** | 0.010 | -97% | 0.5 | 0.0586 | 0% | 2.9 |

Table 7G-2: Total Selenium in surface discharge from Tenas Control Pond (Operations) and North Management P
(Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| Case | Tenas Control Pond | | | North Management Pond | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 0.024 | 0% | 11.9 | 0.0082 | 0% | 4.1 |
| **MC1** | 0.021 | -10% | 10.7 | 0.0082 | 0% | 4.1 |
| **MC2** | 0.032 | +36% | 16.2 | 0.0077 | -6% | 3.8 |
| **MC3** | 0.030 | +28% | 15.2 | 0.0070 | -15% | 3.5 |
| **MC4** | 0.024 | +1% | 12.0 | 0.0082 | 0% | 4.1 |
| **MC5** | 0.024 | 0% | 11.9 | 0.0082 | 0% | 4.1 |
| **MC6** | 0.024 | -0% | 11.9 | 0.0082 | -0% | 4.1 |
| **MC7** | 0.006 | -75% | 3.0 | 0.0022 | -73% | 1.1 |
| **MC8** | 0.001 | -96% | 0.5 | 0.0082 | -0% | 4.1 |

# Table 7G-3: Sulphate in surface discharge from Tenas Control Pond (Operations) and North Management Pond (Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| **Case** | **Tenas Control Pond** | | | **North Management Pond** | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 419 | 0% | 1.9 | 228 | 0% | 1.0 |
| **MC1** | 394 | -6% | 1.8 | 228 | 0% | 1.0 |
| **MC2** | 564 | +35% | 2.6 | 233 | +2% | 1.1 |
| **MC3** | 531 | +27% | 2.4 | 225 | -1% | 1.0 |
| **MC4** | 422 | +1% | 1.9 | 228 | 0% | 1.0 |
| **MC5** | 419 | 0% | 1.9 | 228 | 0% | 1.0 |
| **MC6** | 419 | 0% | 1.9 | 228 | 0% | 1.0 |
| **MC7** | 167 | -60% | 0.8 | 199 | -13% | 0.9 |
| **MC8** | 200 | -52% | 0.9 | 228 | -0% | 1.0 |

Table 7G-4: Total Aluminum in surface discharge from Tenas Control Pond (Operations) and North Management P
(Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| **Case** | **Tenas Control Pond** | | | **North Management Pond** | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 0.39 | 0% | 2.0 | 0.39 | 0% | 2.1 |
| **MC1** | 0.39 | +0% | 2.0 | 0.39 | 0% | 2.1 |
| **MC2** | 0.39 | +0% | 2.0 | 0.39 | -0% | 2.1 |
| **MC3** | 0.39 | +0% | 2.0 | 0.39 | -0% | 2.1 |
| **MC4** | 0.39 | 0% | 2.0 | 0.39 | 0% | 2.1 |
| **MC5** | 0.39 | 0% | 2.0 | 0.39 | 0% | 2.1 |
| **MC6** | 0.07 | -82% | 0.4 | 0.08 | -81% | 0.4 |
| **MC7** | 0.39 | +0% | 2.0 | 0.39 | -1% | 2.0 |
| **MC8** | 0.39 | +1% | 2.1 | 0.39 | +0% | 2.1 |

Table 7G-5: Nitrate in surface discharge from Tenas Control Pond (Operations) and North Management Pond (Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| **Case** | **Tenas Control Pond** | | | **North Management Pond** | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 13.0 | 0% | 4.3 | 2.54 | 0% | 0.8 |
| **MC1** | 12.2 | -6% | 4.1 | 2.32 | -9% | 0.8 |
| **MC2** | 18.8 | +45% | 6.3 | 2.70 | +6% | 0.9 |
| **MC3** | 16.2 | +25% | 5.4 | 2.61 | +3% | 0.9 |
| **MC4** | 14.1 | +9% | 4.7 | 2.55 | +1% | 0.9 |
| **MC5** | 8.1 | -37% | 2.7 | 1.59 | -37% | 0.5 |
| **MC6** | 13.0 | 0% | 4.3 | 2.54 | 0% | 0.8 |
| **MC7** | 2.7 | -79% | 0.9 | 1.79 | -29% | 0.6 |
| **MC8** | 0.5 | -96% | 0.2 | 2.54 | -0% | 0.8 |

Table 7G-6: Dissolved Zinc in surface discharge from Tenas Control Pond (Operations) and North Management P
(Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| Case | Tenas Control Pond | | | North Management Pond | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 0.010 | 0% | 2.3 | 0.0020 | 0% | 0.5 |
| **MC1** | 0.0091 | -8% | 2.2 | 0.0020 | -3% | 0.5 |
| **MC2** | 0.012 | +18% | 2.8 | 0.0022 | +8% | 0.5 |
| **MC3** | 0.011 | +12% | 2.6 | 0.0021 | +5% | 0.5 |
| **MC4** | 0.010 | +1% | 2.4 | 0.0021 | +2% | 0.5 |
| **MC5** | 0.010 | 0% | 2.3 | 0.0020 | 0% | 0.5 |
| **MC6** | 0.010 | 0% | 2.3 | 0.0020 | 0% | 0.5 |
| **MC7** | 0.0051 | -48% | 1.2 | 0.0031 | +51% | 0.7 |
| **MC8** | 0.010 | +3% | 2.4 | 0.0020 | -0% | 0.5 |

Table 7G-7: Dissolved Copper in surface discharge from Tenas Control Pond (Operations) and North Managemer
(Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| Case | Tenas Control Pond | | | North Management Pond | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 0.0017 | 0% | 2.1 | 0.0022 | 0% | 2.8 |
| **MC1** | 0.0017 | -0% | 2.1 | 0.0022 | 0% | 2.8 |
| **MC2** | 0.0019 | +14% | 2.4 | 0.0021 | -3% | 2.7 |
| **MC3** | 0.0018 | +8% | 2.3 | 0.0020 | -11% | 2.5 |
| **MC4** | 0.0017 | 0% | 2.1 | 0.0022 | 0% | 2.8 |
| **MC5** | 0.0017 | 0% | 2.1 | 0.0022 | 0% | 2.8 |
| **MC6** | 0.0017 | 0% | 2.1 | 0.0022 | 0% | 2.8 |
| **MC7** | 0.0014 | -16% | 1.8 | 0.0017 | -21% | 2.2 |
| **MC8** | 0.00010 | -94% | 0.1 | 0.0022 | +1% | 2.8 |

Table 7G-8: Dissolved Nickel in surface discharge from Tenas Control Pond (Operations) and North Management (Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| **Case** | **Tenas Control Pond** | | | **North Management Pond** | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 0.0060 | 0% | 2.7 | 0.0023 | 0% | 1.0 |
| **MC1** | 0.0058 | -4% | 2.6 | 0.0023 | 0% | 1.0 |
| **MC2** | 0.0078 | +29% | 3.5 | 0.0022 | -4% | 1.0 |
| **MC3** | 0.0074 | +22% | 3.4 | 0.0021 | -7% | 1.0 |
| **MC4** | 0.0061 | +0% | 2.8 | 0.0023 | 0% | 1.0 |
| **MC5** | 0.0060 | 0% | 2.7 | 0.0023 | 0% | 1.0 |
| **MC6** | 0.0060 | 0% | 2.7 | 0.0023 | 0% | 1.0 |
| **MC7** | 0.0037 | -40% | 1.7 | 0.0023 | +3% | 1.1 |
| **MC8** | 0.0050 | -17% | 2.3 | 0.0023 | 0% | 1.0 |

Table 7G-9: Total Molybdenum in surface discharge from Tenas Control Pond (Operations) and North Managemer
(Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| **Case** | **Tenas Control Pond** | | | **North Management Pond** | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 0.035 | 0% | 1.0 | 0.0077 | 0% | 0.2 |
| **MC1** | 0.035 | -2% | 1.0 | 0.0077 | 0% | 0.2 |
| **MC2** | 0.048 | +34% | 1.4 | 0.0079 | +2% | 0.2 |
| **MC3** | 0.045 | +26% | 1.3 | 0.0076 | -1% | 0.2 |
| **MC4** | 0.036 | +1% | 1.1 | 0.0077 | 0% | 0.2 |
| **MC5** | 0.035 | 0% | 1.0 | 0.0077 | 0% | 0.2 |
| **MC6** | 0.035 | -0% | 1.0 | 0.0077 | -0% | 0.2 |
| **MC7** | 0.010 | -71% | 0.3 | 0.012 | +49% | 0.3 |
| **MC8** | 0.037 | +3% | 1.1 | 0.0077 | -0% | 0.2 |

# Table 7G-10: Total Iron in surface discharge from Tenas Control Pond (Operations) and North Management Pond (Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| **Case** | **Tenas Control Pond** | | | **North Management Pond** | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 1.5 | 0% | 1.5 | 1.5 | 0% | 1.5 |
| **MC1** | 1.5 | +0% | 1.5 | 1.5 | 0% | 1.5 |
| **MC2** | 1.5 | +0% | 1.5 | 1.5 | +0% | 1.5 |
| **MC3** | 1.5 | +0% | 1.5 | 1.5 | 0% | 1.5 |
| **MC4** | 1.5 | -0% | 1.5 | 1.5 | -0% | 1.5 |
| **MC5** | 1.5 | 0% | 1.5 | 1.5 | 0% | 1.5 |
| **MC6** | 0.2 | -84% | 0.2 | 0.2 | -84% | 0.2 |
| **MC7** | 1.5 | +0% | 1.5 | 1.5 | -0% | 1.5 |
| **MC8** | 1.5 | 0% | 1.5 | 1.5 | 0% | 1.5 |

Table 7G-11: Total Chromium in surface discharge from Tenas Control Pond (Operations) and North Management (Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| **Case** | **Tenas Control Pond** | | | **North Management Pond** | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 0.0020 | 0% | 2.0 | 0.0014 | 0% | 1.4 |
| **MC1** | 0.0019 | -3% | 1.9 | 0.0014 | 0% | 1.4 |
| **MC2** | 0.0021 | +6% | 2.1 | 0.0014 | +1% | 1.4 |
| **MC3** | 0.0021 | +6% | 2.1 | 0.0014 | +0% | 1.4 |
| **MC4** | 0.0020 | +0% | 2.0 | 0.0014 | +0% | 1.4 |
| **MC5** | 0.0020 | 0% | 2.0 | 0.0014 | 0% | 1.4 |
| **MC6** | 0.0009 | -52% | 0.9 | 0.0003 | -75% | 0.3 |
| **MC7** | 0.0016 | -17% | 1.6 | 0.0014 | +2% | 1.4 |
| **MC8** | 0.0020 | +2% | 2.0 | 0.0014 | 0% | 1.4 |

# Table 7G-12: Total Cobalt in surface discharge from Tenas Control Pond (Operations) and North Management Pon (Post-Closure)

| | Operations | | | Post-Closure | | |
|---|---|---|---|---|---|---|
| **Case** | **Tenas Control Pond** | | | **North Management Pond** | | |
| | Max Monthly ( | Change over | Limit Exceed | Max Monthly ( | Change over | Limit Exceed |
| **Project Case** | 0.003 | 0% | 0.9 | 0.0013 | 0% | 0.3 |
| **MC1** | 0.0034 | -2% | 0.9 | 0.0013 | 0% | 0.3 |
| **MC2** | 0.004 | +25% | 1.1 | 0.0014 | +5% | 0.4 |
| **MC3** | 0.004 | +19% | 1.0 | 0.0014 | +3% | 0.3 |
| **MC4** | 0.003 | +1% | 0.9 | 0.0014 | +1% | 0.3 |
| **MC5** | 0.003 | 0% | 0.9 | 0.0013 | 0% | 0.3 |
| **MC6** | 0.003 | -16% | 0.7 | 0.0008 | -41% | 0.2 |
| **MC7** | 0.0031 | -12% | 0.8 | 0.0018 | +30% | 0.4 |
| **MC8** | 0.004 | +2% | 0.9 | 0.0013 | 0% | 0.3 |

# Table 7G-1: Nitrite in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**NITRITE - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.30 | 0% | 15.0 | 0.054 | 0% | 2.7 | 0.079 | 0% | 4.0 | 0.106 | 0% | 5.3 |
| **MC1** | 0.28 | -6% | 14.1 | 0.054 | -0% | 2.7 | 0.070 | -12% | 3.5 | 0.091 | -14% | 4.6 |
| **MC2** | 0.43 | +44% | 21.6 | 0.049 | -10% | 2.4 | 0.078 | -2% | 3.9 | 0.114 | +8% | 5.7 |
| **MC3** | 0.37 | +25% | 18.6 | 0.050 | -8% | 2.5 | 0.070 | -12% | 3.5 | 0.107 | +1% | 5.3 |
| **MC4** | 0.33 | +9% | 16.3 | 0.056 | +4% | 2.8 | 0.082 | +4% | 4.1 | 0.107 | +1% | 5.4 |
| **MC5** | 0.19 | -37% | 9.4 | 0.034 | -37% | 1.7 | 0.050 | -37% | 2.5 | 0.066 | -37% | 3.3 |
| **MC6** | 0.30 | 0% | 15.0 | 0.054 | 0% | 2.7 | 0.079 | 0% | 4.0 | 0.106 | 0% | 5.3 |
| **MC7** | 0.06 | -80% | 3.1 | 0.039 | -28% | 1.9 | 0.051 | -36% | 2.5 | 0.027 | -75% | 1.3 |
| **MC8** | 0.32 | +7% | 16.0 | 0.055 | +2% | 2.7 | 0.082 | +3% | 4.1 | 0.106 | +0% | 5.3 |

**NITRITE - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.041 | 0% | 2.1 | 0.024 | 0% | 1.2 | 0.039 | 0% | 1.9 | 0.10 | 0% | 5.2 |
| **MC1** | 0.038 | -8% | 1.9 | 0.023 | -3% | 1.1 | 0.027 | -30% | 1.4 | 0.09 | -14% | 4.5 |
| **MC2** | 0.044 | +6% | 2.2 | 0.030 | +28% | 1.5 | 0.050 | +30% | 2.5 | 0.11 | +7% | 5.6 |
| **MC3** | 0.041 | -1% | 2.1 | 0.030 | +29% | 1.5 | 0.064 | +64% | 3.2 | 0.11 | +1% | 5.3 |
| **MC4** | 0.042 | +0% | 2.1 | 0.024 | -0% | 1.2 | 0.040 | +3% | 2.0 | 0.10 | +1% | 5.2 |
| **MC5** | 0.026 | -37% | 1.3 | 0.015 | -37% | 0.7 | 0.024 | -37% | 1.2 | 0.07 | -37% | 3.3 |
| **MC6** | 0.041 | 0% | 2.1 | 0.024 | 0% | 1.2 | 0.039 | 0% | 1.9 | 0.10 | 0% | 5.2 |
| **MC7** | 0.028 | -32% | 1.4 | 0.017 | -28% | 0.8 | 0.026 | -33% | 1.3 | 0.03 | -74% | 1.3 |
| **MC8** | 0.040 | -2% | 2.0 | 0.024 | +0% | 1.2 | 0.040 | +3% | 2.0 | 0.10 | +0% | 5.2 |

# Table 7G-2: Total Selenium in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**TOTAL SELENIUM - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.024 | 0% | 11.9 | 0.0069 | 0% | 3.4 | 0.0051 | 0% | 2.6 | 0.0082 | 0% | 4.1 |
| **MC1** | 0.021 | -10% | 10.7 | 0.0069 | 0% | 3.4 | 0.0049 | -5% | 2.5 | 0.0081 | -1% | 4.0 |
| **MC2** | 0.032 | +36% | 16.2 | 0.0064 | -8% | 3.2 | 0.0047 | -8% | 2.4 | 0.0101 | +24% | 5.1 |
| **MC3** | 0.030 | +28% | 15.2 | 0.0064 | -7% | 3.2 | 0.0045 | -12% | 2.2 | 0.0087 | +6% | 4.3 |
| **MC4** | 0.024 | +1% | 12.0 | 0.0069 | +0% | 3.4 | 0.0055 | +6% | 2.7 | 0.0082 | +0% | 4.1 |
| **MC5** | 0.024 | 0% | 11.9 | 0.0069 | 0% | 3.4 | 0.0051 | 0% | 2.6 | 0.0082 | 0% | 4.1 |
| **MC6** | 0.024 | 0% | 11.9 | 0.0069 | 0% | 3.4 | 0.0051 | 0% | 2.6 | 0.0082 | 0% | 4.1 |
| **MC7** | 0.006 | -75% | 3.0 | 0.0031 | -54% | 1.6 | 0.0038 | -26% | 1.9 | 0.0033 | -60% | 1.6 |
| **MC8** | 0.025 | +4% | 12.3 | 0.0069 | -0% | 3.4 | 0.0064 | +25% | 3.2 | 0.0082 | -0% | 4.1 |

**TOTAL SELENIUM - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.0085 | 0% | 4.3 | 0.0059 | 0% | 2.9 | 0.0020 | 0% | 1.0 | 0.0082 | 0% | 4.1 |
| **MC1** | 0.0084 | -1% | 4.2 | 0.0059 | 0% | 2.9 | 0.0015 | -23% | 0.8 | 0.0081 | -1% | 4.0 |
| **MC2** | 0.0079 | -8% | 3.9 | 0.0053 | -9% | 2.7 | 0.0026 | +35% | 1.3 | 0.0097 | +19% | 4.9 |
| **MC3** | 0.0075 | -12% | 3.8 | 0.0050 | -15% | 2.5 | 0.0037 | +91% | 1.9 | 0.0085 | +4% | 4.3 |
| **MC4** | 0.0085 | -1% | 4.2 | 0.0059 | 0% | 2.9 | 0.0021 | +5% | 1.0 | 0.0082 | +0% | 4.1 |
| **MC5** | 0.0085 | 0% | 4.3 | 0.0059 | 0% | 2.9 | 0.0020 | 0% | 1.0 | 0.0082 | 0% | 4.1 |
| **MC6** | 0.0085 | 0% | 4.3 | 0.0059 | 0% | 2.9 | 0.0020 | 0% | 1.0 | 0.0082 | 0% | 4.1 |
| **MC7** | 0.0015 | -83% | 0.7 | 0.0010 | -84% | 0.5 | 0.0016 | -17% | 0.8 | 0.0033 | -60% | 1.6 |
| **MC8** | 0.0088 | +3% | 4.4 | 0.0059 | -0% | 2.9 | 0.0021 | +5% | 1.0 | 0.0082 | -0% | 4.1 |

# Table 7G-3: Sulphate in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**SULFATE - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 419 | 0% | 1.9 | 240 | 0% | 1.1 | 196 | 0% | 0.9 | 251 | 0% | 1.2 |
| **MC1** | 394 | -6% | 1.8 | 239 | -1% | 1.1 | 189 | -3% | 0.9 | 248 | -1% | 1.1 |
| **MC2** | 564 | +35% | 2.6 | 223 | -7% | 1.0 | 186 | -5% | 0.9 | 274 | +9% | 1.3 |
| **MC3** | 531 | +27% | 2.4 | 224 | -7% | 1.0 | 184 | -6% | 0.8 | 255 | +2% | 1.2 |
| **MC4** | 422 | +1% | 1.9 | 245 | +2% | 1.1 | 203 | +4% | 0.9 | 252 | +0% | 1.2 |
| **MC5** | 419 | 0% | 1.9 | 240 | 0% | 1.1 | 196 | 0% | 0.9 | 251 | 0% | 1.2 |
| **MC6** | 419 | 0% | 1.9 | 240 | 0% | 1.1 | 196 | 0% | 0.9 | 251 | 0% | 1.2 |
| **MC7** | 167 | -60% | 0.8 | 328 | +37% | 1.5 | 252 | +29% | 1.2 | 433 | +72% | 2.0 |
| **MC8** | 432 | +3% | 2.0 | 243 | +1% | 1.1 | 229 | +17% | 1.1 | 251 | -0% | 1.2 |

**SULFATE - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 195 | 0% | 0.9 | 176 | 0% | 0.8 | 78 | 0% | 0.4 | 251 | 0% | 1.2 |
| **MC1** | 193 | -1% | 0.9 | 176 | 0% | 0.8 | 61 | -21% | 0.3 | 248 | -1% | 1.1 |
| **MC2** | 231 | +19% | 1.1 | 165 | -6% | 0.8 | 106 | +36% | 0.5 | 271 | +8% | 1.2 |
| **MC3** | 218 | +12% | 1.0 | 155 | -12% | 0.7 | 155 | +98% | 0.7 | 255 | +2% | 1.2 |
| **MC4** | 195 | +0% | 0.9 | 176 | 0% | 0.8 | 81 | +3% | 0.4 | 252 | +0% | 1.2 |
| **MC5** | 195 | 0% | 0.9 | 176 | 0% | 0.8 | 78 | 0% | 0.4 | 251 | 0% | 1.2 |
| **MC6** | 195 | 0% | 0.9 | 176 | 0% | 0.8 | 78 | 0% | 0.4 | 251 | 0% | 1.2 |
| **MC7** | 138 | -29% | 0.6 | 154 | -12% | 0.7 | 107 | +37% | 0.5 | 433 | +72% | 2.0 |
| **MC8** | 212 | +9% | 1.0 | 175 | -0% | 0.8 | 80 | +3% | 0.4 | 251 | -0% | 1.2 |

# Table 7G-4: Total Aluminum in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**ALUMINUM TOTAL - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.018 | 0% | 0.1 | 0.022 | 0% | 0.1 | 0.018 | 0% | 0.1 | 0.021 | 0% | 0.1 |
| **MC1** | 0.019 | +7% | 0.1 | 0.022 | 0% | 0.1 | 0.018 | +4% | 0.1 | 0.021 | +1% | 0.1 |
| **MC2** | 0.018 | +3% | 0.1 | 0.021 | -8% | 0.1 | 0.016 | -10% | 0.1 | 0.020 | -2% | 0.1 |
| **MC3** | 0.018 | +3% | 0.1 | 0.021 | -7% | 0.1 | 0.016 | -9% | 0.1 | 0.020 | -2% | 0.1 |
| **MC4** | 0.018 | -0% | 0.1 | 0.023 | +1% | 0.1 | 0.018 | +3% | 0.1 | 0.021 | +0% | 0.1 |
| **MC5** | 0.018 | 0% | 0.1 | 0.022 | 0% | 0.1 | 0.018 | 0% | 0.1 | 0.021 | 0% | 0.1 |
| **MC6** | 0.018 | 0% | 0.1 | 0.022 | 0% | 0.1 | 0.018 | 0% | 0.1 | 0.021 | 0% | 0.1 |
| **MC7** | 0.019 | +10% | 0.1 | 0.021 | -5% | 0.1 | 0.016 | -7% | 0.1 | 0.032 | +52% | 0.2 |
| **MC8** | 0.021 | +21% | 0.1 | 0.026 | +15% | 0.1 | 0.020 | +12% | 0.1 | 0.022 | +6% | 0.1 |

**ALUMINUM TOTAL - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.016 | 0% | 0.1 | 0.017 | 0% | 0.1 | 0.0056 | 0% | 0.0 | 0.021 | 0% | 0.1 |
| **MC1** | 0.016 | +2% | 0.1 | 0.017 | 0% | 0.1 | 0.0067 | +18% | 0.0 | 0.021 | +1% | 0.1 |
| **MC2** | 0.016 | +2% | 0.1 | 0.015 | -13% | 0.1 | 0.0069 | +22% | 0.0 | 0.020 | -2% | 0.1 |
| **MC3** | 0.015 | -2% | 0.1 | 0.014 | -18% | 0.1 | 0.0096 | +70% | 0.1 | 0.020 | -2% | 0.1 |
| **MC4** | 0.016 | -1% | 0.1 | 0.017 | 0% | 0.1 | 0.0058 | +3% | 0.0 | 0.021 | +0% | 0.1 |
| **MC5** | 0.016 | 0% | 0.1 | 0.017 | 0% | 0.1 | 0.0056 | 0% | 0.0 | 0.021 | 0% | 0.1 |
| **MC6** | 0.016 | 0% | 0.1 | 0.017 | 0% | 0.1 | 0.0056 | 0% | 0.0 | 0.021 | 0% | 0.1 |
| **MC7** | 0.016 | +2% | 0.1 | 0.013 | -21% | 0.1 | 0.0055 | -3% | 0.0 | 0.032 | +52% | 0.2 |
| **MC8** | 0.021 | +33% | 0.1 | 0.018 | +5% | 0.1 | 0.0060 | +7% | 0.0 | 0.022 | +6% | 0.1 |

# Table 7G-5: Nitrate in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**NITRATE - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 13.0 | 0% | 4.3 | 2.32 | 0% | 0.8 | 3.45 | 0% | 1.1 | 4.60 | 0% | 1.5 |
| **MC1** | 12.2 | -6% | 4.1 | 2.31 | -0% | 0.8 | 3.05 | -12% | 1.0 | 3.96 | -14% | 1.3 |
| **MC2** | 18.8 | +45% | 6.3 | 2.11 | -9% | 0.7 | 3.37 | -2% | 1.1 | 4.96 | +8% | 1.7 |
| **MC3** | 16.2 | +25% | 5.4 | 2.15 | -7% | 0.7 | 3.05 | -12% | 1.0 | 4.60 | +0% | 1.5 |
| **MC4** | 14.1 | +9% | 4.7 | 2.42 | +4% | 0.8 | 3.58 | +4% | 1.2 | 4.65 | +1% | 1.5 |
| **MC5** | 8.1 | -37% | 2.7 | 1.46 | -37% | 0.5 | 2.16 | -37% | 0.7 | 2.88 | -37% | 1.0 |
| **MC6** | 13.0 | 0% | 4.3 | 2.32 | 0% | 0.8 | 3.45 | 0% | 1.1 | 4.60 | 0% | 1.5 |
| **MC7** | 2.7 | -79% | 0.9 | 1.77 | -24% | 0.6 | 2.29 | -34% | 0.8 | 1.29 | -72% | 0.4 |
| **MC8** | 13.8 | +7% | 4.6 | 2.36 | +2% | 0.8 | 3.55 | +3% | 1.2 | 4.62 | +0% | 1.5 |

**NITRATE - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 1.8 | 0% | 0.6 | 1.02 | 0% | 0.3 | 1.69 | 0% | 0.6 | 4.51 | 0% | 1.5 |
| **MC1** | 1.6 | -8% | 0.5 | 0.99 | -3% | 0.3 | 1.18 | -30% | 0.4 | 3.87 | -14% | 1.3 |
| **MC2** | 1.9 | +6% | 0.6 | 1.31 | +28% | 0.4 | 2.19 | +30% | 0.7 | 4.82 | +7% | 1.6 |
| **MC3** | 1.8 | -1% | 0.6 | 1.31 | +29% | 0.4 | 2.77 | +64% | 0.9 | 4.55 | +1% | 1.5 |
| **MC4** | 1.8 | +0% | 0.6 | 1.02 | 0% | 0.3 | 1.75 | +3% | 0.6 | 4.55 | +1% | 1.5 |
| **MC5** | 1.1 | -37% | 0.4 | 0.64 | -37% | 0.2 | 1.06 | -37% | 0.4 | 2.83 | -37% | 0.9 |
| **MC6** | 1.8 | 0% | 0.6 | 1.02 | 0% | 0.3 | 1.69 | 0% | 0.6 | 4.51 | 0% | 1.5 |
| **MC7** | 1.2 | -31% | 0.4 | 0.76 | -26% | 0.3 | 1.16 | -31% | 0.4 | 1.29 | -71% | 0.4 |
| **MC8** | 1.7 | -3% | 0.6 | 1.02 | 0% | 0.3 | 1.73 | +3% | 0.6 | 4.52 | +0% | 1.5 |

# Table 7G-6: Dissolved Zinc in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**ZINC DISSOLVED - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.010 | 0% | 2.3 | 0.0092 | 0% | 2.2 | 0.0073 | 0% | 1.7 | 0.0071 | 0% | 1.7 |
| **MC1** | 0.0091 | -8% | 2.2 | 0.0092 | -0% | 2.2 | 0.0072 | -2% | 1.7 | 0.0068 | -4% | 1.6 |
| **MC2** | 0.012 | +18% | 2.8 | 0.0086 | -7% | 2.0 | 0.0069 | -6% | 1.6 | 0.009 | +32% | 2.2 |
| **MC3** | 0.011 | +12% | 2.6 | 0.0086 | -7% | 2.0 | 0.0069 | -6% | 1.6 | 0.0085 | +19% | 2.0 |
| **MC4** | 0.010 | +1% | 2.4 | 0.0094 | +2% | 2.2 | 0.0074 | +2% | 1.8 | 0.0076 | +7% | 1.8 |
| **MC5** | 0.010 | 0% | 2.3 | 0.0092 | 0% | 2.2 | 0.0073 | 0% | 1.7 | 0.0071 | 0% | 1.7 |
| **MC6** | 0.010 | 0% | 2.3 | 0.0092 | 0% | 2.2 | 0.0073 | 0% | 1.7 | 0.0071 | 0% | 1.7 |
| **MC7** | 0.0051 | -48% | 1.2 | 0.010 | +13% | 2.5 | 0.0081 | +10% | 1.9 | 0.0089 | +25% | 2.1 |
| **MC8** | 0.0101 | +3% | 2.4 | 0.009 | +1% | 2.2 | 0.0083 | +13% | 2.0 | 0.0073 | +2% | 1.7 |

**ZINC DISSOLVED - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.0040 | 0% | 1.0 | 0.0015 | 0% | 0.3 | 0.0028 | 0% | 0.7 | 0.0059 | 0% | 1.4 |
| **MC1** | 0.0041 | +1% | 1.0 | 0.0015 | +0% | 0.3 | 0.0024 | -14% | 0.6 | 0.0053 | -9% | 1.3 |
| **MC2** | 0.0035 | -13% | 0.8 | 0.0032 | +118% | 0.8 | 0.0037 | +32% | 0.9 | 0.0068 | +16% | 1.6 |
| **MC3** | 0.0034 | -17% | 0.8 | 0.0032 | +122% | 0.8 | 0.0054 | +95% | 1.3 | 0.0067 | +14% | 1.6 |
| **MC4** | 0.0040 | -1% | 1.0 | 0.0015 | 0% | 0.3 | 0.0029 | +3% | 0.7 | 0.0062 | +5% | 1.5 |
| **MC5** | 0.0040 | 0% | 1.0 | 0.0015 | 0% | 0.3 | 0.0028 | 0% | 0.7 | 0.0059 | 0% | 1.4 |
| **MC6** | 0.0040 | 0% | 1.0 | 0.0015 | 0% | 0.3 | 0.0028 | 0% | 0.7 | 0.0059 | 0% | 1.4 |
| **MC7** | 0.0025 | -38% | 0.6 | 0.0017 | +17% | 0.4 | 0.0032 | +17% | 0.8 | 0.0088 | +51% | 2.1 |
| **MC8** | 0.0035 | -14% | 0.8 | 0.0015 | 0% | 0.3 | 0.0028 | +2% | 0.7 | 0.0059 | +0% | 1.4 |

# Table 7G-7: Dissolved Copper in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**COPPER DISSOLVED - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.0017 | 0% | 2.1 | 0.0017 | 0% | 2.1 | 0.0010 | 0% | 1.2 | 0.0023 | 0% | 2.8 |
| **MC1** | 0.0017 | -0% | 2.1 | 0.0017 | 0% | 2.1 | 0.0010 | +5% | 1.3 | 0.0023 | +1% | 2.8 |
| **MC2** | 0.0019 | +14% | 2.4 | 0.0016 | -8% | 2.0 | 0.0008 | -14% | 1.0 | 0.0022 | -2% | 2.8 |
| **MC3** | 0.0018 | +8% | 2.3 | 0.0015 | -14% | 1.9 | 0.0008 | -14% | 1.0 | 0.0022 | -1% | 2.8 |
| **MC4** | 0.0017 | 0% | 2.1 | 0.0017 | 0% | 2.1 | 0.0010 | +5% | 1.3 | 0.0023 | +0% | 2.8 |
| **MC5** | 0.0017 | 0% | 2.1 | 0.0017 | 0% | 2.1 | 0.0010 | 0% | 1.2 | 0.0023 | 0% | 2.8 |
| **MC6** | 0.0017 | 0% | 2.1 | 0.0017 | 0% | 2.1 | 0.0010 | 0% | 1.2 | 0.0023 | 0% | 2.8 |
| **MC7** | 0.0014 | -16% | 1.8 | 0.0014 | -18% | 1.8 | 0.00095 | -3% | 1.2 | 0.0035 | +55% | 4.4 |
| **MC8** | 0.0019 | +11% | 2.3 | 0.0017 | +2% | 2.2 | 0.0011 | +8% | 1.3 | 0.0023 | +2% | 2.9 |

**COPPER DISSOLVED - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.0017 | 0% | 2.1 | 0.0017 | 0% | 2.1 | 0.00029 | 0% | 0.4 | 0.0023 | 0% | 2.8 |
| **MC1** | 0.0017 | -0% | 2.1 | 0.0017 | 0% | 2.1 | 0.00040 | +40% | 0.5 | 0.0023 | +1% | 2.8 |
| **MC2** | 0.0019 | +14% | 2.4 | 0.0016 | -8% | 2.0 | 0.00033 | +15% | 0.4 | 0.0022 | -2% | 2.8 |
| **MC3** | 0.0018 | +8% | 2.3 | 0.0015 | -14% | 1.9 | 0.00044 | +54% | 0.6 | 0.0022 | -1% | 2.8 |
| **MC4** | 0.0017 | 0% | 2.1 | 0.0017 | 0% | 2.1 | 0.00030 | +4% | 0.4 | 0.0023 | +0% | 2.8 |
| **MC5** | 0.0017 | 0% | 2.1 | 0.0017 | 0% | 2.1 | 0.00029 | 0% | 0.4 | 0.0023 | 0% | 2.8 |
| **MC6** | 0.0017 | 0% | 2.1 | 0.0017 | 0% | 2.1 | 0.00029 | 0% | 0.4 | 0.0023 | 0% | 2.8 |
| **MC7** | 0.0014 | -16% | 1.8 | 0.0014 | -21% | 1.7 | 0.00031 | +9% | 0.4 | 0.0035 | +55% | 4.4 |
| **MC8** | 0.0019 | +11% | 2.3 | 0.0017 | +2% | 2.2 | 0.00030 | +4% | 0.4 | 0.00230 | +2% | 2.9 |

# Table 7G-8: Dissolved Nickel in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**NICKEL DISSOLVED - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.0060 | 0% | 2.7 | 0.0065 | 0% | 2.9 | 0.0053 | 0% | 1.1 | 0.0056 | 0% | 2.2 |
| **MC1** | 0.0058 | -4% | 2.6 | 0.0065 | -0% | 2.9 | 0.0051 | -2% | 1.1 | 0.0054 | -4% | 2.1 |
| **MC2** | 0.0078 | +29% | 3.5 | 0.0061 | -6% | 2.8 | 0.0050 | -4% | 1.1 | 0.0074 | +32% | 3.0 |
| **MC3** | 0.0074 | +22% | 3.4 | 0.0061 | -5% | 2.8 | 0.0051 | -4% | 1.1 | 0.0058 | +4% | 2.3 |
| **MC4** | 0.0061 | +0% | 2.8 | 0.0065 | +1% | 3.0 | 0.0053 | +1% | 1.1 | 0.0060 | +7% | 2.4 |
| **MC5** | 0.0060 | 0% | 2.7 | 0.0065 | 0% | 2.9 | 0.0053 | 0% | 1.1 | 0.0056 | 0% | 2.2 |
| **MC6** | 0.0060 | 0% | 2.7 | 0.0065 | 0% | 2.9 | 0.0053 | 0% | 1.1 | 0.0056 | 0% | 2.2 |
| **MC7** | 0.0037 | -40% | 1.7 | 0.0076 | +17% | 3.4 | 0.0060 | +14% | 1.3 | 0.0069 | +22% | 2.7 |
| **MC8** | 0.0062 | +2% | 2.8 | 0.0065 | +1% | 3.0 | 0.0060 | +14% | 1.3 | 0.0057 | +2% | 2.3 |

**NICKEL DISSOLVED - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.0022 | 0% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | 0% | 0.4 | 0.0044 | 0% | 1.8 |
| **MC1** | 0.0023 | +5% | 1.0 | 0.0017 | 0% | 0.8 | 0.0017 | -20% | 0.4 | 0.0038 | -13% | 1.5 |
| **MC2** | 0.0021 | -1% | 1.0 | 0.0023 | +37% | 1.0 | 0.0028 | +35% | 0.6 | 0.0051 | +16% | 2.0 |
| **MC3** | 0.0020 | -6% | 0.9 | 0.0023 | +39% | 1.1 | 0.0042 | +100% | 0.9 | 0.0047 | +7% | 1.9 |
| **MC4** | 0.0021 | -1% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | +2% | 0.5 | 0.0046 | +5% | 1.8 |
| **MC5** | 0.0022 | 0% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | 0% | 0.4 | 0.0044 | 0% | 1.8 |
| **MC6** | 0.0022 | 0% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | 0% | 0.4 | 0.0044 | 0% | 1.8 |
| **MC7** | 0.0017 | -23% | 0.8 | 0.0015 | -9% | 0.7 | 0.0025 | +19% | 0.5 | 0.0068 | +56% | 2.7 |
| **MC8** | 0.0023 | +4% | 1.0 | 0.0017 | 0% | 0.8 | 0.0021 | +2% | 0.5 | 0.0044 | +0% | 1.8 |

# Table 7G-9: Total Molybdenum in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**MOLYBDENUM TOTAL - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.035 | 0% | 1.0 | 0.010 | 0% | 0.3 | 0.0075 | 0% | 0.2 | 0.0084 | 0% | 0.2 |
| **MC1** | 0.035 | -2% | 1.0 | 0.010 | 0% | 0.3 | 0.0070 | -7% | 0.2 | 0.0083 | -1% | 0.2 |
| **MC2** | 0.048 | +34% | 1.4 | 0.009 | -8% | 0.3 | 0.0069 | -8% | 0.2 | 0.010 | +21% | 0.3 |
| **MC3** | 0.045 | +26% | 1.3 | 0.009 | -8% | 0.3 | 0.0066 | -13% | 0.2 | 0.0086 | +3% | 0.3 |
| **MC4** | 0.036 | +1% | 1.1 | 0.010 | +3% | 0.3 | 0.0080 | +6% | 0.2 | 0.0085 | +1% | 0.2 |
| **MC5** | 0.035 | 0% | 1.0 | 0.010 | 0% | 0.3 | 0.0075 | 0% | 0.2 | 0.0084 | 0% | 0.2 |
| **MC6** | 0.035 | 0% | 1.0 | 0.010 | 0% | 0.3 | 0.0075 | 0% | 0.2 | 0.0084 | 0% | 0.2 |
| **MC7** | 0.010 | -71% | 0.3 | 0.019 | +90% | 0.6 | 0.013 | +77% | 0.4 | 0.024 | +188% | 0.7 |
| **MC8** | 0.036 | +3% | 1.1 | 0.010 | +2% | 0.3 | 0.009 | +25% | 0.3 | 0.008 | -0% | 0.2 |

**MOLYBDENUM TOTAL - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.012 | 0% | 0.3 | 0.0059 | 0% | 0.2 | 0.0025 | 0% | 0.1 | 0.0084 | 0% | 0.2 |
| **MC1** | 0.012 | -1% | 0.3 | 0.0059 | 0% | 0.2 | 0.0019 | -23% | 0.1 | 0.0083 | -1% | 0.2 |
| **MC2** | 0.010 | -12% | 0.3 | 0.0056 | -6% | 0.2 | 0.0033 | +33% | 0.1 | 0.010 | +21% | 0.3 |
| **MC3** | 0.010 | -15% | 0.3 | 0.0053 | -11% | 0.2 | 0.0045 | +83% | 0.1 | 0.0086 | +3% | 0.3 |
| **MC4** | 0.012 | -1% | 0.3 | 0.0059 | +0% | 0.2 | 0.0026 | +6% | 0.1 | 0.0085 | +1% | 0.2 |
| **MC5** | 0.012 | 0% | 0.3 | 0.0059 | 0% | 0.2 | 0.0025 | 0% | 0.1 | 0.0084 | 0% | 0.2 |
| **MC6** | 0.012 | 0% | 0.3 | 0.0059 | 0% | 0.2 | 0.0025 | 0% | 0.1 | 0.0084 | 0% | 0.2 |
| **MC7** | 0.0078 | -34% | 0.2 | 0.0060 | +1% | 0.2 | 0.005 | +118% | 0.2 | 0.024 | +188% | 0.7 |
| **MC8** | 0.010 | -15% | 0.3 | 0.006 | -0% | 0.2 | 0.003 | +5% | 0.1 | 0.008 | -0% | 0.2 |

# Table 7G-10: Total Iron in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**IRON TOTAL - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.036 | 0% | 0.0 | 0.11 | 0% | 0.1 | 0.080 | 0% | 0.1 | 0.063 | 0% | 0.1 |
| **MC1** | 0.041 | +13% | 0.0 | 0.11 | +0% | 0.1 | 0.080 | -1% | 0.1 | 0.062 | -2% | 0.1 |
| **MC2** | 0.041 | +13% | 0.0 | 0.10 | -6% | 0.1 | 0.076 | -5% | 0.1 | 0.080 | +27% | 0.1 |
| **MC3** | 0.041 | +13% | 0.0 | 0.10 | -5% | 0.1 | 0.077 | -4% | 0.1 | 0.074 | +18% | 0.1 |
| **MC4** | 0.035 | -2% | 0.0 | 0.11 | +2% | 0.1 | 0.080 | +1% | 0.1 | 0.067 | +7% | 0.1 |
| **MC5** | 0.036 | 0% | 0.0 | 0.11 | 0% | 0.1 | 0.080 | 0% | 0.1 | 0.063 | 0% | 0.1 |
| **MC6** | 0.036 | 0% | 0.0 | 0.11 | 0% | 0.1 | 0.080 | 0% | 0.1 | 0.063 | 0% | 0.1 |
| **MC7** | 0.039 | +8% | 0.0 | 0.10 | -6% | 0.1 | 0.077 | -4% | 0.1 | 0.062 | -1% | 0.1 |
| **MC8** | 0.036 | +0% | 0.0 | 0.106 | 0% | 0.1 | 0.087 | +9% | 0.1 | 0.064 | +2% | 0.1 |

**IRON TOTAL - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.021 | 0% | 0.0 | 0.01 | 0% | 0.0 | 0.028 | 0% | 0.0 | 0.061 | 0% | 0.1 |
| **MC1** | 0.023 | +9% | 0.0 | 0.02 | +10% | 0.0 | 0.025 | -10% | 0.0 | 0.058 | -6% | 0.1 |
| **MC2** | 0.021 | -0% | 0.0 | 0.04 | +168% | 0.0 | 0.037 | +32% | 0.0 | 0.066 | +8% | 0.1 |
| **MC3** | 0.019 | -6% | 0.0 | 0.04 | +172% | 0.0 | 0.055 | +98% | 0.1 | 0.067 | +9% | 0.1 |
| **MC4** | 0.021 | -1% | 0.0 | 0.01 | +1% | 0.0 | 0.029 | +2% | 0.0 | 0.063 | +3% | 0.1 |
| **MC5** | 0.021 | 0% | 0.0 | 0.01 | 0% | 0.0 | 0.028 | 0% | 0.0 | 0.061 | 0% | 0.1 |
| **MC6** | 0.021 | 0% | 0.0 | 0.01 | 0% | 0.0 | 0.028 | 0% | 0.0 | 0.061 | 0% | 0.1 |
| **MC7** | 0.022 | +7% | 0.0 | 0.01 | -3% | 0.0 | 0.027 | -4% | 0.0 | 0.059 | -4% | 0.1 |
| **MC8** | 0.021 | -0% | 0.0 | 0.014 | -0% | 0.0 | 0.028 | +1% | 0.0 | 0.062 | +0% | 0.1 |

# Table 7G-11: Total Chromium groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**CHROMIUM TOTAL - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.00077 | 0% | 0.8 | 0.00035 | 0% | 0.4 | 0.00023 | 0% | 0.2 | 0.00020 | 0% | 0.2 |
| **MC1** | 0.00072 | -8% | 0.7 | 0.00035 | 0% | 0.4 | 0.00023 | +0% | 0.2 | 0.00021 | +7% | 0.2 |
| **MC2** | 0.00089 | +14% | 0.9 | 0.00034 | -4% | 0.3 | 0.00019 | -19% | 0.2 | 0.00024 | +22% | 0.2 |
| **MC3** | 0.00089 | +14% | 0.9 | 0.00034 | -4% | 0.3 | 0.00018 | -21% | 0.2 | 0.00067 | +238% | 0.7 |
| **MC4** | 0.00078 | +1% | 0.8 | 0.00035 | 0% | 0.4 | 0.00025 | +7% | 0.2 | 0.00021 | +7% | 0.2 |
| **MC5** | 0.00077 | 0% | 0.8 | 0.00035 | 0% | 0.4 | 0.00023 | 0% | 0.2 | 0.00020 | 0% | 0.2 |
| **MC6** | 0.00077 | 0% | 0.8 | 0.00035 | 0% | 0.4 | 0.00023 | 0% | 0.2 | 0.00020 | 0% | 0.2 |
| **MC7** | 0.00045 | -42% | 0.4 | 0.00039 | +11% | 0.4 | 0.00027 | +17% | 0.3 | 0.00039 | +97% | 0.4 |
| **MC8** | 0.00080 | +3% | 0.8 | 0.00035 | 0% | 0.4 | 0.00026 | +14% | 0.3 | 0.00020 | -0% | 0.2 |

**CHROMIUM TOTAL - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.00032 | 0% | 0.3 | 0.00013 | 0% | 0.1 | 0.00007 | 0% | 0.1 | 0.00020 | 0% | 0.2 |
| **MC1** | 0.00031 | -1% | 0.3 | 0.00013 | +0% | 0.1 | 0.00009 | +20% | 0.1 | 0.00021 | +7% | 0.2 |
| **MC2** | 0.00029 | -11% | 0.3 | 0.00012 | -3% | 0.1 | 0.00008 | +12% | 0.1 | 0.00024 | +22% | 0.2 |
| **MC3** | 0.00027 | -15% | 0.3 | 0.00011 | -9% | 0.1 | 0.00011 | +49% | 0.1 | 0.00031 | +59% | 0.3 |
| **MC4** | 0.00032 | -1% | 0.3 | 0.00013 | 0% | 0.1 | 0.00008 | +6% | 0.1 | 0.00021 | +7% | 0.2 |
| **MC5** | 0.00032 | 0% | 0.3 | 0.00013 | 0% | 0.1 | 0.00007 | 0% | 0.1 | 0.00020 | 0% | 0.2 |
| **MC6** | 0.00032 | 0% | 0.3 | 0.00013 | 0% | 0.1 | 0.00007 | 0% | 0.1 | 0.00020 | 0% | 0.2 |
| **MC7** | 0.00022 | -31% | 0.2 | 0.00012 | -8% | 0.1 | 0.00010 | +43% | 0.1 | 0.00039 | +97% | 0.4 |
| **MC8** | 0.00028 | -12% | 0.3 | 0.00013 | 0% | 0.1 | 0.00007 | +3% | 0.1 | 0.00020 | -0% | 0.2 |

# Table 7G-12: Total Cobalt in groundwater seepage from Tenas Control Pond, North Management Pond, East Management Pond and West Management Pond (Operations and Post-Closure)

**TOTAL COBALT - OPS**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.003 | 0% | 0.7 | 0.0040 | 0% | 1.0 | 0.0035 | 0% | 0.9 | 0.0042 | 0% | 1.0 |
| **MC1** | 0.0028 | -2% | 0.7 | 0.0040 | -0% | 1.0 | 0.0034 | -2% | 0.8 | 0.0040 | -4% | 1.0 |
| **MC2** | 0.004 | +30% | 0.9 | 0.0038 | -5% | 1.0 | 0.0034 | -3% | 0.8 | 0.005 | +31% | 1.4 |
| **MC3** | 0.003 | +24% | 0.9 | 0.0039 | -4% | 1.0 | 0.0034 | -3% | 0.8 | 0.0042 | +1% | 1.1 |
| **MC4** | 0.003 | +1% | 0.7 | 0.0040 | +1% | 1.0 | 0.0035 | +1% | 0.9 | 0.0045 | +7% | 1.1 |
| **MC5** | 0.003 | 0% | 0.7 | 0.0040 | 0% | 1.0 | 0.0035 | 0% | 0.9 | 0.0042 | 0% | 1.0 |
| **MC6** | 0.003 | 0% | 0.7 | 0.0040 | 0% | 1.0 | 0.0035 | 0% | 0.9 | 0.0042 | 0% | 1.0 |
| **MC7** | 0.0024 | -14% | 0.6 | 0.005 | +12% | 1.1 | 0.0038 | +11% | 1.0 | 0.0047 | +13% | 1.2 |
| **MC8** | 0.0029 | +3% | 0.7 | 0.004 | +1% | 1.0 | 0.0039 | +13% | 1.0 | 0.0043 | +2% | 1.1 |

**TOTAL COBALT - Closure**

| Case | Tenas Control Pond | | | North Management Pond | | | East Management Pond | | | West Management Pond | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier | Max Monthly Concentration [mg/l] | Reduction over Project Case | Limit Exceedance Multiplier |
| **Project Case** | 0.0010 | 0% | 0.2 | 0.0005 | 0% | 0.1 | 0.0015 | 0% | 0.4 | 0.0028 | 0% | 0.7 |
| **MC1** | 0.0010 | +6% | 0.3 | 0.0005 | +0% | 0.1 | 0.0012 | -21% | 0.3 | 0.0024 | -14% | 0.6 |
| **MC2** | 0.0009 | -8% | 0.2 | 0.0014 | +175% | 0.4 | 0.0020 | +36% | 0.5 | 0.0032 | +13% | 0.8 |
| **MC3** | 0.0009 | -12% | 0.2 | 0.0015 | +180% | 0.4 | 0.0030 | +102% | 0.7 | 0.0030 | +5% | 0.7 |
| **MC4** | 0.0010 | -1% | 0.2 | 0.0005 | +0% | 0.1 | 0.0015 | +2% | 0.4 | 0.0029 | +4% | 0.7 |
| **MC5** | 0.0010 | 0% | 0.2 | 0.0005 | 0% | 0.1 | 0.0015 | 0% | 0.4 | 0.0028 | 0% | 0.7 |
| **MC6** | 0.0010 | 0% | 0.2 | 0.0005 | 0% | 0.1 | 0.0015 | 0% | 0.4 | 0.0028 | 0% | 0.7 |
| **MC7** | 0.0008 | -22% | 0.2 | 0.0007 | +32% | 0.2 | 0.0016 | +12% | 0.4 | 0.0040 | +40% | 1.0 |
| **MC8** | 0.0008 | -19% | 0.2 | 0.0005 | 0% | 0.1 | 0.0015 | +2% | 0.4 | 0.0028 | +0% | 0.7 |

# Appendix H Tenas Project Best available Technology assessment report (2025)

# Tenas Project
# Best Achievable Technology Assessment

**Prepared for**

**Telkwa Mining Limited**

**Prepared by**

SRK Consulting (Canada) Inc.
CAPR002055
March 2025

# Tenas Project
# Best Achievable Technology Assessment

March 2025

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Project No: CAPR002055

File Name: Telkwa BAT Report CAPR002055 20250305 FNL.docx

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# Executive Summary

Telkwa Mining Limited (TML) is proposing to develop the Tenas Coal Project (the Project) located in northwest British Columbia 25 km Southwest of the town of Smithers, BC. This report documents the Best Achievable Technology (BAT) assessment completed for the Project as part of the Information Requests 176,353,355, and 514 provided by the EAO in their Water IR letter in November of 2022 (SRK 2025) related to the Project's Environmental Assessment Certificate (EAC) application.

The purpose of the BAT assessment is to identify technologies that are best suited for managing or mitigating Parameters of Concern (POCs) in anticipated groundwater and surface water effluents from the Tenas Project site. The BAT assessment methodology followed guidance issued by the BC Ministry of Environment and Climate Change Strategy (BC ENV) in November 2024 (BC ENV 2024).

The BAT assessment considered the following discharges:

- Surface discharge:
  - Tenas Control Pond discharge (during operations until 2048) – discharges to Goathorn Creek
  - North Management Pond (after 2048) – discharges to Goathorn Creek
  - Rail Infrastructure Sedimentation Pond (during operations until 2044) – discharges to the ground
- Groundwater discharges:
  - Tenas Control Pond (TCP) – discharges to Tenas Creek, Goathorn Creek, and Telkwa River.
  - North Management Pond (NMP) – discharges to Tenas Creek, Goathorn Creek, and Telkwa River.
  - East Management Pond (EMP) – discharges to Four Creek, Tenas Creek, Goathorn Creek, and Telkwa River.
  - West Management Pond (WMP) – discharges to Tenas Creek, Goathorn Creek, and Telkwa River.

Groundwater recharge in the open pit is two orders of magnitude lower than the management and control ponds and as such is not considered in the analysis of Parameters of Potential Concern. Groundwater recharge from the Coal Processing Plant is four orders of magnitude lower than the management and control ponds and was not considered in this analysis Parameters of Potential Concern.

Parameters of Potential Concern (POPCs) and Parameters of Concern (POCs) were identified based on water quality model results as per BC ENV's general guidance on Parameters of Concern

(BC ENV 2024). A total of 12 POCs were identified for the anticipated future effluent sources with four of the POCs being identified for background (or baseline) waters in the Project Area.

**Table E-1 POCs Identified for the Tenas Project BAT Assessment**

| | Surface Discharge | | | Groundwater Discharge (Post-Closure) | | | | Background / Baseline |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **TCP Discharge (Operation)** | **NMP Discharge (Post-Closure)** | **RLO discharge – (Operation)** | **TCP Seepage** | **NMP Seepage** | **WMP Seepage** | **EMP Seepage** | **See Footnote** |
| **Nitrogen Nutrients** | | | | | | | | |
| Nitrate | X | | | X | | X | | |
| Nitrite | X | | | X | X | X | X | |
| **Sulphate** | | | | | | | | |
| Sulphate | X | X | | X | X | X | | |
| **Metals** | | | | | | | | |
| Aluminum, total | X | X | X | | | | | X[A] |
| Cadmium, dissolved | | | X[D] | | | | | |
| Cobalt, total | | | | | X | X | X | |
| Copper, dissolved | X | X | | | | X | | X[B] |
| Iron, total | X | X | X | | | | | X[C] |
| Nickel, dissolved | X | X | X | X | X | X | X | |
| Zinc, dissolved | X | | | X | X | X | | |
| **Oxyanions** | | | | | | | | |
| Molybdenum, total | X | | | X | | | | |
| Selenium, total | X | X | | X | X | X | X | |
| | | | | | | | | |

Notes:
A - Background POC for Four, Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
B - Background POC for Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
C - Background POC for Four, Tenas Creeks, Telkwa and Bulkley Rivers.
D - Cd is POC for Rail Load Out only - it is therefore not considered in future screening

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20240925.xlsx]POC Condensed

Surface water discharges from the Project will be limited to the open water season and is expected to reach a maximum around freshet. Groundwater discharges, on the other hand, are expected to steadily increase over the duration of the Operation phase of the Project as the water management ponds are constructed and filled, but significant seasonal variability in groundwater flows are not expected.

Through the development and design of the Tenas Project, TML has made efforts to include as many source control measures and best management practices as is practically achievable to manage wager quality within and downstream of the Project Area. Such efforts include the inundation of potentially acid generating (PAG) rock in the management ponds on site to prevent potential Acid Rock Drainage, lining of the management and control ponds to reduce seepage and groundwater recharge, progressive reclamation and covering of non-potential acid generating rock (non-PAG) backfilled into the open pit, construction of dam/buttresses and backfills (any potential external piles) using a bottom up construction methodology, attenuation of effluent in Tenas Control Pond and pacing of discharge to the open water season, erosion prevention in collection and diversion channels, and sediment control in sedimentation/control ponds, clean water diversions to route water around Project activities, and the use of blasthole liners to reduce loss and dissolution of residual ammonium nitrate fuel oil (ANFO) explosives.

Updated water and load balance model results for the Project issued in 2024 indicated that surface and groundwater discharges from the Project are unlikely to cause concentrations in downstream receiving waters to approach or exceed BC water quality guidelines (WQGs) for protection of freshwater aquatic life at the modelled prediction nodes. Nonetheless, this BAT assessment was conducted to determine whether implementation of water treatment technologies to further reduce loadings in site effluent would be feasible and achievable.

Candidate BATs there were deemed to be potentially feasible included:

- Passive/Active flocculation.
- In-situ Active Gravel Bed Reactors (In-situ Active GBR).
- Active Tank Base Water Treatment Options listed below
  - Membrane Filtration + Anaerobic Biological Treatment.
  - Membrane Filtration + Anaerobic Biological Treatment + Lime Treatment.
  - Membrane Filtration + Anaerobic Biological Treatment + Sulphide Treatment.
  - Membrane Filtration + Anaerobic Biological Treatment + Ferric Co-precipitation.
  - Membrane Filtration + Anaerobic Biological Treatment + Ion Exchange.
  - Zero Liquid Discharge.
- Modified Management and Control Pond liners.

In addition to these, the base case option that includes a wide range of BMPs for managing water quality was also evaluated.

Candidate BATs were evaluated using a multiple accounts analysis (MAA). Evaluation criteria and weights were predefined by BC ENV but slightly modified by TML to account for the Yintah Management Directives provided by the Office of the Wet'suwet'en (OW) to recognize First Nation input into the process. The following was concluded based on the MAA for the Tenas Project:

- In-situ Active GBRs and the base case with BMPs were the highest ranked scenarios (78 points out of a possible 100) followed by passive/active flocculation (77 points).
- The option of modifying management pond liners to reduce seepage scored 73 points and was therefore less preferred than the In-situ Active GBR, the base case with BMPs, or flocculation.
- Active tank-based water treatment options, except for the zero liquid discharge treatment option, scored between 65 and 69 points, with an average of 67 points.
- Zero liquid discharge scored lowest at 55 points.

The active tank-based water treatment options generally scored higher for criteria related to control-effectiveness, but scored lower for environmental and socio-cultural criteria, and cost. Overall, the BAT assessment indicated that In-situ active GBR and the base case are about equally preferred with a slight preference for the In-situ active GBR option. Tank-based water treatment options,

GBRs, flocculation and the base case with BMPs scored similarly for the combined reliability criteria.

The following was concluded based on the outcome of the BAT assessment:

- The base case with BMPs is a highly rated and feasible option for protecting downstream water quality as is.

- In-situ Active GBRs and flocculation are highly rated and feasibility mitigation controls that should be retained as contingency options during permitting if water quality predictions for the Project differ substantially from actual conditions observed during the development of the mine. To improve on the technology readiness of the Active In-situ GBR technology TML should develop a pilot In-situ Active GBR with the Coal Processing Plan Sedimentation Pond.

- Active tank-based water treatment options are less suitable but feasible and should be retained as contingency options during permitting if water quality predictions for the Project differ substantially from actual conditions observed during the development of the mine and are trending towards exceedances of the WQGs.

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Appendix A –WQG and POPC Screening Summary Tables

# 1 Introduction

This report documents a Best Achievable Technology (BAT) assessment for the Tenas Project (the Project), which is a proposed open pit metallurgical coal mine near Telkwa, British Columbia. In 2022, Telkwa Mining Limited (TML) applied for an Environmental Assessment Certificate (EAC) for the Project, which is currently under review. The BAT assessment was prepared in response Information Requests (IR) 176,353,355, and 514 provided by the EAO in their Water IR letter in November of 2022 (SRK 2025).

The BAT assessment included key anticipated discharges from the proposed Tenas Project, including surface discharges (from Tenas Control Pond (operations), North Management Pond (post-closure), and from the Rail Infrastructure/Loadout) and seepage that would report to groundwater (seepage from Tenas Control Pond (TCP), North Management Pond (NMP), West Management Pond (WMP), and East Management Pond (EMP). Groundwater recharge in the open pit area is two orders of magnitude lower than management and control pond seepages and as such is too minor to be a controlled or managed discharge. Groundwater recharge from the Coal Processing Plant is four orders of magnitude lower than the management and control ponds and was not considered in this analysis Parameters of Potential Concern.

The BAT assessment aimed to adhere to the guidance issued by the BC Ministry of Environment and Climate Change Strategy (BC ENV), in November 2024 (BC ENV 2024a). TML consulted with BC ENV during the preparation of the BAT assessment to ensure that TML's interpretation of the BAT guidance aligned with the BC ENV's intent. On December 18, 2025 TML issued a presentation to BC ENV that summarized the methodology and preliminary results of the BAT assessment. TML subsequently received review comments from BC ENV on the summary presentation in January 2025. BC ENV's review comments and suggestions have been incorporated into this report, to the extent possible.

This report is organized as follows:

- **Section 2** describes the methodology used for the updated BAT assessment and highlights information and methods used as per BC ENV's direction.
- **Section 3** defines the BAT assessment setting, including Parameters of Potential Concern (POPCs), Parameters of Concern (POCs), the expected range of discharge flows, as well as other information that is relevant for informing the technology selection.
- **Section 4** summarizes the technology identification and technology feasibility screening step.
- **Section 5** documents the evaluation and ranking of candidate BAT technologies that were deemed to be potentially feasible in the technology screening step, and
- **Section 6** presents conclusions of the BAT assessment and identifies the preferred BAT(s).

# 2 BAT Assessment Methodology

This section describes the methodology used for the BAT assessment while figure Figure 2-1 below summarizes the overall assessment methodology

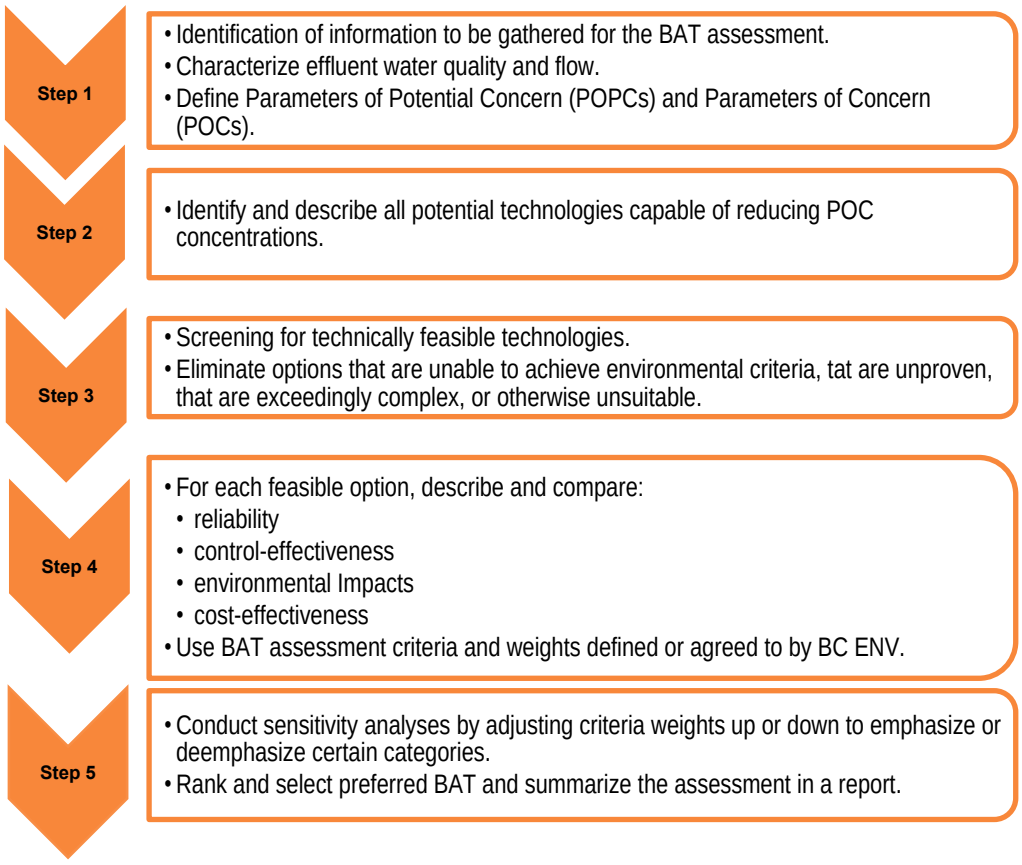



**Figure 2-1 Overview of BAT Assessment Methodology**

## 2.1 Step One: Identification of POPCs and POCs

This BAT assessment followed BC ENV's general guidance on Parameters of Concern (POCs) issued by BC ENV in January 2024 (BC ENV 2024). The purpose of the BAT assessment is to identify technologies that are best suited for managing or mitigating POCs in proposed discharges from the mine site. Step 1 of the assessment used the water quality model results from the water and load balance model developed for the Tenas Project (2024 revision) as a basis for identifying POPCs. POCs are identified by first defining Parameters of Potential Concern (POPCs) as follows:

- POPCs include all parameters with expected (untreated) discharge concentrations that are greater than 80% of applicable water quality guidelines (WQG). WQGs were chosen according to the following order of preference:
  - The lowest of approved or working BC water quality guideline for protection of freshwater aquatic life.

  - CCME water quality guidelines (Canadian Council of Ministers of the Environment) when BC guidelines are unavailable, or
  - ECCC water quality guidelines (Environment, and Climate change Canada) when 1) or 2) are unavailable.

  The only exception to the use of aquatic life guidelines was for molybdenum (total), for which BC's ruminant (wildlife) was chosen as the WQG as it was lower for wildlife receptors. While some parameters have lower guidelines for irrigation and drinking water these were not used for the selection of POCs because water from the Project is not used for irrigation or as a primary drinking water source. For guidelines that depend on toxicity-modifying factors, medium background values from baseline datasets within each creek were used.

- POPCs are automatically added to the list of POCs unless a clear scientifically based rationale is provided for excluding them. For this BAT assessment, all POPCs were conservatively assumed to be POCs.

The POC guidance stipulates that parameters with no WQG or other appropriate threshold should be identified as POPCs. However, this requirement is impractical because of the hundreds of thousands of inorganic and organic species without WQGs (or other thresholds) and was therefore not considered. In addition, certain "special case parameters" that can cause toxicity in unpredictable ways or that can bioaccumulate, bioconcentrate or biomagnify – such as selenium and mercury – should be considered POPCs irrespective of anticipated discharge concentrations. Selenium was identified as a POPC and a POC because effluent concentrations are expected to be higher than the BC WQG. However, mercury was not included as a POPC/POC because concentrations in the effluent from the site are modelled to be at or near the analytical detection limit.

## 2.2 Steps 2 and 3: Technology Identification and Screening

In Step 2 of the BAT assessment, technologies that potentially could be implemented are identified. BC ENV guidance specified specific information requirements to be included as part of the technology identification, including:

- a brief description of the treatment technology and its use in the mining industry.
- a description of any necessary ancillary technologies or infrastructure required, e.g., pre-treatment equalization, post-treatment solid/liquid separation, etc.
- a high-level process flow diagram, and
- a summary of advantages and disadvantages, including consideration for treatment by-products.

The requested information has been included in this report to the extent possible.

Identified technologies were then screened for feasibility in Step 3 of the assessment. BC ENV requested that the following criteria were used to screen for potential feasibility of each technology:

- Ability to achieve environmental criteria:

  - Evaluate each technology's capability to achieve the target effluent concentrations (in this case 80% of WQGs) for any identified POCs. Technologies that only address specific POCs rather than all of them may still be included for further evaluation.

- Proven commercial application:
  - Technologies considered as BAT, at a minimum, must have a demonstration system operating at near full-scale in the same industry and under similar site-specific conditions. For emerging technologies, technologies that have not been successfully implemented in a similar site condition, a Technology Readiness Assessment (TRA) must be conducted in accordance with the Technology Readiness Assessment Interim Technical Guidance (BC ENV 2022) and a TRA report should be submitted with the BAT assessment. Technologies that have been assessed at TRL-6, or below, are considered research and development technologies. Technologies considered for a BAT assessment prepared for an EAC application, must be assessed at a TRL level 7, 8, or 9.
- Operational Complexity:
  - This criterion considers several factors which may include, but are not limited to operator attendance requirement, chemical requirements, ease of process control, level of automation, level of expertise required to operate the system, maintenance requirements, and downtime expectations (for maintenance and part repairs and replacement).

BC ENV also stated that the cost of implementation are not to be considered at the screening stage. Technology screening often relies on professional judgement and operational experience. Therefore, the BAT assessment report has attempted to document rationales for screening out technologies as clearly as possible.

## 2.3 Step 4: Evaluation Criteria and Weights

BC ENV's guidance stipulates that a Multiple Accounts Analysis (MAA) should be used for assessing candidate BATs that pass the feasibility screening step. The following general criteria are to be used:

- Reliability.
- Control-effectiveness.
- Environmental impacts, and
- Cost effectiveness.

Each of the accounts have two or more sub-accounts (evaluation criteria) as illustrated in Table 2-1. Also indicated are the weights assigned by BC ENV to each account and criterion. Each criterion is scored on a scale of 1 to 5 with a score of 1 assigned to least favorable, and 5 to most favorable attributes.

TML proposed to add a criterion called "Adherence to Yintah Management Directives" to the "environmental impacts" account (Table 2-1). The criterion was added to acknowledge the

importance of considering the values of Wet'suwet'en First Nation on whose traditional territory the Project is located.

The following sections summarize SRK's understanding of the evaluation criteria to be used in the MAA.

**Table 2-1 BAT Assessment Criteria and Weight Distribution**

| Assessment Criterion | BC ENV's Suggested Weights | TML's Proposed Weights |
|---|---|---|
| **Reliability** | **20** | **20** |
| *Risk Assessment* | 5 | 5 |
| *Robustness* | 5 | 5 |
| *Scalability* | 5 | 5 |
| *Long-term Viability* | 5 | 5 |
| **Control-Effectiveness** | **35** | **30** |
| *Pollutant Reduction* | 20 | 20 |
| *Toxicity Reduction* | 15 | 10 |
| **Environmental Impacts** | **20** | **25** |
| *Energy Efficiency* | 5 | 5 |
| *Greenhouse Gas Emission* | 6 | 6 |
| *Footprint* | 4 | 4 |
| *Secondary Waste Production* | 5 | 5 |
| ***Adherence to Yintah Management Directives*** | - | **5** |
| **Cost-Effectiveness** | **25** | **25** |
| *Efficient Use of Existing Resources* | 3 | 3 |
| *Life Cycle Cost Analysis* | 22 | 22 |
| **Total** | **100** | **100** |

Note: **purple text** indicates SRK's proposed modifications to BC ENV's criteria and weights.

### 2.3.1 Reliability

#### 2.3.1.1 Risk Assessment

BC ENV described the 'risk assessment' criterion as follows:

*"Risk Assessment* - Conduct a risk assessment for each technology to identify the potential risks associated with the implementation, operation, and maintenance of the technology. These risks may include but are not limited to the likelihood of process failure, environmental and human health risks resulting from process failure, as well as risks associated with secondary waste production (by-products) that may impact the environment and human health."

A general definition of "risk" is the combination of the probability that an adverse event will occur and the consequence of that event. For each candidate BAT considered, the predominant risks identified will be presented and assigned a risk category based on the associated probability and consequence. In the MAA table, technologies with high or extreme risks will be assigned lower scores than options with moderate or low risks. Note that certain extreme risks may cause a BAT to be eliminated from subsequent analysis.

#### 2.3.1.2 Robustness

BC ENV describes the 'robustness' criterion as follows:

*"Robustness* - means consistent and reliable performance under various conditions over the technology operational life. Evaluate technologies based on their ability to maintain effectiveness and performance under the fluctuations in operating conditions such as effluent quality (physical and chemical characteristics) and quantity (flow)."

This assessment criterion was evaluated according to the definition provided.

#### 2.3.1.3 Scalability

BC ENV describes the 'scalability' criterion as follows:

*"Scalability* - evaluate the scalability of each technology for future site expansions to manage the increased loads of POCs and additional effluent flows. Assess the systems performance under increased loads and flow conditions and identify potential system modifications that might be required to accommodate the changes effectively. Additionally, evaluate if the site condition such as available footprint, power, etc., can accommodate future expansions."

Since future discharge quality and flows are estimated based on the Project's water and load balance model, scalability is an important consideration. As such this assessment criterion was evaluated according to the definition provided.

#### 2.3.1.4 Long-Term Viability

BC ENV describes the 'long-term viability' criterion as follows:

*"Long Term Viability* - long term viability involves evaluating the sustainability and performance effectiveness of each technology over an extended period. Discuss and compare longevity and expected lifespan for each technology."

This evaluation criterion is interpreted to be synonymous with effort required to maintain the BAT in a state where it can perform as designed for the duration it is required which is estimated at over one hundred years. As such there is overlap between long-term viability, operating costs/sustaining capital, and operational complexity.

## 2.4 Control Effectiveness

### 2.4.1 Pollutant Reduction

BC ENV describes the 'pollutant reduction' criterion as follows:

*"Pollutant Reduction (achieving discharge limits)* - discuss the efficacy of each technology in removing the POCs in terms of percent pollutant removal and achievable effluent concentrations. Pollutant reduction scores can be assigned to each POC individually, and an average of the allocated score for all POCs can be used to determine the final score of the

technology. The proposed scores shown in Table 2-2 should be used in your evaluation for control effectiveness."

**Table 2-2 Proposed Scores for Pollutant Reduction (BC ENV)**

| Percent Pollutant Reduction (%) | Score (1-5) |
|---|---|
| 0% to 20% | 1 |
| 20% to 40% | 2 |
| 40% to 60% | 3 |
| 60% to 80% | 4 |
| 80% to 100% | 5 |

The intent and logic behind the pollutant reduction criterion is straight-forward. The pollutant reduction score for candidate BATs is evaluated for each POC individually. For example, if POCs include copper, selenium, molybdenum, and nitrate then each candidate technology is only assessed based on the parameter(s) that specific technology can address. Lime treatment for removal of copper would receive a high pollutant reduction score (4 or 5) even though the process does not remove any selenium, molybdenum, or nitrate. Similarly, anaerobic biological treatment would score high for removal of selenium and nitrate even though the process would not remove copper and molybdenum.

This approach ensures that each candidate BAT is evaluated according to its intended purpose and that none of the options are penalized for not addressing all POCs. It also ensures that preferred BATs can be selected for each parameter such that the final selection could include a combination/chain of options. However, before candidate BATs are combined, each must first be preferred for removal of a specific POC on its own merit. For example, combining a poor technology for removal of copper (as judged by the BAT assessment) with a suitable option for selenium removal does not improve the poor copper removal option since the capabilities of the two technologies do not overlap.

### 2.4.2 Toxicity Reduction

BC ENV describes the 'toxicity reduction' criterion as follows:

*"Toxicity Reduction* - mine effluent must not be acutely toxic to the most sensitive receptor present in the receiving environment. If applicable, discuss how each treatment technology addresses the acute toxicity characteristics of the effluent, by removing the POCs that are acutely toxic to the most sensitive receptor."

This assessment criterion is self-explanatory and was evaluated according to the definition provided.

## 2.5 Environmental Impacts

The assessment criteria of 'energy efficiency,' 'greenhouse gas emissions,' 'required footprint,' and 'secondary waste production' are self-explanatory and were evaluated according to the definitions provided.

As discussed above, TML added a fifth criterion that evaluates the extent to which the candidate BAT adheres to the Yintah Management Directives provided by OW. The score for this criterion is subjective and may have to be revised following further review of the BAT assessment by representatives from Wet'suwet'en First Nation.

## 2.6 Cost Effectiveness

The evaluation criterion of 'efficient use of existing' resources is straight-forward and was evaluated according to the definitions provided.

Similarly, capital, operating, maintenance, and sustaining capital costs were calculated according to the descriptions provided. Discount rates for NPV calculations will be based on guidance by the BC Ministry of Energy, Mines, and Low Carbon Innovation concerning calculation of reclamation liability cost estimates (EMLI 2024).

The effect of the cost-effectiveness account on the outcome of the BAT assessment is often of interest. Therefore, TML also included an evaluation of candidate BATs without the inclusion of the cost-effectiveness account (i.e., the subaccounts in the category were set to zero for all options considered).

# 3 BAT Assessment

## 3.1 Location of Discharges

Figure 3-1 shows the location of the planned surface discharges from the TCP during the Operation phase of the Project, and from the NMP during the Post-closure phase of the Project when the TCP has been decommissioned.

Seepages from the TCP, NMP, WMP, and EMP that would discharge to groundwater would flow through the pond liners within each of the pond footprints. Once the seepages report to the groundwater, they would follow the local and regional groundwater flow paths as illustrated in Figure 3-2. Details concerning the groundwater flows for the Project are available in SRK (2024).

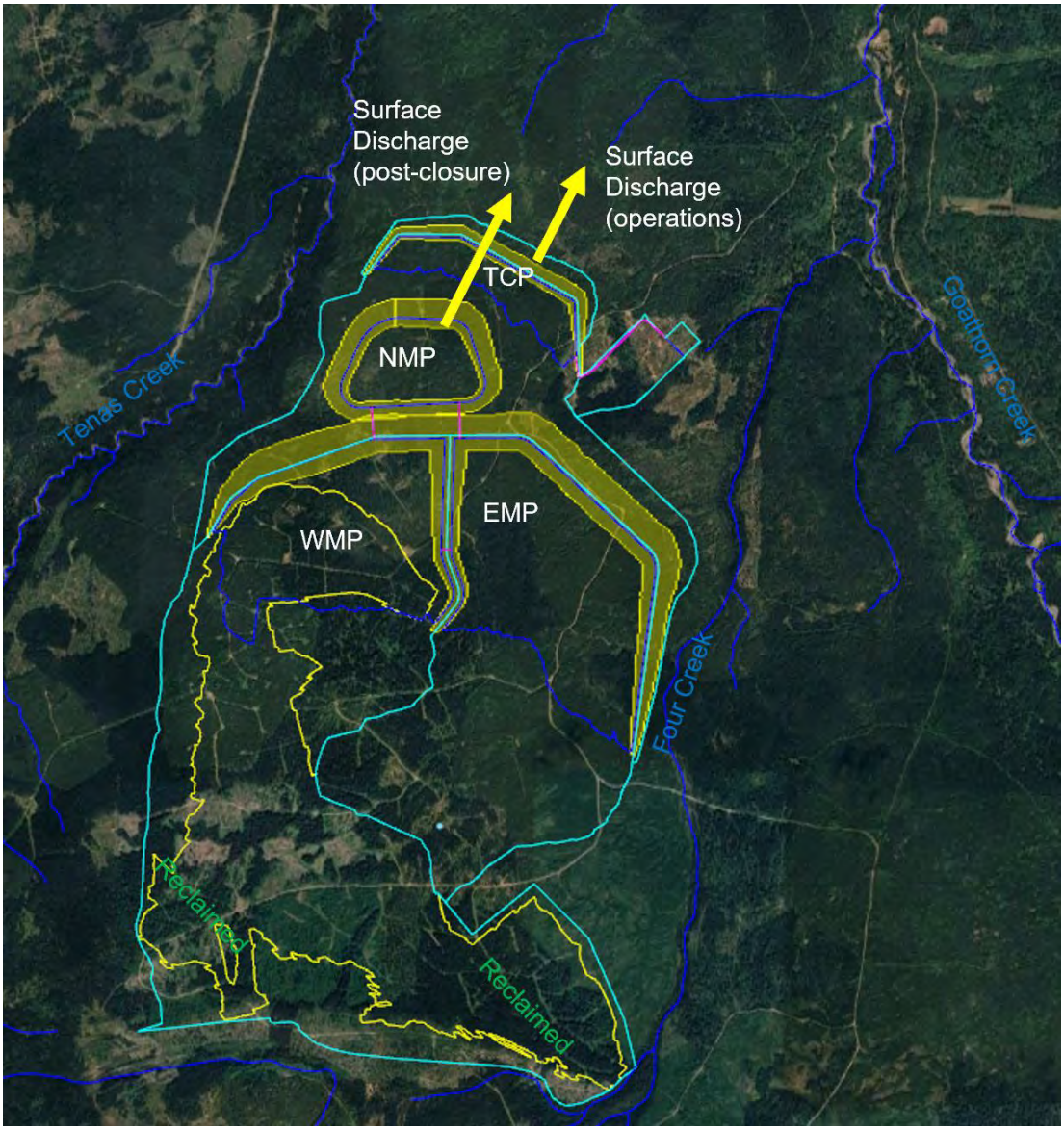



**Figure 3-1 Location of Surface Discharges from the TCP (Operations) and NMP (Post-Closure)**

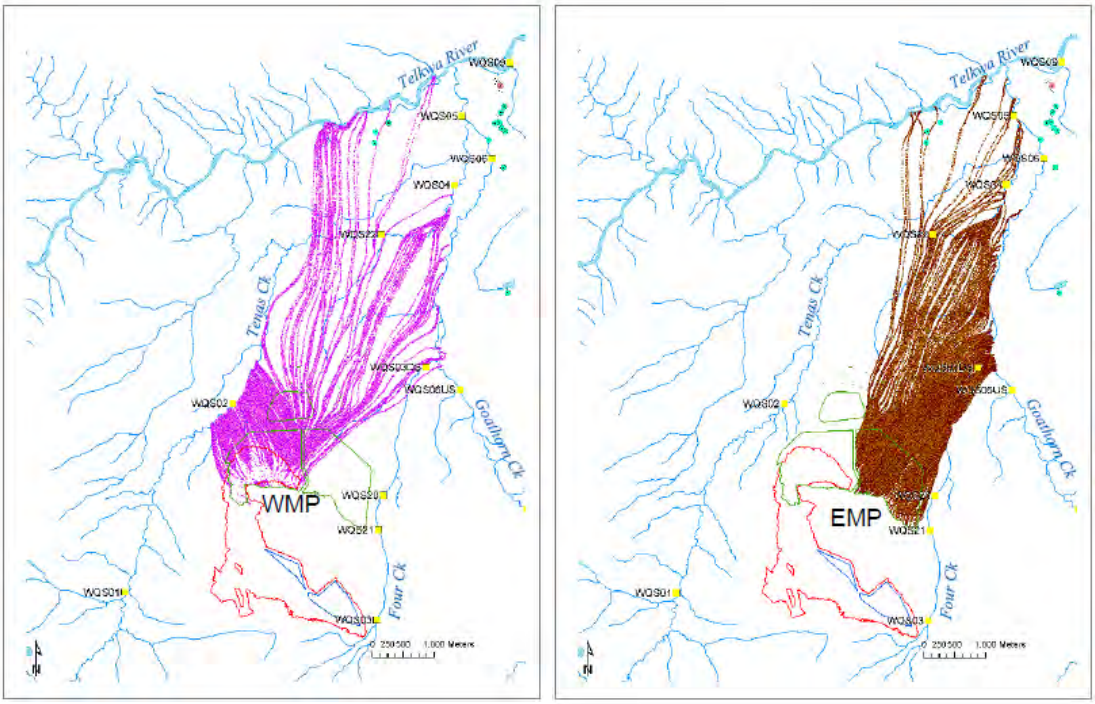



**Figure 3-2 Modelled Groundwater Flow Paths from the WMP and EMP (SRK 2024)**

## 3.2 Temporal Limit of BAT Assessment

This BAT assessment is focussed on technologies that can be implemented during the Construction, Operation, Decommissioning and Reclamation, and Post-closure phases of the Tenas Project.

## 3.3 Discharge Flows

Figure 3-3 shows modelled rates of discharge from the TCP during the Operation phase of the Project and NMP following the closure and decommissioning of the TCP. The modelled flows shown in the figure assumes that the TCP and management ponds have little or no capacity to attenuate peak freshet flows. However, assuming that storage capacity is available, the peak flows can be attenuated such that steady discharge rates of approximately 2,000 gpm over the open water season from May through October are possible during an average hydrological year (Figure 3-4). Accounting for a 1 in 200 wet year, the average open water discharge rate would be approximately 3,000 gpm.

Modelled seepage rates for the EMP, NMP, WMP, and TCP are illustrated in Figure 3-5. Seepage rages are expected to increase as the ponds a built up and as pond water levels increase. According to the closure plan for the Project, the TCP will be decommissioned in year 2048 and seepage therefore ceases at that time. However, seepage from the management ponds is expected to persist long-term.

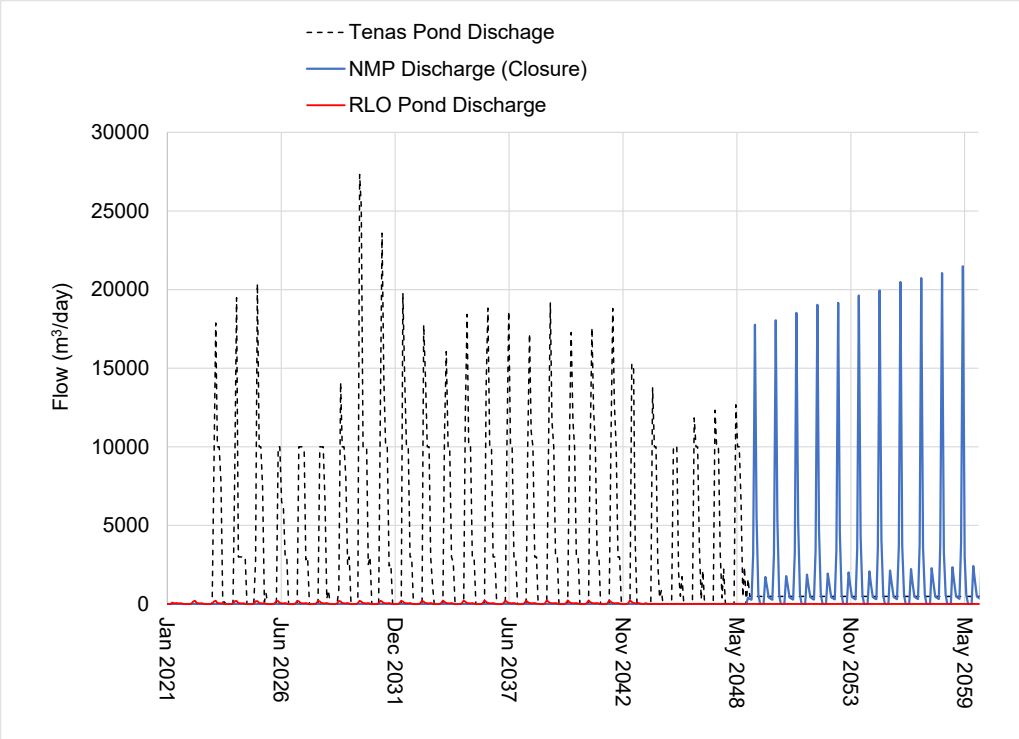



**Figure 3-3 Modelled Surface Discharge Flows from TCP and WMP**

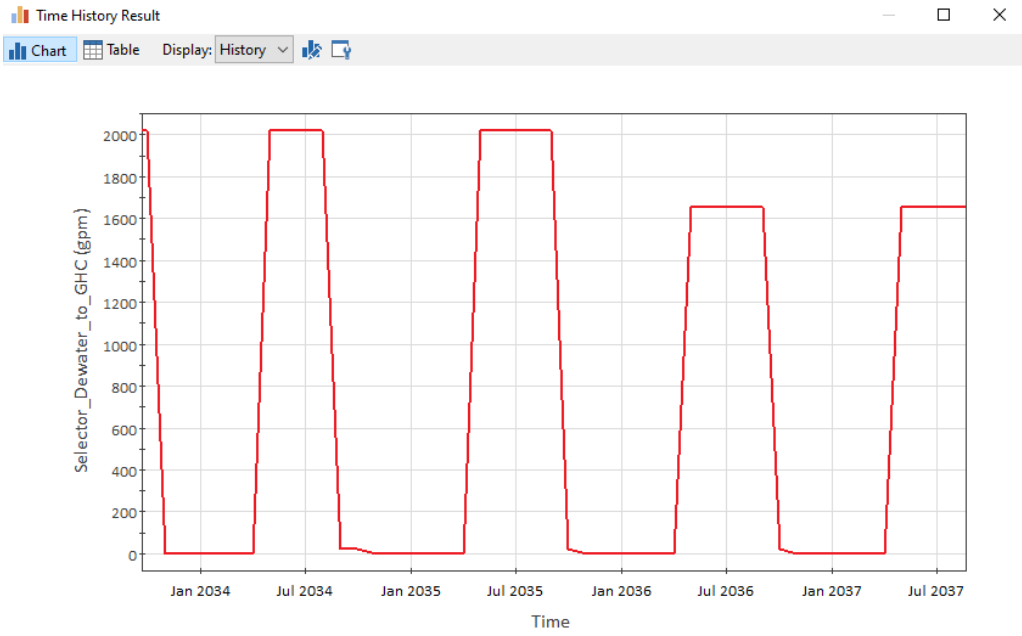



**Figure 3-4 Surface Discharge Attenuated by the TCP and Management Ponds**

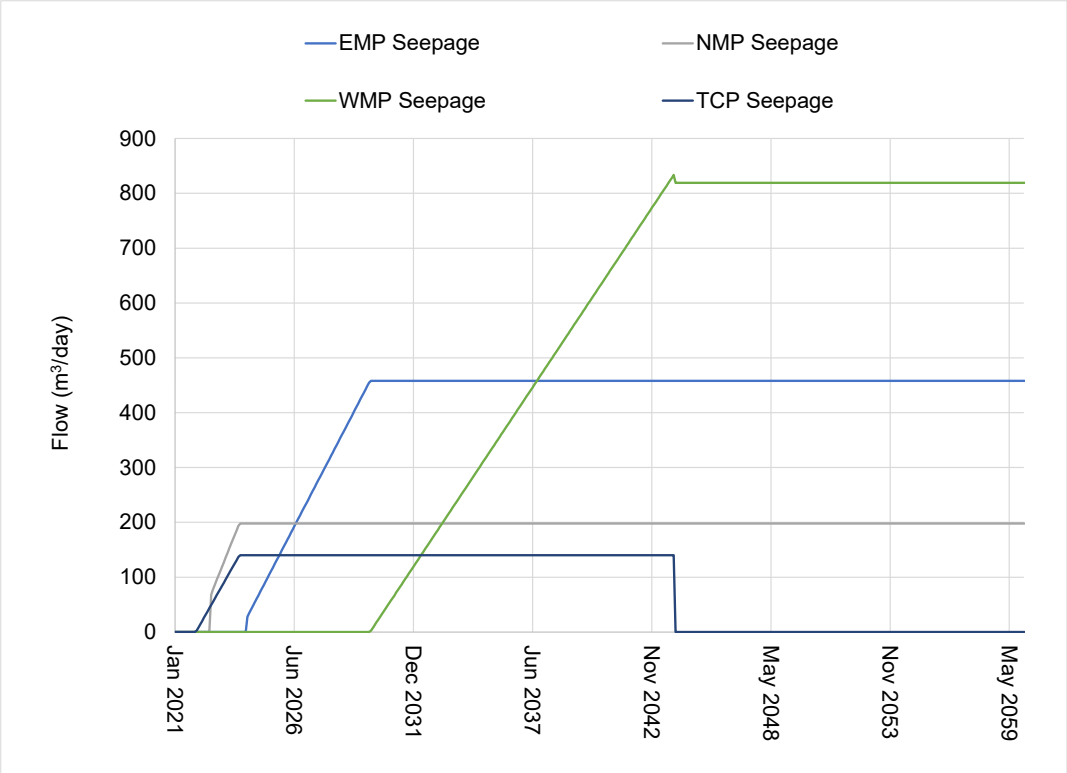



**Figure 3-5 Modelled Seepage Rates for EMP, NMP, WMP, and TCP**

## 3.4 Screening for POPCs and POCs

As discussed in Section 2.1, POPCs in discharges were identified by comparing the 2024 water quality model results to 80% of the applicable guidelines. Table 3-1 summarizes POCs identified for the Tenas Project.

Water quality guidelines used for POC screening and summary tables that compare water quality model results (maximum monthly discharge concentrations) to these WQGs are included in Appendix A.

**Table 3-1 POCs Identified for the Tenas Project BAT Assessment**

| | Surface Discharge | | | Groundwater Discharge (Post-Closure) | | | | Background / Baseline |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **TCP Discharge (Operation)** | **NMP Discharge (Post-Closure)** | **RLO discharge – (Operation)** | **TCP Seepage** | **NMP Seepage** | **WMP Seepage** | **EMP Seepage** | **See Footnote** |
| **Nitrogen Nutrients** | | | | | | | | |
| Nitrate | X | | | X | | X | | |
| Nitrite | X | | | X | X | X | X | |
| **Sulphate** | | | | | | | | |
| Sulphate | X | X | | X | X | X | | |
| **Metals** | | | | | | | | |
| Aluminum, total | X | X | X | | | | | X[A] |
| Cadmium, dissolved | | | X[D] | | | | | |
| Cobalt, total | | | | | X | X | X | |
| Copper, dissolved | X | X | | | | X | | X[B] |
| Iron, total | X | X | X | | | | | X[C] |
| Nickel, dissolved | X | X | X | X | X | X | X | |
| Zinc, dissolved | X | | | X | X | X | | |
| **Oxyanions** | | | | | | | | |
| Molybdenum, total | X | | | X | | | | |
| Selenium, total | X | X | | X | X | X | X | |
| | | | | | | | | |

Notes:
A - Background POC for Four, Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
B - Background POC for Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
C - Background POC for Four, Tenas Creeks, Telkwa and Bulkley Rivers.
D - Cd is POC for Rail Load Out only - it is therefore not considered in future screening

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20240925.xlsx]POC Condensed

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/Telkwa BAT Tech Screening REV01.xlsx

## 3.5 Base Case with Best Management Practices

The base case for the BAT assessment is a model scenario that includes source control measures and other BMPs that TML has committed to implement as part of the Project development including:

- Inundation of potentially acid generating (PAG) rock in the management ponds on site.
- Lining of the management and control ponds to reduce seepage and groundwater recharge.
- Progressive reclamation and covering of non-acid generating rock backfilled into the open pit.
- Attenuation of water in TCP and in Management Ponds on site and pacing of discharge to open water season.
- Erosion prevention in diversion and collection channels and sediment control in sedimentation\control ponds.
- Clean water diversions to route water around Project activities, and
- Use of blasthole liners to reduce loss and dissolution of residual ammonium nitrate fuel oil (ANFO) explosives.

From a water and load balance modelling perspective, the base case scenario is referred to as the Updated EAC Project Case (2024, with blasthole liners added).

# 4 Technology Identification and Screening

Since both surface and groundwater discharges are evaluated by the BAT assessment, the technology screening and evaluation steps include two technology categories, namely groundwater-specific technologies (interception and containment technologies) and technologies applicable to surface discharges (treatment).

Table 4-1 lists technologies that could be implemented to manage groundwater discharges. Technologies that intercept and extract groundwater must be combined with a BAT for treating or managing surface discharge based on the assumption that groundwater with POCs would have to be treated prior to surface discharge once extracted. Table 4-2 lists in-situ treatment technologies and tank-based active treatment processes that could be used for treating surface water discharges. In-situ treatment technologies are applicable for improving the quality of both groundwater and surface water discharges. The two tables also indicates whether each of the identified technologies were deemed to be potentially feasible and therefore shortlisted for further assessment, or if some issue disqualified it from further assessment.

The following sections provide a brief description of the use of each of the identified technologies in the mining industry, a list of ancillary technologies or infrastructure required to implement each technology, a high-level process flow diagram, and a summary of advantages and disadvantages including considerations for management of treatment byproducts.

**Table 4-1 Groundwater-Specific Mitigation Technologies**

| Technology | Notes | Shortlisted for Assessment |
|---|---|---|
| **Containment/Interception** | | |
| Interception wells (+ surface discharge BAT) | Extraction of clean groundwater unavoidable. Requires a large number of wells. Not operationally or practically feasible. | No |
| Modified pond liner(s) (+ surface discharge BAT) | Potentially feasible | Yes |
| Pump from bottom of water management ponds (+surface discharge BAT) | Flushing pore water is inefficient and would take a long period of time. Performance is highly uncertain. | No |
| Construction of slurry walls downgradient of management ponds | Construction infeasible. Groundwater pathway too deep. | No |

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/Telkwa BAT Tech Screening REV01.xlsx

## Table 4-2 In-situ Treatment Technologies and Tank-Based Technologies Applicable for Treating Surface Discharges

| | SO4 | Nitrogen | | Metals | | | | | | | Oxyanions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POPC/POCs** | Sulphate | Nitrite | Nitrate | Aluminum, Total | Cadmium, Dissolved | Cobalt, Total | Copper, Dissolved | Iron, Total | Nickel, Dissolved | Zinc, Dissolved | Molybdenum, Total | Selenium, Total | Notes | **Shortlisted for Assessment** |
| **In-Situ or Semi-Passive Technologies** | | | | | | | | | | | | | | |
| In-situ anoxic gravel bed reactor (actively managed) | u | x | x | x | x | u | x | x | u | x | u | x | Potentially feasible. | Yes |
| In-situ anoxic biological treatment (passive with organic substrate) | | x | x | x | u | | u | x | | | | x | Lack of control over the treatment process makes this option infeasible. | No |
| Engineered wetland | | x | x | x | x | x | x | x | | x | x | x | Not suitable for high freshet flows or winter operation. Also, required foot-print may be too large. | No |
| Passive/active flocculation | | | | x | | | | x | | | | | TSS will be managed according to erosion prevention and sediment management plan but passive flocculation (use of floc blocks) had not been considered as part of that plan. | Yes |
| **Active Tank-Based Water Treatment Technologies** | | | | | | | | | | | | | | |
| Lime treatment and sedimentation/concentration | | | | x | x | u | x | x | u | | | | Unable to achieve effluent concentrations that are lower than WQG for several POPCs. | No |
| Sulphide precipitation, sedimentation/concentration | | | | x | x | x | x | x | | | | | Unable to achieve effluent concentrations that are lower than WQG for several POPCs. | No |
| Ferric co-precipitation and sedimentation/concentration | | | | | | | | | | | | | Unable to achieve effluent concentrations that are lower than WQG for most POPCs. | No |
| RO + lime treatment | x | | | x | x | x | x | x | x | x | | | Potentially feasible for sulphate and metal removal. | Yes |
| RO + sulphide precipitation | | | | x | x | x | x | x | x | x | | | Potentially feasible for metal removal. | Yes |
| RO + ferric co-precipitation | | | | | | | | | | | x | | Potentially feasible for metal removal. | Yes |
| Ion exchange and regenerant treatment, selenium removal | | | | | | | | | | | | x | Complex process. Se only POPC removed. | No |
| Ion exchange and regenerant treatment, metals | | | | x | x | x | x | x | x | x | | | Potentially feasible for metal removal. | Yes |
| Ion exchange and regenerant treatment, sulphate removal | x | | | x | x | x | x | x | x | x | | | TRL 6. No full-scale processes currently operating anywhere. | No |
| Electrocoagulation | | | | x | | | | x | | | | | TRL 7 when applied to this project. | No |
| RO + electrocoagulation | | | | x | | | | x | | | x | u | TRL 7 when applied to this project. | No |
| Anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk) | | x | x | x | | | | x | | | | x | Unable to achieve effluent concentrations that are lower than WQG for several POPCs. | No |
| RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk) | | x | x | x | | | | x | | | | x | Potentially feasible for $NO_2$/$NO_3$, Se, Cr, total Al, and Fe removal. | Yes |
| Zero Liquid Discharge (ZLD) process | x | x | x | x | x | x | x | x | x | x | x | x | ZLD processes are very complex, energy intensive, and produce soluble residuals that must be entombed on site or trucked to a hazardous waste facility. However, it is the only process that would remove all POCPs and it is therefore considered. | Yes |
| Ettringite precipitation | x | | | x | x | x | x | x | x | x | | | TRL 5 or 6 for this application. | No |
| Biological sulphate reduction | x | x | x | | x | x | x | x | | x | x | x | TRL 6 or 7. Produces toxic $H_2S$ gas. | No |

x - removes POC to a meaningful extent
u - may remove POC but efficacy is uncertain

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/Telkwa BAT Tech Screening REV01.xlsx

## 4.1 Groundwater Specific Technologies

### 4.1.1 Interception Wells (+ Surface Discharge BAT)

Interception wells are commonly used in the mining industry to intercept and recover seepage from tailings storage facilities or waste rock storage areas. Wells are drilled into aquifers downstream of where seepages report to the groundwater system. Interception wells require power to operate pumps and for heat tracing of well-heads and piping that conveys the intercepted water. Interception wells also require a network of pipes to convey the intercepted groundwater to a location where it can be used for processing, treated, or otherwise disposed of.

Interception wells must be in areas that are readily accessible to allow for regular inspection and maintenance. Disadvantages associated with interception wells is that they required ongoing operator attention and maintenance and a reliable source of power.

For the Tanas Project, the seepage rates from the management ponds and the TCP are expected to be minor and it would be virtually impossible to install wells that would specifically target discrete groundwater flow paths that contain seepage. Instead, many wells would be required, and these would likely extract predominantly clean background groundwater, which could reduce base flows in creeks downstream to an unsustainable level. Therefore, installation and operation of interception wells was considered to be **not technically feasible** for the Tenas Project.

### 4.1.2 Modified Liners in Management and Control Ponds (+ Surface Discharge BAT)

This option considers the possibility of modifying the design of the pond liners to further reduce the rates of seepage that enter the groundwater system. The liner systems considered for the Updated EAC Project Case (2024, with blasthole liners added) include:

- Soil-bentonite liner (0.3m) for EMP, NMP, and WMP (excluding WMP End Wall rock);
- Bituminous geomembrane liner for the Tenas Control Pond.

The modified liner design includes one of two options:

- Option 1:
  - Soil-bentonite liner (0.56m) for EMP, NMP, and WMP (excluding WMP End Wall rock);
  - Bituminous geomembrane liner on top of soil-bentonite liner (0.15m) for the Tenas Control Pond.
- Option 2:
  - Bituminous geomembrane liner on top of soil-bentonite liner (0.3m) for EMP;
  - Soil-bentonite liner (0.56m) for NMP, and WMP (excluding WMP End Wall rock);
  - Bituminous geomembrane liner on top of soil-bentonite liner (0.15m) for the Tenas Control Pond

Option 1 includes a thicker bentonite amended liner, covering the management pond bottoms, and upstream dam slopes, as well as the in-pit overburden portion of the West Management Pond.

Liner thicknesses are assumed to be 560 mm in management ponds. The Tenas Control Pond contains an added soil-bentonite liner of 150mm thickness compared to none in the base case.

Option 2 is that same as Option 1 for NMP, WMP, and TCP. The only change is the additional bituminous geomembrane liner on top of the soil-bentonite liner with a thickness of 300 mm for the East Management Pond.

The disadvantage associated with this option is primarily the high initial capital cost associated with the liner construction.

The performance of the modified liner designs were estimated as part of a mitigation modelling study completed in parallel with this BAT assessment (SRK 2025). Construction of modified and improved pond liners is clearly **feasible,** and the option was therefore advanced for further assessment.

### 4.1.3 Pump from Bottom of Water Management Ponds (+ Surface Discharge BAT)

Seepage from the management ponds is assumed to have the same water quality as the pore water contained in the PAG rock and processed rock (tailings) stored in the ponds. Most of the loadings associated with the pore water come from the initial wet-up of the material stored in the ponds (i.e., first flush loadings). Once loadings associated with this first flush have been eliminated the rock and tailings stored in the ponds is almost completely inert and is not expected to contribute any additional loadings to the pore water or seepage.

The option of pumping pore water from the bottom of the management ponds to surface (for treatment by a surface discharge BAT is predicated on the idea that the first flush pore water could be rinsed out of the PAG and processed rocks stored in the pond. Once the entire pore water volume has been displaced any seepage from the ponds would theoretically have lower constituent concentrations.

There are no known examples of this type of deliberate pore water flushing used at mines anywhere. The approach is highly theoretical and the performance of such a flushing operation is highly uncertain. Therefore, the approach was judged to be **not feasible** for implementation at the Tenas Project.

### 4.1.4 Construction of Slurry Cut-off Walls Downgradient of Management Ponds and TCP

Slurry cut-off walls can in some cases be used to contain contaminated groundwater plumes that are relatively shallow. The technology works by excavating a trench that is subsequently backfilled with bentonite-amended soil. When mixed with soil, bentonite clay forms a material that has extremely low hydraulic conductivity, which makes it suitable for use as a barrier for groundwater flow paths. Figure 4-1 shows a schematic of a slurry cut-off wall construction.

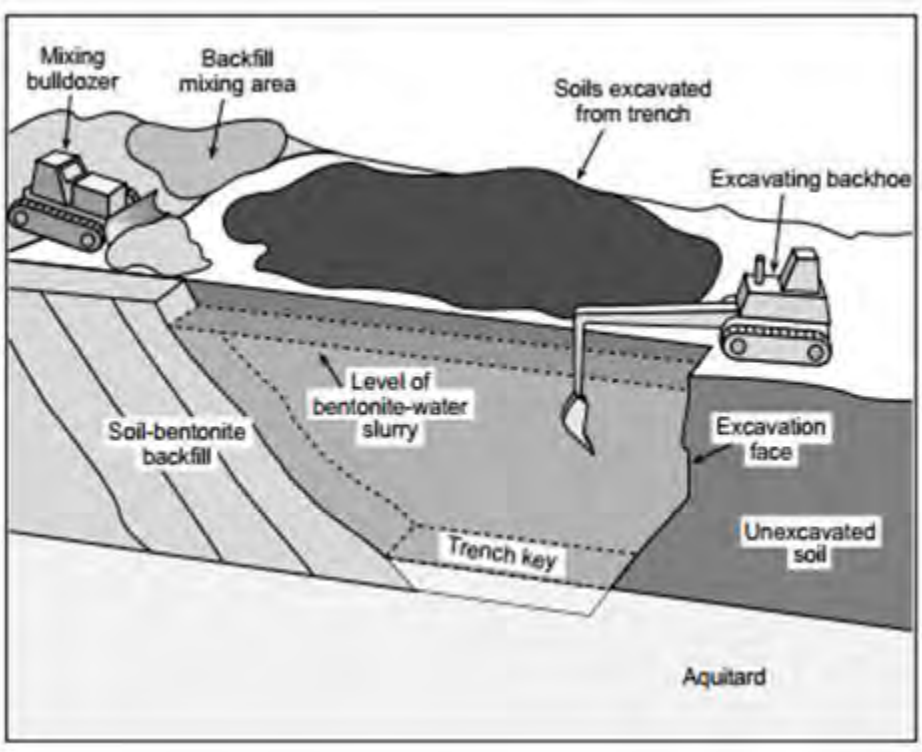



**Figure 4-1 Schematic of a Slurry Wall Construction**

Source: https://www.geoengineer.org/storage/wcp_assignment/135/editor_photos/4094/figure_5.jpg

Slurry cut-off walls are occasionally used in the mining industry, but most commonly to contain solutions in facilities that are constructed in relatively flat and homogenously stratified terrain such as on the Canadian prairies. The approach is less suitable in mountainous terrain with heterogenous and complex geology. Furthermore, because of the construction method, slurry walls are only applicable for containing relatively shallow groundwater flows. Also, sufficient footprint must be available to allow construction access and the slurry walls must not compromise the stability of embankment structures constructed upstream. Because the anticipated depth of the groundwater flow paths for the Tenas Project is outside of the depth range of conventional slurry walls, and because of the limited footprint downstream of the management pond embankments, this option was considered **not feasible** and was not assessed further.

## 4.2 In-situ Treatment Technologies

### 4.2.1 Actively Managed Gravel Bed Reactor (GBR)

A gravel bed reactor is a pond or reservoir that has been backfilled with coarse rock/gravel, covered by an insulating layer (soil and/or organics) and fitted with injection and extraction wells. The operation of a GBR is illustrated in Figure 4-2. Mine water flowing to the injection wells is dosed with a source of easily degradable organic carbon such as methanol or glucose and other nutrients as required. Inside the GBR, microorganisms degrade the organic carbon.

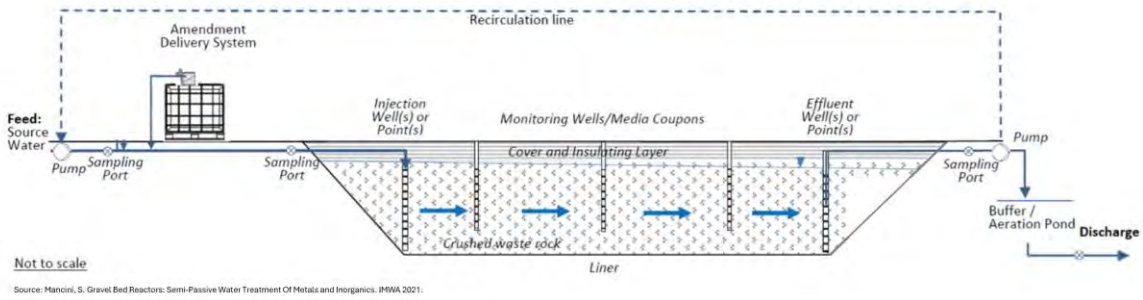



**Figure 4-2 Schematic of a Gravel Bed Reactor**

The degradation process of carbon consumes oxygen and oxidizes species such as nitrate, ferric iron ($Fe^{3+}$), selenate ($SeO_4^{2-}$), and sulphate ($SO_4^{2-}$) and produces reduced constituents such as ferrous iron ($Fe^{2+}$), selenite or elemental selenium ($SeO_3^{2-}$, $Se^0$) and sulphide ($S^{2-}$). Sulphide can form insoluble precipitates with dissolved metals such as copper, lead, cadmium, nickel, and zinc, which will be removed in the process.

The mining industry is in the early phase of adopting GBRs. A full-scale GBR with a treatment capacity of 20,000 $m^3$/day has been constructed at the Rainy River Mine in Ontario and currently operates as primary water treatment for the removal of copper. At two coal mines in the Elk Valley in BC, saturated rockfill reactors (SRFs) – a variant of GBRs – are currently used to remove selenium and nitrate from mine water.

GBRs are simpler and less costly to construct and operate than comparable active water treatment system. However, GBRs do not offer the same level of precise process control and post-treatment of effluent may be required.

The three management ponds planned for the Tenas Project are ideally suited to be used as actively managed GBRs. Hydraulic controls could be constructed as PAG rock is placed in the ponds such that water pumped to the pond would flow through the pond along a pre-determined flow path. This would allow for control of the hydraulic residence time, which would facilitate removal of POCs such as copper, selenium, nickel, and nitrate.

For this application, the technology readiness level (TRL) was judged to be an 8 for removal of copper and 7 for removal of other POCs such as nitrate, nickel, and selenium. Therefore, the technology was considered to be **potentially feasible** for implementation at the Tenas Project. However, a technology maturation plan must be developed, which would include pilot- and field-scale trials to evaluate the feasibility of the approach for this Project.

### 4.2.2 In-situ Anoxic Biological Treatment (Passive with Organic Substrate)

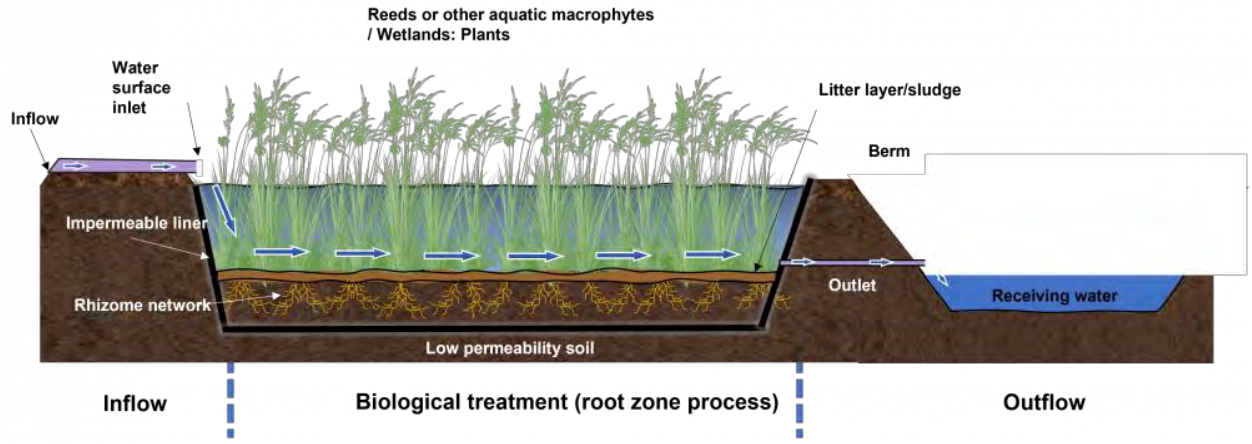
Passive bioreactors are like GBRs but are filled with a mixture of coarse rock, limestone, and organic material such as wood chips, manure, straw, biochar, or similar materials. The organic materials serve the same function as the degradable organic carbon added to the GBR influent, namely, to promote growth of anaerobic microorganisms.

Passive bioreactors have been used with limited success at mines in BC, including at the Brule and Quinsam coal mines. However, their use is not widespread. Although the reactors are operationally simple, the only means of controlling the process (and treatment performance) is to increase or decrease the inflow to the reactor. For this application, TRL is 6 or lower and the lack of process control makes it unsuitable for implementation at the Tenas Project. Therefore, the technology was considered to be **not feasible** and was not considered further.

### 4.2.3 Engineered Wetland

The use of engineered (or constructed) wetlands began in Germany in the 1950s and gained wider acceptance in the 1970s and 1980s (Seidel 1976). Engineered wetlands are most used to treat, or for polishing treatment of, municipal sewage or agricultural runoff but have also found use in the mining industry (Aurora 2018). Engineered wetlands tend to work best in applications where flows are low compared to the size of the wetland and when high-performance treatment is not required.

Figure 4-3 shows a schematic of a type of engineered wetland referred to as 'free-water surface flow wetland'[1]. The wetland works by mimicking the actions of a natural wetland. Vegetation filters out suspended solids, plant matter adsorbs or assimilate contaminants, and aerobic and anaerobic microorganisms transform or sequester various water quality constituents. An engineered wetland is constructed by placing an impermeable liner (clay or synthetic) within a pond or natural depression. A growth substrate placed on top of the liner is planted with wetland plants such as cattails, bulrushes, and canary grass. The outlet of the wetland either reports to a discharge pond or directly to the receiving environment.




Source: https://wiki.sustainabletechnologies.ca/wiki/Wetlands

**Figure 4-3 Schematic Illustrating the Operation of an Engineered Wetland**

An important consideration for implementation of an engineered wetland is the availability of a suitable location for construction of a lined pond. The area must be flat or gently sloped and relatively large. Although it may be possible to locate a suitable area for construction of an engineered wetland near the Tenas Project, a wetland would not be a candidate BAT because the TRL is less than 7 for this application due to the flows required and year-round treatment

[1] https://wiki.sustainabletechnologies.ca/wiki/Wetlands

requirements. Therefore, the technology was considered to be **not feasible** and was not considered further.

### 4.2.4 Passive/Active Flocculation

Passive flocculation refers to the practice of passively dosing flocculant polymers to turbid water by placing a “floc bloc” in the flow path of the stream (Figure 4-4) while active flocculation involves the addition of flocculants to contact water prior to it entering a pond to enhance the settlement of particulate matter in the water. Floc blocs have been used in the mining industry to facilitate removal of suspended sediment for many years (TRL 9). They are relatively low cost and is an operationally and environmentally safe method for improving removal of POCs associated with suspended sediment (total aluminum and total iron).

Active flocculation has been used in mining industry successfully over the past decades and is an operationally and environmentally safe method for improving removal of POCs associated with suspended sediment (total aluminum and total iron) and is TRL 9. Therefore, the use of passive\active flocculation was **potentially feasible** for the Tenas Project.

**Figure 4-4 Examples of Floc Blocs in a Stream and Active Floc Dosing**

## 4.3 Active Tank-Based Treatment Technologies

### 4.3.1 Lime Treatment

Lime treatment is one of the most common methods used for removing dissolved metals, suspended solids, and (in some cases) sulphate from mine water. The process works by increasing the mine water pH to between 9 and 10 by adding hydrated lime. At this pH, most dissolved metals such as copper, zinc, cadmium, lead, iron, and nickel precipitate as metal hydroxides solids and is then removed in a solid-liquid separation step. Lime treatment is TRL 9.

There are two general approaches for implementing lime treatment:

- Low Density Sludge (LDS): in this process, mine water is mixed with hydrated lime in one or more (typically two) lime reactor tanks (Figure 4-5). In the reactors, the pH setpoint (typically between pH 9 and 10) is controlled by adjusting lime addition. Reduced species such as ferrous

iron or manganese are oxidized by aeration. From the reactors, the process solution flows to a pond where precipitated metal hydroxides and calcite settle as sludge. The treated outflow from the pond may be filtered and in some cases the pH is lowered by adding carbon dioxide or acid. The settled sludge will periodically have to be removed from the pond by dredging.

- High Density Sludge (HDS): the first part of the HDS process is the same as the LDS process. However, instead of using a pond for settling of sludge, a mechanical clarifier is used (Figure 4-6). A portion of the sludge collected by the clarifier is pumped back to the lime reactor tanks via a rapid mix tank where the hydrated lime is added. The recycled sludge becomes coated by hydrated lime, which causes dissolved metals in the mine water to precipitate onto the sludge particles. This process increases the density of the sludge, improves the metal removal efficiency, and also improves the lime utilization. As in the LDS process, treated effluent flowing from the clarifier may be filtered and the pH may be adjusted.

Lime treatment plants require several ancillary services and facilities, including:

- A reliable source of power.
- Fresh water for reagent make-up (treated effluent can be used in some cases).
- Reagent storage and a laboratory for influent and effluent analysis.
- A pond for settling of sludge (LDS only),
- A mechanical clarifier for sludge (HDS only), and
- A facility for permanent disposal of sludge.

Advantages associated with lime treatment of include:

- High degree of process control and reliable performance

Disadvantages include:

- Lime treatment can remove metals but may not be able to achieve effluent concentrations that are less then 80% of the water quality guidelines. For example, the process can reduce dissolved copper concentrations from 0.01 mg/L to less than 0.0005 mg/L, but it may not be able to reduce cobalt, nickel, and zinc concentrations below 80% of the WQG concentrations.
- The process requires constant or frequent operator attention.
- Sludge must be managed on an ongoing basis.
- The use of lime, which is corrosive, involves the risk of operator exposure or spills.

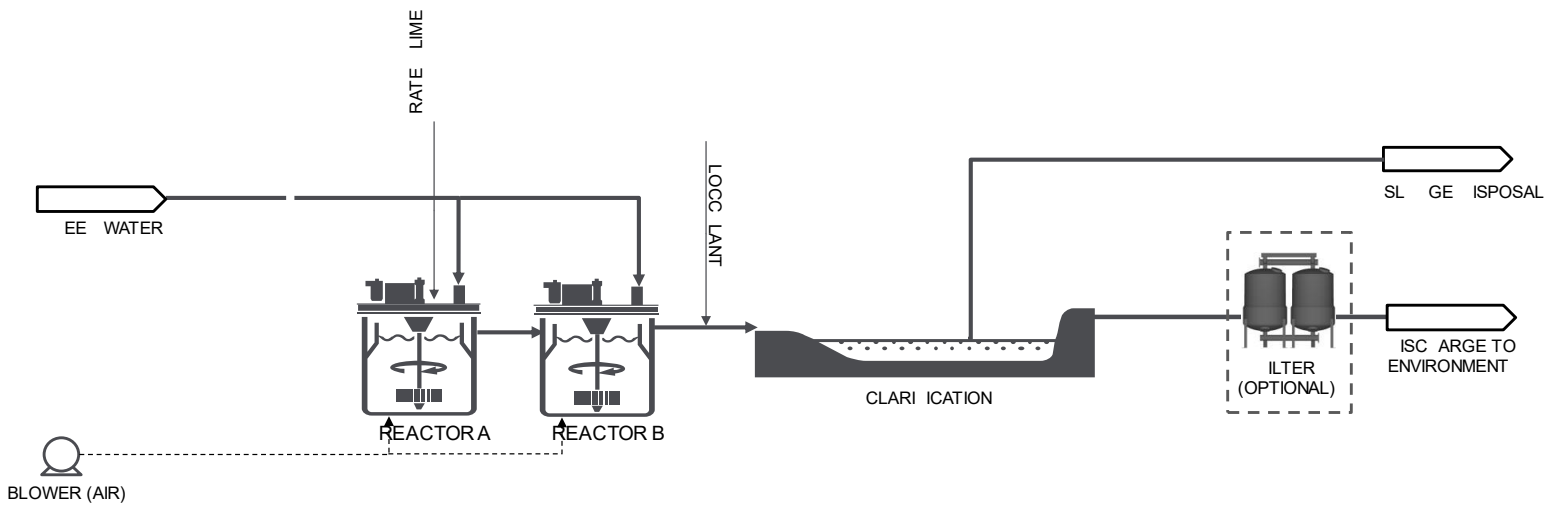



**Figure 4-5 Schematic of a Low-Density Sludge (LDS) Lime Treatment Process**

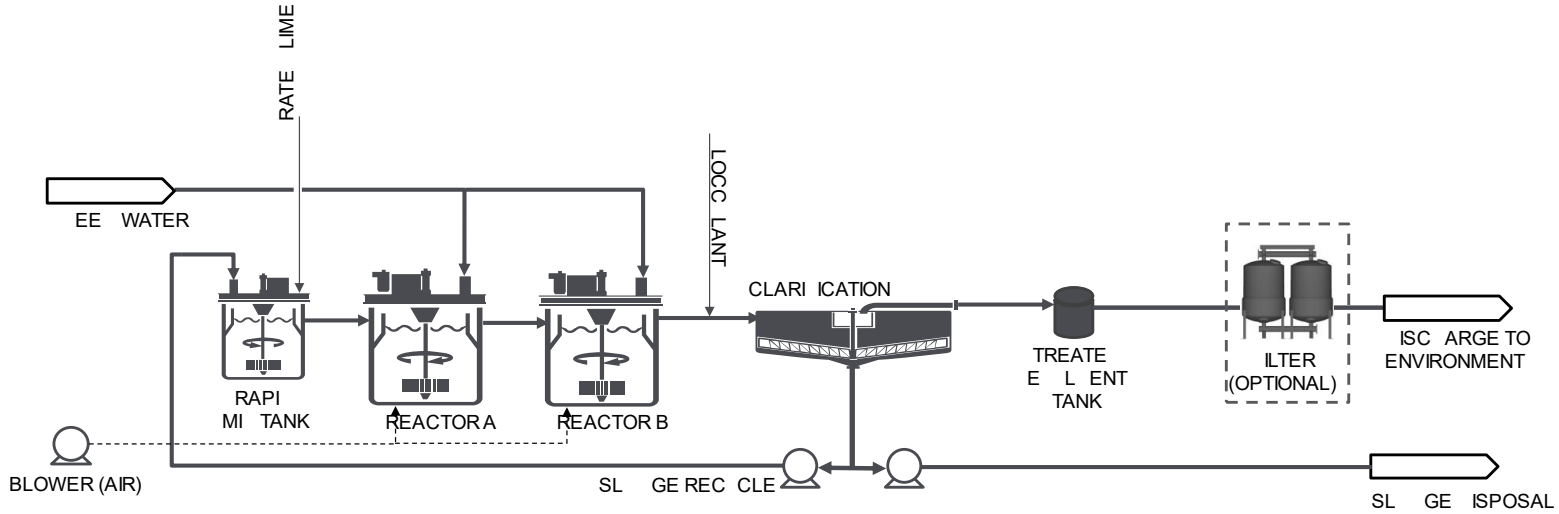



**Figure 4-6 Schematic of a High-Density Sludge (HDS) Lime Treatment Process**

- Capital and operating costs are relatively high compared to source control or semi-passive options.
- Energy requirements and greenhouse gas emissions are relatively high compared to source control or semi-passive options.

Implementation of lime treatment as a stand-alone process for treating surface discharge from the Tenas Project would realistically not be considered because it would not be able to reduce some of the already low POCs to levels below 80% of the WQG. A membrane or ion exchange pre-concentration step is required to achieve such low levels. Therefore, lime treatment as a stand-alone process was deemed to be **not feasible** for implementation at the Tenas Project.

### 4.3.2 Sulphide Precipitation

A sulphide precipitation water treatment process removes dissolved metals by precipitating them as insoluble metal sulphides. In the process, an inorganic sulphide reagent such as sodium hydrosulphide (NaHS) is added to metal-containing mine water in a reactor. Here, the dissolved metals are precipitated as sulphide solids (i.e., $Cu^{2+} + S^{2-} \rightarrow CuS$ (s)). The metal sulphide sludge is then removed by settling and filtration (Figure 4-7) or by microfiltration (Figure 4-8). Sulphide precipitation is TRL 9.

The sulphide precipitation process is relatively common in the mining industry because of its ability to target dissolved metals for removal in a manner that minimizes sludge production compared to lime treatment. This is possible because the process does not produce calcite, gypsum, or ferric hydroxide solids, which often account for most of the sludge produced by a lime treatment process.

Sulphide treatment plant require similar ancillary services and facilities as lime plants, including:

- A reliable source of power.
- Fresh water for reagent make-up.
- Reagent storage and a laboratory for influent and effluent analysis, and
- A facility for permanent disposal of sludge.

Although the sludge produced is relatively stable, it can oxidize over time and release the precipitated metals if exposed to atmospheric conditions. Therefore, it should be stored in a low oxygen environment or under a permanent water cover. Advantages associated with sulphide treatment include:

- High degree of process control and reliable performance.

Disadvantages include:

- Even though sulphide precipitation can achieve lower effluent concentrations than lime treatment for some POCs (i.e., copper, cobalt, and cadmium) the process cannot achieve extremely low concentrations of zinc and aluminum and is generally unable to remove nickel.
- The process requires constant or frequent operator attention.

- Sludge must be managed on an ongoing basis in a low oxygen environment or under a permanent water cover.
- The use of NaHS, which is toxic and can produce noxious hydrogen sulphide, involves the risk of operator exposure or spills.
- Capital and operating costs are relatively high compared to source control or semi-passive options.
- Energy requirements and greenhouse gas emissions are relatively high compared to source control or semi-passive options.

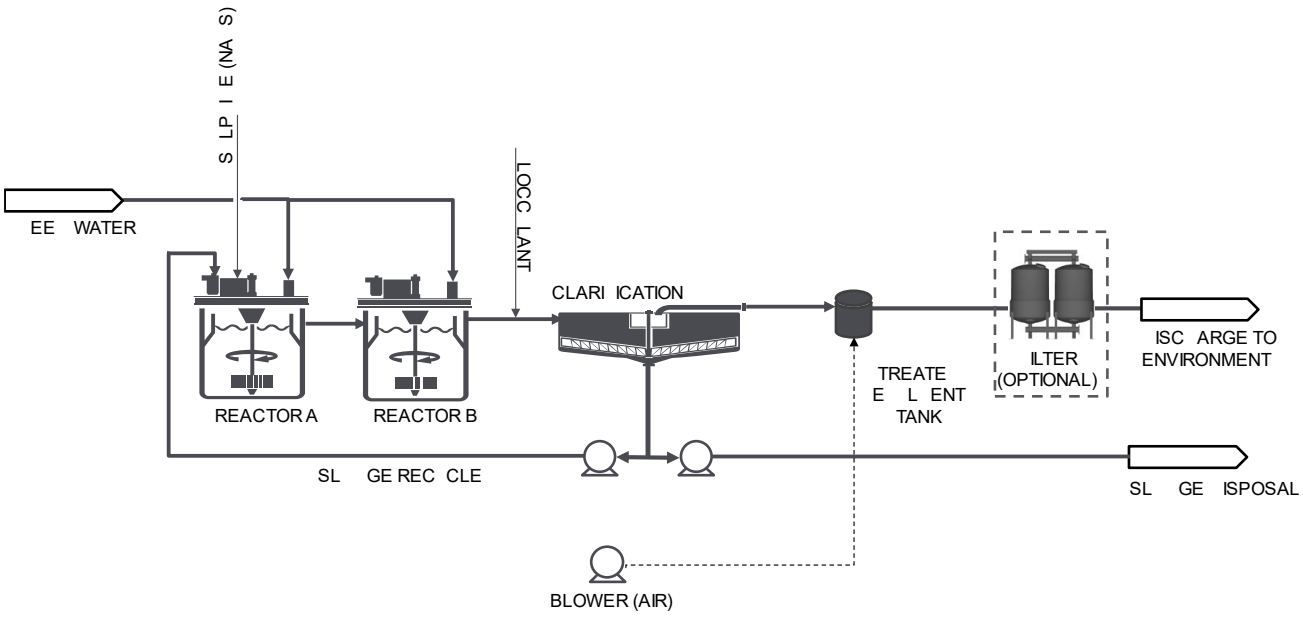



**Figure 4-7 Schematic of a Conventional Sulphide Precipitation Process**

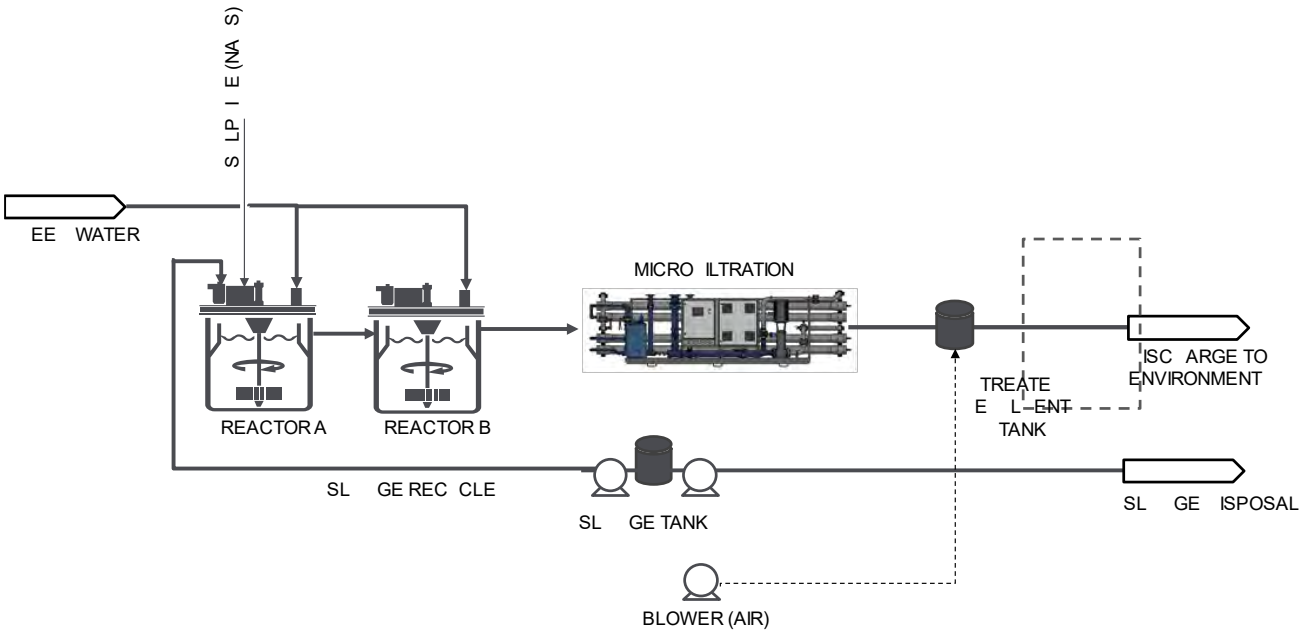



**Figure 4-8 Schematic of a Sulphide Precipitation and Microfiltration Process**

As with lime treatment, implementation of sulphide treatment as a stand-alone process for treating surface discharge from the Tenas Project would realistically not be considered because it would not be able to reduce some of the already low POCs to levels below 80% of the WQG. A membrane or ion exchange pre-concentration step is required to achieve such low levels. Therefore, sulphide treatment as a stand-alone process was deemed to be **not feasible** for implementation at the Tenas Project.

### 4.3.3 Ferric Co-precipitation and Sedimentation or Micro-filtration

Figure 4-9 shows a schematic of a ferric co-precipitation process. A ferric reagent (ferric sulphate or ferric chloride) is added to mine water in a reactor. Here, the ferric iron precipitates as ferric hydroxide solids/sludge. Some constituents, and in particular oxyanions of molybdenum adsorb to or become occluded with the precipitated iron hydroxide and can thereby be removed with the sludge. This technology is TRL 9.

Ferric co-precipitation is commonly used in the mining industry for removal of molybdenum. However, modelled molybdenum concentrations in effluents at the Tenas Project are relatively low and ferric co-precipitation as a stand-alone process would not be able to reduce concentrations to a meaningful extent. Therefore, iron co-precipitation as a stand-alone process was deemed to be **not feasible**.

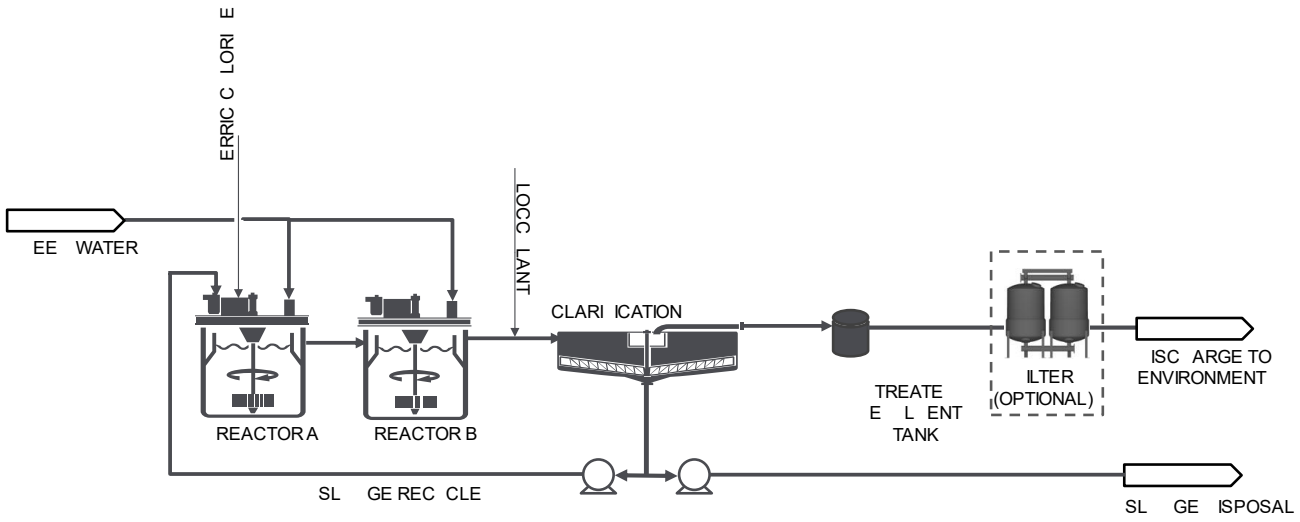



**Figure 4-9 Schematic of a Ferric Co-precipitation Process**

### 4.3.4 Membrane Filtration and HDS Lime Treatment

This treatment process is like the lime treatment process described in Section 4.3.1, but it includes a membrane filtration step ahead of the lime reactors. Membrane filtration works by forcing mine water through a synthetic membrane at high pressure. The process is commonly used and is TRL 9. The membrane rejects charged molecules (i.e., ions) such as sulfate and dissolved metals while it permits passage of non charged molecules, primarily ($H_2O$). RO membranes rejects virtually all molecules, while nano filtration membranes only rejects larger divalent molecules such as sulphate, calcium, and magnesium.

Membrane filtration produces two streams, namely a clean permeate (water that passes through the membrane) and a brine solution that contains the dissolved constituents that are rejected by the membrane. Typically, 70% to 85% of feed water is recovered as clean permeate, while 15% to 25% of the feed water volume and up is in the brine stream.

Figure 4-10 shows a schematic of a membrane filtration and HDS lime treatment process.

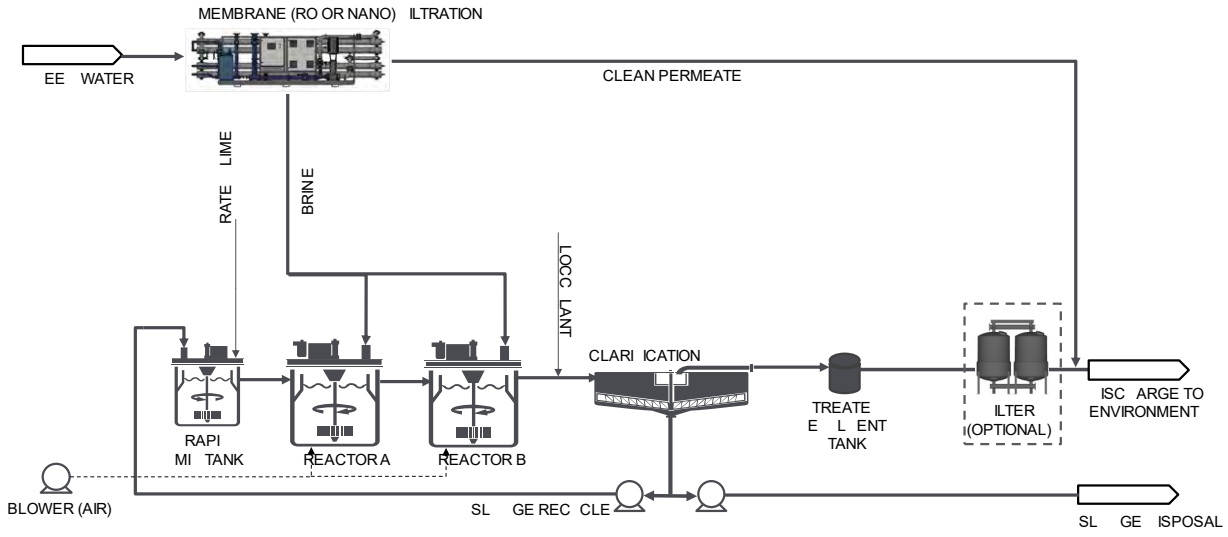



**Figure 4-10 Schematic of a Membrane Filtration and HDS Lime Treatment Process**

Feed water would be pumped to the membrane filtration unit, which would produce clean permeate and a brine stream. The feed water would likely require pretreatment such as multimedia and cartridge filtration before it can be processed by the membrane filter (pretreatment not shown on Figure 4-10). The brine solution would be pumped to the HDS lime treatment plant and treated as described above. The final plant discharge would be the combined effluent from the lime treatment process and the clean membrane permeate.

Membrane filtration ahead of HDS lime treatment is not commonly used to treat water at operating mines, but it is becoming more common as effluent quality limits are tightened to an extent where conventional treatment processes are inadequate. Advantages of the membrane and HDS process over an ‘ S only’ process include:

- Better performance in terms of copper removal (effluent with lower concentrations).
- An ability to remove some sulphate (a POC) because of the pre-concentration stage.

Disadvantages include:

- A more complex process that would be more prone to upsets and down-time.
- Higher capital and operating costs and greater energy demand and greenhouse gas emissions.

Since the membrane filtration and HDS process consists of two conventional technologies and since the process can remove all metal POCs it was considered to be potentially **feasible** and was advanced for further evaluation.

### 4.3.5 Membrane Filtration and Sulphide Precipitation

This process is identical to the process discussed in Section 4.3.2 but it includes a membrane pre-concentration process like the one discussed in the previous section (Section 4.3.4). Sulphide precipitation was rejected as a stand-alone process because of its inability to remove the already

low concentrations of metal POCs in untreated discharge from the Tenas Project. However, with the addition of a membrane pre-concentration step, POCs could be removed to levels below 80% of the WQG. Therefore, the process was considered to be **potentially feasible**.

### 4.3.6 Membrane Filtration and Ferric Co-precipitation

This process is identical to the process discussed in Section 4.3.3, but it includes a membrane pre-concentration process like the one discussed in Section 4.3.4. Iron co-precipitation was rejected as a stand-alone process because of its inability to remove the already low concentrations of molybdenum in untreated discharge from the Tenas Project. However, with the addition of a membrane pre-concentration step, molybdenum could be removed to levels below 80% of the WQG. Therefore, the process was considered to be **potentially feasible**.

### 4.3.7 Ion Exchange, Selenium Removal

Ion exchange (IX) is a process that removes dissolved ions from solution by adsorption onto a fixed media. The media is a synthetic resin made of polymers with functional groups that have specific affinity for certain ions (example in Figure 4-11). The process works by passing process water through columns with IX resin where the target constituent is adsorbed by displacing an inert ion such as sodium, chloride, or sulphate. IX resins are available in an anionic form that removes negatively charged molecules and in a cationic form that removed positively charged ions. It is a proven process with TRL 9.

**Figure 4-11 Ion Exchange Resin**

Selenium could be removed using an anionic ion exchange resin with affinity for selenate ($SeO_4^{2}$). Over time, the IX resin becomes saturated and is then regenerated using solutions with high concentrations of ions that can displace the adsorbed selenate. In the anionic IX process a solution of concentrated sodium sulphate can be used to displace the adsorbed selenate ions. The spent regenerant solution would subsequently be treated to remove the captured selenate or copper.

An approach to regenerating selenate-containing regenerant using electrochemical reduction has been commercialized in recent years[2] and is currently at a TRL of 8 (Figure 4-12).

IX plants require several ancillary services and facilities, including:

- A reliable source of power.
- Fresh water for reagent make-up.
- Reagent storage and a laboratory for influent and effluent analysis, and
- A facility or repository for permanent disposal of sludge.

Advantages associated with IX treatment of discharge include:

- High degree of process control and reliable performance.

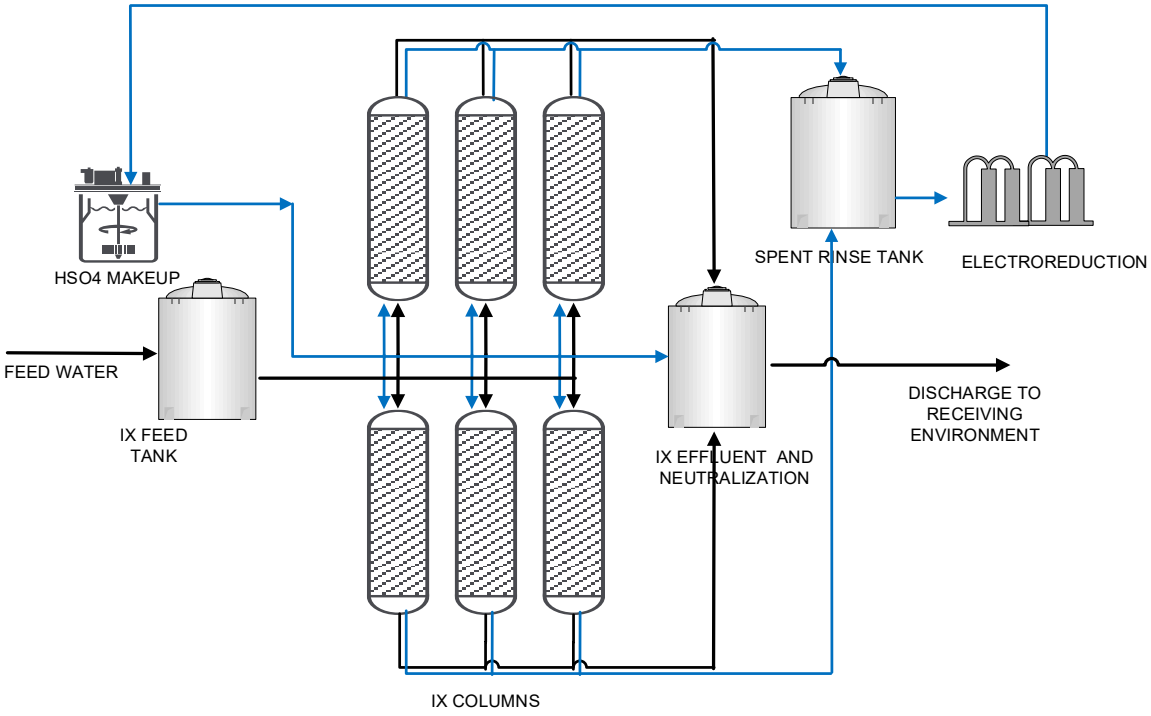



**Figure 4-12 Simplified Schematic of an Ion Exchange Process for Removal of Selenium**

Disadvantages include:

- The process requires constant or frequent operator attention.
- Sludge must be managed on an ongoing basis.
- The risk of operator exposure to, or spills of hazardous treatment reagents.

[2] https://www.bqewater.com/technology-solutions/selenium/

- The ion exchange process is more complex and more difficult to operate than other active water treatment processes such as sulphide or lime treatment.
- Capital and operating costs are relatively high compared to source control or semi-passive options.
- Energy requirements and greenhouse gas emissions are relatively high compared to source control or semi-passive options.

Because of the complexity of ion exchange for removal of selenium and because this would be the only POC that would be removed by the process, it was considered to be **not feasible** for the Tenas Project.

### 4.3.8 Ion Exchange, Metal Removal

Removal of metals using ion exchange is like the process described for removal of selenium in Section 4.3.7. However, instead of using an anionic exchange resin, a cationic resin is used, and the resin is regenerated using a dilute acid solution or a salt solution such as sodium chloride. Metals can be removed from the spent regenerant relatively easily by treating it with lime or sulphide. Ion exchange is not commonly used in the mining industry, but it is used in industrial treatment applications, particularly in cases where effluent with extremely low metal concentrations must be produced. Because the use of ion exchange for metal removal is a proven process and simpler than ion exchange for selenium removal it was considered **potentially feasible** for implementation for the Tenas Project. The technology is TRL 9.

### 4.3.9 Ion Exchange, Sulphate Removal

Removal of sulphate using ion exchange is  but the process is inefficient and complex and there are no full-scale plant in operations at mines anywhere in the world.  Therefore, the process was considered to be **not feasible** for the Tenas Project.

### 4.3.10 Electrocoagulation

Electrocoagulation is implemented by passing process water through electrochemical cells where an electrical current is applied across immersed anodes and cathodes.  At the anode, which typically consists of iron or aluminum metal, metals are oxidized to soluble ions. At the cathode, water is hydrolyzed to hydroxide ions and hydrogen gas.

In the overall process, the oxidized iron or aluminum precipitate as hydroxides and can therefore be removed in subsequent solid-liquid separation step that usually involves settling or clarification and filtration. When iron is used as anode material, the process is similar to ferric co-precipitation process described in Section 4.3.3.

Electrocoagulation can be a useful process for removing suspended solids and some metals but is it unable to produce effluent with POC concentrations that are lower than 80% of the WQGs. Since most POCs in untreated effluent for the Tenas Project are already low, electrocoagulation would not be able to improve the quality of the effluent and was therefore considered to be **not feasible**.

### 4.3.11 Membrane Filtration and Electrocoagulation

The addition of a membrane filtration stage upstream of the electrocoagulation is also considered to be a **not feasible** since electrocoagulation is poorly suited for removing POC to low concentrations.

### 4.3.12 Anaerobic Biological Treatment (with or without Membrane Filtration)

Anaerobic biological treatment works by dosing a source of degradable organic carbon to the mine water as it is pumped to a bioreactor filled with a solid but porous media. The organic carbon stimulates growth of microorganisms, which consume dissolved oxygen and begin to reduce oxygen-containing constituents. The dose of organic carbon determine the extent to which oxidized constituents are reduced. Mildly to moderately reducing conditions will convert nitrate ($NO_3^-$) to nitrogen gas and selenate ($SeO_4^{2-}$) to selenite ($SeO_3^{2-}$) or elemental selenium, while strongly reducing conditions will also reduce sulphate ($SO_4^{2-}$) to sulphide ($S^{2-}$). The technology is TRL 9.

Figure 4-13 shows a simplified schematic of an anaerobic biological treatment process. Feed water is pumped to the anaerobic bioreactor where organic carbon and nutrients are added. The bioreactor provide sufficient residence time for anaerobic microbes to degrade the organic carbon and complete the reduction process. A post treatment stage consisting of an aerobic bioreactor that removes residual organic carbon and reduced species produced by the anaerobic bioreactor (such as sulphides) treats the effluent from the anaerobic bioreactor. A solid-liquid separation step such as a clarifier, pond and/or filter may be required to remove residual biosolids. From the post treatment stage, the treated water flows to an effluent tank and from there it is discharged to the receiving environment.

Anaerobic bioreactors require a number of ancillary services and facilities, including:

- A reliable source of power and fresh water.
- Reagent storage and a laboratory for influent and effluent analysis, and
- A facility or repository for permanent disposal of spent reactor media and sludge.

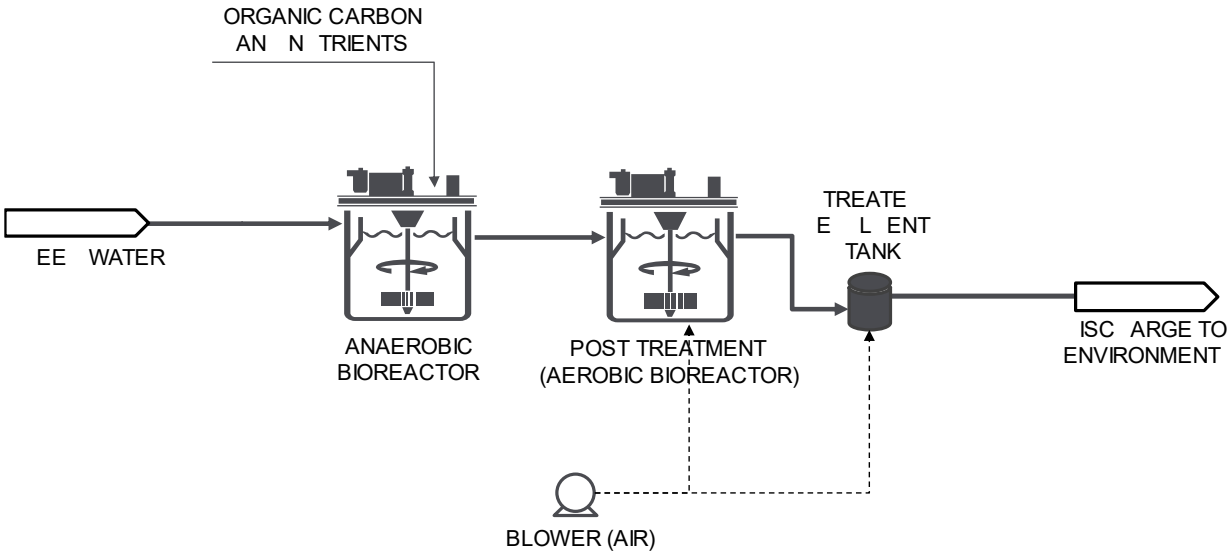



**Figure 4-13 Simplified Schematic of an Anaerobic Biological Treatment Process**

Advantages associated with anaerobic biological treatment of discharge from SW38/SW63 include:

- High degree of process control and reliable performance.

Disadvantages include:

- The process requires constant or frequent operator attention.
- Sludge must be managed on an ongoing basis.
- The risk of operator exposure to, or spills of hazardous treatment reagents.
- Capital and operating costs are relatively high compared to source control or semi-passive options.
- Energy requirements and greenhouse gas emissions are relatively high compared to source control or semi-passive options.

Anaerobic bioreactor processes are both common and conventional processes for removal or selenium and nitrate from mine water. For nitrate removal, it is only process in common use. If anaerobic biological treatment were to be implemented for the Tenas Project both nitrate and selenium would be targeted by the process. However, conventional anaerobic biological treatment would likely not be able to remove the selenium concentrations in untreated effluent that are generally projected to be less than 0.020 mg/L and often less than 0.010 mg/L. Anaerobic biological treatment can generally only be relied upon to achieve a selenium concentration of 0.010 mg/L. Therefore, a membrane filtration stage would be required to pre-concentrate the untreated discharge before it is treated by the anaerobic biological.

Accordingly, implementation of an anaerobic biological process was considered to be **not feasible** as a standalone process but potentially **feasible** if combined with a membrane filtration process.

### 4.3.13 Zero Liquid Discharge (ZLD) process

The zero liquid discharge process uses mechanical and thermal energy to concentrate POCs in successive stages until a dry salt is produced. Figure 4-14 shows a schematic of the process.

First, mine water is pre-treated before it is pumped to a membrane filtration unit (RO or Electrodialysis Reversal (EDR)). Brine produced by the membrane filtration is pumped to an evaporator that produces a saline slurry, which in turn is passed on to a crystallizer that evaporates remaining water and produces a dry salt. The salt is highly soluble and must therefore be disposed in a facility that can maintain it dry (i.e., it must be entombed by synthetic liners, buried in barrels, cast in cement, or similar disposal methods). Disposal of the soluble salt by-product produced by the process is a major draw-back. ZLD is considered to be a mature technology and is therefore TRL 9.

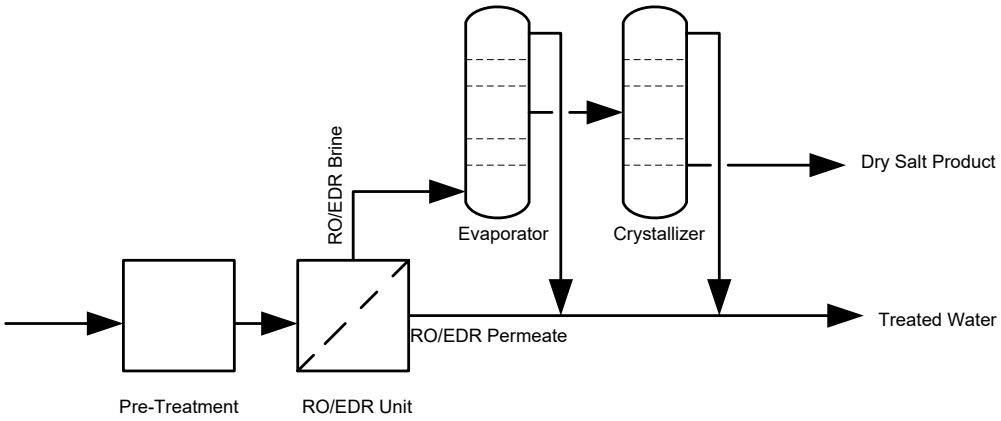



**Figure 4-14: Schematic of Membrane Concentration followed by Mechanical Evaporation**

The process is rarely used in the mining industry because of the high capital and operating costs and because of the very high power demand. However, it can be the only option available if a POC such as chloride has to be removed.

In spite of the disadvantages, the ZLD process was deemed to be **potentially feasible** for treating discharges from the Tenas Project since it theoretically could reduce all POCs to levels well below the WQGs.

### 4.3.14 Ettringite Precipitation

In the ettringite precipitation process, sulphate ions are precipitated as $Ca_6Al_2(SO_4)_3(OH)_{12}\cdot 26H_2O$ by adding calcium hydroxide and aluminum hydroxide to the process water. The process reliably removes sulphate and also dissolved metals because of the high pH used in the precipitation process. However, the process has never been implemented at an industrial scale. One reason for the lack of commercialization is the prohibitively high cost of the aluminum reagent required for the precipitation process. Efforts at recovering and recycling the aluminum have been made by various water treatment companies over the years but none have succeeded. The process was judged to be **not feasible** principally because of the fact that it has never been commercialized and is considered to be TRL 6 or 7.

### 4.3.15 Biological Sulphate Reduction

Biological sulphate reduction removes sulphate by converting it into hydrogen sulphide gas, which can subsequently be converted to elemental sulphur. In addition, the process is likely to remove most other POCs. The process has been implemented at full scale and is therefore TRL 8 or 9.

The anaerobic bioreactor process involves the following steps: first, the intake water undergoes settling and/or filtration to remove suspended solids. Next, the water is heated to a temperature between 20 to 30 degrees C. The anaerobic processes do occur at lower temperature, but the rates are slower, which means that reactors have to be much larger. After heating, the water is passed to the anaerobic reactors where a source of organic carbon (or electron donor) such as acetate or methanol is added. The sulphate reducing bacteria in the reactor feed on the carbon and converts sulphate to hydrogen sulphide gas ($H_2S$) as follows:

$SO_4^{2-}$ + 8 e- (organic carbon) + 10 $H^+$ → $H_2S$ (gas) + 4 $H_2O$

Hydrogen sulphide gas is highly reactive and toxic, so it must be converted to elemental sulphur, a grey or yellow solid, using an oxidation reactor. In addition, the water treated in the anaerobic bioreactor must subsequently be treated in an aerobic bioreactor that removes residual organic carbon not consumed in the anaerobic reactor.

Ordinarily, selenium is also removed in an anaerobic bioreactor. However, when a reactor is operated at conditions that reduces sulphate, selenium can form soluble selenide ($Se^{2-}$) ions or organo-selenium compounds. Such compounds can be more toxic and bioaccumulate more readily than selenate ($SeO_4^{2-}$), which is the species typically found in normal surface water. Therefore, an additional treatment step may be required to remove residual reduced selenium species.

Worldwide, there are very few examples of anaerobic bioreactors specifically designed to remove sulphate. The best (and perhaps only) known example is a plant constructed at the Budel zinc refinery in the Netherlands. Built in 1992, the plant has a capacity of about 300 $m^3$/hour. The feed for the plant is a contaminated groundwater plume containing about 1,000 mg/L of sulphate and about 100 mg/L of zinc. As such, the plant was constructed to deal with both sulphate and metals contamination.

Because the sulphate reducing biological treatment process is complex and produces hazardous hydrogen sulphide gas it was considered to be **not feasible** for implementation at the Tenas Project.

# 5 BAT Evaluation and Ranking

## 5.1 Candidate BAT Scenarios

The technology identification and screening described in Section 4 looked at specific technologies that are capable of targeting specific POCs. Therefore, in order to address most (if not all) POCs, it is necessary to combine candidate BATs into scenarios that can be implemented as comprehensive water treatment solutions.

Table 5-1 lists BAT scenario considered for the Tenas Project. The table indicates which POCs would be addressed by the BATs that were deemed to be potentially feasible and which POCs would not be addressed by each scenario. Scenarios that include active tank-based treatment technologies also require the use of the TCP as a buffer pond for attenuating freshet flows so that the active water treatment processes can operate at a steady rate throughout the open water treatment and discharge season.

Implementation of complete BAT scenarios requires more infrastructure than the stand-alone technologies discussed in Section 4. Figure 5-1 and Figure 5-2 show example flow sheets for implementation of Scenario 3 (Active GBR) and Scenario 5 (Membrane Filtration + Anaerobic Bioreactor + Lime Treatment). In the MAA, it is important that all requirements for implementation of the complete operational scenarios are fairly evaluated.

## Table 5-1 Candidate BAT Scenarios for the Tenas Project

**Groundwater Discharge**

| Interception | Description | $NO_2/NO_3$ | Se/Mo | Metals | SO4 | POCs Addressed | POCs Not Addressed |
|---|---|---|---|---|---|---|---|
| Additional Liner | Add additional liner material to further reduce groundwater seepage from ponds. | Go to Surface BAT → | | | | | |
| None | In-situ Active GBR | In-situ Active GBR: NO2, NO3, Al, Fe, Cu, (Se polishing) (not Mo, Co, Ni, Zn) | | | none | NO2, NO3, Al, Fe, Cu, (Se - polishing) | Mo, Co, Ni, Zn, SO4 |

**Surface Discharge**

| Scenario | Description | Flow Attenuation | $NO_2/NO_3$ | Se/Mo | Metals | SO4 | POCs Addressed | POCs Not Addressed |
|---|---|---|---|---|---|---|---|---|
| 1 | BMPs already planned | None | **No additional source control or water treatment measures beyond BATs already incorporated into the Project design.** | | | | All | No additional removal of POCs. |
| 2 | Passive/active flocculation (only) | None | **none** | | none except TSS removal (Al and Fe) | none | TSS, Fe, Al | NO2, NO3, Se, Co, Cu, Ni, Zn, Mo, SO4 |
| 3 | In-situ Active GBR | None | In-situ Active GBR: NO2, NO3, Al, Fe, Cu, (Se polishing) (not Mo, Co, Ni, Zn) | | | none | NO2, NO3, Al, Fe, Cu, (Se - polishing) | Mo, Co, Ni, Zn, SO4 |
| 4 | RO + Anaerobic Biological Treatment | **Tenas Control Pond** | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): NO2, NO3, Se. (not Cu, Mo) | | none except TSS removal (Al and Fe) | none | $NO_2$, $NO_3$, Se, Al, Fe | Mo, Co, Cu, Ni, Zn, SO4 |
| 5 | RO + Anaerobic Biological Treatment + Lime Treatment | **Tenas Control Pond** | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): NO2, NO3, Se. (not Mo) | | **Lime Treatment:** Al, Co, Cu, Fe, Ni, Zn, SO4 | | $NO_2$, $NO_3$, Se, Al, Co, Cu, Fe, Ni, Zn, $SO_4$ | Mo |
| 6 | RO + Anaerobic Biological Treatment + Sulphide Treatment | **Tenas Control Pond** | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): NO2, NO3, Se. (not Mo) | | **Sulphide Treatment:** Co, Cu, Ni, Zn + TSS removal (Al, Fe) | none | $NO_2$, $NO_3$, Se, Al, Co, Cu, Ni, Zn | Mo, SO4 |
| 7 | RO + Anaerobic Biological Treatment + Ferric Co-precipitation | **Tenas Control Pond** | **RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk):** $NO_2$, $NO_3$, Se. | | **Ferric Co-precipitation:** Mo + TSS removal (Al, Fe) | none | $NO_2$, $NO_3$, Se, Al, Fe, Mo | Co, Cu, Ni, Zn, SO4 |
| 8 | RO + Anaerobic Biological Treatment + Ion Exchange | **Tenas Control Pond** | **RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk):** $NO_2$, $NO_3$, Se. | | **Ion Exchange:** Al, Co, Cu, Fe, Ni, Zn. | none | NO2, NO3, Se, Al, Co, Cu, Mo, Fe, Ni, Zn | $SO_4$ |
| 9 | Zero Liquid Discharge | **Tenas Control Pond** | Zero Liquid Discharge (ZLD): All POCs | | | | NO2, NO3, Se, Al, Co, Cu, Fe, Ni, Zn, Mo, SO4 | none |
| 10 | Additional Liner in Water Management Ponds | **Tenas Control Pond** | This options reduces seepage from the water management ponds but increases surface dsicharge by the same volume. Therefore, there is not net POC removal if additional liners are added as a stand-alone BAT | | | | none | NO2, NO3, Se, Al, Co, Cu, Fe, Ni, Zn, Mo, SO4 |

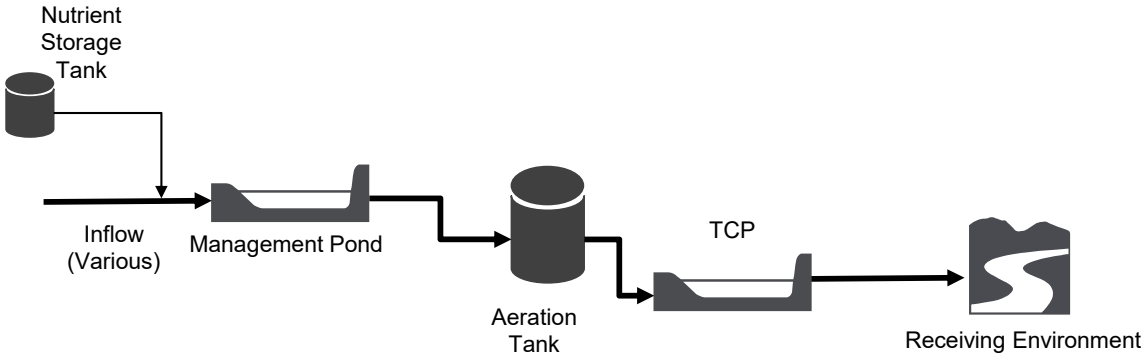



**Figure 5-1 Scenario 3: Gravel Bed Reactor**

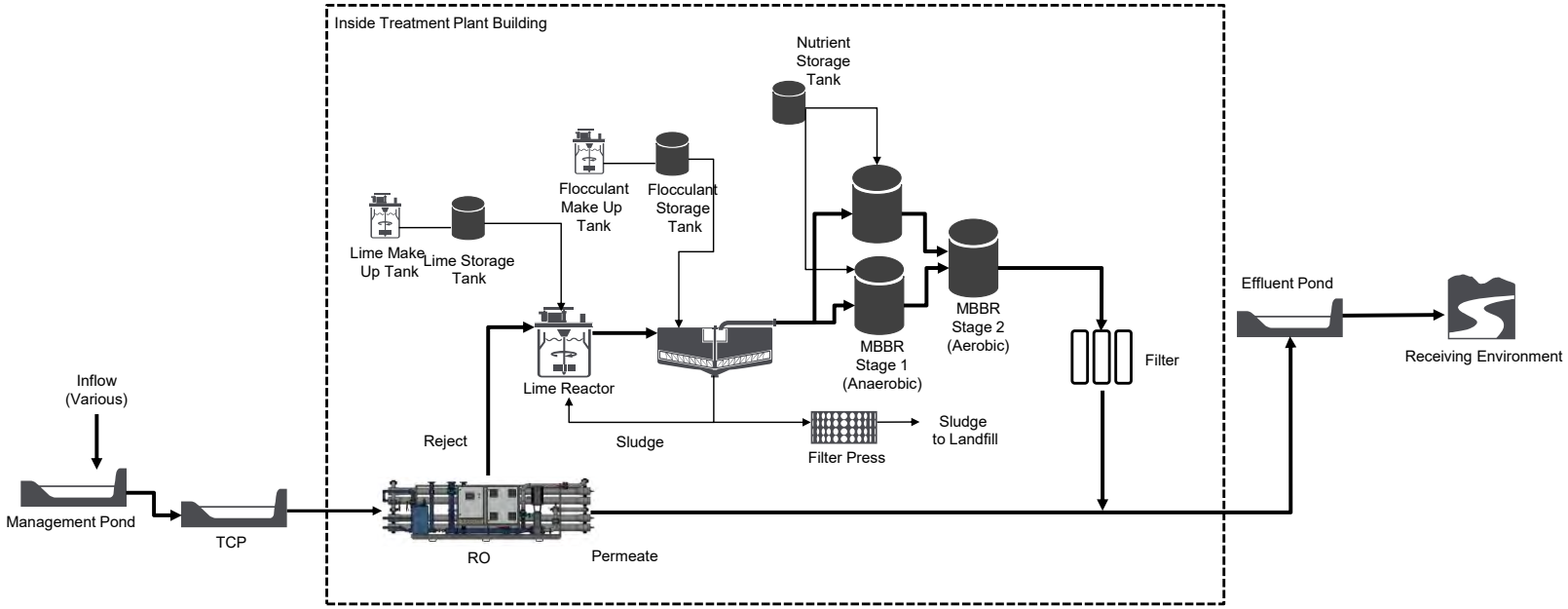



**Figure 5-2 Scenario 5: Membrane Filtration + Anaerobic Bioreactor + Lime Treatment**

In summary, the following candidate BATs scenarios were advanced for the MAA:

- Modified Liners in Water Management Ponds.
- Passive/Active Flocculation.
- In-situ Active GBR.
- Membrane Filtration + MBBR
- Membrane Filtration + MBBR + HDS Lime
- Membrane Filtration + MBBR + Sulphide
- Membrane Filtration + MBBR + Ferric
- Membrane Filtration + MBBR + Ion Exchange
- Zero Liquid Discharge.

In addition to these, the base case options of that includes the BMPs developed for the Project was also considered in the MAA. Each of the candidate BATs were evaluated according to the criteria provided by BC ENV. The rationales behind the criteria scores are documented in Section 5.2. Ranking of the candidate BATs and selection of the preferred BAT are discussed in Section 5.3.

## 5.2 Criteria Scoring

### 5.2.1 Reliability Scores

The reliability account consists of the following criteria: risk, robustness, scalability, and long-term viability. These were scored as follows:

- **Risk**: risks associated with the Base Case that includes all BMPs are likely limited because of the relatively clean untreated water and lack of projected exceedances in the receiving environment.
  - The risk account was scored as follows: a score of 3 due to potentially higher constituent concentrations in the receiving environment (Base Case, Flocculation), hazards associated with sulphide (RP + MMBR + sulphide), and performance uncertainty (Modified Liners)
  - A score of 4 for remaining active water treatment options.
- **Robustness:** refers to consistent and reliable performance under various conditions.
  - Planned source control measures are expected to be robust and were therefore assigned a score of 5, as was Option 10 (additional liners in water management ponds).
  - Passive/active flocculation and in-situ GBR are expected to work well at normal operating conditions but may perform less well at high flow or upset conditions (Score 3).

  - Active water treatment is generally robust, but any mechanical system can potentially fail or malfunction. More complex processes are generally more prone to malfunctions (Score 4 for all except the more complex RO + MMBR + Ion Exchange)).

- **Scalability:** the ability to accommodate increases in flow or loadings.
  - Mechanical treatment plants are generally difficult to scale since all equipment, piping and pumps are designed to accommodate a certain design flow. The more complex a process is the more difficult it is to scale up (Score 3, or 2 for ZLD).
  - Passive/active flocculation can readily be scaled by adding floc stations in more locations and additional liners could be installed in any new pond (Score 5).
  - In-situ GBRs can be scaled by constructing additional ponds (Score 4).
  - Planned source control measures are likely scalable to an expanded operation (Score 4).
- **Long-term viability**: refers to sustainability and performance effectiveness over an extended period.
  - Planned source control measures such as inundating PAG waste rock and construction of low-permeability liners are sustainable and expected to perform well for many decades or centuries with minimal maintenance (Score 5).
  - Likewise, additional liners are expected to perform well long-term (Score 5).
  - Mechanical equipment can be made to operate indefinitely if it is well maintained and replaced at the end of its operating life. However, ongoing maintenance is less sustainable (Score 4).
  - ZLD is less sustainable because it produces a soluble salt that must be entombed in barrels or liners and stored in perpetuity (Score 2).

### 5.2.2 Control-Effectiveness Scores

Pollutant Reduction was calculated and scored as follows:

- Percent loadings removed of each POC over and above planned source control measures was calculated and weighed by total volume discharged for each candidate BAT option.
- Percent loadings removed was averaged across all POCs to get an overall score.
- Percent loading removal was based on MAXIMUM POC concentrations. Therefore, actual loadings removal percentages are likely to be substantially lower.
- Passive/Active flocculation was assigned an overall loading removal of zero because the extent of TSS removal cannot be quantified reliably (i.e., passive flocculation will remove some TSS, but a definitive removal factor cannot be assigned).

Table nn shows a summary of the pollutant reduction evaluation.

**Table 5-2 Pollutant Reduction Calculation Result**

| POC | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 | Option 7 | Option 8 | Option 9 | Option 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Nitrate | 0% | 0% | 78% | 89% | 89% | 89% | 89% | 89% | 89% | 0% |
| Nitrite | 0% | 0% | 81% | 91% | 91% | 91% | 91% | 91% | 91% | 0% |
| Sulphate | 0% | 0% | 0% | 0% | 40% | 0% | 0% | 0% | 70% | 0% |
| Aluminum, total | 0% | 0% | 56% | 65% | 65% | 65% | 65% | 65% | 86% | 0% |
| Cobalt, total | 0% | 0% | 0% | 0% | 14% | 14% | 0% | 14% | 71% | 0% |
| Copper, dissolved | 0% | 0% | 0% | 0% | 94% | 94% | 0% | 94% | 94% | 0% |
| Iron, total | 0% | 0% | 60% | 70% | 80% | 80% | 80% | 80% | 96% | 0% |
| Molybdenum, total | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 75% | 75% | 0% |
| Nickel, dissolved | 0% | 0% | 0% | 0% | 13% | 13% | 0% | 65% | 65% | 0% |
| Selenium, total | 0% | 0% | 78% | 93% | 93% | 93% | 93% | 93% | 93% | 0% |
| Zinc, dissolved | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 77% | 77% | 0% |
| Overall Maximum POC Load Reduction* | 0% | 0% | 29% | 34% | 48% | 45% | 35% | 66% | 80% | 0% |
| **Score** | **1** | **1** | **2.5** | **2.5** | **3** | **3** | **2.5** | **4** | **4.5** | **1** |

Untreated discharge is not expected to be acutely toxic. However, water quality model results indicates that when TSS in untreated effluent is at the maximum proposed concentration (35 mg/L) the total iron concentration could marginally exceed the acute guideline of 1.0 mg/L total iron. Similarly, model results indicates that nitrite concentrations could marginally exceed the acute guideline of 0.06 mg/L nitrite-N.

Both of these acute guideline exceedances are unlikely to occur, but option 1 and 2 were nonetheless given a score of 4.5, while the other options, which all remove iron and nitrite, was given a score of 5.

### 5.2.3 Environmental Impacts and Socio-Cultural Scores

Sub-accounts were scored as follows:

- **Energy Efficiency**:
  - The base case option (Option 1) that includes various source control measures do not include construction of additional facilities and was therefore given an energy efficiency score of 5. Once installed, additional liners (Option 10) do not consume energy (Score 5).
  - Zero Liquid Discharge process is very energy intensive (~15 kW-hr/m3) and was therefore assigned a score of 1.
  - In-situ active GBR only require energy for aerating the effluent after treatment (Score 4.5)
  - Other active water treatment measures are moderately energy efficient (~4 kW-hr/m3) compared to ZLD and were therefore given a score of 3.5.

- **Greenhouse Gas (GHG) Emission**s:
  - GHG emissions generally follow energy emissions, but emissions associated with treatment reagents must also be taken into account. Option 4 received a slightly better score of 4 because of the lower reagent demand.
  - Installation of additional liners was scored 3.5 because a large volume of bentonite would have to be shipped to site from Kamloops.
- **Foot-print:**
  - Source control (Option 1, base case), passive/active flocculation (Option 2), and additional liners (Option 10) do not require additional foot-print and therefore scored 5.
  - In-situ GBR requires minimal foot-print for installation of aeration equipment (Score 4.5).
  - Most active water treatment options require a sizable foot-print (Score 3).
  - Option 4 is smaller because a clarifier is not required (Score 4).
- **Secondary Waste Production:**
  - Base case, passive/active flocculation, and additional liners scored 5 because of no or negligible secondary waste production.
  - In-situ GBR has nearly no waste production, but the post-treatment aeration could produce some total iron that would settle in the TCP (Score 4.5)
  - RO + MBBR (Option 4) produces biomass and TSS sludge (Score 4)
  - Other active water treatment options score 3, 2.5 or 1 depending on the volume or stability of the secondary waste produced. ZLD produces large volumes of soluble salts that must be disposed of in a hazardous landfill off site and was therefore assigned a score of 1.
- Adherence to Yintah Management Directives:
  - The Office of Wet'suwet'en has provided a document that lays out a series best management practices that should be followed when developing a Project within Yintah.
  - The following is the directive that was deemed most relevant after discussion with the OW and house groups

  **“Maintain surface water quantity and quality within the natural range of variability in perpetuity across the Yintah for future generations of Wet’suwet’en people.”**
  - Using this information the same scoring use used as pollutant reduction as the technologies that were most effective for pollutant reduction also achieved water quality values closer to the natural baseline conditions

### 5.2.4 Cost-Effectiveness Scores

The cost effectiveness criteria were scored as follows:

- **Efficient Use of Existing Resources**:
  - The base case (Option 1) and passive/active flocculation uses only existing infrastructure and resources and therefore scored 5.

- Additional liners make use of the planned water management ponds but cannot be constructed from materials on site (bentonite will have to be sourced in Kamloops) (Score 3).
- The in-situ GBR will be imbedded in the design of the water management ponds and require only little equipment in addition to that (i.e., aeration tank). Score 4.
- All active water treatment options require construction of new infrastructure that will consume additional resources (Score 2 or Score 1.5 for ZLD).

Life Cycle Cost Analysis scores were based on 100-year Net Present Value (NPV) discounted at 4%. Table 5-3 lists order-of-magnitude (Class V) NPVs for the options considered along with the associated scores.

**Table 5-3 Order-of-Magnitude Cost Estimates and Scores for Candidate BAT Scenarios**

| | | NPV (M$) | Score |
|---|---|---|---|
| Base Case | Option 1 | $ - | 5 |
| Passive Flocculation | Option 2 | $ 1 | 5 |
| In-situ Active (GBR) | Option 3 | $ 12 | 4.5 |
| RO + MBBR | Option 4 | $ 66 | 3.5 |
| RO + MBBR + HDS Lime | Option 5 | $ 100 | 3 |
| RO + MBBR + Sulphide | Option 6 | $ 100 | 3 |
| RO + MBBR + Ferric | Option 7 | $ 100 | 3 |
| RO + MBBR + Ion Exchange | Option 8 | $ 123 | 2.5 |
| Zero Liquid Discharge | Option 9 | $ 285 | 1 |
| Additional WMP Liners | Option 10 | $ 45 | 4 |

## 5.3 MAA Ranking and Preferred BAT

Table 5-4 shows the scoring of short-listed BAT scenarios for the Tenas Project:

- In-situ active GBRs and the base case with BMPs were the highest ranked scenarios (78 points out of a possible 100) followed by passive/active flocculation (77 points).
- The option of modifying management pond liners to reduce seepage scored 73 points and was therefore less preferred than GBR, the base case with BMPs or flocculation.
- All active tank-based water treatment options, with the exception of zero liquid discharge treatment, ranged between 65 and 69 points, with an average of 67 points.
- Zero liquid discharge scored lowest (55 points).

The active tank-based water treatment options generally scored higher for criteria related to control-effectiveness, but scored lower for environmental and socio-cultural criteria, and cost. Overall, the BAT assessment indicated that pump-back of drainages and the base case are about equally preferred with a slight preference for the pump-back option. Tank-based water treatment options, GBRs, flocculation and the base case with BMPs scored similarly for the combined reliability criteria.

## 5.4 MAA without Cost-Effectiveness Account

Table 5-5 shows the MAA table for the candidate BATs without the Cost-Effectiveness account included (i.e., cost is not considered to be a factor). When the cost-effectiveness account is eliminated from the MAA, all options achieves scores in a similar range with Option 3 (In-situ GBR) and Option 8 (RO + MBBR + Ion Exchange) slightly preferred.

**Table 5-4 MAA Assessment of Candidate BAT Scenarios**

| | | Base Case with BMPs | Passive/Active Flocculation | In-situ Active (GBR) | RO + MBBR | RO + MBBR + HDS Lime | RO + MBBR + Sulphide | RO + MBBR + Ferric | RO + MBBR + Ion Exchange | Zero Liquid Discaherge | Modified Liners in Water Management Ponds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Assessment Criterion** | **Weight** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** | **Option 6** | **Option 7** | **Option 8** | **Option 9** | **Option 10** |
| **Reliability** | **20** | **17** | **16** | **14** | **15** | **15** | **14** | **15** | **14** | **12** | **18** |
| **Risk Assessment** | 5 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| **Robustness** | 5 | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 5 |
| **Scalability** | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 5 |
| **Long-term Viability** | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 5 |
| **Control-Effectiveness** | **30** | **13** | **13** | **20** | **20** | **22** | **22** | **20** | **26** | **28** | **13** |
| **Pollutant Reduction** | 20 | 1 | 1 | 2.5 | 2.5 | 3 | 3 | 2.5 | 4 | 4.5 | 1 |
| **Toxicity Reduction** | 10 | 4.5 | 4.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4.5 |
| **Environmental & Socio-Cultural Impacts** | **25** | **23** | **23** | **22** | **20** | **17** | **17** | **17** | **17** | **10** | **22** |
| **Energy Efficiency** | 5 | 5 | 5 | 4.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 5 |
| **Greenhouse Gas Emission** | 6 | 5 | 5 | 4.5 | 4 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 3.5 |
| **Footprint** | 4 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 3 | 3 | 5 |
| **Secondary Waste Production** | 5 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 2.5 | 1 | 5 |
| **Adherence to Yintah Management Directives** | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Cost-Effectiveness** | **25** | **25** | **25** | **22** | **14** | **12** | **12** | **12** | **12** | **5** | **19** |
| **Efficient Use of Existing Resources** | 3 | 5 | 5 | 4 | 2 | 2 | 2 | 2 | 2 | 1.5 | 3 |
| **Life Cycle Cost Analysis** | 22 | 5 | 5 | 4.5 | 3 | 2.5 | 2.5 | 2.5 | 2.5 | 1 | 4 |
| **Total** | **100** | **78** | **77** | **78** | **69** | **66** | **65** | **64** | **69** | **55** | **73** |

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/ Telkwa BAT Tech Screening REV01.xlsx

**Table 5-5 MAA Assessment of Candidate BAT Scenarios with Cost-Effectiveness Account Eliminated**

| | | Base Case with BMPs | Passive/Active Flocculation | In-situ Active (GBR) | RO + MBBR | RO + MBBR + HDS Lime | RO + MBBR + Sulphide | RO + MBBR + Ferric | RO + MBBR + Ion Exchange | Zero Liquid Discaherge | Modified Liners in Water Management Ponds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Assessment Criterion** | **Weight** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** | **Option 6** | **Option 7** | **Option 8** | **Option 9** | **Option 10** |
| **Reliability** | **20** | **17** | **16** | **14** | **15** | **15** | **14** | **15** | **14** | **12** | **18** |
| **Risk Assessment** | 5 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| **Robustness** | 5 | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 5 |
| **Scalability** | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 5 |
| **Long-term Viability** | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 5 |
| **Control-Effectiveness** | **30** | **13** | **13** | **20** | **20** | **22** | **22** | **20** | **26** | **28** | **13** |
| **Pollutant Reduction** | 20 | 1 | 1 | 2.5 | 2.5 | 3 | 3 | 2.5 | 4 | 4.5 | 1 |
| **Toxicity Reduction** | 10 | 4.5 | 4.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4.5 |
| **Environmental & Socio-Cultural Impacts** | **25** | **23** | **23** | **22** | **20** | **17** | **17** | **17** | **17** | **10** | **22** |
| **Energy Efficiency** | 5 | 5 | 5 | 4.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 5 |
| **Greenhouse Gas Emission** | 6 | 5 | 5 | 4.5 | 4 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 3.5 |
| **Footprint** | 4 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 3 | 3 | 5 |
| **Secondary Waste Production** | 5 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 2.5 | 1 | 5 |
| **Adherence to Yintah Management Directives** | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Cost-Effectiveness** | **25** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Efficient Use of Existing Resources** | 3 | | | | | | | | | | |
| **Life Cycle Cost Analysis** | 22 | | | | | | | | | | |
| **Total** | **100** | **53** | **52** | **56** | **55** | **54** | **53** | **52** | **57** | **50** | **53** |

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/ Telkwa BAT Tech Screening REV01.xlsx

# 6 Conclusions

The following was concluded based on the assessment of Best Achievable Technologies for the Tenas Project:

- The base case with BMPs is a highly rated and feasible option for protecting downstream water quality as is.
- TML should consider supplementing the base case BMPs with active in-situ GBRs and flocculation.
- Active tank-based water treatment options are less suitable but feasible and should be retained as contingency options in the event that water quality predictions for the Project differ substantially from actual conditions observed during the development of the mine.
- When the cost-effectiveness account is eliminated from the MAA, all options achieves scores in a similar range with Option 3 (In-situ GBR) and Option 8 (RO + MBBR + Ion Exchange) slightly preferred.

As per the MAA methodology, the preferred BAT is the highest ranked (highest score) scenario. However, the BAT assessment is a conceptual evaluation of technologies based on information and data currently available. If subsequent studies or engineering design identifies limitations or issues that had not been identified as part of the conceptual evaluation, the rank order may change such that the second or third highest ranked BAT becomes the preferred BAT. Alternatively, unexpected benefits of one or more of the ranked BATs that may be discovered as part of subsequent investigations, may cause lower ranked BATs to become preferred BATs.

This report, Tenas Project Best Achievable Technology (BAT) Assessment, was prepared by SRK Consulting (Canada) Inc.,

3 March 2025

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EGBC Permit to Practice: 1003655

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The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

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# Appendix A Water Quality Guidelines

**Table A-1.1 Water Quality Guidelines for Receiving Water Nodes**

| Receiving Environment | | Tenas Creek | | Four Creek | | Goathorn Creek | | Telkwa River | | Bulkley River | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Selected for FEAC** | **Rationale** | **Selected for FEAC** | **Rationale** | **Selected for FEAC** | **Rationale** | **Selected for FEAC** | **Rationale** | **Selected for FEAC** | **Rationale** |
| Alkalinity | mg CaCO3/L | | | | | | | | | | |
| Ammonia, total | mg-N/L | 1.3 | Used BC AWQG | 0.992 | Used BC AWQG | 1.56 | Used BC AWQG | 1.66 | Used BC AWQG | 1.6 | Used BC AWQG |
| Chloride | mg/L | 150 | Used BC AWQG | 150 | Used BC AWQG | 150 | Used BC AWQG | 150 | Used BC AWQG | 150 | Used BC AWQG |
| Fluoride | mg/L | 1.22 | Used BC AWQG | 1.37 | Used BC AWQG | 1.19 | Used BC AWQG | 0.99 | Used BC AWQG | 0.84 | Used BC AWQG |
| Nitrate | mg-N/L | 3 | Used BC AWQG | 3 | Used BC AWQG | 3 | Used BC AWQG | 3 | Used BC AWQG | 3 | Used BC AWQG |
| Nitrite | mg-N/L | 0.02 | Used BC AWQG | 0.02 | Used BC AWQG | 0.02 | Used BC AWQG | 0.02 | Used BC AWQG | 0.02 | Used BC AWQG |
| Sulphate | mg/L | 218 | Used BC AWQG | 309 | Used BC AWQG | 218 | Used BC AWQG | 218 | Used BC AWQG | 128 | Used BC AWQG |
| Aluminum, total | mg/L | 0.35 | Used BC AWQG | 0.69 | Used BC AWQG | 0.27 | Used BC AWQG | 0.19 | Used BC AWQG | 0.18 | Used BC AWQG |
| Antimony, total | mg/L | 0.072 | Used BC AWQG | 0.072 | Used BC AWQG | 0.072 | Used BC AWQG | 0.072 | Used BC AWQG | 0.072 | Used BC AWQG |
| Arsenic, total | mg/L | 0.005 | Used BC AWQG | 0.005 | Used BC AWQG | 0.005 | Used BC AWQG | 0.005 | Used BC AWQG | 0.005 | Used BC AWQG |
| Barium, total | mg/L | 1 | No AWQG, Used WWQG | 1 | No AWQG, Used WWQG | 1 | No AWQG, Used WWQG | 1 | No AWQG, Used WWQG | 1 | No AWQG, Used WWQG |
| Beryllium, total | mg/L | 0.00013 | No AWQG, Used WWQG | 0.00013 | No AWQG, Used WWQG | 0.00013 | No AWQG, Used WWQG | 0.00013 | No AWQG, Used WWQG | 0.00013 | No AWQG, Used WWQG |
| Boron, total | mg/L | 1.2 | Used BC AWQG | 1.2 | Used BC AWQG | 1.2 | Used BC AWQG | 1.2 | Used BC AWQG | 1.2 | Used BC AWQG |
| Cadmium, dissolved | mg/L | 0.00017 | Used BC AWQG | 0.00023 | Used BC AWQG | 0.00016 | Used BC AWQG | 0.00011 | Used BC AWQG | 0.00009 | Used BC AWQG |
| Chromium (Cr(VI)), total | mg/L | 0.0025 | No AWQG, Used WWQG | 0.0025 | No AWQG, Used WWQG | 0.0025 | No AWQG, Used WWQG | 0.0025 | No AWQG, Used WWQG | 0.0025 | No AWQG, Used WWQG |
| Cobalt, total | mg/L | 0.004 | Used BC AWQG | 0.004 | Used BC AWQG | 0.004 | Used BC AWQG | 0.004 | Used BC AWQG | 0.004 | Used BC AWQG |
| Copper, dissolved | mg/L | 0.0026 | Used BC AWQG | 0.0047 | Used BC AWQG | 0.0013 | Used BC AWQG | 0.0008 | Used BC AWQG | 0.0011 | Used BC AWQG |
| Iron, total | mg/L | 1 | Used BC Acute WQG | 1 | Used BC Acute WQG | 1 | Used BC Acute WQG | 1 | Used BC Acute WQG | 1 | Used BC Acute WQG |
| Iron, dissolved | mg/L | 0.35 | Used BC Acute WQG | 0.35 | Used BC Acute WQG | 0.35 | Used BC Acute WQG | 0.35 | Used BC Acute WQG | 0.35 | Used BC Acute WQG |
| Lead, total | mg/L | 0.0055 | Used BC AWQG | 0.0069 | Used BC AWQG | 0.0053 | Used BC AWQG | 0.0044 | Used BC AWQG | 0.0040 | Used BC AWQG |
| Manganese, total | mg/L | 0.94 | Used BC AWQG | 1.09 | Used BC AWQG | 0.91 | Used BC AWQG | 0.79 | Used BC AWQG | 0.73 | Used BC AWQG |
| Mercury, total | mg/L | 0.00002 | Used BC AWQG | 0.00002 | Used BC AWQG | 0.00002 | Used BC AWQG | 0.00002 | Used BC AWQG | 0.00002 | Used BC AWQG |
| Molybdenum, total | mg/L | 0.034 | Used BC ruminant wildlife guideline | 0.034 | Used BC ruminant wildlife guideline | 0.034 | Used BC ruminant wildlife guideline | 0.034 | Used BC ruminant wildlife guideline | 0.034 | Used BC ruminant wildlife guideline |
| Nickel, dissolved | mg/L | 0.003 | Used BC AWQG | 0.005 | Used BC AWQG | 0.002 | Used BC AWQG | 0.001 | Used BC AWQG | 0.001 | Used BC AWQG |
| Selenium, total | mg/L | 0.002 | Used BC AWQG | 0.002 | Used BC AWQG | 0.002 | Used BC AWQG | 0.002 | Used BC AWQG | 0.002 | Used BC AWQG |
| Silver, total | mg/L | 0.00005 | Used BC AWQG | 0.0015 | Used BC AWQG | 0.00005 | Used BC AWQG | 0.00005 | Used BC AWQG | 0.00005 | Used BC AWQG |
| Strontium, dissolved | mg/L | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life |
| Thallium, total | mg/L | 0.0008 | No AWQG, Used WWQG | 0.0008 | No AWQG, Used WWQG | 0.0008 | No AWQG, Used WWQG | 0.001 | No AWQG, Used WWQG | 0.001 | No AWQG, Used WWQG |
| Uranium, total | mg/L | 0.0085 | No AWQG, Used WWQG | 0.0085 | No AWQG, Used WWQG | 0.0085 | No AWQG, Used WWQG | 0.0085 | No AWQG, Used WWQG | 0.0085 | No AWQG, Used WWQG |
| Zinc, dissolved | mg/L | 0.0071 | Used BC AWQG | 0.0139 | Used BC AWQG | 0.0074 | Used BC AWQG | 0.0042 | Used BC AWQG | 0.0039 | Used BC AWQG |

Notes: BC AWQG = Approved BC Water Quality Guidelines for Aquatic Life; BC WWQG = WORKING BC Water Quality Guidelines for Aquatic Life; ECCC FEQG = Environment Canada Federal Environmental Quality Guidelines

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[Telkwa_BAT_assessment_BCWQGused_26062024.xlsx]WQG_table

## Table A-1.2 Parameters to calculate Water Quality Guidelines for Receiving Water

| Receiving Environment | | Tenas Creek | Four Creek | Goathorn Creek | Telkwa River | Bulkley River |
|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **P50** | **P50** | **P50** | **P50** | **P50** |
| Temperature | degC | 3 | 3 | 5 | 5 | 9 |
| pH | pH unit | 8.1 | 8.3 | 7.9 | 7.8 | 7.7 |
| Hardness | mg-$CaCO_3$/L | 73 | 110 | 69 | 37 | 27 |
| Chloride | mg/L | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Dissolved Organic Carbon | | 2.5 | 8 | 2 | 1.6 | 2.2 |

**Table A-2.1 TCP surface discharge (operations), NMP surface discharge (closure) - POCs**

| | | TCP surface discharge (operations), NMP surface discharge (closure) - POCs | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Goathorn creek (WQSEA1) | | | | POCs selection | | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max TCP discharge - Normal ST | Max NMP discharge -Normal ST | Exceeds at EA1? - Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0070 | 1.6 | 1.3 | 1.1 | 0.093 | 0.020 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 6.6 | 3.1 | 0.86 |
| Fluoride | mg/L | 0.032 | 0.041 | 1.2 | 0.96 | 0.15 | 0.031 | 0.050 |
| Nitrate | mg-N/L | 0.041 | 0.076 | 3.0 | 2.4 | 8.1 | 0.66 | 0.17 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.19 | 0.015 | 0.0041 |
| Sulphate | mg/L | 24 | 37 | 220 | 180 | 420 | 230 | 62 |
| Aluminum, total | mg/L | 0.092 | 0.75 | 0.27 | 0.22 | 0.39 | 0.39 | 0.19 |
| Antimony, total | mg/L | 0.000073 | 0.00014 | 0.074 | 0.059 | 0.00079 | 0.00043 | 0.00013 |
| Arsenic, total | mg/L | 0.00023 | 0.00068 | 0.0050 | 0.0040 | 0.0018 | 0.00090 | 0.00044 |
| Barium, total | mg/L | 0.058 | 0.072 | 1.0 | 0.80 | 0.080 | 0.025 | 0.076 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000061 | 0.000015 | 0.000060 |
| Boron, total | mg/L | 0.0050 | 0.050 | 1.2 | 0.96 | 0.13 | 0.14 | 0.029 |
| Cadmium, dissolved | mg/L | 0.0000081 | 0.000036 | 0.00016 | 0.00013 | 0.000032 | 0.0000054 | 0.000016 |
| Chromium (Cr(VI)), total | mg/L | 0.00020 | 0.00091 | 0.0025 | 0.0020 | 0.0020 | 0.0013 | 0.00053 |
| Cobalt, total | mg/L | 0.000050 | 0.00055 | 0.0040 | 0.0032 | 0.0035 | 0.0013 | 0.00039 |
| Copper, dissolved | mg/L | 0.0014 | 0.0039 | 0.0013 | 0.0010 | 0.0017 | 0.0022 | 0.0021 |
| Iron, total | mg/L | 0.085 | 0.78 | 1.0 | 0.80 | 1.5 | 1.5 | 0.43 |
| Iron, dissolved | mg/L | 0.015 | 0.13 | 0.35 | 0.28 | 0.036 | 0.0080 | 0.025 |
| Lead, total | mg/L | 0.000025 | 0.00023 | 0.0053 | 0.0042 | 0.0016 | 0.0010 | 0.00021 |
| Manganese, total | mg/L | 0.0059 | 0.033 | 0.91 | 0.73 | 0.061 | 0.030 | 0.012 |
| Mercury, total | mg/L | 0.0000025 | 0.0000064 | 0.000020 | 0.000016 | 0.0000085 | 0.0000046 | 0.0000040 |
| Molybdenum, total | mg/L | 0.00047 | 0.00062 | 0.034 | 0.027 | 0.035 | 0.0077 | 0.0022 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0011 | 0.0022 | 0.0018 | 0.0060 | 0.0023 | 0.00065 |
| Selenium, total | mg/L | 0.000086 | 0.00020 | 0.0020 | 0.0016 | 0.024 | 0.0082 | 0.0015 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0.000027 | 0.0000084 | 0.000012 |
| Strontium, dissolved | mg/L | 0.076 | 0.11 | 2.5 | 2.0 | 0.28 | 0.25 | 0.14 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.000076 | 0.000017 | 0.000014 |
| Uranium, total | mg/L | 0.000054 | 0.00014 | 0.0085 | 0.0068 | 0.0047 | 0.0025 | 0.00049 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0021 | 0.0074 | 0.0059 | 0.0098 | 0.0019 | 0.0021 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241210.xlsx]COCs selection

**Table A-2.2 MP seepage - POCs**

| | | MP seepage - POCs | | | | | |
|---|---|---|---|---|---|---|---|
| | | Four creek (WQS03_DS) | | | | POCs selection | |
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **80% WQG** | **Max EMP - Normal ST** | **Exceeds at WQS03_DS? - Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0092 | 0.99 | 0.79 | 0.28 | 0.050 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 1.6 | 0.47 |
| Fluoride | mg/L | 0.059 | 0.068 | 1.4 | 1.1 | 0.027 | 0.10 |
| Nitrate | mg-N/L | 0.013 | 0.058 | 3.0 | 2.4 | 2.2 | 0.38 |
| Nitrite | mg-N/L | 0.00050 | 0.0010 | 0.020 | 0.016 | 0.050 | 0.0095 |
| Sulphate | mg/L | 1.9 | 28 | 310 | 250 | 200 | 33 |
| Aluminum, total | mg/L | 0.099 | 1.2 | 0.69 | 0.55 | 0.018 | 0.26 |
| Antimony, total | mg/L | 0.000050 | 0.00012 | 0.074 | 0.059 | 0.00018 | 0.000087 |
| Arsenic, total | mg/L | 0.00074 | 0.0011 | 0.0050 | 0.0040 | 0.00037 | 0.0013 |
| Barium, total | mg/L | 0.071 | 0.13 | 1.0 | 0.80 | 0.032 | 0.16 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000027 | 0.000086 |
| Boron, total | mg/L | 0.012 | 0.020 | 1.2 | 0.96 | 0.032 | 0.019 |
| Cadmium, dissolved | mg/L | 0.0000052 | 0.000012 | 0.00023 | 0.00018 | 0.000059 | 0.000013 |
| Chromium (Cr(VI)), total | mg/L | 0.00026 | 0.0016 | 0.0025 | 0.0020 | 0.00023 | 0.00052 |
| Cobalt, total | mg/L | 0.000050 | 0.00047 | 0.0040 | 0.0032 | 0.0035 | 0.00068 |
| Copper, dissolved | mg/L | 0.0014 | 0.0034 | 0.0047 | 0.0038 | 0.00098 | 0.0024 |
| Iron, total | mg/L | 0.095 | 1.1 | 1.0 | 0.80 | 0.080 | 0.24 |
| Iron, dissolved | mg/L | 0.015 | 0.41 | 0.35 | 0.28 | 0.080 | 0.052 |
| Lead, total | mg/L | 0.000025 | 0.00028 | 0.0069 | 0.0055 | 0.00027 | 0.000065 |
| Manganese, total | mg/L | 0.0025 | 0.024 | 1.1 | 0.88 | 0.064 | 0.013 |
| Mercury, total | mg/L | 0.0000025 | 0.000013 | 0.000020 | 0.000016 | 0.0000030 | 0.0000052 |
| Molybdenum, total | mg/L | 0.00023 | 0.00038 | 0.034 | 0.027 | 0.0075 | 0.0012 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0018 | 0.0047 | 0.0038 | 0.0053 | 0.0011 |
| Selenium, total | mg/L | 0.000025 | 0.000095 | 0.0020 | 0.0016 | 0.0051 | 0.00081 |
| Silver, total | mg/L | 0.0000050 | 0.000022 | 0.0015 | 0.0012 | 0.000010 | 0.0000087 |
| Strontium, dissolved | mg/L | 0.17 | 0.24 | 2.5 | 2.0 | 0.17 | 0.32 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.000074 | 0.000020 |
| Uranium, total | mg/L | 0.000078 | 0.00025 | 0.0085 | 0.0068 | 0.00096 | 0.00019 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0025 | 0.014 | 0.011 | 0.0073 | 0.0026 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241210.xlsx]COCs selection

**Table A-2.3 MP seepage - POCs**

| | | MP seepage - POCs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tenas Creek (WQS04) | | | | POCs selection | | | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max NMP - Normal ST | Max WMP - Normal ST | Max TCP - Normal ST | Exceeds at WQS04? Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 1.3 | 1.0 | 0.19 | 0.37 | 1.1 | 0.031 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 2.3 | 3.2 | 6.6 | 0.52 |
| Fluoride | mg/L | 0.031 | 0.045 | 1.2 | 0.96 | 0.043 | 0.033 | 0.15 | 0.055 |
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 2.4 | 1.5 | 2.9 | 8.1 | 0.24 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.034 | 0.066 | 0.19 | 0.0060 |
| Sulphate | mg/L | 2.6 | 7.4 | 220 | 180 | 240 | 250 | 420 | 24 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.35 | 0.28 | 0.022 | 0.021 | 0.018 | 0.11 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.074 | 0.059 | 0.00033 | 0.00046 | 0.00079 | 0.00022 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.0050 | 0.0040 | 0.00065 | 0.00042 | 0.0013 | 0.00068 |
| Barium, total | mg/L | 0.034 | 0.047 | 1.0 | 0.80 | 0.059 | 0.024 | 0.074 | 0.054 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000058 | 0.000018 | 0.000061 | 0.000068 |
| Boron, total | mg/L | 0.015 | 0.050 | 1.2 | 0.96 | 0.10 | 0.14 | 0.13 | 0.028 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.00017 | 0.00014 | 0.000082 | 0.000055 | 0.000032 | 0.0000069 |
| Chromium (Cr(VI)), total | mg/L | 0.00032 | 0.0018 | 0.0025 | 0.0020 | 0.00035 | 0.00020 | 0.00077 | 0.00054 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.0032 | 0.0040 | 0.0042 | 0.0028 | 0.00034 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0026 | 0.0021 | 0.0017 | 0.0023 | 0.0017 | 0.0015 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.80 | 0.11 | 0.063 | 0.036 | 0.068 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | 0.28 | 0.11 | 0.063 | 0.036 | 0.028 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0055 | 0.0044 | 0.00045 | 0.00060 | 0.0012 | 0.000070 |
| Manganese, total | mg/L | 0.0050 | 0.058 | 0.94 | 0.75 | 0.079 | 0.074 | 0.036 | 0.0084 |
| Mercury, total | mg/L | 0.0000025 | 0.0000089 | 0.000020 | 0.000016 | 0.0000046 | 0.0000023 | 0.0000054 | 0.0000041 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.027 | 0.0100 | 0.0084 | 0.035 | 0.00084 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0025 | 0.0020 | 0.0065 | 0.0056 | 0.0060 | 0.00068 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.0016 | 0.0069 | 0.0082 | 0.024 | 0.00078 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0.000017 | 0.0000094 | 0.000027 | 0.000014 |
| Strontium, dissolved | mg/L | 0.11 | 0.13 | 2.5 | 2.0 | 0.24 | 0.27 | 0.28 | 0.14 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.00010 | 0.000067 | 0.000076 | 0.000016 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | 0.0085 | 0.0068 | 0.0019 | 0.0026 | 0.0047 | 0.00034 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0071 | 0.0057 | 0.0092 | 0.0071 | 0.0098 | 0.0019 |

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**Table A-2.4 Rail Load Out - POCs**

| | | Rail Load Out - POCs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Bulkley River (WQS11) | | | | POCs selection | | | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max RLO discharge - Normal ST | Exceeds at WQS11? - Normal ST | Max RLO discharge - High ST | Exceeds at WQS11? - High ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 1.6 | 1.3 | 0 | 0.0052 | 0 | 0.0052 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 0.080 | 0.26 | 2.3 | 0.26 |
| Fluoride | mg/L | 0.031 | 0.045 | 0.84 | 0.67 | 0 | 0.031 | 0 | 0.031 |
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 2.4 | 0 | 0.014 | 0 | 0.014 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0 | 0.0052 | 0 | 0.0052 |
| Sulphate | mg/L | 2.6 | 7.4 | 130 | 100 | 68 | 4.8 | 1600 | 4.8 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.18 | 0.14 | 0.37 | 0.15 | 0.37 | 0.15 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.074 | 0.059 | 0.0000054 | 0.000052 | 0.00012 | 0.000052 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.0050 | 0.0040 | 0.00051 | 0.00031 | 0.00062 | 0.00031 |
| Barium, total | mg/L | 0.034 | 0.047 | 1.0 | 0.80 | 0.012 | 0.031 | 0.14 | 0.031 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0 | 0.000052 | 0 | 0.000052 |
| Boron, total | mg/L | 0.015 | 0.050 | 1.2 | 0.96 | 0.0083 | 0.0052 | 0.18 | 0.0052 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.000085 | 0.000068 | 0.000091 | 0.0000031 | 0.0021 | 0.0000031 |
| Chromium (Cr(VI)), total | mg/L | 0.00032 | 0.0018 | 0.0025 | 0.0020 | 0.0012 | 0.00031 | 0.0016 | 0.00031 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.0032 | 0.0014 | 0.00010 | 0.021 | 0.00010 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0011 | 0.00088 | 0.00023 | 0.00073 | 0.0062 | 0.00073 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.80 | 1.5 | 0.19 | 1.8 | 0.19 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | 0.28 | 0.076 | 0.052 | 0.30 | 0.052 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0040 | 0.0032 | 0.00044 | 0.00016 | 0.0014 | 0.00016 |
| Manganese, total | mg/L | 0.0050 | 0.058 | 0.73 | 0.58 | 0.071 | 0.018 | 1.2 | 0.018 |
| Mercury, total | mg/L | 0.0000025 | 0.0000089 | 0.000020 | 0.000016 | 0.0000047 | 0.0000031 | 0.000040 | 0.0000031 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.027 | 0.00018 | 0.00042 | 0.0035 | 0.00042 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0013 | 0.0010 | 0.0023 | 0.00031 | 0.048 | 0.00031 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.0016 | 0.00035 | 0.000031 | 0.0080 | 0.000031 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0 | 0.000010 | 0 | 0.000010 |
| Strontium, dissolved | mg/L | 0.11 | 0.13 | 2.5 | 2.0 | 0.068 | 0.0000023 | 1.5 | 0.000051 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.00010 | 0.000010 | 0.0025 | 0.000010 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | 0.0085 | 0.0068 | 0.000031 | 0.000042 | 0.00047 | 0.000042 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0039 | 0.00312 | 0.0034 | 0.0016 | 0.094 | 0.0016 |

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# APPENDIX 11: TENAS PROJECT BEST ACHIEVABLE TECHNOLOGY ASSESSMENT UPDATED, SRK

# Tenas Project
# Best Achievable Technology Assessment Updated – Rev01

**Prepared for**

**Telkwa Mining Limited**

**Prepared by**

SRK Consulting (Canada) Inc.
CAPR002055
January 2026

# Tenas Project
# Best Achievable Technology Assessment Updated – Rev01

January 2026


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# Executive Summary

Telkwa Mining Limited (TML) is proposing to develop the Tenas Steelmaking Coal Project (the Project) located in Northwest British Columbia, approximately 25 km Southwest of the town of Smithers, BC. This report documents the Best Achievable Technology (BAT) assessment completed for the Project as part of the Environmental Assessment Office (EAO) Issues Tracking Table Information Requests (ITT IR) 175,176,350,353,355, and 514 provided by the EAO in their Water IR letter in November of 2022 (SRK 2025) related to the Project's Environmental Assessment Certificate (EAC) application.

The purpose of the BAT assessment is to identify technologies that are best suited for managing and/or mitigating identified Parameters of Concern (POCs) in modelled groundwater seepages and surface water discharges of treated effluent from the Project. The BAT assessment methodology followed guidance issued by the BC Ministry of Environment and Climate Change Strategy (BC ENV) in November 2024 (BC ENV 2024).

The BAT assessment considered the following surface water discharges and groundwater seepages:

- Surface water discharges:
  - Tenas Control Pond (TCP) discharge (during Operations until 2048) – discharges to Goathorn Creek
  - North Management Pond (NMP) (during Post-Closure after 2048) – discharges to Goathorn Creek
  - Rail Infrastructure Sedimentation Pond (during Operations until 2044) – discharges to the ground
- Groundwater Seepages:
  - Tenas Control Pond (TCP) – modelled seepages to Tenas Creek, Goathorn Creek, and Telkwa River (during Operations until 2048).
  - North Management Pond (NMP) – modelled seepages to Tenas Creek, Goathorn Creek, and Telkwa River (during Post-Closure after 2048).
  - East Management Pond (EMP) – modelled seepages to Four Creek, Tenas Creek, Goathorn Creek, and Telkwa River (during Operations and Post-Closure).
  - West Management Pond (WMP) – modelled seepages to Tenas Creek, Goathorn Creek, and Telkwa River (during Operations and Post-Closure).

Modelled volumes of groundwater seepage from the Project's Open Pit are two orders of magnitude lower than the modelled seepage volumes from the management and control ponds and as such is not considered in the analysis of Parameters of Potential Concern. Furthermore, modelled volumes of groundwater seepage from the Coal Processing Plant, Explosive Facility, Explosive Magazine, and Rock Quarry Sedimentation Ponds are at least four orders of magnitude lower than

the modelled seepage volumes from the management and control ponds and as such were not considered in the analysis of Parameters of Potential Concern.

Parameters of Potential Concern (POPCs) and Parameters of Concern (POCs) were identified based on water quality model results as per BC ENV's general guidance on Parameters of Concern (BC ENV 2024). A total of 12 POCs were identified for modelled surface discharges and groundwater seepages. Four of the 12 POCs identified in Table E-1 below were included as POCs because these parameters measured in streams and rivers baseline (background) monitoring results between 2017 to 2022 naturally exceeded BC WQGs.

**Table E-1 POCs Identified for the Tenas Project BAT Assessment**

| | Surface Discharge | | | Groundwater Discharge (Post-Closure) | | | | Background / Baseline |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **TCP Discharge (Operation)** | **NMP Discharge (Post-Closure)** | **RLO discharge – (Operation)** | **TCP Seepage** | **NMP Seepage** | **WMP Seepage** | **EMP Seepage** | **See Footnote** |
| **Nitrogen Nutrients** | | | | | | | | |
| Nitrate | X | | | X | | X | | |
| Nitrite | X | | | X | X | X | X | |
| **Sulphate** | | | | | | | | |
| Sulphate | X | X | | X | X | X | | |
| **Metals** | | | | | | | | |
| Aluminum, total | X | X | X | | | | | X[A] |
| Cadmium, dissolved | | | X[D] | | | | | |
| Cobalt, total | | | | | X | X | X | |
| Copper, dissolved | X | X | | | | X | | X[B] |
| Iron, total | X | X | X | | | | | X[C] |
| Nickel, dissolved | X | X | X | X | X | X | X | |
| Zinc, dissolved | X | | | X | X | X | | |
| **Oxyanions** | | | | | | | | |
| Molybdenum, total | X | | | X | | | | |
| Selenium, total | X | X | | X | X | X | X | |
| | | | | | | | | |

Notes:
A - Background POC for Four, Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
B - Background POC for Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
C - Background POC for Four, Tenas Creeks, Telkwa and Bulkley Rivers.
D - Cd is POC for Rail Load Out only - it is therefore not considered in future screening

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Treated surface water discharges from the Project will be limited to the open water season and is modelled to reach maximum volumes during freshet (April to May). Groundwater seepages, on the other hand, are modelled based on a conservative assumption to steadily increase over the duration of the Construction and Operation Phases of the Project as the one control pond and three management ponds are constructed and filled. Significant seasonal variability in groundwater flows are not expected based on the model results.

Through the development and design of the Tenas Project, TML has made efforts to include as many proven source control measures and best management practices (BMPs) into the Base Case as is practically achievable to manage water quality and quantity within and downstream of the Project Area. Such efforts include:

- Inundation of potentially acid generating (PAG) rock in the management ponds to prevent potential Acid Rock Drainage within an average timing of six months and no longer than 12 months,
- Lining of the management and control ponds to reduce seepage and groundwater recharge,
- Lining of the Explosives Facility, Coal Processing Plant, and Rail Infrastructure Sedimentation Ponds to reduce seepage and groundwater recharge,
- Lining of the Potable Water Storage, Wastewater (sanitary) Storage and Soil Treatment Ponds to reduce seepage and groundwater recharge,
- Progressive reclamation and covering of non-potential acid generating rock (non-PAG) backfilled into the open pit and placed into buttresses and dams with overburden,
- Construction of dam/buttresses and backfills (and any potential external permanent material storage piles and stockpiles) using a bottom-up construction methodology utilizing thin lifts less than approximately 5 meters,
- Attenuation of treated effluent in Tenas Control Pond,
- Pacing of treated surface water discharge from the Tenas Control Pond during only the open water season,
- Erosion prevention in collection and diversion channels and discharge channels,
- Sediment control using sedimentation/control/management ponds,
- Clean (non-contact) water diversions to route water around Project activities, and
- Use of blasthole liners to reduce the loss and dissolution of residual ammonium nitrate fuel oil (ANFO) explosives.

Updated water and load balance model results for the Project issued in 2024 indicated that surface water discharges and groundwater seepages from the Project are unlikely to cause parameter concentrations in downstream receiving waters to exceed BC water quality guidelines (WQGs) for the protection of freshwater aquatic life at the modelled prediction nodes. Nonetheless, this BAT assessment was conducted to determine whether the implementation of water treatment technologies to further reduce loadings for Project's treated effluent would be recommended, feasible, and achievable.

The candidate technologies that were deemed to be potentially feasible included:

- Base Case.
- Passive/Active flocculation with the Base Case.

- In-situ Active Gravel Bed Reactors (In-situ Active GBR) with the Base Case.
- Active Tank Base Water Treatment Options listed below.
  - Membrane Filtration (RO) + Anaerobic Biological Treatment (MBBR) with the Base Case.
  - Membrane Filtration (RO) + Anaerobic Biological Treatment (MBBR) + HDS Lime Treatment with the Base Case.
  - Membrane Filtration (RO) + Anaerobic Biological Treatment (MBBR) + Sulphide Treatment with the Base Case.
  - Membrane Filtration (RO) + Anaerobic Biological Treatment (MBBR) + Ferric Co-precipitation with the Base Case.
  - Membrane Filtration (RO) + Anaerobic Biological Treatment (MBBR) + Ion Exchange with the Base Case.
  - Zero Liquid Discharge (ZLD) with the Base Case.
- Modified Management and Control Pond liners with the Base Case.

Candidate technology with the Base Case options, as well as the Base Case option only were evaluated using a multiple accounts analysis (MAA). Evaluation criteria and weights were predefined by BC ENV but slightly modified by TML to account for the Yintah Management Directives provided by the Office of the Wet'suwet'en (OW) to recognize Wet'suwet'en First Nation input into the process. The following was concluded based on the MAA for the Tenas Project:

- In-situ Active GBRs with the Base Case and the Base Case were the highest ranked options (78 points out of a possible 100) followed by Passive/Active flocculation with the Base Case option with a score of 77 points.
- The option of modifying management and control pond liners with the Base Case to reduce seepage scored 71 points and was therefore less preferred than the In-situ Active GBR with the Base Case, the Base Case, or Passive/Active flocculation with the Base Case options.
- Active tank-based water treatment options with the Base Case, except for the zero liquid discharge treatment option with the Base Case, scored between 65 and 69 points, with an average of 67 points.
- Zero liquid discharge with the Base Case option scored the lowest at 55 points.

The active tank-based water treatment options with the Base Case generally scored higher for criteria related to control-effectiveness, but scored lower for environmental and socio-cultural criteria, and cost. Overall, the BAT assessment indicated that In-situ Active GBR with the Base Case and the Base Case options are about equally preferred as they scored the same in the BAT assessment. Tank-based water treatment options with the Base Case, In-situ Active GBRs with the Base Case, Passive/Active flocculation with the Base Case and the Base Case options scored similarly for the combined reliability criteria.

The following was concluded based on the outcome of the BAT assessment:

- The Base Case option is a highly ranked and feasible option for protecting the downstream water quality from the Project without the need for any further BMPs or technologies to be incorporated.

- In-situ Active GBRs with the Base Case and/or the Passive/Active flocculation with the Base Case are also highly ranked and feasible options that should be retained as contingency options during permitting and subsequent Operation phase if water quality predictions for the Project differ substantially from actual conditions observed during the development of the Project and water quality monitoring results are trending toward exceedances of the WQGs at some point in the future.

- Active tank-based water treatment options with the Base Case are ranked lower but are still feasible and meet the required Technology Readiness Levels (TRL) as defined by BC Ministry of Environment for EAC and permitting phase. These water treatment options should be retained as contingency options during permitting and subsequent Operation phase if water quality predictions for the Project differ substantially from actual conditions observed during the development of the Project and water quality monitoring results are trending toward exceedances of the WQGs at some point in the future. RO+MBBR+HDS Lime was selected as the primary mitigation method for potential future water quality concerns identified by onsite water quality monitoring.

- Modification of management and control pond liners with the Base Case is ranked even lower but is still feasible and should be retained as a contingency option for the West Management Pond (WMP) during permitting and subsequent Operation Phase if water quality predictions for the Project differ substantially from actual conditions observed during the development of the Project and water quality monitoring results are trending toward exceedances of the WQGs at some point in the future.

- When the cost-effectiveness account is eliminated from the MAA, all options achieve scores in a similar range with Option 3 (In-situ Active GBR with the Base Case) and Option 8 (RO + MBBR + Ion Exchange with the Base Case) ranked slightly higher.

- Given the low risk profile of the Project and modelling results, it is highly likely that pre-emptive construction of a RO+MBBR+HDS Lime water treatment plant (i.e., during mine construction) would be an unnecessary misuse of resources, energy, and capital.

As per the MAA methodology, the preferred technology is the highest ranked (highest score) option. However, the BAT assessment is a conceptual evaluation of technologies based on information and data currently available. If subsequent studies or engineering design identifies limitations or issues that had not been identified as part of the conceptual evaluation, the rank order for the various technologies may change such that the second or third highest ranked technology becomes the highest ranked (preferred) technology. Alternatively, unexpected benefits of one or more of the lower ranked technologies may be discovered as part of subsequent investigations, which may cause lower ranked technologies to become the highest ranked (preferred) technology.

The following are key recommendations from this report:

- TML develops a robust and comprehensive water quality monitoring program for review and input by various regulatory agencies and Indigenous nations during the BC provincial permitting process.

- To improve on the technology readiness level of the In-situ Active GBR technology for the POCs identified, TML should construct a Pilot In-situ Active GBR within the Coal Processing Plan Sedimentation Pond or alternative pond during the Project's Construction phase. As such it is recommended that TML designs and obtains provincial approvals for this pilot facility.

- TML designs and permits an RO+MBBR+HDS Lime water treatment plant so that it is ready for potential implementation in the future within approximately one year based on an approved Trigger Action Response plan developed during the BC permitting process, which will be based on water monitoring data collected during the Construction and Operation phases. RO+MBBR+HDS Lime was selected as the primary mitigation method for potential future water quality concerns identified by onsite water quality monitoring.

- Postponing the implementation active water treatment until water monitoring demonstrates that WQGs will be exceeded at some point in the future.

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Appendix B – British Columbia Water Quality Guidelines and Parameter of Potential Concern Screening Summary Tables

Appendix C – Acute Toxicity Assessment of Modelled Effluent at End of Pipe, Borealis Environmental

Appendix D – Conceptual Design for RO+MBBR+HDS Lime Water Treatment Plant

# 1 Introduction

This report documents a Best Achievable Technology (BAT) assessment for the Tenas Project (the Project), which is a proposed open pit metallurgical coal mine near Telkwa, British Columbia. In 2022, Telkwa Mining Limited (TML) applied for an Environmental Assessment Certificate (EAC) for the Project, which is currently under review. The BAT assessment was prepared in response Information Requests (IR) 175,176,350,353,355, and 514 provided by the BC Environmental Assessment Office (EAO) in their Water IR letter in November of 2022 (SRK 2025).

The BAT assessment included key modelled surface water discharges and groundwater seepages from the proposed Tenas Project, including surface water discharges (from Tenas Control Pond (operations), North Management Pond (Post-closure), and from the Rail Infrastructure/Loadout Sedimentation Pond (operations) and groundwater seepages that would report to groundwater (seepage from Tenas Control Pond (TCP) (till 2048), North Management Pond (NMP) (operations and Post-closure), West Management Pond (WMP) (operations and Post-closure), and East Management Pond (EMP) (operations and Post-closure).

Groundwater seepages, on the other hand, are modelled based on a conservative assumption to steadily increase over the duration of the Construction and Operation Phases of the Project as the three management ponds are constructed and filled with no effect of them becoming blinded off with fines. The hydrogeological model for the Project indicates that significant seasonal variability in groundwater flows are not expected to occur.

The BAT assessment aimed to adhere to the guidance issued by the BC Ministry of Environment and Climate Change Strategy (BC ENV), in November 2024 (BC ENV 2024a). TML consulted with BC ENV during the preparation of the BAT assessment to ensure that TML's interpretation of the BAT guidance aligned with the BC ENV's intent. On December 18, 2024, TML issued a presentation to BC ENV that summarized the methodology and preliminary results of the BAT assessment. TML subsequently received review comments from BC ENV on the summary presentation on January 30th, 2025. BC ENV's review comments and suggestions have been incorporated into this report, to the extent possible.

ENV Team comments of January 30, 2025, for the BAT presentation provided on December 18, 2024 (See Appendix A), are shown below (ENV, 2025), email from Kirsty Wade, Neil Bailey, Luc Lachance and Kelsey Norlund. These comments were incorporated via edits to the BAT presentation and in this report.

- The BAT methodology generally follows BAT guidance, including the new Mining BAT methodology (https://www2.gov.bc.ca/assets/gov/environment/waste-management/waste-discharge-authorization/guides/bat_assessment_methodology.pdf.)

- Considering proposed Best Management Practices (BMPs), including source control and water management approaches, as technologies to be assessed in the BAT assessment is not aligned with the BAT methodology and the guidance on effluent permitting process (https://www2.gov.bc.ca/assets/gov/environment/wastemanagement/industrialwaste/industrial-waste/mining-smelt-energy/guidance-documents/effluent_permitting_process_guidance.pdf).

- Step 2 indicates that “a wide range of established and novel approaches will be considered, including source control and water management measures”. Treatment technologies should be considered last resort options, and the evaluation of the potential technologies should assume implementation of BMPs, including water management approaches. Slide 41, sub bullet 1 suggests this in fact what was done when evaluating pollutant reduction associated to each technology.

- Necessary overlap between BMPs and technology implementation is expected. For example, attenuation of peak flows is necessary for a stable operation of some proposed treatment technologies. However, evaluation of BMPs as potential BAT is not aligned with the methodology.

- Slide 27 – the text states that “most POC concentration in untreated effluent are only marginally higher than the water quality guidelines, and under normal circumstances such low parameters would not be considered for water treatment”. Conclusion of the BAT assessment is that water treatment benefits are limited based on criteria evaluated as provided by MENV guidance, as alluded to on Slide 39 and 60 preliminary recommendations.

- Technology screening for individual POC and considering benefits of a group of technologies is good practice and aligned with the BAT methodology.

- Slide 57 - last bullet typo. This should read TRL7, not TRL9.

This report is organized as follows:

- **Section 2** describes the methodology used for the updated BAT assessment and highlights information and methods used as per BC ENV’s guidance.
- **Section 3** defines the BAT assessment setting, including Parameters of Potential Concern (POPCs), Parameters of Concern (POCs), the modelled range of surface water discharges and groundwater seepage flows, as well as other information that is relevant for informing the technology selection.
- **Section 4** summarizes the technology identification and technology feasibility screening step.
- **Section 5** documents the evaluation and ranking of candidate BAT technologies that were deemed to be potentially feasible in the technology screening step, and
- **Section 6** presents conclusions of the BAT assessment and identifies the preferred BAT(s).
- **Section 7** provides recommendations following the BAT assessment.

# 2 BAT Assessment Methodology

This section describes the methodology used for the BAT assessment while Figure 2-1 below illustrates the overall BAT assessment methodology.

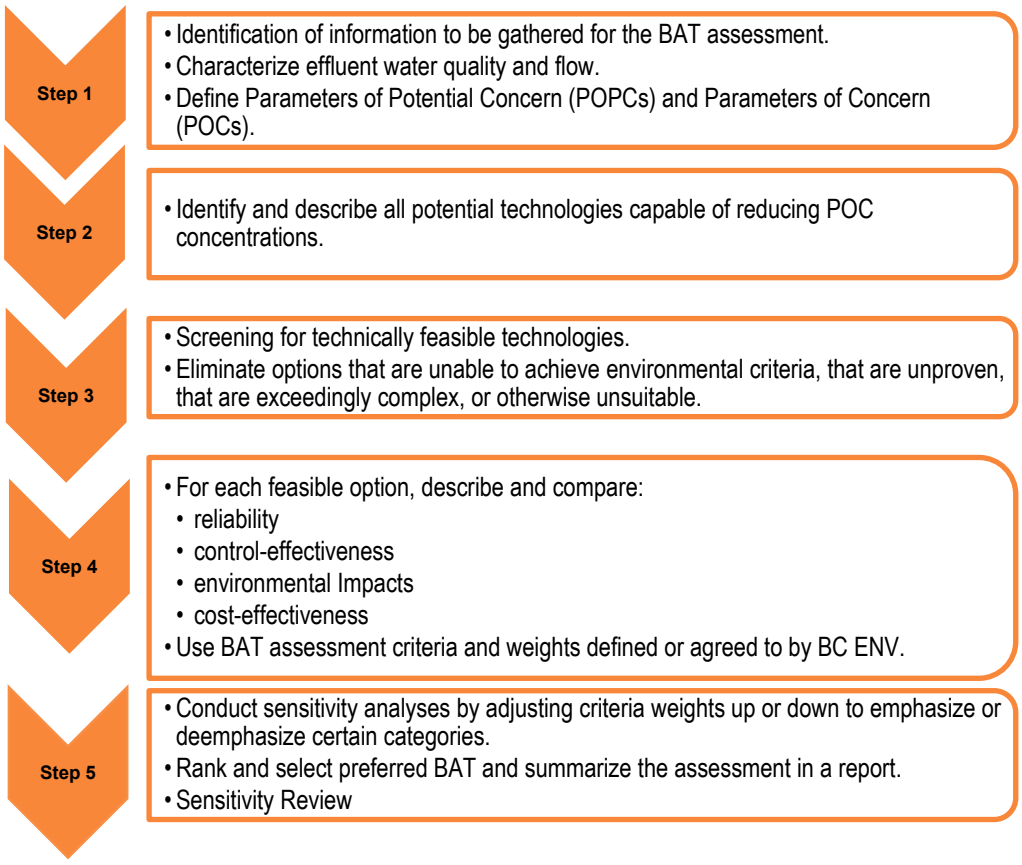



**Figure 2-1 Overview of BAT Assessment Methodology**

## 2.1 Step One: Information Gathering and Identification of POPCs and POCs

The first step in the BAT assessment is to gather all information required to complete the assessment, including the site location and layout, discharge locations, expected discharge rates, quality of untreated effluent, etc.

This BAT assessment followed BC ENV's general guidance on Parameters of Concern (POCs) issued by BC ENV in January 2024 (BC ENV 2024b). The purpose of the BAT assessment is to identify technologies that are best suited for managing or mitigating identified POCs in modelled surface water discharges and groundwater seepages from the Project. Step 1 of the assessment used the water quality model results from the water and load balance model developed for the Tenas Project (2024 revision) as a basis for identifying POPCs (Section 3). POCs are identified by first defining Parameters of Potential Concern (POPCs) as follows:

- POPCs include parameters with modelled (untreated) surface water discharge and groundwater seepage concentrations that are greater than 80% of applicable water quality guidelines (WQG). WQGs were chosen according to the following order of preference:
  - The lowest of approved or working BC Water Quality Guidelines for protection of freshwater aquatic life.
  - CCME water quality guidelines (Canadian Council of Ministers of the Environment) when BC Guidelines are unavailable, or
  - ECCC water quality guidelines (Environment, and Climate Change Canada) when 1) or 2) are unavailable.

The only exception to the use of BC WQG aquatic life guidelines was for molybdenum (total), for which BC's ruminant (wildlife) was chosen as the WQG as it was lower than aquatic receptors and was reasonably applicable for this Project. While some parameters have lower guidelines for irrigation and drinking water these were not used for the selection of POCs because water from the Project is not used for irrigation or as a primary drinking water source. For guidelines that depend on toxicity-modifying factors, medium background values from baseline datasets within each creek were used.

POPCs are automatically added to the list of POCs unless a clear scientifically based rationale is provided for excluding them. For this BAT assessment, all POPCs were conservatively assumed to be POCs.

The POC guidance stipulates that parameters with no WQG or other appropriate threshold should be identified as POPCs. However, this requirement is impractical because of the hundreds of thousands of inorganic and organic species without WQGs (or other thresholds) and was therefore not considered feasible. In addition, certain "special case parameters" that can cause toxicity in unpredictable ways or that can bioaccumulate, bioconcentrate or biomagnify – such as selenium and mercury – should be considered POPCs irrespective of modelled surface water discharge or groundwater seepage concentrations. Selenium was identified as a POPC and a POC because treated effluent concentrations are modelled to be higher than the BC WQG. However, mercury was not included as a POPC/POC because concentrations in the treated effluent from the Project are modelled to be at or near the analytical detection limit which is well below the BC WQGs.

## 2.2 Steps Two and Three: Technology Identification and Screening

In Step 2 of the BAT assessment, all technologies that potentially could be implemented are identified. BC ENV guidance specified specific information requirements to be included as part of the technology identification, including:

- a brief description of the treatment technology and its use in the mining industry,
- a description of any necessary ancillary technologies or infrastructure required, e.g., pre-treatment equalization, post-treatment solid/liquid separation, etc.
- a high-level process flow diagram, and

- a summary of advantages and disadvantages, including consideration for treatment by-products.

The requested information has been included in this report to the extent possible (Section 4).

Identified technologies were then screened for feasibility in Step 3 of the assessment. BC ENV requested that the following criteria were used to screen for potential feasibility of each technology:

- Ability to achieve environmental criteria:
  - Evaluate each technology's capability to achieve the target effluent concentrations (in this case 80% of WQGs) for any identified POCs. Technologies that only address specific POCs rather than all of them may still be included for further evaluation.
- Proven commercial application:
  - Technologies considered as BAT, at a minimum, must have a demonstration system operating at near full-scale in the same industry and under similar site-specific conditions. For emerging technologies, technologies that have not been successfully implemented in a similar site condition, a Technology Readiness Assessment (TRA) must be conducted in accordance with the Technology Readiness Assessment Interim Technical Guidance (BC ENV 2022) and a TRA report should be submitted with the BAT assessment. Technologies that have been assessed at technology readiness level (TRL) 6, or below, are considered research and development technologies. Technologies considered for a BAT assessment prepared for an EAC application, must be assessed at a TRL 7, 8, or 9.
- Operational Complexity:
  - This criterion considers several factors which may include, but are not limited to operator attendance requirement, chemical requirements, ease of process control, level of automation, level of expertise required to operate the system, maintenance requirements, and downtime expectations (for maintenance and part repairs and replacement).

BC ENV also stated that the cost of implementation is not to be considered at the screening stage. Technology screening often relies on professional judgement and operational experience. Therefore, this BAT assessment report has attempted to document rationales for screening out technologies as clearly as possible.

## 2.3 Step Four: Evaluation Criteria and Weights

BC ENV's guidance stipulates that a Multiple Accounts Analysis (MAA) should be used for assessing candidate BATs that pass the feasibility screening step. The following general criteria are to be used:

- Reliability.
- Control-effectiveness.
- Environmental impacts, and

- Cost effectiveness.

Each of the accounts have two or more sub-accounts (evaluation criteria) as illustrated in Table 2-1. Also indicated are the weights assigned by BC ENV to each account and criterion. Each criterion is scored on a scale of 1 to 5 with a score of 1 assigned to least favorable, and 5 to most favorable attributes.

TML proposed to add a criterion called “Adherence to Yintah Management Directives” to the “environmental impacts” account (Table 2-1). The criterion was added to acknowledge the importance of considering the values of Wet’suwet’en First Nation on whose traditional territory the Project is located.

The following sections summarize SRK’s understanding of the evaluation criteria to be used in the MAA.

**Table 2-1 BAT Assessment Criteria and Weight Distribution**

| Assessment Criterion | BC ENV’s Suggested Weights | TML’s Proposed Weights |
|---|---|---|
| **Reliability** | **20** | **20** |
| *Risk Assessment* | 5 | 5 |
| *Robustness* | 5 | 5 |
| *Scalability* | 5 | 5 |
| *Long-term Viability* | 5 | 5 |
| **Control-Effectiveness** | **35** | **30** |
| *Pollutant Reduction* | 20 | 20 |
| *Toxicity Reduction* | 15 | 10 |
| **Environmental Impacts** | **20** | **25** |
| *Energy Efficiency* | 5 | 5 |
| *Greenhouse Gas Emission* | 6 | 6 |
| *Footprint* | 4 | 4 |
| *Secondary Waste Production* | 5 | 5 |
| ***Adherence to Yintah Management Directives*** | - | **5** |
| **Cost-Effectiveness** | **25** | **25** |
| *Efficient Use of Existing Resources* | 3 | 3 |
| *Life Cycle Cost Analysis* | 22 | 22 |
| **Total** | **100** | **100** |

Note: **purple text** indicates SRK’s proposed modifications to BC ENV’s criteria and weights.

### 2.3.1 Reliability

#### 2.3.1.1 Risk Assessment

BC ENV described the ‘risk assessment’ criterion as follows:

*“Risk Assessment* - Conduct a risk assessment for each technology to identify the potential risks associated with the implementation, operation, and maintenance of the technology. These risks may include but are not limited to the likelihood of process failure, environmental and human health risks resulting from process failure, as well as risks associated with secondary waste production (by-products) that may impact the environment and human health.”

A general definition of “risk” is the combination of the probability that an adverse event will occur and the consequence of that event. For each candidate BAT considered, the predominant risks identified will be presented and assigned a risk category based on the associated probability and consequence. In the MAA table, technologies with high or extreme risks will be assigned lower scores than options with moderate or low risks. Note that certain extreme risks may cause a BAT to be eliminated from subsequent analysis.

#### 2.3.1.2 Robustness

BC ENV describes the ‘robustness’ criterion as follows:

*“Robustness* - means consistent and reliable performance under various conditions over the technology operational life. Evaluate technologies based on their ability to maintain effectiveness and performance under the fluctuations in operating conditions such as effluent quality (physical and chemical characteristics) and quantity (flow).”

This assessment criterion was evaluated according to the definition provided.

#### 2.3.1.3 Scalability

BC ENV describes the ‘scalability’ criterion as follows:

*“Scalability* - evaluate the scalability of each technology for future site expansions to manage the increased loads of POCs and additional effluent flows. Assess the systems performance under increased loads and flow conditions and identify potential system modifications that might be required to accommodate the changes effectively. Additionally, evaluate if the site condition such as available footprint, power, etc., can accommodate future expansions.”

Since future discharge quality and flows are estimated based on the Project’s water and load balance model, scalability is an important consideration. As such this assessment criterion was evaluated according to the definition provided.

#### 2.3.1.4 Long-Term Viability

BC ENV describes the ‘long-term viability’ criterion as follows:

*“Long Term Viability* - long term viability involves evaluating the sustainability and performance effectiveness of each technology over an extended period. Discuss and compare longevity and expected lifespan for each technology.”

This evaluation criterion is interpreted to be synonymous with effort required to maintain the BAT in a state where it can perform as designed for the duration it is required which is estimated at over one hundred years. As such there is overlap between long-term viability, operating costs/sustaining capital, and operational complexity.

### 2.3.2 Control Effectiveness

#### 2.3.2.1 Pollutant Reduction

BC ENV describes the 'pollutant reduction' criterion as follows:

*"Pollutant Reduction (achieving discharge limits)* - discuss the efficacy of each technology in removing the POCs in terms of percent pollutant removal and achievable effluent concentrations. Pollutant reduction scores can be assigned to each POC individually, and an average of the allocated score for all POCs can be used to determine the final score of the technology. The proposed scores shown in Table 2-2 should be used in your evaluation for control effectiveness."

**Table 2-2 Proposed Scores for Pollutant Reduction (BC ENV)**

| Percent Pollutant Reduction (%) | Score (1-5) |
|---|---|
| 0% to 20% | 1 |
| 20% to 40% | 2 |
| 40% to 60% | 3 |
| 60% to 80% | 4 |
| 80% to 100% | 5 |

The intent and logic behind the pollutant reduction criterion is straight-forward. The pollutant reduction score for candidate BATs is evaluated for each POC individually. For example, if POCs include copper, selenium, molybdenum, and nitrate then each candidate technology is only assessed based on the parameter(s) that specific technology can address. Lime treatment for removal of copper would receive a high pollutant reduction score (4 or 5) even though the process does not remove any selenium, molybdenum, or nitrate. Similarly, anaerobic biological treatment would score high for removal of selenium and nitrate even though the process would not remove copper and molybdenum.

This approach ensures that each candidate BAT is evaluated according to its intended purpose and that none of the options are penalized for not addressing all POCs. It also ensures that preferred BATs can be selected for each parameter such that the final selection could include a combination/chain of options. However, before candidate BATs are combined, each must first be preferred for removal of a specific POC on its own merit. For example, combining a poor technology for removal of copper (as judged by the BAT assessment) with a suitable option for selenium removal does not improve the poor copper removal option since the capabilities of the two technologies do not overlap.

#### 2.3.2.2 Toxicity Reduction

BC ENV describes the 'toxicity reduction' criterion as follows:

*"Toxicity Reduction* - mine effluent must not be acutely toxic to the most sensitive receptor present in the receiving environment. If applicable, discuss how each treatment technology addresses the acute toxicity characteristics of the effluent, by removing the POCs that are acutely toxic to the most sensitive receptor."

This assessment criterion is self-explanatory and was evaluated according to the definition provided.

### 2.3.3 Environmental Impacts

The assessment criteria of 'energy efficiency,' 'greenhouse gas emissions,' 'required footprint,' and 'secondary waste production' are self-explanatory and were evaluated according to the definitions provided.

As discussed above, TML added a fifth criterion that evaluates the extent to which the candidate BAT adheres to the Yintah Management Directives provided by OW. The score for this criterion is subjective and may have to be revised following further review of the BAT assessment by representatives from Wet'suwet'en First Nation.

### 2.3.4 Cost Effectiveness

The evaluation criterion of 'efficient use of existing' resources is straight-forward and was evaluated according to the definitions provided.

Similarly, capital, operating, maintenance, and sustaining capital costs were calculated according to the descriptions provided. Discount rates for NPV calculations will be based on guidance by the BC Ministry of Energy, Mines, and Low Carbon Innovation concerning calculation of reclamation liability cost estimates (EMLI 2024).

The effect of the cost-effectiveness account on the outcome of the BAT assessment is often of interest. Therefore, TML also included an evaluation of candidate BATs without the inclusion of the cost-effectiveness account (i.e., the subaccounts in the category were set to zero for all options considered).

## 2.4 Step Five: BAT Selection and Reporting

The final step culminates in the selection of the BAT based on weighted scores from the assessment criteria and professional judgement (Section 5.3). A sensitivity analysis on the MAA table for the candidate technologies without the Cost-Effectiveness account (i.e., cost is not considered to be a factor) is also completed. Findings are documented in a report and include:

- Summary of all technologies considered, including those considered infeasible. A description on why a given technology was considered infeasible is included.
- Summary table presenting the results for each considered technology.
- Summary of selected BAT or combination of BATs, including the following information:
  - Description of treatment mechanism.
  - Process flow diagram of preposed treatment process and ancillary works.
- Justification of selected BAT or combination of BATs, including trade-offs.

- List of major equipment and chemicals required for selected technology.

# 3 Step One - BAT Assessment Setting

## 3.1 Location of Surface Water Discharges and Groundwater Seepages

The first step in the BAT assessment is to gather and summarize information required for the BAT assessment, including the site location and setting. Figure 3-1 shows the location of the planned surface water discharges from the Tenas Control Pond (TCP) during the Operation phase of the Project, and from the North Management Pond (NMP) during the Post-closure phase of the Project when the TCP has been decommissioned.

Seepages from the TCP, NMP, West Management Pond (WMP), and East Management Pond (EMP) that would seep to groundwater would flow through the pond liners within each of the pond footprints. Once the seepages report to the groundwater, they would follow the local and regional groundwater flow paths as illustrated in Figure 3-2. Details concerning the groundwater flows for the Project are available in SRK (2024).

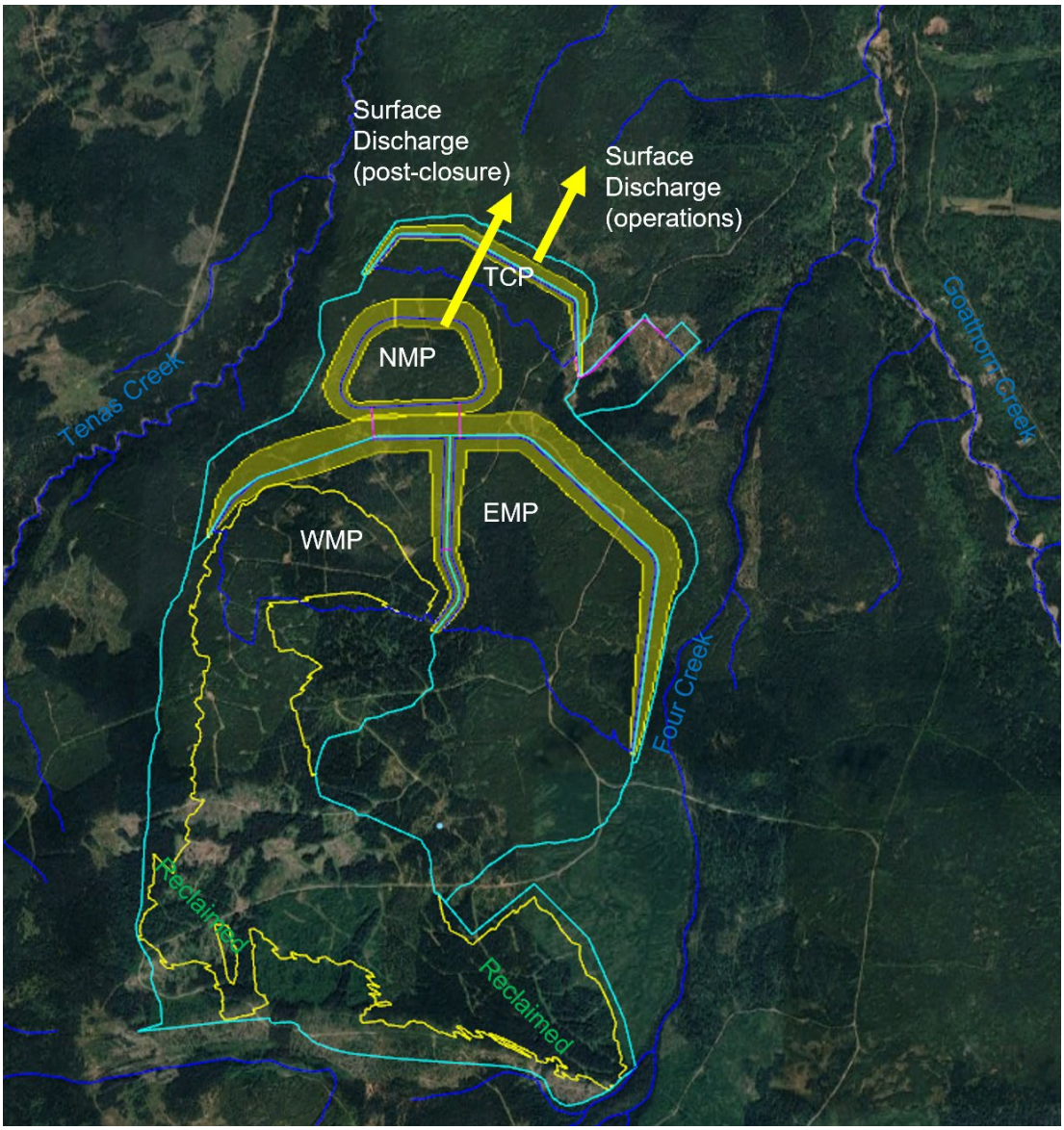



**Figure 3-1 Location of Surface Discharges from the TCP (Operations) and NMP (Post-Closure)**

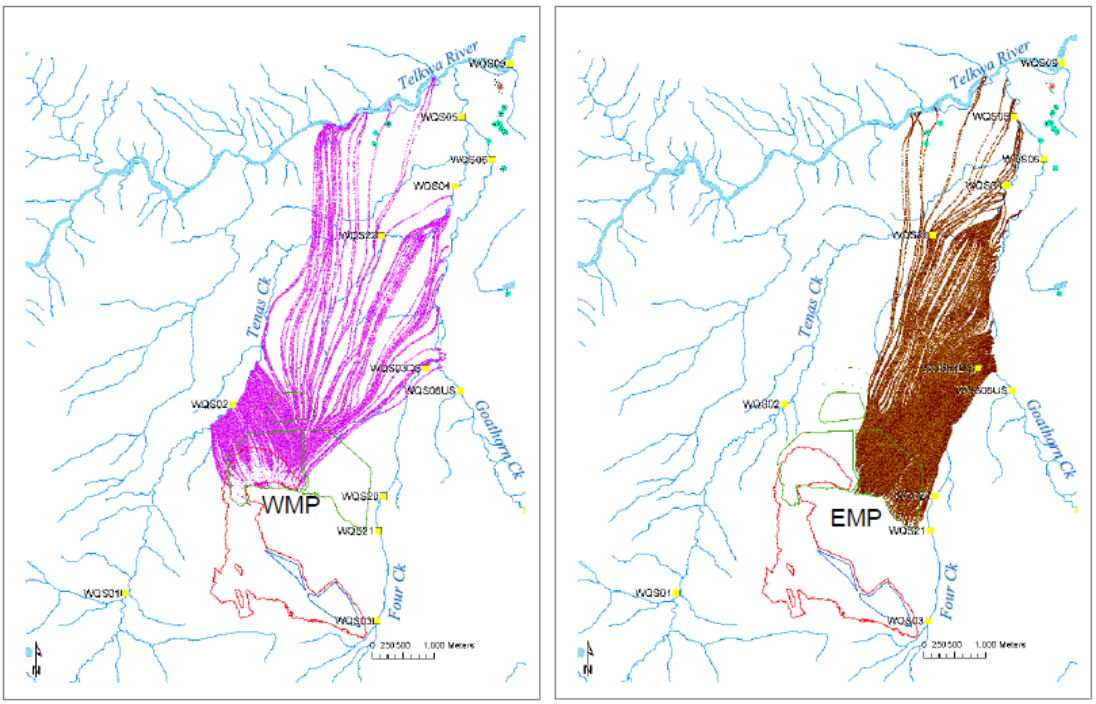



**Figure 3-2 Modelled Groundwater Flow Paths from the WMP and EMP (SRK 2024)**

## 3.2 Temporal Limit of BAT Assessment

This BAT assessment is focussed on technologies that can be implemented during the Construction, Operation, Decommissioning and Reclamation, and Post-closure phases of the Tenas Project.

## 3.3 Surface Water Discharges and Groundwater Seepages

Figure 3-3 shows modelled rates of surface water discharge from the TCP during the Operation phase of the Project and NMP following the closure and decommissioning of the TCP and the Rail Infrastructure Sedimentation Pond (RLO Pond) during the Operation phase. The modelled flows shown in the figure assumes that the TCP and management ponds have little or no capacity to attenuate peak freshet flows. However, assuming that storage capacity is available in the TCP outside of freshet, the peak flows can be attenuated such that steady discharge rates of approximately 2,000 gpm (7,571 liters per minute(lpm)) over the open water season from May through October are possible during an average hydrological year (Figure 3-4). Accounting for a 1 in 200 wet year, the average open water discharge rate would be approximately 3,000 gpm (11,356 lpm).

Modelled groundwater seepage rates for the EMP, NMP, WMP, and TCP are illustrated in Figure 3-5. Groundwater seepage rates are conservatively modelled to increase as the ponds a built up and as pond water levels increase without any blinding of them occurring due to fines. According to the closure plan for the Project, the TCP will be decommissioned in year 2048 and seepage therefore ceases at that time. However, seepage from the management ponds is modelled to persist long-term. The modelled groundwater seepage at maximum level at the end of the

Operation phase is 305 gpm (1,150 lpm) which is approximately an order of magnitude lower than modelled surface flow.

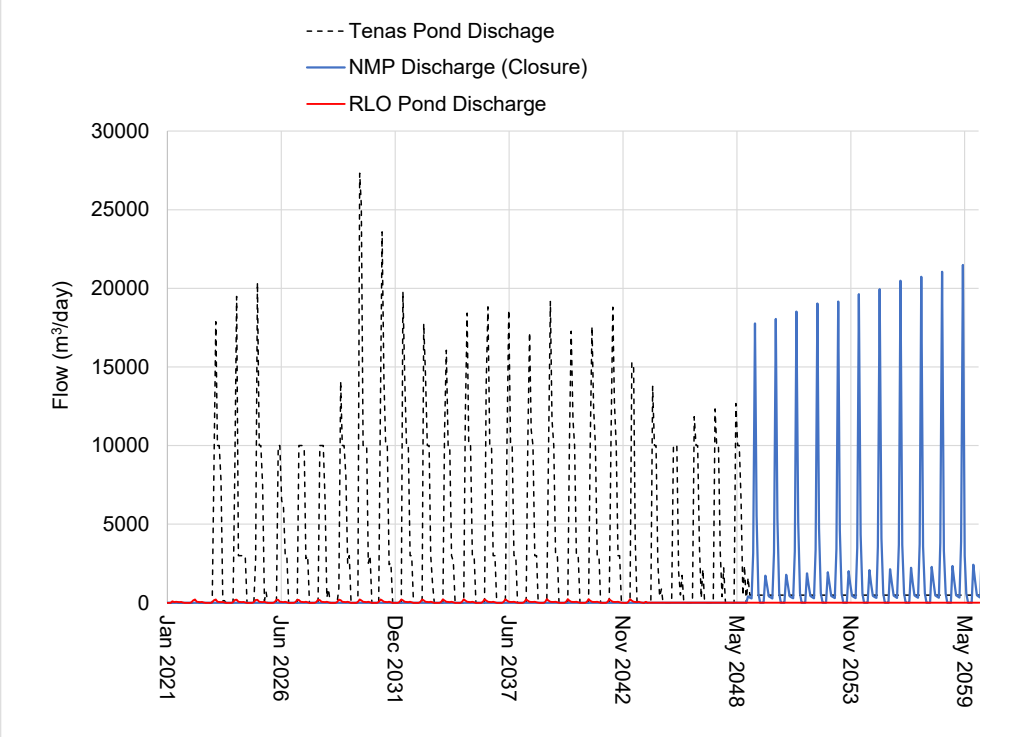



**Figure 3-3 Modelled Surface Water Discharge Flows from TCP and NMP**

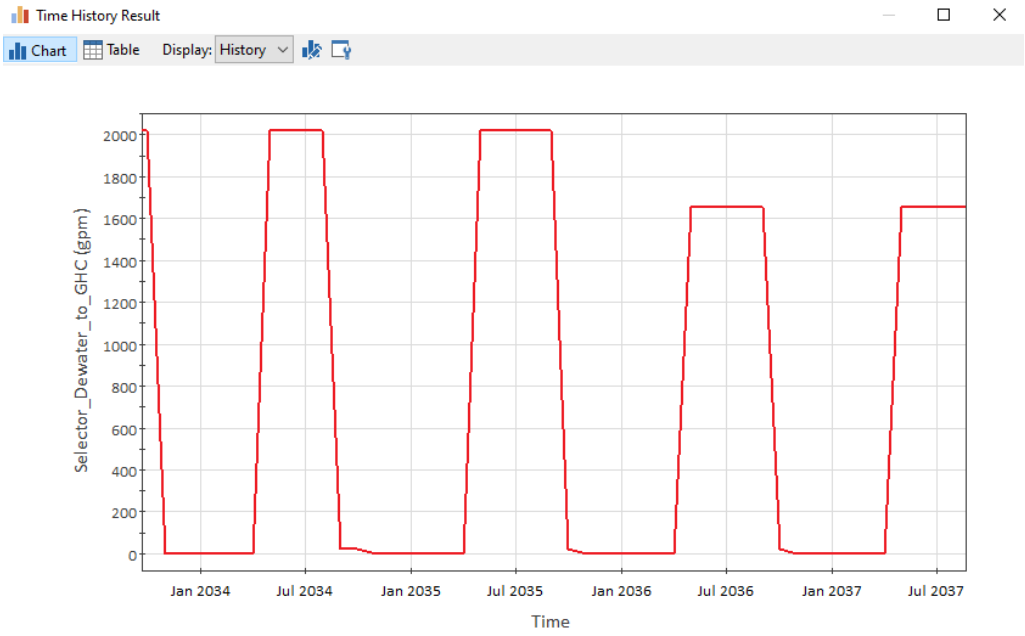



**Figure 3-4 Surface Water Discharge Attenuated by the TCP and Management Ponds**

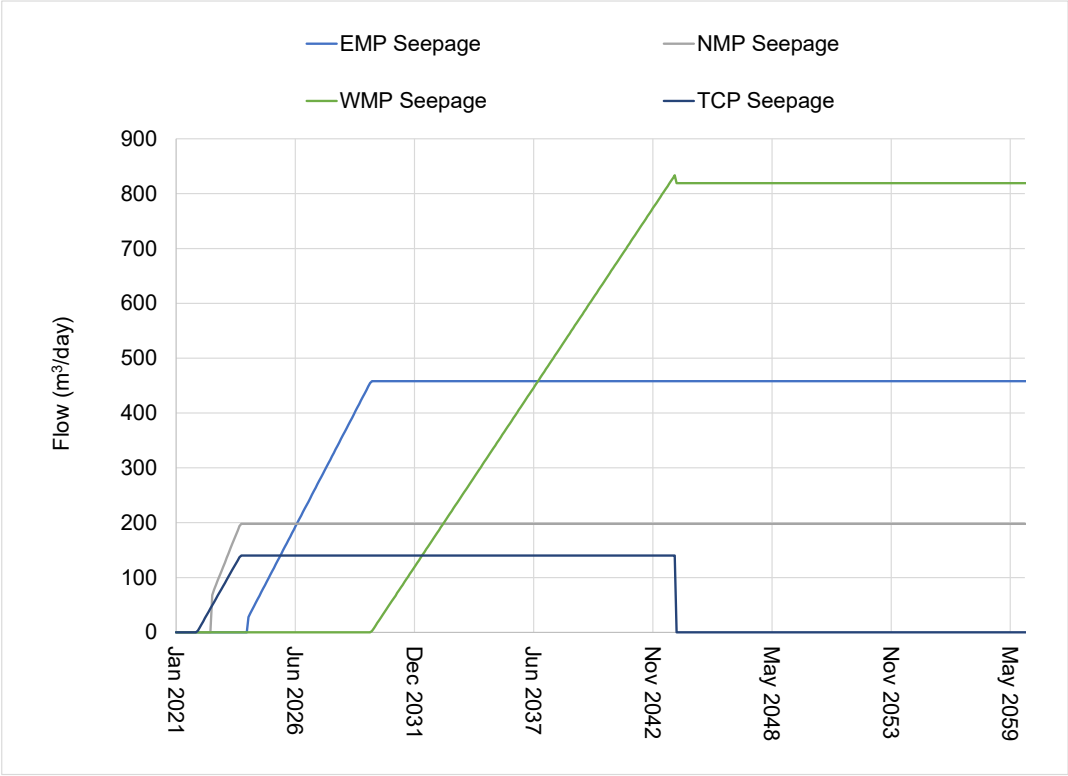



**Figure 3-5 Modelled Groundwater Seepage Rates for EMP, NMP, WMP, and TCP**

## 3.4 Screening for POPCs and POCs

As discussed in Section 2.1, POPCs in surface water discharges and groundwater seepages were identified by comparing the 2024 water quality model results to 80% of the current applicable guidelines. Table 3-1 summarizes the POCs identified for the Tenas Project.

The water quality guidelines used for POC screening and in the summary tables to compare the water quality model results (maximum monthly discharge concentrations) with are included in Appendix B.

**Table 3-1 POCs Identified for the Tenas Project BAT Assessment**

| | Surface Discharge | | | Groundwater Discharge (Post-Closure) | | | | Background / Baseline |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **TCP Discharge (Operation)** | **NMP Discharge (Post-Closure)** | **RLO discharge – (Operation)** | **TCP Seepage** | **NMP Seepage** | **WMP Seepage** | **EMP Seepage** | **See Footnote** |
| **Nitrogen Nutrients** | | | | | | | | |
| Nitrate | X | | | X | | X | | |
| Nitrite | X | | | X | X | X | X | |
| **Sulphate** | | | | | | | | |
| Sulphate | X | X | | X | X | X | | |
| **Metals** | | | | | | | | |
| Aluminum, total | X | X | X | | | | | X[A] |
| Cadmium, dissolved | | | X[D] | | | | | |
| Cobalt, total | | | | | X | X | X | |
| Copper, dissolved | X | X | | | | X | | X[B] |
| Iron, total | X | X | X | | | | | X[C] |
| Nickel, dissolved | X | X | X | X | X | X | X | |
| Zinc, dissolved | X | | | X | X | X | | |
| **Oxyanions** | | | | | | | | |
| Molybdenum, total | X | | | X | | | | |
| Selenium, total | X | X | | X | X | X | X | |
| | | | | | | | | |

Notes:
A - Background POC for Four, Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
B - Background POC for Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
C - Background POC for Four, Tenas Creeks, Telkwa and Bulkley Rivers.
D - Cd is POC for Rail Load Out only - it is therefore not considered in future screening

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20240925.xlsx]POC Condensed

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/Telkwa BAT Tech Screening REV01.xlsx

## 3.5 Base Case with Best Management Practices

The base case for the BAT assessment is a model scenario that includes source control measures and other BMPs that TML has committed to implement as part of the Project development including:

- Inundation of potentially acid generating (PAG) rock in the management ponds on site.
- Lining of the management and control ponds to reduce seepage and groundwater recharge.
- Progressive reclamation and covering of non-acid generating rock backfilled into the open pit.
- Attenuation of water in TCP and in Management Ponds on site and pacing of surface water discharges to the open water season.
- Erosion prevention in diversion and collection channels and sediment control in sedimentation\control ponds.
- Clean water (non-contact) diversions to route water around Project activities, and
- Use of blasthole liners to reduce loss and dissolution of residual ammonium nitrate fuel oil (ANFO) explosives.

From a water and load balance modelling perspective, the base case scenario used in the BAT assessment is referred to as the Updated EAC Project Case (2024) with blasthole liners.

# 4 Steps Two and Three - Technology Identification and Screening

Since both surface discharges and groundwater seepages are evaluated by the BAT assessment, the technology screening and evaluation steps include two technology categories, namely groundwater-specific technologies (interception and containment technologies) and technologies applicable to surface water discharges (treatment).

Table 4-1 lists technologies that could be implemented to manage groundwater seepages. Technologies that intercept and extract groundwater must be combined with a BAT for treating or managing surface water discharges based on the assumption that groundwater with POCs would have to be treated prior to surface water discharge once extracted. Table 4-2 lists in-situ treatment technologies and tank-based active treatment processes that could be used for treating surface water discharges. In-situ treatment technologies are applicable for improving the quality of both groundwater seepages and surface water discharges. The two tables also indicates whether each of the identified technologies were deemed to be potentially feasible and therefore shortlisted for further assessment, or if some issue disqualified it from further assessment.

The following sections provide a brief description of the use of each of the identified technologies in the mining industry, a list of ancillary technologies or infrastructure required to implement each technology, a high-level process flow diagram, and a summary of advantages and disadvantages including considerations for management of treatment byproducts.

**Table 4-1 Groundwater-Specific Mitigation Technologies**

| Technology | Notes | Shortlisted for Assessment |
|---|---|---|
| **Containment/Interception** | | |
| Interception wells (+ surface discharge BAT) | Extraction of clean groundwater unavoidable. Requires a large number of wells. Not operationally or practically feasible. | No |
| Modified pond liner(s) (+ surface discharge BAT) | Potentially feasible | Yes |
| Pump from bottom of water management ponds (+surface discharge BAT) | Flushing pore water is inefficient and would take a long period of time. Performance is highly uncertain. | No |
| Construction of slurry walls downgradient of management ponds | Construction infeasible. Groundwater pathway too deep. | No |

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/Telkwa BAT Tech Screening REV01.xlsx

**Table 4-2 In-situ Treatment Technologies and Tank-Based Technologies Applicable for Treating Surface Water Discharges**

| | SO4 | Nitrogen | | Metals | | | | | | | Oxyanions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POPC/POCs** | Sulphate | Nitrite | Nitrate | Aluminum, Total | Cadmium, Dissolved | Cobalt, Total | Copper, Dissolved | Iron, Total | Nickel, Dissolved | Zinc, Dissolved | Molybdenum, Total | Selenium, Total | Notes | **Shortlisted for Assessment** |
| **In-Situ or Semi-Passive Technologies** | | | | | | | | | | | | | | |
| In-situ anoxic gravel bed reactor (actively managed) | u | x | x | x | x | u | x | x | u | x | u | x | Potentially feasible. | Yes |
| In-situ anoxic biological treatment (passive with organic substrate) | | x | x | x | u | | u | x | | | | x | Lack of control over the treatment process makes this option infeasible. | No |
| Engineered wetland | | x | x | x | x | x | x | x | | x | x | x | Not suitable for high freshet flows or winter operation. Also, required foot-print may be too large. | No |
| Passive/active flocculation | | | | x | | | | x | | | | | TSS will be managed according to erosion prevention and sediment management plan but passive flocculation (use of floc blocks) had not been considered as part of that plan. | Yes |
| **Active Tank-Based Water Treatment Technologies** | | | | | | | | | | | | | | |
| Lime treatment and sedimentation/concentration | | | | x | x | u | x | x | u | | | | Unable to achieve effluent concentrations that are lower than WQG for several POPCs. | No |
| Sulphide precipitation, sedimentation/concentration | | | | x | x | x | x | x | | | | | Unable to achieve effluent concentrations that are lower than WQG for several POPCs. | No |
| Ferric co-precipitation and sedimentation/concentration | | | | | | | | | | | | | Unable to achieve effluent concentrations that are lower than WQG for most POPCs. | No |
| RO + lime treatment | x | | | x | x | x | x | x | x | x | | | Potentially feasible for sulphate and metal removal. | Yes |
| RO + sulphide precipitation | | | | x | x | x | x | x | x | x | | | Potentially feasible for metal removal. | Yes |
| RO + ferric co-precipitation | | | | | | | | | | | x | | Potentially feasible for metal removal. | Yes |
| Ion exchange and regenerant treatment, selenium removal | | | | | | | | | | | | x | Complex process. Se only POPC removed. | No |
| Ion exchange and regenerant treatment, metals | | | | x | x | x | x | x | x | x | | | Potentially feasible for metal removal. | Yes |
| Ion exchange and regenerant treatment, sulphate removal | x | | | x | x | x | x | x | x | x | | | TRL 6. No full-scale processes currently operating anywhere. | No |
| Electrocoagulation | | | | x | | | | x | | | | | TRL 7 when applied to this project. | No |
| RO + electrocoagulation | | | | x | | | | x | | | x | u | TRL 7 when applied to this project. | No |
| Anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk) | | x | x | x | | | | x | | | | x | Unable to achieve effluent concentrations that are lower than WQG for several POPCs. | No |
| RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk) | | x | x | x | | | | x | | | | x | Potentially feasible for $NO_2$/$NO_3$, Se, Cr, total Al, and Fe removal. | Yes |
| Zero Liquid Discharge (ZLD) process | x | x | x | x | x | x | x | x | x | x | x | x | ZLD processes are very complex, energy intensive, and produce soluble residuals that must be entombed on site or trucked to a hazardous waste facility. However, it is the only process that would remove all POCPs and it is therefore considered. | Yes |
| Ettringite precipitation | x | | | x | x | x | x | x | x | x | | | TRL 5 or 6 for this application. | No |
| Biological sulphate reduction | x | x | x | | x | x | x | x | | x | x | x | TRL 6 or 7. Produces toxic $H_2S$ gas. | No |

x - removes POC to a meaningful extent
u - may remove POC but efficacy is uncertain

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/Telkwa BAT Tech Screening REV01.xlsx

## 4.1 Groundwater Specific Technologies

### 4.1.1 Interception Wells (+ Surface Water Discharge BAT)

Interception wells are commonly used in the mining industry to intercept and recover seepage from tailings storage facilities or waste rock storage areas. Wells are drilled into aquifers downstream of where seepages report to the groundwater system. Interception wells require power to operate pumps and for heat tracing of well-heads and piping that conveys the intercepted water. Interception wells also require a network of pipes to convey the intercepted groundwater to a location where it can be used for processing, treated, or otherwise disposed of.

Interception wells must be in areas that are readily accessible to allow for regular inspection and maintenance. Disadvantages associated with interception wells is that they required ongoing operator attention and maintenance and a reliable source of power.

For the Tenas Project, the seepage rates from the management ponds and the TCP are modelled to be minor and it would be virtually impossible to install wells that would specifically target discrete groundwater flow paths that only contain seepage from these facilities. Instead, many wells would be required, and these would likely extract predominantly clean background groundwater, which could reduce base flows in creeks downstream of the Project to unsustainable levels. Therefore, installation and operation of interception wells was considered to be **not technically feasible** for the Tenas Project.

### 4.1.2 Modified Liners in Management and Control Ponds (+ Surface Water Discharge BAT)

This option considers the possibility of modifying the design of the pond liners to further reduce the rates of seepage that enter the groundwater system. The liner systems considered for the Updated EAC Project Case (2024) with blasthole liners include:

- Soil-bentonite liner (0.3m) for EMP, NMP, and WMP (excluding WMP End Wall rock);
- Bituminous geomembrane liner for the Tenas Control Pond.

The modified liner design includes two options:

- Option 1:
  - Soil-bentonite liner (0.56m) for EMP, NMP, and WMP (excluding WMP End Wall rock);
  - Bituminous geomembrane liner on top of soil-bentonite liner (0.15m) for the Tenas Control Pond.
- Option 2:
  - Bituminous geomembrane liner on top of soil-bentonite liner (0.3m) for EMP;
  - Soil-bentonite liner (0.56m) for NMP, and WMP (excluding WMP End Wall rock);
  - Bituminous geomembrane liner on top of soil-bentonite liner (0.15m) for the Tenas Control Pond

Option 1 includes a thicker bentonite amended liner, covering the management pond bottoms, and upstream dam slopes, as well as the in-pit overburden portion of the West Management Pond. Liner thicknesses are assumed to be 560 mm in the management ponds. The Tenas Control Pond contains an added soil-bentonite liner of 150mm thickness below the bituminous geomembrane liner compared to none in the base case.

Option 2 is that same as Option 1 for NMP, WMP, and TCP. The only change is the addition of a bituminous geomembrane liner on top of the soil-bentonite liner with a thickness of 300 mm for the East Management Pond.

The disadvantage associated with this option is primarily the high initial capital cost associated with adding a geomembrane to the liner construction and delays in project construction due the requirement for warm air temperatures and dry conditions for liner installation.

The performance of the modified liner designs was estimated as part of a mitigation modelling study completed in parallel with this BAT assessment (SRK 2025). Construction of modified and improved pond liners is clearly **feasible,** and the option was therefore advanced for further assessment.

### 4.1.3 Pump from Bottom of Management Ponds (+ Surface Water Discharge BAT)

Seepage from the management ponds is assumed to have the same water quality as the pore water contained in the PAG rock and processed rock (tailings) stored in the ponds. Most of the loadings associated with the pore water come from the initial wet-up of the material stored in the ponds (i.e., first flush loadings). Once loadings associated with this first flush have been eliminated the rock and tailings stored in the ponds is almost completely inert and is not modelled to contribute any additional loadings to the pore water or seepage.

The option of pumping pore water from the bottom of the management ponds to surface for treatment by a surface water discharge BAT is predicated on the idea that the first flush pore water could be rinsed out of the PAG, and processed rocks stored in the pond. Once the entire pore water volume has been displaced any seepage from the ponds would theoretically have lower constituent concentrations.

There are no known examples of this type of deliberate pore water flushing used at mines anywhere. The approach is highly theoretical and the performance of such a flushing operation is highly uncertain. Therefore, the approach was judged to be **not feasible** for implementation at the Tenas Project.

### 4.1.4 Construction of Slurry Cut-off Walls Downgradient of Management Ponds and TCP

Slurry cut-off walls can in some cases be used to contain contaminated groundwater plumes that are relatively shallow. The technology works by excavating a trench that is subsequently backfilled with bentonite-amended soil. When mixed with soil, bentonite clay forms a material that has extremely low hydraulic conductivity, which makes it suitable for use as a barrier for groundwater flow paths. Figure 4-1 shows a schematic of a slurry cut-off wall construction.

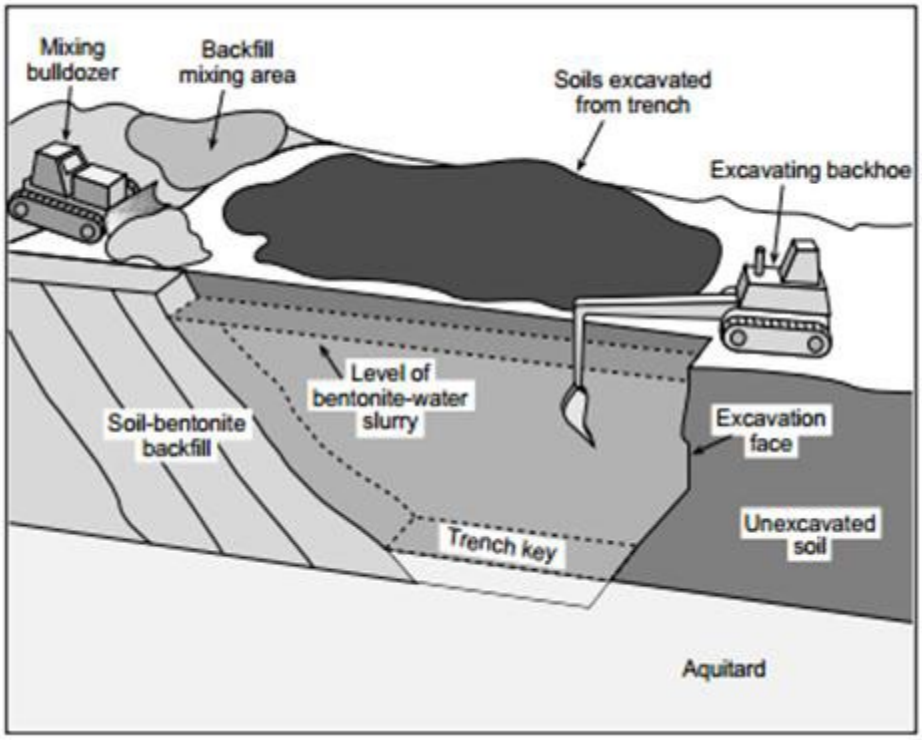



**Figure 4-1 Schematic of a Slurry Wall Construction**

Source: https://www.geoengineer.org/storage/wcp_assignment/135/editor_photos/4094/figure_5.jpg

Slurry cut-off walls are occasionally used in the mining industry, but most commonly to contain solutions in facilities that are constructed in relatively flat and homogenously stratified terrain such as on the Canadian prairies. The approach is less suitable in mountainous terrain with heterogenous and complex geology. Furthermore, because of the construction method, slurry walls are only applicable for containing relatively shallow groundwater flows. Also, sufficient footprint must be available to allow construction access and the slurry walls must not compromise the stability of embankment structures constructed upstream. Because the modelled depth of the groundwater flow paths for the Tenas Project is outside of the depth range of conventional slurry walls, and because of the limited footprint downstream of the management pond embankments, this option was considered **not feasible** and was not assessed further.

## 4.2 In-situ Treatment Technologies

### 4.2.1 Actively Managed Gravel Bed Reactor (GBR)

A gravel bed reactor is a pond or reservoir that has been backfilled with coarse rock/gravel, covered by an insulating layer (soil and/or organics) and fitted with injection and extraction wells. The operation of a GBR is illustrated in Figure 4-2. Mine water flowing to the injection wells is dosed with a source of easily degradable organic carbon such as methanol or glucose and other nutrients as required. Inside the GBR, microorganisms degrade the organic carbon.

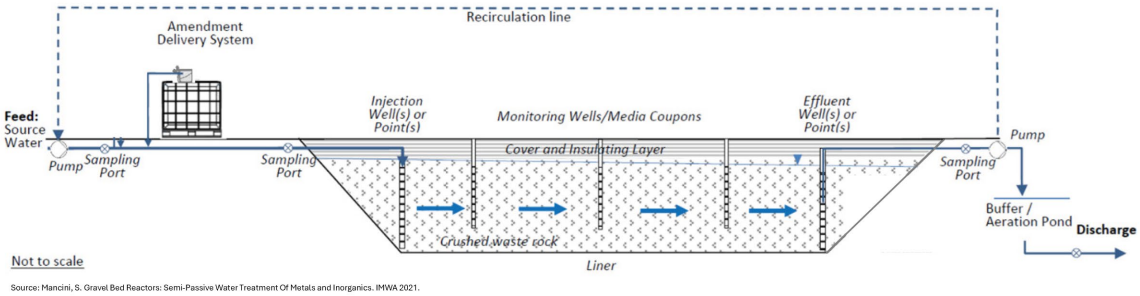



**Figure 4-2 Schematic of a Gravel Bed Reactor**

The degradation process of carbon consumes oxygen and oxidizes species such as nitrate, ferric iron ($Fe^{3+}$), selenate ($SeO_4^{2-}$), and sulphate ($SO_4^{2-}$) and produces reduced constituents such as ferrous iron ($Fe^{2+}$), selenite or elemental selenium ($SeO_3^{2-}$, $Se^0$) and sulphide ($S^{2-}$). Sulphide can form insoluble precipitates with dissolved metals such as copper, lead, cadmium, nickel, and zinc, which will be removed in the process. These precipitates will be permanently kept below water at the bottom of the management ponds and are not expected to re-enter the environment due to redox conditions presents.

The mining industry is in the second decade of adopting GBRs. A full-scale GBR with a treatment capacity of 20,000 $m^3$/day has been constructed at the Rainy River Mine in Ontario and currently operates as primary water treatment for the removal of copper. At two coal mines in the Elk Valley in BC, saturated rockfill reactors (SRFs) – a variant of GBRs – are currently used to remove selenium and nitrate from mine water.

GBRs are simpler and less costly to construct and operate than comparable active water treatment systems. However, GBRs do not offer the same level of precise process control and post-treatment of effluent may be required.

The three management ponds planned for the Tenas Project are ideally suited to be used as actively managed GBRs. Hydraulic controls could be constructed as PAG rock is placed in the ponds such that water pumped to the pond would flow through the pond along a pre-determined flow path. This would allow for control of the hydraulic residence time, which would facilitate removal of POCs such as copper, selenium, nickel, and nitrate.

For this application, the TRL was judged to be an 8 for removal of copper and 7 for removal of other POCs such as nitrate, nickel, and selenium. Therefore, the technology was considered to be **potentially feasible** for implementation at the Tenas Project. However, a technology maturation plan must be developed, which would include pilot- and field-scale trials to evaluate the feasibility of the approach for this Project.

### 4.2.2 In-situ Anoxic Biological Treatment (Passive with Organic Substrate)

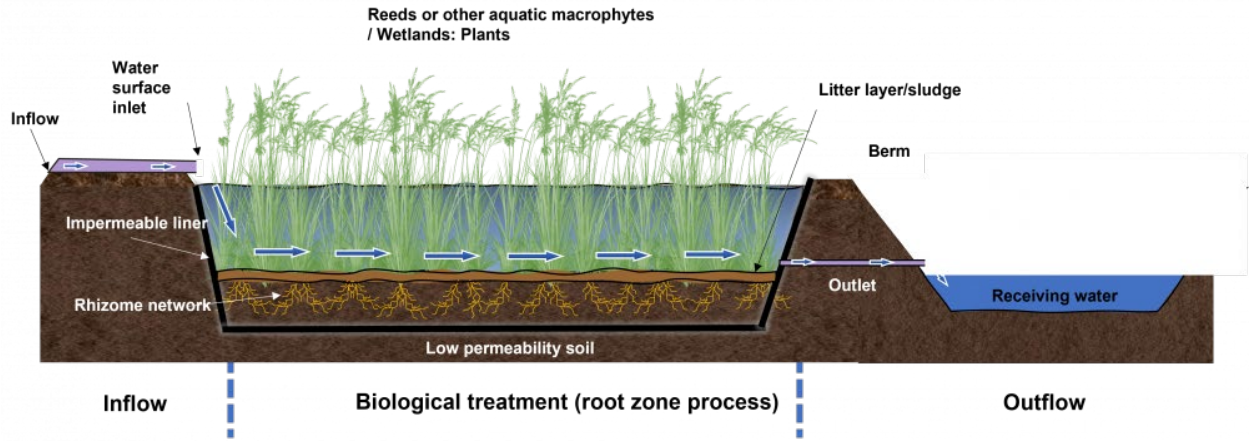
Passive bioreactors are like GBRs but are filled with a mixture of coarse rock, limestone, and organic material such as wood chips, manure, straw, biochar, or similar materials. The organic materials serve the same function as the degradable organic carbon added to the GBR influent, namely, to promote growth of anaerobic microorganisms.

Passive bioreactors have been used with limited success at mines in BC, including at the Brule and Quinsam coal mines. However, their use is not widespread. Although the reactors are operationally simple, the only means of controlling the process (and treatment performance) is to increase or decrease the inflow to the reactor. For this application, TRL is 6 or lower and the lack of process control makes it unsuitable for implementation at the Tenas Project. Therefore, the technology was considered to be **not feasible** and was not considered further.

### 4.2.3 Engineered Wetland

The use of engineered (or constructed) wetlands began in Germany in the 1950s and gained wider acceptance in the 1970s and 1980s (Seidel 1976). Engineered wetlands are most used to treat, or for polishing treatment of, municipal sewage or agricultural runoff but have also found use in the mining industry (Aurora 2018). Engineered wetlands tend to work best in applications where flows are low compared to the size of the wetland and when high-performance treatment is not required.

Figure 4-3 shows a schematic of a type of engineered wetland referred to as 'free-water surface flow wetland'[1]. The wetland works by mimicking the actions of a natural wetland. Vegetation filters out suspended solids, plant matter adsorbs or assimilate contaminants, and aerobic and anaerobic microorganisms transform or sequester various water quality constituents. An engineered wetland is constructed by placing an impermeable liner (clay or synthetic) within a pond or natural depression. A growth substrate placed on top of the liner is planted with wetland plants such as cattails, bulrushes, and canary grass. The outlet of the wetland either reports to a discharge pond or directly to the receiving environment.




Source: https://wiki.sustainabletechnologies.ca/wiki/Wetlands

**Figure 4-3 Schematic Illustrating the Operation of an Engineered Wetland**

An important consideration for implementation of an engineered wetland is the availability of a suitable location for construction of a lined pond. The area must be flat or gently sloped and relatively large. Although it may be possible to locate a suitable area for construction of an engineered wetland near the Tenas Project, a wetland would not be a candidate BAT because the TRL is less than 7 for this application due to the flows required and year-round treatment

[1] https://wiki.sustainabletechnologies.ca/wiki/Wetlands

requirements. Therefore, the technology was considered to be **not feasible** and was not considered further.

### 4.2.4 Passive/Active Flocculation

Passive flocculation refers to the practice of passively dosing flocculant polymers to turbid water by placing a “floc bloc” in the flow path of the stream (Figure 4-4) while active flocculation involves the addition of flocculants to contact water prior to it entering a pond to enhance the settlement of particulate matter in the water. Floc blocs have been used in the mining industry to facilitate removal of suspended sediment for many years (TRL 9). They are relatively low cost and are an operationally and environmentally safe method for improving removal of POCs associated with suspended sediment (total aluminum and total iron).

Active flocculation has been used in mining industry successfully over the past decades and is an operationally and environmentally safe method for improving removal of POCs associated with suspended sediment (total aluminum and total iron) and is TRL 9. Therefore, the use of passive\active flocculation was **potentially feasible** for the Tenas Project.

**Figure 4-4 Examples of Floc Blocs in a Stream and Active Floc Dosing**

## 4.3 Active Tank-Based Treatment Technologies

### 4.3.1 Lime Treatment

Lime treatment is one of the most common methods used for removing dissolved metals, suspended solids, and (in some cases) sulphate from mine water. The process works by increasing the mine water pH to between 9 and 10 by adding hydrated lime. Sulphate could precipitate as gypsum, while at this pH, most dissolved metals such as copper, zinc, cadmium, lead, iron, and nickel precipitate as metal hydroxides solids and is then removed in a solid-liquid separation step. Lime treatment is TRL 9.

There are two general approaches for implementing lime treatment:

- Low Density Sludge (LDS): in this process, mine water is mixed with hydrated lime in one or more (typically two) lime reactor tanks (Figure 4-5). In the reactors, the pH setpoint (typically between pH 9 and 10) is controlled by adjusting lime addition. Reduced species such as ferrous

iron or manganese are oxidized by aeration. From the reactors, the process solution flows to a pond where precipitated metal hydroxides and calcite settle as sludge. The treated outflow from the pond may be filtered and in some cases the pH is lowered by adding carbon dioxide or acid. The settled sludge will periodically have to be removed from the pond by dredging.

- High Density Sludge (HDS): the first part of the HDS process is the same as the LDS process. However, instead of using a pond for settling of sludge, a mechanical clarifier is used (Figure 4-6). A portion of the sludge collected by the clarifier is pumped back to the lime reactor tanks via a rapid mix tank where the hydrated lime is added. The recycled sludge becomes coated by hydrated lime, which causes dissolved metals in the mine water to precipitate onto the sludge particles. This process increases the density of the sludge, improves the metal removal efficiency, and improves the lime utilization. As in the LDS process, treated effluent flowing from the clarifier may be filtered and the pH may be adjusted.

Lime treatment plants require several ancillary services and facilities, including:

- A reliable source of power.
- Fresh water for reagent make-up (treated effluent can be used in some cases).
- Reagent storage and a laboratory for influent and effluent analysis.
- A pond for settling of sludge (LDS only),
- A mechanical clarifier for sludge (HDS only), and
- A facility for permanent disposal of sludge.

Advantages associated with lime treatment of include:

- High degree of process control and reliable performance

Disadvantages include:

- Lime treatment can remove metals but may not be able to achieve treated effluent concentrations that are less then 80% of the water quality guidelines. For example, the process can reduce dissolved copper concentrations from 0.01 mg/L to less than 0.0005 mg/L, but it may not be able to reduce cobalt, nickel, and zinc concentrations below 80% of the WQG concentrations.
- The process requires constant or frequent operator attention.
- Sludge must be managed on an ongoing basis.
- The use of lime, which is corrosive, involves the risk of operator exposure or spills.
- Capital and operating costs are relatively high compared to source control or semi-passive options.
- Energy requirements and greenhouse gas emissions are relatively high compared to source control or semi-passive options.

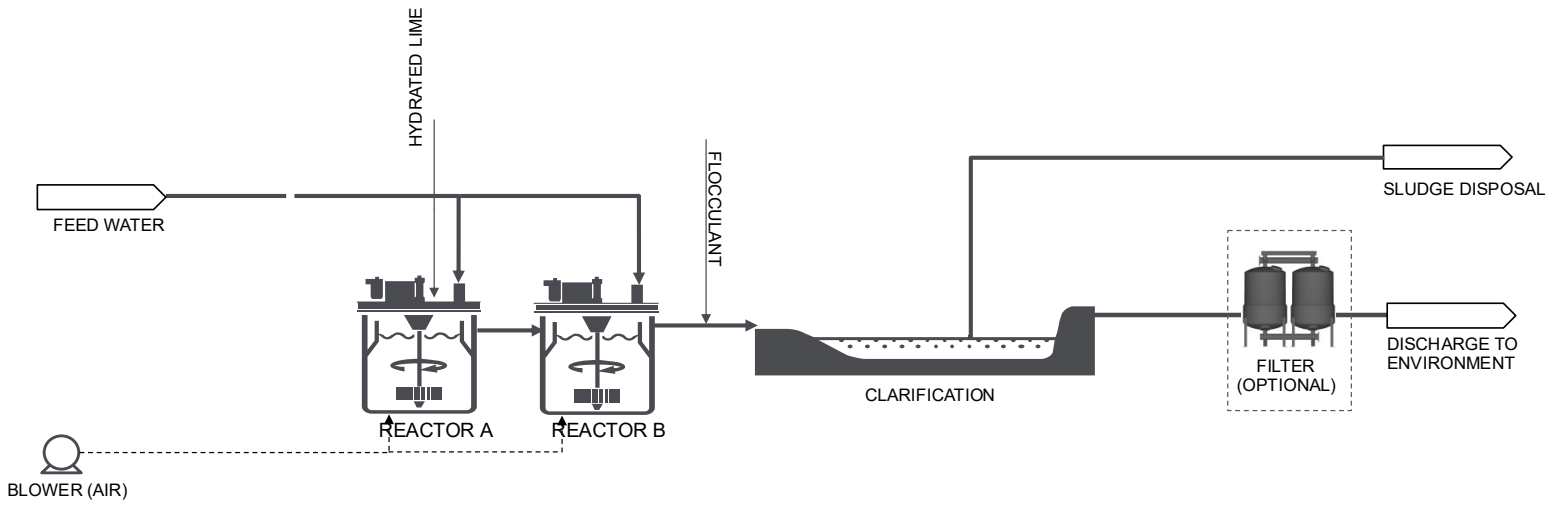



**Figure 4-5 Schematic of a Low-Density Sludge (LDS) Lime Treatment Process**

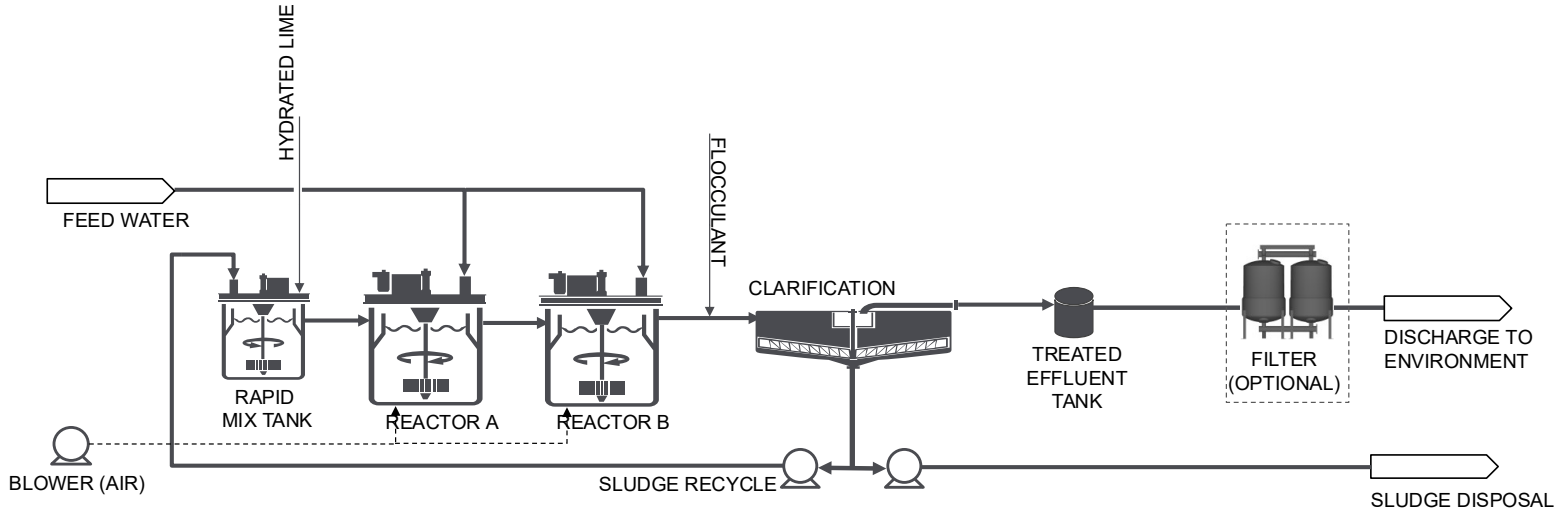



**Figure 4-6 Schematic of a High-Density Sludge (HDS) Lime Treatment Process**

Implementation of lime treatment as a stand-alone process for treating surface water discharge from the Tenas Project would realistically not be considered because it would not be able to reduce some of the already low POCs to levels below 80% of the WQG. A membrane or ion exchange pre-concentration step is required to achieve such low levels. Therefore, lime treatment as a stand-alone process was deemed to be **not feasible** for implementation at the Tenas Project.

### 4.3.2 Sulphide Precipitation

A sulphide precipitation water treatment process removes dissolved metals by precipitating them as insoluble metal sulphides. In the process, an inorganic sulphide reagent such as sodium hydrosulphide (NaHS) is added to metal-containing mine water in a reactor. Here, the dissolved metals are precipitated as sulphide solids (i.e., $Cu^{2+} + S^{2-} \rightarrow CuS$ (s)). The metal sulphide sludge is then removed by settling and filtration (Figure 4-7) or by microfiltration (Figure 4-8). Sulphide precipitation is TRL 9.

The sulphide precipitation process is relatively common in the mining industry because of its ability to target dissolved metals for removal in a manner that minimizes sludge production compared to lime treatment. This is possible because the process does not produce calcite, gypsum, or ferric hydroxide solids, which often account for most of the sludge produced by a lime treatment process.

Sulphide treatment plant require similar ancillary services and facilities as lime plants, including:

- A reliable source of power.
- Fresh water for reagent make-up.
- Reagent storage and a laboratory for influent and effluent analysis, and
- A facility for permanent disposal of sludge.

Although the sludge produced is relatively stable, it can oxidize over time and release the precipitated metals if exposed to atmospheric conditions. Therefore, it should be stored in a low oxygen environment or under a permanent water cover.

Advantages associated with sulphide treatment include:

- High degree of process control and reliable performance.

Disadvantages include:

- Even though sulphide precipitation can achieve lower treated effluent concentrations than lime treatment for some POCs (i.e., copper, cobalt, and cadmium) the process cannot achieve extremely low concentrations of zinc and aluminum and is generally unable to remove nickel.
- The sulphide precipitation process is unable to remove selenium.
- The process requires constant or frequent operator attention.
- Sludge must be managed on an ongoing basis in a low oxygen environment or under a permanent water cover.

- The use of NaHS, which is toxic and can produce noxious hydrogen sulphide, involves the risk of operator exposure or spills.
- Capital and operating costs are relatively high compared to source control or semi-passive options.
- Energy requirements and greenhouse gas emissions are relatively high compared to source control or semi-passive options.

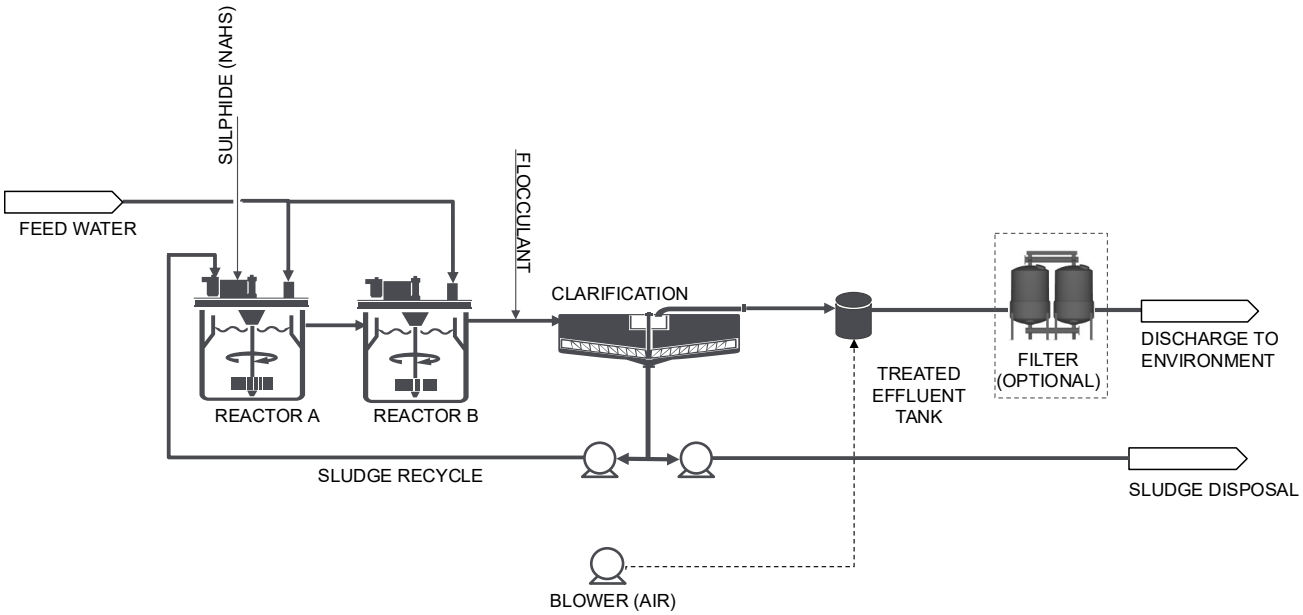



**Figure 4-7 Schematic of a Conventional Sulphide Precipitation Process**

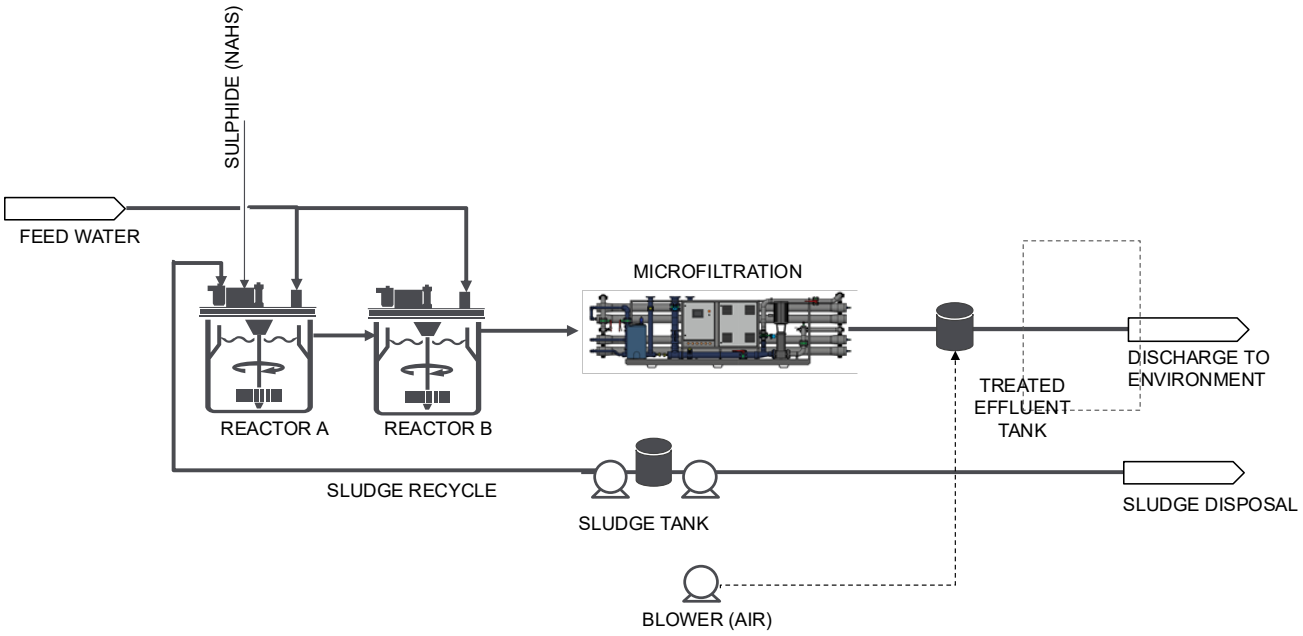



**Figure 4-8 Schematic of a Sulphide Precipitation and Microfiltration Process**

As with lime treatment, implementation of sulphide treatment as a stand-alone process for treating surface water discharge from the Tenas Project would realistically not be considered because it would not be able to reduce some of the already low POCs to levels below 80% of the WQG. A membrane or ion exchange pre-concentration step is required to achieve such low levels. Therefore, sulphide treatment as a stand-alone process was deemed to be **not feasible** for implementation at the Tenas Project.

### 4.3.3 Ferric Co-precipitation and Sedimentation or Micro-filtration

Figure 4-9 shows a schematic of a ferric co-precipitation process. A ferric reagent (ferric sulphate or ferric chloride) is added to mine water in a reactor. Here, the ferric iron precipitates as ferric hydroxide solids/sludge. Some constituents, and in particular oxyanions of molybdenum adsorb to or become occluded with the precipitated iron hydroxide and can thereby be removed with the sludge. This technology is TRL 9.

Ferric co-precipitation is commonly used in the mining industry for removal of molybdenum. However, modelled molybdenum concentrations in effluents at the Tenas Project are relatively low and ferric co-precipitation as a stand-alone process would not be able to reduce concentrations to a meaningful extent. Therefore, iron co-precipitation as a stand-alone process was deemed to be **not feasible**.

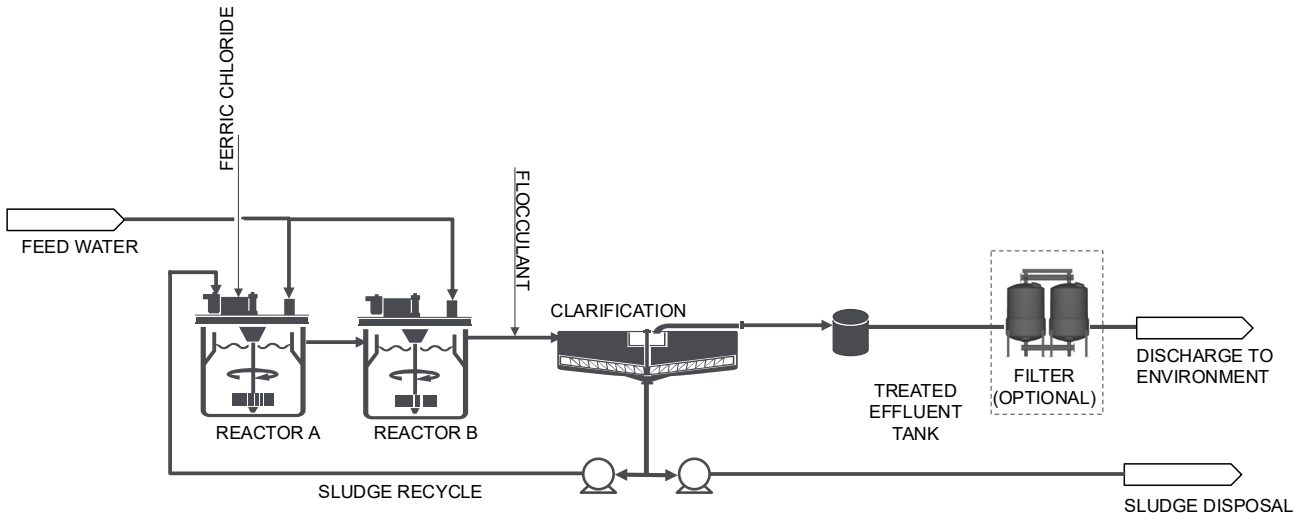



**Figure 4-9 Schematic of a Ferric Co-precipitation Process**

### 4.3.4 Membrane Filtration and HDS Lime Treatment

This treatment process is like the lime treatment process described in Section 4.3.1, but it includes a membrane filtration step ahead of the lime reactors. Membrane filtration works by forcing mine water through a synthetic membrane at high pressure. The process is commonly used and is TRL 9. The membrane rejects charged molecules (i.e., ions) such as sulfate and dissolved metals while it permits passage of non charged molecules, primarily ($H_2O$). RO membranes reject virtually all molecules, while nano filtration membranes only reject larger divalent molecules such as sulphate, calcium, and magnesium.

Membrane filtration produces two streams, namely a clean permeate (water that passes through the membrane) and a brine solution that contains the dissolved constituents that are rejected by the membrane. Typically, 70% to 85% of feed water is recovered as clean permeate, while 15% to 25% of the feed water volume and up is in the brine stream.

Figure 4-10 shows a schematic of a membrane filtration and HDS lime treatment process.

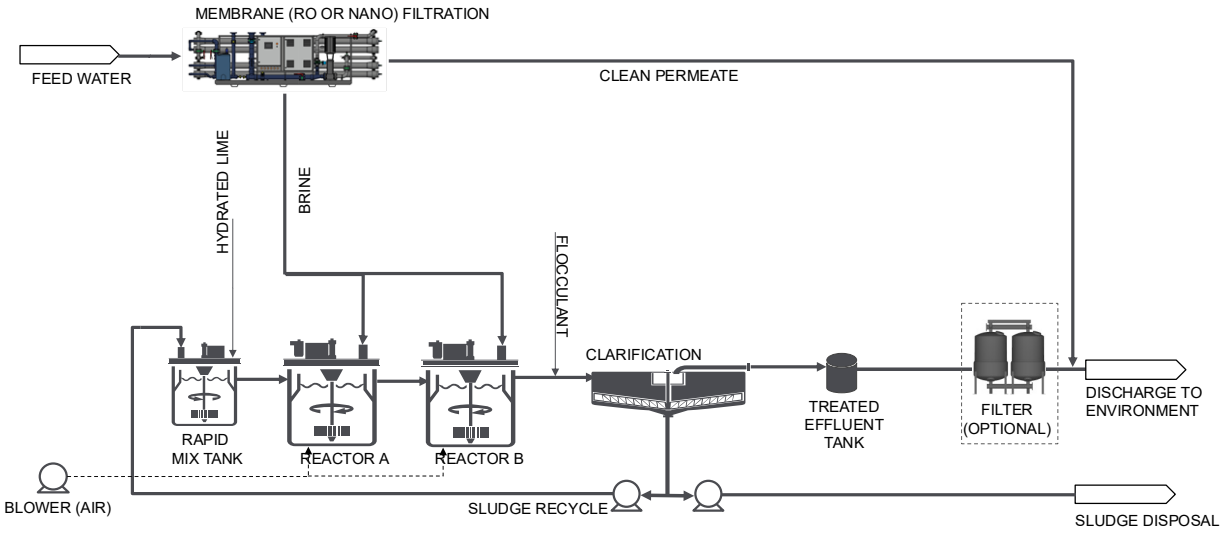



**Figure 4-10 Schematic of a Membrane Filtration and HDS Lime Treatment Process**

Feed water would be pumped to the membrane filtration unit, which would produce clean permeate and a brine stream. The feed water would likely require pretreatment such as multimedia and cartridge filtration before it can be processed by the membrane filter (pretreatment not shown on Figure 4-10). The brine solution would be pumped to the HDS lime treatment plant and treated as described above. The final plant discharge would be the combined treated effluent from the lime treatment process and the clean membrane permeate.

Membrane filtration ahead of HDS lime treatment is not commonly used to treat water at operating mines, but it is becoming more common as treated effluent quality limits are tightened to an extent where conventional treatment processes are inadequate. Advantages of the membrane and HDS process over an ‘HDS only’ process include:

- Better performance in terms of copper removal (treated effluent with lower concentrations).
- An ability to remove some sulphate (a POC) because of the pre-concentration stage.

Disadvantages include:

- A more complex process that would be more prone to upsets and down-time.
- Higher capital and operating costs and greater energy demand and greenhouse gas emissions.

Since the membrane filtration and HDS process consists of two conventional technologies and since the process can remove all metal POCs it was considered to be **potentially feasible** and was advanced for further evaluation.

### 4.3.5 Membrane Filtration and Sulphide Precipitation

This process is identical to the process discussed in Section 4.3.2, but it includes a membrane pre-concentration process like the one discussed in the previous section (Section 4.3.4). Sulphide precipitation was rejected as a stand-alone process because of its inability to remove the already low concentrations of metal POCs in untreated discharge from the Tenas Project. However, with the addition of a membrane pre-concentration step, POCs could be removed to levels below 80% of the WQG. Therefore, the process was considered to be **potentially feasible**.

### 4.3.6 Membrane Filtration and Ferric Co-precipitation

This process is identical to the process discussed in Section 4.3.3, but it includes a membrane pre-concentration process like the one discussed in Section 4.3.4. Iron co-precipitation was rejected as a stand-alone process because of its inability to remove the already low concentrations of molybdenum in untreated discharge from the Tenas Project. However, with the addition of a membrane pre-concentration step, molybdenum could be removed to levels below 80% of the WQG. Therefore, the process was considered to be **potentially feasible**.

### 4.3.7 Ion Exchange, Selenium Removal

Ion exchange (IX) is a process that removes dissolved ions from solution by adsorption onto a fixed media. The media is a synthetic resin made of polymers with functional groups that have specific affinity for certain ions (example in Figure 4-11). The process works by passing process water through columns with IX resin where the target constituent is adsorbed by displacing an inert ion such as sodium, chloride, or sulphate. IX resins are available in an anionic form that removes negatively charged molecules and in a cationic form that removed positively charged ions. It is a proven process with TRL 9.

**Figure 4-11 Ion Exchange Resin**

Selenium could be removed using an anionic ion exchange resin with affinity for selenate ($SeO_4^{2}$). Over time, the IX resin becomes saturated and is then regenerated using solutions with high concentrations of ions that can displace the adsorbed selenate. In the anionic IX process a solution of concentrated sodium sulphate can be used to displace the adsorbed selenate ions. The spent regenerant solution would subsequently be treated to remove the captured selenate or copper.

An approach to regenerating selenate-containing regenerant using electrochemical reduction has been commercialized in recent years[2] and is currently at a TRL of 8 (Figure 4-12).

IX plants require several ancillary services and facilities, including:

- A reliable source of power,
- Fresh water for reagent make-up,
- Reagent storage and a laboratory for influent and treated effluent analysis, and
- A facility or repository for permanent disposal of sludge.

Advantages associated with IX treatment of discharge include:

- High degree of process control and reliable performance.

[2] https://www.bqewater.com/technology-solutions/selenium/

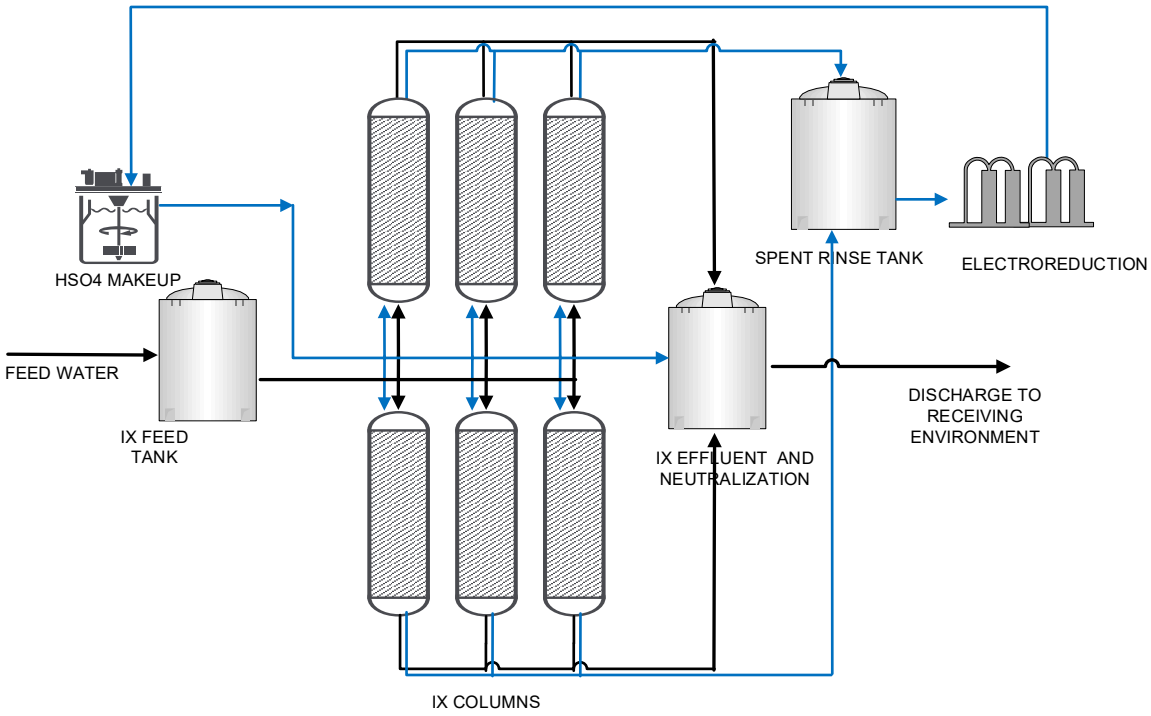



**Figure 4-12 Simplified Schematic of an Ion Exchange Process for Removal of Selenium**

Disadvantages include:

- The process requires constant or frequent operator attention.
- Sludge must be managed on an ongoing basis.
- The risk of operator exposure to, or spills of hazardous treatment reagents.
- The ion exchange process is more complex and more difficult to operate than other active water treatment processes such as sulphide or lime treatment.
- Capital and operating costs are relatively high compared to source control or semi-passive options.
- Energy requirements and greenhouse gas emissions are relatively high compared to source control or semi-passive options.

Because of the complexity of ion exchange for removal of selenium and because this would be the only POC that would be removed by the process, it was considered to be **not feasible** for the Tenas Project.

### 4.3.8 Ion Exchange, Metal Removal

Removal of metals using ion exchange is like the process described for removal of selenium in Section 4.3.7. However, instead of using an anionic exchange resin, a cationic resin is used, and the resin is regenerated using a dilute acid solution or a salt solution such as sodium chloride.

Metals can be removed from the spent regenerant relatively easily by treating it with lime or sulphide. Ion exchange is not commonly used in the mining industry, but it is used in industrial treatment applications, particularly in cases where effluent with extremely low metal concentrations must be produced. Because the use of ion exchange for metal removal is a proven process and simpler than ion exchange for selenium removal it was considered **potentially feasible** for implementation for the Tenas Project. The technology is TRL 9.

### 4.3.9 Ion Exchange, Sulphate Removal

Removal of sulphate using ion exchange is possible, but the process is inefficient and complex and there are no full-scale plants in operation at mines anywhere in the world. Based on this information the technology has a TRL of 6 or lower and therefore, the process was considered to be **not feasible** for the Tenas Project.

### 4.3.10 Electrocoagulation

Electrocoagulation is implemented by passing process water through electrochemical cells where an electrical current is applied across immersed anodes and cathodes. At the anode, which typically consists of iron or aluminum metal, metals are oxidized to soluble ions. At the cathode, water is hydrolyzed to hydroxide ions and hydrogen gas.

In the overall process, the oxidized iron or aluminum precipitate as hydroxides and can therefore be removed in subsequent solid-liquid separation step that usually involves settling or clarification and filtration. When iron is used as anode material, the process is like ferric co-precipitation process described in Section4.3.3.

Electrocoagulation can be a useful process for removing suspended solids and some metals but is it unable to produce effluent with POC concentrations that are lower than 80% of the WQGs. Since most POCs in untreated effluent for the Tenas Project are already low, electrocoagulation would not be able to improve the quality of the effluent and was therefore considered to be **not feasible**.

### 4.3.11 Membrane Filtration and Electrocoagulation

The addition of a membrane filtration stage upstream of the electrocoagulation is also considered to be a **not feasible** since electrocoagulation is poorly suited for removing POC to low concentrations.

### 4.3.12 Anaerobic Biological Treatment (MBBR) (with or without Membrane Filtration)

Anaerobic biological treatment works by dosing a source of degradable organic carbon to the mine water as it is pumped to a bioreactor filled with a solid but porous media. The organic carbon stimulates growth of microorganisms, which consume dissolved oxygen and begin to reduce oxygen-containing constituents. The dose of organic carbon determines the extent to which oxidized constituents are reduced. Mildly to moderately reducing conditions will convert nitrate ($NO_3^-$) to nitrogen gas and selenate ($SeO_4^{2-}$) to selenite ($SeO_3^{2-}$) or elemental selenium, while strongly reducing conditions will also reduce sulphate ($SO_4^{2-}$) to sulphide ($S^{2-}$). The technology is TRL 9.

Figure 4-13 shows a simplified schematic of an anaerobic biological treatment process. Feed water is pumped to the anaerobic bioreactor where organic carbon and nutrients are added. The bioreactor provides sufficient residence time for anaerobic microbes to degrade the organic carbon and complete the reduction process. A post treatment stage consisting of an aerobic bioreactor that removes residual organic carbon and reduced species produced by the anaerobic bioreactor (such as sulphides) treats the effluent from the anaerobic bioreactor. A solid-liquid separation step such as a clarifier, pond and/or filter may be required to remove residual biosolids. From the post treatment stage, the treated water flows to an effluent tank and from there it is discharged to the receiving environment.

Anaerobic bioreactors require several ancillary services and facilities, including:

- A reliable source of power and fresh water.
- Reagent storage and a laboratory for influent and effluent analysis, and
- A facility or repository for permanent disposal of spent reactor media and sludge.

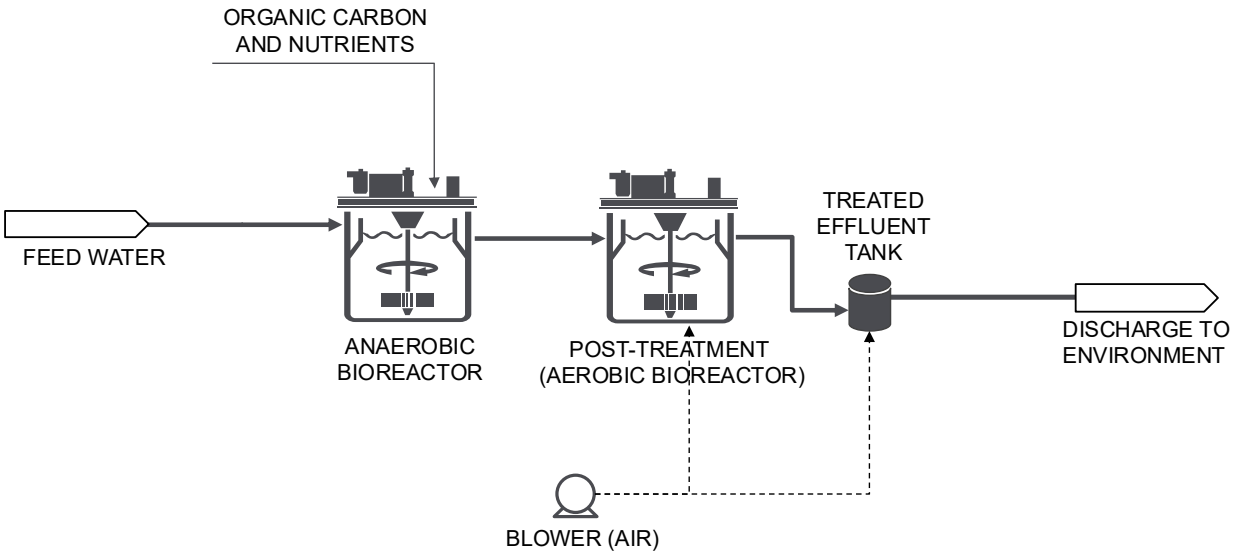



**Figure 4-13 Simplified Schematic of an Anaerobic Biological Treatment Process**

Advantages associated with anaerobic biological treatment of discharge from SW38/SW63 include:

- High degree of process control and reliable performance.

Disadvantages include:

- The process requires constant or frequent operator attention.
- Sludge must be managed on an ongoing basis.

- The risk of operator exposure to, or spills of hazardous treatment reagents.
- Capital and operating costs are relatively high compared to source control or semi-passive options.
- Energy requirements and greenhouse gas emissions are relatively high compared to source control or semi-passive options.

Anaerobic bioreactor processes are both common and conventional processes for removal or selenium and nitrate from mine water. For nitrate removal, it is the only process in common use. If anaerobic biological treatment were to be implemented for the Tenas Project, both nitrate and selenium would be targeted by the process. However, conventional anaerobic biological treatment would likely not be able to remove the selenium concentrations in untreated effluent that are generally modelled to be less than 0.020 mg/L and often less than 0.010 mg/L. Anaerobic biological treatment can generally only be relied upon to achieve a selenium concentration of 0.010 mg/L. Therefore, a membrane filtration stage would be required to pre-concentrate the untreated discharge before it is treated by the anaerobic biological.

Accordingly, implementation of an anaerobic biological process was considered to be **not feasible** as a standalone process but potentially **feasible** if combined with a membrane filtration process.

### 4.3.13 Zero Liquid Discharge (ZLD) process

The zero liquid discharge process uses mechanical and thermal energy to concentrate POCs in successive stages until a dry salt is produced. Figure 4-14 shows a schematic of the process.

First, mine water is pre-treated before it is pumped to a membrane filtration unit (RO or Electrodialysis Reversal (EDR)). Brine produced by the membrane filtration is pumped to an evaporator that produces a saline slurry, which in turn is passed on to a crystallizer that evaporates remaining water and produces a dry salt. The salt is highly soluble and must therefore be disposed in a facility that can maintain it dry (i.e., it must be entombed by synthetic liners, buried in barrels, cast in cement, or similar disposal methods). Disposal of the soluble salt by-product produced by the process is a major draw-back. ZLD is considered to be a mature technology and is therefore TRL 9.

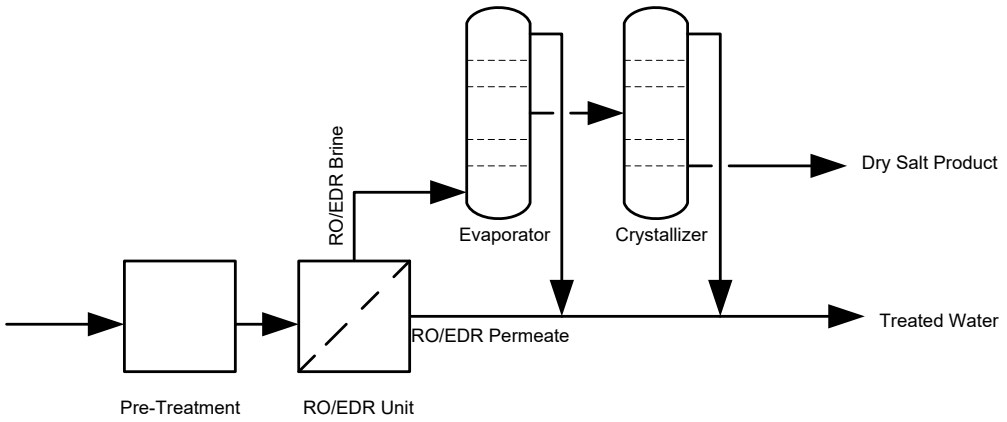



**Figure 4-14 Schematic of Membrane Concentration followed by Mechanical Evaporation**

The process is rarely used in the mining industry because of the high capital and operating costs and because of the very high-power demand. However, it can be the only option available if a POC such as chloride must be removed.

Despite the disadvantages, the ZLD process was deemed to be **potentially feasible** for treating surface water discharges from the Tenas Project since it theoretically could reduce all POCs to levels well below the WQGs.

### 4.3.14 Ettringite Precipitation

In the ettringite precipitation process, sulphate ions are precipitated as $Ca_6Al_2(SO_4)_3(OH)_{12}\cdot 26H_2O$ by adding calcium hydroxide and aluminum hydroxide to the process water. The process reliably removes sulphate and dissolved metals because of the high pH used in the precipitation process. However, the process has never been implemented at an industrial scale. One reason for the lack of commercialization is the prohibitively high cost of the aluminum reagent required for the precipitation process. Efforts at recovering and recycling the aluminum have been made by various water treatment companies over the years but none have succeeded. The process was judged to be **not feasible** principally because it has never been commercialized and is considered to be TRL 6 or 7.

### 4.3.15 Biological Sulphate Reduction

Biological sulphate reduction removes sulphate by converting it into hydrogen sulphide gas, which can subsequently be converted to elemental sulphur. In addition, the process is likely to remove most other POCs. The process has been implemented at full scale and is therefore TRL 8 or 9.

The anaerobic bioreactor process involves the following steps: first, the intake water undergoes settling and/or filtration to remove suspended solids. Next, the water is heated to a temperature between 20 to 30 degrees C. The anaerobic processes do occur at lower temperature, but the rates are slower, which means that reactors must be much larger. After heating, the water is passed to the anaerobic reactors where a source of organic carbon (or electron donor) such as acetate or methanol is added. The sulphate reducing bacteria in the reactor feed on the carbon and converts sulphate to hydrogen sulphide gas ($H_2S$) as follows:

$SO_4^{2-}$ + 8 e- (organic carbon) + 10 $H^+$ → $H_2S$ (gas) + 4 $H_2O$

Hydrogen sulphide gas is highly reactive and toxic, so it must be converted to elemental sulphur, a grey or yellow solid, using an oxidation reactor. In addition, the water treated in the anaerobic bioreactor must subsequently be treated in an aerobic bioreactor that removes residual organic carbon not consumed in the anaerobic reactor.

Ordinarily, selenium is also removed in an anaerobic bioreactor. However, when a reactor is operated at conditions that reduces sulphate, selenium can form soluble selenide ($Se^{2-}$) ions or organo-selenium compounds. Such compounds can be more toxic and bioaccumulate more readily than selenate ($SeO_4^{2-}$), which is the species typically found in normal surface water. Therefore, an additional treatment step may be required to remove residual reduced selenium species.

Worldwide, there are very few examples of anaerobic bioreactors specifically designed to remove sulphate. The best (and perhaps only) known example is a plant constructed at the Budel zinc refinery in the Netherlands. Built in 1992, the plant has a capacity of about 300 $m^3$/hour. The feed for the plant is a contaminated groundwater plume containing about 1,000 mg/L of sulphate and about 100 mg/L of zinc. As such, the plant was constructed to deal with both sulphate and metals contamination.

Because the sulphate reducing biological treatment process is complex and produces hazardous hydrogen sulphide gas it was considered to be **not feasible** for implementation at the Tenas Project.

# 5 Step Four - BAT Evaluation and Ranking

## 5.1 Candidate BAT Scenarios

The technology identification and screening described in Section 4 looked at specific technologies that can target specific POCs. Therefore, to address most (if not all) POCs, it is necessary to combine candidate BATs into scenarios that can be implemented as comprehensive water treatment solutions.

Table 5-1 lists BAT scenario considered for the Tenas Project. The table indicates which POCs would be addressed by the BATs that were deemed to be potentially feasible and which POCs would not be addressed by each scenario. Scenarios that include active tank-based treatment technologies also require the use of the TCP as a buffer pond for attenuating freshet flows so that the active water treatment processes can operate at a steady rate throughout the open water treatment and discharge season.

Implementation of complete BAT scenarios requires more infrastructure than the stand-alone technologies discussed in Section 4. Figure 5-1 and Figure 5-2 show example flow sheets for implementation of Scenario 3 (In-situ Active GBR) and Scenario 5 (Membrane Filtration + Anaerobic Bioreactor (MBBR) + Lime Treatment). In the MAA, it is important that requirements for implementation of the complete operational scenarios are accurately evaluated.

**Table 5-1 Candidate BAT Scenarios for the Tenas Project**

| Scenario | Description | Flow Attenuation | $NO_2/NO_3$ | Se/Mo | Metals | SO4 | POCs Addressed | POCs Not Addressed |
|---|---|---|---|---|---|---|---|---|
| 1 | BMPs already planned | None | **No additional source control or water treatment measures beyond BMPs or BATs already incorporated into the Project design.** | | | | All | No additional removal of POCs. |
| 2 | Passive/active flocculation (only) | None | **none** | | none except TSS removal (Al and Fe) | none | TSS, Fe, Al | NO2, NO3, Se, Co, Cu, Ni, Zn, Mo, SO4 |
| 3 | In-situ Active GBR | None | In-situ Active GBR: NO2, NO3, Al, Fe, Cu, (Se polishing) (not Mo, Co, Ni, Zn) | | | none | NO2, NO3, Al, Fe, Cu, (Se - polishing) | Mo, Co, Ni, Zn, SO4 |
| 4 | RO + Anaerobic Biological Treatment | **Tenas Control Pond** | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): NO2, NO3, Se. (not Cu, Mo) | | none except TSS removal (Al and Fe) | none | $NO_2$, $NO_3$, Se, Al, Fe | Mo, Co, Cu, Ni, Zn, SO4 |
| 5 | RO + Anaerobic Biological Treatment + Lime Treatment | **Tenas Control Pond** | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): NO2, NO3, Se. (not Mo) | | **Lime Treatment:** Al, Co, Cu, Fe, Ni, Zn, SO4 | | $NO_2$, $NO_3$, Se, Al, Co, Cu, Fe, Ni, Zn, $SO_4$ | Mo |
| 6 | RO + Anaerobic Biological Treatment + Sulphide Treatment | **Tenas Control Pond** | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): NO2, NO3, Se. (not Mo) | | **Sulphide Treatment:** Co, Cu, Ni, Zn + TSS removal (Al, Fe) | none | $NO_2$, $NO_3$, Se, Al, Co, Cu, Ni, Zn | Mo, SO4 |
| 7 | RO + Anaerobic Biological Treatment + Ferric Co-precipitation | **Tenas Control Pond** | **RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk):** $NO_2$, $NO_3$, Se. | | **Ferric Co-precipitation:** Mo + TSS removal (Al, Fe) | none | $NO_2$, $NO_3$, Se, Al, Fe, Mo | Co, Cu, Ni, Zn, SO4 |
| 8 | RO + Anaerobic Biological Treatment + Ion Exchange | **Tenas Control Pond** | **RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk):** $NO_2$, $NO_3$, Se. | | **Ion Exchange:** Al, Co, Cu, Fe, Ni, Zn. | none | NO2, NO3, Se, Al, Co, Cu, Mo, Fe, Ni, Zn | Mo, SO4 |
| 9 | Zero Liquid Discharge | **Tenas Control Pond** | Zero Liquid Discharge (ZLD): All POCs | | | | NO2, NO3, Se, Al, Co, Cu, Fe, Ni, Zn, Mo, SO4 | none |
| 10 | Additional Liner in Water Management Ponds | **Tenas Control Pond** | **This options reduces seepage from the water management ponds but increases surface dsicharge by the same volume. Therefore, there is not net POC removal if additional liners are added as a stand-alone BAT** | | | | none | NO2, NO3, Se, Al, Co, Cu, Fe, Ni, Zn, Mo, SO4 |

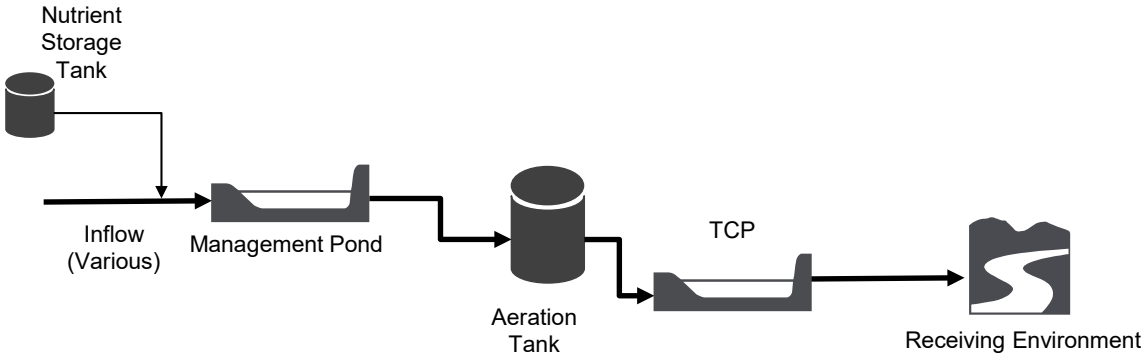



**Figure 5-1 Scenario 3: In-situ Active Gravel Bed Reactor**

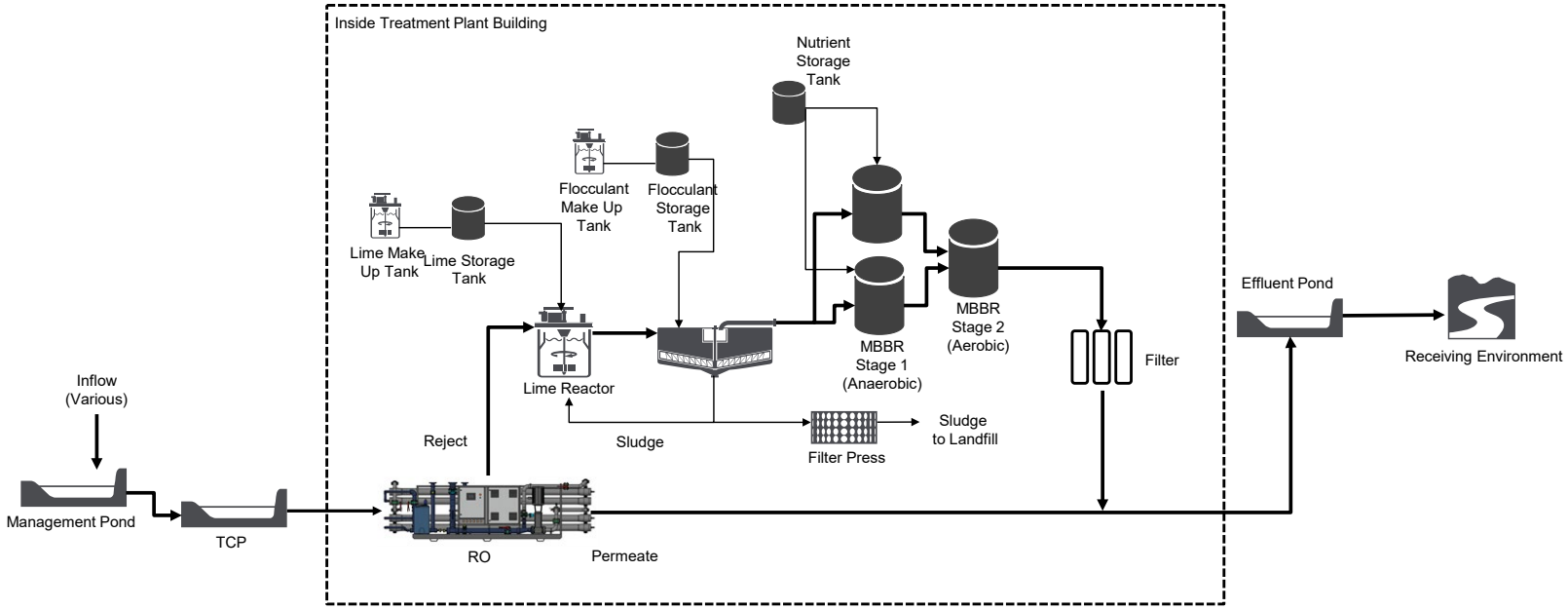



**Figure 5-2 Scenario 5: Membrane Filtration + Anaerobic Bioreactor (MBBR) + HDS Lime Treatment**

In summary, the following candidate BATs scenarios were advanced for the MAA:

1. Base Case with BMPs provided for comparison.
2. Passive/Active Flocculation with the Base Case .
3. In-situ Active GBR with the Base Case .
4. Membrane Filtration + MBBR with the Base Case.
5. Membrane Filtration + MBBR + HDS Lime with the Base Case.
6. Membrane Filtration + MBBR + Sulphide with the Base Case.
7. Membrane Filtration + MBBR + Ferric with the Base Case.
8. Membrane Filtration + MBBR + Ion Exchange with the Base Case.
9. Zero Liquid Discharge with the Base Case.
10. Modified Liners in Management and Control Ponds with the Base Case.

Each of the candidate technologies were evaluated according to the criteria provided by BC ENV. The rationales behind the criteria scores are documented in Section 5.2. Ranking of the candidate BATs and selection of the preferred BAT are discussed in Section 5.3.

## 5.2 Criteria Scoring

### 5.2.1 Reliability Scores

The reliability account consists of the following criteria: risk, robustness, scalability, and long-term viability. These were scored as follows:

- **Risk**: risks associated with the Base Case scenario that includes source control measures and other BMPs that TML has committed to implement as part of the Project development. Risks are likely limited because of the relatively clean untreated water and lack of modelled exceedances in the receiving environment.
  - The risk account was scored as follows: a Score of 3 due to potentially higher parameter concentrations in the receiving environment for the Base Case, Passive/Active Flocculation with the Base Case, hazards associated with sulphides (RP + MMBR + sulphide with the Base Case), and performance uncertainty related to Modified Liners in the management and control ponds with the Base Case.
  - A Score of 4 was given for remaining active water treatment with the Base Case options.
- **Robustness:** refers to consistent and reliable performance of a technology under various conditions.
  - Planned source control measures are expected to be robust and were therefore assigned a score of 5, as was Option 10 (modified liners in the management and control ponds with the Base Case).

  - Passive/Active flocculation with the Base Case and In-situ Active GBR with the Base Case are expected to work well under typical operating conditions but may perform less well at high flow or during upset conditions and therefor were given a Score of 3.
  - Active water treatment technology Options with the Base Case are generally robust, but any mechanical system can potentially fail or malfunction. More complex processes are generally more prone to malfunctions. A Score 4 was given for all active water treatment technology options with the Base Case except the more complex RO + MMBR + Ion Exchange with Base Case which was given a Score of 3.

- **Scalability:** the ability to accommodate increases in flow or loadings.
  - Mechanical treatment plants are generally difficult to scale up since equipment, piping and pumps are designed to accommodate a certain design flow. The more complex a process is the more difficult it is to scale up. A Score of 3 was assigned to water all water technologies versus a Score of 2 for ZLD with the Base Case.
  - Passive/Active flocculation with the Base Case can readily be scaled by adding flocculation stations and/or flocculant blocks in more locations and were therefore given a Score of 5. Modified liners in management and control ponds with the Base Case could be installed in any new management and/or control pond however most of these ponds are constructed at the beginning of the Project leaving only the WMP liner that can be modified based on monitoring results, so this option was given a reduced Score of 3.
  - In-situ Active GBRs with the Base Case can be scaled by constructing additional ponds and were given a Score of 4.
  - Planned source control measures in the Base Case are likely scalable to an expanded operation and were given a Score of 4.

- **Long-term viability**: refers to sustainability and performance effectiveness over an extended period.
  - Planned source control measures in the Base Case such as inundating PAG rock and construction of low-permeability liners are sustainable and expected to perform well for many decades or centuries with minimal maintenance and were given a Score of 5.
  - Likewise, modified liners in the management and control ponds with the Base Case are expected to perform well long-term and were given a Score of 5.
  - Mechanical equipment can be made to operate indefinitely if it is well maintained and replaced at the end of its operating life. However, ongoing maintenance is less sustainable and so active water treatment technologies with the Base Case besides ZLD with the Base Case were given a Score of 4.
  - ZLD with the Base Case is less sustainable because it produces a soluble salt that must be entombed in barrels or liners and stored in perpetuity and was given a Score of 2.

### 5.2.2 Control-Effectiveness Scores

Pollutant Reduction was calculated and scored as follows:

- Percent loadings removed of each POC over, and above planned source control measures was calculated and weighed by total volume discharged for each candidate BAT option.
- Percent loadings removed was averaged across all POCs identified for the Project to get an overall score.
- Percent loading removal was based on MAXIMUM Modelled POC concentrations. Therefore, actual loading removal percentages are likely to be substantially lower.
- Passive/Active flocculation with the Base Case was assigned an overall loading removal of zero because the extent of TSS removal cannot be quantified reliably (i.e., Passive/Active flocculation with the Base Case will remove some TSS, but a definitive removal factor cannot be assigned).

Table 5-2 shows a summary of the pollutant reduction evaluation.

**Table 5-2 Pollutant Reduction Calculation Result**

| POC | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 | Option 7 | Option 8 | Option 9 | Option 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Nitrate | 0% | 0% | 78% | 70% | 70% | 70% | 70% | 70% | 70% | 0% |
| Nitrite | 0% | 0% | 81% | 70% | 70% | 70% | 70% | 70% | 70% | 0% |
| Sulphate | 0% | 0% | 0% | 0% | 37% | 0% | 0% | 0% | 56% | 0% |
| Aluminum, total | 0% | 0% | 56% | 65% | 65% | 65% | 65% | 65% | 73% | 0% |
| Cobalt, total | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 55% | 55% | 0% |
| Copper, dissolved | 0% | 0% | 0% | 0% | 9% | 9% | 0% | 9% | 53% | 0% |
| Iron, total | 0% | 0% | 0% | 0% | 70% | 70% | 0% | 70% | 70% | 0% |
| Molybdenum, total | 0% | 0% | 60% | 70% | 72% | 72% | 72% | 72% | 74% | 0% |
| Nickel, dissolved | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 64% | 0% |
| Selenium, total | 0% | 0% | 0% | 0% | 49% | 10% | 0% | 49% | 49% | 0% |
| Zinc, dissolved | 0% | 0% | 78% | 71% | 71% | 71% | 71% | 71% | 71% | 0% |
| Overall Maximum POC Load Reduction | 0% | 0% | 0% | 0% | 58% | 0% | 0% | 58% | 58% | 0% |
| **Score** | **1.0** | **1.0** | **2.5** | **2.4** | **3.4** | **2.8** | **2.5** | **3.5** | **4.2** | **1.0** |

The Base Case treated effluent is not modelled to be acutely toxic. However, water quality model results indicates that when TSS in treated effluent is at the maximum proposed concentration (35 mg/L) the total iron concentration could marginally exceed the acute guideline of 1.0 mg/L total iron. Similarly, model results indicate that nitrite concentrations could marginally exceed the acute guideline of 0.06 mg/L nitrite-N.

Both acute guideline exceedances are unlikely to occur, but Options 1 and 2 were nonetheless given a Score of 4.5, while the other options, which remove iron and nitrite, were given a Score of 5.

Furthermore, Borealis Environmental Consulting Incorporated was contracted to review the POC acute toxicity concentrations and determined that nitrite and total iron concentrations do not exceed LC50 values for either rainbow trout or Daphne and therefore the modelled effluent is not expected to be acutely toxic. Please see Appendix C attached for a copy of their report.

### 5.2.3 Environmental Impacts and Socio-Cultural Scores

Sub-accounts were scored as follows:

- **Energy Efficiency**:
  - The Base Case option (Option 1) that includes various source control measures do not include construction of additional facilities and was therefore given an energy efficiency Score of 5. Once installed, modified liners in the management and control ponds with the Base Case(Option 10) do not consume energy and was also given a Score of 5.
  - Zero Liquid Discharge with the Base Case process is very energy intensive (~15 kW-hr/m3) technology and was therefore assigned a Score of 1.
  - In-situ Active GBR with the Base Case only requires energy for aerating the effluent after treatment and was given a Score of 4.5)
  - Other active water treatment options with the Base Case are moderately energy efficient (~4 kW-hr/m3) compared to ZLD with the Base Case and were therefore given a Score of 3.5.
- **Greenhouse Gas (GHG) Emission**s:
  - GHG emissions generally follow energy emissions, but emissions associated with treatment reagents must also be considered. Option 4 received a slightly better Score of 4 because of the lower reagent demand versus its energy efficiency score.
  - Installation of modified liners in the management and control ponds with the Base Case was scored lower at 3.5 versus its energy efficiency score because a large volume of bentonite would have to be shipped to the Project from Kamloops.

- **Footprint:**
  - Base Case (Option 1), Passive/Active flocculation with the Base Case (Option 2), and modified liners in the management and control ponds with the Base Case (Option 10) do not require additional footprint and therefore scored 5.
  - In-situ Active GBR with the Base Case requires minimal footprint for installation of aeration equipment and was given a Score of 4.5.
  - Most active water treatment options with the Base Case require a sizable footprint and were given a Score of 3.
  - Option 4 has a smaller footprint because a clarifier is not required so was given a Score of 4.
- **Secondary Waste Production:**
  - Base Case, Passive/Active flocculation with the Base Case, and modified liners in the management and control ponds with the Base Case scored 5 because of no or negligible secondary waste production.
  - In-situ Active GBR with the Base Case has nearly no secondary waste production, but the post-treatment aeration could produce some total iron that would settle in the TCP and was given a Score of 4.5.
  - RO + MBBR with the Base Case (Option 4) produces biomass and TSS sludge and was therefore given a Score of 4.
  - Other active water treatment options with the Base Case Score 3, 2.5, or 1 depending on the volume and/or stability of the secondary waste produced. ZLD with the Base Case produces large volumes of soluble salts that must be disposed of in a hazardous landfill off site and was therefore assigned a Score of 1.
- **Adherence to Yintah Management Directives**:
  - The Office of Wet'suwet'en has provided a document that lays out a series of best management practices that should be followed when developing a Project within their Yintah.
  - The following is the directive that was deemed most relevant after discussion with the OW and the House Groups.

**"Maintain surface water quantity and quality within the natural range of variability in perpetuity across the Yintah for future generations of Wet'suwet'en people."**

  - Using this information the same scoring as pollutant reduction was used as the technologies that were most effective for pollutant reduction also achieved water quality values closer to the natural baseline conditions.

### 5.2.4 Cost-Effectiveness Scores

The cost effectiveness criteria were scored as follows:

- **Efficient Use of Existing Resources**:
  - The Base Case (Option 1) and Passive/Active flocculation with the Base Case uses only existing infrastructure and resources and therefore scored 5.
  - Modified liners in the management and control ponds with the Base Case make use of the planned management ponds but cannot be constructed from materials at the Project as bentonite will have to be sourced from Kamloops and therefore was given a Score of 3.
  - The In-situ Active GBR with the Base Case will be embedded in the design of the management ponds and will require little additional equipment such as an aeration tank to function efficiently. This option was given a Score of 4.
  - Active water treatment options with the Base Case require construction of new infrastructure that will consume additional resources and were given a Score of 2 while a Score of 1.5 was assigned to ZLD with the Base Case.

Life Cycle Cost Analysis scores were based on 100-year Net Present Value (NPV) discounted at 4% which aligns with regulatory guidance. Table 5-3 lists order-of-magnitude (Class V) NPVs for the options considered along with the associated assigned scores.

**Table 5-3 Order-of-Magnitude Cost Estimates and Scores for Candidate BAT Scenarios**

| | | NPV (M$) | Score |
|---|---|---|---|
| Base Case | Option 1 | $ - | 5 |
| Passive/Active Flocculation | Option 2 | $ 1 | 5 |
| In-situ Active (GBR) | Option 3 | $ 12 | 4.5 |
| RO + MBBR | Option 4 | $ 66 | 3.5 |
| RO + MBBR + HDS Lime | Option 5 | $ 100 | 3 |
| RO + MBBR + Sulphide | Option 6 | $ 100 | 3 |
| RO + MBBR + Ferric | Option 7 | $ 100 | 3 |
| RO + MBBR + Ion Exchange | Option 8 | $ 123 | 2.5 |
| Zero Liquid Discharge | Option 9 | $ 285 | 1 |
| Modified WMP Liners | Option 10 | $ 45 | 4 |

## 5.3 Step Five - MAA Ranking and Preferred BAT

Table 5-4 shows the scoring of candidate BAT scenarios for the Tenas Project:

- In-situ Active GBRs with the Base Case and the Base Case were the highest ranked scenarios (78 points out of a possible 100) followed by Passive/Active flocculation with the Base Case (77 points).
- The option of modifying management and control pond liners to reduce seepage with the Base Case scored 71 points and was therefore less preferred than the In-situ Active GBR with the Base Case technology, the Base Case or Passive/Active flocculation with the Base Case.

- Active tank-based water treatment options with the Base Case, except for zero liquid discharge treatment with the Base Case, ranged between 64 and 69 points, with an average of 65 points.
- Zero liquid discharge with the Base Case scored the lowest at 55 points.

The active tank-based water treatment options generally scored higher for criteria related to control-effectiveness, but scored lower for environmental and socio-cultural criteria, and cost. Overall, the BAT assessment indicated the base case was similar in ranking to the In-situ Active GBR technology with the Base Case. Tank-based water treatment options with the Base Case, In-situ Active GBRs with the Base Case, Passive/Active flocculation with the Base Case, and the Base Case with BMPs scored similarly for the combined reliability criteria.

## 5.4 Step 5 - Sensitivity

### 5.4.1 MAA without Cost-Effectiveness Account

Table 5-5 shows the MAA table for the candidate technologies without the Cost-Effectiveness account (i.e., cost is not considered to be a factor). When the cost-effectiveness account is eliminated from the MAA, all options achieve scores in a similar range with Option 3 (In-situ Active GBR with the Base Case), Option 5 (RO+MBBR+HDS Lime) and Option 8 (RO + MBBR + Ion Exchange with the Base Case) slightly preferred. Option 5 (RO+MBBR+HDS Lime) was selected as the primary mitigation method for potential future water quality concerns identified by onsite water quality monitoring.

**Table 5-4 MAA Assessment of Candidate BAT Scenarios**

| | | Base Case with BMPs | Passive/Active Flocculation | In-situ Active (GBR) | RO + MBBR | RO + MBBR + HDS Lime | RO + MBBR + Sulphide | RO + MBBR + Ferric | RO + MBBR + Ion Exchange | Zero Liquid Discaherge | Modified Liners in Water Management Ponds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Assessment Criterion** | **Weight** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** | **Option 6** | **Option 7** | **Option 8** | **Option 9** | **Option 10** |
| **Reliability** | **20** | **17** | **16** | **14** | **15** | **14** | **14** | **15** | **14** | **12** | **16** |
| **Risk Assessment** | 5 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| **Robustness** | 5 | 5 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 5 |
| **Scalability** | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 3 |
| **Long-term Viability** | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 5 |
| **Control-Effectiveness** | **30** | **13** | **13** | **20** | **20** | **24** | **21** | **20** | **24** | **27** | **13** |
| **Pollutant Reduction** | 20 | 1 | 1 | 2.5 | 2.4 | 3.4 | 2.8 | 2.5 | 3.5 | 4.2 | 1 |
| **Toxicity Reduction** | 10 | 4.5 | 4.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4.5 |
| **Environmental & Socio-Cultural Impacts** | **25** | **23** | **23** | **22** | **20** | **17** | **17** | **17** | **17** | **10** | **22** |
| **Energy Efficiency** | 5 | 5 | 5 | 4.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 5 |
| **Greenhouse Gas Emission** | 6 | 5 | 5 | 4.5 | 4 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 3.5 |
| **Footprint** | 4 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 3 | 3 | 5 |
| **Secondary Waste Production** | 5 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 2.5 | 1 | 5 |
| **Adherence to Yintah Management Directives** | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Cost-Effectiveness** | **25** | **25** | **25** | **22** | **14** | **12** | **12** | **12** | **12** | **5** | **19** |
| **Efficient Use of Existing Resources** | 3 | 5 | 5 | 4 | 2 | 2 | 2 | 2 | 2 | 1.5 | 3 |
| **Life Cycle Cost Analysis** | 22 | 5 | 5 | 4.5 | 3 | 2.5 | 2.5 | 2.5 | 2.5 | 1 | 4 |
| **Total** | **100** | **78** | **77** | **78** | **69** | **67** | **65** | **64** | **67** | **54** | **71** |

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/ Telkwa BAT Tech Screening REV02.xlsx

**Table 5-5 MAA Assessment of Candidate BAT Scenarios with Cost-Effectiveness Account Eliminated**

| | | Base Case with BMPs | Passive/Active Flocculation | In-situ Active (GBR) | RO + MBBR | RO + MBBR + HDS Lime | RO + MBBR + Sulphide | RO + MBBR + Ferric | RO + MBBR + Ion Exchange | Zero Liquid Discaherge | Modified Liners in Water Management Ponds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Assessment Criterion** | **Weight** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** | **Option 6** | **Option 7** | **Option 8** | **Option 9** | **Option 10** |
| **Reliability** | **20** | **17** | **16** | **14** | **15** | **14** | **14** | **15** | **14** | **12** | **16** |
| **Risk Assessment** | 5 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| **Robustness** | 5 | 5 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 5 |
| **Scalability** | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 3 |
| **Long-term Viability** | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 5 |
| **Control-Effectiveness** | **30** | **13** | **13** | **20** | **20** | **24** | **21** | **20** | **24** | **27** | **13** |
| **Pollutant Reduction** | 20 | 1 | 1 | 2.5 | 2.4 | 3.4 | 2.8 | 2.5 | 3.5 | 4.2 | 1 |
| **Toxicity Reduction** | 10 | 4.5 | 4.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4.5 |
| **Environmental & Socio-Cultural Impacts** | **25** | **23** | **23** | **22** | **20** | **17** | **17** | **17** | **17** | **10** | **22** |
| **Energy Efficiency** | 5 | 5 | 5 | 4.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 5 |
| **Greenhouse Gas Emission** | 6 | 5 | 5 | 4.5 | 4 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 3.5 |
| **Footprint** | 4 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 3 | 3 | 5 |
| **Secondary Waste Production** | 5 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 2.5 | 1 | 5 |
| **Adherence to Yintah Management Directives** | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Cost-Effectiveness** | **25** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Efficient Use of Existing Resources** | 3 | | | | | | | | | | |
| **Life Cycle Cost Analysis** | 22 | | | | | | | | | | |
| **Total** | **100** | **53** | **52** | **56** | **54** | **55** | **52** | **52** | **55** | **48** | **51** |

Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/ Telkwa BAT Tech Screening REV02.xlsx

# 6 Conclusions

The following was concluded based on the assessment of Best Achievable Technologies for the Tenas Project:

- The Base Case option that include Best Management Practices for water management is a highly ranked and feasible option for protecting the downstream water quality from the Project without the need for any further BMPs or technologies to be incorporated.

- In-situ Active GBRs with the Base Case and/or the Passive/Active flocculation with the Base Case are also highly ranked and feasible options that should be retained as contingency options during permitting and subsequent Operation phase if water quality predictions for the Project differ substantially from actual conditions observed during the development of the Project and water quality monitoring results are trending toward exceedances of the WQGs at some point in the future.

- To improve on the technology readiness level of the In-situ Active GBR technology for the POCs identified, TML should construct a Pilot In-situ Active GBR within the Coal Processing Plan Sedimentation Pond or alternative pond during the Project's Construction phase. As such it is recommended that TML designs and obtains provincial approvals for this pilot facility.

- Active tank-based water treatment options with the Base Case are ranked lower but are still feasible and meet the required Technology Readiness Levels (TRL) as defined by BC Ministry of Environment for EAC and permitting phase. These water treatment options should be retained as contingency options during permitting and subsequent Operation phase if water quality predictions for the Project differ substantially from actual conditions observed during the development of the Project and water quality monitoring results are trending toward exceedances of the WQGs at some point in the future. RO+MBBR+HDS Lime was selected as the primary mitigation method for potential future water quality concerns identified by onsite water quality monitoring.

- Modification of management and control pond liners with the Base Case is ranked even lower but is still feasible and should be retained as a contingency option for the West Management Pond (WMP) during permitting and subsequent Operation Phase if water quality predictions for the Project differ substantially from actual conditions observed during the development of the Project and water quality monitoring results are trending toward exceedances of the WQGs at some point in the future.

- When the cost-effectiveness account is eliminated from the MAA, all options achieve scores in a similar range with Option 3 (In-situ Active GBR with the Base Case) and Option 8 (RO + MBBR + Ion Exchange with the Base Case) ranked slightly higher than other options.

- Given the low risk profile of the Project and modelling results, it is highly likely that pre-emptive construction of a RO+MBBR+HDS Lime water treatment plant (i.e., during mine construction) would be an unnecessary misuse of resources, energy, and capital until water monitoring demonstrates that WQGs will be exceeded at some point in the future.

As per the MAA methodology, the preferred technology is the highest ranked (highest score) option. However, the BAT assessment is a conceptual evaluation of technologies based on information and data currently available. If subsequent studies or engineering design identifies limitations or issues that had not been identified as part of the conceptual evaluation, the rank order for the various technologies may change such that the second or third highest ranked technology becomes the highest ranked (preferred) technology. Alternatively, unexpected benefits of one or more of the lower ranked technologies may be discovered as part of subsequent investigations, which may cause lower ranked technologies to become the highest ranked (preferred) technology.

# 7 Recommendations

Based on a review of the Project water and load balance model results and the outcome of the BAT assessment, SRK recommends that TML implements a plan to improve the technology readiness level of the In-situ Active GBR technology for the POCs identified. TML should construct a Pilot In-situ Active GBR within the Coal Processing Plan Sedimentation Pond or alternative pond during the Project's Construction phase. As such it is recommended that TML commits to design and obtain provincial approvals for this pilot facility.

Given the inherent uncertainties associated with model results as well of the lack of site-specific pilot- or field-scale In-situ Active GBR test data, SRK further recommends that TML designs and permits Option 5 (RO+MBBR+HDS Lime water treatment technology) based on an approved Trigger Action Response Plan developed during BC provincial permitting process, for potential implementation in the future within one year of a final construction decisions, which will be based on water monitoring data collected during the Construction and Operation phases. Although Option 4 (RO + MBBR) scored higher than Option 5 (RO+MBBR+HDS Lime) and Option 8 (RO+MBBR+ Ion Exchange), both Option 5 and Option 8 scored higher when costs are eliminated from consideration since they both remove a wider range of constituents than Option 4. Furthermore, all unit operations in Option 5 are in common use at operating mine sites, while the use of ion exchange is relatively uncommon. Therefore, the performance and operational risks associated with Options 5 are lower than Option 8. This is the rationale used to recommend Option 5 for design and permitting tasks as the primary mitigation method to address potential future water quality concerns identified by onsite water quality monitoring.

A conceptual design of the RO+MBBR+HDS Lime water treatment technology has been provided in Appendix D which covers the following aspects:

- Description of the water treatment process and general design features.
- Proposed treatment plant location.
- Expected range of influent water quality and flow.

- Discharge quality and location.
- Estimated reagent use.
- Sludge volumes and sludge management, and
- Capital and operating cost estimates.

The water quality model results indicates that the Project will not cause any exceedances of BC water quality guidelines in receiving water at the mixing zone boundary in Goathorn Creek during any phase of the Project. There is a very short duration cobalt exceedance (2025 guideline) in Four Creek caused by transient groundwater flow which will likely not occur once groundwater attenuation mechanisms are accounted for using actual field monitoring. Therefore, SRK recommends that TML postpone construction of the RO+MBBR+HDS Lime water treatment plant until actual site water quality data has been collected but before any material long term water quality effects are detected. In SRK's view given the modelled water quality results, it is highly likely that the pre-emptive construction of a RO+MBBR+HDS Lime water treatment plant would be an unnecessary misuse of resources, energy, and capital. Given the low risk profile of the Project, the prudent approach is to design and permit an RO+MBBR+HDS Lime water treatment plant and rely on an approved Trigger Action Response Plan developed during BC provincial permitting process for potential implementation in the future, which will be based on water monitoring data collected during the Construction and Operation phases.

TML develop a robust and comprehensive water quality monitoring program for review and input by various regulatory agencies and Indigenous nations during the BC provincial permitting process.

This report, Tenas Project Best Achievable Technology (BAT) Assessment, was prepared by SRK Consulting (Canada) Inc.

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EGBC Permit to Practice: 1003655

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The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

# 8 References

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# Appendix A: Draft Tenas Project BAT Presentation provided December 18, 2024 to Ministry of Environment and Ministry of Mines for Feedback

# TENAS PROJECT

## BAT Assessment Discussion

18 December, 2024

Updated

31 March, 2025

TELKWA MINING LIMITED

srk consulting

BATHURST RESOURCES LIMITED

# AGENDA

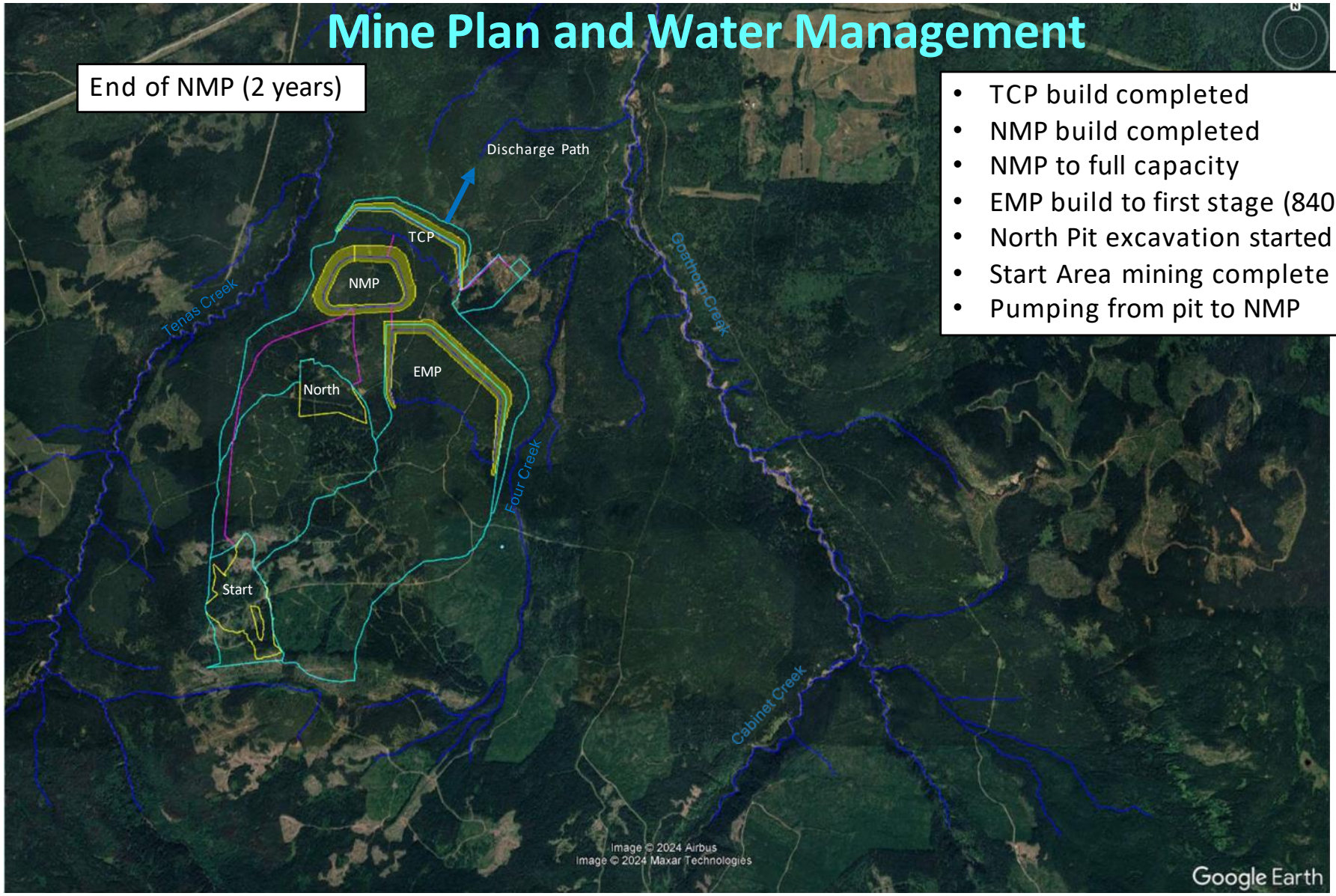
- Introduction
- Mine Plan
- Surface & Groundwater Model Overview
- Updated EA Project Case (2024 – with blasthole liners) changes from EA Project Case
- BAT Assessment
- Technology Readiness Level Assessment
- Effects of Water Treatment
- Preliminary Recommendations
- Next Steps

# Introduction

- **Project Overview:**
  - Telkwa Mining Limited (TML) is proposing to develop the Tenas coal deposit (the Project) in northwest British Columbia within the Telkwa River watershed.
  - The Project includes an open pit, a coal processing plant, management ponds for permanent disposal of potentially acid generating waste rock, a control pond for managing surface discharges, and a rail infrastructure area.
- **Water Management and Water Quality Mitigation:**
  - Water management has been a major focus in the design of the Project.
  - Significant source control measures and best water management practices have been incorporated in the design of the Project, including:
    - PAG rock will be permanently inundated in management ponds to prevent neutral leaching and formation of acid rock drainage.
    - The management ponds will be lined by low-permeability bentonite to reduce recharge of groundwater.
    - Non-acid generating rock backfilled into the open pit will be progressively reclaimed and covered in a manner that will minimize oxidation and metal leaching.
    - Attenuation of effluent in Tenas Control Pond and pacing of discharge.
    - Erosion prevention and sediment control in sedimentation ponds
    - Clean water diversions to route water around Project activities
    - Incorporation of Blasthole Liners
  - The mitigation measures already included in the Project design can be considered Best Management Practices (BMPs) for managing water quality of site effluent.

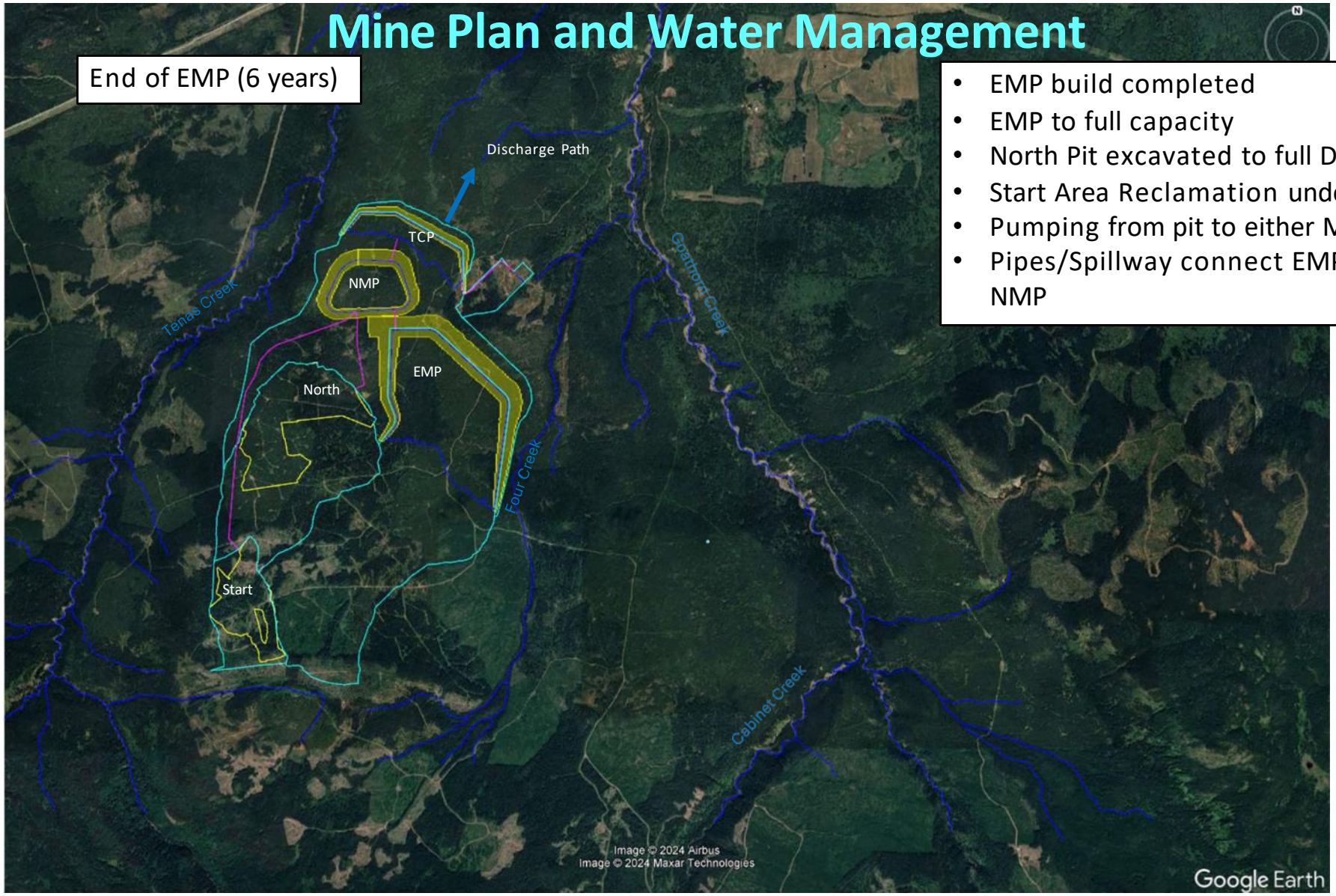
TELKWA MINING LIMITED srk consulting BATHURST RESOURCES LIMITED

# Mine Plan and Water Management



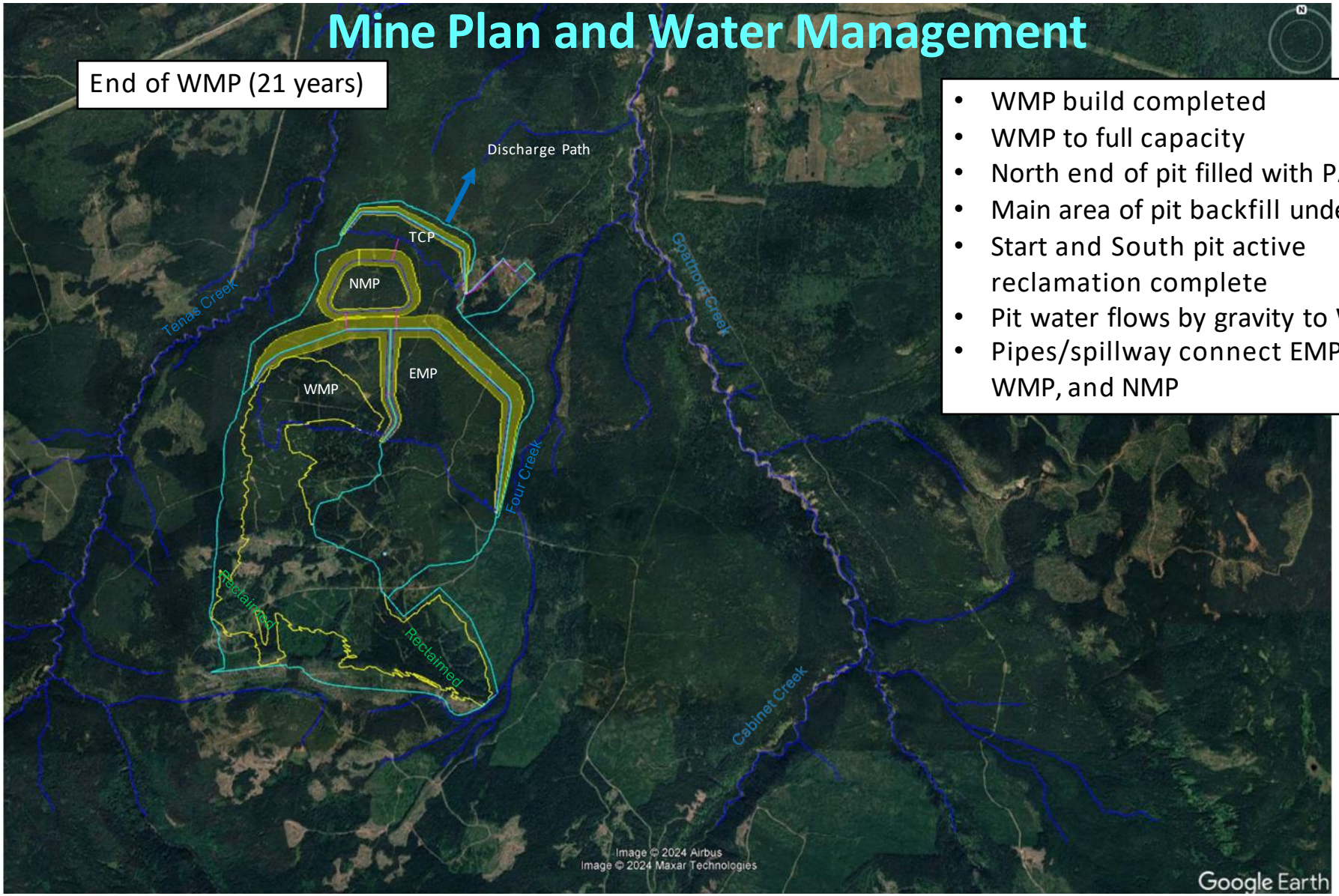

- TCP build completed
- NMP build completed
- NMP to full capacity
- EMP build to first stage (840m)
- North Pit excavation started
- Start Area mining complete
- Pumping from pit to NMP

# Mine Plan and Water Management




- EMP build completed
- EMP to full capacity
- North Pit excavated to full Depth
- Start Area Reclamation underway
- Pumping from pit to either MP
- Pipes/Spillway connect EMP to NMP

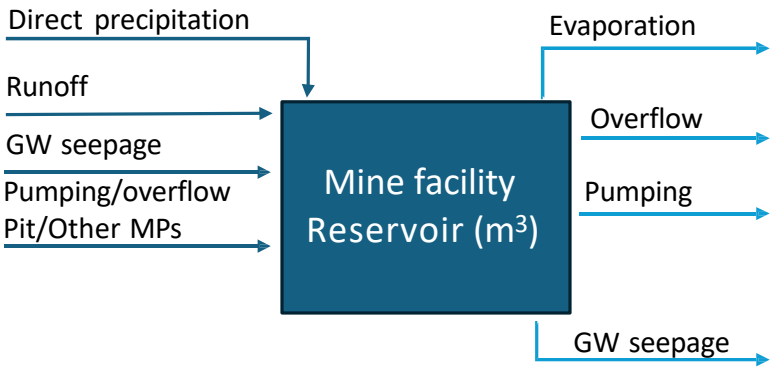
# Mine Plan and Water Management



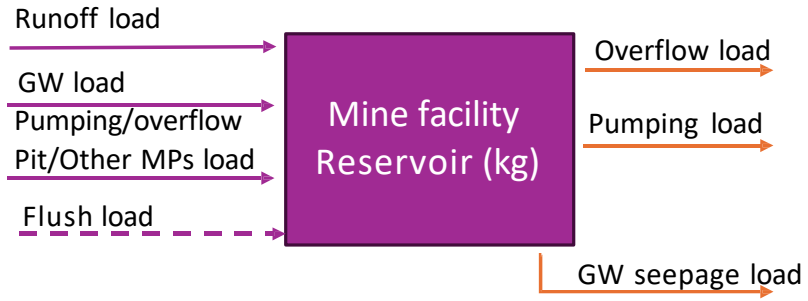

- WMP build completed
- WMP to full capacity
- North end of pit filled with PAG
- Main area of pit backfill underway
- Start and South pit active reclamation complete
- Pit water flows by gravity to WMP
- Pipes/spillway connect EMP, WMP, and NMP

# Surface and Groundwater Model Overview

Inflows and outflows




Loads in and out

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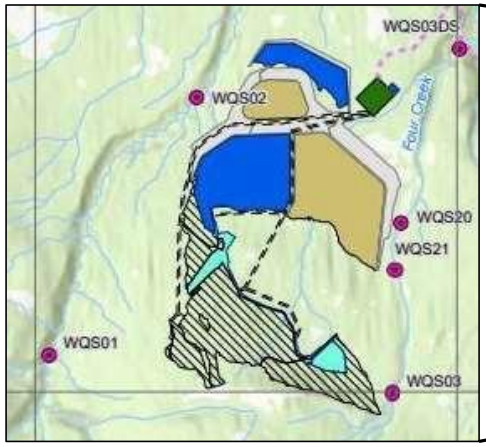
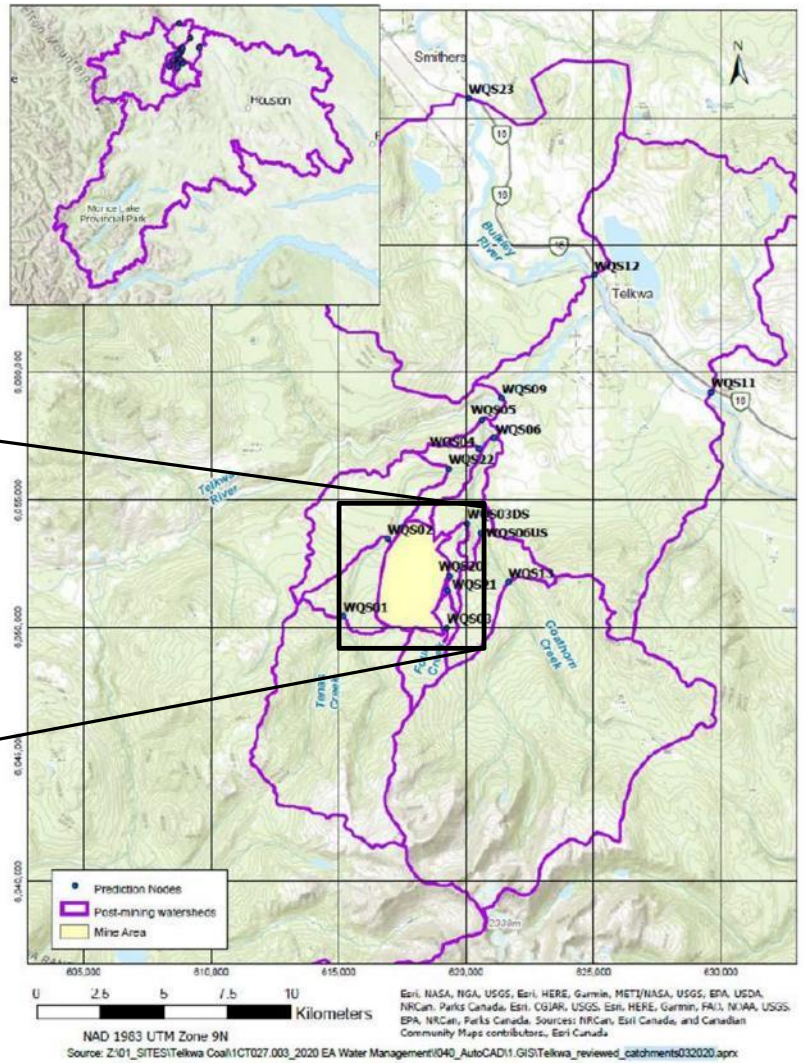
# Surface and Groundwater Model Overview

## Model boundaries:

Water and Load Balance Model (WLBM) was developed to evaluate the Project's potential effect on local catchments and downstream water quality, and to evaluate the feasibility and performance of mitigation controls.

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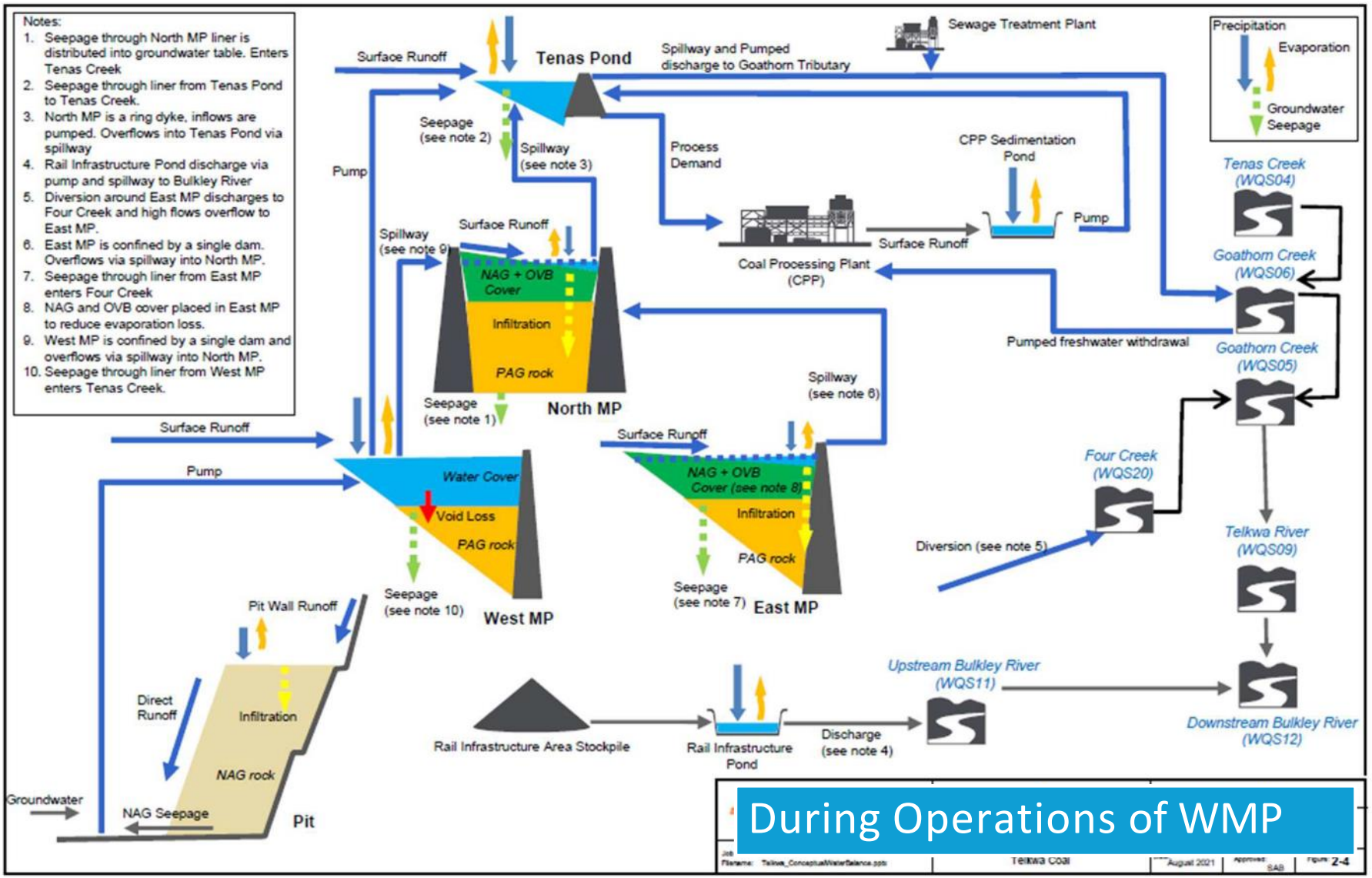
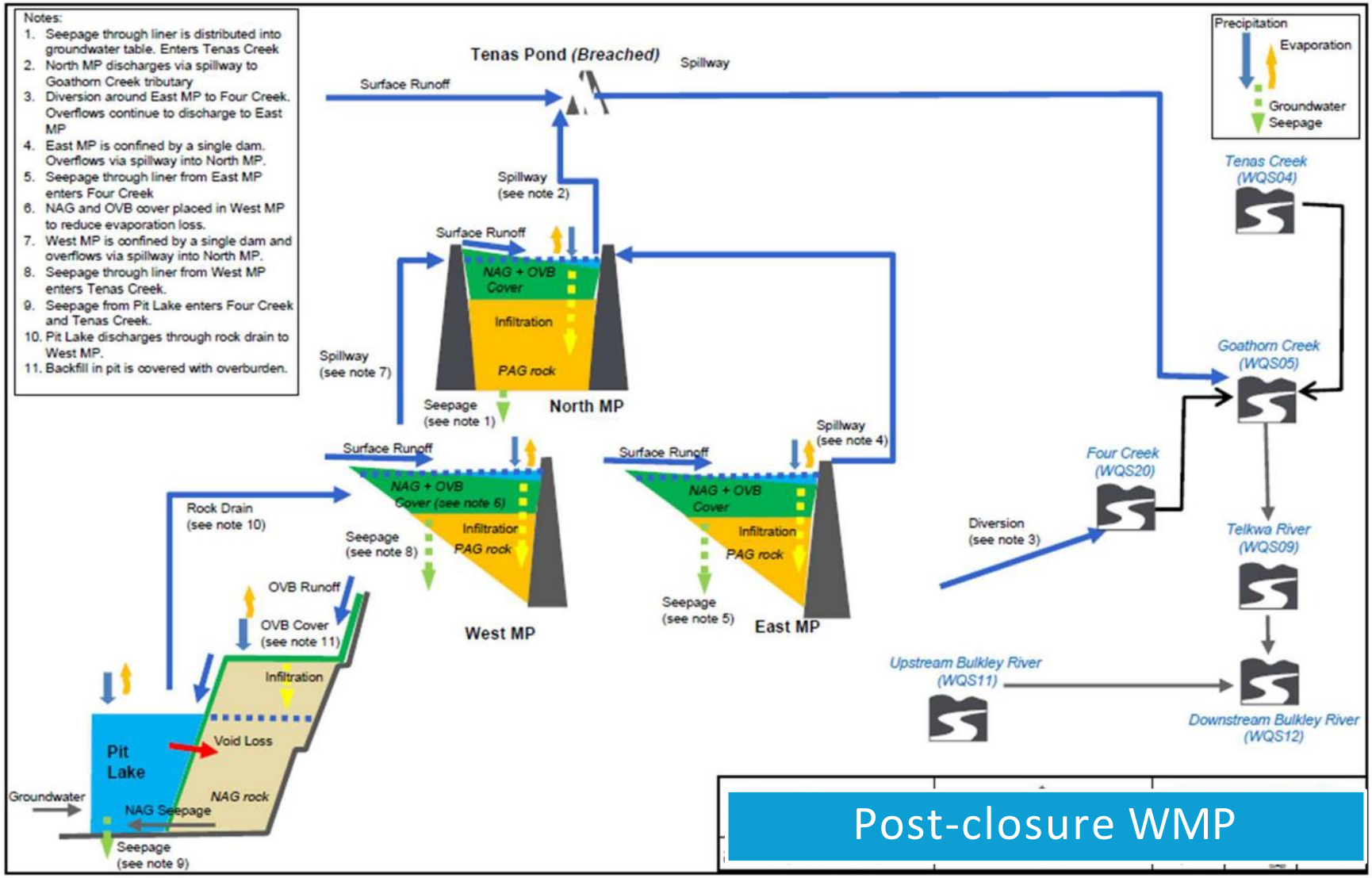



# During Operations of WMP

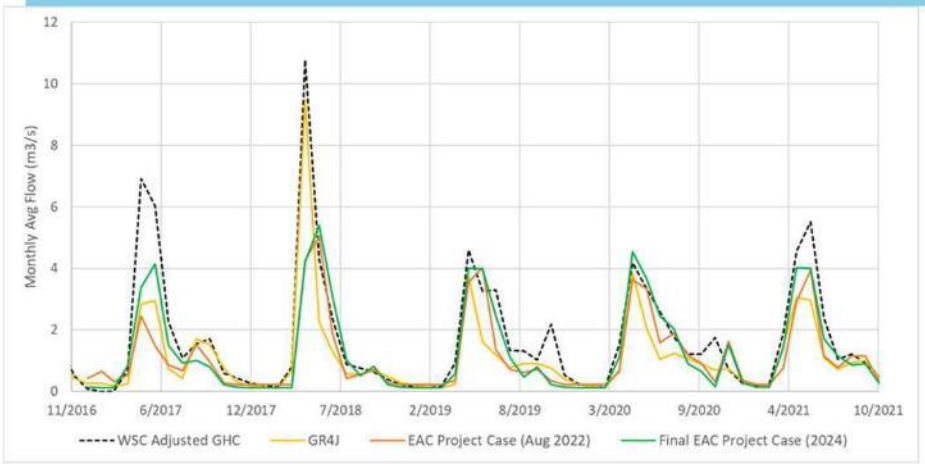



# Post-closure WMP

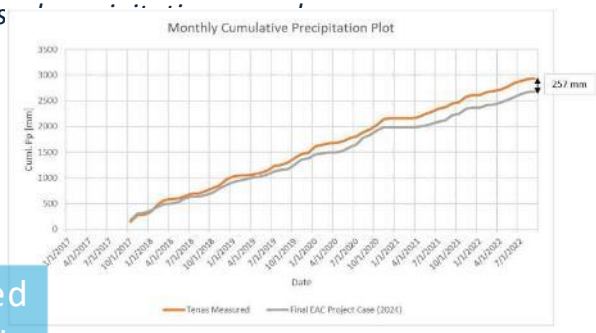
# Updated EAC Project Case (2024)*: changes from EA Project Case (2022)

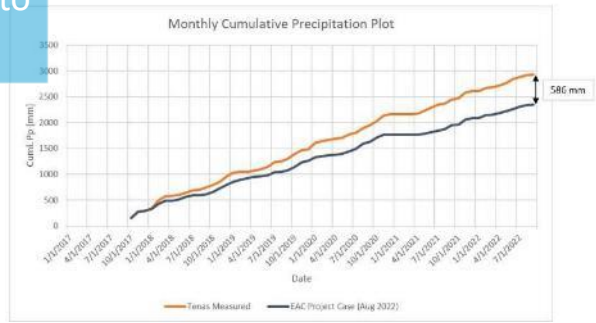
- Hydrology
  - Precipitation and temperature
    *Updated synthetic historical dataset for precipitation (1983-2023) based on additional measured precipitation values from Tenas Deposit Station,*
    *changing the mean annual precipitation (MAP) from 608 to 666mm*
  - Evaporation rates
    *Updated evaporation rates using Morton coefficient (size dependent for ponds) and updated with updated MAP estimates and climate change corrections*
  - Climate change rate of change
    *Updated to the latest published models/analyses (CMIP6) published in 2022*
  - Calibrated runoff coefficients and baseflow for each catchment
    *Runoff coefficients and recession values updated based on additional flow measurements and revi s*
    *Update of baseflows when needed based on new flow measurements*

Comparison of runoff flow models for Goathorn Creek




Comparison of scaled precipitation for site to measured data




*This Updated EAC Project Case (2024) includes blasthole liners

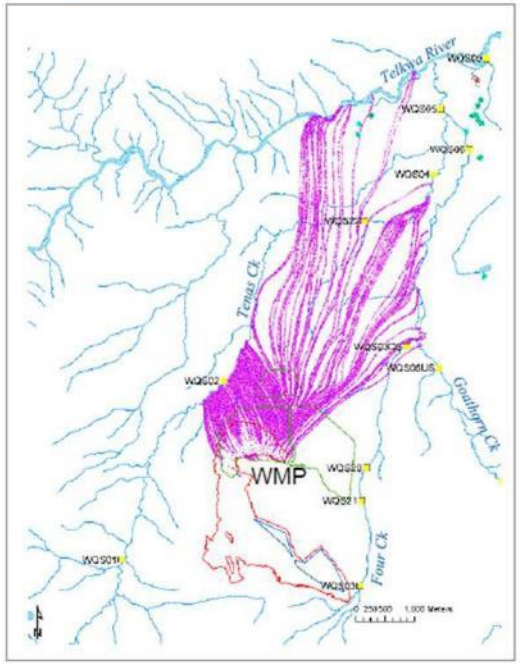
# Updated EAC Project Case (2024)*: changes from EA Project Case (2022)

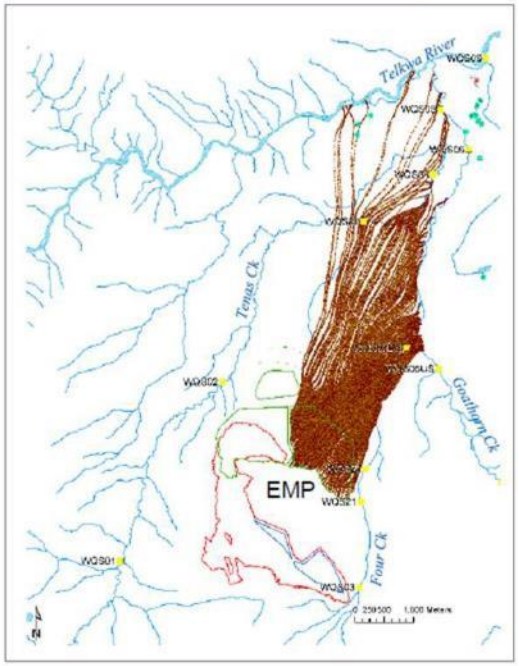
- Groundwater seepage
  - Seepage from and to mine facilities (flows in/out of mine facilities)
  - Impact on baseflow at prediction nodes
  - Particle pathways in groundwatershed from mine facilities to prediction nodes

    *Keeping the contribution of mine seepage to stream baseflows consistent between the groundwater and WLB models*

    *100% of the load is still accounted for, but ends up further downstream than previously modelled*

Groundwater modelling of particle pathways in groundwatershed




*This Updated EAC Project Case (2024) includes blasthole liners

# Updated EAC Project Case (2024)*: changes from EA Project Case (2022)

- Geochemical source terms
  - Loading rate ("flush") for submerged mined rock
  - Concentration based source term for impacted catchments
    - *All contact source terms were updated based on new barrel data collected up to 2022 with the analysis completed in 2023*
    - *Development of overburden source term*
    - *Revised backfill source term developed by O'Kane modelled low oxidation rate and higher wetted levels within the backfill*
- Background concentrations
  - Concentration based source term for unimpacted catchments ("natural")
    - *Use of seasonal background parameter concentrations source term (summer/winter)*
    - *Revision of groundwater source term for total parameters*

## O'Kane modelling of backfill $O_2$ ingress

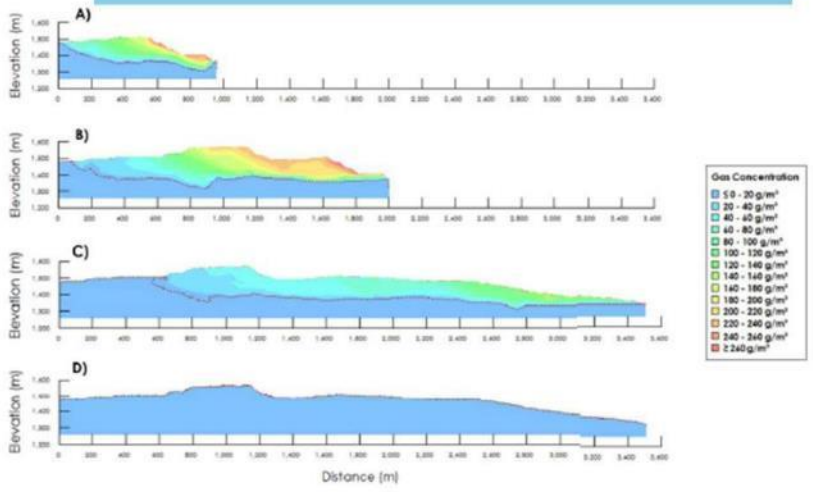
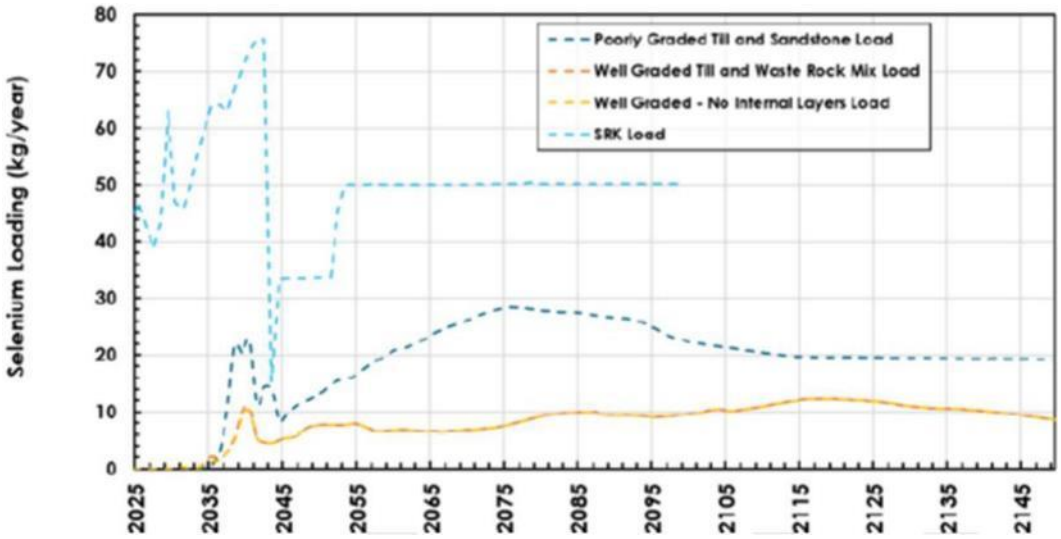



Figure 4.3: Development of suboxic zone (outlined by red dashed line in figures, which represents the zone at, or below, an $O_2$ concentration of 13 g/m³ or 1 vol.%) for the no internal layers scenario at A) Year 12; B) Year 17; C) Year 23; and d) Year 36/Long Term.

## Se load comparison between O'Kane and SRK




*This Updated EAC Project Case (2024) includes blasthole liners

# Updated EAC Project Case (2024)*: changes from EA Project Case (2022)

- Mine plan
  - Rock placement schedule
  - Facility sizing (TCP, MP, Pit)
  - Water management decisions (pumping etc)

- Progressive reclamation of the NAG backfill in the Open Pit
- Water cover kept between 0.5m (min) to 0.7m (max) during PAG placement in MPs, Blasthole liners to reduce N-leaching from explosives
- TCP breached in 2048, NMP starts surface discharge after 2048
- Unsaturated rock volume for dam/buttresses updated to 7% by mass
- Process water comes from Pit seepage, then TCP
- Blasthole liners to decrease nitrogen load during blasting

*This Updated EAC Project Case (2024) includes blasthole liners

# Updated EAC Project Case (2024)* – modelled results in the receiving environment

| Prediction Node | BC WQG (August 2022) (mg/L) | BC WQG (2024) (mg/L) | Guideline Comments | EAC Project CASE (August 2022) (mg/L) | Updated EAC Project Case (2024)* (mg/L) | Comments |
|---|---|---|---|---|---|---|
| **WQSEA1 – Goathorn Creek** Copper (d) | N/A | 0.0012 | New Cu(d) guideline | Not Available | 0.0022 | Load from site comes mainly from surface discharge |
| **WQS06 – Goathorn Creek** Copper (d) | N/A | 0.0012 | New Cu(d) guideline | 0.0020 | 0.0021 | Load from site comes mainly from surface discharge |
| **WQS03_DS – Four Creek** | | | | | | |
| Aluminum (d) | 0.050 | N/A | Not available | 0.16 | 0.052 | |
| Aluminum (t) | 0.10 | 0.69 | New Al(t) guideline | 0.25 | 0.26 | |
| Cadmium (d) | 0.00024 | 0.00023 | Same | 0.00026 | 0.000013 | Load from site comes from groundwater seepage |
| Cadmium (t) | 0.00009 | N/A | Not used | 0.00026 | 0.000015 | |
| Chromium (t) | 0.0089 | 0.001 | Using Cr(IV) | 0.0021 | 0.00052 | |
| Nitrite (t) | 0.020 | 0.020 | Same | 0.0038 | 0.0095 | |
| Sulphate (t) | 309 | 309 | Same | 360 | 31 | |
| Selenium (t) | 0.0020 | 0.0020 | Same | 0.0058 | 0.00074 | |
| **WQS04 – Tenas Creek** | | | | | | |
| Aluminum (d) | 0.05 | N/A | Not available | 0.053 | 0.027 | |
| Aluminum (t) | 0.10 | 0.35 | New Al(t)guideline | 0.10 | 0.11 | |
| Cadmium (d) | 0.00017 | 0.00017 | Same | 0.00016 | 0.0000068 | |
| Cadmium (t) | 0.00009 | N/A | Not used | 0.00017 | 0.0000088 | Load from site comes from groundwater seepage |
| Chromium (t) | 0.0089 | 0.001 | Using Cr(IV) | 0.0017 | 0.00054 | |
| Nitrite (t) | 0.020 | 0.020 | Same | 0.045 | 0.0060 | |
| Sulphate (t) | 218 | 218 | Same | 260 | 23 | |
| Copper (d) | N/A | 0.0026 | New Cu(d) guideline | 0.0031 | 0.0015 | |
| Selenium (t) | 0.0020 | 0.0020 | Same | 0.0041 | 0.00071 | |
| Nickel (d) | N/A | 0.0025 | New Ni (d) guideline | 0.0031 | 0.00065 | |

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*This Updated EAC Project Case (2024) includes blasthole liners

# BAT Methodology for the Tenas Project

- **Environmental Assessment:**
  - The Environmental Assessment Certificate (EAC) Application for the Tenas Project is currently under review.
  - On November 23rd 2022, the Project Working Group (BC ENV) asked TML to prepare a Best Achievable Technology (BAT) assessment for additional mitigation measures that could improve the quality of discharge from the Project (i.e., improvements beyond those that would be realized by the BMPs already incorporated in the Project design).
  - The proposed assessment methodology described in this presentation was developed for the Tenas Project BAT assessment.
  - TML has incorporated feedback on the proposed methodology and will use this as the path forward with the EA Sub Working Group comprised of EMLI and MENV participants.

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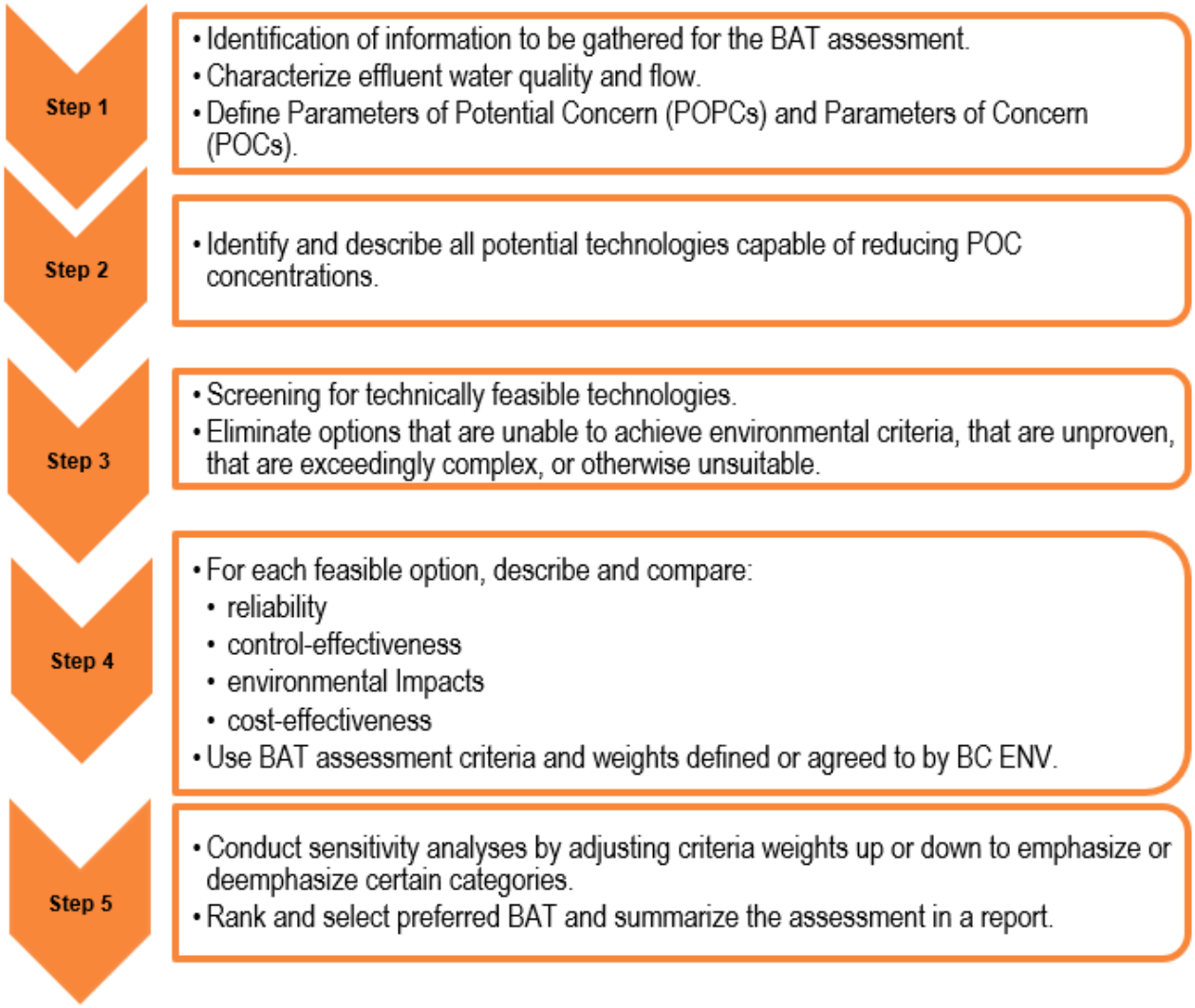
# BAT Methodology




**Based on BC ENV's November 2024 guidance document.**

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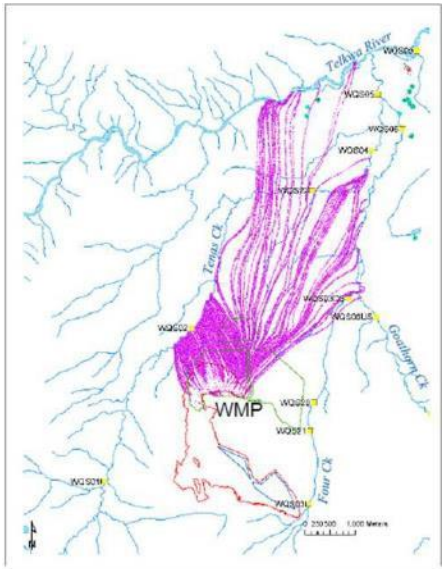
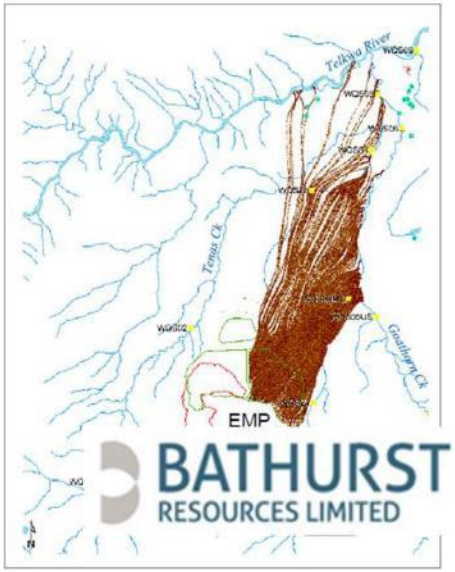
# Step 1: Discharges Considered in BAT

The following discharges were considered in the BAT assessment:

- **Surface discharge:**
  - Tenas Control Pond discharge (during operations until 2048) – discharges to Goathorn Creek
  - North Management Pond (after 2048) – discharges to Goathorn Creek
  - Rail Loadout settling pond (during operations until 2044) – discharges to the ground
- **Groundwater discharges:**
  - Tenas Control Pond (TCP) – discharges to Tenas Creek, Goathorn Creek, and Telkwa River.
  - North Management Pond (NMP) – discharges to Tenas Creek, Goathorn Creek, and Telkwa River.
  - East Management Pond (EMP) – discharges to Four Creek, Tenas Creek, Goathorn Creek, and Telkwa River.
  - West Management Pond (WMP) – discharges to Tenas Creek, , Goathorn Creek, and Telkwa River.
  - Groundwater recharge in the open pit is two orders of magnitude lower than management ponds and control pond and as such is not considered to be a controlled/managed discharge.

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# Step 1: Parameters of Potential Concern (POPCs) and Parameters of Concern (POCs)

- A parameter is declared to be a Parameter of Potential Concern (POPC) if concentrations in untreated effluent is **greater than 80% of the lowest applicable water quality guideline (WQG)**.
- Guidelines considered for this BAT assessment include BC WQG for protection of aquatic life, and wildlife. Canada's Federal Environmental Quality Guidelines (FQEG) is used for strontium, which does not have a BC WQG.
- POPCs were identified by comparing **base case** water quality model results with 'typical' (as opposed to 'high') source terms to 80% of the lowest WQG.

  - ***base case*** *refers to "Updated EAC Project case (2024) with blasthole liners"*

- POPC screening is a pass/fail exercise. The magnitude or frequence of WQG exceedance are not considered at this stage (as per BC ENV guidelines).
- Parameters cannot be excluded from the list of POPCs just because background concentrations are elevated above WQGs (as per BC ENV guidance).
- The identified POPCs become POCs unless there is some scientific or operational reason for excluding them.

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# Step 1: Parameters of Concern

- 12 POCs.
- Background water quality has four POCs.
- All technologies that could be used to remove or reduce the identified POCs will be considered in the technology screening step.

| | Surface Discharge | | | Groundwater Discharge (Post-Closure) | | | | Background / Baseline |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **TCP Discharge (Operation)** | **NMP Discharge (Post-Closure)** | **RLO discharge – (Operation)** | **TCP Seepage** | **NMP Seepage** | **WMP Seepage** | **EMP Seepage** | **See Footnote** |
| **Nitrogen Nutrients** | | | | | | | | |
| Nitrate | X | | | X | | X | | |
| Nitrite | X | | | X | X | X | X | |
| **Sulphate** | | | | | | | | |
| Sulphate | X | X | | X | X | X | | |
| **Metals** | | | | | | | | |
| Aluminum, total | X | X | X | | | | | X[A] |
| Cadmium, dissolved | | | X[D] | | | | | |
| Cobalt, total | | | | | X | X | X | |
| Copper, dissolved | X | X | | | | X | | X[B] |
| Iron, total | X | X | X | | | | | X[C] |
| Nickel, dissolved | X | X | X | X | X | X | X | |
| Zinc, dissolved | X | | | X | X | X | | |
| **Oxyanions** | | | | | | | | |
| Molybdenum, total | X | | | X | | | | |
| Selenium, total | X | X | | X | X | X | X | |
| | | | | | | | | |

Notes:
A - Background POC for Four, Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
B - Background POC for Goathorn, Tenas Creeks, Telkwa and Bulkley Rivers.
C - Background POC for Four, Tenas Creeks, Telkwa and Bulkley Rivers.
D - Cd is POC for Rail Load Out only - it is therefore not considered in future screening

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20240925.xlsx]POC Condensed

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# Tenas Pond/NMP Surface Discharge POCs

| POC | Units | Goathorn Creek WQEA1 Baseline P50 | Goathorn Creek WQEA1 Baseline P95 | WQG | 80% WQG | Max TCP discharge concentration Typical Source Terms | Max NMP discharge concentration Typical Source Terms |
|---|---|---|---|---|---|---|---|
| Nitrate | mg-N/L | 0.041 | 0.076 | 3.0 | 2.4 | 8.1 | 0.66 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.19 | 0.015 |
| Sulphate | mg/L | 24 | 37 | 218 | 180 | 420 | 230 |
| Aluminum, total | mg/L | 0.092 | 0.75 | 0.27 | 0.22 | 0.39 | 0.39 |
| Copper, dissolved | mg/L | 0.0014 | 0.0039 | 0.0013 | 0.0010 | 0.0017 | 0.0022 |
| Iron, total | mg/L | 0.085 | 0.78 | 1.0 | 0.80 | 1.5 | 1.5 |
| Molybdenum, total | mg/L | 0.00047 | 0.00062 | 0.034 | 0.027 | 0.035 | 0.0077 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0011 | 0.0022 | 0.0018 | 0.0060 | 0.0023 |
| Selenium, total | mg/L | 0.000086 | 0.00020 | 0.0020 | 0.0016 | 0.024 | 0.0082 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0021 | 0.0074 | 0.0059 | 0.0098 | 0.0019 |

Blue colour cells indicate parameters exceeding BC WQG
Modelled results are for “Updated EAC Project Case (2024) with blasthole liners”

# EMP Groundwater Seepage POCs

| Parameter | Units | Four Creek WQS03_DS Baseline P50 | Four Creek WQS03_DS Baseline P95 | WQG | 80% WQG | Max EMP - Typical ST |
|---|---|---|---|---|---|---|
| Nitrite | mg-N/L | 0.00050 | 0.0010 | 0.020 | 0.016 | 0.050 |
| Aluminum, total | mg/L | 0.099 | 1.2 | 0.69 | 0.55 | 0.018 |
| Cobalt, total | mg/L | 0.000050 | 0.00047 | 0.0040 | 0.0032 | 0.0035 |
| Iron, total | mg/L | 0.095 | 1.1 | 1.0 | 0.80 | 0.080 |
| Iron, dissolved | mg/L | 0.015 | 0.41 | 0.35 | 0.28 | 0.080 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0018 | 0.0047 | 0.0038 | 0.0053 |
| Selenium, total | mg/L | 0.000025 | 0.000095 | 0.0020 | 0.0016 | 0.0051 |

Blue colour cells indicate parameters exceeding BC WQG
Modelled results are for “Updated EAC Project Case (2024) with blasthole liners”

# NMP, WMP, TCP Groundwater Seepage POCs

| Parameter | Units | Tenas Creek WQS04 Baseline P50 | Tenas Creek WQS04 Baseline P95 | WQG | 80% WQG | Max NMP - Typical ST | Max WMP - Typical ST | Max TCP - Typical ST |
|---|---|---|---|---|---|---|---|---|
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 2.4 | 1.5 | 2.9 | 8.1 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.034 | 0.066 | 0.19 |
| Sulphate | mg/L | 2.6 | 7.4 | 220 | 180 | 240 | 250 | 420 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.0032 | 0.0040 | 0.0042 | 0.0028 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0026 | 0.0021 | 0.0017 | 0.0023 | 0.0017 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.027 | 0.0100 | 0.0084 | 0.035 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0025 | 0.0020 | 0.0065 | 0.0056 | 0.0060 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.0016 | 0.0069 | 0.0082 | 0.024 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0071 | 0.0057 | 0.0092 | 0.0071 | 0.0098 |

Blue colour cells indicate parameters exceeding BC WQG
Modelled results are for “Updated EAC Project Case (2024) with blasthole liners”

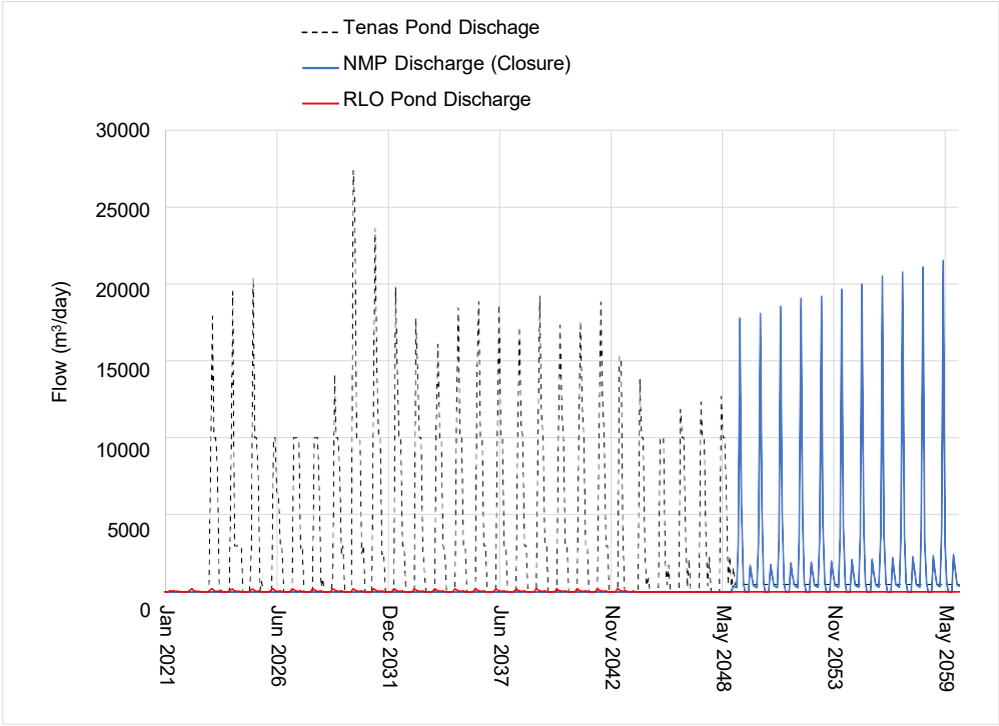
# Rail Loadout Discharge (to ground) POCs

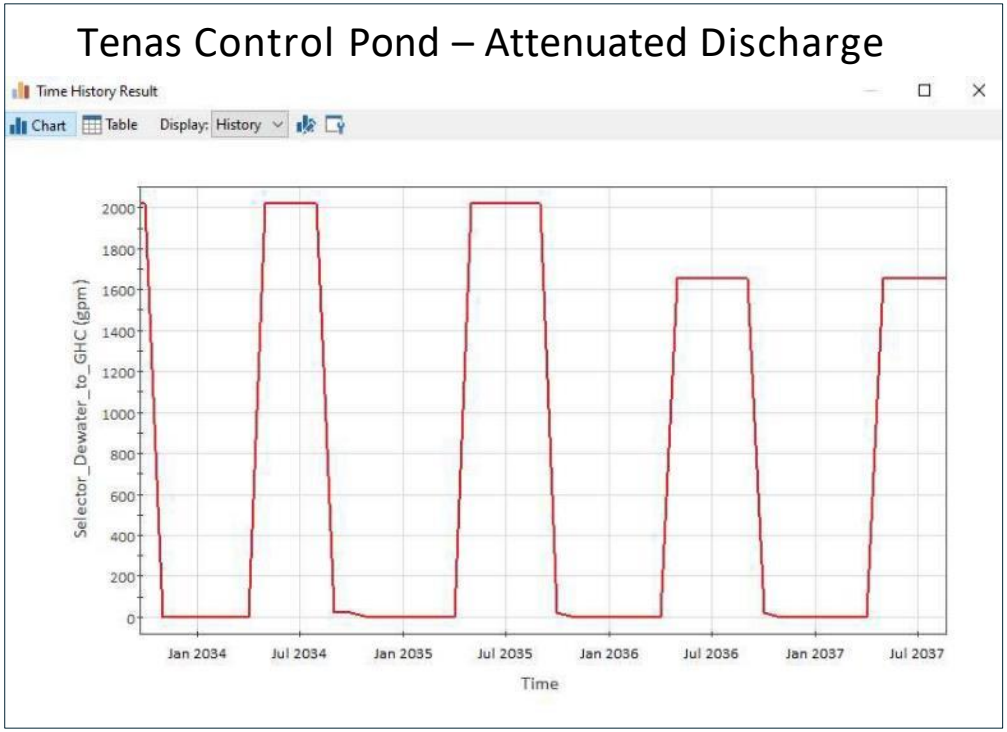
| Parameter | Units | Bulkley River WQS011 Baseline P50 | Bulkley River WQS011 Baseline P95 | WQG | 80% WQG | Max RLO discharge – Typical ST |
|---|---|---|---|---|---|---|
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.18 | 0.14 | 0.37 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.000085 | 0.000068 | 0.000091 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.80 | 1.5 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0013 | 0.0010 | 0.0023 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0039 | 0.00312 | 0.00342400 |

Blue colour cells indicate parameters exceeding BC WQG
Modelled results are for “Updated EAC Project Case (2024) with blasthole liners”

# Step 1: Discharge Rates

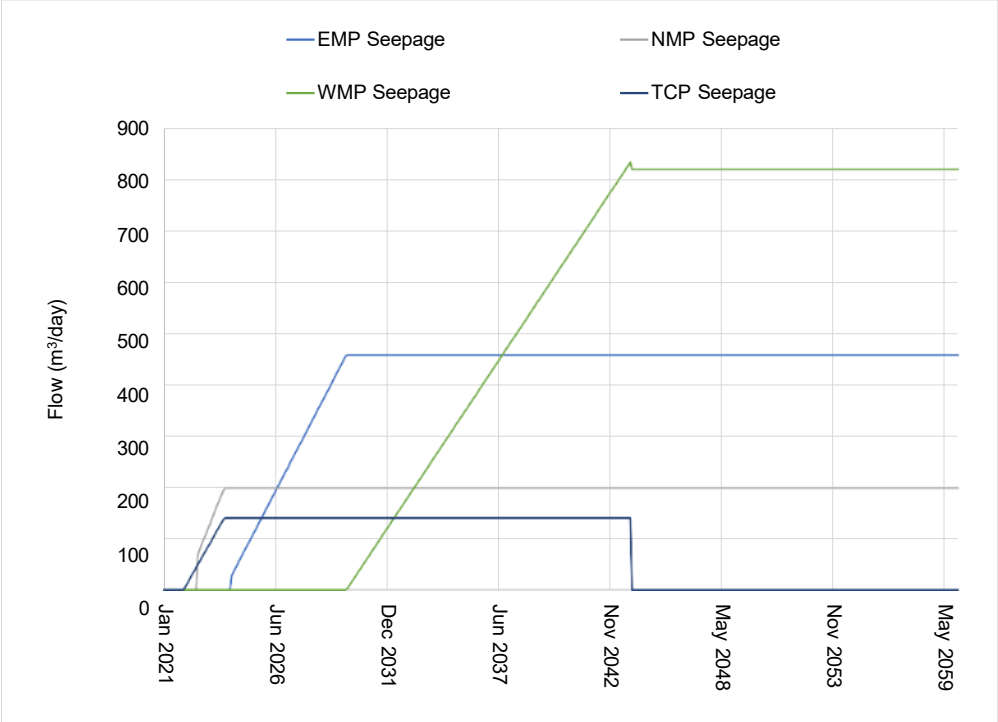
- Surface discharges are proportional to the natural hydrograph with high freshet flows and low winter flows.
- Active treatment of surface discharges would involve attenuation of peak flows using the Tenas Control Pond.



# Step 1: Discharge Rates

- Groundwater discharge rates are expected to increase gradually during the development of the Project and eventually reach a steady state.
- BATs for reducing/mitigation of the flow of groundwater will be considered before water treatment options are assessed.

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# Step 2: Identification of All Potentially Applicable Technologies

- Most POC concentrations in untreated effluent are only marginally higher than the water quality guidelines.
- There are no exceedances of POC's in the receiving environment at the modelled prediction nodes.
- Therefore, technologies that potentially could remove some (but not ALL) POCs to concentrations below WQGs were also considered to be potentially applicable technologies.

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# Step 2: Identification of All Potentially Applicable Technologies Groundwater-Specific Mitigation Controls and/or Treatment

| Technology | Notes |
|---|---|
| **Containment/Interception** | |
| Interception wells (+ surface discharge BAT) | Extraction of clean groundwater unavoidable. Requires a large number of wells. Not operationally or practically feasible. |
| Modified pond liner(s) (+ surface discharge BAT) | Potentially feasible |
| Pump from bottom of water management ponds (+surface discharge BAT) | Flushing pore water is inefficient and would take a long period of time. Performance is highly uncertain. |
| Construction of slurry walls downgradient of management ponds | Construction infeasible. Groundwater pathway too deep. |

# Step 2: Identification of All Potentially Applicable Technologies
# Surface Discharge Management or Treatment

| | SO4 | Nitrogen | | Metals | | | | | | | Oxyanions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POPC/POCs** | Sulphate | Nitrite | Nitrate | Aluminum, Total | Cadmium, Dissolved | Cobalt, Total | Copper, Dissolved | Iron, Total | Nickel, Dissolved | Zinc, Dissolved | Molybdenum, Total | Selenium, Total |
| **In-Situ or Semi-Passive Technologies** | | | | | | | | | | | | |
| In-situ anoxic gravel bed reactor (actively managed) | u | x | x | x | x | u | x | x | u | x | u | x |
| In-situ anoxic biological treatment (passive with organic substrate) | | x | x | x | u | | u | x | | | | x |
| Engineered wetland | | x | x | x | x | x | x | x | | x | x | x |
| Passive flocculation (use of floc blocks) | | | | x | | | | x | | | | |
| **Active Tank-Based Water Treatment Technologies** | | | | | | | | | | | | |
| Lime treatment and sedimentation/concentration | | | | x | x | u | x | x | u | | | |
| Sulphide precipitation, sedimentation/concentration | | | | x | x | x | x | x | | | | |
| Ferric co-precipitation and sedimentation/concentration | | | | | | | | | | | | |
| RO + lime treatment | x | | | x | x | x | x | x | x | x | | |
| RO + sulphide precipitation | | | | x | x | x | x | x | x | x | | |
| RO + ferric co-precipitation | | | | | | | | | | | x | |
| Ion exchange and regenerant treatment, selenium removal | | | | | | | | | | | | x |
| Ion exchange and regenerant treatment, metals | | | | x | x | x | x | x | x | x | | |
| Ion exchange and regenerant treatment, sulphate removal | x | | | x | x | x | x | x | x | x | | |
| Electrocoagulation | | | | x | | | | x | | | | |
| RO + electrocoagulation | | | | x | | | | x | | | x | u |
| Anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk) | | x | x | x | | | | x | | | | x |
| RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk) | | x | x | x | | | | x | | | | x |
| Zero Liquid Discharge (ZLD) process | x | x | x | x | x | x | x | x | x | x | x | x |
| Ettringite precipitation | x | | | x | x | x | x | x | x | x | | |
| Biological sulphate reduction | x | x | x | | x | x | x | x | | x | x | x |

# STEP 3
# SCREENING FOR FEASIBILITY

- In **Step 3** of the BAT assessment, all potentially feasible water management measures or water treatment technologies (established and novel) that were identified in Step 2 are screened for feasibility.
- Feasibility screening criteria include: ability to meet environmental criteria, operational complexity, and proven commercial application.
- Proven commercial application is evaluated by assigning a Technology Readiness Level (TRL) to each option considered.
- As per interim guidance issued by the Province of BC, Technologies that have been assessed at TRL 7, 8, or 9 may be acceptable to fulfil information requirements in an EAC application.
- Accordingly, if candidate BATs are deemed to be at TRL 6 or below the option is either screened out (i.e., rejected) or another candidate BAT with TRL 7 or greater is implemented in parallel as a contingency measure.

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# STEP 3
# TECHNOLOGY READINESS ASSESSMENT (TRA)

- All technologies considered in the BAT assessment are proven, conventional technologies that are commercially available, ***except for passive flocculation and In-situ active (GBR), which are emerging technologies.***
- The proposed use of an emerging technology in an Environmental Assessment Application requires determination of the Technology Readiness Level (**TRL**), which is a component of a broader technology readiness assessment (**TRA**).
- Conventional and commercially available technologies are not classified as "emerging" and therefore do not require a TRL determination or a TRA.
- In August 2022, BC ENV and EMLI issued an interim guidance document that provided proponents with a framework for completing TRAs for emerging technologies contemplated for use in mine operations.

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# STEP 3
# TECHNOLOGY READINESS ASSESSMENT (TRA)

- The TRA guidance suggests that the following components are included in a technology readiness assessment:
  - Independent Peer Review,
  - Technology Readiness Level (TRL) Determination,
  - A technology maturation plan (if required), and
  - A risk management approach and risk register.
- The TRL determination followed the definitions and check-list items included in Appendix B of the TRA Guidance.

# STEP 3
# TECHNOLOGY READINESS ASSESSMENT (TRA)

- Technologies that have been assessed at **TRL-8 or TRL-9** are considered to be proven technologies and are generally deemed acceptable to meet initial information requirements for MA and/or EMA applications.
- Technologies with **TRL-7** may be included in Environmental Assessment Certificate Applications.

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# STEP 3
# TECHNOLOGY READINESS ASSESSMENT (TRL 6 and 7)

| TRL | Criteria |
|---|---|
| **Level 6**<br><br>**Prototype Demonstration in a simulated Environment (Demonstration system operating under relevant site-specific conditions)** | ☐ Development of a prototype that represents or nearly represents the final configuration.<br><br>☐ Testing in a laboratory or simulated environment.<br><br>☐ Collection of empirical data. |
| **Level 7**<br><br>**Prototype Demonstration in Site-Specific Environment (Demonstration system operating at near full-scale under relevant site-specific conditions)** | ☐ Development of a prototype representative of the final configuration.<br><br>☐ Testing in the actual field setting.<br><br>☐ Empirical data supports the implementation of the technology to meet receiving environment requirements under a range of conditions representative of the expected life and application of the technology.<br><br>☐ A risk management approach and risk register have been developed. Identified risks have proposed mitigations through operational and management actions.<br><br>☐ MA and EMA Joint Application Information Requirements for the technology, excluding capital and operating costs, that are technology-specific can be met. An independent peer review may be used in lieu of literature and analogue data. |

# STEP 3
# TECHNOLOGY READINESS ASSESSMENT (TRL 8 and 9)

| TRL | Criteria |
|---|---|
| **Level 8**<br><br>**Actual Technology Completed and Qualified Through Tests and Demonstrations** | ☐ A risk management approach and risk register have been developed/updated. Identified risks have proposed mitigations through operational and management actions.<br><br>☐ The technology is transferable and can conceptually be implemented at any site, subject to site-specific conditions.<br><br>☐ The operational and replacement costs of the technology can be calculated for bonding requirements.<br><br>☐ MA and EMA Joint Application Information Requirements for the technology are fully met using an appropriate combination of literature, analogue data, and empirical data for the technology. |
| **Level 9**<br><br>**Actual Technology Proven Through Successful Deployment in Operational Settings** | ☐ MA and EMA Joint Application Information Requirements for the technology are met using an appropriate combination of literature and analogue data for the technology. Empirical data may not be required. |

# STEP 3
# TECHNOLOGY READINESS ASSESSMENT (TRL 8 and 9)

- TRL determinations are closely linked to performance expectations for all treatment technologies.
- Therefore, before a TRL can be declared, it is necessary to carefully define the following:
  - Which parameters (POCs) are targeted by treatment?
  - What are the specific effluent target concentrations for these POCs: a fixed numerical concentration limit or polishing (i.e., just a general non-specific reduction)?
  - What is the expected range of climatic conditions and is treatment seasonal or year-round?
  - What is the expected range of hydraulic residence times?
  - How is monitoring and control implemented?
- Depending on the answers to these questions – in other words, depending on the performance expectations – the TRL for the same technology could range from 4 to 8.

## Step 3: Technology Screening for Feasibility

## Groundwater-Specific Mitigation Measures or Treatment

| Shortlisted for Assessment | Technology | Notes | Shortlisted for Assessment |
|---|---|---|---|
| | **Containment/Interception** | | |
| No | Interception wells (+ surface discharge BAT) | Extraction of clean groundwater unavoidable. Requires a large number of wells. Not operationally or practically feasible. | No |
| Yes | Modified pond liner(s) (+ surface discharge BAT) | Potentially feasible | Yes |
| No | Pump from bottom of water management ponds (+surface discharge BAT) | Flushing pore water is inefficient and would take a long period of time. Performance is highly uncertain. | No |
| No | Construction of slurry walls downgradient of management ponds | Construction infeasible. Groundwater pathway too deep. | No |

# Step 3: Technology Screening for Feasibility: Surface Discharge

| | SO4 | Nitrogen | | Metals | | | | | | | Oxyanions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POPC/POCs** | Sulphate | Nitrite | Nitrate | Aluminum, Total | Cadmium, Dissolved | Cobalt, Total | Copper, Dissolved | Iron, Total | Nickel, Dissolved | Zinc, Dissolved | Molybdenum, Total | Selenium, Total | Notes | **Shortlisted for Assessment** |
| **In-Situ or Semi-Passive Technologies** | | | | | | | | | | | | | | |
| In-situ anoxic gravel bed reactor (actively managed) | u | x | x | x | x | u | x | x | u | x | u | x | Potentially feasible. | Yes |
| In-situ anoxic biological treatment (passive with organic substrate) | | x | x | x | u | | u | x | | | | x | Lack of control over the treatment process makes this option infeasible. | No |
| Engineered wetland | | x | x | x | x | x | x | x | | x | x | x | Not suitable for high freshet flows or winter operation. Also, required foot-print may be too large. | No |
| Passive/active flocculation | | | | x | | | | x | | | | | TSS will be managed according to erosion prevention and sediment management plan but passive flocculation (use of floc blocks) had not been considered as part of that plan. | Yes |
| **Active Tank-Based Water Treatment Technologies** | | | | | | | | | | | | | | |
| Lime treatment and sedimentation/concentration | | | | x | x | u | x | x | u | | | | Unable to achieve effluent concentrations that are lower than WQG for several POPCs. | No |
| Sulphide precipitation, sedimentation/concentration | | | | x | x | x | x | x | | | | | Unable to achieve effluent concentrations that are lower than WQG for several POPCs. | No |
| Ferric co-precipitation and sedimentation/concentration | | | | | | | | | | | | | Unable to achieve effluent concentrations that are lower than WQG for most POPCs. | No |
| RO + lime treatment | x | | | x | x | x | x | x | x | x | | | Potentially feasible for sulphate and metal removal. | Yes |
| RO + sulphide precipitation | | | | x | x | x | x | x | x | x | | | Potentially feasible for metal removal. | Yes |
| RO + ferric co-precipitation | | | | | | | | | | | x | | Potentially feasible for metal removal. | Yes |
| Ion exchange and regenerant treatment, selenium removal | | | | | | | | | | | | x | Complex process. Se only POPC removed. | No |
| Ion exchange and regenerant treatment, metals | | | | x | x | x | x | x | x | x | | | Potentially feasible for metal removal. | Yes |
| Ion exchange and regenerant treatment, sulphate removal | x | | | x | x | x | x | x | x | x | | | TRL 6. No full-scale processes currently operating anywhere. | No |
| Electrocoagulation | | | | x | | | | x | | | | | TRL 7 when applied to this project. | No |
| RO + electrocoagulation | | | | x | | | | x | | | x | u | TRL 7 when applied to this project. | No |
| Anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk) | | x | x | x | | | | x | | | | x | Unable to achieve effluent concentrations that are lower than WQG for several POPCs. | No |
| RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk) | | x | x | x | | | | x | | | | x | Potentially feasible for $NO_2$/$NO_3$, Se, Cr, total Al, and Fe removal. | Yes |
| Zero Liquid Discharge (ZLD) process | x | x | x | x | x | x | x | x | x | x | x | x | ZLD processes are very complex, energy intensive, and produce soluble residuals that must be entombed on site or trucked to a hazardous waste facility. However, it is the only process that would remove all POCPs and it is therefore considered. | Yes |
| Ettringite precipitation | x | | | x | x | x | x | x | x | x | | | TRL 5 or 6 for this application. | No |
| Biological sulphate reduction | x | x | x | | x | x | x | x | | x | x | x | TRL 6 or 7. Produces toxic $H_2S$ gas. | No |

x - removes POC to a meaningful extent
u - may remove POC but efficacy is uncertain

# Step 3: Technology Screening for Feasibility Candidate BAT Scenarios – Groundwater

- Groundwater Discharge Scenarios
- Two options passed screening:
  - Installation of an additional (secondary) liner in the water management ponds (+surface water BAT), and
  - Implementation of an active gravel bed reactor (GBR) in the management ponds.

| Interception | Description | $NO_2/NO_3$ | Se/Mo | Metals | SO4 | POCs Addressed | POCs Not Addressed |
|---|---|---|---|---|---|---|---|
| Additional Liner | Add additional liner material to further reduce groundwater seepage from ponds. | Go to Surface BAT → | | | | | |
| None | In-situ Active GBR | In-situ Active GBR: NO2, NO3, Al, Fe, Cu, (Se polishing) (not Mo, Co, Ni, Zn) | | | none | NO2, NO3, Al, Fe, Cu, (Se - polishing) | Mo, Co, Ni, Zn, SO4 |

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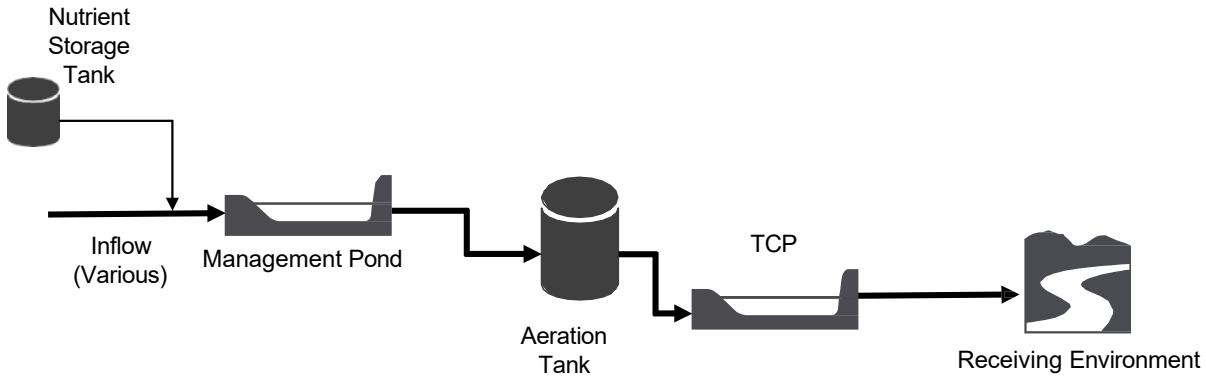
# Step 3: Candidate Technology Screening for Feasibility
# Candidate BAT Scenarios – surface water

| Scenario | Description | Flow Attenuation | $NO_2/NO_3$ | Se/Mo | Metals | SO4 | POCs Addressed | POCs Not Addressed |
|---|---|---|---|---|---|---|---|---|
| 1 | BMPs already planned | None | No additional source control or water treatment measures beyond BMPs or BATs already incorporated into the Project design. | | | | All | No additional removal of POCs. |
| 2 | Passive/active flocculation (only) | None | none | | none except TSS removal (Al and Fe) | none | TSS, Fe, Al | NO2, NO3, Se, Co, Cu, Ni, Zn, Mo, SO4 |
| 3 | In-situ Active GBR | None | In-situ Active GBR: NO2, NO3, Al, Fe, Cu, (Se polishing) (not Mo, Co, Ni, Zn) | | | none | NO2, NO3, Al, Fe, Cu, (Se - polishing) | Mo, Co, Ni, Zn, SO4 |
| 4 | RO + Anaerobic Biological Treatment | Tenas Control Pond | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): NO2, NO3, Se. (not Cu, Mo) | | none except TSS removal (Al and Fe) | none | $NO_2$, $NO_3$, Se, Al, Fe | Mo, Co, Cu, Ni, Zn, SO4 |
| 5 | RO + Anaerobic Biological Treatment + Lime Treatment | Tenas Control Pond | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): NO2, NO3, Se. (not Mo) | | Lime Treatment: Al, Co, Cu, Fe, Ni, Zn, SO4 | | $NO_2$, $NO_3$, Se, Al, Co, Cu, Fe, Ni, Zn, $SO_4$ | Mo |
| 6 | RO + Anaerobic Biological Treatment + Sulphide Treatment | Tenas Control Pond | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): NO2, NO3, Se. (not Mo) | | Sulphide Treatment: Co, Cu, Ni, Zn + TSS removal (Al, Fe) | none | $NO_2$, $NO_3$, Se, Al, Co, Cu, Ni, Zn | Mo, SO4 |
| 7 | RO + Anaerobic Biological Treatment + Ferric Co-precipitation | Tenas Control Pond | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): $NO_2$, $NO_3$, Se. | | Ferric Co-precipitation: Mo + TSS removal (Al, Fe) | none | $NO_2$, $NO_3$, Se, Al, Fe, Mo | Co, Cu, Ni, Zn, SO4 |
| 8 | RO + Anaerobic Biological Treatment + Ion Exchange | Tenas Control Pond | RO + anaerobic biological treatment (MBBR, FBR, ABMet, SeHawk): $NO_2$, $NO_3$, Se. | | Ion Exchange: Al, Co, Cu, Fe, Ni, Zn. | none | NO2, NO3, Se, Al, Co, Cu, Mo, Fe, Ni, Zn | $SO_4$ |
| 9 | Zero Liquid Discharge | Tenas Control Pond | Zero Liquid Discharge (ZLD): All POCs | | | | NO2, NO3, Se, Al, Co, Cu, Fe, Ni, Zn, Mo, SO4 | none |
| 10 | Additional Liner in Water Management Ponds | Tenas Control Pond | This options reduces seepage from the water management ponds but increases surface dsicharge by the same volume. Therefore, there is not net POC removal if additional liners are added as a stand-alone BAT | | | | none | NO2, NO3, Se, Al, Co, Cu, Fe, Ni, Zn, Mo, SO4 |

← Base Case

- Surface Water Discharge Scenarios
- A scenario with BMPs already planned (base case)
- Passive/Active flocculation
- One in-situ treatment option
- Six active treatment options
- Modification of liners in management and control ponds

# Step 3: Technology Screening for Feasibility
# Candidate Example Flowsheet for In-situ Active (GBR) Water Treatment

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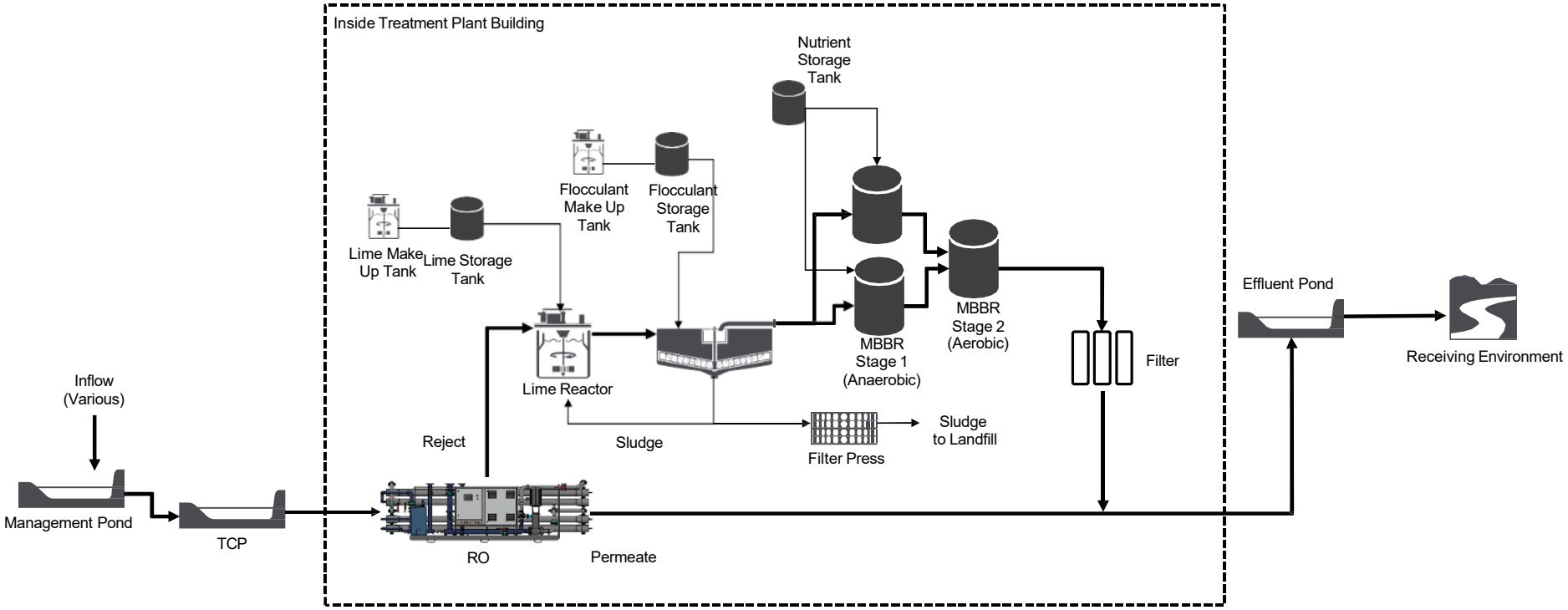
# Step 3: Technology Screening for Feasibility Candidate Example Flowsheet for Active Water Treatment

- Scenario 4: RO + Anaerobic Bioreactor (MBBR) + HDS Lime Treatment

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# Step 4: Evaluation of Candidate BATs

- Multiple Accounts Analysis (MAA)
- Based on guidance from BC ENV
- Four Accounts, each with several subaccounts
- Accounts and sub-accounts can be weighted independently
- TML proposed to allocate 5 points to “Adherence to Yintah Management Directives” from “Toxicity Reduction” to reflect input from the Wet'suwet’en First Nation

| | Assessment Criterion | BC ENV’s Suggested Weight | TML’s Proposed Weights |
|---|---|---|---|
| Accounts → | | | |
| Sub-accounts → | **Reliability** | **20** | **20** |
| → | Risk Assessment | 5 | 5 |
| → | Robustness | 5 | 5 |
| → | Scalability | 5 | 5 |
| → | Long-term Viability | 5 | 5 |
| Accounts → | **Control-Effectiveness** | **35** | **30** |
| | Pollutant Reduction | 20 | 20 |
| | Toxicity Reduction | 15 | 10 |
| Accounts → | **Environmental & Socio-Economic Impacts** | **20** | **25** |
| | Energy Efficiency | 5 | 5 |
| | Greenhouse Gas Emission | 6 | 6 |
| | Footprint | 4 | 4 |
| | Secondary Waste Production | 5 | 5 |
| | Adherence to Yintah Management Directives | - | 5 |
| Accounts → | **Cost-Effectiveness** | **25** | **25** |
| | Efficient Use of Existing Resources | 3 | 3 |
| | Life Cycle Cost Analysis | 22 | 22 |
| | Total | 100 | 100 |

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# Step 5 – BAT Ranking

- Candidate BATs need to be compared to the Project Case that includes all proposed BMPs.
- Candidate BATs will be ranked according to scores in the MAA table.
- The preferred BAT is the highest ranked (highest score) option.
- HOWEVER, the BAT assessment is a conceptual evaluation of technologies based on information and data currently available.
- If subsequent studies or engineering design identifies limitations or issues that had not been identified as part of the conceptual evaluation, the rank order may change such that the second or third highest ranked BAT becomes the preferred BAT.
- Alternatively, unexpected benefits of one or more of the ranked BATs that may be discovered as part of subsequent investigations, may cause lower ranked BATs to become preferred BATs.

# Step 5 – BAT Ranking

## Notes on MAA Scoring

**Reliability Account:**

- Risk assessment: risks associated with the Base Case that includes all BMPs are likely limited because of the relatively clean untreated water and lack of projected exceedances in the receiving environment.
  - The risk account was scored as follows: a score of 3 due to potentially higher constituent concentrations in the receiving environment (Base Case, Flocculation), hazards associated with sulphide (RO + MMBR + sulphide), and performance uncertainty (Modified Liners)
  - A score of 4 for remaining active water treatment options.
- Robustness: refers to consistent and reliable performance under various conditions.
  - Planned source control measures are expected to be robust and were therefore assigned a score of 5, as was Option 10 (additional liners in water management ponds).
  - Passive/active flocculation and In-situ Active (GBR) are expected to work well at normal operating conditions but may perform less well at high flow or upset conditions (Score 3).
  - Active water treatment is generally robust, but any mechanical system can potentially fail or malfunction. More complex processes are generally more prone to malfunctions (Score 4 for all except the more complex RO + MMBR + Ion Exchange)).
- Scalability: the ability to accommodate increases in flow or loadings.
  - Mechanical treatment plants are generally difficult to scale since all equipment, piping and pumps are designed to accommodate a certain design flow. The more complex a process is the more difficult it is to scale up (Score 3, or 2 for ZLD). Passive flocculation can readily be scaled by adding floc stations in more locations. Additional liners can only be installed in West Management Pond after construction as the NMP and EMP will already built (Score 3). In-situ Active (GBRs) can be scaled by constructing additional ponds (Score 4). Planned source control measures are likely scalable to an expanded operation (Score 4).

# Step 5 – BAT Ranking

## Notes on MAA Scoring

**Reliability Account:**

- Long-term viability: refers to sustainability and performance effectiveness over an extended period.
  - Planned source control measures such as inundating PAG waste rock and construction of low-permeability liners are sustainable and expected to perform well for many decades or centuries with minimal maintenance (Score 5).
  - Likewise, additional liners are expected to perform well long-term (Score 5).
  - Mechanical equipment can be made to operate indefinitely if it is well maintained and replaced at the end of its operating life. However, ongoing maintenance is less sustainable (Score 4).
  - ZLD is less sustainable because it produces a soluble salt that must be entombed in barrels or liners and stored in perpetuity (Score 2).

# Step 5 – BAT Ranking

## Notes on MAA Scoring

**Control Effectiveness:**

- Pollutant Reduction was calculated and scored as follows:
  - Percent loadings removed of each POC ***over and above planned source control measures*** was calculated and weighed by total volume discharged for each candidate BAT option.
  - Percent loadings removed was averaged across all POCs to get an overall score.
  - Percent loading removal was based on MAXIMUM POC concentrations. Therefore, actual loadings removal percentages are likely to be substantially lower.
  - Passive/Active flocculation was assigned an overall loading removal of zero because the extent of TSS removal cannot be quantified reliably (i.e., passive flocculation will remove some TSS, but a definitive removal factor cannot be assigned).
  - Results on next slide →

# Step 5 – BAT Ranking

## Notes on MAA Scoring – Pollutant Reduction

| POC | Base Case with BMPs | Passive/Active Flocculation | In-situ Active (GBR) | RO + MBBR | RO + MBBR + HDS Lime | RO + MBBR + Sulphide | RO + MBBR + Ferric | RO + MBBR + Ion Exchange | Zero Liquid Discharge | Modified Liners in Water Management Ponds |
|---|---|---|---|---|---|---|---|---|---|---|
| | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 | Option 7 | Option 8 | Option 9 | Option 10 |
| Nitrate | 0% | 0% | 78% | 89% | 89% | 89% | 89% | 89% | 89% | 0% |
| Nitrite | 0% | 0% | 81% | 91% | 91% | 91% | 91% | 91% | 91% | 0% |
| Sulphate | 0% | 0% | 0% | 0% | 40% | 0% | 0% | 0% | 70% | 0% |
| Aluminum, total | 0% | 0% | 56% | 65% | 65% | 65% | 65% | 65% | 86% | 0% |
| Chromium (Cr(VI)), total | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 56% | 56% | 0% |
| Cobalt, total | 0% | 0% | 0% | 0% | 14% | 14% | 0% | 14% | 71% | 0% |
| Copper, dissolved | 0% | 0% | 0% | 0% | 94% | 94% | 0% | 94% | 94% | 0% |
| Iron, total | 0% | 0% | 60% | 70% | 80% | 80% | 80% | 80% | 96% | 0% |
| Molybdenum, total | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 75% | 75% | 0% |
| Nickel, dissolved | 0% | 0% | 0% | 0% | 13% | 13% | 0% | 65% | 65% | 0% |
| Selenium, total | 0% | 0% | 78% | 93% | 93% | 93% | 93% | 93% | 93% | 0% |
| Zinc, dissolved | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 77% | 77% | 0% |
| **Overall Maximum POC Load Reduction*** | **0%** | **0%** | **29%** | **34%** | **48%** | **45%** | **35%** | **66%** | **80%** | **0%** |
| **Score** | 1 | 1 | 2.5 | 2.5 | 3 | 3 | 2.5 | 4 | 4.5 | 1 |

*Based on maximum possible load reductions. Actual load reductions are expected to be substantially lower

# Step 5 – BAT Ranking

## Notes on MAA Scoring

**Control Effectiveness:**

- Toxicity Reduction:
  - Untreated discharge is not expected to be acutely toxic.
  - Water quality model results indicates that when TSS in untreated effluent is at the maximum proposed concentration (35 mg/L) the total iron concentration may marginally exceed the acute guideline of 1.0 mg/L total iron.
  - Similarly, model results indicates that nitrite concentrations could marginally exceed the acute guideline of 0.06 mg/L.
  - Both of these acute guideline exceedances are unlikely to occur, but option 1 and 2 were nonetheless given a score of 4.5, while the other options, which all remove iron and nitrite, was given a score of 5.

# Step 5 – BAT Ranking

## Notes on MAA Scoring

**Environmental & Socio-Cultural Impacts:**

- Energy Efficiency:
  - The base case option (Option 1) that includes various source control measures do not include construction of additional facilities and was therefore given an energy efficiency score of 5. Once installed, additional liners (Option 10) do not consume energy (Score 5).
  - Zero Liquid Discharge process is very energy intensive (~15 kW-hr/$m^3$) and was therefore assigned a score of 1.
  - In-situ Active (GBR) only require energy for aerating the effluent after treatment (Score 4.5)
  - Other active water treatment measures are moderately energy efficient (~4 kW-hr/$m^3$) compared to ZLD and were therefore given a score of 3.5.
- Greenhouse Gas (GHG) Emissions:
  - GHG emissions generally follow energy emissions, but emissions associated with treatment reagents must also be taken into account. Option 4 received a slightly better score of 4 because of the lower reagent demand.
  - Installation of additional liners was scored 3.5 because a large volume of bentonite would have to be shipped to site from Kamloops.

# Step 5 – BAT Ranking

## Notes on MAA Scoring

### Environmental & Socio-Cultural Impacts:

- Foot-print:
  - Source control (Option 1, base case), passive flocculation (Option 2), and additional liners (Option 10) do not require additional foot-print and therefore scored 5.
  - In-situ Active (GBR) requires minimal foot-print for installation of aeration equipment (Score 4.5).
  - Most active water treatment options require a sizable foot-print (Score 3).
  - Option 4 is smaller because a clarifier is not required (Score 4).
- Secondary Waste Production:
  - Base case, passive flocculation, and additional liners scored 5 because of no or negligible secondary waste production.
  - In-situ Active (GBR) has nearly no waste production, but the post-treatment aeration could produce some total iron that would settle in the TCP (Score 4.5)
  - RO + MBBR (Option 4) produces biomass and TSS sludge (Score 4)
  - Other active water treatment options score 3, 2.5 or 1 depending on the volume or stability of the secondary waste produced.

# Step 5 – BAT Ranking

## Notes on MAA Scoring

### Environmental & Socio-Cultural Impacts:

- Adherence to Yintah Management Directives:
  - The Office of Wet'suwet'en (OW) has provided a document that lays out a series best management practices that should be followed when developing a Project within their Yintah.
  - The following is the directive that was deemed most relevant after discussion with the OW and house groups.

***"Maintain surface water quantity and quality within the natural range of variability in perpetuity across the Yintah for future generations of Wet'suwet'en people."***

- Using this information the same scoring use used as pollutant reduction as the technologies that were most effective for pollutant reduction also achieved water quality values closer to the natural baseline conditions.

| POC | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 | Option 7 | Option 8 | Option 9 | Option 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Overall Maximum POC Load Reduction* | 0% | 0% | 29% | 34% | 48% | 45% | 35% | 66% | 80% | 0% |
| **Score** | 1 | 1 | 2.5 | 2.5 | 3 | 3 | 2.5 | 4 | 4.5 | 1 |

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# Step 5 – BAT Ranking

## Notes on MAA Scoring

**Cost Effectiveness:**

- Efficient Use of Existing Resources:
  - The base case (Option 1) and passive/active flocculation uses only existing infrastructure and resources and therefore scored 5.
  - Additional liners make use of the planned water management ponds but cannot be constructed from materials on site (bentonite will have to be sourced in Kamloops) (Score 3).
  - The In-situ Active (GBR) will be imbedded in the design of the water management ponds and require only little equipment in addition to that (i.e., aeration tank). Score 4.
  - All active water treatment options require construction of new infrastructure that will consume additional resources (Score 2 or Score 1.5 for ZLD).

# Step 5 – BAT Ranking

## Notes on MAA Scoring

### Cost Effectiveness:

- Life Cycle Cost Analysis:
  - Scores were assigned based on 100-year Net Present Value (NPV) discounted at 4%.
  - **Preliminary order-of-magnitude cost.**

| | | NPV (M$) | Score |
|---|---|---|---|
| Base Case | Option 1 | $ - | 5 |
| Passive/Active Flocculation | Option 2 | $ 1 | 5 |
| In-situ Active (GBR) | Option 3 | $ 12 | 4.5 |
| RO + MBBR | Option 4 | $ 66 | 3.5 |
| RO + MBBR + HDS Lime | Option 5 | $ 100 | 3 |
| RO + MBBR + Sulphide | Option 6 | $ 100 | 3 |
| RO + MBBR + Ferric | Option 7 | $ 100 | 3 |
| RO + MBBR + Ion Exchange | Option 8 | $ 123 | 2.5 |
| Zero Liquid Discharge | Option 9 | $ 285 | 1 |
| Additional WMP Liners | Option 10 | $ 45 | 4 |

# STEP 5 – BAT Ranking
## TRL Determination – Passive / Active Flocculation

- Passive flocculation works by placing “floc blocks” in a channel or culvert where turbid water flows.
- The flocculant is gradually released into the flowing water where it facilitates settling of TSS.
- Passive flocculation is arguable not an emerging technology, since it is in widespread use and commercially available.
- It was considered to be an mature technology with TRL 9 for the reduction of TSS levels.
- Active flocculation works by adding flocculant to the influent water flows into the sedimentation ponds to aid with settling of TSS
- A TRL 9 for the reduction of TSS levels was deemed appropriate for this technology.

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# STEP 5 – BAT Ranking
# TRL Determination – In-situ Active GBR

- The performance of In-situ Active (GBRs) have been studied in pilot trials and several full-scale facilities have been implemented.
- Parameters targeted by In-situ Active (GBRs) typically include nitrate and nitrite, dissolved metals and selenium.
- The first principals and expected performances of In-situ Active (GBRs) are well understood, and fundamentally the treatment process (anaerobic biological treatment) is well characterized.
- In-situ Active (GBRs) represents a mid-point in a continuum ranging from fully active and automated treatment plants to fully passive treatment installations that all rely on the same basic treatment process.
- This infers In-situ Active (GBRs) can be assigned **TRL 8** because: "The technology is transferable and can conceptually be implemented at any site, subject to site-specific conditions."

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# STEP 5 – BAT Ranking
# TRL Determination – In-situ Active GBR

- The expected performance of In-situ Active (GBRs) for the Tenas Project can be characterized as "polishing treatment".
- POCs are generally close to WQGs (within an order of magnitude or less).
  - **Nitrate** in untreated water is expected to be less than 10 mg/L as N and would ideally be reduced to less than 2.4 mg/L (or 80% of the WQG). Removal of nitrate in In-situ Active (GBRs) is so well documented and easily achievable that it can be assigned a **TRL of 8**.
  - Total selenium in untreated mine water is expected to be less than 20 µg/L and concentrations are not expected to exceed the WQG of 2 µg/L in the receiving environment.
  - Published performance data for In-situ Active (GBRs) (pilot and full-scale) with influent concentrations with a similar range to the Project show a notable reduction to concentrations often to less than 5 µg/L. Selenium removal tends to improve for larger facilities with longer residence times. Accordingly, polishing (or "some removal") of total selenium for an In-situ Active (GBR) for this Project is **TRL-8**. The TRL for a specified effluent concentration (such as 2 µg/L) of total selenium as selenate can likely be assigned **TRL-7** and ultimately **TRL-8** after completion of the necessary site-specific test-work.
  - Removal of total metals (particulate-bound) is **TRL-9** since only filtration is required.
  - Removal of dissolved metals as a polishing step is **TRL-7** or **TRL-8** depending on the target concentrations. Final determination can be made following completion of site-specific test-work.
- A preliminary TRL determination has been completed for an In-situ Active (GBR) and it has been implemented successfully under similar site conditions, so a formal TRA is not required.

# Step 5 – BAT Ranking
# MAA Results

| Assessment Criterion | Weight | Base Case with BMPs | Passive/Active Flocculation | In-situ Active (GBR) | RO + MBBR | RO + MBBR + HDS Lime | RO + MBBR + Sulphide | RO + MBBR + Ferric | RO + MBBR + Ion Exchange | Zero Liquid Discaherge | Modified Liners in Water Management Ponds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 | Option 7 | Option 8 | Option 9 | Option 10 |
| **Reliability** | **20** | **17** | **16** | **14** | **15** | **14** | **14** | **15** | **14** | **12** | **16** |
| Risk Assessment | 5 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| Robustness | 5 | 5 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 5 |
| Scalability | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 3 |
| Long-term Viability | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 5 |
| **Control-Effectiveness** | **30** | **13** | **13** | **20** | **20** | **22** | **22** | **20** | **26** | **28** | **13** |
| Pollutant Reduction | 20 | 1 | 1 | 2.5 | 2.5 | 3 | 3 | 2.5 | 4 | 4.5 | 1 |
| Toxicity Reduction | 10 | 4.5 | 4.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4.5 |
| **Environmental & Socio-Cultural Impacts** | **25** | **23** | **23** | **22** | **20** | **17** | **17** | **17** | **17** | **10** | **22** |
| Energy Efficiency | 5 | 5 | 5 | 4.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 5 |
| Greenhouse Gas Emission | 6 | 5 | 5 | 4.5 | 4 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 3.5 |
| Footprint | 4 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 3 | 3 | 5 |
| Secondary Waste Production | 5 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 2.5 | 1 | 5 |
| Adherence to Yintah Management Directives | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Cost-Effectiveness** | **25** | **25** | **25** | **22** | **14** | **12** | **12** | **12** | **12** | **5** | **19** |
| Efficient Use of Existing Resources | 3 | 5 | 5 | 4 | 2 | 2 | 2 | 2 | 2 | 1.5 | 3 |
| Life Cycle Cost Analysis | 22 | 5 | 5 | 4.5 | 3 | 2.5 | 2.5 | 2.5 | 2.5 | 1 | 4 |
| **Total** | **100** | **78** | **77** | **78** | **69** | **65** | **65** | **64** | **69** | **55** | **71** |

ource: https://srk.sharepoint.com/sites/NACAPR002055/Internal/BAT Assessment/ Telkwa BAT Tech Screening REV01.xlsx

- Option 1 (base case), Option 2 Passive Flocculation, and Option 3 [In-situ Active (GBR)] all achieved similar MAA scores.
- Source control measures included in the base case are considered to be BMPs and will be implemented.
- Passive flocculation may be implemented if required (depends on the performance of erosion prevention measures).
- In-situ Active (GBR) should be further developed toward a goal of achieving TRL 9 ahead of being required at a full scale.
- All active water treatment options achieved similar MAA scores that were lower than In-situ Active (GBR).
- ZLD and installation of additional liners achieved the lowest score.

# Step 5 – BAT Ranking Sensitivity

## Sensitivity Analysis: MAA Results with NO Cost Account

| | | Base Case with BMPs | Passive/Active Flocculation | In-situ Active (GBR) | RO + MBBR | RO + MBBR + HDS Lime | RO + MBBR + Sulphide | RO + MBBR + Ferric | RO + MBBR + Ion Exchange | Zero Liquid Discaherge | Modified Liners in Water Management Ponds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Assessment Criterion** | **Weight** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** | **Option 6** | **Option 7** | **Option 8** | **Option 9** | **Option 10** |
| **Reliability** | **20** | **17** | **16** | **14** | **15** | **14** | **14** | **15** | **14** | **12** | **16** |
| **Risk Assessment** | 5 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| **Robustness** | 5 | 5 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 5 |
| **Scalability** | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 3 |
| **Long-term Viability** | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 5 |
| **Control-Effectiveness** | **30** | **13** | **13** | **20** | **20** | **22** | **22** | **20** | **26** | **28** | **13** |
| **Pollutant Reduction** | 20 | 1 | 1 | 2.5 | 2.5 | 3 | 3 | 2.5 | 4 | 4.5 | 1 |
| **Toxicity Reduction** | 10 | 4.5 | 4.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4.5 |
| **Environmental & Socio-Cultural Impacts** | **25** | **23** | **23** | **22** | **20** | **17** | **17** | **17** | **17** | **10** | **22** |
| **Energy Efficiency** | 5 | 5 | 5 | 4.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 5 |
| **Greenhouse Gas Emission** | 6 | 5 | 5 | 4.5 | 4 | 3.5 | 3.5 | 3.5 | 3.5 | 1 | 3.5 |
| **Footprint** | 4 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 3 | 3 | 5 |
| **Secondary Waste Production** | 5 | 5 | 5 | 4.5 | 4 | 3 | 3 | 3 | 2.5 | 1 | 5 |
| **Adherence to Yintah Management Directives** | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Cost-Effectiveness** | **25** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Efficient Use of Existing Resources** | 3 | | | | | | | | | | |
| **Life Cycle Cost Analysis** | 22 | | | | | | | | | | |
| **Total** | **100** | **53** | **52** | **56** | **55** | **53** | **53** | **52** | **57** | **50** | **51** |

- When the cost-effectiveness account is eliminated from the MAA, all options achieves scores in a similar range with Option 3 [(In-situ Active (GBR)] and Option 8 (RO + MBBR + Ion Exchange) slightly preferred.

# Recommendations and Next Steps

- Continue with Updated EAC Project Case (2024) with blasthole liners for Final EAC Project Case (2024) for IR submission to EAO
- Complete IR responses and presentation for EAO
- As the option selected for the BAT does not result in elimination of POCs, an IDZ analysis is allowed for by the government guidance documents (just as a note even the active water treatment method does not eliminate the majority of the POCs at end of pipe)
- Develop Execution/Maturation Plan for In-situ Active (GBR) for EA application
- PERMITTING
  - Develop Trigger Action Response document for passive/active flocculation, Full scale In-situ Active (GBR) in the management ponds, Active Water Treatment using RO+ Anaerobic Bioreactor +HDS Lime, and construction of modified liner in the WMP
  - Submit feasibility level designs for Pilot scale In-situ Active (GBR) in the CPP Sedimentation Pond, Full scale In-situ GBR Active in management ponds, and RO+ Anaerobic Bioreactor +HDS Lime
- Implement a pilot In-situ Active GBR for the CPP Sedimentation Pond during Construction and Operation phases to increase the TRL rating for this technology to 9 for the POCs targeted
- Construct management ponds to allow their conversion to In-situ Active (GBRs) in the future if required

# Tenas Pond/NMP Surface Discharge POCs – high ST

Table A-2.1 TCP surface discharge (operations), NMP surface discharge (closure) - POCs

| | | TCP surface discharge (operations), NMP surface discharge (closure) - POCs | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Goathorn creek (WQSEA1) | | | | POCs selection | | | | | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max TCP discharge - Normal ST | Max NMP discharge -Normal ST | Exceeds at EA1? - Normal ST | Max TCP discharge - High ST | Max NMP discharge - High ST | Exceeds at EA1? - High ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0070 | 1.6 | 1.3 | 1.1 | 0.093 | 0.020 | 4.1 | 0.24 | 0.069 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 6.6 | 3.1 | 0.86 | 13 | 3.4 | 1.1 |
| Fluoride | mg/L | 0.032 | 0.041 | 1.2 | 0.96 | 0.15 | 0.031 | 0.050 | 0.15 | 0.031 | 0.050 |
| Nitrate | mg-N/L | 0.041 | 0.076 | 3.0 | 2.4 | 8.1 | 0.66 | 0.17 | 32 | 1.8 | 0.55 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.19 | 0.015 | 0.0041 | 0.75 | 0.042 | 0.013 |
| Sulphate | mg/L | 24 | 37 | 220 | 180 | 420 | 230 | 62 | 850 | 630 | 110 |
| Aluminum, total | mg/L | 0.092 | 0.75 | 0.27 | 0.22 | 0.39 | 0.39 | 0.19 | 0.39 | 0.39 | 0.19 |
| Antimony, total | mg/L | 0.000073 | 0.00014 | 0.074 | 0.059 | 0.00079 | 0.00043 | 0.00013 | 0.0014 | 0.0011 | 0.00021 |
| Arsenic, total | mg/L | 0.00023 | 0.00068 | 0.0050 | 0.0040 | 0.0018 | 0.00090 | 0.00044 | 0.0027 | 0.0015 | 0.00050 |
| Barium, total | mg/L | 0.058 | 0.072 | 1.0 | 0.80 | 0.080 | 0.025 | 0.076 | 0.095 | 0.026 | 0.076 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000061 | 0.000015 | 0.000060 | 0.000061 | 0.000015 | 0.000060 |
| Boron, total | mg/L | 0.0050 | 0.050 | 1.2 | 0.96 | 0.13 | 0.14 | 0.029 | 0.23 | 0.15 | 0.033 |
| Cadmium, dissolved | mg/L | 0.0000081 | 0.000036 | 0.00016 | 0.00013 | 0.000032 | 0.0000054 | 0.000016 | 0.00011 | 0.000016 | 0.000020 |
| Chromium (Cr(VI)), total | mg/L | 0.00020 | 0.00091 | 0.0010 | 0.00080 | 0.0020 | 0.0013 | 0.00053 | 0.0024 | 0.0015 | 0.00056 |
| Cobalt, total | mg/L | 0.000050 | 0.00055 | 0.0040 | 0.0032 | 0.0035 | 0.0013 | 0.00039 | 0.012 | 0.0028 | 0.00086 |
| Copper, dissolved | mg/L | 0.0014 | 0.0039 | 0.0013 | 0.0010 | 0.0017 | 0.0022 | 0.0021 | 0.0028 | 0.0051 | 0.0021 |
| Iron, total | mg/L | 0.085 | 0.78 | 1.0 | 0.80 | 1.5 | 1.5 | 0.43 | 1.5 | 1.5 | 0.44 |
| Iron, dissolved | mg/L | 0.015 | 0.13 | 0.35 | 0.28 | 0.036 | 0.0080 | 0.025 | 0.064 | 0.040 | 0.027 |
| Lead, total | mg/L | 0.000025 | 0.00023 | 0.0053 | 0.0042 | 0.0016 | 0.0010 | 0.00021 | 0.0026 | 0.0023 | 0.00031 |
| Manganese, total | mg/L | 0.0059 | 0.033 | 0.91 | 0.73 | 0.061 | 0.030 | 0.012 | 0.19 | 0.035 | 0.019 |
| Mercury, total | mg/L | 0.0000025 | 0.0000064 | 0.000020 | 0.000016 | 0.0000085 | 0.0000046 | 0.0000040 | 0.000012 | 0.0000057 | 0.0000043 |
| Molybdenum, total | mg/L | 0.00047 | 0.00062 | 0.034 | 0.027 | 0.035 | 0.0077 | 0.0022 | 0.070 | 0.023 | 0.0047 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0011 | 0.0022 | 0.0018 | 0.0060 | 0.0023 | 0.00065 | 0.017 | 0.0068 | 0.0013 |
| Selenium, total | mg/L | 0.000086 | 0.00020 | 0.0020 | 0.0016 | 0.024 | 0.0082 | 0.0015 | 0.049 | 0.025 | 0.0031 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0.000027 | 0.0000084 | 0.000012 | 0.000044 | 0.000018 | 0.000013 |
| Strontium, dissolved | mg/L | 0.076 | 0.11 | 2.5 | 2.0 | 0.28 | 0.25 | 0.14 | 0.52 | 0.27 | 0.15 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.000076 | 0.000017 | 0.000014 | 0.00013 | 0.000026 | 0.000018 |
| Uranium, total | mg/L | 0.000054 | 0.00014 | 0.0085 | 0.0068 | 0.0047 | 0.0025 | 0.00049 | 0.0094 | 0.0068 | 0.0011 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0021 | 0.0074 | 0.0059 | 0.0098 | 0.0019 | 0.0021 | 0.020 | 0.0049 | 0.0028 |

https://sk.sharepoint.com/sites/NACAPR002055/InternalWater Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241210.xlsx]POCs

Tables showing modelled "High" Source Terms have been included in this presentation for completeness of the data comparison.

"Typical" source terms did not generate POCs therefore were not included.

# EMP Groundwater Seepage POCs – high ST

Table A-2.2 MP seepage - POCs

| | | MP seepage - POCs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Four creek (WQS03_DS) | | | | POCs selection | | | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max EMP - Normal ST | Exceeds at WQS03_DS? - Normal ST | Max EMP - High ST | Exceeds at WQS03_DS ? - High ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0092 | 0.99 | 0.79 | 0.28 | 0.050 | 1.1 | 0.19 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 1.6 | 0.47 | 5.3 | 1.1 |
| Fluoride | mg/L | 0.059 | 0.068 | 1.4 | 1.1 | 0.027 | 0.10 | 0.027 | 0.10 |
| Nitrate | mg-N/L | 0.013 | 0.058 | 3.0 | 2.4 | 2.2 | 0.38 | 8.6 | 1.5 |
| Nitrite | mg-N/L | 0.00050 | 0.0010 | 0.020 | 0.016 | 0.050 | 0.0095 | 0.20 | 0.035 |
| Sulphate | mg/L | 1.9 | 28 | 310 | 250 | 200 | 33 | 700 | 120 |
| Aluminum, total | mg/L | 0.099 | 1.2 | 0.69 | 0.55 | 0.018 | 0.26 | 0.027 | 0.26 |
| Antimony, total | mg/L | 0.000050 | 0.00012 | 0.074 | 0.059 | 0.00018 | 0.000087 | 0.00053 | 0.00014 |
| Arsenic, total | mg/L | 0.00074 | 0.0011 | 0.0050 | 0.0040 | 0.00037 | 0.0013 | 0.00081 | 0.0013 |
| Barium, total | mg/L | 0.071 | 0.13 | 1.0 | 0.80 | 0.032 | 0.16 | 0.041 | 0.16 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000027 | 0.000086 | 0.000027 | 0.000086 |
| Boron, total | mg/L | 0.012 | 0.020 | 1.2 | 0.96 | 0.032 | 0.019 | 0.093 | 0.025 |
| Cadmium, dissolved | mg/L | 0.0000052 | 0.000012 | 0.00023 | 0.00018 | 0.000059 | 0.000013 | 0.00014 | 0.000026 |
| Chromium (Cr(VI)), total | mg/L | 0.00026 | 0.0016 | 0.0010 | 0.00080 | 0.00023 | 0.00052 | 0.00050 | 0.00052 |
| Cobalt, total | mg/L | 0.000050 | 0.00047 | 0.0040 | 0.0032 | 0.0035 | 0.00068 | 0.014 | 0.0024 |
| Copper, dissolved | mg/L | 0.0014 | 0.0034 | 0.0047 | 0.0038 | 0.00098 | 0.0024 | 0.0015 | 0.0024 |
| Iron, total | mg/L | 0.095 | 1.1 | 1.0 | 0.80 | 0.080 | 0.24 | 0.15 | 0.24 |
| Iron, dissolved | mg/L | 0.015 | 0.41 | 0.35 | 0.28 | 0.080 | 0.052 | 0.15 | 0.053 |
| Lead, total | mg/L | 0.000025 | 0.00028 | 0.0069 | 0.0055 | 0.00027 | 0.000065 | 0.00086 | 0.00017 |
| Manganese, total | mg/L | 0.0025 | 0.024 | 1.1 | 0.88 | 0.064 | 0.013 | 0.21 | 0.039 |
| Mercury, total | mg/L | 0.0000025 | 0.000013 | 0.000020 | 0.000016 | 0.0000030 | 0.0000052 | 0.0000053 | 0.0000052 |
| Molybdenum, total | mg/L | 0.00023 | 0.00038 | 0.034 | 0.027 | 0.0075 | 0.0012 | 0.026 | 0.0046 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0018 | 0.0047 | 0.0038 | 0.0053 | 0.0011 | 0.019 | 0.0035 |
| Selenium, total | mg/L | 0.000025 | 0.000095 | 0.0020 | 0.0016 | 0.0051 | 0.00081 | 0.019 | 0.0032 |
| Silver, total | mg/L | 0.0000050 | 0.000022 | 0.0015 | 0.0012 | 0.000010 | 0.0000087 | 0.000022 | 0.0000088 |
| Strontium, dissolved | mg/L | 0.17 | 0.24 | 2.5 | 2.0 | 0.17 | 0.32 | 0.43 | 0.32 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.000074 | 0.000020 | 0.00016 | 0.000036 |
| Uranium, total | mg/L | 0.000078 | 0.00025 | 0.0085 | 0.0068 | 0.00096 | 0.00019 | 0.0032 | 0.00061 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0025 | 0.014 | 0.011 | 0.0073 | 0.0026 | 0.023 | 0.0054 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241210.xlsx]POPCs

# NMP, WMP, TCP Groundwater Seepage POCs – high ST

Table A-2.3 MP seepage - POCs

| | | MP seepage - POCs | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tenas Creek (WQS04) | | | | POCs selection | | | | | | | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max NMP - Normal ST | Max WMP - Normal ST | Max TCP - Normal ST | Exceeds at WQS04? Normal ST | Max NMP - High ST | Max WMP - High ST | Max TCP - High ST | Exceeds at WQS04? High ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 1.3 | 1.0 | 0.19 | 0.37 | 1.1 | 0.031 | 0.73 | 1.3 | 4.1 | 0.10 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 2.3 | 3.2 | 6.6 | 0.52 | 7.9 | 10 | 13 | 1.0 |
| Fluoride | mg/L | 0.031 | 0.045 | 1.2 | 0.96 | 0.043 | 0.033 | 0.15 | 0.055 | 0.043 | 0.033 | 0.15 | 0.055 |
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 2.4 | 1.5 | 2.9 | 8.1 | 0.24 | 5.8 | 10 | 32 | 0.82 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.034 | 0.066 | 0.19 | 0.0060 | 0.13 | 0.24 | 0.75 | 0.019 |
| Sulphate | mg/L | 2.6 | 7.4 | 220 | 180 | 240 | 250 | 420 | 24 | 910 | 1000 | 850 | 79 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.35 | 0.28 | 0.022 | 0.021 | 0.018 | 0.11 | 0.032 | 0.022 | 0.019 | 0.11 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.074 | 0.059 | 0.00033 | 0.00046 | 0.00079 | 0.00022 | 0.00088 | 0.0012 | 0.0014 | 0.00022 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.0050 | 0.0040 | 0.00065 | 0.00042 | 0.0013 | 0.00068 | 0.0013 | 0.0013 | 0.0022 | 0.00070 |
| Barium, total | mg/L | 0.034 | 0.047 | 1.0 | 0.80 | 0.059 | 0.024 | 0.074 | 0.054 | 0.067 | 0.037 | 0.088 | 0.055 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000058 | 0.000018 | 0.000061 | 0.000068 | 0.000058 | 0.000018 | 0.000061 | 0.000068 |
| Boron, total | mg/L | 0.015 | 0.050 | 1.2 | 0.96 | 0.10 | 0.14 | 0.13 | 0.028 | 0.14 | 0.22 | 0.23 | 0.033 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.00017 | 0.00014 | 0.000082 | 0.000055 | 0.000032 | 0.0000069 | 0.00020 | 0.00016 | 0.00011 | 0.000013 |
| Chromium (Cr(VI)), total | mg/L | 0.00032 | 0.0018 | 0.0010 | 0.00080 | 0.00035 | 0.00020 | 0.00077 | 0.00054 | 0.00075 | 0.00088 | 0.0012 | 0.00055 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.0032 | 0.0040 | 0.0042 | 0.0028 | 0.00034 | 0.018 | 0.020 | 0.011 | 0.00087 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0026 | 0.0021 | 0.0017 | 0.0023 | 0.0017 | 0.0015 | 0.0039 | 0.0049 | 0.0028 | 0.0016 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.80 | 0.11 | 0.063 | 0.036 | 0.068 | 0.21 | 0.13 | 0.064 | 0.069 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | 0.28 | 0.11 | 0.063 | 0.036 | 0.028 | 0.21 | 0.13 | 0.064 | 0.031 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0055 | 0.0044 | 0.00045 | 0.00060 | 0.0012 | 0.000070 | 0.0014 | 0.0021 | 0.0022 | 0.00018 |
| Manganese, total | mg/L | 0.0050 | 0.058 | 0.94 | 0.75 | 0.079 | 0.074 | 0.036 | 0.0084 | 0.28 | 0.29 | 0.16 | 0.014 |
| Mercury, total | mg/L | 0.0000025 | 0.0000089 | 0.000020 | 0.000016 | 0.0000046 | 0.0000023 | 0.0000054 | 0.0000041 | 0.0000078 | 0.0000058 | 0.0000085 | 0.0000041 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.027 | 0.0100 | 0.0084 | 0.035 | 0.00084 | 0.041 | 0.068 | 0.070 | 0.0049 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0025 | 0.0020 | 0.0065 | 0.0056 | 0.0060 | 0.00068 | 0.026 | 0.026 | 0.017 | 0.0016 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.0016 | 0.0069 | 0.0082 | 0.024 | 0.00078 | 0.026 | 0.037 | 0.049 | 0.0029 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0.000017 | 0.0000094 | 0.000027 | 0.000014 | 0.000033 | 0.000037 | 0.000044 | 0.000014 |
| Strontium, dissolved | mg/L | 0.11 | 0.13 | 2.5 | 2.0 | 0.24 | 0.27 | 0.28 | 0.14 | 0.63 | 0.55 | 0.52 | 0.15 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.00010 | 0.000067 | 0.000076 | 0.000016 | 0.00023 | 0.00018 | 0.00013 | 0.000022 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | 0.0085 | 0.0068 | 0.0019 | 0.0026 | 0.0047 | 0.00034 | 0.0052 | 0.0080 | 0.0094 | 0.00078 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0071 | 0.0057 | 0.0092 | 0.0071 | 0.0098 | 0.0019 | 0.032 | 0.030 | 0.020 | 0.0029 |

https://rsk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241210.xlsx]POPCs

# Rail Loadout Discharge (to ground) POCs – High ST

Table A-2.4 Rail Load Out - POCs

| | | Rail Load Out - POCs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Bulkley River (WQS11) | | | | POCs selection | | | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max RLO discharge - Normal ST | Exceeds at WQS11? - Normal ST | Max RLO discharge - High ST | Exceeds at WQS11? High ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 1.6 | 1.3 | 0 | 0.0052 | 0 | 0.0052 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 0.080 | 0.26 | 2.3 | 0.26 |
| Fluoride | mg/L | 0.031 | 0.045 | 0.84 | 0.67 | 0 | 0.031 | 0 | 0.031 |
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 2.4 | 0 | 0.014 | 0 | 0.014 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0 | 0.0052 | 0 | 0.0052 |
| Sulphate | mg/L | 2.6 | 7.4 | 130 | 100 | 68 | 4.8 | 1600 | 4.8 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.18 | 0.14 | 0.37 | 0.15 | 0.37 | 0.15 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.074 | 0.059 | 0.0000054 | 0.000052 | 0.00012 | 0.000052 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.0050 | 0.0040 | 0.00051 | 0.00031 | 0.00062 | 0.00031 |
| Barium, total | mg/L | 0.034 | 0.047 | 1.0 | 0.80 | 0.012 | 0.031 | 0.14 | 0.031 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0 | 0.000052 | 0 | 0.000052 |
| Boron, total | mg/L | 0.015 | 0.050 | 1.2 | 0.96 | 0.0083 | 0.0052 | 0.18 | 0.0052 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.000085 | 0.000068 | 0.000091 | 0.0000031 | 0.0021 | 0.0000031 |
| Chromium (Cr(VI)), total | mg/L | 0.00032 | 0.0018 | 0.0010 | 0.00080 | 0.0012 | 0.00031 | 0.0016 | 0.00031 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.0032 | 0.0014 | 0.00010 | 0.021 | 0.00010 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0011 | 0.00088 | 0.00023 | 0.00073 | 0.0062 | 0.00073 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.80 | 1.5 | 0.19 | 1.8 | 0.19 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | 0.28 | 0.076 | 0.052 | 0.30 | 0.052 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0040 | 0.0032 | 0.00044 | 0.00016 | 0.0014 | 0.00016 |
| Manganese, total | mg/L | 0.0050 | 0.058 | 0.73 | 0.58 | 0.071 | 0.018 | 1.2 | 0.018 |
| Mercury, total | mg/L | 0.0000025 | 0.0000089 | 0.000020 | 0.000016 | 0.0000047 | 0.0000031 | 0.000040 | 0.0000031 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.027 | 0.00018 | 0.00042 | 0.0035 | 0.00042 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0013 | 0.0010 | 0.0023 | 0.00031 | 0.048 | 0.00031 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.0016 | 0.00035 | 0.000031 | 0.0080 | 0.000031 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0 | 0.000010 | 0 | 0.000010 |
| Strontium, dissolved | mg/L | 0.11 | 0.13 | 2.5 | 2.0 | 0.068 | 0.0000023 | 1.5 | 0.000051 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.00010 | 0.000010 | 0.0025 | 0.000010 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | 0.0085 | 0.0068 | 0.000031 | 0.000042 | 0.00047 | 0.000042 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0039 | 0.00312 | 0.0034 | 0.0016 | 0.094 | 0.0016 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241210.xlsx]POPCs

# Appendix B: British Columbia Water Quality Guidelines and Parameter of Potential Concern Screening Summary Tables

**Table B-1.1 Water Quality Guidelines for Receiving Water Nodes**

| Receiving Environment | | Tenas Creek | | Four Creek | | Goathorn Creek | | Telkwa River | | Bulkley River | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Selected for FEAC** | **Rationale** | **Selected for FEAC** | **Rationale** | **Selected for FEAC** | **Rationale** | **Selected for FEAC** | **Rationale** | **Selected for FEAC** | **Rationale** |
| Alkalinity | mg CaCO3/L | | | | | | | | | | |
| Ammonia, total | mg-N/L | 1.3 | Used BC AWQG | 0.992 | Used BC AWQG | 1.56 | Used BC AWQG | 1.66 | Used BC AWQG | 1.6 | Used BC AWQG |
| Chloride | mg/L | 150 | Used BC AWQG | 150 | Used BC AWQG | 150 | Used BC AWQG | 150 | Used BC AWQG | 150 | Used BC AWQG |
| Fluoride | mg/L | 1.22 | Used BC AWQG | 1.37 | Used BC AWQG | 1.19 | Used BC AWQG | 0.99 | Used BC AWQG | 0.84 | Used BC AWQG |
| Nitrate | mg-N/L | 3 | Used BC AWQG | 3 | Used BC AWQG | 3 | Used BC AWQG | 3 | Used BC AWQG | 3 | Used BC AWQG |
| Nitrite | mg-N/L | 0.02 | Used BC AWQG | 0.02 | Used BC AWQG | 0.02 | Used BC AWQG | 0.02 | Used BC AWQG | 0.02 | Used BC AWQG |
| Sulphate | mg/L | 218 | Used BC AWQG | 309 | Used BC AWQG | 218 | Used BC AWQG | 218 | Used BC AWQG | 128 | Used BC AWQG |
| Aluminum, total | mg/L | 0.35 | Used BC AWQG | 0.69 | Used BC AWQG | 0.27 | Used BC AWQG | 0.19 | Used BC AWQG | 0.18 | Used BC AWQG |
| Antimony, total | mg/L | 0.072 | Used BC AWQG | 0.072 | Used BC AWQG | 0.072 | Used BC AWQG | 0.072 | Used BC AWQG | 0.072 | Used BC AWQG |
| Arsenic, total | mg/L | 0.005 | Used BC AWQG | 0.005 | Used BC AWQG | 0.005 | Used BC AWQG | 0.005 | Used BC AWQG | 0.005 | Used BC AWQG |
| Barium, total | mg/L | 1 | No AWQG, Used WWQG | 1 | No AWQG, Used WWQG | 1 | No AWQG, Used WWQG | 1 | No AWQG, Used WWQG | 1 | No AWQG, Used WWQG |
| Beryllium, total | mg/L | 0.00013 | No AWQG, Used WWQG | 0.00013 | No AWQG, Used WWQG | 0.00013 | No AWQG, Used WWQG | 0.00013 | No AWQG, Used WWQG | 0.00013 | No AWQG, Used WWQG |
| Boron, total | mg/L | 1.2 | Used BC AWQG | 1.2 | Used BC AWQG | 1.2 | Used BC AWQG | 1.2 | Used BC AWQG | 1.2 | Used BC AWQG |
| Cadmium, dissolved | mg/L | 0.00017 | Used BC AWQG | 0.00023 | Used BC AWQG | 0.00016 | Used BC AWQG | 0.00011 | Used BC AWQG | 0.00009 | Used BC AWQG |
| Chromium (Cr(VI)), total | mg/L | 0.0025 | No AWQG, Used WWQG | 0.0025 | No AWQG, Used WWQG | 0.0025 | No AWQG, Used WWQG | 0.0025 | No AWQG, Used WWQG | 0.0025 | No AWQG, Used WWQG |
| Cobalt, total | mg/L | 0.004 | Used BC AWQG | 0.004 | Used BC AWQG | 0.004 | Used BC AWQG | 0.004 | Used BC AWQG | 0.004 | Used BC AWQG |
| Copper, dissolved | mg/L | 0.0026 | Used BC AWQG | 0.0047 | Used BC AWQG | 0.0013 | Used BC AWQG | 0.0008 | Used BC AWQG | 0.0011 | Used BC AWQG |
| Iron, total | mg/L | 1 | Used BC Acute WQG | 1 | Used BC Acute WQG | 1 | Used BC Acute WQG | 1 | Used BC Acute WQG | 1 | Used BC Acute WQG |
| Iron, dissolved | mg/L | 0.35 | Used BC Acute WQG | 0.35 | Used BC Acute WQG | 0.35 | Used BC Acute WQG | 0.35 | Used BC Acute WQG | 0.35 | Used BC Acute WQG |
| Lead, total | mg/L | 0.0055 | Used BC AWQG | 0.0069 | Used BC AWQG | 0.0053 | Used BC AWQG | 0.0044 | Used BC AWQG | 0.0040 | Used BC AWQG |
| Manganese, total | mg/L | 0.94 | Used BC AWQG | 1.09 | Used BC AWQG | 0.91 | Used BC AWQG | 0.79 | Used BC AWQG | 0.73 | Used BC AWQG |
| Mercury, total | mg/L | 0.00002 | Used BC AWQG | 0.00002 | Used BC AWQG | 0.00002 | Used BC AWQG | 0.00002 | Used BC AWQG | 0.00002 | Used BC AWQG |
| Molybdenum, total | mg/L | 0.034 | Used BC ruminant wildlife guideline | 0.034 | Used BC ruminant wildlife guideline | 0.034 | Used BC ruminant wildlife guideline | 0.034 | Used BC ruminant wildlife guideline | 0.034 | Used BC ruminant wildlife guideline |
| Nickel, dissolved | mg/L | 0.003 | Used BC AWQG | 0.005 | Used BC AWQG | 0.002 | Used BC AWQG | 0.001 | Used BC AWQG | 0.001 | Used BC AWQG |
| Selenium, total | mg/L | 0.002 | Used BC AWQG | 0.002 | Used BC AWQG | 0.002 | Used BC AWQG | 0.002 | Used BC AWQG | 0.002 | Used BC AWQG |
| Silver, total | mg/L | 0.00005 | Used BC AWQG | 0.0015 | Used BC AWQG | 0.00005 | Used BC AWQG | 0.00005 | Used BC AWQG | 0.00005 | Used BC AWQG |
| Strontium, dissolved | mg/L | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life | 2.5 | No BC AWQG or WWQG, Used ECCC FEQG for Aquatic Life |
| Thallium, total | mg/L | 0.0008 | No AWQG, Used WWQG | 0.0008 | No AWQG, Used WWQG | 0.0008 | No AWQG, Used WWQG | 0.001 | No AWQG, Used WWQG | 0.001 | No AWQG, Used WWQG |
| Uranium, total | mg/L | 0.0085 | No AWQG, Used WWQG | 0.0085 | No AWQG, Used WWQG | 0.0085 | No AWQG, Used WWQG | 0.0085 | No AWQG, Used WWQG | 0.0085 | No AWQG, Used WWQG |
| Zinc, dissolved | mg/L | 0.0071 | Used BC AWQG | 0.0139 | Used BC AWQG | 0.0074 | Used BC AWQG | 0.0042 | Used BC AWQG | 0.0039 | Used BC AWQG |

Notes: BC AWQG = Approved BC Water Quality Guidelines for Aquatic Life; BC WWQG = WORKING BC Water Quality Guidelines for Aquatic Life; ECCC FEQG = Environment Canada Federal Environmental Quality Guidelines

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[Telkwa_BAT_assessment_BCWQGused_26062024.xlsx]WQG_table

## Table B-1.2 Parameters to calculate Water Quality Guidelines for Receiving Water

| Receiving Environment | | Tenas Creek | Four Creek | Goathorn Creek | Telkwa River | Bulkley River |
|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **P50** | **P50** | **P50** | **P50** | **P50** |
| Temperature | degC | 3 | 3 | 5 | 5 | 9 |
| pH | pH unit | 8.1 | 8.3 | 7.9 | 7.8 | 7.7 |
| Hardness | mg-$CaCO_3$/L | 73 | 110 | 69 | 37 | 27 |
| Chloride | mg/L | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Dissolved Organic Carbon | | 2.5 | 8 | 2 | 1.6 | 2.2 |

**Table B-2.1 TCP surface discharge (operations), NMP surface discharge (closure) - POCs**

| | | TCP surface discharge (operations), NMP surface discharge (closure) - POCs | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Goathorn creek (WQSEA1) | | | | POCs selection | | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max TCP discharge - Normal ST | Max NMP discharge -Normal ST | Exceeds at EA1? - Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0070 | 1.6 | 1.3 | 1.1 | 0.093 | 0.020 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 6.6 | 3.1 | 0.86 |
| Fluoride | mg/L | 0.032 | 0.041 | 1.2 | 0.96 | 0.15 | 0.031 | 0.050 |
| Nitrate | mg-N/L | 0.041 | 0.076 | 3.0 | 2.4 | 8.1 | 0.66 | 0.17 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.19 | 0.015 | 0.0041 |
| Sulphate | mg/L | 24 | 37 | 220 | 180 | 420 | 230 | 62 |
| Aluminum, total | mg/L | 0.092 | 0.75 | 0.27 | 0.22 | 0.39 | 0.39 | 0.19 |
| Antimony, total | mg/L | 0.000073 | 0.00014 | 0.074 | 0.059 | 0.00079 | 0.00043 | 0.00013 |
| Arsenic, total | mg/L | 0.00023 | 0.00068 | 0.0050 | 0.0040 | 0.0018 | 0.00090 | 0.00044 |
| Barium, total | mg/L | 0.058 | 0.072 | 1.0 | 0.80 | 0.080 | 0.025 | 0.076 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000061 | 0.000015 | 0.000060 |
| Boron, total | mg/L | 0.0050 | 0.050 | 1.2 | 0.96 | 0.13 | 0.14 | 0.029 |
| Cadmium, dissolved | mg/L | 0.0000081 | 0.000036 | 0.00016 | 0.00013 | 0.000032 | 0.0000054 | 0.000016 |
| Chromium (Cr(VI)), total | mg/L | 0.00020 | 0.00091 | 0.0025 | 0.0020 | 0.0020 | 0.0013 | 0.00053 |
| Cobalt, total | mg/L | 0.000050 | 0.00055 | 0.0040 | 0.0032 | 0.0035 | 0.0013 | 0.00039 |
| Copper, dissolved | mg/L | 0.0014 | 0.0039 | 0.0013 | 0.0010 | 0.0017 | 0.0022 | 0.0021 |
| Iron, total | mg/L | 0.085 | 0.78 | 1.0 | 0.80 | 1.5 | 1.5 | 0.43 |
| Iron, dissolved | mg/L | 0.015 | 0.13 | 0.35 | 0.28 | 0.036 | 0.0080 | 0.025 |
| Lead, total | mg/L | 0.000025 | 0.00023 | 0.0053 | 0.0042 | 0.0016 | 0.0010 | 0.00021 |
| Manganese, total | mg/L | 0.0059 | 0.033 | 0.91 | 0.73 | 0.061 | 0.030 | 0.012 |
| Mercury, total | mg/L | 0.0000025 | 0.0000064 | 0.000020 | 0.000016 | 0.0000085 | 0.0000046 | 0.0000040 |
| Molybdenum, total | mg/L | 0.00047 | 0.00062 | 0.034 | 0.027 | 0.035 | 0.0077 | 0.0022 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0011 | 0.0022 | 0.0018 | 0.0060 | 0.0023 | 0.00065 |
| Selenium, total | mg/L | 0.000086 | 0.00020 | 0.0020 | 0.0016 | 0.024 | 0.0082 | 0.0015 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0.000027 | 0.0000084 | 0.000012 |
| Strontium, dissolved | mg/L | 0.076 | 0.11 | 2.5 | 2.0 | 0.28 | 0.25 | 0.14 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.000076 | 0.000017 | 0.000014 |
| Uranium, total | mg/L | 0.000054 | 0.00014 | 0.0085 | 0.0068 | 0.0047 | 0.0025 | 0.00049 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0021 | 0.0074 | 0.0059 | 0.0098 | 0.0019 | 0.0021 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241210.xlsx]COCs selection

**Table B-2.2 MP seepage - POCs**

| | | MP seepage - POCs | | | | | |
|---|---|---|---|---|---|---|---|
| | | Four creek (WQS03_DS) | | | | POCs selection | |
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **80% WQG** | **Max EMP - Normal ST** | **Exceeds at WQS03_DS? - Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0092 | 0.99 | 0.79 | 0.28 | 0.050 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 1.6 | 0.47 |
| Fluoride | mg/L | 0.059 | 0.068 | 1.4 | 1.1 | 0.027 | 0.10 |
| Nitrate | mg-N/L | 0.013 | 0.058 | 3.0 | 2.4 | 2.2 | 0.38 |
| Nitrite | mg-N/L | 0.00050 | 0.0010 | 0.020 | 0.016 | 0.050 | 0.0095 |
| Sulphate | mg/L | 1.9 | 28 | 310 | 250 | 200 | 33 |
| Aluminum, total | mg/L | 0.099 | 1.2 | 0.69 | 0.55 | 0.018 | 0.26 |
| Antimony, total | mg/L | 0.000050 | 0.00012 | 0.074 | 0.059 | 0.00018 | 0.000087 |
| Arsenic, total | mg/L | 0.00074 | 0.0011 | 0.0050 | 0.0040 | 0.00037 | 0.0013 |
| Barium, total | mg/L | 0.071 | 0.13 | 1.0 | 0.80 | 0.032 | 0.16 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000027 | 0.000086 |
| Boron, total | mg/L | 0.012 | 0.020 | 1.2 | 0.96 | 0.032 | 0.019 |
| Cadmium, dissolved | mg/L | 0.0000052 | 0.000012 | 0.00023 | 0.00018 | 0.000059 | 0.000013 |
| Chromium (Cr(VI)), total | mg/L | 0.00026 | 0.0016 | 0.0025 | 0.0020 | 0.00023 | 0.00052 |
| Cobalt, total | mg/L | 0.000050 | 0.00047 | 0.0040 | 0.0032 | 0.0035 | 0.00068 |
| Copper, dissolved | mg/L | 0.0014 | 0.0034 | 0.0047 | 0.0038 | 0.00098 | 0.0024 |
| Iron, total | mg/L | 0.095 | 1.1 | 1.0 | 0.80 | 0.080 | 0.24 |
| Iron, dissolved | mg/L | 0.015 | 0.41 | 0.35 | 0.28 | 0.080 | 0.052 |
| Lead, total | mg/L | 0.000025 | 0.00028 | 0.0069 | 0.0055 | 0.00027 | 0.000065 |
| Manganese, total | mg/L | 0.0025 | 0.024 | 1.1 | 0.88 | 0.064 | 0.013 |
| Mercury, total | mg/L | 0.0000025 | 0.000013 | 0.000020 | 0.000016 | 0.0000030 | 0.0000052 |
| Molybdenum, total | mg/L | 0.00023 | 0.00038 | 0.034 | 0.027 | 0.0075 | 0.0012 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0018 | 0.0047 | 0.0038 | 0.0053 | 0.0011 |
| Selenium, total | mg/L | 0.000025 | 0.000095 | 0.0020 | 0.0016 | 0.0051 | 0.00081 |
| Silver, total | mg/L | 0.0000050 | 0.000022 | 0.0015 | 0.0012 | 0.000010 | 0.0000087 |
| Strontium, dissolved | mg/L | 0.17 | 0.24 | 2.5 | 2.0 | 0.17 | 0.32 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.000074 | 0.000020 |
| Uranium, total | mg/L | 0.000078 | 0.00025 | 0.0085 | 0.0068 | 0.00096 | 0.00019 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0025 | 0.014 | 0.011 | 0.0073 | 0.0026 |

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**Table B-2.3 MP seepage - POCs**

| | | MP seepage - POCs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tenas Creek (WQS04) | | | | POCs selection | | | |
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **WQG** | **80% WQG** | **Max NMP - Normal ST** | **Max WMP - Normal ST** | **Max TCP - Normal ST** | **Exceeds at WQS04? Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 1.3 | 1.0 | 0.19 | 0.37 | 1.1 | 0.031 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 2.3 | 3.2 | 6.6 | 0.52 |
| Fluoride | mg/L | 0.031 | 0.045 | 1.2 | 0.96 | 0.043 | 0.033 | 0.15 | 0.055 |
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 2.4 | 1.5 | 2.9 | 8.1 | 0.24 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0.034 | 0.066 | 0.19 | 0.0060 |
| Sulphate | mg/L | 2.6 | 7.4 | 220 | 180 | 240 | 250 | 420 | 24 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.35 | 0.28 | 0.022 | 0.021 | 0.018 | 0.11 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.074 | 0.059 | 0.00033 | 0.00046 | 0.00079 | 0.00022 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.0050 | 0.0040 | 0.00065 | 0.00042 | 0.0013 | 0.00068 |
| Barium, total | mg/L | 0.034 | 0.047 | 1.0 | 0.80 | 0.059 | 0.024 | 0.074 | 0.054 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0.000058 | 0.000018 | 0.000061 | 0.000068 |
| Boron, total | mg/L | 0.015 | 0.050 | 1.2 | 0.96 | 0.10 | 0.14 | 0.13 | 0.028 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.00017 | 0.00014 | 0.000082 | 0.000055 | 0.000032 | 0.0000069 |
| Chromium (Cr(VI)), total | mg/L | 0.00032 | 0.0018 | 0.0025 | 0.0020 | 0.00035 | 0.00020 | 0.00077 | 0.00054 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.0032 | 0.0040 | 0.0042 | 0.0028 | 0.00034 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0026 | 0.0021 | 0.0017 | 0.0023 | 0.0017 | 0.0015 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.80 | 0.11 | 0.063 | 0.036 | 0.068 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | 0.28 | 0.11 | 0.063 | 0.036 | 0.028 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0055 | 0.0044 | 0.00045 | 0.00060 | 0.0012 | 0.000070 |
| Manganese, total | mg/L | 0.0050 | 0.058 | 0.94 | 0.75 | 0.079 | 0.074 | 0.036 | 0.0084 |
| Mercury, total | mg/L | 0.0000025 | 0.0000089 | 0.000020 | 0.000016 | 0.0000046 | 0.0000023 | 0.0000054 | 0.0000041 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.027 | 0.0100 | 0.0084 | 0.035 | 0.00084 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0025 | 0.0020 | 0.0065 | 0.0056 | 0.0060 | 0.00068 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.0016 | 0.0069 | 0.0082 | 0.024 | 0.00078 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0.000017 | 0.0000094 | 0.000027 | 0.000014 |
| Strontium, dissolved | mg/L | 0.11 | 0.13 | 2.5 | 2.0 | 0.24 | 0.27 | 0.28 | 0.14 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.00010 | 0.000067 | 0.000076 | 0.000016 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | 0.0085 | 0.0068 | 0.0019 | 0.0026 | 0.0047 | 0.00034 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0071 | 0.0057 | 0.0092 | 0.0071 | 0.0098 | 0.0019 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241210.xlsx]COCs selection

**Table B-2.4 Rail Load Out - POCs**

| | | Rail Load Out - POCs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Bulkley River (WQS11) | | | | POCs selection | | | |
| Parameter | Units | Baseline P50 | Baseline P95 | WQG | 80% WQG | Max RLO discharge - Normal ST | Exceeds at WQS11? - Normal ST | Max RLO discharge - High ST | Exceeds at WQS11? - High ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 1.6 | 1.3 | 0 | 0.0052 | 0 | 0.0052 |
| Chloride | mg/L | 0.25 | 0.50 | 150 | 120 | 0.080 | 0.26 | 2.3 | 0.26 |
| Fluoride | mg/L | 0.031 | 0.045 | 0.84 | 0.67 | 0 | 0.031 | 0 | 0.031 |
| Nitrate | mg-N/L | 0.0050 | 0.060 | 3.0 | 2.4 | 0 | 0.014 | 0 | 0.014 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.020 | 0.016 | 0 | 0.0052 | 0 | 0.0052 |
| Sulphate | mg/L | 2.6 | 7.4 | 130 | 100 | 68 | 4.8 | 1600 | 4.8 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 0.18 | 0.14 | 0.37 | 0.15 | 0.37 | 0.15 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.074 | 0.059 | 0.0000054 | 0.000052 | 0.00012 | 0.000052 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.0050 | 0.0040 | 0.00051 | 0.00031 | 0.00062 | 0.00031 |
| Barium, total | mg/L | 0.034 | 0.047 | 1.0 | 0.80 | 0.012 | 0.031 | 0.14 | 0.031 |
| Beryllium, total | mg/L | 0.000050 | 0.00010 | 0.00013 | 0.00010 | 0 | 0.000052 | 0 | 0.000052 |
| Boron, total | mg/L | 0.015 | 0.050 | 1.2 | 0.96 | 0.0083 | 0.0052 | 0.18 | 0.0052 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.000085 | 0.000068 | 0.000091 | 0.0000031 | 0.0021 | 0.0000031 |
| Chromium (Cr(VI)), total | mg/L | 0.00032 | 0.0018 | 0.0025 | 0.0020 | 0.0012 | 0.00031 | 0.0016 | 0.00031 |
| Cobalt, total | mg/L | 0.000050 | 0.00099 | 0.0040 | 0.0032 | 0.0014 | 0.00010 | 0.021 | 0.00010 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0011 | 0.00088 | 0.00023 | 0.00073 | 0.0062 | 0.00073 |
| Iron, total | mg/L | 0.048 | 1.2 | 1.0 | 0.80 | 1.5 | 0.19 | 1.8 | 0.19 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | 0.28 | 0.076 | 0.052 | 0.30 | 0.052 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0040 | 0.0032 | 0.00044 | 0.00016 | 0.0014 | 0.00016 |
| Manganese, total | mg/L | 0.0050 | 0.058 | 0.73 | 0.58 | 0.071 | 0.018 | 1.2 | 0.018 |
| Mercury, total | mg/L | 0.0000025 | 0.0000089 | 0.000020 | 0.000016 | 0.0000047 | 0.0000031 | 0.000040 | 0.0000031 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 0.034 | 0.027 | 0.00018 | 0.00042 | 0.0035 | 0.00042 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0013 | 0.0010 | 0.0023 | 0.00031 | 0.048 | 0.00031 |
| Selenium, total | mg/L | 0.000051 | 0.00020 | 0.0020 | 0.0016 | 0.00035 | 0.000031 | 0.0080 | 0.000031 |
| Silver, total | mg/L | 0.0000050 | 0.000020 | 0.000050 | 0.000040 | 0 | 0.000010 | 0 | 0.000010 |
| Strontium, dissolved | mg/L | 0.11 | 0.13 | 2.5 | 2.0 | 0.068 | 0.0000023 | 1.5 | 0.000051 |
| Thallium, total | mg/L | 0.0000050 | 0.000010 | 0.00080 | 0.00064 | 0.00010 | 0.000010 | 0.0025 | 0.000010 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | 0.0085 | 0.0068 | 0.000031 | 0.000042 | 0.00047 | 0.000042 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0039 | 0.00312 | 0.0034 | 0.0016 | 0.094 | 0.0016 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241210.xlsx]COCs selection

# Appendix C: Acute Toxicity Assessment of Modelled Effluent at End of Pipe, Borealis Environmental

# TECHNICAL MEMORANDUM

**To:** Dan Farmer, COO, Tenas Project (Telkwa Mining)

**Cc:** Soren Jensen, Principal Consultant (Environmental Engineering)
(SRK Consulting (Canada) Inc.)

**From:** Guy Gilron, Principal, Senior Environmental Scientist
(Borealis Environmental Consulting Inc.)

**Subject:** Evaluation of Acute *Daphnia magna* and Rainbow Trout LC50 Toxicity Supporting Tenas Project Best Available Technology assessment study – Parameters of Concern: Nitrite, Iron (total) and Iron (dissolved)

**Date:** December 17, 2024.

## 1.0 Introduction

A Best Available Technology (BAT) assessment supporting the Tenas Project's Environmental Assessment (EA), currently being conducted by SRK (SRK, 2024), has yielded modeling results indicating that effluent concentrations of three parameters of concern (POCs) will potentially exceed BC acute water quality guidelines for the protection for aquatic life (BC ALGs), specifically: nitrite, iron (total) and iron (dissolved). As part of the toxicity reduction section of *Best Achievable Technology Assessment Methodology for Mining Projects* (ENV, 2024; DRAFT), there is a requirement that "…mine effluent must not be acutely toxic to the most sensitive receptor in the receiving environment."

Borealis Environmental Consulting Inc. (Borealis) was retained to provide an evaluation of the effluent data, to confirm the above-mentioned exceedances, and then determine the extent to which effluent concentrations of the above POCs might be acutely toxic. The acute toxicity (LC50s) of the POCs for two standard test species - routinely used to evaluate acute toxicity of industrial effluents (*i.e.,* the cladoceran, *Daphnia magna*, and the salmonid, Rainbow Trout (*Oncorhynchus mykiss*)) – were reviewed and evaluated to understand whether the POCs in the effluent could render it acutely toxic.

This technical memorandum summarizes this evaluation.

# 2.0 Methods

## 2.1 Confirmation of Parameters of Concern based on BC Aquatic Life Guideline Exceedances

Modelling data presented as part of the BAT assessment provided by SRK (2024) were first evaluated to determine whether they exceed BC ALGs. Table 1 below provides a summary of this determination. For the purposes of this evaluation, those parameters that yield an exceedance factor (similar to a hazard quotient) of >1 are considered POCs; all other parameters not exceeding their respective acute BC ALG would not be deemed acutely toxic.

Appendix A provides a copy of the data set provided to Borealis by SRK on behalf of Telkwa Mining.

**Table 1. Exceedance factors (and basis) for parameters exceeding BC ALGs in Tenas Project mine effluent (based on modelling conducted by SRK (2024)).**

| Parameter | Concentration (in mg/L)* | Exceedance Factor (EF)** | Basis | Notes |
|---|---|---|---|---|
| **Nitrite** | 0.17 | 1.42 | Exceedance of BC ALG for nitrite = 0.12 mg/L | Based on chloride concentrations in the range of 2-4 mg/L |
| | 0.19 | 1.58 | | |
| | 0.19 | 1.58 | | |
| | 0.17 | 1.42 | | |
| **Iron (total)** | 1.48 | 1.48 | Exceedance of BC ALG for total iron = 1 mg/L | - |
| | 1.46 | 1.46 | | |
| | 1.10 | 1.10 | | |
| | 1.50 | 1.50 | | |
| **Iron (dissolved)** | 0.41 | 1.17 | Exceedance of BC ALG for dissolved iron = 0.35 mg/L | - |

* from SRK (2024) Best Available Technology Evaluation report.

** EF=[POC]/BC ALG; exceedance factor is equivalent to a hazard quotient, EF>1 indicates potential aquatic risk.

## 2.2 Acute Lethality Toxicity Test Data Acquisition

To evaluate whether it is likely that parameter concentrations from the modeled effluent would be acutely toxic to the two standard test organisms, a comprehensive search of acute lethality (LC50) data for the POCs listed above was conducted.

LC50 data were extracted from the online USEPA ECOTOX database (ECOTOX Database). The search criteria were as follows:

- Species: *Daphnia magna* and rainbow trout (*Oncorhynchus mykiss*).
- Chemicals: Nitrite and Iron (both total and dissolved).
- Endpoint: LC50 with survival as the primary focus.
- Exposure Type: acute, in freshwater conditions.

LC50 data were filtered by species, chemical form, exposure duration, and test conditions (*e.g.,* water hardness, pH). The lowest reported LC50 values were targeted for further evaluation (to remain conservative), and specifically noted for citing the original reference sources (where possible). Results were cross-referenced with published toxicity literature for consistency. As required, additional references were obtained from other searches to ensure a robust dataset.

Where required, toxicity-modifying factors for the three POCs (*e.g.,* chloride concentrations for nitrite) were taken into consideration for the published acute toxicity concentration values used to evaluate whether the effluent modelled for the Project was acutely toxic.

# 3.0 Results

## 3.1 NITRITE

Nitrite ($NO_2^-$) exhibits acute toxicity to aquatic organisms, including *Daphnia magna* and rainbow trout (*Oncorhynchus mykiss*), primarily by interfering with oxygen transport and other physiological processes.

- For *Daphnia magna*, exposure to nitrite can lead to immobilization and mortality, with median lethal concentrations (48-hr LC50) typically in the range of 10–30 mg/L.

- Rainbow trout, sensitive to nitrite's effects on hemoglobin oxygenation (forming methemoglobin), yielded 96-hr LC50 values in the range 0.19–2.5 mg/L, depending on water chemistry factors, like chloride[1] levels and hardness.

Based on the USEPA ECOTOX queries, the lowest reported LC50 values for nitrite were 27.3 mg/L for *Daphnia magna* (Ewell *et al*., 1986) and 0.19 mg/L for rainbow trout (Russo *et al.,* 2011) (Table 2). The more sensitive LC50 (for rainbow trout) of 0.19 mg/L is slightly higher than the lowest concentration in the BAT dataset (*i.e.,* 0.17), indicating that nitrite in the effluent would unlikely result in acute toxicity of the effluent (Table 3).

[1]The BC ALG for nitrite is chloride dependent.

## 3.2 IRON

Iron (Fe) toxicity in aquatic environments, whether in total or dissolved forms, can significantly adversely affect the health of aquatic invertebrates and fish.

- For *Daphnia magna*, elevated iron can cause oxidative stress and disrupt physiological processes critical for survival. Acute toxicity is influenced by bioavailability, which depends on factors like pH, dissolved organic matter, and water hardness (ECCC, 2024). High concentrations can impair mobility and survival, with LC50s typically in the range of several mg/L for dissolved iron under controlled laboratory conditions.

- Rainbow trout (*Oncorhynchus mykiss*), being extremely sensitive to water quality changes, can also be acutely affected by iron toxicity. Iron, particularly in dissolved forms, can precipitate on gill surfaces, impairing respiration and leading to mortality at concentrations as low as 1 mg/L, depending on water chemistry. The bioavailability and toxicity of iron are mitigated by factors such as higher water hardness and the presence of competing ions, which reduce iron uptake.

### 3.2.1 Total Iron

Based on the USEPA ECOTOX (and other search) queries, the lowest reported LC50 values were 6.47 mg/L for *Daphnia magna* (Mahassen *et al*., 2024) and 26 mg/L for rainbow trout (USEPA, 1992) (Table 2). The more sensitive LC50 (for *Daphnia magna*) of 6.47 mg/L is higher than the lowest concentration in the BAT dataset (*i.e.,* 1.1 mg/L), indicating that total iron in the effluent would unlikely result in acute toxicity of the effluent (Table 3).

### 3.2.2 Dissolved Iron

The USEPA ECOTOX query/search did not result in an LC50 for either of the two standard test species; however, to provide some indication of potential acute toxicity for dissolved iron, the lowest LC50 for an invertebrate reported in the rationale for the dissolved iron guideline in BC is for the amphipod, *Hyallela azteca* (ENV, 2008). While *Hyallela azteca* is considered a benthic invertebrate (*cf. Daphnia magna*, which is a planktonic invertebrate), citing this threshold is supported by the fact that both species are crustaceans and are common and representative toxicity test organisms (https://www.canada.ca/en/environment-climate-change/services/wildlife-research-landscape-science/biological-test-method-publications.html).

The reported LC50 for *Hyallela azteca* is 3.5 mg/L (ENV, 2008). This LC50 is higher than the lowest concentration in the BAT dataset (*i.e.,* 0.41 mg/L), indicating that dissolved total iron in the effluent would unlikely result in acute toxicity of the effluent (Table 3).

**Table 2. Lowest reported *Daphnia magna* and Rainbow trout LC50 values for POCs from BAT study for Tenas Project [Accessed from: https://cfpub.epa.gov/ecotox/].**

| Test Species | *Daphnia magna*[c] | | | Rainbow Trout (*Oncorhynchus mykiss*) | | |
|---|---|---|---|---|---|---|
| **POC** | **Duration** | **Value (mg/L)** | **Reference** | **Duration** | **Value (mg/L)** | **Reference** |
| Nitrite | 48 hours | 27.3[a] | Ewell *et al.,* 1986 | 96 hours | 0.19 | Russo *et al.,* 2011 |
| Iron (total) | 48 hours | 6.47 | Mahassen *et al*., 2024 | 96 hours | 26[b] | U.S. Environmental Protection Agency, 1992 |
| Iron (dissolved)[c] | NR | 3.5 | ENV, 2008 | - | - | - |

NR – not reported

[a]*Daphnia magna* was exposed to nitrite as sodium nitrite in this study; the value listed reflects concentration as nitrite.

[b]Original study was not accessed; the value reported in the US EPA ECOTOX database was reported as ferrous sulphide; the value was converted to total iron.

[c]For dissolved iron, no data were reported for *Daphnia magna* or rainbow trout; the LC50 value is based on toxicity data of the benthic invertebrate, *Hyallela azteca*, cited in BC aquatic life guideline document (ENV, 2008).

**Table 3. Summary of evaluation results**

| POC | Lowest LC50 reported (mg/L) | Reference | Test Species | Lowest [POC] (mg/L) | Exceedance Factor | Conclusion |
|---|---|---|---|---|---|---|
| Nitrite | 0.19 | Russo *et al*., 2011 | Rainbow trout | 0.17 | 0.89 | ***Nitrite is unlikely to be acutely lethal at the concentrations modelled for the effluent*** |
| Iron (total) | 6.47 | Mahassen *et al*., 2024 | *Daphnia magna* | 1.1 | 0.17 | ***Total iron is unlikely to be acutely lethal at the concentrations modelled for the effluent*** |
| Iron (dissolved) | 3.5[a] | ENV, 2008 | *Hyallela azteca* | 0.41 | 0.12 | ***Dissolved iron is unlikely to be acutely lethal at the concentrations modelled for the effluent*** |

[a]For dissolved iron, no data were reported for *Daphnia magna* or rainbow trout; the LC50 value is based on toxicity data of the benthic invertebrate, *Hyallela azteca*, cited in BC aquatic life guideline document (ENV, 2008).

## 4.0 Conclusions

For nitrite, while rainbow trout can exhibit acute toxicity at 0.19 mg/L, modeled effluent concentrations (*i.e.,* ≤0.17 mg/L) are below this threshold. Similarly, total iron's lowest reported LC50 for *Daphnia magna* (*i.e.,* 6.47 mg/L) is significantly higher than the modeled concentrations (*i.e.,* ≤1.1 mg/L). Dissolved iron demonstrates similar outcomes, with modeled concentrations well below the acute toxicity thresholds of 3.5 mg/L for the most sensitive invertebrate species (*i.e.,* using the rationale that *Hyallela azteca* can serve as a surrogate for *Daphnia magna*).

The evaluation of effluent concentrations from the BAT assessment study of the Tenas Project EA (SRK, 2024) for three POCs—nitrite, total iron, and dissolved iron - indicates that acute toxicity to aquatic organisms in the receiving environment is unlikely. Using conservative thresholds derived from LC50 values for standard test organisms (where available), none of the modeled effluent concentrations exceed the lowest toxicity benchmarks. This finding suggests that the effluent would comply with the requirement of avoiding acute toxicity to the most sensitive aquatic receptors.

In conclusion, the evaluation supports the environmental feasibility of the Tenas Project effluent, as the modeled concentrations of POCs do not pose a significant acute risk. This aligns with the project's commitment to minimizing ecological impacts and adherence to BAT standards. Further ongoing monitoring is recommended to ensure consistency with these findings.

## Closure

We trust that this information meets your requirements at the present time. Please do not hesitate to contact the undersigned at your convenience to discuss any aspects of this Technical Memorandum.

Sincerely,

**BOREALIS ENVIRONMENTAL CONSULTING INC.**

Guy Gilron, MSc, RPBio*
Senior Environmental Scientist/Principal

*Certificate of Competency attached as Appendix B.

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# Appendix A – Data set from SRK, 2024

# (attached)

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**Table B-3.1 TCP surface discharge (operations), NMP surface discharge (closure) - POPCs**

| | | TCP surface discharge (operations), NMP surface discharge (closure) - POPCs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Goathorn creek (WQSEA1) | | | | | POCs selection | | |
| Parameter | Units | Baseline P50 | Baseline P95 | Acute WQG | CCME WQG Acute | Acute WQG selected | Max TCP discharge - Normal ST | Max NMP discharge -Normal ST | Exceeds at EA1? - Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0070 | 6.14 | | 6.14 | 1.00 | 0.09 | 0.02 |
| Chloride | mg/L | 0.25 | 0.5 | 600 | | 600 | 5.6 | 3.1 | 0.6 |
| Fluoride | mg/L | 0.032 | 0.041 | 1.19 | | 1.19 | 0.14 | 0.03 | 0.05 |
| Nitrate | mg-N/L | 0.041 | 0.076 | 32.8 | | 32.8 | 7.5 | 0.7 | 0.1 |
| Nitrite | mg-N/L | 0.0005 | 0.002 | 0.12 | | 0.12 | 0.173 | 0.015 | 0.004 |
| Aluminum, total | mg/L | 0.092 | 0.75 | 5 | | 5 | 0.390 | 0.39 | 0.165 |
| Antimony, total | mg/L | 0.000073 | 0.00014 | 0.25 | | 0.25 | 0.00066 | 0.00043 | 0.00011 |
| Arsenic, total | mg/L | 0.00023 | 0.00068 | 0.025 | | 0.025 | 0.0016 | 0.0009 | 0.0005 |
| Cadmium, dissolved | mg/L | 0.0000081 | 0.000036 | 0.00041 | | 0.00041 | 0.000024 | 0.000006 | 0.000016 |
| Cobalt, total | mg/L | 0.00005 | 0.00055 | 0.11 | | 0.11 | 0.0031 | 0.001347 | 0.0003 |
| Copper, dissolved | mg/L | 0.0014 | 0.0039 | 0.0078 | | 0.0078 | 0.0014 | 0.0022 | 0.0021 |
| Iron, total | mg/L | 0.085 | 0.78 | 1 | | 1 | 1.48 | 1.46 | 0.28 |
| Iron, dissolved | mg/L | 0.015 | 0.13 | 0.35 | | 0.35 | 0.03 | 0.01 | 0.02 |
| Lead, total | mg/L | 0.000025 | 0.00023 | 0.0518 | | 0.0518 | 0.0014 | 0.0010 | 0.0001 |
| Manganese, total | mg/L | 0.0059 | 0.033 | 8.25 | | 8.25 | 0.053 | 0.030 | 0.010 |
| Molybdenum, total | mg/L | 0.00047 | 0.00062 | 46 | | 46 | 0.032 | 0.008 | 0.001 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0011 | 0.031 | | 0.031 | 0.005 | 0.002 | 0.001 |
| Silver, total | mg/L | 0.000005 | 0.00002 | 0.0001 | | 0.0001 | 0.000023 | 0.000008 | 0.000012 |
| Uranium, total | mg/L | 0.000054 | 0.00014 | | 0.033 | 0.033 | 0.0040 | 0.0025 | 0.0003 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0021 | 0.039 | | 0.039 | 0.008 | 0.002 | 0.002 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241104_basecase_noC02.xlsx]WQ_HighST

**Table B-3.2 MP seepage - POPCs**

| | | MP seepage - POPCs | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Four creek (WQS03_DS) | | | | | POCs selection | |
| Parameter | Units | Baseline P50 | Baseline P95 | BC AWQG Acute | CCME WQG Acute | Acute WQG selected | Max EMP - Normal ST | Exceeds at WQS03_DS? - Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0092 | 6.22 | | 6.22 | 0.27 | 0.05 |
| Chloride | mg/L | 0.25 | 0.5 | 600 | | 600 | 1.4 | 0.5 |
| Fluoride | mg/L | 0.059 | 0.068 | 1.37 | | 1.37 | 0.02 | 0.10 |
| Nitrate | mg-N/L | 0.013 | 0.058 | 32.8 | | 32.8 | 2.1 | 0.4 |
| Nitrite | mg-N/L | 0.0005 | 0.001 | 0.06 | | 0.06 | 0.048 | 0.009 |
| Aluminum, total | mg/L | 0.099 | 1.2 | 5 | | 5 | 0.017 | 0.26 |
| Antimony, total | mg/L | 0.00005 | 0.00012 | 0.25 | | 0.25 | 0.00014 | 0.00009 |
| Arsenic, total | mg/L | 0.00074 | 0.0011 | 0.025 | | 0.025 | 0.0003 | 0.0013 |
| Cadmium, dissolved | mg/L | 0.0000052 | 0.000012 | 0.00065 | | 0.00065 | 0.000056 | 0.000013 |
| Cobalt, total | mg/L | 0.00005 | 0.00047 | 0.11 | | 0.11 | 0.0033 | 0.0006658 |
| Copper, dissolved | mg/L | 0.0014 | 0.0034 | 0.0335 | | 0.0335 | 0.0008 | 0.0024 |
| Iron, total | mg/L | 0.095 | 1.1 | 1 | | 1 | 0.08 | 0.24 |
| Iron, dissolved | mg/L | 0.015 | 0.41 | 0.35 | | 0.35 | 0.08 | 0.05 |
| Lead, total | mg/L | 0.000025 | 0.00028 | 0.0922 | | 0.0922 | 0.0002 | 0.0001 |
| Manganese, total | mg/L | 0.0025 | 0.024 | 1.75 | | 1.75 | 0.061 | 0.013 |
| Molybdenum, total | mg/L | 0.00023 | 0.00038 | 46 | | 46 | 0.006 | 0.001 |
| Nickel, dissolved' | mg/L | 0.00025 | 0.0018 | 0.0547 | | 0.0547 | 0.005 | 0.001 |
| Silver, total | mg/L | 0.000005 | 0.000022 | 0.003 | | 0.003 | 0.000008 | 0.000009 |
| Uranium, total | mg/L | 0.000078 | 0.00025 | | 0.033 | 0.033 | 0.0008 | 0.0002 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0025 | 0.0746 | | 0.0746 | 0.007 | 0.003 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241104_basecase_noC02.xlsx]WQ_HighST

**Table B-3.3 MP seepage - POPCs**

| | | MP seepage - POPCs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Tenas Creek (WQS04) | | | | | POCs selection | | | |
| **Parameter** | **Units** | **Baseline P50** | **Baseline P95** | **BC AWQG Acute** | **CCME WQG Acute** | **Acute WQG selected** | **Max NMP - Normal ST** | **Max WMP - Normal ST** | **Max TCP - Normal ST** | **Exceeds at WQS04? Normal ST** |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 6.22 | | 6.22 | 0.19 | 0.37 | 1.0 | 0.03 |
| Chloride | mg/L | 0.25 | 0.5 | 600 | | 600 | 2.3 | 3 | 6 | 0.5 |
| Fluoride | mg/L | 0.031 | 0.045 | 1.22 | | 1.22 | 0.039 | 0.032 | 0.14 | 0.055 |
| Nitrate | mg-N/L | 0.005 | 0.06 | 32.8 | | 32.8 | 1.4 | 2.8 | 7 | 0.2 |
| Nitrite | mg-N/L | 0.0005 | 0.002 | 0.12 | | 0.12 | 0.033 | 0.07 | 0.17 | 0.006 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 5 | | 5 | 0.03 | 0.022 | 0.02 | 0.11 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.25 | | 0.25 | 0.00033 | 0.0005 | 0.0007 | 0.00022 |
| Arsenic, total | mg/L | 0.00048 | 0.0009 | 0.025 | | 0.025 | 0.0007 | 0.0004 | 0.0011 | 0.0007 |
| Cadmium, dissolved | mg/L | 0.0000025 | 0.0000058 | 0.00044 | | 0.00044 | 0.000081 | 0.00005 | 0.000024 | 0.000007 |
| Cobalt, total | mg/L | 0.00005 | 0.00099 | 0.11 | | 0.11 | 0.0039 | 0.0041 | 0.0025 | 0.0003 |
| Copper, dissolved | mg/L | 0.0011 | 0.003 | 0.0153 | | 0.0153 | 0.0017 | 0.0023 | 0.0014 | 0.0015 |
| Iron, total | mg/L | 0.048 | 1.2 | 1 | | 1 | 0.10 | 0.062 | 0.03 | 0.068 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | | 0.35 | 0.10 | 0.062 | 0.03 | 0.027 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0566 | | 0.0566 | 0.0005 | 0.0006 | 0.0010 | 0.00007 |
| Manganese, total | mg/L | 0.005 | 0.058 | 1.37 | | 1.37 | 0.078 | 0.07 | 0.027 | 0.008 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 46 | | 46 | 0.010 | 0.008 | 0.032 | 0.001 |
| Nickel, dissolved' | mg/L | 0.00025 | 0.0017 | 0.0336 | | 0.0336 | 0.006 | 0.005 | 0.005 | 0.001 |
| Silver, total | mg/L | 0.000005 | 0.00002 | 0.0001 | | 0.0001 | 0.000017 | 0.000009 | 0.000023 | 0.000014 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | | 0.033 | 0.033 | 0.0019 | 0.003 | 0.004 | 0.0003 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0429 | | 0.0429 | 0.009 | 0.007 | 0.008 | 0.0019 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241104_basecase_noC02.xlsx]WQ_HighST

**Table B-3.4 Rail Load Out - POPCs**

| | | Rail Load Out - POPCs | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Bulkley River (WQS11) | | | | | POCs selection | |
| Parameter | Units | Baseline P50 | Baseline P95 | BC AWQG Acute | CCME WQG Acute | Acute WQG selected | Max RLO discharge - Normal ST | Exceeds at WQS11? - Normal ST |
| Ammonia, total | mg-N/L | 0.0025 | 0.0074 | 5.91 | | 5.91 | 0 | 0.0052 |
| Chloride | mg/L | 0.25 | 0.50 | 600.00 | | 600 | 0.08 | 0.26 |
| Fluoride | mg/L | 0.031 | 0.045 | 0.84 | | 0.84 | 0 | 0.031 |
| Nitrate | mg-N/L | 0.005 | 0.060 | 32.800 | | 32.8 | 0 | 0.014 |
| Nitrite | mg-N/L | 0.00050 | 0.0020 | 0.06 | | 0.06 | 0 | 0.0052 |
| Aluminum, total | mg/L | 0.056 | 1.8 | 5 | | 5 | 0.37 | 0.15 |
| Antimony, total | mg/L | 0.00013 | 0.00024 | 0.25 | | 0.25 | 5.4E-06 | 5.2E-05 |
| Arsenic, total | mg/L | 0.00048 | 0.00090 | 0.02500 | | 0.025 | 0.00051 | 0.00031 |
| Cadmium, dissolved | mg/L | 2.5E-06 | 5.8E-06 | 0.00016 | | 0.00016 | 0.00009 | 3.1E-06 |
| Cobalt, total | mg/L | 0.00005 | 0.00099 | 0.11 | | 0.11 | 0.0014 | 0.00010 |
| Copper, dissolved | mg/L | 0.0011 | 0.0030 | 0.0063 | | 0.0063 | 0.0002 | 0.00073 |
| Iron, total | mg/L | 0.048 | 1.2 | 1 | | 1 | 1.5 | 0.19 |
| Iron, dissolved | mg/L | 0.015 | 0.14 | 0.35 | | 0.35 | 0.076 | 0.052 |
| Lead, total | mg/L | 0.000025 | 0.00039 | 0.0169 | | 0.0169 | 0.00044 | 0.00016 |
| Manganese, total | mg/L | 0.005 | 0.058 | 0.86 | | 0.86 | 0.07 | 0.018 |
| Molybdenum, total | mg/L | 0.00012 | 0.00019 | 46 | | 46 | 0.00018 | 0.00042 |
| Nickel, dissolved | mg/L | 0.00025 | 0.0017 | 0.0169 | | 0.0169 | 0.00228 | 0.00031 |
| Silver, total | mg/L | 0.000005 | 0.00002 | 0.0001 | | 0.0001 | 8.0E-07 | 1.0E-05 |
| Uranium, total | mg/L | 0.00011 | 0.00025 | | 0.033 | 0.033 | 0.00003 | 4.2E-05 |
| Zinc, dissolved | mg/L | 0.0015 | 0.0015 | 0.0183 | | 0.0183 | 0.003 | 0.0016 |

https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20240516_UEA_to BAT Team/New Results to BAT Team/BAT_Calcs_05042024/[BAT_effluenttarget_CCM_20241104_basecase_noC02.xlsx]WQ_HighST

BOREALIS
ENVIRONMENTAL
CONSULTING INC

# Appendix B – Certificate of Competency for

# Guy Gilron, MSc, RPBio

# (attached)

borealisenvironmental@gmail.com
778 877 0690

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

# Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals[1], under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional: **Guy Gilron** Title: **Senior Environmental Scientist**
2. Are you a registered member of a professional association in B.C.? X Yes ☐ No
   Name of Association: **College of Applied Biologists** Registration **# 590**
3. Brief description of professional services:

**Evaluation of modelling data for coal mine effluent, comparison against BC aquatic life guidelines to determine exceedance factors/hazard quotients for parameters of concern POCs. Database and literature review of acute lethality (LC50) data to determine most sensitive values, to evaluate whether effluents will have the potential to be acutely toxic in standard toxicity tests using invertebrates and fish.**

This declaration of competency is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

# Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature: Witnessed by:

**X** **X**

Print Name: **Guy Gilron** Print Name: **Joanne Mulhall**

Date signed: December 16th, 2024.

*Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

*a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and*

*b) through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*

# Appendix D: Conceptual Design for RO+MBBR+HDS Lime Water Treatment Plant

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# Memo

| | | | |
|---|---|---|---|
| **To:** | Dan Farmer (TML) | **Client:** | Telkwa Mining Limited (TML) |
| **From:** | Soren Jensen, PEng, MEng (SRK)<br>Andrea Bowie, P.Eng. (SRK) | **Project No.:** | CAPR002055 |
| | | **Date:** | January 16, 2026 |
| **Subject:** | Tenas Project Active Water Treatment Plant – Conceptual Design | | |

## 1 Background

Telkwa Mining Limited (TML) has applied for an Environmental Assessment Certificate (EAC) for the Tenas Project to the BC Environmental Assessment Office (EAO). The EAO advised TML that reviewers with the BC Ministry of Environment and Parks (BC ENV) had flagged some perceived deficiencies related to the Technology Readiness Level (TRL) of water treatment technologies recommended for the Tenas Project. Specifically, the review comment made by BC ENV stated that:

> "TML's Water IR response does not identify a Best Achievable Technology (BAT) at Technology Readiness Level (TRL 7) as required in the IR. The treatment options presented are not sufficiently proven or reliable for use as primary mitigation."

On December 8, 2025, TML participated in a call with the EAO, BC ENV, and BC Ministry of Mines and Critical Minerals (BC MCM) to discuss the perceived absence of a water treatment option with a TRL of 7 or greater. On the call, TML clarified that the company has committed to implementing active water treatment processes with TRLs of at least 8 based on triggers defined in a trigger response plan developed during the permitting process for the Project. The trigger response plan would be reviewed and approved by BC ENV, BC MCM and First Nations during this process.

TML stated that a TRL 8 or 9 water treatment facility would be designed and permitted and therefore would be "shovel ready" if early warning water quality triggers were to materialize. However, based on the water quality model assessments and related studies, TML's Qualified Professionals (QPs) recommended against procuring, constructing, and commissioning an active water treatment plant prior to the start of the Operation phase of the Tenas Project. Water quality risks associated with the Project are low, and there is a high likelihood that an active water treatment plant constructed prior to the Operation phase might be unnecessary and therefore a misuse of resources. As such SRK recommends that TML designs and permits a Reverse Osmosis (RO) + High Density Sludge (HDS) Lime water treatment+ Moving Bed Bio Reactor (MBBR) treatment plant so that it is ready

for potential future implementation. Timing of future implementation would be based on an approved Trigger Action Response plan developed during the BC permitting process, using water monitoring data collected during the Construction and Operation phases.

Computer modelling for the Tenas Project indicates no tank-based mechanical water treatment plant is required to meet water quality guidelines in the receiving waters downstream. However, there is a margin of uncertainty between models and actual mining activities. It is possible that a water treatment plant constructed prior to the start of the Project may not be tailored to address some of the parameter(s) of concern that could emerge on site based on actual water quality monitoring results and the water treatment plant would require adaptive management and additional costs and resources to remedy this situation.

TML further committed to updating the Best Achievable Technology (BAT) assessment to include specific recommendations for a preferred BAT with at least a TRL 8 as well as a conceptual design for the recommended BAT, which is RO, HDS lime water treatment, and a MBBR treatment plant. This memorandum includes the conceptual design of a RO, HDS lime water treatment, and a MBBR treatment plant that likely would be suitable for the Tenas Project and therefore could be implemented if mine water constituent concentrations in the Operation phase were to be meaningfully greater than expected.

The memo is organized as follows:

- Section 2: Overview
  - Description of the water treatment process.
  - Process Flow Diagram.
- Section 3: Design Basis and Performance
  - Expected range of influent water quality and flow.
  - Expected performance (effluent quality).
- Section 4: Conceptual Design
  - General arrangement and plant location.
  - Major equipment.
  - Mass balance, reagent use, and sludge management.
  - Health and safety considerations.
- Section 5: Capital and operating cost estimates.
- Section 6: Closure.

# 2 Overview

The BAT assessment for the Tenas Project evaluated a range of technologies that could be implemented to treat effluent from the Tenas Control Pond throughout the Operation phase of the Project and later for effluent from the North Management Pond in the post-closure period when the Tenas Control Pond has been reclaimed.

As discussed above, the scenario that was selected as the preferred active tank-based water treatment BAT includes RO, HDS, and MBBR treatment processes, which are discussed below.

## 2.1 Reverse Osmosis (RO)

The purpose of the RO process is to pre-concentrate the feed water from the Tenas Control Pond before passing it to the subsequent HDS and MBBR treatment steps (Figure 2-1). RO is not commonly used as part of mine water treatment. However, in this case it is necessary to pre-concentrate the feed water since expected parameter concentrations are so low in the Tenas Control Pond that conventional treatment processes would be unable to reduce them much further.

RO is a membrane filtration process that works by forcing the feed water through a synthetic membrane at high pressure. The membrane rejects charged molecules (i.e., ions) such as sulphate and dissolved metals while it permits passage of non charged molecules, (primarily $H_2O$). RO membranes reject virtually all charged molecules.

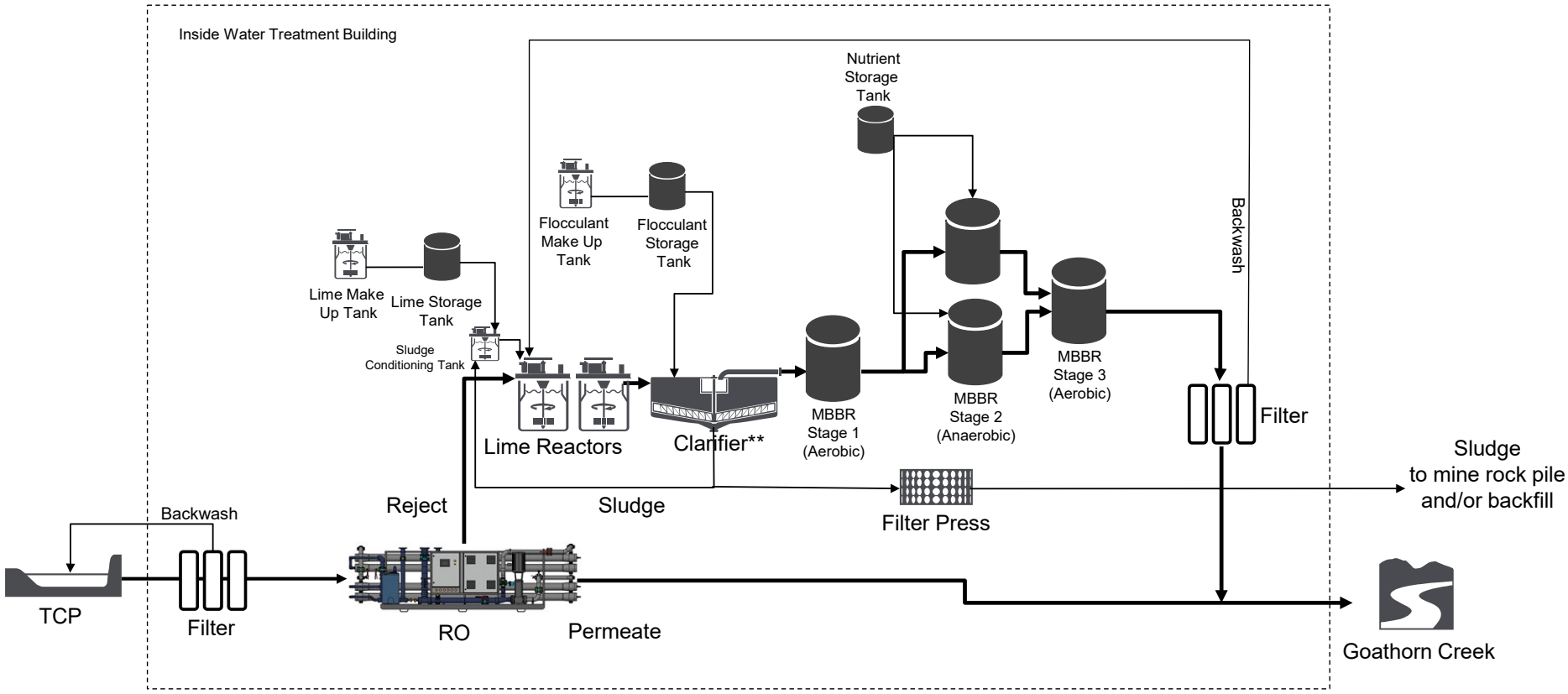
RO produces two streams, namely a clean permeate (water that passes through the membrane) and a brine solution that contains the dissolved constituents that are rejected by the membrane. Typically, 70% to 85% of feed water is recovered as clean permeate, while 15% to 30% of the feed water volume is in the brine stream. For the Tenas Project, the brine stream would be passed on for further treatment, while the permeate would be pumped directly to an effluent tank that feeds the effluent pipe to Goathorn Creek.

Although not commonly used for mine water treatment, RO is one of the most common municipal and industrial water treatment processes and it is considered to be both proven and reliable with a TRL 9.

## 2.2 High Density Sludge (HDS) Lime Treatment

The brine produced by the RO process will then be sent to the HDS lime water treatment plant. Lime treatment is one of the most common methods used for removing dissolved metals, suspended solids, and (in some cases) sulphate from mine water. The process works by increasing the mine water pH between 9 and 10 by adding hydrated lime. At this pH, most dissolved metals such as copper, zinc, cadmium, cobalt, lead, iron, and nickel precipitate as metal hydroxide solids and is then removed in a solid-liquid separation step. Lime treatment has been used worldwide for many decades and is considered to be TRL 9.

Figure 2-1 shows a schematic of the process. Brine from the RO is pumped to a lime reactor tank where it is mixed with sludge from the clarifier and hydrated lime. The pH setpoint is controlled by




Note: **The clarifier will be located outside of the water treatment building.

Source: https://srk.sharepoint.com/sites/NACAPR002055/Deliverables/BAT Report - December 2025 Update/ PFD Telkwa BAT Assessment.pptx

**Figure 2-1: Process Flow Diagram for the Tenas Active Water Treatment Process (RO+HDS+MBBR Lime Treatment)**

adjusting lime addition. The reactor tank is sparged with air to oxidize reduced species such as ferrous iron or manganese. From the reactors, the process solution flows to clarifier where precipitated solids are collected. Flocculant is added upstream of the clarifier to facilitate settling of the sludge produced in the lime reactor tanks. A portion of the sludge collected by the clarifier is pumped back to the lime reactor tanks via a rapid mix tank where the hydrated lime is added. The recycled sludge becomes coated by hydrated lime, which causes dissolved metals in the mine water to precipitate onto the sludge particles. This sludge conditioning process increases the density of the sludge, improves the metal removal efficiency, and improves the lime utilization.

The treated overflow from the clarifier is pumped to the moving bed bioreactor tanks. Excess sludge in the clarifier will occasionally be dewatered in a filter press and the resulting filter cake will be hauled to a mine rock pile and/or backfill. Because of the very low (expected) metal concentrations in the Tenas Control Pond water, the sludge will almost entirely consist of calcite (calcium carbonate) and ferric hydroxide, and possibly some gypsum, all of which are inert, stable, and non-toxic. Therefore, there are no environmental risks associated with the sludge disposal at the Project Site.

## 2.3 Moving Bed Bio Reactor (MBBR)

The final step in the treatment process is a series of MBBR reactors that are designed to convert nitrate into nitrogen gas using anaerobic microorganisms. Anaerobic biological treatment works by dosing a source of degradable organic carbon such as methanol to the mine water as it is pumped to a bioreactor filled with a solid but porous media. The organic carbon stimulates growth of microorganisms, which consume dissolved oxygen and begin to reduce oxygen-containing constituents. The dose of organic carbon determines the extent to which oxidized constituents are reduced. Mildly to moderately reducing conditions will convert nitrate ($NO_3^-$) to nitrogen gas. The process can also remove selenium by converting the common selenate ($SeO_4^{2-}$) to selenite ($SeO_3^{2-}$) or elemental selenium. The technology is considered to be TRL 9.

The bioreactor provides sufficient residence time for anaerobic microbes to degrade the organic carbon and complete the reduction process. A post treatment stage consisting of an aerobic bioreactor removes residual organic carbon and reduced species produced by the anaerobic bioreactor (such as sulphides). A filtration step is required to remove residual biosolids before the effluent can be released to the receiving environment. The biosolids will be pumped to the HDS system and will be recovered with the HDS sludge, or they can be dewatered and disposed of separately.

## 2.4 Discharge

Water treated by the RO+HDS+MBBR process will be released to Goathorn Creek via a pipeline. Discharge would only occur in the open water season from May though October each year.

# 3 Design Basis and Performance

This conceptual design relied on the design basis declared in the BAT assessment:

- Average treatment capacity of 2,000 gpm (11,000 $m^3$/day) in the discharge season (May through October each year).
- Maximum hydraulic treatment capacity of 3,000 gpm (16,500 $m^3$/day).

As discussed above, brine produced by the RO process is expected to amount to 15% to 30% of the total feed flow. Since only brine is treated in the HDS and MBBR processes, these will be designed for average and maximum hydraulic capacities of 680 gpm and 1,000 gpm (3,700 $m^3$/day and 5,450 $m^3$/day), respectively.

Expected maximum constituent concentrations in the Tenas Control Pond (water treatment plant feed water) were based on results of the water and load balance model for the Project (Table 3-1).

Parameters of Concern (POC) concentrations in treated effluent were estimated based on typical process performances, as follows:

- Nitrate: 0.5 mg/L
- Nitrite: 0.01 mg/L
- Sulfate: 200 mg/L
- Selenium, total: 0.001 mg/L
- Aluminum, total: 0.05 mg/L
- Cobalt, dissolved: 0.003 mg/L
- Copper, dissolved: 0.0001 mg/L
- Iron, total: 0.05 mg/L
- Nickel, dissolved: 0.005 mg/L
- Zinc, dissolved: 0.008 mg/L
- Total Suspended Solids: < 5.0 mg/L.

Parameters not listed above were either not designated as POCs or were assumed to be unaffected by the treatment process.

**Table 3-1 Water Quality Model Results for Tenas Control Pond – Active Water Treatment Plant Influent**

| Parameter | Units | Goathorn WQG | Baseline in Goathorn Creek | | Operations | | | | | | | | Closure | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Final EAC Project Case (2024) | | | | High Source terms (Alternative Case 2) | | | | Final EAC Project Case (2024) | | | | High Source terms (Alternative Case 2) | | | |
| | | | P50 | P95 | Max Summer | Max Winter | Average Summer | Average Winter | Max Summer | Max Winter | Average Summer | Average Winter | Max Summer | Max Winter | Average Summer | Average Winter | Max Summer | Max Winter | Average Summer | Average Winter |
| Total Hardness | mg-$CaCO_3$/L | | 74 | 100 | 138 | 163 | 90 | 111 | 236 | 291 | 152 | 197 | 66 | 3274 | 5 | 15 | 91 | 4721 | 6 | 21 |
| Alkalinity, total | mg CaCO3/L | | 54 | 85 | 500 | 560 | 270 | 350 | 820 | 1000 | 530 | 650 | 120 | 7200 | 4.2 | 27 | 230 | 14000 | 8.3 | 55 |
| Chloride | mg/L | 150 | 0.25 | 0.50 | 6.0 | 6.7 | 3.1 | 4.0 | 10 | 13 | 6.6 | 8.1 | 2.1 | 120 | 0.072 | 0.46 | 2.7 | 170 | 0.095 | 0.64 |
| Fluoride | mg/L | 1.19 | 0.032 | 0.041 | 0.071 | 0.15 | 0.046 | 0.082 | 0.071 | 0.15 | 0.046 | 0.082 | 0.028 | 1.6 | 0.0010 | 0.0061 | 0.028 | 1.6 | 0.0010 | 0.0061 |
| Ammonia, total | mg-N/L | 1.56 | 0.0025 | 0.0070 | 0.56 | 1.1 | 0.13 | 0.24 | 2.2 | 4.4 | 0.48 | 0.88 | 0.071 | 2.3 | 0.0018 | 0.0093 | 0.19 | 5.3 | 0.0046 | 0.022 |
| Nitrate | mg/L | 3 | 0.043 | 0.084 | 4.3 | 8.6 | 0.96 | 1.7 | 17 | 34 | 3.7 | 6.8 | 0.51 | 16 | 0.013 | 0.065 | 1.5 | 40 | 0.035 | 0.17 |
| Nitrite | mg/L | 0.02 | 0.00050 | 0.0020 | 0.099 | 0.20 | 0.023 | 0.040 | 0.39 | 0.79 | 0.086 | 0.16 | 0.012 | 0.39 | 0.00031 | 0.0016 | 0.034 | 0.94 | 0.00082 | 0.0040 |
| Sulfate | mg/L | 218 | 25 | 38 | 410 | 420 | 220 | 260 | 770 | 850 | 520 | 590 | 130 | 7700 | 4.3 | 29 | 290 | 17000 | 10.0 | 66 |
| Aluminum, total | mg/L | 0.27 | 0.034 | 0.66 | 0.39 | 0.39 | 0.38 | 0.38 | 0.39 | 0.39 | 0.38 | 0.38 | 0.38 | 1.0 | 0.37 | 0.37 | 0.38 | 1.1 | 0.37 | 0.37 |
| Antimony, total | mg/L | 0.074 | 0.000055 | 0.00013 | 0.00073 | 0.00080 | 0.00038 | 0.00049 | 0.0012 | 0.0014 | 0.00079 | 0.00094 | 0.00025 | 0.015 | 0.000010 | 0.000058 | 0.00054 | 0.031 | 0.000020 | 0.00012 |
| Arsenic, total | mg/L | 0.005 | 0.00020 | 0.00060 | 0.0018 | 0.0018 | 0.0013 | 0.0014 | 0.0025 | 0.0027 | 0.0018 | 0.0020 | 0.00092 | 0.023 | 0.00052 | 0.00059 | 0.0011 | 0.036 | 0.00053 | 0.00064 |
| Barium, total | mg/L | 1 | 0.059 | 0.071 | 0.072 | 0.080 | 0.050 | 0.062 | 0.075 | 0.095 | 0.058 | 0.072 | 0.038 | 1.6 | 0.0076 | 0.013 | 0.041 | 1.7 | 0.0077 | 0.013 |
| Beryllium, total | mg/L | 0.00013 | 0.000050 | 0.00010 | 0.000056 | 0.000061 | 0.000038 | 0.000044 | 0.000056 | 0.000061 | 0.000038 | 0.000044 | 0.000034 | 0.0016 | 0.0000010 | 0.0000060 | 0.000034 | 0.0016 | 0.0000010 | 0.0000060 |
| Boron, total | mg/L | 1.2 | 0.0050 | 0.050 | 0.11 | 0.13 | 0.063 | 0.080 | 0.19 | 0.23 | 0.13 | 0.15 | 0.090 | 4.5 | 0.0031 | 0.018 | 0.097 | 5.3 | 0.0035 | 0.021 |
| Cadmium, dissolved | mg/L | 0.00016 | 0.0000075 | 0.000033 | 0.000034 | 0.000030 | 0.000022 | 0.000022 | 0.00011 | 0.00010 | 0.000063 | 0.000062 | 0.0000070 | 0.00036 | 0.00000021 | 0.0000013 | 0.000013 | 0.00075 | 0.00000045 | 0.0000029 |
| Chromium, total | mg/L | 0.0089 | 0.00020 | 0.00084 | 0.0018 | 0.0020 | 0.0016 | 0.0017 | 0.0022 | 0.0024 | 0.0018 | 0.0020 | 0.0014 | 0.012 | 0.0012 | 0.0012 | 0.0015 | 0.018 | 0.0012 | 0.0012 |
| Cobalt, dissolved | mg/L | 0.00045 | 0.000050 | 0.00010 | 0.0029 | 0.0029 | 0.0019 | 0.0021 | 0.012 | 0.011 | 0.0050 | 0.0050 | 0.00045 | 0.028 | 0.000015 | 0.00011 | 0.00095 | 0.059 | 0.000032 | 0.00022 |
| Copper, dissolved | mg/L | 0.0013 | 0.0011 | 0.0036 | 0.0015 | 0.0015 | 0.0011 | 0.0012 | 0.0019 | 0.0019 | 0.0015 | 0.0015 | 0.0012 | 0.069 | 0.000042 | 0.00026 | 0.0019 | 0.11 | 0.000068 | 0.00041 |
| Iron, total | mg/L | 1 | 0.040 | 0.70 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 2.1 | 1.5 | 1.5 | 1.5 | 2.9 | 1.5 | 1.5 |
| Iron, dissolved | mg/L | 0.35 | 0.015 | 0.12 | 0.038 | 0.036 | 0.026 | 0.026 | 0.066 | 0.059 | 0.039 | 0.036 | 0.014 | 0.67 | 0.00043 | 0.0025 | 0.026 | 1.5 | 0.00094 | 0.0056 |
| Lead, dissolved | mg/L | 0.0026 | 0.000025 | 0.000050 | 0.0011 | 0.0012 | 0.00057 | 0.00072 | 0.0020 | 0.0022 | 0.0012 | 0.0015 | 0.00026 | 0.017 | 0.0000091 | 0.000064 | 0.00056 | 0.036 | 0.000020 | 0.00014 |
| Manganese, total | mg/L | 0.913 | 0.0036 | 0.029 | 0.063 | 0.061 | 0.047 | 0.049 | 0.19 | 0.18 | 0.089 | 0.090 | 0.031 | 0.34 | 0.025 | 0.026 | 0.036 | 0.58 | 0.026 | 0.027 |
| Mercury, total | mg/L | 0.00002 | 0.0000025 | 0.0000052 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 | 0.0000025 |
| Molybdenum, total | mg-N/L | 0.034 | 0.00048 | 0.00062 | 0.036 | 0.036 | 0.018 | 0.022 | 0.064 | 0.070 | 0.040 | 0.046 | 0.0055 | 0.35 | 0.00022 | 0.0014 | 0.013 | 0.84 | 0.00049 | 0.0032 |
| Nickel, dissolved | mg/L | 0.0022 | 0.00025 | 0.00060 | 0.0060 | 0.0061 | 0.0037 | 0.0042 | 0.017 | 0.016 | 0.0091 | 0.0096 | 0.0012 | 0.076 | 0.000041 | 0.00028 | 0.0024 | 0.15 | 0.000085 | 0.00058 |
| Selenium, total | mg/L | 0.002 | 0.000084 | 0.00020 | 0.022 | 0.024 | 0.011 | 0.014 | 0.039 | 0.049 | 0.024 | 0.030 | 0.0044 | 0.28 | 0.00016 | 0.0011 | 0.0093 | 0.58 | 0.00031 | 0.0022 |
| Strontium, total | mg/L | 2.5 | 0.080 | 0.11 | 0.28 | 0.29 | 0.18 | 0.20 | 0.47 | 0.53 | 0.34 | 0.38 | 0.18 | 11 | 0.0099 | 0.044 | 0.21 | 12 | 0.011 | 0.051 |
| Silver, total | mg/L | 0.00005 | 0.0000050 | 0.000020 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 | 0.0000050 |
| Thallium, total | mg/L | 0.00003 | 0.0000050 | 0.000010 | 0.000050 | 0.000077 | 0.000034 | 0.000047 | 0.00013 | 0.00013 | 0.000078 | 0.000089 | 0.000013 | 0.00077 | 0.00000048 | 0.0000029 | 0.000018 | 0.0011 | 0.00000065 | 0.0000041 |
| Uranium, total | mg/L | 0.0085 | 0.000056 | 0.00014 | 0.0045 | 0.0048 | 0.0023 | 0.0028 | 0.0078 | 0.0093 | 0.0049 | 0.0060 | 0.0014 | 0.084 | 0.000060 | 0.00033 | 0.0032 | 0.19 | 0.00012 | 0.00073 |
| Zinc, dissolved | mg/L | 0.0074 | 0.0013 | 0.0021 | 0.0088 | 0.0099 | 0.0055 | 0.0066 | 0.021 | 0.019 | 0.012 | 0.014 | 0.0021 | 0.12 | 0.000065 | 0.00044 | 0.0036 | 0.20 | 0.00011 | 0.00076 |

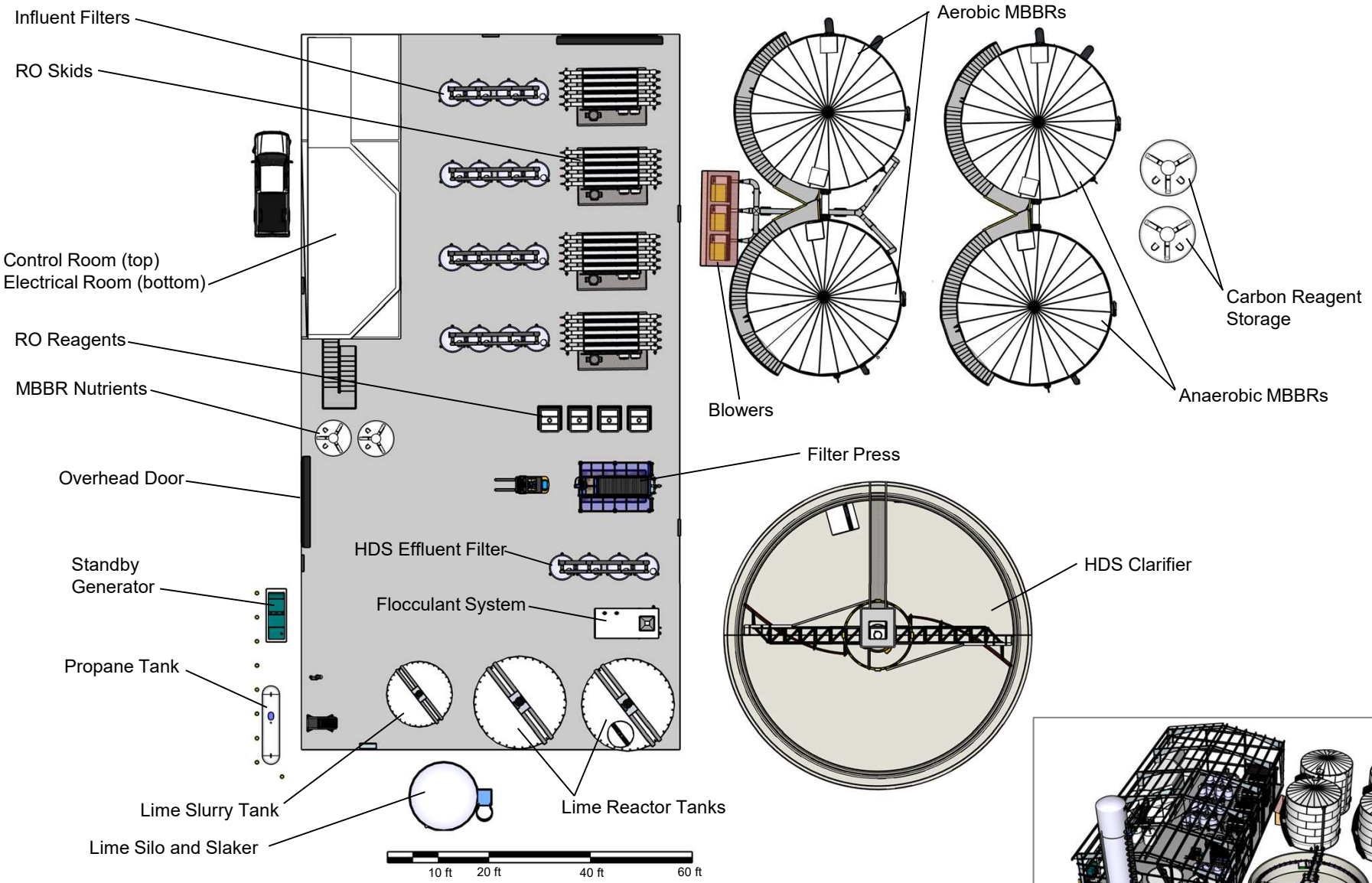
Source: https://srk.sharepoint.com/sites/NACAPR002055/Internal/Water Balance Modelling/Results/20250403_FEAC_2024/Results_MMPs_WaterQuality_EAModel_41_20250717.xlsm

# 4 Conceptual Design

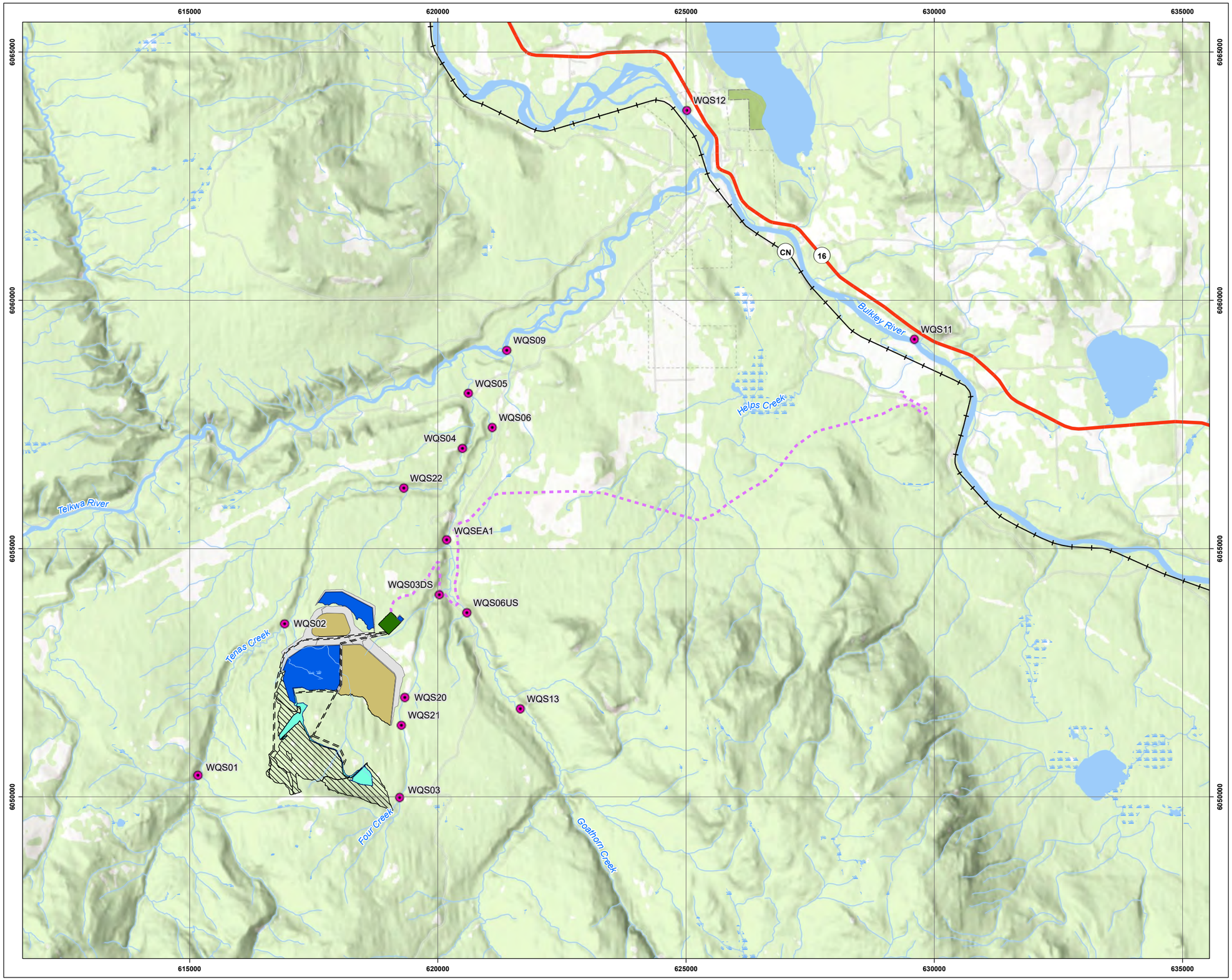
## 4.1 General Arrangement and Location

Figure 4-1 shows a preliminary general arrangement of the RO+HDS+MBBR water treatment plant proposed as a contingency for the Tenas Project. The plant will be housed inside a building measuring approximately 23 m (75 ft) wide by 45 m (150 ft) long by 10 m (33 ft) tall. The lime silo and slaker, HDS clarifier, MBBR tanks, MBBR blowers, and carbon reagents will be constructed outside of the plant building.

The water treatment plant will be located within the Mine Infrastructure Complex (MIC) pad (green shading on Figure 4-2 and Figure 4-3). Treated effluent will be conveyed by pipeline to a location on Goathorn Creek upstream from water quality monitoring station WQSEA1 (Figure 4-2).




| | | | |
|---|---|---|---|
| srk consulting | TELKWA MINING LIMITED | Tenas Project Environmental Assessment | |
| | | **Preliminary General Arrangement Tenas Active Water Treatment Plant** | |
| Job No: CAPR002055<br>Filename: Tenas WTP Figures REV00.pptx | Tenas Project | Date: 22 DEC 2025 | Approved: SRJ | Figure: **4-1** |




# Tenas Project

## Mine Site and Water Quality Monitoring Stations

### Legend

- Surface Water Monitoring Station
- Highway
- Rail Line
- Wetland
- Watercourse
- Waterbody

**Mine Features**

- Bypass Road
- Proposed Pit Haul Road
- Backfill
- Core Footprint
- Pit Lake
- Plant and Maintenance Area
- Pond
- Rock Cover

### Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

### Sources

- Project Features: Allegiance Coal, 2020
- Basedata: Government of British Columbia
- Basemap: World Topo Base

N

1:75,000

0 1 2 3 4 5

Kilometers

NAD 1983 UTM Zone 9N

Page Size: 11" x 17"

| 1CT027.003 | Production Date: Jul 30, 2025 | Figure 4-2 |
|---|---|---|

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Water Treatment Plant

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Tenas Project Environmental Assessment

**Tenas Water Treatment Plant**
***Location***

Job No: CAPR002055
Filename: Tenas WTP Figures REV00.pptx

Tenas Project

| Date: | Approved: | Figure: |
|---|---|---|
| 22 DEC 2025 | SRJ | **4-3** |

## 4.2 Major Equipment

Figure 4-4 shows an isometric view of major equipment for the feed filtration and RO circuit. Although water stored in the Tenas Control Pond is expected to have low concentrations of total suspended solids it will be necessary to filter it to remove as much suspended solids as possible ahead of RO filtration to avoid fouling the RO membranes. In this conceptual design, it was assumed the feed filtration will consist of multi-media filtration implemented as four parallel filter skids each with a capacity of approximately 750 gpm. However, it may be necessary to add cartridge filters (or similar filtration capable of removing solids smaller than 1 micron) and filtration tests on actual feed water is required to confirm pre-filtration requirements. Similarly, the feed water is not expected to have a high potential for scaling the RO membranes, so it was assumed that no (or only minimal) pre-treatment of the feed water would be required.

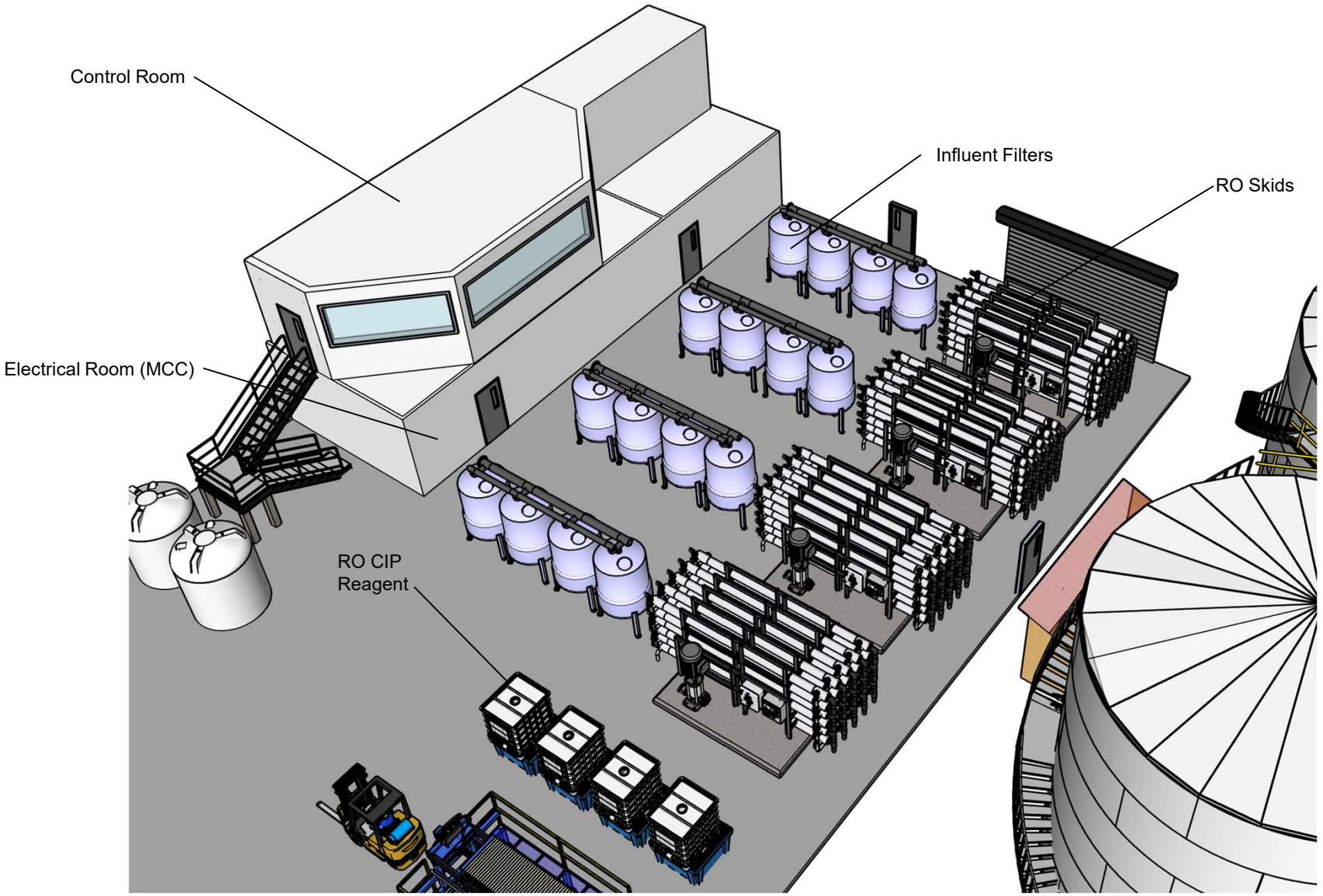
The RO skids would be manufactured off site as turn-key units complete with pumps, valves, instruments, and control systems. For this design, it was assumed that four parallel skids each with a capacity of approximately 750 gpm would be required. Clean permeate from the RO skids would be sent directly to the discharge pipe where it would be mixed with effluent from the MBBR process. If the combined effluent does not meet permitted discharge quality limits, it can temporarily be pumped back to the Tenas Control Pond.

The RO skids will be delivered with Clean-In-Place (CIP) reagent skids, which consists of tanks or totes with various cleaning reagents as well as metering pumps for dosing reagents. The type of cleaning reagents required will be determined as part of operational optimization following commissioning of the treatment process.

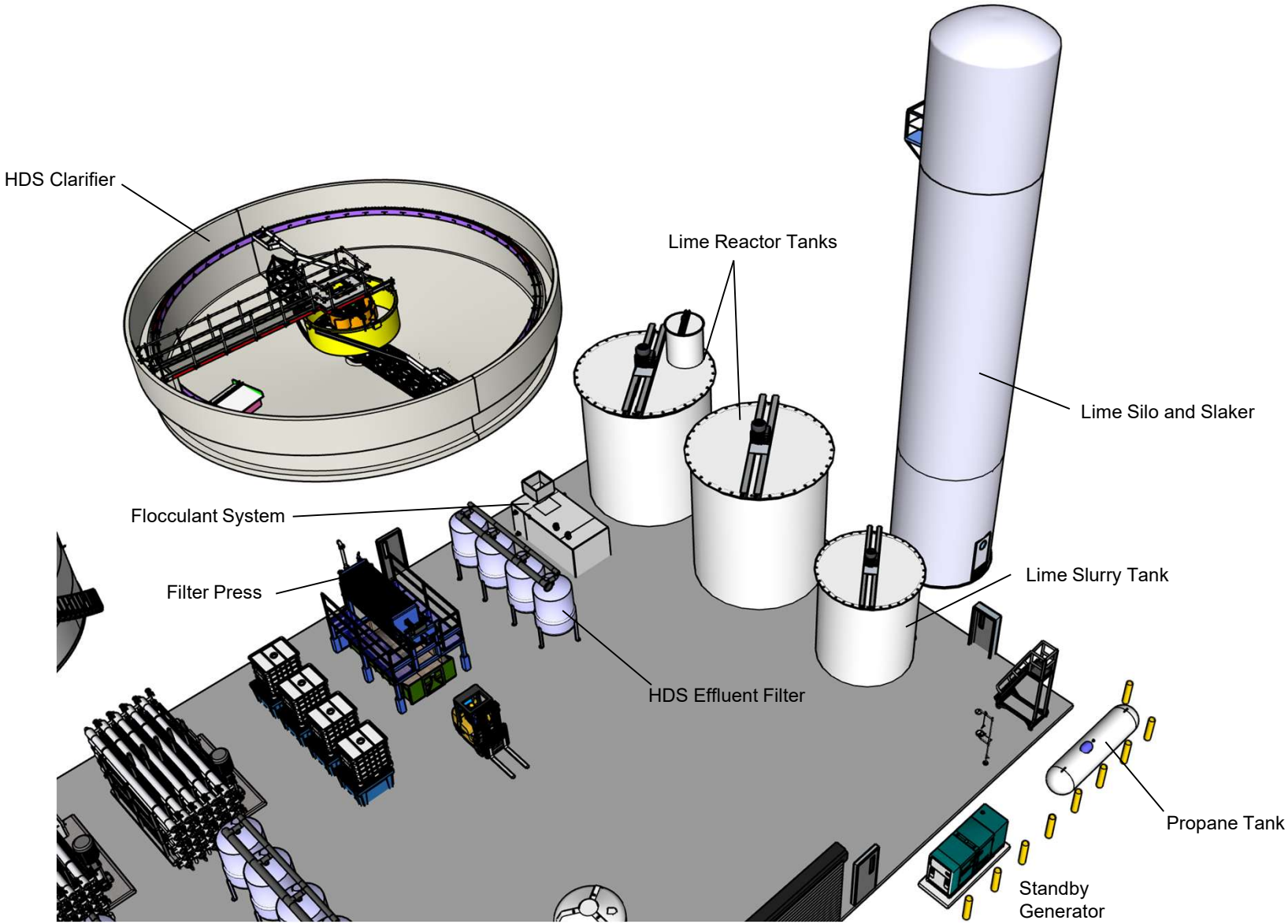
The brine produced by the RO process will be pumped to the first of two lime reactor tanks in the HDS circuit (Figure 4-5). In the first lime reactor tank, the brine from the RO process is mixed with clarifier underflow (sludge) from the clarifier and lime from the lime slurry tank. The sludge and lime slurry are pre-mixed in the sludge conditioning tank before it flows to the first lime reactor. Sludge is recycled at a rate that results in a solids concentration in the lime reactors of 3.5% to 5%.

The first reactor tank overflows into the second reactor tank by gravity. For this conceptual design, it was assumed that the combined residence time of the two reactors would be approximately 40 minutes. However, given the very low constituent concentrations in the feed water, a shorter residence time (and therefore smaller reactors) may be sufficient. On-site tests with actual feed water samples are required to confirm the necessary hydraulic residence time.

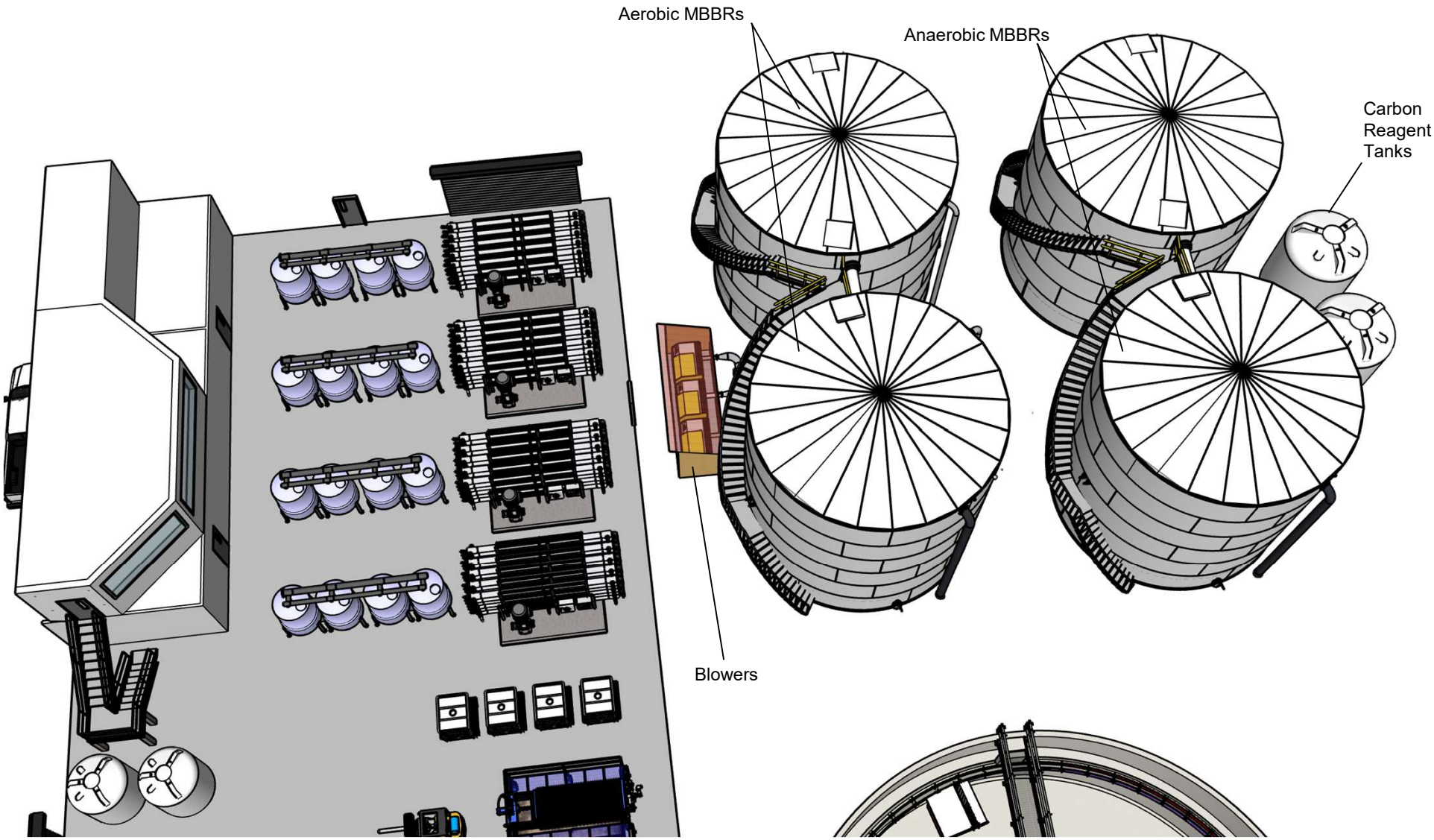
From the second reactor, the process water solution flows by gravity to the clarifier. Coagulant (ferric chloride) and flocculant is added inline. In the clarifier, the sludge settles and clear water overflows into the launder and from there to the MBBR circuit. Excess sludge collected in the clarifier is periodically pumped to the plate and frame filter press where it is dewatered. The filter cake consists almost exclusively of calcite and ferric hydroxide, both of which are stable and environmentally harmless. Concentrations of other metals is minimal because of the very low constituent concentrations in the feed water from the Tenas Control Pond. The sludge composition and volume are described in Section 4.3.




| | | | | |
|---|---|---|---|---|
| srk consulting | TELKWA MINING LIMITED | Tenas Project Environmental Assessment | | |
| | | **Feed Filtration and RO Circuit** | | |
| Job No: CAPR002055<br>Filename: Tenas WTP Figures REV00.pptx | Tenas Project | Date: 22 DEC 2025 | Approved: SRJ | Figure: **4-4** |




| | | |
|---|---|---|
| srk consulting | TELKWA MINING LIMITED | Tenas Project Environmental Assessment |
| | | **HDS Lime Treatment Circuit** |
| Job No: CAPR002055<br>Filename: Tenas WTP Figures REV00.pptx | Tenas Project | Date: 22 DEC 2025 \| Approved: SRJ \| Figure: **4-5** |




MBBR Nutrient Tanks (MKP)

| | | | | |
|---|---|---|---|---|
| srk consulting | TELKWA MINING LIMITED | Tenas Project Environmental Assessment | | |
| | | **MBBR Circuit** | | |
| Job No: CAPR002055<br>Filename: Tenas WTP Figures REV00.pptx | Tenas Project | Date: 22 DEC 2025 | Approved: SRJ | Figure: **4-6** |

The MBBR circuit consists of four large, insulated and heat traced tanks with approximate dimensions of 30 ft diameter by 34 ft in height. HDS effluent would flow to an aerobic MBBR tank which would be filled up to 50% by plastic MBBR media. The aerobic MBBR tank is aerated by a blower (approximately 50 hp), which supplies the aerobic microorganisms with oxygen and agitates the tank. The purpose of the first stage is to convert any ammonia in the feed water to nitrate. Water quality model results indicate that ammonia concentrations in water stored in the Tenas Control Pond are likely to be very low. If the feed water ammonia concentrations are less than 5 mg/L or so, the first aerobic MBBR tank could be omitted from the process. The first stage is supplied by a phosphorus reagent (MKP) as well as some lime, as required, to maintain a neutral pH.

The second stage in the MBBR process is the anaerobic stage where nitrate is converted to nitrogen gas. The second stage requires two 9.1 m (30 ft) by 10.4 m (34 ft) tanks arranged in series and filled 50% with MBBR media. These tanks will be mixed by agitators. An organic carbon source (typically methanol) is dosed to the tanks to promote the growth of anaerobic bacteria, which consumes any dissolved oxygen and nitrate contained in the feed water.

From the anaerobic stage, the MBBR process water overflows by gravity to the third stage, which is another aerobic MBBR tank. Here, the anaerobic water is aerated and oxygenated, and any residual organic carbon is degraded. Finally, the effluent from the third stage is filtered and overflows to the discharge pipe where is blended with the clean permeate from the RO process. As mentioned above, the plant operators will be able to temporarily pump the treated effluent back to the Tenas Control Pond if it does not meet permitted effluent quality limits.

## 4.3 Mass Balance

Table 4-1 shows the reagent mass balance for the water treatment process. The RO process may require various reagents (such as anti-scalants or acids) for pretreatment of the feed water from Tenas Control Pond. However, onsite test work is required to confirm the type and quantity of such reagents.

The HDS process require the following reagents:

- Hydrated lime: increases the pH of the process water.
- Flocculant: collects precipitated solids and facilitates settling of sludge.
- Ferric chloride: used as a coagulant to neutralize surface charges on precipitated solids and thereby make them attach to one another. Work with flocculants to promote settling of sludge.

**Table 4-1 HDS+MBBR Mass Balance and Reagent Requirements**

| **Feed Flow** | | **Units** |
|---|---|---|
| Average Feed Flow for HDS and MBBR Circuits | 2523 | L/min |
| (30% of total feed flow) | 42 | L/s |
| | 3,700 | $m^3$/day |
| | 680 | gpm |
| | 700,000 | $m^3$/year |
| Max Feed Flow for RO and MBBR Circuits | 3,785 | L/min |
| (30% of total feed flow) | 1,000 | gpm |
| | 5,450 | $m^3$/day |
| **Quick Lime** | | **Units** |
| Lime Dosage (as CaO) | 100 | mg/L |
| Lime Utilization Efficiency | 90% | |
| Average Lime Demand | 411 | kg/day |
| Max Lime Demand | 606 | kg/day |
| Lime Stock Solution Concentration | 10% | |
| Lime Stock Density | 1,070 | kg/$m^3$ |
| Average Lime Slurry Demand | 3.84 | $m^3$/day Lime Solution |
| | 2.7 | L/min |
| Max Lime Slurry Demand | 6 | $m^3$/day Lime Solution |
| | 4.2 | l/min |
| **Total Dry Lime Required:** | **70** | ***tonnes/year*** |
| **Flocculant** | | **Units** |
| Flocculant Dosage | 2.0 | mg/L |
| Average Flocculant Demand | 7.4 | kg/day |
| Max Flocculant Demand | 10.9 | kg/day |
| Flocculant Stock Solution Concentration | 0.50% | |
| Flocculant Solution Density | 1,000 | kg/$m^3$ |
| Average Flocculant Solution Demand | 1,480 | L/day floc Solution |
| | 1,028 | ml/min |
| | 62 | L/hour |
| Max Flocculant Solution Demand | 2,180 | L/day floc Solution |
| | 1,514.0 | ml/min |
| ***Total Dry Flocculant Required:*** | ***1,400*** | ***kg/year*** |
| **Ferric Chloride** | | **Units** |
| Ferric Chloride *Specs* | | |
| 40% Ferric Chloride, Density | 1450 | kg/$m^3$ |
| 40% Ferric Chloride Concentration | 40% | as FeCl3 |
| Ferric Dose (as $Fe^{3+}$) | 5.0 | mg $Fe^{3+}$/L |
| Ferric Dose as 40% Ferric Chloride Reagent | 36 | mg/L |
| Daily Demand, 40% Ferric Chloride Reagent, Average | 134.1 | kg/day of 40% solution |
| | 92.5 | L/day of 40% solution |
| | 64.2 | ml/min |
| Daily Demand, 40% Ferric Chloride Reagent, Maximum | 197.6 | kg/day |
| | 136.3 | L/day |
| | 94.6 | ml/min |
| Annual Demand, 40% Ferric Chloride | 49.0 | tonnes/year |
| | ***34*** | ***$m^3$/year*** |

**Table 4-1 Continued…**

| **Sludge Production** | | **Units** |
|---|---|---|
| Sludge, Lime to Calcium Carbonate | 541 | kg/day |
| | 197 | tonnes/year |
| Sludge, Ferric to Ferric Hydroxide | 35.3 | kg/day |
| | 12.9 | tonnes/year |
| Sludge Density | 10% | solids by weight |
| **Total Sludge Generated** | **576** | **kg/day** |
| | **210** | **Tonnes/year (dry)** |
| | 840 | $m^3$/year |
| Sludge Density | 25% | |
| Sludge Volume | 3 to 8 | $m^3$/day |
| | **840** | **$m^3$/year** |
| Filter Cake Solids Content | 50% | |
| Filter Cake Volume | 1.2 | $m^3$/day |
| | **420** | **$m^3$/year** |
| **HDS Sludge Composition** | | **Units** |
| Calcium Carbonate | 94% | |
| Ferric Hydroxide | 6.0% | |
| Suspended Solids | 0% | |
| Metal Hydroxide | <0.01% | |
| **MKP Consumption Rates** | | **Units** |
| P Demand | 3.4 | mg of P/L |
| MKP Demand | 14.9 | mg MKP/L |
| MKP Purity | 96% | |
| MKP Design Demand | 57.57 | kg/day |
| MKP Maximum Demand | 84.81 | kg/day |
| MKP Stock Solution (Assumed) | 10% | |
| MKP Solution Density | 1040 | $kg/m^3$ |
| MKP Solution Demand, Average | 575.7 | L/day |
| MKP Solution Demand, Max | 848.1 | L/day |
| Dry MKP Required: | **11** | **tonnes/year** |
| **Electron Donor Annual Demand** | | **Units** |
| Influent Nitrate-N Concentration | 17 | mg/L |
| Nitrate Mass | 11,479 | kg |
| Nitrate-N Moles | 819,946 | mol |
| Influent Dissolved Oxygen Concentration | 10 | mg/L |
| Oxygen Mass | 6,753 | kg |
| O2 Moles | 211,016 | mol |
| **Carbon Requirements (calculated based on influent nitrate and dissolved oxygen)** | | |
| Moles of nitrogen | 819,946 | mol N |
| Moles of methanol required | 683,289 | mol C |
| Moles of dissolved oxygen | 211,016 | mol O2 |
| Moles of methanol required | 316,523 | mol C |
| Methanol Requirement (100% of electron donor is methanol) | | |
| Methanol Molar Mass | 32 | g/mol |
| Total Methanol Requirement, Stoichiometric | 999,812 | mol CHOH |
| Excess Over Stoichiometric | 30% | |
| Total Methanol Required | 1,299,756 | mol CHOH |
| Methanol Concentration | 30.8 | mg/L |
| Biomass Production | 10 to 20 | Tonnes/year |
| Mass of Methanol Required | **42** | **Tonnes/year** |

The MBBRs require the following reagents:

- Mono-potassium phosphate (MKP): phosphorus nutrient required by aerobic and anaerobic microorganisms.
- Electron donor: easily degradable organic carbon such as methanol or glycerine. Use by anaerobic microorganisms as a nutrient.
- Hydrated lime: may be required by the aerobic MBBR process to maintain neutral pH.

The dosages listed in Table 4-1 are estimated based on experience with operation of water treatment plants with similar feed water composition.

Based on the mass balance in Table 4-1, the approximate annual reagent requirements include:

- 70 tonnes quicklime (dry),
- 1.4 tonnes flocculant (dry) ,
- 49 tonnes ferric chloride (40% solution),
- 11 tonnes of MKP (dry), and
- 42 tonnes methanol (liquid, 100%).

All reagents are common and can be procured from various chemical reagent supplier.

As indicated in Table 4-1, the sludge is expected to consist of calcite (~94%), ferric hydroxide (~6%), with trace amounts of other metal hydroxides. Depending on the sulphate concentration of the feed water, the sludge may also contain small amounts of gypsum. Based on the preliminary mass balance, the annual sludge production is estimated at 210 dry tonnes/year or approximately 420 $m^3$ of filter cake with 50% solids. If biomass from the MBBR is added to the HDS sludge for disposal, it would add 10 to 20 tonnes of mass to the sludge.

## 4.4 Health and Safety Considerations

The treatment processes proposed for the Tenas Project are conventional processes that have been safely implemented and operated at countless mines and industrial operations worldwide. Standard engineering designs and operating procedures have been developed that ensures that the processes can be operated safely despite the potentially hazardous nature of the treatment reagents (quick lime and ferric chloride are highly corrosive and methanol is flammable).

Detailed engineering design typically includes two or more Hazards and Operability Analyses where the treatment processes are systematically analyzed for any design features that could generate a potential hazard or operability issue. During commissioning of the plant, standard operating procedures will be developed and task training records for each individual operator will be kept ensuring that all operators are fully trained and qualified before they assume responsibility for the plant operation.

# 5 Cost Estimates

## 5.1 Capital Cost Estimate

Table 5-1 shows an order-of-magnitude cost estimate (+/- 50%) for the water treatment plant described in this document. The capital cost was developed by applying a factor of 4 to raw equipment costs to get an estimate of installed equipment costs. The installation factor of 4 includes all engineering costs (process, civil, mechanical, electrical, architectural) instrumentation and electrical installation and equipment, HVAC, building foundation, and various indirect costs.

In recent years, construction costs for water treatment plants appear to have escalated such that equipment installation factors of 5 to 7 had to be applied to calculate the total project costs. However, some owners who have been willing to self-perform the procurement process and manage contractors have been able to reduce equipment installation factors to as little as 2. Therefore, the capital cost estimate is highly dependent on the design and procurement approach selected by the owner.

**Table 5-1 Capital Cost Estimate for Tenas Project Water Treatment Plant (± 50%)**

| Major Equipment | Unit Cost | Quantity | Total Cost |
|---|---|---|---|
| Building, Steel Frame, Insulated | $ 1,600 | 1,200 | $ 1,920,000 |
| Influent Pipe | $ 800 | 200 | $ 200,000 |
| Feed Filters | $ 140,000 | 4 | $ 600,000 |
| RO with integrated CIP | $ 3,500,000 | 1 | $ 3,500,000 |
| Rapid Mix Tank and Agitator | $ 40,000 | 1 | $ 40,000 |
| Lime Reactor Tank and Agitator | $ 100,000 | 2 | $ 200,000 |
| Blower | $ 120,000 | 2 | $ 240,000 |
| Clarifier Tank, Rake, and Drive Mechanism | $ 1,190,000 | 1 | $ 1,190,000 |
| Sludge Filter Press | $ 200,000 | 1 | $ 200,000 |
| Process Pumps (lot) | $ 250,000 | 1 | $ 250,000 |
| Lime Silo and Integrated Slaker | $ 1,200,000 | 1 | $ 1,200,000 |
| Flocculant Preparation System | $ 140,000 | 1 | $ 140,000 |
| Reagent Dosing Systems | $ 50,000 | 3 | $ 150,000 |
| MBBR Tanks | $ 450,000 | 4 | $ 1,800,000 |
| MBBR Media | $ 400,000 | 1 | $ 400,000 |
| MBBR Agitators | $ 120,000 | 4 | $ 480,000 |
| MBBR Blowers | $ 75,000 | 3 | $ 230,000 |
| MBBR Effluent Filter | $ 140,000 | 1 | $ 140,000 |
| Critical Spares | lot | 1 | $ 1000,000 |
| **Total Raw Equipment Costs** | | | **$ 14,000,000** |
| Total Installed Cost, factored | | | $ 56,000,000 |
| Contingency (20%) | | | $ 11,000,000 |
| **Total Cost Estimate** | | | **$ 67,000,000** |

Source: Tenas WTP Cost Estimate REV00

## 5.2 Operating Cost Estimate

Table 5-2 shows an order-of-magnitude (+/- 50%) operating cost estimate for the Tenas water treatment plant. As discussed above, the plant is only expected to operate in the open water season from May to October each year. Therefore, it is estimated that only 3 full time equivalent (FTE) operators would be required along with one supervisor and one full-time maintenance worker. The total power demand was estimated at 3 kW-hr/$m^3$ treated, which is based on a power demand by the RO system of 3.5 kW-hr/$m^3$ and 1.0 kW-hr/$m^3$ for the HDS and MBBR circuits combined. Power was assumed to cost $0.11/kW-hr.

Sustaining capital was assumed to amount to 5% of initial raw equipment costs on an annual basis. The total operating cost estimate for the plant is estimated at $3.9M/year, ± 50%.

**Table 5-2 Operating Cost Estimate (± 50%)**

| | Qty/year | Unit | Unit Cost $/year | Total Cost $/year |
|---|---|---|---|---|
| **Personnel** | | | | |
| Plant Operator | 3 | FTE | $ 165,000 | $ 495,000 |
| Supervisor | 1 | FTE | $ 190,000 | $ 190,000 |
| Maintenance | 1 | FTE | $ 175,000 | $ 175,000 |
| Contractors | | Lot | | $ 150,000 |
| **Power** | | | | |
| Equipment and House Power | 2.2 $Mm^3$/year at 3 kW-hr/$m^3$ | | | |
| | 6,600,000 | kW-hr/year | $ 0.11 | $ 726,000 |
| **Reagents** | | | | |
| Lime | 70 | tonnes/year | $ 450 | $ 30,000 |
| Flocculant | 1.4 | tonnes/year | $ 6,500 | $ 9,000 |
| Ferric Chloride | 49 | tonnes/year | $ 700 | $ 34,000 |
| Methanol | 42 | tonnes/year | $ 1,100 | $ 46,000 |
| MKP | 11 | tonnes/year | $ 800 | $ 9,000 |
| CIP Reagents and membranes | $ 0.35/$m^3$ treated | | | $ 250,000 |
| **Lab Fees and Consumables** | | | | |
| Lab Assays | 200 | Samples | $ 260 | $ 52,000 |
| Consumables | Lump Sum | | | $ 100,000 |
| **Sustaining Capital** | | | | |
| 5% of Installed Equipment Costs | | | | $ 700,000 |
| **General Overhead** | | | | |
| Lump Sum | | | | $ 300,000 |
| Contingency | | % | 20% | $ 653,000 |
| **Total Operating Cost Estimate** | | **$/year** | | **$ 3,900,000** |
| **Total Operation Cost Estimate** | | **$/$m^3$ treated** | | **$ 1.77** |

Source: Tenas WTP Cost Estimate REV00

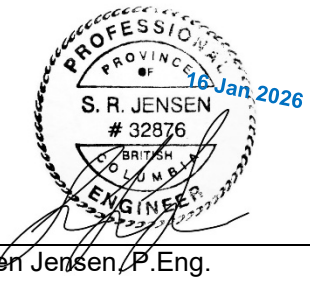
# 6 Conclusion and Recommendations

Based on the conceptual design completed above SRK is confident that the recommended water treatment plant can be constructed and operated for this Project which should address the majority of the POCs identified by the water quality model.

SRK recommends that TML designs and permits an RO+MBBR+HDS lime water treatment plant so that it is ready for potential future implementation as required based on an approved Trigger Action Response Plan (TARP) developed during the BC permitting process. The TARP triggers should be defined based on water quality monitoring data collected during the Construction and Operation phases such that the water treatment plant can be optimized to address actual POCs.

# 7 Closure

This memorandum was prepared by SRK Consulting (Canada) Inc.

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EGBC Permit to Practice: 1003655

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The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

# APPENDIX 12: ENVIRONMENTAL EFFECTS ASSESSMENT - SURFACE WATER VALUED COMPONENT

# APPENDIX 13: TENAS PROJECT, INITIAL DILUTION ZONE ASSESSMENT, SRK

# APPENDIX 14: TENAS COAL MINE INFORMATION REQUEST # 498, 500-504, AND 520 - EXPERT ADVICE REGARDING FISH AND FISH HABITAT WITHIN THE PROJECT AREA, PALMER ENVIRONMENTAL

# APPENDIX 15: TENAS PROJECT, MINE MATERIAL MANAGEMENT BASED ON AN NPR CUT-OFF OF 2.0, 1.80, 1.60, AND 1.20, TELKWA MINING

# APPENDIX 16: TELKWA COAL TENAS PROJECT ENVIRONMENTAL ASSESSMENT APPLICATION – RESPONSES TO 2022 SUPPLEMENTAL GEOCHEMISTRY INFORMATION REQUESTS FROM THE MINISTRY OF ENERGY, MINES AND LOW CARBON INNOVATION, SRK

# APPENDIX 17: METAL LEACHING/ACID ROCK DRAINAGE MANAGEMENT PLAN, SRK

# APPENDIX 18: TENAS PROJECT INFORMATION REQUEST RESPONSES RELATED TO GEOTECHNICAL ASPECTS, SRK

# APPENDIX 19: TENAS PROJECT DAM BREACH ASSESSMENT REPORT, SRK

# APPENDIX 20: PAG MANAGEMENT ALTERNATIVES ASSESSMENT, SRK

# APPENDIX 21: TENAS PROJECT POTENTIAL ACID GENERATING MATERIAL STORAGE ALTERNATIVES ASSESSMENT, SRK

# APPENDIX 22: TENAS PROJECT INFORMATION REQUEST RESPONSES FROM OFFICE OF THE WET'SUWET'EN – FINAL, SRK

# Attachment B: Telkwa Mining Response to the follow up information requests from MENV on April 15, 2026

# Attachment C: Telkwa Mining Response to the follow up information requests from MCMM on May 15, 2026

# Attachment D: Telkwa Mining Response to the follow up information requests 8 and 9 from MENV on May 22, 2026

# Attachment E: Telkwa Mining Response to the follow up information request 8 from MENV and MCMM on June 25, 2026