Appendix 13.15-G SRK, Tenas Project Water Management Technical Report

TELKWA COAL
LIMITED

Tenas Project – Water Management Design Technical Report - FINAL

Tenas Project, Telkwa, British Columbia, Canada

Telkwa Coal Limited

SRK Consulting (Canada) Inc. ▪ 1CT027.003 ▪ April 2022

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FINAL

Tenas Project – Water Management Technical Design Report

Tenas Project, Telkwa BC, Canada

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Cover Image(s):
Proposed North Management Pond area during drilling. Credit: Kyle Scale, February 17, 2021.

Contents

Tables

Figures

Appendices

Useful Definitions

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

AIR	Application Information Requirements
AMC	Antecedent Moisture Condition
CAPEX	Capital cost estimate
CDA	Canadian Dam Association
CMIP5	Fifth Version of Coupled Model Intercomparison Project
CN	Curve Number
CPP	Coal Processing Plant
DDF	Depth-Duration-Frequency
EA	Environmental Assessment
EAO	BC Environmental Assessment Office
ECMWF	European Centre from Medium-Range Weather Forecast
EMP	East Management Pond
EOM	End of mining
EOPM	End of pre-mining
EOY	End of year
GCM	Global Circulation Model
FLNRO	BC Forests, Lands and Natural Resource Operations
FS	Feasibility Study
FoS	Factor of Safety
GCM	Global climate model
IDF	Inflow Design Flood
MAR	Mean Annual Runoff
Non-PAG	Non-acid Generating Rock
NARR	North American Regional Reanalysis
NCEP	National Centers for Environmental Prediction
NMP	North Management Pond
OPEX	Operational cost estimate
PAG	Potential acid generating
PCIC	Pacific Climate Impacts Consortium
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
Project	Tenas Project
RCP	Representative concentration pathways
SRK	SRK Consulting (Canada) Inc.
SWE	Snow water equivalent
T_c	Time of concentration
TAC	Tenas Access Corridor
TCL	Telkwa Coal Limited
TCP	Tenas Control Pond
TRM	Turf reinforcement mat
WMP	West Management Pond

Executive Summary

Water management designs for the Tenas Project have been developed in support of the Environmental Assessment (EA) application. The water management system was prepared for the proposed life of mine, including construction, operation with progressive reclamation, decommissioning and reclamation, and post-closure phases. Design criteria have been selected based on applicable regulations and associated guidance documents, including the Health, Safety and Reclamation Code for Mines in British Columba (MEM, 2017), and with consideration for Project-specific risks.

The objectives of the water management system include minimizing the potential effects on the downstream environment by managing water within the Project footprint such that water quality and water quantity objectives are achieved. Potentially-acid generating (PAG) material are separated and stored in a series of management ponds which are designed with a permanent water cover to control metal leaching and prevent acid rock drainage. A minimum of 1 m of water cover will be maintained on top of PAG material throughout the life of mine, using runoff collected from within the Project footprint. Water storage facilities, including management ponds, are equipped with emergency spillways, designed in accordance with CDA guidelines based on dam failure consequence classifications. These consequence classifications are supported by dam breach and inundation modeling.

Diversion channels are designed to route runoff from undisturbed areas around Project infrastructure into adjacent creeks and rivers, maintaining pre-existing watershed drainage conditions wherever feasible. Collection channels are designed to collect runoff from disturbed areas for treatment (for total suspended solids (TSS)), prior to discharge to the environment. Erosion protection for channels was selected based on the design life of each structure and the expected velocities during design flood events. Most of the channels are lined with turf reinforcement mats for erosion protection to promote vegetation growth, while higher risk structures (i.e., steeper channel segments, channels with design lives extending post-closure, and spillway channels) are lined with riprap.

The Tenas Control Pond has been designed to provide sediment control for the open pits and quarries, management ponds and rock storage areas, as well as provide water supply to the Coal Processing Plant and the management pond water covers. Target operating levels were established for the Tenas Control Pond to meet water demand year-round and in upset conditions (i.e., droughts). Excess water is discharged via a pumping system over the dam to a tributary of Goathorn Creek. The pond includes an emergency spillway and an additional surge capacity equal to the 1 in 10-year inflow volume to provide operational flexibility with respect to discharge rates into Goathorn Creek.

Sedimentation ponds will be situated downstream of pads and working areas. The sedimentation ponds include the Explosives Magazine Sedimentation Pond, Explosives Facility Sedimentation Pond, Rail Infrastructure Sedimentation Pond, Coal Processing Plant (CPP) Sedimentation Pond, Rock Quarry Sedimentation Pond, Gravel Quarry Sedimentation Ponds for Pit 1 and Pit 2, and the East and West Tenas Access Corridor (TAC) Sedimentation Ponds. Sedimentation ponds are designed in accordance with the British Columbia Ministry of Environment Technical Guidance (BC MOE, 2015) to control sediment release from the Project to the environment. Sedimentation pond discharge is directed into the nearest watercourse, maintaining pre-mining drainage paths where feasible.

1 Introduction

1.1 Project Description

Telkwa Coal Limited (TCL) are proposing to develop the Tenas coal deposit (the Project) in northwest British Columbia. The Project is located approximately 25 km southwest of the town of Smithers within the Telkwa River watershed and will consist of an open pit, a process plant and rail load out area, external NAG rock and coal stockpiles, water management and control ponds, (Figure 1-1). Processed and unprocessed PAG mine rock will be backfilled into the open pits and stored subaqueously in the water management ponds. 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 which includes progressive reclamation. Consideration for water management during the reclamation and post-closure period are also presented.

SRK Consulting (Canada) Inc. have developed the water management designs for the Tenas Project in support of the Environmental Assessment Certificate (EAC Application). The EAC Application has been prepared in accordance with the BC Environmental Assessment Office (BC EAO) Guidelines for Preparing Environmental Assessments (BC EAO 2016).

In May 2020, the EAO issued an Application Information Requirements (AIR) document that provided the requirements of the EA application (EAO, May 2020). This report addresses the following AIR requirements:

- Part A, Section 1.3, Project Design and/or Alternative Means of Conducting the Project
- Part B, Section 3.5, Assessment Methodology and Mitigation Measures
- Part B, Section 4.0, Environmental Effects Assessment, Surface Water Intermediate Component
- Part E, Management Plans and Management Strategies

1.2 Objective

The objective of the water management plan is to minimize the effect to Project-area watercourses (water quality and quantity). Specifically, the water management plan aims to:

- Reduce project water requirements by incorporating water recycling and waste dewatering processes into the mining process (e.g., processed rock dewatering)
- Reduce effects to streams downstream of the Project by maintaining as small of footprints as practical and incorporating clean water diversions, maintaining pre-mining drainage patterns where feasible
- Reduce sourcing water from rivers for water cover or potable water use
- Manage seasonal discharge to maintain natural flow conditions
- Maintain minimum water cover requirements to reduce risk ML/ARD from potentially acid generating (PAG) rock

- Reduce water quality effects by collecting and treating (for TSS) potentially high sediment water (i.e., surface water runoff from overburden, and non-PAG piles) that has the potential to impair water quality of the receiving streams
- Reduce water flowing into the pit and active excavation areas to keep the construction areas as dry as possible

Designs were prepared in accordance with the Health, Safety and Reclamation Code for Mines in British Columba (MEM, 2017) and BC MOE Technical Guidance 7 of the Environmental Management: Assessing the Design, Size, and Operation of Sediment Ponds Used in Mining V.1.0 (BC MOE 2015).

1.3 Scope of Work

This report presents the water management plan and design of related infrastructure for the Tenas Project. As part of this work the following activities were completed:

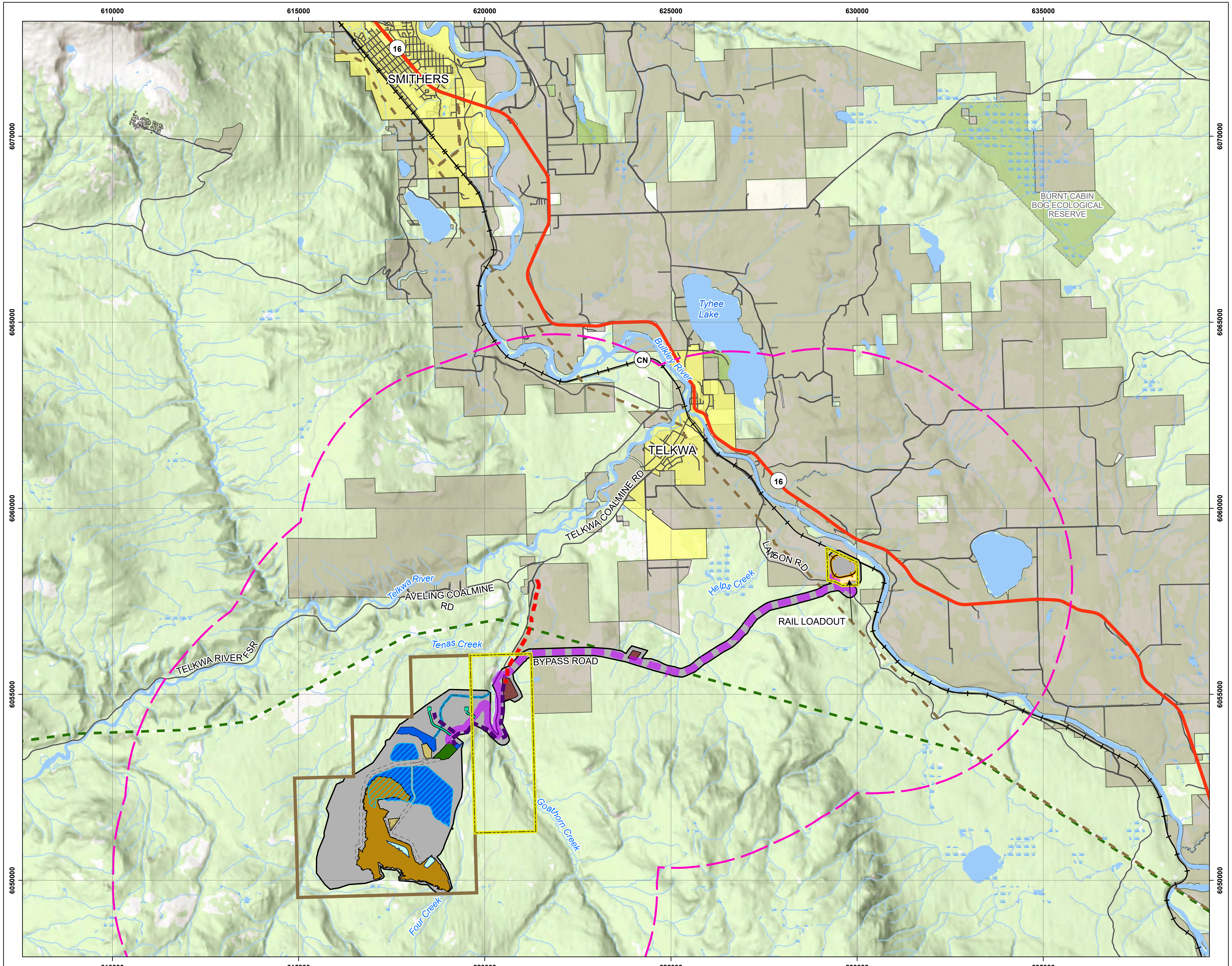
- Developing water management design basis inputs based on site hydrology (SRK 2021a) and water and load balance modelling (SRK 2021b), to support design of water management infrastructure. Results with inputs to infrastructure designs are summarized in Sections 2 and 4
- Develop a water management strategy to address requirements of the AIR, as outlined in Section 1.1
- Develop feasibility-level designs of water management infrastructure to achieve the water management strategy

The water management plan presented in this report excludes the following:

- Coal Processing Plant (CPP) pumping system from the Tenas Control Pond (described in Sedgman, 2018)
- Water treatment plant designs for potable water and sewage treatment (described in Radloff, 2021)
- Groundwater management (described in SRK, 2021h)
- ML/ARD Management and PAG Management Alternatives (described in SRK, 2021i)
- Water management within the rail infrastructure area (described in Section 1-1 Description of Proposed Project, EAC Application)
- Water management along the Tenas Access Corridor (described in DWB 2019 and in Section 1-1 Description of Proposed Project, EAC Application)
- Geotechnical embankment design for the water management and control ponds (described in Section 1-1 Description of Proposed Project, EAC Application)

1.4 Report Layout

Section 2 of this report summarizes the hydrological analyses which support the water management design. Section 3 provides an overview of the water management infrastructure and strategies. Section 4 presents the water management design. Recommendations, risks, and opportunities are presented in Section 5.



Tenas Project

Site Location

Legend

- Rail Line
- Highway
- Road
- Watercourse
- Wetland
- Waterbody
- Park or Protected Area
- Municipal Area
- General Private Property
- 138 kV Transmission Line
- 500 kV Transmission Line

Project Features

- Existing 25 kV Power Line
- 25 kV Power Line
- Haul Road
- Rail Loop
- Discharge Path
- Tenas Access Corridor
- Backfill Area
- Control and Plant Sedimentation Pond
- Explosive Infrastructure
- Management Pond
- Mine Infrastructure Complex
- Open Pit
- Pit Lake
- Quarry
- Rail Infrastructure
- Topsoil Stockpile
- Tenas Coal Licenses
- Telkwa Coal Limited Private Property
- Project Area
- Wildlife LSA

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.
3. Project line features are for display only.

Sources

- Project Features: Allegiance Coal, April 21, 2021.
- Basedata: Government of British Columbia
- Basemap: World Topo Base

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2 Supporting Climate Analysis

Climate and hydrologic analyses completed for pre-feasibility (SRK 2017) and feasibility study (SRK 2019) were reviewed and updated to include recent meteorological and hydrometric data collected for the Project. A climate change assessment for the Project was also completed using the fifth version of the Coupled Model Intercomparison Project (CMIP5). The update is presented in the Baseline Hydrometeorological Characterization Report (SRK 2021a). The following sections include the inputs relevant to water management infrastructure designs, including temperature variability, extreme rainfall and snowmelt magnitudes, unit runoff rates and lake evaporation. Each section summarizes the potential effects of climate change, relevant to that parameter, where applicable.

Design parameters were estimated for the Project by developing a site-specific long-term synthetic climate dataset, based on correlations between the short-term Project climate recorded at the Tenas Deposit Meteorological Station, and longer term records from Smithers Airport and other regional stations, and supported by the results of selected climate reanalysis packages. This is described in further detail in SRK 2021a.

2.1 Temperature

Regionally, mean annual temperature decreases with increasing elevation. The elevation of the Project ranges from 750 to 1050 masl. Monthly correction factors were developed to adjust temperatures recorded at the Smithers Airport station for the Project catchments based on a correlation between temperatures at both locations. Table 2-1 summarizes expected monthly air temperatures at the elevation of the Tenas Deposit Meteorological Station. The mean annual temperature is 2.2°C.

Table 2-1: Project Temperature Summary [°C]

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: SRK 2021a

The mean annual temperature is expected to increase by between 2 and 5°C by the year 2100. The increase was evaluated monthly, which showed a consistent increase for months. This may result in an earlier spring snowmelt, with a peak flow occurring in late March and April as opposed to April and May based on historic flow datasets.

2.2 Precipitation

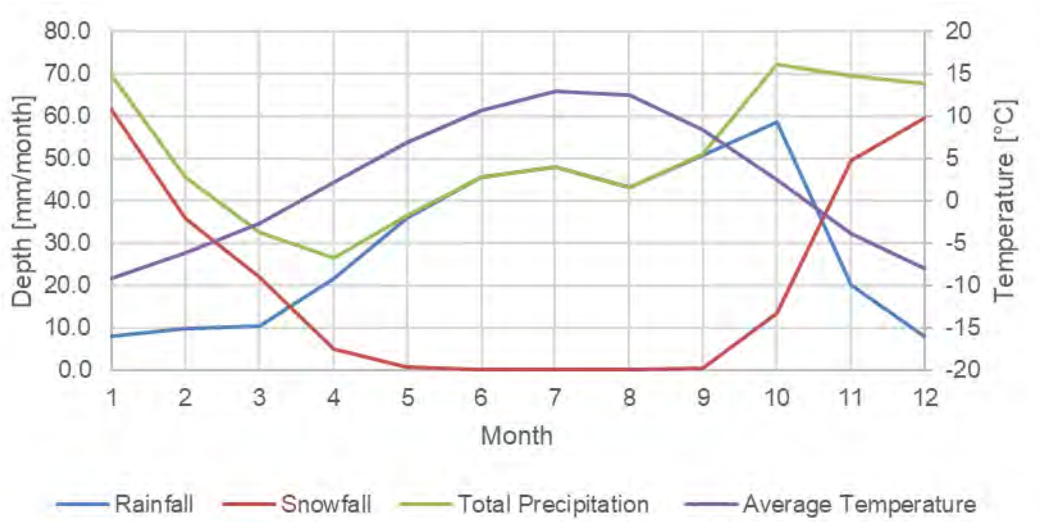
Mean annual precipitation for the Project is 608 mm, approximately 20% greater than at the Smithers Airport station (Table 2-2).

Table 2-2: 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

Note: Snowfall presented as snow water equivalent. Source: SRK 2021a

Figure 2-1 illustrates the average monthly precipitation distribution as rain and snow-water equivalent (SWE). Precipitation typically falls as snow from October to April. Average snowfall (314 mm SWE) is approximately 50% of mean annual precipitation.



Source: SRK 2021a

Figure 2-1: Monthly Precipitation as Snow and Rain

Based on the ensembled median data from the Coupled Model Intercomparison Project (CMIP5) and representative concentration pathway (RCP) 4.5, the mean annual precipitation for the Project is expected to increase by 75 mm to 175 mm by the year 2100. An increase in precipitation is expected for all months except July and August, which are expected to decrease until 2070, after which August will begin to increase and July will continue to decrease through 2100. This could result in lower streamflow during dry months of July and August.

2.2.1 Annual Frequency Analyses

A frequency analysis was performed on the long-term precipitation record generated for the Project to evaluate extreme annual precipitation magnitudes (Table 2-3).

Table 2-3: Annual Precipitation Frequency Analysis

Hydrological Condition	Return Period [years]	Annual Precipitation [mm]
Wet	1000	997
	500	964
	200	918
	100	882
	50	843
	25	803
	20	789
	10	743
	5	690
Median	2	608
Dry	5	517
	10	479
	20	448
	25	440
	50	416
	100	396
	200	378
	500	357
	1000	343

Source: SRK 2021a

2.2.2 Depth Duration Frequency Curves

Depth-duration-frequency curves were developed for the Project to define storm hyetographs. The storm hyetographs are used in the HEC-HMS rainfall-runoff model, described in Section 4.1, to evaluate peak flows for water management infrastructure design. Precipitation depth-duration-frequency (DDF) curves were generated for the Project, with and without climate change (up to 2100). Water management designs incorporate the climate change-adjusted curves, so only these results are presented in this report.

DDF curves for the Project were developed using a frequency analysis for 24-hour and 72-hour precipitation depths and a web-based tool (IDF_CC Tool, version 3) (ICLR 2018).

The IDF_CC tool (ICLR 2018) includes a procedure to evaluate changes associated with climate change. The tool includes 9 bias-corrected Global Circulation Models (GCMs), and 24 raw GCMs, for a total of 33 GCM datasets. The available range for predictions is from 2006 to 2100 (Schardon *et al*. 2018). GCMs in the IDF_CC tool are for future emission scenarios based on Representative Concentration Pathways (RCPs) of 2.6, 4.5 and 8.5.

The depth-duration-frequency curve for return periods 2 to 100 years were developed for the Project based on the synthetic Project daily climate datasets and the Smithers short-duration DDF curves (SRK 2021a).

The Pacific Climate Impacts Consortium (PCIC 2014) attach no probability or likelihood of occurrence to the different RCPs and leave it up to each designer/stakeholder to judge. Climate change-adjusted DDF data for Project were developed using bias corrected RCP4.5 GCMs for the time-period 2006 to 2100. Table 2-4 summarizes the DDF for the Project, with climate change. The 200-year, and 1,000-year return period curves were developed by extrapolation.

Table 2-4: Project Depth-Duration-Frequency Data with Climate Change, Year 2100 (Precipitation Depth – mm)

Duration (min)	Return Period							
	2	5	10	25	50	100	200	1000
5	4.7	7.3	8.9	10.5	11.8	12.7	15.7	19.7
10	6.7	10.4	12.8	15.3	17.3	18.8	23.4	29.2
15	8.1	12.3	14.9	17.4	19.5	20.9	25.8	32.2
30	11.3	16.5	19.5	22.4	24.7	26.1	32.0	40.0
60	15.4	22.7	26.9	30.9	33.9	35.7	43.6	54.6
120	20.1	29.0	33.9	38.2	41.6	43.3	52.3	65.8
360	32.8	45.9	52.2	56.7	59.8	61.6	72.3	91.5
720	40.4	57.7	67.0	75.0	81.2	84.3	101.4	127.5
1,440	49.2	70.6	84.2	98.4	110.6	119.7	150.7	187.0

Source: SRK 2021a

2.2.3 Extreme Precipitation

The probable maximum precipitation (PMP) was calculated using the Hershfield methodology (WMO 2009) for the spring and summer/autumn conditions, based on the synthetic long-term project climate dataset. Table 2-5 presents the PMPs for the Project where summer/autumn was defined as July 1 to October 31.

Table 2-5: Project Probable Maximum Precipitation

Season	PMP (mm)
Spring	250
Summer/Autumn	277

Source: SRK 2021a

Table 2-6 illustrates the duration curve for the PMP distribution using duration factors consistent with the 1:1000-year return period. The PMP was not adjusted for climate change at this time (Alberta Transportation 2004).

Table 2-6: Baseline Project PMP IDF Curve

Duration (min)	Applied Duration Factors*	PMP Depth (mm)	
		Spring	Summer
5	0.11	26.3	29.1
10	0.16	39.0	43.2
15	0.17	43.1	47.7
30	0.21	53.5	59.2
60	0.29	73.0	80.9
120	0.35	87.9	97.4
360	0.49	122.3	135.5
720	0.68	170.4	188.8
1440	1.00	250.0	277.0

Source: SRK 2021a

Note: *Duration factors based on the distribution of the 1:1000-year DDF curve (Table 2-4)

2.3 Snowmelt

A snowmelt model was developed for the Project and validated using regional snow pillow data (SRK 2021a). Snowmelt at the Project was determined to typically start in April and peak in May. On average, by end of June, snow on the ground is gone. Table 2-7 summarizes maximum daily snowmelt for a range of return periods.

Table 2-7: Project Daily Snowmelt Depth Frequency Analysis

Return Period [years]	1-day Snowmelt Depth [mm]
2	23
5	27
10	29
25	32
50	33
100	35
200	36
500	38
1000	39

Source: SRK 2021a

Snowmelt was also evaluated considering the effects of climate change on both temperature and precipitation datasets. Results confirmed an earlier snowmelt with above-zero temperatures beginning in March, as noted in Section 2.1, resulting in a lesser snowpack and lower magnitude snowmelt events. For this reason, the historical snowmelt statistics were used for design.

2.4 Project Runoff

Ruoff rates were calculated for the Project based on a rainfall-runoff model, calibrated to local streamflow gauges (SRK 2021a). The average monthly runoff distribution is presented in Table 2-8 and the frequency analysis for annual runoff rates is presented in Table 2-9.

Table 2-8: Project Monthly Runoff Distribution [%]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Runoff Distribution	2%	2%	3%	15%	34%	11%	7%	5%	6%	8%	6%	2%	100%

Source: SRK 2021a

Table 2-9: Annual Runoff Frequency Analysis

Hydrological Condition	Return Period [years]	Annual Precipitation [mm]
Wet	100	294
	50	285
	25	275
	10	272
	5	260
	Mean	246
Dry	5	219
	10	191
	25	177
	50	165
	100	162

Source: SRK 2021a

2.5 Evaporation

Lake surface evaporation for the Project was developed using the Morton CRWE shallow lake evaporation method (Morton 1983). Mean annual evaporation for the Project was determined to be 529 mm (Table 2-10).

Table 2-10: Project Monthly Evaporation Rates [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: SRK 2021a

Climate change analyses indicate a net increase in lake evaporation for months of the year, with an annual increase of 2% to 5% by 2100, with monthly increases of up to 8% during the open water season, April through September.

3 Surface Water Management Plan

The water management strategy for the Project is to collect and control surface runoff in a series of engineered channels, ponds, and spillways. Due to the presence of PAG material, three management ponds will be constructed and filled with PAG material and processed rock during the life of the mine. These management ponds require a minimum of 1 m of water cover to prevent oxidation and acid rock generation. The PAG management strategy is discussed in detail in the PAG Management Alternatives Assessment memo (SRK 2021g). Channel alignments were chosen to optimize the volume of water directed to each management pond and to prevent the release of turbid water to the environment.

3.1 Summary of Water Management Infrastructure

Proposed water management infrastructure consists of engineered channels, management ponds and associated spillways, sedimentation ponds, culvert road crossings, and pumping systems (see Table 3-1 and Drawing 1).

Table 3-1: Water Management Infrastructure

Structure Type	Structure Name / Description
Sedimentation Ponds	Tenas Control Pond
	CPP Sedimentation Pond
	Rail Infrastructure Sedimentation Pond
	Explosives Magazine Sedimentation Pond
	Explosives Facility Sedimentation Pond
	Rock Quarry Sedimentation Pond
	Gravel Quarry Pit 1 Sedimentation Pond
	Gravel Quarry Pit 2 Sedimentation Pond
	East TAC Sedimentation Pond
	West TAC Sedimentation Pond
Management Ponds	North Management Pond (NMP)
	East Management Pond (EMP)
	West Management Pond (WMP)
Other Ponds	Wastewater Storage Pond
	Potable Water Storage Pond
	Soil Treatment Facility Pond
Collection Channels	C-01: Collect potentially high-sediment runoff and seepage from EMP dam and buttress, with optional contributions of water from C-02 and the Potable Water Pond
	C-02: Collect undisturbed runoff upstream of EMP and pond locally in the Potable Water Pond. Discharge direction controlled by a flow control valve to connect to C-01 or to discharge into Four Creek
	C-03: Collect potentially high-sediment runoff from WMP and NMP dam and buttress
	C-04: Collect high-sediment runoff along the toe of the Tenas Control Pond dam. Discharge back into the Tenas Control Pond or to the tributary of Goathorn Creek
	C-05: Divert undisturbed runoff around southern extents of open pit to Four Creek.
Pumping Systems	Pump System 1 (PMP_SYS-01): Tenas Control Pond to Goathorn tributary
	Pump System 2 (PMP_SYS-02): Tenas Control Pond to management ponds
	Pump System 3 (PMP_SYS-03): management ponds to Tenas Control Pond
	Pump System 4 (PMP_SYS-04): CPP Sedimentation Pond to Tenas Control Pond
	Pump System 5 (PMP_SYS-05): Sedimentation Pond to environment
	Pump System 6 (PMP_SYS-06): Open pit to management ponds
Culvert Road Crossings	CU-01: Convey flows from channel C-01 through the North Management Pond haul ramp into Tenas Control Pond
	CU-02: Convey flows from channel C-02 through service road
	CU-03: Convey flows from West Management Pond to North Management Pond
	CU-04: Convey flows from East Management Pond to North Management Pond

Structure Type	Structure Name / Description
	CU-05: Convey flows discharged from Tenas Control Pond into Goathorn Creek Tributary beneath the Explosives Magazine access road

3.2 Surface Water Management Phases

Water management through the mine life is represented by a series of phases as listed below:

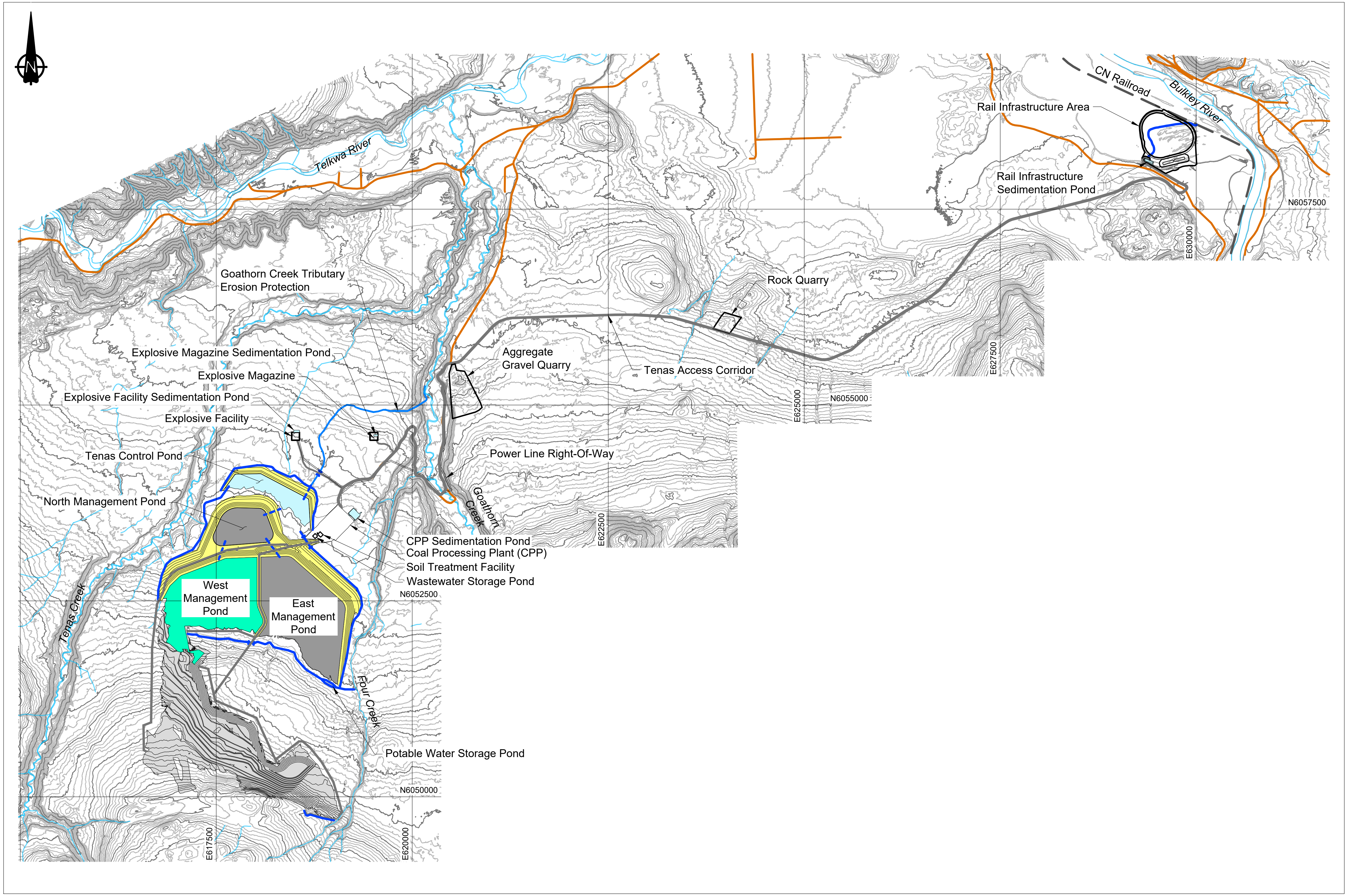
- Phase 1: Construction
- Phase 2: Operation and Progressive Closure
- Phase 3: Decommissioning and Reclamation
- Phase 4: Post-Closure

Table 3-2 describes activities related to water management throughout each phase of the Tenas Project. Figure 3-1 through Figure 3-8 present the water management plan layouts by year and phase.

Table 3-2: Surface Water Management Activities by Mine Phase

Phase	Year	Water Management Activities
Phase 1: Construction	End of pre-mining (EOPM, EOY0)	- Construct perimeter channels C-01, C-02, C-03 and C-04 and associated culverts - Install temporary BMPs to divert water around proposed Tenas Control Pond dam and control erosion and sedimentation - Construct the Tenas Control Pond, CPP Sedimentation Pond and Rail Infrastructure Sedimentation Pond including the associated spillways and erosion protection - Install pumping system from CPP Sedimentation Pond to Tenas Control Pond (PMP_SYS-03) - Construct North Management Pond (NMP) dam, including spillway to Tenas Control Pond - Pre-stripping of pit begins. Water collected and pumped to Tenas Control Pond for sediment control
Phase 2: Operations	EOY1	- Convey surface runoff to the NMP - Deposition of PAG material to the NMP - Begin construction of East Management Pond (EMP) dam - Active pit excavation begins. Water collected in pit is pumped to NMP (pump system design by others) - Install pumping system between Tenas Control Pond and NMP (PMP_SYS-01) - If needed, pump water from the Tenas Control Pond to the NMP to maintain minimum water cover in NMP
	EOY2	- Place NAG and overburden buttress around NMP dam and EMP dam - Convey water to EMP prior to PAG placement - Placement of PAG material in NMP is complete - Deposition of PAG material transitions to EMP - Transition PMP_SYS-01 to connect Tenas Control Pond and EMP - Active pit excavation area expands - Place NAG rock and soil cover on NMP - If needed, pump water between the Tenas Control Pond, NMP, and EMP to maintain minimum water cover over PAG materials
	EOY3	- PAG material deposition continues in EMP - Convey water to Tenas Control Pond and EMP - Active pit excavation area expands - NAG and overburden placed as buttress along EMP dam - NAG backfill begins in southwestern portion of pit

Phase	Year	Water Management Activities
		- Continue to pump water between the Tenas Control Pond, the NMP, and the EMP to maintain minimum water cover during deposition
	EOY4	- PAG material deposition continues in EMP - Convey surface runoff to Tenas Control Pond and EMP - Continue to add NAG and overburden buttress along EMP and NMP dams - NAG backfill in southwestern portion of pit continues - Active pit excavation area expands - Continue to pump water between the Tenas Control Pond, the NMP, and the EMP to maintain minimum water cover during deposition
	EOY5	- PAG material deposition continues in EMP - Convey water to Tenas Control Pond and EMP - Continue to add NAG and overburden buttress along EMP and NMP dams - Active pit excavation area expands - NAG backfill in southwestern portion of pit continues - Start construction of West Management Pond (WMP) dam - Continue to pump water between the Tenas Control Pond, the NMP, and the EMP to maintain minimum water cover during deposition
	EOY7	- Deposition of PAG material transitions to WMP - Convey water to Tenas Control Pond and WMP - Continue to add NAG and overburden buttress along EMP, WMP, and NMP dams - Active pit excavation area expands - NAG backfill in southwestern portion of pit continues - Place rock cover on EMP - Construct C-05 channel prior to pit excavation in the southeastern area of Project - Continue to pump water between the Tenas Control Pond, the NMP, the WMP and the EMP to maintain minimum water cover during deposition
	End of Mining (EOM)	- Operations and WMP PAG material deposition complete - Placement of PAG material in WMP is complete - Backfill of NAG rock in open pit is complete, leaving a single exposed Pit Lake - Continue required water management activities such as pumping to maintain minimum water covers
Phase 3: Decommissioning and Reclamation		- Placement of overburden cover across NAG backfill in open pit - Placement of overburden cover across exposed pit wall - Placement of NAG rock and soil cover on WMP - Maintain existing water management infrastructure (i.e., collection channels and Tenas Control Pond) until water quality objectives are achieved - Tenas Control Pond is dewatered, and dam is breached - Decommission sedimentation ponds - Decommission channels and road crossings
Phase 4: Post-Closure		- Pit Lake reaches maximum level and discharges through NAG backfill towards WMP - Maintain collection channel systems upslope of management ponds (C-02 and C-05) to divert water to Four Creek. - Maintain management pond spillways and embankments in perpetuity



LEGEND

- Water Management Feature
- Spillway
- Existing Watercourse
- Existing Road
- Proposed Road
- Dam and Buttress
- Sedimentation and Control 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. Mine Infrastructure designs by Telkwa Coal Limited (TCL).

REFERENCE

NAD83 UTM Zone 9.

0m 500 1000 1500 2000

srk consulting

TELKWA COAL LIMITED

SRK JOB NO.: 1CT027.003

FILE NAME: 1CT027.003 Overview.dwg

Telkwa Coal

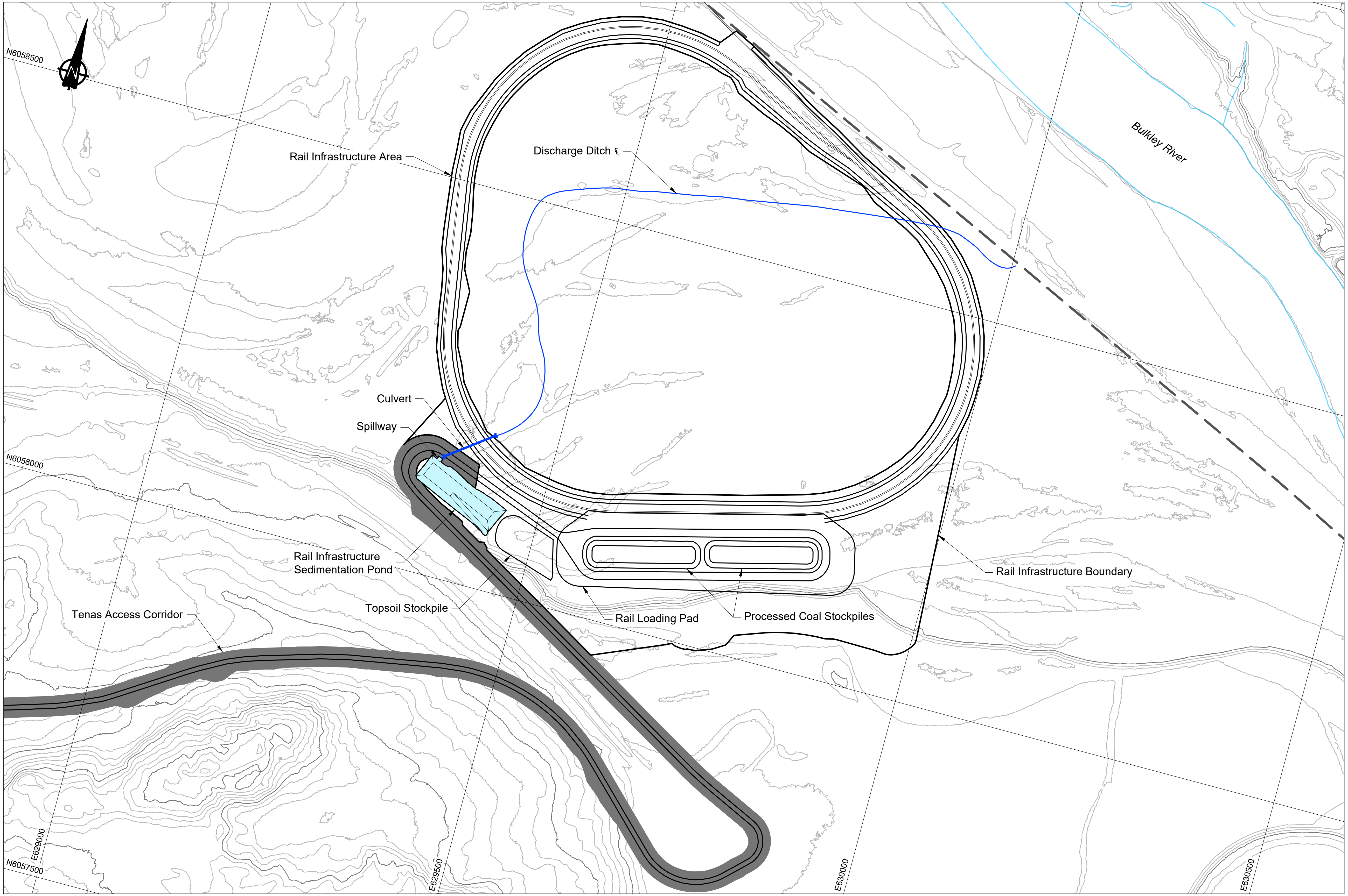
Environmental Assessment

Water Management Overview

DATE: 2021/07/16

APPROVED: SAB

FIGURE: 3-1



LEGEND

- Water Management Feature
- Spillway
- Culvert
- Existing Watercourse
- Proposed Road
- CN Railroad
- Sedimentation Pond

NOTES

1. Contours shown at 2.0m intervals.
2. All dimensions shown in meters unless otherwise stated.
3. Pile designs by SRK Consulting Ltd.

REFERENCE

NAD83 UTM Zone 9.

0m 50 100 150 200

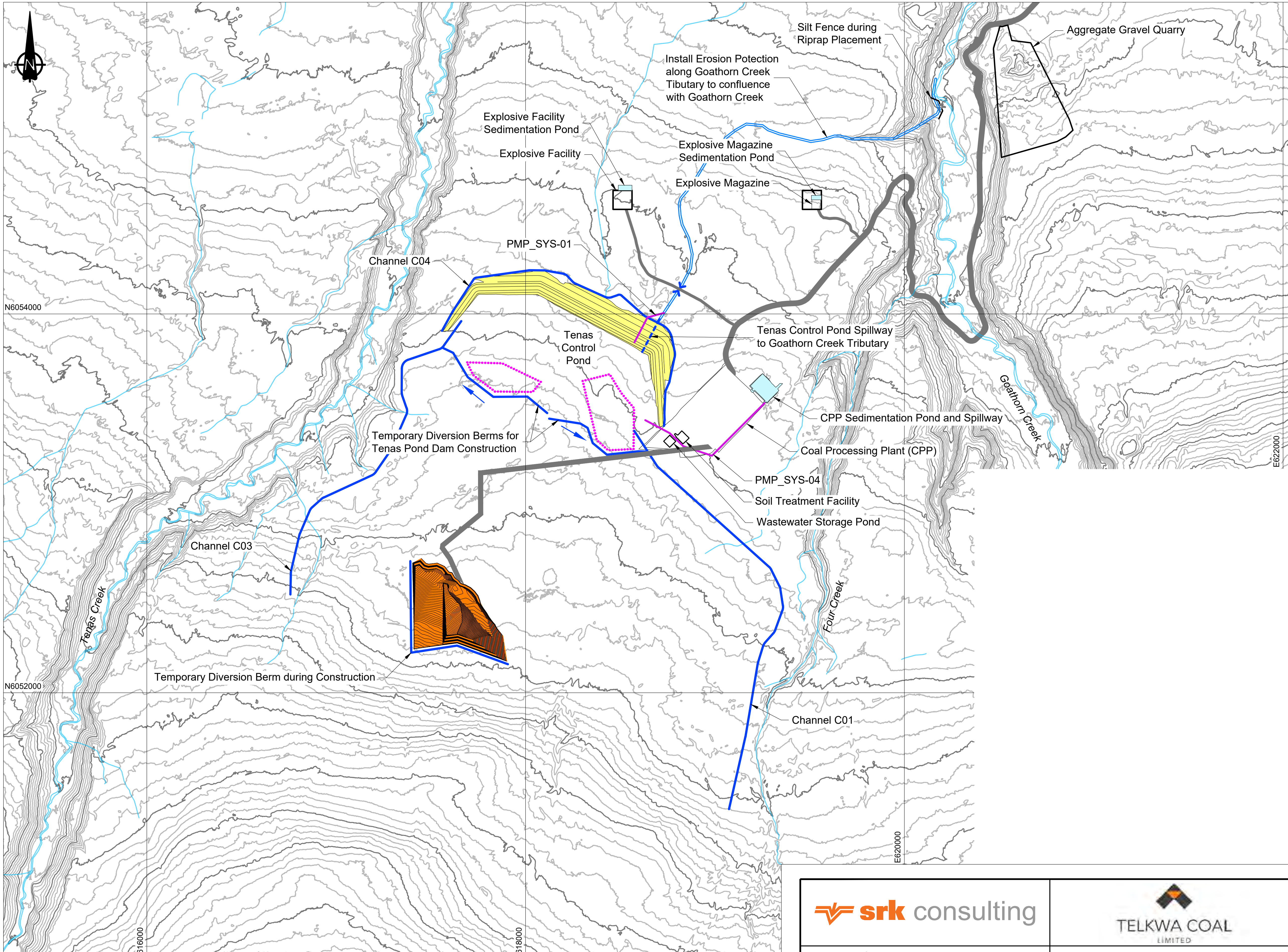
srk consulting

TELKWA COAL LIMITED

Environmental Assessment

Water Management Rail Infrastructure Area

SRK JOB NO.: 1CT027.003	Telkwa Coal	DATE: 2021/07/16	APPROVED: SAB	FIGURE: 3-2
FILE NAME: 1CT027.003 Pond Rail Infrastructure.dwg				



LEGEND

- Water Management Feature
- Water Flow Direction
- Spillway
- Culvert
- Existing Watercourse
- Pipeline
- Proposed Road
- Dam and Buttress
- Pit Excavation
- Sedimentation and Control Pond
- Topsoil Stockpile

NOTES

1. Contours shown at 5.0m intervals.
2. All dimensions shown in meters unless otherwise stated.
3. Erosion protection along Goathorn Creek tributary to be completed during winter or low flow period.
4. Silt fencing and Best Management Practices for sediment control during riprap placement.
5. Channel C04 and temporary diversion berms constructed prior to construction of Tenas Control Pond dam.
6. Plant Sedimentation Pond to be constructed prior to Coal Processing Plant and associated pad for sediment control.

REFERENCE

NAD83 UTM Zone 9.

0m 200 400 600 800

srk consulting

SRK JOB NO.: 1CT027.003

FILE NAME: 1CT027.003 Construction.dwg

TELKWA COAL LIMITED

Telkwa Coal

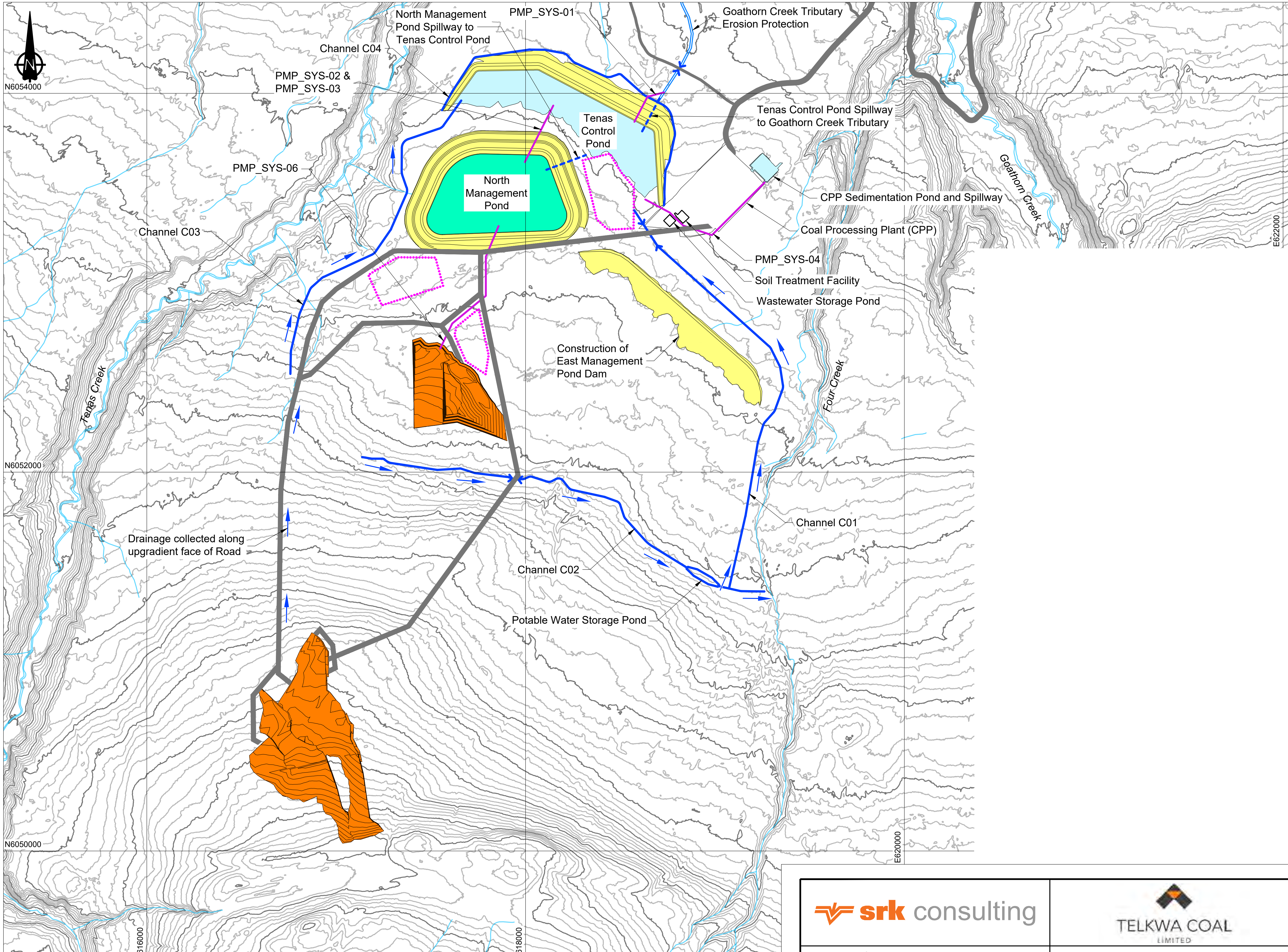
Environmental Assessment

Water Management Construction Phase Year -0.5

DATE: 2021/07/16

APPROVED: SAB

FIGURE: 3-3



LEGEND

- Water Management Feature
- Water Flow Direction
- Spillway
- Culvert
- Existing Watercourse
- Pipeline
- Proposed Road
- Dam and Buttress
- Pit Excavation
- Sedimentation and Control Pond
- Active Management Pond
- Topsoil Stockpile

NOTES

1. Contours shown at 5.0m intervals.
2. All dimensions shown in meters unless otherwise stated.
3. North Management Pond is active. All PAG rock and processed rock to be placed in North Management Pond.
4. Channels C01 and C02 are constructed along eastern extents of Project footprint, and Channel C03 is constructed on western extents.
5. Channel C02 discharges normal flows to Four Creek with high flows directed to Channel C01 via overflow spillway.
6. Open pit mining begins. All runoff collected in open pit pumped to North Management Pond.
7. Construction of East Management Pond dam begins.
8. PMP_SYS-05 to be installed at Explosive Magazine, Explosive Facility and Rail Infrastructure Sedimentation Pond to discharge nominal flows up to 1 in 10-year event to downstream environment.

REFERENCE

NAD83 UTM Zone 9.

0m 200 400 600 800

srk consulting

TELKWA COAL LIMITED

SRK JOB NO.:	1CT027.003		
FILE NAME:	1CT027.003 EOY 1.dwg	Telkwa Coal	

Environmental Assessment

Water Management
End of Year 1

DATE:	APPROVED:	FIGURE:
2021/07/16	SAB	3-4

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