



BC EAO EAC Application – Tenas Project

Section 13.0 Management Plans

Chapter 4 Construction Environmental Management Plan

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VERSION 1.0

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Submitted by:	Telkwa Coal Limited Suite 1410 – 409 Granville Street Vancouver, BC V6C 1T2

Tenas Project

Section 13.0 Management Plans Chapter 4 Construction Environmental Management Plan

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ABBREVIATIONS AND ACRONYMS

Abbreviation or Acronym	Long Form of Abbreviation or Acronym
AQMP	Air Quality Management Plan (S13.0-C2)
ALR	Agricultural Land Reserve
ARD	acid rock drainage
BC	British Columbia
BC EAO	British Columbia Environmental Assessment Office
BC MECCS	British Columbia Ministry of Environment and Climate Change Strategy
BC MEM	British Columbia Ministry of Energy and Mines
BC MEMLI	British Columbia Ministry of Energy, Mines and Low Carbon Innovation
BC MOE	British Columbia Ministry of Environment
BC MOF	British Columbia Ministry of Forests
BC MWLAP	British Columbia Ministry of Water, Land and Air Protection
BMPs	best management practices
C	Chapter
CEMP	Construction Environmental Management Plan
CEPA	<i>Canadian Environmental Protection Act</i> , SC 1999, c 33 (Government of Canada [GovCan] 1999)
CMSTHP	Chemicals and Materials, Storage, Transfer, and Handling Plan (S13.0-C3)
CNR	Canadian National Railway
Code	Health, Safety and Reclamation Code in British Columbia (British Columbia Ministry of Energy, Mines and Low Carbon Innovation [BC MEMLI 2021])
CPP	Coal Processing Plant
DMP	Discharge Management Plan (S13.0-C5)
EA	environmental assessment
EAA	<i>Environmental Assessment Act</i> , SBC 2002, c 43 (Government of British Columbia [GovBC] 2002b)
EAC	Environmental Assessment Certificate
EMA	<i>Environmental Management Act</i> , SBC 2003, c 53 (Government of British Columbia [GovBC] 2003)
EMP	Explosives Management Plan (S13.0-C6)
EMS	Environmental Management System (S13.0-C1)
FMSCP	Fuel Management and Spill Control Plan (S13.0-C7)
FSR	Forest Services Road
GovBC	Government of British Columbia
GovCan	Government of Canada
GPS	Global Positioning System

Abbreviation or Acronym	Long Form of Abbreviation or Acronym
GPS	Global Positioning System
HRMP	Heritage Resources Management Plan (S13.0-C8)
IEM	Independent Environmental Monitor
IFC	Issued For Construction (drawings)
JAIR	Joint Application Information Requirements for <i>Mines Act</i> and <i>Environmental Management Act</i> Permits (British Columbia Ministry of Energy, Mines and Petroleum Resources [BC MEMPR] and British Columbia Ministry of Environment and Climate Change Strategy [BC MECCS] 2019).
OHS	occupational health and safety
OHSC	Occupational Health and Safety Committee
LOM	life-of-mine
LTI	Lost Time Incidents
MA/EMA	<i>Mines Act</i> , RSBC 1996, c 293 and <i>Environmental Management Act</i> , SBC 2003, c 53
MIC	Mine Infrastructure Complex
MERP	Mine Emergency Response Plan (S13.0-C9)
ML	metal leaching
ML/ARDMP	Metal Leaching (ML)/Acid Rock Drainage (ARD) Management Plan (S13.0-C12)
MOC	Management of Change
MTCP	Minesite Traffic Control Plan (S13.0-C10)
MWMP	Minesite Water Management Plan (S13.0-C11)
NCD	Non-classified Drainages
non-PAG	non-potential acid generating
OECD	Organisation for Economic Co-operation and Development
OHSC	Occupational Health and Safety Committee
OHSP	Occupational Health and Safety Program (S13.0-C13)
PAG	potentially acid generating
PAMP	Public Access Management Plan (S13.0-C14)
Project	Tenas Project
QEP	Qualified Environmental Professional
QP	Qualified Professional
RCP	Reclamation and Closure Plan (S13.0-C15)
ROW	right-of-way
S	Section
SDS	Safety Data Sheet
SEMP	Socio-economic Management Plan (S13.0-C16)
SEPSCP	Surface Erosion Prevention and Sediment Control Plan (S13.0-C17)

Abbreviation or Acronym	Long Form of Abbreviation or Acronym
SPPs	Standard Policies and Procedures
SMP	Soil Management Plan (Appendix 13.15-B of the Reclamation and Closure Plan [S13.0-C15] [RCP] of the EAC Application)
TAC	Tenas Access Corridor
TCL	Telkwa Coal Limited
TSS	total suspended solids
VMP	Vegetation Management Plan (S13.0-C18)
VRMP	Visual Resources Management Plan (S13.0-C19)
WMPRE	Waste Management Plan for Refuse and Emissions (S13.0-C20)
WMP	Wildlife Management Plan (S13.0-C21)

UNITS OF MEASURE

Abbreviation or Acronym	Long Form of Abbreviation or Acronym
μ	micron
%	percent
ha	hectare
km	kilometre
kV	kilovolt
m	metre
mg/L	milligrams per litre
mm	millimetre

EXECUTIVE SUMMARY

The Construction Environmental Management Plan (CEMP) outlines the procedures, policies, and control measures related to site preparation and construction for the Tenas Project (Project).

This CEMP will be implemented prior to the commencement of the Construction Phase and be used to guide employees and contractors through the initial development phases of the Project.

Telkwa Coal Limited (TCL) will ensure that the highest standards of safety, health, and environmental management are applied during the Construction Phase of the Project. High standards will be achieved through open and consistent communication and engagement with all staff, including the Independent Environmental Monitor (IEM) required by the Environmental Assessment Certificate (EAC) conditions as it relates to environmental management.

The objectives of the CEMP are to:

- ▶ ensure compliance with permit conditions;
- ▶ track issues arising for Project start-up; and
- ▶ provide a framework to guide new, short-term, and long-term managers and contractors about construction requirements.

This CEMP provides guidance to protect the environment through compliance with regulatory commitments and objectives, establishment of implementation processes for environmental protection measures in a timely, effective, and cost-efficient manner, and coordination with other management plans and monitoring programs.

This CEMP is designed to fulfill the guidance provided by provincial and federal statutes and best management practices (BMPs), the Project's Environmental Assessment Certificate (EAC), and the Joint Application Information Requirements for *Mines Act* and *Environmental Management Act* Permits (British Columbia Ministry of Energy, Mines and Petroleum Resources [BC MEMPR] and British Columbia Ministry of Environment and Climate Change Strategy [BC MECCS] 2019) (JAIR) and the resulting *Mines Act*, RSBC 1996, c 293 and *Environmental Management Act*, SBC 2003, c 53 (MA/EMA) permits. This CEMP includes the expected EAC requirement of TCL to hire and maintain an IEM that will report to the British Columbia Environmental Assessment Office (BC EAO) during the Construction Phase.

Through implementation of this CEMP and relevant Standard Policies and Procedures (SPPs), TCL will ensure Construction Phase activities are done safely and with minimal impact to the surrounding environment at the Project.

1. INTRODUCTION

The Tenas Project (Project) will require a Construction Phase to allow for mining to be accomplished onsite; however, the Project is situated in area where there is a potential for adverse effects from the Construction Phase on personnel and the surrounding environment. This Construction Environmental Management Plan (CEMP) describes the management processes and procedures associated with dealing specifically with the Construction Phase of the Project to allow the Project to be developed in a safe and environmentally responsible manner.

As areas will be disturbed during construction of the Minesite Infrastructure, the Tenas Control Pond, located downslope of the Mine Infrastructure will be built first to manage runoff and sedimentation. Temporary runoff, erosion and sediment control best management practices (BMPs) will be required during construction, specifically prior to completion of the Tenas Control Pond.

The Tenas Access Corridor (TAC) requires a Bypass Road which is an 11 kilometre (km) portion that is new construction and has several watercourse crossings, and some of the watercourses are fish bearing. Soils typically encountered along the Bypass Road are medium to fine-textured silts, clays and loams. Areas with elevated erosion risk and proximity to watercourses have been noted and will require robust temporary measures to be implemented. This includes runoff, erosion and sediment control applications during all construction subphases until permanent measures can be implemented. The Rail Infrastructure will be built on gentle slopes and is not associated with watercourse crossings and is considered to have a lower risk of erosion and sedimentation.

The CEMP provides a risk assessment for construction areas and outlines strategies and applications with appropriate flexibility to allow field-fitting to suit the conditions encountered during the Construction Phase and ultimately over the Project life. The CEMP also provides a summary of site locations and associated runoff, erosion, and sediment control issues, identifies site-specific objectives for BMPs, and provides BMPs that are expected to be appropriate.

This CEMP is a draft document prepared as part of the submission of the Environmental Assessment Certificate (EAC) Application. This CEMP will be approved and/or amended in consultation with British Columbia Ministry of Energy, Mines and Low Carbon Innovation (BC MEMLI), British Columbia Ministry of Environment and Climate Change Strategy (BC MECCS), British Columbia Ministry of Forests, Lands, and Natural Resource Operations and Rural Development (BC MFLNRORD), and the Office of the Wet'suwet'en (OW) and submitted to the British Columbia Environmental Assessment Office (BC EAO) 45 days prior to start of the Construction Phase.

2. PURPOSE AND OBJECTIVES

This CEMP provides guidance about protecting the environment through compliance with regulatory commitments and objectives, establishment of implementation processes for environmental protection measures in a timely, effective, and cost-efficient manner, and coordination with other management plans and monitoring programs.

For the purposes of this CEMP, "erosion prevention" refers to those measures that reduce the amount of soil that is detached and mobilized by water and/or wind. While erosion prevention is proactive, "sediment control" refers to reactive, remedial measures that are designed and implemented to collect and retain sediment that has been detached and mobilized. The main objective of sediment control is to prevent sediment from entering waterways or adversely affecting other sensitive environmental features. Some of these measures, such as check dams, wattles, and fascines can function as both erosion prevention and sediment control, depending on when they are implemented.

The CEMP will outline the procedures, policies, and control measures with respect to site preparation and construction activities for the Project.

This CEMP will be implemented prior to the commencement of Construction Phase activities and used to guide employees and contractors through the initial development phases of the project.

Telkwa Coal Limited (TCL) will ensure that the highest standards of safety, health, and environmental management are applied during the Construction Phase of the Project. High standards will be achieved through open and consistent communication and engagement with all staff as it relates to environmental management.

The objectives of the CEMP are to:

- ▶ maintain compliance with permit conditions;
- ▶ track issues arising for Project start-up; and
- ▶ provide a framework to guide new, short-term, and long-term managers and contractors in construction requirements.

This CEMP is designed to fulfill the compliance objectives outlined in **4. Compliance Obligations**.

3. SCOPE AND SCALE

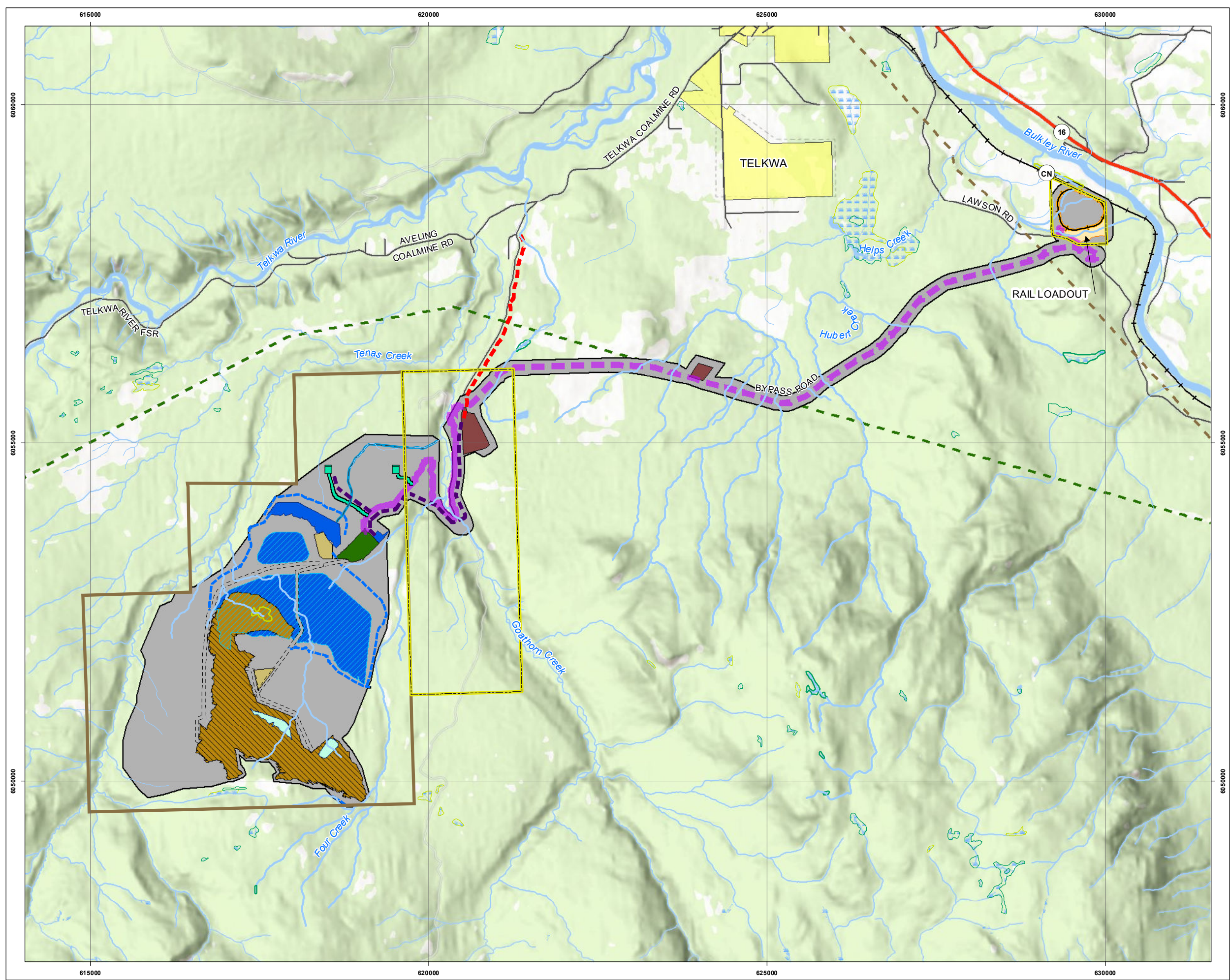
The scope of the CEMP is defined within the Project Area, and includes all activities associated with construction during any Project phase, and especially during the Construction Phase, as well as any construction activities that are directly associated with the Project and exist outside of the Project Area. This CEMP is in effect for all Project phases and ceases to be in force at the final closure of the Project as approved by the regulatory authorities.

The CEMP will be particularly important during the Construction Phase including, but not limited to the construction of the following Project components:

- ▶ Rail Infrastructure;
- ▶ TAC which includes the Bypass Road and improvements to existing Forest Services Roads (FSRs);
- ▶ FSRs;
- ▶ haul and service roads;
- ▶ Surface Water Management Infrastructure;
- ▶ Mine Infrastructure Complex (MIC);
- ▶ Coal Processing Infrastructure;
- ▶ Explosives Infrastructure;
- ▶ quarries; and
- ▶ powerline.

These components are shown in **Figure 3-1** below.

Path: L:\PROJECT\S2018\18P0172_Tenas's_MineMap\map\REPORTING\SECT\Fig 3-1_ProjectOverview_20210608.mxd



Tenas Project

Project overview

Legend

Rail Line

Highway

Road

Stream

Marsh

Swamp

Wetland

Waterbody

Municipal Area

138 kV Transmission Line

500 kV Transmission Line

Existing 25 kV Power Line

25 kV Power Line

Haul Road

Rail Loop

Discharge Path

Ditch

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

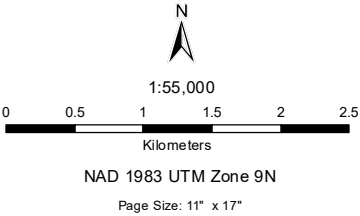
Project Area

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



4. COMPLIANCE OBLIGATIONS

The environmental assessment (EA) for the Project has considered applicable federal and provincial legislation, regulations, strategies, guidelines, plans, and BMPs relevant to the CEMP. Summaries of federal and provincial legislation, regulations and policy applicable to the management of erosion and sedimentation, especially related to Construction Phase activities are summarized in **4.1** to **4.4**.

4.1 Federal Regulatory Requirements

Federal regulations and legislation associated with erosion prevention and sediment control include the *Fisheries Act*, 1985, c F-14 (Government of Canada [GovCan] 1985) and the *Canadian Environmental Protection Act*, SC 1999, c 33 (GovCan 1999) (*CEPA*), both of which are summarized in **Table 4.1-1**.

Table 4.1-1: Summary of Federal Legislation Applicable to the Construction Environmental Management Plan (CEMP)

Name	Year	Description
<i>Canadian Environmental Protection Act</i> , SC 1999, c 33 (Government of Canada [GovCan] 1999) (<i>CEPA</i>)	1999	The <i>CEPA</i> focuses on protecting environmental and human health by preventing, controlling, and managing pollutants, wastes, and other toxic substances and contributing to sustainable development.
<i>Canada Water Act</i> , RSC 1985, c C-11 (GovCan 1985b)	1985	This Act provides the framework for joint federal-provincial management of Canada's water resources.
<i>Fisheries Act</i> , 1985, c F-14 (GovCan 1985c)	1985	This Act prohibits harmful alteration, disruption, and destruction of fish habitat, supports restoration of fish habitat and riparian areas, and regulates commercial fisheries and other industry and development, promoting a biodiversity- and ecosystem-based approach.
<i>Canada Navigable Waters Act</i> , RSC 1985, c N-22 (GovCan 1985a)	1985	This Act regulates works that interfere with navigation built in, on, over, under, through, or across navigable waters in Canada.

4.2 Provincial Regulatory Requirements

Provincial legislation, regulations, policy, and guidance documents applicable to the Project and relevant to the CEMP are described in **Table 4.2-1**.

Table 4.2-1: Summary of Provincial Legislation, Regulations, Policy and Guidance Documents Applicable to the Construction Environmental Management Plan (CEMP)

Name	Year	Description
<i>Agricultural Land Commission Act</i> , SBC 2002, c 36 (Government of British Columbia [GovBC] 2002a)	2002	The Act sets the legislative framework for the establishment and administration of the agricultural land preservation program. The associated Agricultural Land Reserve Use Regulation, BC Reg 30/2019 (GovBC 2019a) identifies permitted land uses within the Agricultural Land Reserve (ALR), and the Regulation sets out the required application procedures for alternative (i.e., non-farm) land uses.

Name	Year	Description
<i>Environmental Assessment Act</i> , SBC 2002, c 43 (GovBC 2002b) (EAA)	2002	The Act provides a mechanism for the Province of British Columbia (BC) to review all major projects proposed in the province to assess for any potentially adverse environmental, economic, social, heritage, or health effects. This Project requires an assessment of potential adverse environmental effects under the Reviewable Projects Regulations, BC Reg 243/2019 (GovBC 2019b) of the Act as the Project exceeds the production capacity of 750,000 tonnes per year.
<i>Environmental Management Act</i> , SBC 2003, c 53 (GovBC 2003) (EMA)	2003	The Act regulates pollution, hazardous waste, contaminated site remediation, and the discharge of municipal and industrial waste to the environment while making sure human health and the environment are protected. The Contaminated Sites Regulations, BC Reg 375/96 (GovBC 1996a) of the Act provide quantitative standards to define site contamination and to assess reclamation success.
<i>Forest and Range Practices Act</i> , SBC 2002, c 69 (GovBC 2002c)	2002	The Act outlines standards and requirements for how forest and range practices and natural resource activities should be conducted on Crown land in BC in a manner that safeguards protection of natural resources, including vegetation. The Act regulates terrain stability, erosion prevention and soil disturbance.
Health, Safety, and Reclamation Code for Mines in British Columbia (British Columbia Ministry of Energy, Mines and Low Carbon Innovation [BC MEMLI] 2021) (Code)	2021	The Code requires the proponent to provide: designs and details for water management structures, water storage, and water treatment facilities, the source, use, and water balance for any water required during all mine phases, a plan for erosion and sediment control and a mine emergency and reclamation plan.
<i>Mines Act</i> , RSBC 1996, c 293 (GovBC 1996b)	1996	The Act and accompanying Code include provisions for the protection of land and watercourses by minimizing the environmental risks associated with mining activities, in addition to reclamation requirements for disturbed areas.
Policy for Mitigating Impacts on Environmental Values ((British Columbia Ministry of Environment [BC MOE] 2014).	2014	The purpose of this policy is to improve the quality, transparency, and consistency of information to support provincial staff, decision makers, and proponents when there is an identified need for environmental mitigation under existing legislation. The policy applies to the identification of Valued Components (VCs), the assessment of potential effects, the development of mitigation measures, and the preparation of mitigation plans
<i>Riparian Areas Protection Act</i> , SBC 1997, c 21 (GovBC 1997)	1997	The Act regulates approvals of work in and around watercourses, including provision of directives relating to the protection and enhancement of riparian areas.
Riparian Areas Protection Regulation, BC Reg 178/2019 (GovBC 2019c)	2019	The Regulation aims to protect riparian areas from development, thus preserving riparian health, features, and functions.
Spill Reporting Regulation, B.C. Reg. 187/2017 (GovBC 2017)	2017	Should spills occur during the construction phase, the reporting and cleanup response will follow the regulation and the Fuel Management and Spill Control Plan (S13.0-C7) (FMSCP) .
Technical Guidance 3 <i>Environmental Management Act</i> - Developing a Mining Erosion and Sediment Control	2015	Under the <i>EMA</i> , this is a guide to help mining companies develop sound practices for erosion and sediment control.

Name	Year	Description
Plan (BC MOE 2015)		
Water Sustainability Act, SBC 2014, c 15 (GovBC 2014)	2016	The Act is the primary legislation to manage the licensing, diversion, and use of water resources, and establishes protections for water quantity, quality, and aquatic ecosystems.
<i>Wildlife Act</i> , RSBC 1996, c 488 (GovBC 1996c)	1996	The Act provides for conservation of specific ecosystems and ecosystem components that provide habitat for wildlife species managed by the BC MOE.

4.3 Joint Application Information Requirements for *Mines Act* and *Environmental Management Act* Permits

The Joint Application Information Requirements for *Mines Act* and *Environmental Management Act* Permits (British Columbia Ministry of Energy, Mines and Petroleum Resources [BC MEMPR] and BC MECCS 2019) (JAIR) provides direction about obtaining *Mines Act*, RSBC 1996, c 293 and *Environmental Management Act*, SBC 2003, c 53 (*MA/EMA*) permits as follows:

- ▶ Provide conceptual methods for prevention of erosion and sediment discharge during all phases of mine life (Construction, Operation, Decommissioning and Reclamation, and Post-closure). A more detailed, site-specific, stand-alone plan will need to be submitted to the Chief Inspector prior to the commencement of construction activities;
- ▶ Include the following specific areas: the Minesite (e.g., plant sites, pits, waste dumps; all access roads; and any utility corridors;
- ▶ Provide information on roles, responsibilities, and training requirements;
- ▶ Provide an assessment of erosion potential (i.e., risk) and consequence;
- ▶ Provide a description of how erosion and sediment control will be managed throughout the mine life;
- ▶ Provide descriptions of methods to be used;
- ▶ Provide drawings and/or maps of where prescriptions will be applied and erosion control/sediment control plans for disturbed surfaces and soil stockpiles;
- ▶ Provide a detailed event-based effectiveness monitoring program including locations and frequencies;
- ▶ Provide a response plan including specific permit triggers, actions to be taken, and reporting protocols; and
- ▶ Address the potential for sediment release from internal sloped structures such as rock stockpiles and any segments of pit walls through the **Minesite Water Management Plan (S13.0-11) (MWMP)**.

The JAIR also states that it is understood that construction may not be a discrete activity that happens once throughout the mine life. Over the life-of-mine (LOM), a separate CEMP may need to be developed for each independent construction project on the Minesite footprint to ensure the plans are site specific and executable on the ground.

The CEMP describes:

- ▶ the Project schedule;
- ▶ a plan for the coordination and management of the construction workforce; and
- ▶ proposed phases of the Project, including site preparation and construction.

The CEMP addresses the following, and is tailored to the proposed construction activities/locations:

- ▶ vegetation management, including buffer setbacks, and invasive plant prevention;
- ▶ drainage control and water management;
- ▶ soil management, including salvage and stockpiling procedures for soil and large woody debris;
- ▶ site-specific erosion and sediment control;
- ▶ wildlife protection, such as timing windows, and wildlife-human interaction management, and pre-construction surveys;
- ▶ a fuel management and spill response strategy;
- ▶ event-based effectiveness monitoring for all of the above; and
- ▶ reporting.

4.4 Standard Practices and Procedures (SPPs)

TCL Standard Practices and Procedures (SPPs) will conform to the Health, Safety and Reclamation Code in British Columbia (BC MEMLI 2021) (Code). In addition to regulatory requirements, the Project will implement SPPs that meet or exceed the required laws and regulations.

4.5 British Columbia Environmental Assessment Office (BC EAO) Requirements

As part of the Environmental Assessment Certificate (EAC) conditions, it is expected that the following will be required for this Project:

- ▶ TCL will retain the services of an Independent Environmental Monitor (IEM). The purpose of the IEM is to assist TCL with:
 - ▶ maintaining compliance with the EAC;
 - ▶ identifying and reducing adverse effects of the Project;
- ▶ The IEM will be a Qualified Professional (QP), with a minimum of five (5) years demonstrated experience and knowledge of environmental monitoring for coal mine construction projects in British Columbia (BC) or otherwise acceptable to the BC EAO. **TCL will not commence construction until an IEM has been retained.** The IEM will remain employed for the duration of the Construction Phase of the Project; and
- ▶ TCL will provide BC EAO with the terms of engagement between TCL and the IEM 120 days prior to the planned date to start construction. The IEM must report independently to BC EAO and provide any information or reporting to any agencies or Indigenous groups as directed by BC EAO.

The terms of engagement will include the following:

- ▶ the roles and responsibility of the IEM;
- ▶ the required inspection and reporting frequency as directed by BC EAO;

- ▶ reporting to include an assessment of TCLs compliance with the EAC, mine permit, other regulatory approvals, and the effectiveness of mitigation measures implemented by TCL under these documents;
- ▶ reports by the IEM must be provided to BC EAO and TCL concurrently in a format and level of detail that is to the satisfaction of both the BC EAO and TCL;
- ▶ provide an opportunity for TCL to respond to reports by the IEM after, but not before, the IEM submits the reports to BC EAO;
- ▶ the circumstances in which the IEM would have the authority to stop work on the Project or a portion of the Project to the extent the IEM determines is necessary to prevent or reduce adverse effects caused by a non-compliance with the EAC; and
- ▶ the process whereby the IEM will make recommendations to TCL to take mitigative or corrective actions to address any non-compliance or potential non-compliance with this EAC and the requirement that the IEM notify BC EAO, and/or any agency or Indigenous groups as directed by BC EAO, of the recommended actions.

The terms of engagement will be to BC EAO's satisfaction.

The IEM must notify BC EAO and the relevant agencies within 72 hours if it determines that TCL has not, or may have not, fully complied with the EAC, mine permit and/or regulatory approvals and that the non-compliance has caused or may cause adverse environmental, health, economic, social, or heritage effects.

5. RELATIONSHIP TO OTHER MANAGEMENT PLANS

The Project is governed by an **Environmental Management System (S13.0-C1) (EMS)**, an overarching management plan strategy comprising a set of processes and practices which enable TCL to manage its environmental and safety performance in a holistic way, within an integrated framework. While the management plans are part of the **EMS**, the **EMS** is not just a collection of management plans.

In addition to the overall guidance of the **EMS**, this CEMP has a relationship with other management plans that also present mitigation measures. Those management plans and their relationship to this CEMP are listed in **Table 5-1**.

Table 5-1: Management Plans with Relationship to the Construction Environmental Management Plan (CEMP)

Management Plans	Nature of Relationship
Environmental Management System (S13.0-C1) (EMS)	All management plans are part of the EMS.
Air Quality Management Plan (S13.0-C2) (AQMP)	Wind erosion can mobilize sediment (dust). In the case of blasting during the Construction Phase, dust, vibration and noise will be addressed through the AQMP.
Chemicals and Materials, Storage, Transfer, and Handling Plan (S13.0-C3) (CMSTHP)	Chemical materials used in the Construction Phase will comply with the CMSTHP.
Discharge Management Plan (S13.0-C5) (DMP)	Construction of the Tenas Control Pond is addressed by the DMP.
Explosives Management Plan (S13.0-C6) (EMP)	In the case of blasting during the Construction Phase, explosives use, storage and handling will be addressed through the EMP.
Fuel Management and Spill Control Plan (S13.0-C7) (FMSCP)	The FMSCP will be in place for equipment or other materials used in the Construction Phase.
Heritage Resources Management Plan (S13.0-C8) (HRMP)	Chance Find Procedures for known or as-yet unknown heritage and paleontological resources will be put in place and training provided to personnel.
Mine Emergency Response Plan (S13.0-C9) (MERP)	Incident management and emergencies in the Construction Phase will be as per the MERP.
Minesite Water Management Plan (S13.0-C11) (MWMP)	Construction of the Tenas Control Pond is covered by the MWMP.
Occupational Health and Safety Program (S13.0-C13) (OHSP)	Incident management and reporting in the Construction Phase will be as per the OHSP.
Public Access Management Plan (S13.0-C14) (PAMP)	Public access during the Construction Phase will follow the PAMP.
Reclamation and Closure Plan (S13.0-C15) (RCP)	Soil management and/or progressive reclamation will be completed in accordance with the RCP and Soil Management Plan in Appendix 13.15-B of the RCP.
Socio-economic Management Plan (S13.0-C16) (SEMP)	Management of local contractors, procurement and crew accommodation etc. will be conducted as per the SEMP.

Management Plans	Nature of Relationship
Surface Erosion Prevention and Sediment Control Plan (S13.0-C17) (SEPSCP)	The SEPSCP guides the mitigation and management of surface erosion and sediment control for all Project Phases.
Vegetation Management Plan (S13.0-C18) (VMP)	Equipment used for construction will be managed with respect to invasive plants via the VMP. There will also be a seeding of stockpiles and slopes and reclaiming previously disturbed areas as an erosion and sediment control strategy.
Waste Management Plan for Refuse and Emissions (S13.0-C20) (WMPRE)	Waste related to the Construction Phase will be handled via the WMPRE.
Wildlife Management Plan (S13.0-C21) (WMP)	Potential wildlife interactions in the Construction Phase will be addressed via the WMP.

6. DETAILS OF CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

6.1 Project Phases

Mine production requires many facilities and infrastructure components to be constructed. The CEMP provides guidance for mining activities to proceed safely and productively while being environmentally responsible. This CEMP has been developed with a focus on the Construction Phase (**Table 6.1-1**). The CEMP will be adapted to site conditions through adaptive management (see **11.2**). The Construction Phase will occur as described below:

Table 6.1-1: Temporal Boundaries for the Construction Phase of the Tenas Project

Phase	Year	Duration (years)	Description of Activities
Construction	-0.5 to 0	1.5	Site clearing, soil salvage, open pit development, building construction, service and haul road development, Rail Infrastructure construction, bridge construction and development of onsite utilities and services. Development of mine rock, and overburden storage piles, stockpiling of reclamation material such as soil, overburden and other materials suitable for reclamation. Development of water management systems and management ponds for storage of potentially acid generating (PAG) materials.

6.2 Existing Site Conditions

6.2.1 Geological Setting and Soils

The Project Area is characterised by subdued or rolling terrain marking a transition of the Hazelton Mountains to the Nechako Plateau. Glacial till basal and ablation represents the predominant soil parent material. The basal till typically has a thickness of 2 metre (m) to 15 m and at depths greater than 0.5 m consists of a silt-clay matrix with 15 percent (%) to 35% coarse fragment content. Ablation till has a sandy-silty matrix and 20% to 70% coarse fragment content with a typical thickness of 0.5 m to 1 m. The well- to moderately well-drained deposits commonly form a thin mantle over basal till (TCL 2021).

6.2.2 Climate and Precipitation

The climate in the Project Area and Bulkley Valley is characterised by four (4) prominent seasons typical of northern interior BC and appears to be like that recorded at the Smithers Airport. The Project is in the transition zone between the wetter Coast Mountains and the drier Interior Plateau. The average amount of annual precipitation is 509 millimetres (mm) per year, with 33% as snowfall and 67% as rainfall. September to November typically has the most precipitation, and February to April has the least. Throughout the fall, short duration, high intensity rain events may produce substantial peak events, such as those associated with the October 24, 2017, storm which resulted in high stream flows and flooding (TCL 2021).

6.2.3 Watercourses

The Project Area lies within portions of two (2) watersheds: Tenas Creek to the northwest and Goathorn Creek to the northeast. The two (2) watercourses merge northeast of the Project and eventually flow into the Telkwa River. Four Creek, a small tributary to Goathorn Creek, runs along the east boundary of the

Project adjacent to the Coal Processing Plant (CPP). The TAC including the Bypass Road crosses several watercourses, including fish-bearing Helps and Hubert creeks and associated tributaries, and tributaries to the Bulkley River.

Annual low flows occur during the winter when most streamflow is dominated by baseflow from groundwater discharge. Snowmelt drives high flow in the spring and a period of low flow typically occurs during late summer and early fall.

6.3 Construction Workforce Management and Coordination

TCL is planning to hire personnel to assist with coordination and management of the Construction Phase and the related workforce. During the Construction Phase additional personnel will be hired for subsequent phases of the Project which are as follows:

- ▶ Mine Manager;
- ▶ Health, Safety, and Human Resources Superintendent;
- ▶ Mine Administrator;
- ▶ Financial Controller;
- ▶ Buyer;
- ▶ Plant Superintendent;
- ▶ Process Engineer;
- ▶ Plant Supervisor;
- ▶ Plant Operators;
- ▶ Mine Superintendent;
- ▶ Senior Mine Engineer;
- ▶ Mine Geologist/Open Pit Mine Surveyor;
- ▶ Environmental Coordinator;
- ▶ Environmental Technician;
- ▶ Maintenance Supervisor/Planner;
- ▶ Maintenance Personnel (Mechanics, Welders); and
- ▶ Mine Equipment Operators.

See **7. Roles and Responsibilities** which outlines some of the specific roles in further detail.

Contractors will be hired for the following Project components and will be responsible for assisting with the management and workforce associated with the construction task areas identified below:

- ▶ CPP, including onsite electrical and water distribution networks;
- ▶ Maintenance Facility;
- ▶ Explosives Infrastructure;
- ▶ TAC;
- ▶ powerline, substation, and communications network;

- ▶ logging;
- ▶ Rail Infrastructure;
- ▶ soil salvage; and
- ▶ mining equipment.

Companies have not yet been assigned to provide the Project components above, however TCL has short-listed companies that have previous experience with constructing these features in western Canada.

As part of the Construction Phase schedule there are the following associated subphases:

- ▶ construction level engineering including Issued For Construction (IFC) level drawings;
- ▶ purchase and delivery of long lead items;
- ▶ site preparation such as logging and topsoil salvage;
- ▶ construction of Project components; and
- ▶ commissioning and handover of Project components to TCL for operation.

6.4 Public Access

The **Public Access Management Plan (S13.0-C14) (PAMP)** will be in place for the Construction Phase of the Project and is designed to control transportation and access to and from the Minesite, while safely meeting the needs of the Project's employees, contractors, Indigenous groups, local residents, and the general public. During the Construction Phase of the Project, the measures to control public access, as outlined in the **PAMP**, will be followed. Furthermore, the **PAMP** will be implemented by all TCL employees and contractors.

6.5 Geotechnical Stability

Geotechnical stability monitoring for the Construction Phase will focus on construction-related slope stability issues during excavation and building of various Project elements and their components, such as the TAC, powerline, and Minesite Infrastructure. **Appendix 13.4-A Geotechnical Investigation Tenas Haul Road Tenas Project Feasibility Study Telkwa, BC** provides both the design report for the TAC and the geotechnical stability report carried out by Westrek.

Prevention of damage to soil and mass wasting events will be a focus of the geotechnical stability assessments and monitoring. Furthermore, detailed onsite terrain stability will be assessed as needed to identify unstable areas. Slopes surrounding the excavation and building sites will be surveyed prior to the start of work and as needed during construction. The survey data will be used to monitor the slope stability.

Where the integrity of a slope is perceived to be threatened by workers or the contractor, work in the area will cease until a QP has inspected the slope and developed a remedial plan as required.

6.6 Construction Surface Erosion Prevention and Sediment Control

The Construction Phase is temporary; however, work will take place over an extended period of time and there is typically a lag time between initial construction and the implementation of permanent soil stability measures. Management practices and controls must remain proactive and be appropriate to remain effective over the expected Construction Phase.

The goal of the CEMP is to minimize the potential for sediment entrainment (source control) and not allow its transport into watercourses or other environmentally sensitive features. This CEMP also relies on the **Surface Erosion Prevention and Sediment Control Plan (S13.0-C17) (SEPSCP)** which should also be reviewed with this CEMP, and the **Minesite Water Management Plan (S13.0-C11) (MWMP)**. Runoff management should be considered and implemented first, erosion prevention second, and sediment control third (**Figure 6.6-1**).

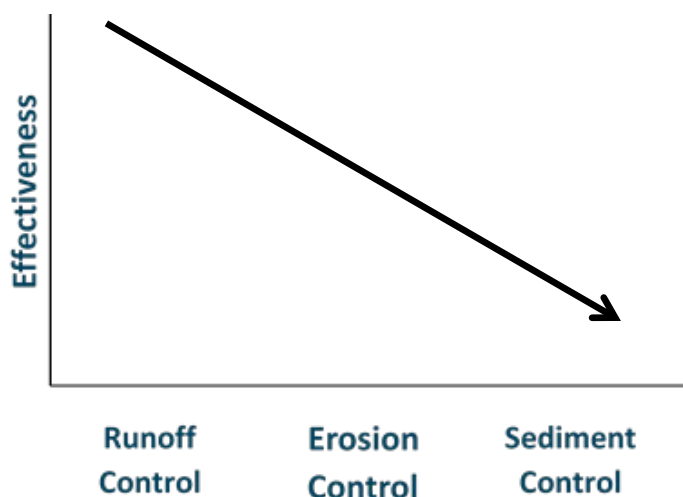


Figure 6.6-1: Best management practices (BMPs) effectiveness

Key elements of effective erosion and sediment control planning include:

- ▶ minimizing Project footprints;
- ▶ implement runoff, erosion, and sediment control in that order of priority;
- ▶ protecting streams and stabilizing runoff paths;
- ▶ establishing non-contact water diversions to minimize volume of contact water generated;
- ▶ phased construction to minimize soil exposure;
- ▶ vegetative buffer retention downslope of Project components;
- ▶ stabilizing exposed soils as soon as practical;
- ▶ training workers in the CEMP and making sure they are familiar with the implementation, inspection and maintenance of the required practices;
- ▶ continually inspect and uphold practices, complete risk assessments as construction proceeds; and
- ▶ build contingency measures into the CEMP to address weather events leading to shutdowns.

6.6.1 Risk Assessment

A proactive approach to erosion and sediment control starts with a risk assessment. Risk is commonly defined as the product of the likelihood of an event occurring (or potential to occur) and its consequences. The risk assessment determines areas that present a greater likelihood of erosion and pose an increased risk of consequences to the environment, the Project and/or to regulatory compliance (e.g., water quality

and fish habitat). Erosion ratings are combined with consideration of potential consequences to determine an appropriate level of mitigation effort.

6.6.1.1 Erosion Potential

Erosion occurs when an erosive force such as rainfall, surface flow or wind, in conjunction with gravity, exceeds the soil's ability to resist that force and particles detach and mobilize. Erosion potential is an estimate of the soil quantity that could mobilize due to erosion and transportation by those forces. Erosion potential considers the severity of existing erosion, potential for future erosion, and location and extent of erodible areas. Three (3) categories have been developed to classify erosion potential which are:

1. **Likely**, where erosion will occur due to the materials and grades present;
2. **Possible**, where erosion has a chance to occur due to the materials and grade present; and
3. **Unlikely**, where erosion will not occur or will be limited due to the materials and grade present.

6.6.1.2 Consequence Evaluation

Consequence, as it relates to soil erosion, refers to adverse effects to the aquatic environment, wetlands, or other ecologically sensitive areas. This is typically a qualitative assessment that considers pathways to sensitive receptors. For a project to have **Minor** consequences of erosion and sedimentation, there should be no ecologically sensitive areas that could be disturbed. If there are sensitive areas present, then the consequence should be rated as **Major**.

6.6.1.3 Risk Assessment Table

Using the definitions and approach outlined above, a Risk Matrix has been developed (**Table 6.6-1**). Erosion potential, or likelihood is evaluated with consequence, and a risk value is assigned.

Table 6.6-1: Risk Matrix for Erosion

Erosion Potential	Consequence	
	Minor	Major
Likely	Moderate	High
Possible	Low	Moderate
Unlikely	Very Low	Low

The Risk Matrix is applied to areas where soil disturbance is expected and assists with determining an appropriate level of erosion and sediment control required (**Table 6.6-2**). Risk is typically highest during the Construction Phase.

Table 6.6-2: Erosion Potential, Consequence, and Level of Mitigation

Erosion Potential	Consequence	Level of Erosion and Sediment Control					
		Procedural BMPs	ESC Plan and Structural BMPs	Water Management BMPs	Staged Construction and Progressive Reclamation	Intensive Sediment Control BMPs	Water Quality Monitoring
Unlikely	Minor	Recommended	Not Recommended	Not Recommended	Not Recommended	Not Recommended	Not Recommended
	Major	Required	Required	Not Recommended	Not Recommended	Not Recommended	Not Recommended
Possible	Minor	Required	Not Recommended	Not Recommended	Not Recommended	Not Recommended	Not Recommended
	Major	Required	Required	Recommended	Recommended	Recommended	Recommended
Likely	Minor	Required	Required	Required	Required	Required	Recommended
	Major	Required	Required	Required	Required	Required	Required

Notes: BMP=best management practices; ESC=Erosion and Sediment Control

6.6.1.4 Rail Infrastructure

The Rail Infrastructure will be located on an inactive, stable part of the Bulkley River floodplain with no evidence of annual flooding or overbank flow (TCL 2021). The area is relatively flat, but as an active Rail Loadout facility, exposed soils and coal accumulation could pose a risk to downstream aquatic habitats. Risk factors, erosion potential and a consequence evaluation are provided in **Table 6.6-3**.

Table 6.6-3: Risk Evaluation - Rail Infrastructure

Area	Risk Factors	Erosion Potential	Consequence	Risk Assessment
Rail Infrastructure	Active Rail Loadout with fine-textured soils, coal stockpiles, effluent discharge to Bulkley River, adjacent wetlands, and Agricultural Land Reserve (ALR) land.	Likely	Minor	Moderate

6.6.1.5 Open Pit

The open pit will be in an area that is relatively flat, but as an active open pit, exposed overburden, rock, and coal could pose a risk to downstream aquatic habitats. Risk factors, erosion potential and a consequence evaluation are provided in **Table 6.6-4**.

Table 6.6-4: Risk Evaluation - Open Pit

Area	Risk Factors	Erosion Potential	Consequence	Risk Assessment
Open Pit	Active open pit with high disturbance of overburden, rock, and coal material	Likely	Minor	Moderate

6.6.1.6 Mine Infrastructure Complex (MIC) and Associated Stockpiles

The MIC and associated stockpiles will be in an area that is relatively flat, but as an active stockpile platform, and exposed coal stockpiles could pose a risk to downstream aquatic habitats. Risk factors, erosion potential and a consequence evaluation are provided in **Table 6.6-5**.

Table 6.6-5: Risk Evaluation - Mine Infrastructure Complex (MIC)

Area	Risk Factors	Erosion Potential	Consequence	Risk Assessment
Mine Infrastructure Complex (MIC)	Active coal stockpiles and MIC pad.	Likely	Minor	Moderate

Note: Risk highest during Construction Phase.

6.6.1.7 Tenas Access Corridor (TAC), Haul and Service Roads, Active Surfaces

Unpaved and active road surfaces provide a unique challenge to erosion and sediment control management as they can cross large areas and encounter diverse environmental conditions and sensitivities, including streams, wetlands, seepage areas and steep terrain.

These haul roads, TAC, service roads, and FSR upgrades will be in place throughout the Operation, Reclamation and Decommissioning, and Post-closure phases of the Project. BMPs for maintenance and upkeep of road surfaces, channels, and cross drains are found in **6.6.2**.

The TAC, haul and service roads are generally located in an area that is relatively flat, but active road surfaces can mobilize sediment which pose a risk to downstream aquatic habitats. This risk is more of an issue at stream crossings and in the Goathorn Creek Valley. Risk factors, erosion potential and a consequence evaluation are provided in **Table 6.6-6**.

Table 6.6-6: Risk Evaluation - Tenas Access Corridor (TAC)

Area	Risk Factors	Erosion Potential	Consequence	Risk Assessment
Tenas Access Corridor (TAC) (within 200 meters [m] of stream crossings)	Active road surfaces with fine soils, proximity to watercourses	Likely	Major	High

6.6.1.8 Landform Design and Erosion Control

The design of final Project landforms at Post-closure will consider geotechnical stability, surface water drainage, vegetation re-establishment and erosion control. Landform design, including final mine closure objectives, is discussed in detail in the **Reclamation and Closure Plan (S13.0-C15) (RCP)**.

6.6.2 Best Management Practices (BMPs)

The BMPs outlined in this CEMP are derived from those described in the following documents:

- ▶ National Guide to Erosion and Sediment Control on Roadway Projects (Transportation Association of Canada 2005);
- ▶ Standards and Best Practices for Instream Works (British Columbia Ministry of Water, Land and Air Protection [BC MWLAP] 2004);
- ▶ Land Development Guidelines for the Protection of Aquatic Habitat (Chilibeck et al. eds 1993);
- ▶ Best Management Practices Handbook: Hillslope Restoration in British Columbia (British Columbia Ministry of Forests [BC MOF] 2001); and
- ▶ Manual of control of erosion and shallow slope movement. (British Columbia Ministry of Transportation and Highways and Thurber Environmental Consultants Ltd. 1997).

The BMPs are intended to be used throughout the Project during all phases, including the Construction Phase. Standard BMPs are presented in **Appendix 13.4-B**. They will be used in the development of site-specific prescriptions for areas of moderate/high erosion risk and high consequence potential.

Implementation of BMPs will be completed under the supervision of appropriately trained person(s) knowledgeable in erosion and sediment control practices and experienced in the proper and effective installation of sediment control materials and measures (see **7. Monitoring**). In addition, TCL will employ an IEM to review daily construction activities and implement BMPs as required.

6.6.2.1 Watercourse Crossings

Work that occurs in and around a stream must be done in such a way as to protect fish and fish habitat. The following summarizes standard mitigation that will be considered:

- ▶ Avoid works during high water, and minimize work carried out during substantial rain events;
- ▶ Work within the channel will be minimized to the extent practical;
- ▶ Minimize the disturbance to existing vegetation within the riparian zone. Where vegetation must be removed consideration will be given to salvaging rooted shrubs and replanting them after construction is completed;
- ▶ Establish construction boundaries using flagging or fencing;
- ▶ Construction activities within the channel will be monitored full-time during start-up by an appropriate qualified person(s);
- ▶ Mitigation measures will be installed prior to and/or concurrent with ground disturbance activities near watercourses;
- ▶ If a temporary stream diversion is required, confirm that appropriate *Water Sustainability Act*, SBC 2014, c 15 (GovBC 2014) approvals are in place. Temporary lined diversion channels (passive technique) or pump around method (active technique) will be employed;
- ▶ Avoid connecting channels directly to the watercourse. Use kickout channels, swales and or cross channels to direct flows to vegetated areas;
- ▶ Monitor runoff patterns and pathways during construction;
- ▶ Any controlled, permitted, discharge locations into watercourses must have appropriate erosion protection;
- ▶ Install sediment fencing or other controls to isolate the watercourse from bank construction work (i.e., bridge abutments);
- ▶ Riprap, rock or other material placed on the banks or within the active channel are to be free of debris and fines;
- ▶ Stockpiled material will not be placed or stored closer than 15 m from any watercourse or waterbody;
- ▶ Fuel storage and refueling stations will be located at least 30 m from the stream on level ground where possible. Double-walled fuel tanks will be used. In absence of double-walled tanks, secondary containment must be used;
- ▶ Work in or near streams will adhere to the guidelines in the Riparian Management Area Guidebook (BC MOF 1995) and the Standards and Best Practices for Instream Works (BC MWLAP 2004); and
- ▶ For work on or adjacent to fish-bearing watercourses, implement guidance found in the Fish-Stream Crossing Guidebook (BC MOF 2012).

6.6.2.2 Clearing and Grubbing

Clearing is considered the complete removal and disposal of all standing and fallen trees, stumps, logs, roots, and all other vegetation growth, whereas grubbing is considered the removal and disposal of organic material and soil to a depth of approximately 0.30 m below the existing ground surface. Clearing and grubbing will be necessary for all areas of new construction and strategic removal of vegetation can help reduce the risk of erosion and the need for controls.

The following are BMPs to minimize adverse effects from these Construction Phase activities:

- ▶ Clearing and grubbing will be undertaken outside the bird nesting window identified for the site as determined by a Qualified Environmental Professional (QEP), to the extent practical. If works must proceed within the bird nesting window, a QEP will be consulted to determine the best course of action;
- ▶ Limit the extent of clearing and grubbing and mark all watercourses on maps and in the field;
- ▶ At environmentally sensitive sites (wetlands, watercourse crossings), implement a close-cut, no grubbing practice (i.e., cutting trees/shrubs at ground level and leave root systems intact) or undertake hand clearing;
- ▶ Avoid clearing and grubbing within 15 m of a watercourse until construction is ready to proceed (within 30 days);
- ▶ If areas are to be cleared all at once and will remain exposed for more than 30 days, apply temporary erosion protection;
- ▶ Whenever feasible, conduct clearing and grubbing work in dry weather, and temporarily halt construction during periods of sustained heavy precipitation;
- ▶ Keep equipment on designated routes, to the extent practical to minimize soil compaction;
- ▶ When clearing large areas, stagger works to prevent unnecessary exposure of soils;
- ▶ Leave surfaces in a rough and loose state as much as possible, as opposed to grading and compacting, specifically if they will remain exposed for more than 30 days;
- ▶ When falling trees or vegetation, do not allow trees or debris to fall into watercourses. Take care when removing felled trees or vegetation around watercourses to prevent unnecessary damage to the riparian zone; and
- ▶ While clearing and grubbing near watercourses, monitor runoff patterns and install temporary road kickout channels, sumps, and swales to direct water into vegetated areas.

6.6.2.3 Cut and Fill Construction

Cut and fill construction is commonly a part of road construction to create a safe, stable road grade and to eliminate unsuitable soils. Cuts are expected to be excavated on steep slopes with poor soils that cannot support side-casting. Fills will be constructed by side-casting (steep slopes) or end-dumping.

- ▶ During the Construction Phase, the use of mulches or mats in conjunction with seeding may be required to minimize the risk of erosion prior to the establishment of new vegetation. Cuts and fills will be re-vegetated as soon as feasible after construction is complete;
- ▶ Roads constructed or upgraded in steep terrain will be built using full bench construction. This type of construction uses only a cut and is preferred where the slope is too steep to support a fill; and
- ▶ If cut material needs to be stockpiled for later use in fill areas, it will be stored on stable and level ground at least 15 m from any watercourse and other sensitive environmental features.

6.6.2.4 Sensitive Soils

Sensitive soils tend to contain small grain sizes (silts and clays) that are more erodible, and more susceptible to compaction. Generally, mitigation of sensitive soils will not differ greatly from other exposed soils within the Project; however, the following BMPs will be applied:

- ▶ Identify areas where sensitive soils are present and minimize disturbance to the extent practical. If the areas do not need to be disturbed, leave them intact, and set boundaries to contain equipment;
- ▶ Avoid compaction of sensitive soils beyond designated access roads or pads as this will likely lead to the potential reduction of surface infiltration;
- ▶ Construction in areas with known sensitive soils should only be done in the dry to minimize erosion;
- ▶ If sensitive soils are known and the area is to be compacted, then expect water to run off these surfaces more readily than other surfaces. Address this by constructing channels or other catchments to manage water and runoff; and
- ▶ Prioritize reclamation in areas where sensitive soils are present.

6.6.2.5 Steep Slopes

Steep slopes, especially those that have been cleared or are exposed, have a high risk of sediment being mobilized. Steep slopes are more prone to erosion (i.e., from rain drop, sheet, rilling, and gullyng). The Project Area is considered to have relatively flat topography; however, localized steep slopes are present along Goathorn Creek. The following BMPs are expected to help mitigate erosion and sediment:

- ▶ Minimize the amount of time the slope has exposed soil; apply erosion cover as quickly as possible and use temporary BMPs to the extent practical during the Construction Phase;
- ▶ Avoid compacting steep slopes unless an erosion blanket is being applied. Leave slopes in a rough and loose state if seeding, hydro-seeding, hydro-mulching or using other revegetation methods;
- ▶ Use slope breaks, such as diversions or benches, as appropriate, to reduce the length of a cut or fill slope, and to limit the potential for sheet and rill erosion and to prevent gullyng. General recommendations for spacing of slope breaks are provided in **Table 6.6-7** (British Columbia Ministry of Energy and Mines [BC MEM] 2002);
- ▶ If runoff or seepage is present at the top of the slope and access is available and safe, install a non-contact channels to collect and convey water around the slope. If access is not available, provide a lined surface for water to flow on and consider permanent slope armouring measures;
- ▶ Install wattles or other energy dissipaters keyed in across exposed slopes to slow runoff and trap silt on steep slopes;
- ▶ Install sediment fencing along the base of the slope to capture sediment mobilized by sheet erosion;
- ▶ If channel lines are installed at the base of steep slopes, prevent them from directly draining into any watercourse. Construct channels to lead to settling ponds or to stable, vegetated areas;
- ▶ Install erosion and sediment control BMPs in the toe slope channels to slow water velocities, reduce scour and promote settling; and
- ▶ Monitor exposed slopes frequently, particularly during a substantial rain fall event.

Table 6.6-7: Recommended Slope Break Spacing to Reduce Erosion

Slope Type	Slope Gradient	Slope Break Spacing (m)
Steep slopes	2:1 (50%)	6
	3:1 (33%)	11
	4:1 (25%)	14
Long slopes	15-25%	15

Slope Type	Slope Gradient	Slope Break Spacing (m)
	10-15%	24
	6-10%	38
	3-6%	61
	<3%	91

Notes: <=less than; %=percent; m=metre

6.6.2.6 Non-contact Water Diversions

Non-contact water is water that has not been influenced by the Project. This can include overland flow, groundwater seeps or any other source of flow from beyond the Project boundaries. Every effort practical should be made to divert non-contact water around active areas. The following are BMPs for managing non-contact water:

- ▶ Install drainage channels, berms, or other structures to intercept non-contact water and convey it around active areas;
- ▶ Non-contact water channels should be appropriately protected against erosion and sedimentation. Armoring with riprap, channel lining or equivalent, installation of check dams to reduce velocity, and vegetating the channel banks will be implemented;
- ▶ Any outlets to the natural environment should be appropriately armored to prevent scour or introduction of sediment into any offsite natural watercourse;
- ▶ Regularly inspect water management structures to confirm they are functioning as intended and are not contributing sediment to any watercourse(s); and
- ▶ When constructing channel lines or kickouts along roads, riprap or other protective measures against erosion will be used to minimize sediment mobilization within the channels.

6.6.2.7 Road Surfaces, Channels, and Cross Drains

Road construction and maintenance can cause an increase in erosion due to the removal of cover, increased slope gradients, decreased infiltration rates, interception of subsurface flow and concentration of intercepted water. Proper road design, construction, and maintenance can reduce erosion and sediment generation. The following are BMPs that will be employed during road construction and maintenance:

- ▶ Road and channel grades will be minimized to the extent practical to reduce erosion potential;
- ▶ Roads will be graded to produce a crown, and in-slope or out-slope design will be undertaken to avoid puddling. Grader operators will be instructed not to blade road material or snow into stream channels or diversion channels;
- ▶ Runoff will be collected in channels and directed to basins, small settling ponds and vegetated areas, where practical. During construction, appropriate channels, kickouts, culverts, shallow water bars and grading will be implemented to direct runoff away from watercourses;
- ▶ Small sumps and sediment catch basins will be used to protect the upstream end of culverts from plugging with sediment and debris. The culvert will be installed deep enough to prevent it from being crushed by traffic loads;
- ▶ If the stream is fish-bearing, the culvert will be sized for 1 in 200-year flows;

- ▶ Culvert inlets and outlets will be armoured up to just below the road surface;
- ▶ Direct connection of permanent roadside channels to watercourses will be avoided where possible. If channels must be connected to watercourses, sufficient erosion control will be implemented in the channel bottom using standard BMPs (**Appendix 13.4-B Standard Best Management Practices**);
- ▶ Road surfaces will be capped with appropriate material in areas where sensitive environmental features are present or on steep gradients; and
- ▶ Maintenance will include grading and replacement of surface material as required to avoid wash-boarding, potholes, and puddling of surface water.

6.6.2.8 Topsoil and Overburden Management

Large areas will require topsoil salvage and overburden handling. Topsoil will be separated and stockpiled for reclamation use. Overburden will be used to construct the Tenas Control Pond Dam and the three (3) management pond dams. Excess overburden will be stockpiled. The following are BMPs for the stockpiling of topsoil at the designated locations:

- ▶ Stockpiles will be stored on stable and level ground to the extent possible and not exceed 6 m in height or slopes of 2:1 where possible;
- ▶ Stockpiles will be located at least 30 m away from watercourses or other sensitive environmental features;
- ▶ Topsoil stockpiles will be seeded as soon as practical with an appropriate mix free of invasive plant species, and/or capped or covered to protect against erosion;
- ▶ Runoff from adjacent areas will be directed away from stockpiles; and
- ▶ Silt fencing will be installed around the perimeter of the stockpiles, where practical to minimize sheet erosion off the piles.

6.6.2.9 Quarry Sites

Two (2) quarries will be developed to support road construction. Quarry development will involve clearing and grubbing, stripping of overburden followed by excavation, crushing, and stockpiling of gravel materials. BMPs for quarry sites are outlined below:

- ▶ Organic and fine-grained soils removed from the quarry locations will be stockpiled for use in future reclamation;
- ▶ The quarries will be resloped to a stable configuration and revegetated or otherwise reclaimed after construction is complete; and
- ▶ Perimeter channels or berms will be placed upslope of the area prior to the start of construction to divert non-contact water from entering the quarry, where feasible.

6.6.2.10 Snow Handling and Storage

Snow management is an often-overlooked aspect of erosion and sediment control. Road surface material can be entrained during snow removal activities and when stockpiles of snow melt quickly, they contribute to surface runoff, erosion, and sediment mobilization. The following BMPs will be used for the Project:

- ▶ Snow pile locations will be pre-planned, marked onsite and on maps, and operators will be trained appropriately;
- ▶ To prevent the delivery of fine materials into stream channels, snow will be piled in undisturbed areas with low slopes a minimum of 30 m from any watercourse; and
- ▶ Sediment fencing or berms will be installed around snow piles as deemed necessary to limit sedimentation.

6.6.2.11 *Erosion and Sediment Control Contingency Materials*

Miscellaneous erosion and sediment control materials will be readily available at appropriate locations throughout the duration of the Project as a contingency measure should inclement weather conditions necessitate their use. Material will be stored within a covered and easily identifiable location. Materials used for runoff, erosion or sediment control must be free of fine materials. Materials will include at a minimum:

- ▶ sediment filter bags;
- ▶ sediment fence and extra wooden stakes (1 m);
- ▶ sediment curtain;
- ▶ straw matting (rolled erosion control blankets) and straw wattles;
- ▶ Curlex sediment logs (wattles);
- ▶ approved grass seed and spreader (stored in dry cool place free of rodents);
- ▶ rope;
- ▶ gravel/cobble stockpile;
- ▶ non-woven geotextile;
- ▶ heavy gauge poly plastic sheeting;
- ▶ burlap sandbags (unfilled is appropriate); and
- ▶ variety of pumps and hoses.

6.6.2.12 *Adverse Weather/Shut Down Guidelines*

If environmental conditions become unfavorable (e.g., heavy winds and/or heavy and persistent rain, snow followed by rapid snow melt), it may become necessary to cease certain construction and operation activities to confirm that runoff is being managed appropriately. Site conditions may require additional mitigation measures be put in place to minimize or eliminate the potential for sediment-laden water to leave construction areas.

The ability to shut down works based on the need to focus on water management, erosion and sediment control mitigation is to be given to the Project and Construction Site Supervisor, the IEM, or any regulatory body.

During adverse weather conditions, erosion and sediment control structures will be inspected at least daily where practical and required maintenance will be conducted immediately, provided it is safe to do so. Erosion and sediment control materials and pumps will be stored where they are readily accessible.

6.6.2.13 Tenas Access Corridor (TAC)

The TAC will include 11 km of new road construction, called the Bypass Road, from the Rail Infrastructure to an existing gravel quarry. From there, FSR upgrades will be completed up to the MIC Pad at chainage (KM) 16+000 including Goathorn Creek Bridge and Four Creek Crossing. The TAC detailed designs are provided in **Appendix 13.4-C Project Summary Report – Tenas Bypass Road Feasibility Design**.

The installation and/or upgrade of 119 culverts and installation of nine (9) clear span bridges are associated with the TAC. A summary of the key stream crossings and bridge locations is provided in **Table 6.6-8** and **Table 6.6-9**.

Table 6.6-8: Key Watercourse Crossings with Culvert Installations or Upgrades

Culverts	Structure Description (mm)	Road Chainage
Bypass Road	1,800	2+634
Bypass Road	1,200	3+570
Bypass Road	1,400	4+471
Bypass Road	900	5+168
Bypass Road	900	5+667
Bypass Road	1,200	5+885
Bypass Road	900	5+921
Bypass Road	900	6+091
Bypass Road	1,000	6+652
Bypass Road	1,000	6+839
Bypass Road	800	7+281
Bypass Road	800	7+760
Forest Service Road (FSR) - Four Creek	1,800	13+665

Notes: mm=millimetre

Table 6.6-9: Bridge Structure Locations

Location	Structure Description	Road Chainage
Bypass Road (Site 3-1)	14 m slab bridge	5+640
Bypass Road (Site 22-1)	10 m slab bridge	6+320
Bypass Road (Site 10-1)	8 m slab bridge	6+500
Bypass Road (Site 9-1)	8 m slab bridge	6+660
Bypass Road (Site 8-1)	24.4 m composite bridge	7+025
Bypass Road (Site 7-1)	21.3 m composite bridge	7+220
Bypass Road (Site 6-1)	24.4 m composite bridge	8+050
Bypass Road (Site 5-1)	21.3 m composite bridge	8+540
Telkwa Coalmine Forest Service Road -Goathorn Creek	30 m composite bridge	13+200

Notes: m=metre

Temporary runoff, erosion, and sediment control measures will be required within at least 100 m of watercourses during initial clearing and grubbing and road construction. Where steeper road grades are encountered, or long continuous slope lengths are present, a larger focal area will be needed (e.g., km 7+025, 7+220 and 8+540).

At a minimum, it will be expected that all sediment-laden water is directed away from the watercourse using temporary cross channels, swales or culverts until permanent road surfaces and channels grades are built.

Nine (9) clear-span bridges will be installed with abutments located outside of the ordinary highwater mark. Bridges will be built as slab or composite depending on their size. As per the Water Sustainability Regulation, BC Reg 36/2016 (GovBC 2016), bridges will meet the following criteria:

- ▶ Equipment used for site preparation, or construction, will be situated in a dry stream channel or operated from the top of the bank;
- ▶ The bridge and its approach roads do not produce a back-water effect or increase the head of the stream;
- ▶ The hydraulic capacity of the bridge is equivalent to the hydraulic capacity of the stream channel, or is capable of passing the 1 in 200-year maximum daily flow;
- ▶ The height of the underside of the bridge is adequate to provide free passage of flood debris and ice flows;
- ▶ Appropriate channels kickouts will be installed at least 50 m upslope of the crossing, where topography allows, to direct sediment-laden water into the forest and away from the watercourse;
- ▶ If channels must connect directly to the watercourse, they will be lined with erosion control material (e.g., small grade rock, rolled erosion matting or equivalent). Silt fence is not an appropriate BMP method for channels or areas with flowing water;
- ▶ Downcutting behind the bridge abutment from road runoff will be minimized by installing erosion control and armoring on the bridge approaches. Gravel will be applied to the road surface at the bridge approaches to minimize sediment tracking onto the bridge deck; and
- ▶ Bridge decks will have splash guards to prevent sediment-laden water and soil from entering the watercourse from the deck. Periodic maintenance and cleaning of the bridge decks will occur to remove sediment. This will be done in a way that prevents accumulated sediment from falling into the stream; and
- ▶ Silt fence will be installed between the bridge abutments and the watercourse as a preventative sediment control measure (**Figure 6.6-2**). All exposed soils will be seeded and covered with mulch as soon as construction is complete, or by using a hand seeder and straw or a truck-mounted hydro-seed/hydro-mulch application. Permanent biodegradable erosion control matting will be considered for all fill slopes that pose an erosion risk to watercourses. Temporary silt fence will be installed at the toe of new fill slopes as a temporary measure.



Figure 6.6-2: Example of a silt fence used for sediment control at a bridge site

Corrugated steel pipes will be installed at small watercourses, seepage areas and at regular intervals along the TAC to maintain drainage patterns (**Table 6.6-8**).

As per the Water Sustainability Regulation, BC Reg 36/2016 (GovBC 2016), culverts installed on a watercourse will meet the following criteria:

- ▶ The equipment used for site preparation, or for installation, construction, maintenance or removal of the culvert, is situated in a dry stream channel or operated from the top of the bank;
- ▶ If the stream is fish-bearing, the culvert allows fish passage under all flow conditions;
- ▶ The culvert inlet and outlet incorporate measures to protect the structure and the stream channel against erosion;
- ▶ The culvert capacity is equivalent to the hydraulic capacity of the stream channel or is capable of passing the 1 in 200-year maximum daily flow without the water level at the culvert inlet exceeding the top of the culvert;
- ▶ The culvert has a minimum equivalent diameter of 600 mm;

- ▶ The culvert is installed in a manner that permits the removal of obstacles and debris within the culvert and at the culvert ends;
- ▶ Embankment fill materials do not encroach on culvert inlets and outlets;
- ▶ The culvert has a depth of fill cover that is at least 300 mm;
- ▶ The maximum fill heights above the top of the culvert do not exceed 2 m;
- ▶ Appropriate channel kickouts will be installed at least 50 m upslope of the crossing, where topography allows, to direct sediment-laden water into the forest and away from the watercourse;
- ▶ If channels must connect directly to the watercourse, they will be lined with erosion control material (small grade rock, rolled erosion matting or equivalent). Silt fence is not an appropriate BMP method for channels; and
- ▶ To install the culverts, site isolation techniques will be used for all fish-bearing streams, and non-fish bearing streams which are flowing and have connectivity to fish-bearing water. Site isolation may be required for Non-classified Drainages (NCD) as well, depending on the flow and proximity to fish streams. The two (2) suitable options for site isolation are:
 1. dam and pump; or
 2. stream diversion.

Selection of dam and pump technique over other dry worksite isolation techniques is largely based on stream size, potential flows, stream bed material and construction duration. Typically, flows on these streams can be handled with trash pumps in the size range of two (2) to four (4) inches. The water control structure is often a sandbag check dam or cofferdam that can be constructed by hand. The duration of instream work is usually planned for no more than one (1) day (**Figure 6.6-3**).

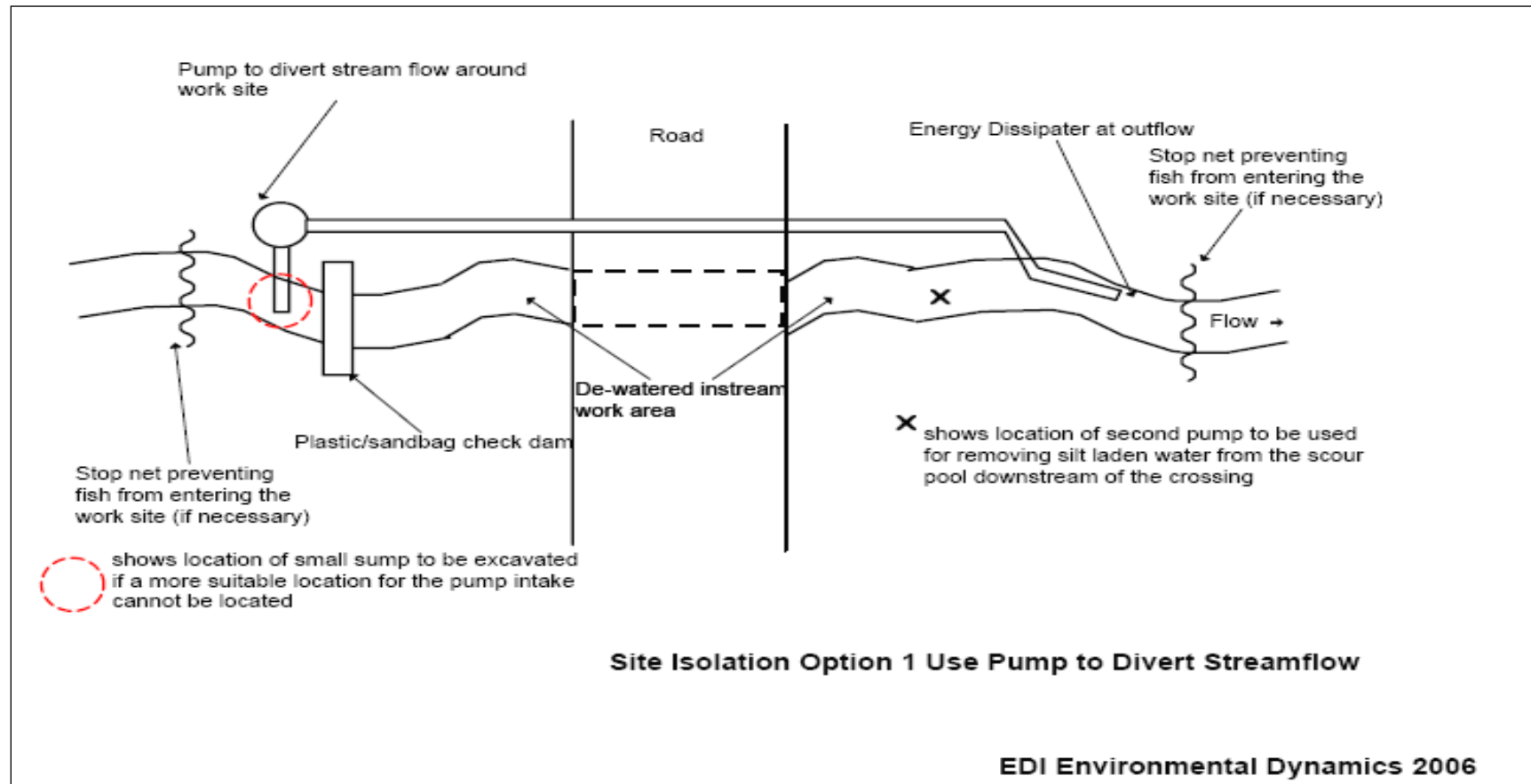


Figure 6.6-3: Small scale application of the dam and pump technique

A stream diversion may be required if instream work is anticipated to extend more than one (1) day unless pumps are used overnight and monitored (**Figure 6.6-4**). Temporary channels used for diverting stream flows should be designed and constructed to divert the 1 in 10-year maximum daily flow around or through the worksite and protected from any anticipated erosion during the period of construction. The IEM will oversee construction of a temporary diversion so that adverse effects on water quality are minimized. If fish passage is required, stream diversions will be built with low gradients.



Figure 6.6-4: Passive diversion technique – temporary poly-lined channel

A detailed erosion and sediment control program for the TAC will be provided six (6) months prior to construction starting for review by regulatory agencies.

6.6.2.14 Clearing and Grubbing

BMPs for clearing and grubbing, which will be implemented as needed during construction of the Project, are outlined in **6.6.2.2**.

Trees will be felled, limbed, decked and hauled offsite, while organic material will be stockpiled in suitable locations to be used for watercourse crossing reclamation and reclamation in the Minesite. Stockpile locations will be determined by the contractor in keeping with the BMP's.

For the Bypass Road, construction will begin at the Rail Infrastructure (km 0) and proceed up chainage towards the Minesite. A temporary access road will be pushed through to cut and process timber and other organic material not used for reclamation will be piled and burned within the right-of-way (ROW) under permit.

A close-cut, no grub technique will be employed where possible near watercourses or other sensitive features such as areas where high silt content is present and risk of erosion is high. Vegetation is cut, but the entire ROW is not grubbed and the organic layer is maintained.

Pre-work planning will be completed to flag all stream crossings in the field and established buffers to prevent equipment from entering the watercourses inadvertently. Temporary bridges or matting will be used to cross all watercourses. Geotextile fabric will be used to protect riparian vegetation at proposed bridge sites and channel integrity will be maintained.

At the Minesite, clearing and grubbing will be completed at the Tenas Control Pond and CPP first, then the North Management Pond, haul road and initial open pit areas to the south. Overburden suitable for reclamation will be stockpiled in designated locations nearby.

Several small watercourses connected to Tenas Creek are associated with the initial open pit and haul roads within the Minesite. Care will be taken to install temporary crossing structures at these locations and equipment will remain out of the channel during clearing and grubbing. Once the Tenas Control Pond is built, these watercourses will be diverted.

6.6.2.15 Cuts and Fill Construction

As 90% of the Bypass Road, FSRs and haul roads are on gentle slopes, they will not require extensive cut and fills. Road segments listed in **Table 6.6-10** identify areas that have steeper slopes and are associated with watercourse crossings. Grades as steep as 9% are present between km 13+000 and km 16+000, which includes Four Creek realignment, and short sections with grades over 7% are present near the Rail Infrastructure. Additional review and planning will be completed in these areas to maintain slope stability and control erosion. Robust temporary measures to minimize sediment-laden water from entering watercourses would be used as and when required.

Table 6.6-10: Areas Associated with Increased Erosion Risk and Sedimentation

Road Chainage	Steepest Grade (%)	Approximate Length (m)	Soil Type	Associated with Watercourse	Comments
1+800 – 2+700	(-) 4.73	900	Silts/Clays	Yes	n/a
3+680 – 5+000	(+) 6.91	1320	Silts/Clays	Yes	n/a
6+000 – 6+360	(+) 5.82	360	Silts/Clays	Yes	n/a
6+600 – 7+960	(+) 5.84	1360	Silts/Clays	Yes	3 bridges (6+660, 7+025, 7+220)
8+340 – 9+820	(+) 3.94	1480	Silts	Yes	1 bridge (8+540), shallow at top of hill, steepens near base.
10+200 – 10+540	(-) 4.33	340	Silts	No	Private driveway at base of hill.

Road Chainage	Steepest Grade (%)	Approximate Length (m)	Soil Type	Associated with Watercourse	Comments
10+580 – 11+330	(+) 4.60	750	Silts (Sands at top of slope)	No	Private driveway at base of hill
13+440 – 15+920	(+) 9.00	2480	Silts with gravels	Yes – Four Creek	Approach to Goathorn Creek (west approach).

Notes: (+) denotes a positive grade (uphill), (-) denotes a negative grade (downhill); %=percent; n/a=not applicable

Temporary measures will be employed early in the Construction Phase. Cross channels and swales will be used on new road surfaces where grades lead to watercourses. Silt fences will be installed at the toe of new cut slopes and maintained regularly during construction.

Temporary check dams will be installed at appropriate intervals to provide erosion and sediment control (e.g., see **Figure 6.6-5**). Appropriate intervals for check dams are based on road grades and dam height (**Table 6.6-4**).



Figure 6.6-5: Examples of temporary erosion and sediment control methods

Table 6.6-11: Appropriate Intervals for Check Dams

Road Grade (%)	Approximate Check Dam Interval (m)	
	Height = 30 cm (1 ft)	Height = 60 cm (2 ft)
0.5	60	120
1.0	30	60
2.0	15	30
3.0	10	20
4.0	8	15

Road Grade (%)	Approximate Check Dam Interval (m)	
	Height = 30 cm (1 ft)	Height = 60 cm (2 ft)
5.0	6	12
7.0	5	10
10.0 and greater	4	8

Source: Adapted from Fifield 2004.

Notes: %=percent; cm=centimetre; ft=foot; m=metre

Check dams are required at more frequent intervals at increasing road grade to provide an adequate retention area to slow water velocities and allow suspended sediment to settle out. If check dams are installed too far apart, erosion and scour could still occur.

The BMP applications on longer and steeper slopes will depend on the soil type present and proximity to the watercourse. Groundwater exposure is possible during construction of road cuts; these areas will be monitored closely and site-specific plans developed to address potential stability issues.

6.6.2.16 Rail Infrastructure

The Rail Infrastructure is located on a relatively level portion of the inactive Bulkley River floodplain and is 16 hectares (ha) in size. Rail Infrastructure includes a 2.5 km Rail Loop connected to the existing Canadian National Railway (CNR) rail line, coal stockpile area, diversion channel, and sedimentation pond. Forest clearing will occur first, and overburden will be salvaged, retaining suitable topsoil for use during reclamation. Contact water will be directed to the sediment pond on the southwest corner and subsequently discharged through a culvert onto a stable, vegetated area of the floodplain. Predominant soils at the discharge location are coarse sands and silt that are well drained; however, there is a component of fine-textured, silty clay soils that are poorly drained, as they lack coarse fragments.

Topography slopes east to west and cut and fills will be required to construct a near zero grade Rail Loop. Sediment-laden water generated during construction will be captured using temporary channels and sumps strategically placed in areas where infiltration is more likely to occur.

Clearing and grubbing will be limited to the areas needed for safe construction of the Rail Infrastructure; pockets of undisturbed ground and vegetation will be retained in the centre of the Rail Loop to the extent practical.

The culvert outlet and spillway will be armoured using suitable erosion protection material to prevent scouring and downcutting.

6.6.2.17 Surface Water Management Infrastructure for Management Pond and Open Pit Development

Surface Water Management Infrastructure on the Minesite includes three (3) material management ponds (North, East, West), one (1) control pond (Tenas Control Pond) which also deals with sediment), and four (4) sedimentation ponds (CPP, Rail Infrastructure, Explosive Facility, Explosive Magazine), and contact and non-contact water channels.

The Tenas Control Pond (30.5 ha) will be the first item constructed for the Minesite to provide water management infrastructure for subsequent Project activities. This will be followed by the North, East and

West management ponds. Contact and non-contact water channels will be completed in stages and channel connection to the Tenas Control Pond will occur after the pond is completed or has sufficient storage capacity.

The Tenas Control Pond will be built on relatively gentle slopes using material from initial open pit development and the dam will be built in lifts. Trees and topsoil will be removed from the pond area behind the dam. There are no watercourses within the footprint of the Tenas Control Pond; however, exposed soils and temporary roads could result in localized erosion during rain events.

- ▶ Contact water generated during construction of the Tenas Control Pond will be contained in temporary sumps immediately upslope of the dam. If needed, contact water will be pumped north onto flat forested areas. Energy dissipaters will be used at the end-of-pipe or hose. Contact water may be dispersed over a larger area using perforated tubing or sediment filter bags depending on site-specific conditions;
- ▶ A flocculent and filtering system will be provided as a contingency for sediment control during construction (see **6.6.4**);
- ▶ Two (2) small headwater watercourses are located north of the Tenas Control Pond, one (1) of which will be used for effluent discharge and the other will not be disturbed. Erosion control applications are not practical on active construction areas; however temporary sediment control measures will be installed at the toe of the dam (silt fence) within 100 m of the watercourses. Temporary channels will be established as needed to direct runoff from the dam face away from the watercourses;
- ▶ A contact water channel system will be built adjacent to the open pit directing contact water to the Tenas Control Pond;
- ▶ The channel will be built from the pond working up-gradient and channel lining will be implemented as construction proceeds to minimize the surface area exposed at a time. Channel blocks will be used if there is a time lag between excavation and lining to minimize sediment inputs into the Tenas Control Pond. If surface flows are likely to overwhelm the channel blocks, openings in the channel will be excavated to be directed onto stable, vegetated areas downslope;
- ▶ During the Construction Phase, inspection of all surface water management facilities will be completed at least once a week to confirm they are functioning as intended and if conditions warrant will be more frequent up to daily inspections of high risk areas (i.e., maintain runoff patterns to the Tenas Control Pond, and prevent erosion and sedimentation). Active construction area inspections will be increased to daily during extended periods of precipitation or if the IEM identifies an increase in risk to the aquatic environment; and
- ▶ A maintenance program will be developed by TCL for ponds and channels to maintain capacity and integrity.

In summary, the following will be the sequence of erosion and sediment control activities for development of the embankment at the Tenas Control Pond which will be expanded on and provided six (6) months prior to the Construction Stage:

- ▶ The existing FSRs will be used to perform logging activities and install the initial temporary lined water diversion channels above the work area and permanent collection channels below the work area to allow the construction of the Tenas Control Pond embankment via the excavation of material from the open pit;
- ▶ The collection channels will be lined and/or constructed with vegetation turf matting product to prevent erosion and sediment mobilization;

- ▶ The diversion structures will be installed to limit the amount of water flowing into the working areas. The diversion structures will be made up of plastic embankment structures and/or lined channels;
- ▶ Once these channels and structures are in place a small temporary sediment pond will be installed south of the embankment of the Tenas Control Pond to deal with sediment generated from the construction of the embankment. A small temporary sediment pond will be installed above the Tenas Control Pond embankment to intercept any water flowing to the low point of this structure to be pumped around the embankment construction. Lastly, a small temporary sediment pond will also be installed south of the open pit area and will collect all flows from this area to be pumped to the southern most temporary sediment pond;
- ▶ Once these channels and sediment ponds are in place a temporary mechanical and flocculant sediment control system will be constructed south of both the open pit and Tenas Control Pond's embankment to treat any water which cannot be handled by the surrounding environment and temporary sediment ponds;
- ▶ Once all of these mitigations are in place the existing FSRs will be widened and surfaced to allow the development of the Tenas Control Pond embankment and open pit;
- ▶ The surfacing material will be sourced from the existing gravel quarry located on the east side of Goathorn Creek or from offsite gravel providers in the region;
- ▶ The existing quarry will have a sediment pond to collect the water from active operation prior to discharge to the environment;
- ▶ All topsoil salvaged for the above structures will be placed in a location that drains to the temporary sedimentation ponds and to the final Tenas Control Pond once it is constructed; and
- ▶ **Figure 6.6-6** illustrates the sediment and erosion control plan associated with the construction of the embankment at Tenas Control Pond.

Once the Tenas Control embankment is constructed, the following activities will be completed as part of the associated **SEPPSCP**:

- ▶ Areas that will be part of the flooded area upstream of the embankment will be logged and topsoil removed;
- ▶ Once these activities are completed the south side of the TCP embankment and internal portion of the TCP will be lined using a bituminous liner to avoid initial high sediment discharge after the pond fills with water;
- ▶ The north side of the embankment will have topsoil placed on it and vegetated to reduce further erosion and sediment generation;
- ▶ Once the TCP is fully constructed, collection channels C03a and C01 will be extended to the south to capture future mining activities and the North Management Pond will commence construction; and
- ▶ **Figure 6.6-7** illustrates the sediment and erosion control plan associated with the construction of the remainder of the Tenas Control Pond after its embankment is in place.

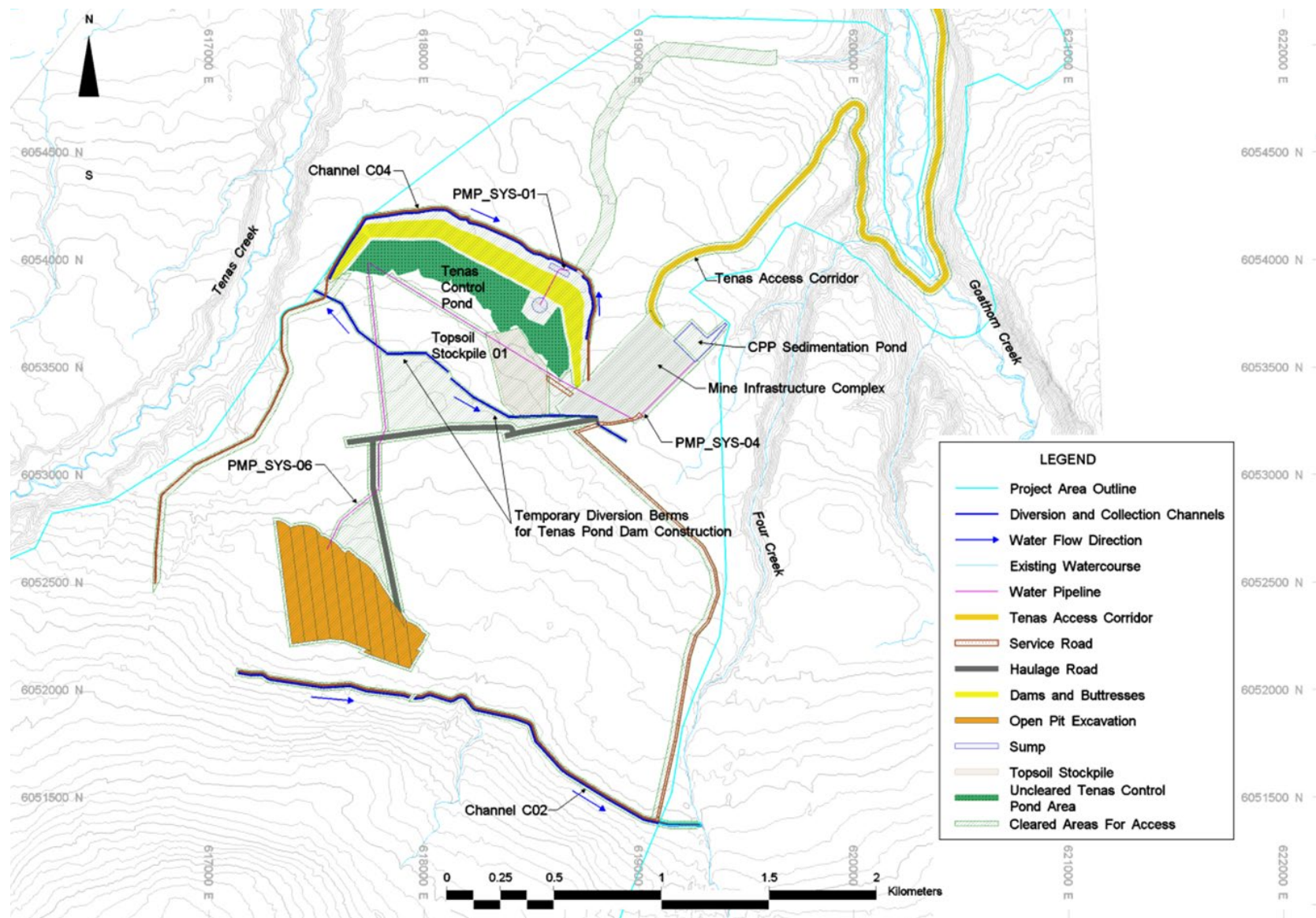


Figure 6.6-6: Erosion and sediment control plan for construction of the Tenas Control Pond embankment

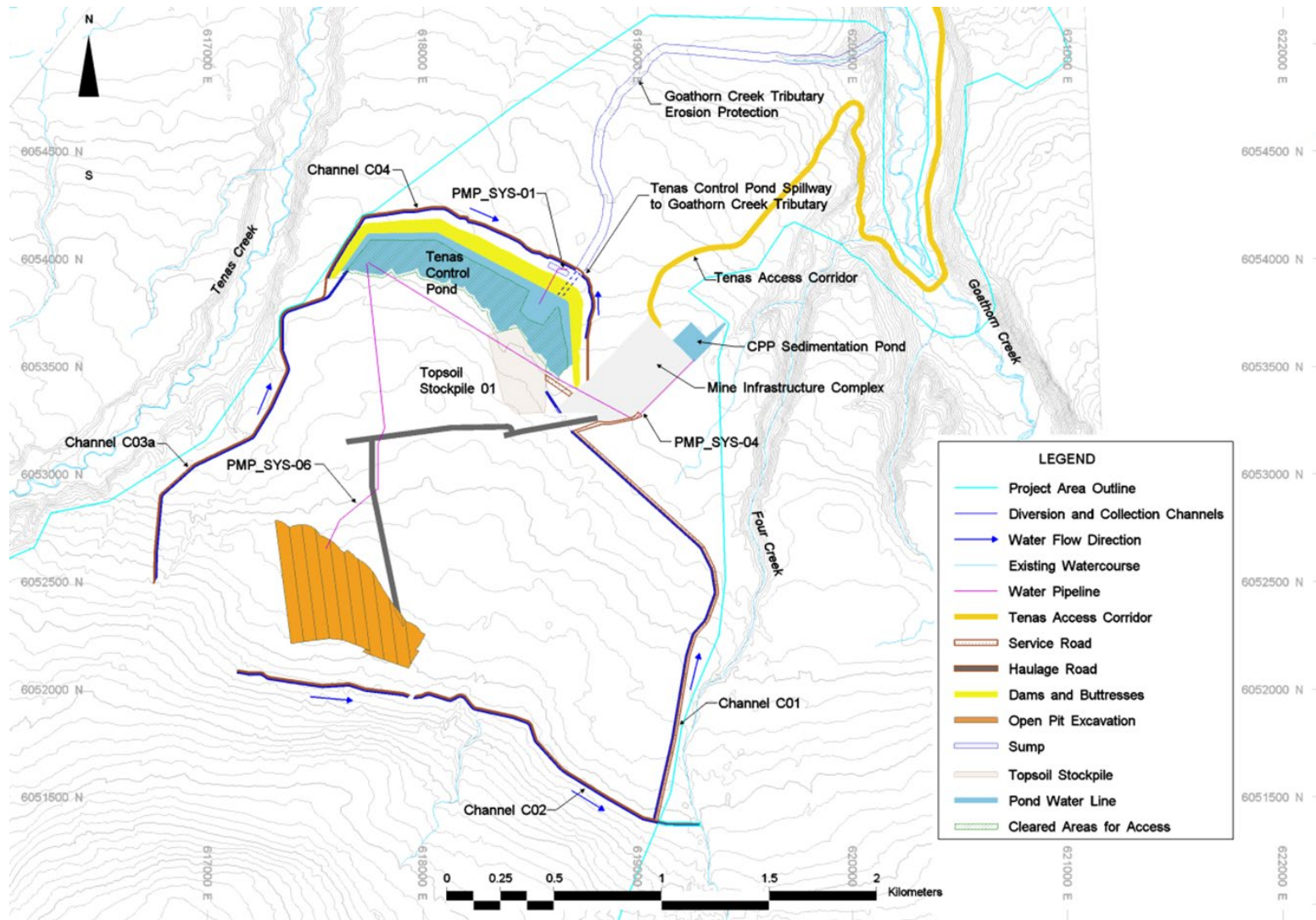


Figure 6.6-7: Erosion and sediment control plan for construction of the internal area of the Tenas Control Pond and interception channels

6.6.2.18 Mine Infrastructure Complex (MIC) Pad

The MIC pad is 15 ha in size and soil textures at this location include silt loams, silty clay loams and loams. Drainage ranges from moderately-well drained on gentle slopes to poorly drained in depressions. Construction of the MIC pad will result in an area of exposed soil, comprised of a mix of clay loams, loams and silts. A channel network will be installed around the MIC pad that will collect water from the pad and direct it to the CPP Sedimentation Pond and from there, it will be pumped to the Tenas Control Pond or released into the environment if the CPP is not operational. Further details include:

- ▶ The MIC pad will be built in stages, limiting the total amount of exposed soil at a time;
- ▶ Flat, stable, vegetated areas away from watercourses and outside the footprint will be identified for contact water release;
- ▶ Temporary channels and sumps will be built as needed during construction activities to capture contact water and pump it north into forested areas away from the watercourse. Discharge locations will be chosen by the Environmental Coordinator and approved by the IEM and inspected frequently;
- ▶ Low-gradient contact water channels will be seeded to encourage vegetation growth;
- ▶ Temporary berms and/or silt fence will be installed within the MIC pad to capture sediment during construction. These measures will be inspected and maintained until all soils are stabilized;
- ▶ Exposed soils will be seeded and covered with erosion protection material if required; and
- ▶ Exposed soil stockpiles will be seeded as soon as possible.

The CPP Sedimentation Pond will collect contact water from the work pad through a network of channels. Contact water will be pumped to the Tenas Control Pond for treatment and release. Furthermore:

- ▶ During construction of the CPP Sedimentation Pond, contact water will be pumped into forested areas to the north and monitored closely to prevent entry into the tributary to Four Creek;
- ▶ Exposed soils will be seeded and covered with erosion protection material if required; and
- ▶ Exposed soil stockpiles will be seeded as soon as possible.

6.6.2.19 Explosives Infrastructure

An Explosive Facility and Explosive Magazine will be constructed to the northeast of the Minesite. These footprints are less than 1.5 ha each and will be constructed on gentle slopes. A 1.0 km service road will be built from the TAC into the Explosive Facility and a 250 m service road is required to access the Explosive Magazine. Both locations will have sedimentation ponds constructed to manage water runoff from the pads and service roads accessing them. Both of these services roads will improve access on the existing exploration and/or FSRs.

Two (2) mapped watercourses are associated with the Explosive Infrastructure: an unnamed tributary to Tenas Creek located 75 m to the west of the Explosive Facility and a second unnamed tributary to Goathorn Creek, which will pass through the midpoint of the Explosive Facility Road.

Standard BMPs that will be implemented during the Construction Phase include the following:

- ▶ Mark all watercourses using flagging and or fencing in the field and establish clear construction-free zones;

- ▶ Construct channels alongside the service roads that discharge away from the watercourse onto stable, vegetated areas;
- ▶ Install temporary erosion control measures within the channels until vegetation can establish;
- ▶ If there is risk of sediment leaving the site to the west towards the unnamed watercourse, install temporary channels and or silt fence. Maintain silt fencing as per BMP specifications provided in **Appendix 13.4-B**;
- ▶ Make sure sediment sump discharge is stable and protected from erosion and directs flows away from the watercourses; and
- ▶ Inspect and maintain the road and facility to confirm that adequate erosion and sediment control measures are in place.

6.6.2.20 Powerline

Four (4) km of new powerline will be built, extending the existing 25 kilovolt (kV) powerline from km 11+800 on the existing FSR that will be improved for the TAC. A new section of powerline will be built adjacent to the existing Caribou FSR 01 and 08 and connect to the Explosive Facility and CPP.

- ▶ Much of the powerline will be constructed adjacent to the existing Caribou FSR 01 and 08, except for 350 m at Four Creek crossing (km 13+700). Limited new clearing is anticipated, as the powerline will be built within the proposed road upgrade ROW. Clearing will be required near Four Creek and the Explosive Facility;
- ▶ Constructing temporary roads on the steep topography near Four Creek will be avoided to the greatest extent practical;
- ▶ If temporary roads are required for clearing or pole placement, establish water bars and swales to direct runoff into vegetated areas away from Four Creek at the bottom of the slope;
- ▶ Leave vegetation under the powerline intact where safe to do so (i.e., remove danger trees and tall timber but leave shrubs and duff layer intact);
- ▶ Deactivate temporary worksites and access roads and loosen soils that are compacted; and
- ▶ Disturbed areas of the ROW will be seeded after completion of the installation.

6.6.3 Adverse Weather Shutdown Triggers

The potential for surface erosion during periods of severe weather may facilitate shutdown or stop work orders of construction activities. Stop work orders will be based on safety concerns, environmental effects, and protection of Project infrastructure. TCL environmental staff will remain vigilant of impending adverse weather patterns or concerns.

Triggers resulting from adverse weather that may cause a shutdown include:

- ▶ periods of substantial rainfall;
- ▶ soils are visibly soft or muddy and associated sediment-laden waters or sediment are flowing towards watercourses, or where such conditions are reasonably anticipated to develop;
- ▶ indicators of erosion and instability (rilling, sediment accumulation, small slumps) are encountered;
- ▶ unsafe conditions may exist, or environmental damage may occur, and
- ▶ traffic restrictions will be put in place in areas that are subject to shutdown of construction activities.

Construction Phase activities that may need to be shut down prior to a forecasted substantial rain event include:

- ▶ subgrade construction on slopes over 50% or where naturally occurring slope failures occur;
- ▶ bridge or culvert construction;
- ▶ work near fish-bearing waters, and
- ▶ work in areas of sensitive soils.

6.6.4 Flocculant Management Plan

The following provides a summary of the Flocculant Management Plan that is part of this CEMP. Refer to **Appendix 13.4-D Bench Scale Testing: Preliminary TSS Sampling With & Without Chemical Addition For Overburden Material** for the flocculant testing that was completed by Stormtec on site-specific materials and **Appendix 13.4-E Safety Data Sheet for Flocculant Flopam** for the referenced Safety Data Sheet (SDS).

6.6.4.1 Flocculant Rationale

A Risk Assessment Matrix has been developed and will be applied to specific Minesite areas and activities. Fine-grain soils are present throughout the Minesite, leading TCL to investigate the use of flocculants and coagulants as settling aids during the Construction, and Operations phases. Together, the application of erosion and sediment control BMPs, water management planning and potential use of settling aids in the Tenas Control Pond, will maintain discharge water quality.

The Tenas Control Pond has been designed to store large volumes of contact water and aid in settling out suspended sediment. If contact water inputs contain small grain fractions (silts and clays), however, when settling time requirements are too long, the use of chemical settling aids will be employed. A particle size analysis was completed on 15 representative soil samples. The percentage of fines less than 0.1 mm ranged from 21% to 71% and an average 48% of total composition (Golder 2021). Natural settling tests using worse case scenarios determined overflow was not suitable for discharge to the environment. With the expectation that natural settling using the current pond design alone may not meet discharge water quality criteria, chemical polymer testing was conducted.

6.6.4.2 Flocculant Selection Process

Selection of a suitable settling aid must consider low toxicity options with the greatest settling effectiveness. During bench scale testing, settlement using Chitosan (natural polymer) and filtration (20 micron [μ] and 10 μ filters) was ineffective at reducing turbidity levels to meet discharge criteria (assuming permit condition of 50 milligrams per litre [mg/L]). Testing was also performed using a synthetic anionic flocculent in combination with a coagulant (FLOPAM™ AN 905 SEP). Overflow sample quality was best achieved over natural settling and Chitosan settling tests but would still require mechanical polishing to meet discharge quality criteria (**Appendix 13.4-D**).

Additional flocculent and coagulant dosage optimization tests will be competed to determine the suitable treatment method and dosing, but initial testing shows promise for anionic flocculant use which has been shown to be less toxic.

6.6.4.3 Flocculant Use and Risk

Flocculant application design is underway, and it is anticipated that application will occur within the inlet of the Tenas Control Pond, to provide adequate dosing, mixing, and settling time prior to discharge. If mechanical polishing is required, additional mobile site infrastructure will be set up at the TCP.

Acute ecological toxicity testing has been completed for *Oncorhynchus mykiss*, *Danio rerio* and *Daphnia magna* and the product has been determined to be of low toxicity. Refer to **Appendix 13.4-E** for the SDS which presents ecological toxicity details including:

- ▶ LC50¹ *Oncorhynchus mykiss*/96 hour > 100 milligrams per litre (mg/L) (OECD 203²);
- ▶ LC50 *Danio rerio*/96 hour greater than (>)100 mg/L (OECD 203); and
- ▶ EC50 *Daphnia magna*/48 hour >100 mg/L (OECD 202).

TCL will engage in discussions with British Columbia Ministry of Environment and Climate Change Strategy (BC MECCS) to determine if the available data and testing is sufficient to show this product has low toxicity or if additional toxicity analysis testing is required for *Ceriodaphnia dubia*.

Once the flocculant application has commenced, sampling of the pond discharge water for 96-hour LC50 rainbow trout toxicity will be done to ensure that pond discharge water is non-toxic. Results from the testing will be compared to the laboratory controls. Discharge samples will be expected to meet the pass/pass/failure (50% survival) criterion. Sampling intervals will be one (1) sample within 24 hours of initiating flocculant use, with results expedited. Further sampling will be conducted as per *Environmental Management Act*, SBC 2003, c 53 (GovBC 2003) (EMA) effluent permit requirements.

6.7 Dust Management

Excessive dust can arise where large areas of vegetation have been stripped, resulting in soil being exposed. Equipment driving across surfaces and strong winds are both contributors to dust development. The following BMPs will be used to manage dust. Detailed dust management measures are provided in the **Air Quality Management Plan (S13.0-C2) (AQMP)** and include measures such as:

- ▶ minimize clearing and exposure of soils;
- ▶ cover and/or seed large stockpiles to the extent practical; and
- ▶ implement approved dust suppression measures on active roads and landings. Avoid applying excessive volumes of water or product, as this can contribute to the mobilization of sediment.

During the Construction Phase, the additional mitigation measures outlined in the **AQMP** will be implemented by all Minesite employees and contractors.

¹ LC50=medial lethal concentration dose that is lethal to 50 percent (%) of test organisms, EC50=acute toxicity in algae where 50% reduction in growth occurs

² OECD= Organisation for Economic Co-operation and Development

6.8 Soil Salvage

During the Construction Phase, the mitigation and management measures outlined in the Soil Management Plan (SMP) (Appendix 13.15-B of the **RCP**), which will be implemented by all Minesite employees and contractors.

The SMP describes the equipment to be used for salvage, guidelines for supervision of salvage operations by trained personnel and QPs, and BMPs to be implemented to maintain the quality of reclamation materials and protect the adjacent environment.

6.9 Fuel Management and Spill Control

During the Construction Phase, the mitigation and management measures in the **Fuel Management and Spill Control Plan (S13.0-C7) (FMSCP)** will be implemented by all Minesite employees and contractors.

6.10 Waste (Refuse and Emissions)

During the Construction Phase, the mitigation and management measures outlined in the **Waste Management Plan for Refuse and Emissions (S13.0-C20) (WMPRE)** will be implemented by all Minesite employees and contractors.

6.11 Vegetation Management

Wetland and riparian ecosystems will be monitored during the Construction Phase and the mitigation measures outlined in the **Vegetation Management Plan (S13.0-C18) (VMP)** will be implemented by all Minesite employees and contractors.

6.12 Wildlife Management

During the Construction Phase of the Project the mitigation measures outlined in the **Wildlife Management Plan (S13.0-C21) (WMP)** will be implemented by all Minesite employees and contractors.

6.13 Socio-economic Management

During the Construction Phase of the Project the mitigation measures outlined in the **Socio-economic Management Plan (S13.0-C16) (SEMP)**, will be implemented by all Minesite employees and contractors to deal with temporary accommodation for construction crews.

6.14 Cultural and Heritage Protection

During the Construction Phase, the mitigation measures outlined in the **Heritage Resources Management Plan (S13.0-C8) (HRMP)** including the Chance Find Procedures for both Heritage and Paleontology Resources, will be followed by all Minesite employees and contractors. The Heritage Chance Find Procedure has been sent to the OW for review and comment, and TCL anticipates incorporating their feedback into future versions of the document. See **Appendix 13.4-F Chance Find Procedure for Heritage Resources** and **Appendix 13.4-G Chance Find Procedure for Paleontological Resources in British Columbia – Tenas Project Phase 1**. Also, the **SEMP** will be implemented by all Minesite employees and contractors.

6.15 Metal Leaching (ML) and Acid Rock Drainage (ARD) Management

During the Construction Phase, not all materials excavated are expected to have a metal leaching (ML)/acid rock drainage (ARD) concern as most material being disturbed are overburden, soils and/or aggregate materials and testing has indicated that these materials are non-potential acid generating (non-PAG) materials. Furthermore, these materials have already undergone weathering so ML is also not expected based on the test work carried out. Only one (1) area within Goathorn Creek may further expose rock that may be classified as potential acid generating (PAG) and this material will be placed in a set location and covered with compacted overburden until the North Management Pond is ready to receive material in the Year 0. Further information on ML/ARD can be found in the **Metal Leaching (ML)/Acid Rock Drainage (ARD) Management Plan (S13.0-C12) (ML/ARDMP)**.

6.16 Occupational Health and Safety

During the Construction Phase, the **Occupational Health and Safety Program (S13.0-C13) (OHSP)** will be provided to employees and contractors of the Project. Contractors responsible for larger construction aspects will be required to submit appropriate health and safety plans for their employees and operations for approval, as required by WorkSafeBC. All work performed at the Minesite will conform to the EAC, MA/EMA permits, the Code, and the TCL's **OHSP**.

6.17 Minesite Traffic Issues

During the Construction Phase, relevant components of the **Minesite Traffic Control Plan (S13.0-C10) (MTCP)** will be used to ensure safe operation of construction equipment on Project roads.

6.18 Emergency Response

During the Construction Phase, the **Mine Emergency Response Plan (S13.0-C9) (MERP)** will be used to provide detailed procedures on preparedness, prevention, response, and contingency plans to address:

- ▶ health and safety requirements;
- ▶ practice drill procedures;
- ▶ preventative measures (e.g., re-fuelling procedures);
- ▶ notification procedures;
- ▶ personnel responsibilities and contact information;
- ▶ response procedures for initial spill response, control, containment, and clean-up; and
- ▶ procedures for incident reporting, assessment, and follow-up.

All Project employees and contractors will receive training on appropriate emergency response procedures.

6.19 Chemicals and Materials Storage, Transfer and Handling Plan (CMSTHP)

During the Construction Phase, mitigation measures in the **Chemicals and Materials Storage, Transfer, and Handling Plan (S13.0-C4) (CMSTHP)** will be followed by all Minesite employees and contractors.

6.20 Construction Scheduling

The Pre-Start-up stage of Construction Phase scheduling takes place as far in advance as possible to consider impacts to EAC and MA/EMA permit requirements, the **Environmental Management System (S13.0-C1) (EMS)**, all related management plans previously listed, as well as:

- ▶ **Discharge Management Plan (S13.0-C5) (DMP);**
- ▶ **Explosives Management Plan (S13.0-C6) (EMP);**
- ▶ **Minesite Water Management Plan (S13.0-C11) (MWMP);**
- ▶ **Public Access Management Plan (S13.0-C14) (PAMP); and**
- ▶ **Visual Resources Management Plan (S13.0-C19) (VRMP).**

Table 6.20-1 provides a high-level schedule for construction associated with the Project. The specific year has not been populated; however, the construction schedule is dependent on two (2) inputs which may delay the timeline as presented:

1. obtaining all regulatory approvals; and
2. TCL providing a final investment decision.

Table 6.20-1: Summary of Schedule

	Pre-Start-up		Year -0.5		Year 0			
Item	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Construction Level Engineering and Issued For Construction (IFC) Drawings								
Order Long Lead Items								
Long Lead Items Manufacturing								
Tenas Control Pond and water management								
Site Preparation								
Coal Processing Plant (CPP) Construction								
Mine Equipment								
Maintenance Shop								
Rail Infrastructure								
Commissioning and Handover								

A detailed construction schedule is currently under development and will be provided during the permitting phase of the Project. Prior to any construction, the detailed schedule will be reviewed and approved by the Mine Manager. Any substantive changes to the approved schedule must be approved by the Mine Manager.

7. MONITORING

During the Construction Phase, there will be an Environmental Monitoring Program that will include, at a minimum:

- ▶ regular inspection of sediment and erosion control measures, based on BMPs;
- ▶ regular inspection of construction equipment, and facilities onsite for leaks or spills or garbage;
- ▶ air quality monitoring as set out in the **AQMP** and Project permits; and
- ▶ water quality monitoring as set out in the **MWMP** and Project permits.

Responsibilities and strategies for environmental compliance involve both planning and proper field execution. The TCL management team will monitor contractor compliance using:

- ▶ ongoing field monitoring and inspections conducted by the Environmental Technician and IEM;
- ▶ periodic assessments by the Mine Manager, Mine Superintendent, and/or Environmental Coordinator;
- ▶ contractor and contract deliverables to verify compliance and confirm corrective actions are being implemented for any areas identified for improvement; and
- ▶ monitoring and tracking of regulatory deliverables (data, reports, etc.) and environmental reporting by environmental personnel in the field.

Monitoring of installed erosion and sediment control measures will be conducted regularly (e.g., daily, weekly) as well as during and immediately following heavy rainfall or snowmelt events. Installed erosion and sediment control measures will be:

- ▶ inspected and or repaired prior to spring melt (freshet) season;
- ▶ inspected during heavy rain events, or during freshet melting periods and adapted, as necessary;
- ▶ repaired in a timely manner and maintained until construction activities, or potential influence from construction activities, in the immediate area have been completed; and
- ▶ removed when construction activities, or influence from construction related activities, have been completed and the area is stable and or vegetated.

The Environmental Technician and IEM will inspect work sites and assess whether applicable regulatory requirements set out in the EAC, *MA/EMA* permits and the applicable management plans are being followed.

TCL's Environmental Technician will undertake daily monitoring of turbidity and/or total suspended solids (TSS) at all permitted sampling sites using the techniques described in the British Columbia Field Sampling Manual (BC MOE 2013). The Environmental Technician will maintain a daily log of site conditions, construction and mitigation activities, turbidity and/or TSS readings, upcoming activities and issues, and any other relevant communications and observations on compliance. Any incidents, unusual occurrences, or sampling results will be documented. The information compiled in the daily log will be supplemented with photographs and GPS waypoints as necessary. The Environmental Technician will record, transcribe, and store all field data, photographs, and results from lab analyses in an information management system.

Reporting and record keeping on the status, repairs, and general maintenance of implemented erosion and sediment control measures will be conducted and reported during weekly or monthly reports.

The Environmental Technician and IEM will complete daily reports which will form the basis for weekly reports. Weekly monitoring reports will include a summary of construction activities, environmental inspections, mitigation implemented, and communications that occurred during that reporting period. A daily monitoring form and weekly report template will be developed 90 days prior to the start of the Construction Phase.

Water quality and flow measurement data will be tabulated by the Environmental Technician and IEM and submitted to the regulators as per the conditions in Project permits including, if required, weekly submission of field data and monthly submission of all other monitoring results (lab analyzed).

Any concerns raised by the IEM will also be recorded along with a description of mitigations completed.

If a non-compliance event is discovered during monitoring or inspection, the Environmental Technician and/or IEM will report the matter to the Environmental Coordinator who will address the issue with the Mine Manager, Mine Superintendent, Contractor Supervisor, and the IEM if the IEM is not the reporter. All non-compliance items will be recorded in daily site environmental logs and reported by the Environmental Coordinator to all agencies as required.

Audit findings resulting from government site visits or communications from external agencies will be shared with the contractors to promote compliance and continuous improvement.

The IEM, Contractor Supervisors, and TCL management will take part in daily planning meetings to proactively address any potential risks in the planned activities.

Weekly environmental meetings will occur to discuss regulatory or environmental issues or concerns associated with work underway or planned. The contractor will then ensure that the construction personnel are taking appropriate steps to comply with the meeting actions.

7.1 Performance Objectives

The objectives for this CEMP include environmental and safety performance as described below.

7.1.1 Environmental

The environmental performance objectives and targets to ensure proper implementation of this CEMP are shown in **Table 7.1-1**:

Table 7.1-1: Performance Objectives Related to Environmental Performance

Objective	Target
Routine inspection and documented function of erosion and sediment control structures and systems	- Measures are functioning as intended - Inspected prior to and after heavy rain events - Inspected weekly during normal open water conditions - Inspected prior to winter to set up for spring snow melt (freshet) season
Timely maintenance and repair of erosion and sediment control structures	All sediment and erosion control structures repaired within 48 hours of identification of need for repair

Objective	Target
	- Maintenance logs maintained for all sediment and erosion control structures - Preventative maintenance plans developed annually
Educate and train selected staff in erosion prevention and sediment control	- All personnel will attend a site orientation which will include a discussion of erosion prevention and sediment control importance and best practices. - All selected personnel attend annual erosion prevention and sediment control training
Maintain water quality in all streams	Achieve regulatory compliance for total suspended solids (TSS) at discharge locations and within streams.
Maintain compliance with <i>Mines Act</i> , RSBC 1996, c 293 and <i>Environmental Management Act</i> , SBC 2003, c 53 (MA/EMA) permits and Environmental Assessment Certificate (EAC) conditions	- Build a cohesive mining, construction and permitting team focused on collaborative communication and plan implementation focused on minimizing impacts to the environment and maintaining compliance. - Review all environmental incidents and non-compliances promptly and develop a plan using education, training, oversight, mitigation, and adaptive management to prevent it being repeated.
Implement flocculant and coagulant use prior to pond discharge and monitor use.	- Track flocculant and coagulant usage (dosing rate and frequency) - Minimize dosing rates and complete toxicity testing - Testing of alternate flocculants and coagulants every two (2) years (best available technology)
Implement environmental management plans	All relevant management plans and associated performance objectives will be followed during the Construction Phase.

7.1.2 Safety

In addition to extensive inspections and monitoring to ensure the health and safety of personnel and contractors, performance objectives and targets related to safety during the Construction Phase are set to guide the proper implementation of the CEMP and are shown in **Table 7.1-2**:

Table 7.1-2: Performance Objectives Related to Safety Performance

Objective	Target
Site field hours – number of hours worked by staff and contractors (direct field labour, subcontractor labour and staff)	Keep records for frequency analysis
Number of medical and/or Lost Time Incidents (LTI)	Target zero
Number of First Aid and Medical Aid Incidents	Target zero
Number of property damages	Continual improvement
Number of high potential incidents	Target zero
Number of Near Miss or Dangerous Occurrences	Target zero

Objective	Target
Number of environmental and safety inductions	All personnel attend construction sediment and erosion control training and safety meetings
Number of Field Level Risk Assessments completed	Everyone does a Field Level Risk Assessment for their tasks every shift.
Specific construction area inspections and safety program audits	Daily
Implement environmental management plans	All relevant management plans and associated performance objectives will be followed during the Construction Phase:

8. REPORTING

8.1 General Reporting

Reporting completed by TCL will confirm consistent implementation of the CEMP and all other associated management plans. Summary reports of construction monitoring activities and results will be compiled and reviewed weekly by the Mine Manager, Mine Superintendent, Environmental Coordinator, Environmental Technician, contractors, and the IEM.

8.2 Compliance Reporting

Compliance reporting will be subject to the EAC, and *MA/EMA* permit conditions. The information gathered during monitoring practices will be summarized with information from other management plans into an Annual Environmental Management Summary Report and upon permitting completion, the Annual Environmental Reports as required by *MA/EMA* permits. Community engagement activities will be an aspect of the **SEMP**. The **SEMP** will have requirements related to reporting on community engagement programs.

8.3 Internal Reporting

Details of the monitoring will be reported internally on an annual basis according to the adaptive management framework of the EMS. The report will provide results of monitoring, assessment of performance objectives where applicable, and any other pertinent information.

TCL staff or contractors will be strongly encouraged to report any inefficiencies or deficiencies to management for evaluation.

8.3.1 Incident Investigation

Environmental Incidents during construction can be grouped into two (2) categories based on the magnitude and complexity of the effect.

1. **Minor Environmental Incidents:** have no permanent or long-term adverse effect on the environment and are generally small scale with simple solutions; and
2. **Major Environmental Incidents:** can have widespread, permanent, or toxic effects; are complex to resolve; and may require extensive remediation or cleanup resources.

Minor Environmental Incidents with little consequence to the environment will be reported to the Environmental Coordinator within 24 hours. Examples of Minor Environmental Incidents include non-compliance with recommended SPPs; spill reporting if not completed (See **FMSCP**); lack of spill cleanup equipment or spill not properly cleaned up; and non-compliance with flagging of environmentally sensitive areas. Cleanup and remediation will be performed by a contractor, in consultation with the Environmental Coordinator, to address the potential effects, and long-term risks. Minor Environmental Incidents are expected to be resolved immediately, reported as required, and generally no follow-up is required once addressed.

Major Environmental Incidents are those with the potential to cause permanent, or widespread effects: a pollution release to the environment; a contravention of legislation and/or permit conditions; or a risk to human health and safety. These incidents are rare but are more complex and resource intensive to

remediate than Minor Environmental Incidents. Examples of Major Environmental Incidents include a major sediment release into a stream and damage to fish habitat or critical wildlife habitat. These incidents will be communicated to the IEM, Environmental Coordinator, and Mine Manager as soon as possible.

Environmental Incidents (Minor and Major) will be communicated by the individual who detects the incident up the chain to their Supervisor and to TCL's Environmental Coordinator. The Environmental Coordinator will contact the appropriate Supervisor and/or Superintendent as soon as practical and a response plan will be developed. **Incident Notification and Investigation Report Forms (Appendix 13.4-H)** will be completed the same day as the incident by the Environmental Coordinator, and will contain the following minimum information:

- ▶ location, cause, and nature of the Incident;
- ▶ environmental or Project features affected (e.g., road, watercourse, forest land, infrastructure);
- ▶ time, extent, and magnitude/quantity of material or area affected;
- ▶ response and actions to control the Incident;
- ▶ follow-up tasks required, mitigation/remediation/corrective actions, or additional sampling needs;
- ▶ notifications of the incident and communication within and outside the Project Team. Photographs, Global Positioning System (GPS) location, and a map may be included for clarification and understanding of proximity risks; and
- ▶ Incident reporting will meet the information requirements set out by *MA/EMA* permits, and all other regulatory requirement. If a spill of fuel or other hazardous substance occurs, regulatory reporting is required per **9.3.2**.

8.3.2 Spill Reporting

All spills are to be communicated to the construction contractors, employees, Environmental Coordinator and/or IEM to the Mine Manager using the appropriate internal reporting form and as per regulatory requirements regarding spills.

The Spill Report Form is located in the **FMSCP** and contains the following information:

In the event of a spill of flammable or hydrocarbon products, the Supervisor is responsible to ensure a prompt and thorough investigation is completed as soon as practicable. The initial report form will provide:

- ▶ the reporting person's name and telephone number;
- ▶ the name and telephone number of the company;
- ▶ the location and time of the spill;
- ▶ the type and quantity of the substance spilled;
- ▶ the cause and effect of the spill;
- ▶ details of action taken or proposed to comply with regulations;
- ▶ a description of the spill location and of the area surrounding the spill;
- ▶ the details of further action contemplated or required and if monitoring conducted, timing for results;
- ▶ the names of agencies on the scene; and
- ▶ the names of other persons or agencies advised concerning the spill.

Details of all construction monitoring activities will be reported internally on a weekly basis as well as annually according to the adaptive management framework of the **EMS**. The report will provide results of monitoring, assessment of performance objectives, and including any other pertinent information.

TCL employees or contractors will be strongly encouraged to report any inefficiencies to management for evaluation consideration.

9. ROLES AND RESPONSIBILITIES

9.1 Mine Manager

The Mine Manager bears overall responsibility for all phases of the Project, and responsibility for onsite environmental monitoring and compliance. The Mine Manager is responsible for implementing the regulatory requirements of all permits and authorizations and will manage all water management and erosion and sediment control measures as outlined in the CEMP.

Where the construction contractors require clarification of a management plan, or advice for site-specific conditions, the contractor is responsible for communicating with the Mine Manager, Mine Superintendent, Environmental Coordinator, and IEM. Conditions which warrant design modification or enhanced erosion, and sediment control works must be identified and discussed with the Mine Manager, Mine Superintendent, Environmental Coordinator, and IEM.

The Mine Manager reports to the executive steering committee for TCL and will coordinate with this group to ensure that Project objectives are being met.

Specifically, the Mine Manager will:

- ▶ delegate responsibilities as appropriate to the Construction Contract Manager and regularly communicate with the Environmental Coordinator, Mine Superintendent, Health, Safety, and Human Resources Superintendent, Environmental Technician, and IEM;
- ▶ ensure employees and contractors implement all water management and erosion and sediment control measures as outlined in this CEMP;
- ▶ take all reasonable and practical measures to provide a safe working environment that complies with and exceeds legislated occupational health and safety (OHS) requirements; and
- ▶ meet obligations set out in the EAC, Code, and *MA/EMA* permits, including support to construction contractors and their managers.

9.2 Mine Superintendent

The Mine Superintendent will:

- ▶ assist the Mine Manager to implement the CEMP;
- ▶ coordinate personnel, equipment and resources and makes sure emergency response procedures have been developed and communicated to site staff and contractors;
- ▶ have the authority to require mitigation and emergency control measures be carried out; and
- ▶ assist the Mine Manager to complete an annual review of the CEMP.

9.3 Environmental Coordinator

The Environmental Coordinator is responsible for the day-to-day management of Project environmental programs and permits. The Environmental Coordinator reports to the Mine Superintendent.

The Environmental Coordinator will:

- ▶ work with construction teams to identify and resolve environmental issues in a manner that fulfills TCL's expectations of environmental performance;
- ▶ monitor and advise if an adverse weather pattern is expected and discuss shutdown with contractor and IEM;
- ▶ act as a resource to the Joint Occupational Health and Safety Committee (OHSC) and construction teams by providing guidance relating to permit conditions, commitments, regulations, acts, interpretation of legislation, company policy, BMPs for prevention of surface erosion, the **OHSP** and safe work procedures;
- ▶ regularly communicate with the Mine Superintendent, Health, Safety, and Human Resources Superintendent, Environmental Technician, and IEM;
- ▶ coordinate activities with the Environmental Technician, and IEM;
- ▶ act as a resource to the construction teams by providing guidance relating to permit conditions, commitments, regulations, acts, interpretation of legislation and this CEMP BMP's;
- ▶ be responsible for obtaining the required environmental permits for construction;
- ▶ be responsible for implementation of the **EMS** and management plans;
- ▶ record inspection concerns in the site inspections forms;
- ▶ produce weekly construction summaries of inspections and concerns;
- ▶ produce annual compliance summaries as per EAC and *MA/EMA* permit requirements;
- ▶ be the liaison for government agencies for permitting and non-compliance Incidents; and
- ▶ be the liaison for Indigenous groups, through their designated representatives, for permitting as well as non-compliance issues.

9.4 Environmental Technician

The Environmental Technician will report directly to the Environmental Coordinator. During the Construction Phase the Environmental Technician will:

- ▶ gather data as required at prescribed monitoring sites;
- ▶ perform daily inspections of the construction site to ensure compliance with the various environmental management plans. A Daily Inspection Report will be maintained in a log book;
- ▶ advise about adaptive management procedures, as necessary;
- ▶ liaise with the IEM, and
- ▶ report non-compliance issues directly to the Construction Contract Manager and the Environmental Coordinator.

9.5 Health, Safety, and Human Resources Superintendent

The Health, Safety, and Human Resources Superintendent reports directly to the Mine Manager. During the Construction Phase, the Health, Safety, and Human Resources Superintendent will:

- ▶ implement the **OHSP**;
- ▶ oversees safety planning under the **OHSP**;

- ▶ organize the Joint OHSC;
- ▶ conduct specific construction area inspections and safety program audits, and
- ▶ with the input of workers and supervisors, develop safe work procedures for all hazardous work.

9.6 Independent Environmental Monitor (IEM)

TCL will retain the services of an IEM as necessary. The IEM reports independently to BC EAO and provides information or reporting to agencies or Indigenous groups as directed by BC EAO. The IEM will have direct communication with the BC EAO and TCL's Environmental Coordinator, Environmental Technician, Mine Superintendent, and Mine Manager to facilitate site inspection access, data requests, reporting and compliance communications. The Mine Manager, Mine Superintendent, and Environmental Coordinator will be available for weekly, or as needed, construction update meetings with the IEM, and will provide information on compliance in a timely manner.

BC EAO will outline the circumstances in which the IEM will have the authority to stop work on the Project or a portion of the Project to the extent that the IEM determines is necessary to prevent or reduce adverse effects caused by a non-compliance with the EAC. This is a critical part of the Terms of Engagement as outlined in **4. Compliance Obligations** and will be completed 120 days prior to the start of the Construction Phase.

9.7 Supervisors

Project and Contractor Supervisors during the Construction Phase will:

- ▶ comply with and enforce the requirements of the Code;
- ▶ provide all available resources to workers so that safe operating procedures, and reporting requirements of the CEMP are adhered to;
- ▶ follow and implement this CEMP; and
- ▶ report all Incidents or Dangerous Occurrences to the Mine Superintendent, the Health, Safety, and Human Resources Superintendent, and the Environmental Coordinator.

9.8 Employees and Contractors

All employees and contractors, in accordance with the Construction Phase induction, will:

- ▶ follow the CEMP as described in the construction-based environmental and safety induction;
- ▶ comply with the Code;
- ▶ attend a safety and environmental induction that includes procedures related to the CEMP and prevention of sediment erosion and implement sediment controls specific to the activity in which they are involved; and
- ▶ report all environmental and safety Incidents or Dangerous Occurrences to their Supervisor.

10. COMMUNICATION

Communication of the CEMP at TCL will be based on internal requirements and primarily through this CEMP and relevant SPPs. Any significant change to construction activities onsite will be communicated to all Minesite employees and contractors through a site-wide email, announcements over all radio channels by Minesite supervision and bulletins posted around the Minesite. When effective to do so, maps will be marked with changes.

During the Construction Phase, it is expected that daily meetings will occur in the morning or evening to review daily tasks, mitigation requirements and responsibilities. TCL and contractor representatives will participate in these meetings.

10.1 Training and Awareness

Training of TCL employees, the IEM, and contractor employees will be conducted using the CEMP, **HRMP**, standard BMPs (**Appendix 13.4-B**), Chance Find Procedures (**Appendix 13.4-F** and **Appendix 13.4-G**), and the **FMSCP**. These will be implemented during construction in the various areas as detailed in the CEMP. Flagging of environmentally sensitive areas and adherence to them, along with construction plans for surface erosion and sediment control, will be an important component.

10.2 Employee and Contractor Training

The environmental training of all personnel involved in construction activities on the Project is considered a critical factor in achieving the objectives outlined in this CEMP. Employees will attend a site induction and will be trained in the CEMP to the degree that is appropriate for their role. All those responsible for the management, implementation, and operation of any aspect of this CEMP will be competent for their role.

10.3 Visitor Training

Visitors will not be required to be knowledgeable of this CEMP as they will be under the direction of TCL employees and will not be allowed to be in a situation involving the Construction Phase activities.

11. EVALUATION AND ADAPTIVE MANAGEMENT

11.1 Evaluation

A review of the CEMP will be completed by the Environmental Coordinator six (6) months prior to construction starting in the field and on a quarterly basis during the Construction Phase to compare data, trends, and implementation of the CEMP objectives. This process will include a review of the performance objectives in 7. **Monitoring** and input received from contractors and regulators, the Wet'suwet'en and the public.

11.2 Adaptive Management

A philosophy of adaptive management will be adopted to ensure that management plans and mitigation measures are consistently meeting or exceeding performance targets. This will be achieved through periodic reviews of the CEMP and the results of monitoring programs.

TCL will work towards continual improvement at all Minesite Infrastructure to manage the Construction Phase. The Environmental Coordinator will investigate improvements in any trend and assess whether the practices responsible for the improvements can be applied to other areas of the Project. Deteriorating trends will be studied to determine the root cause. When the cause is identified, the Environmental Coordinator, and the Health, Safety, and Human Resources Superintendent will propose a suitable corrective action to the Mine Manager. Examples of corrective actions could include:

- ▶ additional training of employees and contractors on CEMP BMP's and/or procedures;
- ▶ enhancement of maintenance or monitoring measures; and/or
- ▶ additional supervisory oversight.

11.3 Continual Improvement

TCL will amend the CEMP as required based on evaluations and feedback from applicable stakeholders. Any proposed changes will be sent out for review by contractors and all relevant stakeholders before being finalized and implemented into the CEMP.

12. CHANGE MANAGEMENT

Changing any part of this CEMP requires a formalized process to be used. If significant changes to objectives, management plan structure, operational milestones, communication and/or information management are being planned, it is required that the Management of Change (MOC) procedure in the **EMS** be followed. Minor edits and/or updates to this CEMP will be controlled through version control and content approval functions.

13. CONCLUSION

Management of runoff, erosion and sediment during the Project life, but particularly during the Construction Phase, is critical in maintaining compliance and minimizing adverse effects on the environment. Through implementation of the CEMP, and adaptive management to address changing site conditions, TCL will use effective strategies and BMPs to prevent the release of contact water and sediment into the environment.

Through implementation of this CEMP and relevant SPPs, TCL will ensure Construction Phase activities are done safely and with minimal impact to the surrounding environment at the Project.

14. REFERENCES

- British Columbia Ministry of Energy and Mines (BC MEM). 2002. Aggregate operators BMP Handbook for British Columbia. VOLUME II Best Management Practices. Available at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/mineral-titles/permitting/agg_bmp_hb_2002vol1.pdf. August 2021.
- British Columbia Ministry of Energy, Mines and Low Carbon Innovation (BC MEMLI). 2021. Health, Safety and Reclamation Code for Mines in British Columbia. Prepared by British Columbia Ministry of Energy, Mines and Petroleum Resources, Mining and Minerals Division: Victoria, BC. Available at: <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/health-safety/health-safety-and-reclamation-code-for-mines-in-british-columbia>. Accessed July 2021.
- British Columbia Ministry of Energy, Mines and Petroleum Resources (BC MEMPR) and British Columbia Ministry of Environment and Climate Change Strategy (BC MECCS). 2019. Joint Application Information Requirements for *Mines Act* and *Environmental Management Act* Permits. Available at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/mineral-titles/permitting/2019_09_24_joint_application_information_requirements.pdf. Accessed July 2021.
- British Columbia Ministry of Environment (BC MOE). 2013. British Columbia Field Sampling Manual. Part E Water and Wastewater Sampling. Victoria, BC. Available at: <https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual>. Accessed August 2021.
- British Columbia Ministry of Environment (BC MOE). 2014. Policy for Mitigating Impacts on Environmental Values (Environmental Mitigation Policy – Working Document, May 13. Available at: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/environmental-mitigation-policy/em_policy_may13_2014.pdf. Accessed August 2021.
- British Columbia Ministry of Environment (BC MOE). 2015. Technical Guidance 3 – Environmental Management Act: Developing a Mining Erosion and Sediment Control Plan. Available at: https://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/mining-smelt-energy/erosion_sediment_control_plan_guide.pdf. Accessed July 2021.
- British Columbia Ministry of Forests (BC MOF). 1995. Riparian Management Area Guidebook. Available at: <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/silvicultural-systems/silviculture-guidebooks/riparian-management-area-guidebook>. Accessed August 2021.
- British Columbia Ministry of Forests (BC MOF). 2001. Best Management Practices Handbook: Hillslope Restoration in British Columbia. Available at <http://www.for.gov.bc.ca/hfd/pubs/docs/Mr/Mr096.htm>. Accessed July 2021.
- British Columbia Ministry of Forests (BC MOF). 2012. Fish-stream Crossing Guidebook. Revised Edition. Prepared by British Columbia Ministry of Forests, Lands and Natural Resource Operations, Ministry of Environment, and Fisheries and Oceans Canada: Victoria, BC. Available at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/resource-roads/fish-stream_crossing_web.pdf. Accessed August 2021.
- British Columbia Ministry of Transportation and Highways and Thurber Environmental Consultants Ltd. 1997. Manual of control of erosion and shallow slope movement. Vancouver Island Highway Project. Available at: <https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation->

- infrastructure/engineering-standards-and-guidelines/environment/references/man_control_erosion.pdf. Accessed September 2021.
- British Columbia Ministry of Water, Land and Air Protection (BC MWLAP). 2004. Standards and Best Practices for Instream Works. Available at: <http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>. Accessed July 2021.
- Chilibeck, Barry et al. eds. 1993. Land Development Guidelines for the Protection of Aquatic Habitat. Department of Fisheries and Oceans & Ministry of Environment, Lands and Parks. Available at: https://www.api.org/~media/Files/Certification/ICP/ICP-Certification-Programs/1169_2017_GovRefDocs/1169_Canada_FisheriesOceansLandDevelop_eff-04-2017.pdf. Accessed August 2021.
- Fifield, J.S. 2004. Designing for Effective Sediment and Erosion Control on Construction Sites. Forrester Communications Inc., Santa Barbara, CA.
- Golder Associates (Golder). 2021. Test Request # B21-133 Particle Size Distribution ASTM D6913 and ASTM D422, Water Content Summary ASTM D2216.
- Government of British Columbia (GovBC). 1996a. Contaminated Sites Regulations, BC Reg 375/96. Available at: <https://canlii.ca/t/5555l>. Accessed November 2021.
- Government of British Columbia (GovBC). 1996b. *Mines Act*, RSBC 1996, c 293. Available at: <https://canlii.ca/t/54qxj>. Accessed July 2021.
- Government of British Columbia (GovBC). 1996c. *Wildlife Act*, RSBC 1996, c 488. Available at: <https://canlii.ca/t/53kqv>. Accessed July 2021.
- Government of British Columbia (GovBC). 1997. *Riparian Areas Protection Act*, SBC 1997, c 21. Available at: <https://canlii.ca/t/543lf>. Accessed July 2021.
- Government of British Columbia (GovBC). 2002a. *Agricultural Land Commission Act*, SBC 2002, c 36. Available at: <https://canlii.ca/t/54r28>. Accessed September 2021.
- Government of British Columbia (GovBC). 2002b. *Environmental Assessment Act*, SBC 2002, c 43. Available at: <https://canlii.ca/t/ktj1>. Accessed November 2021.
- Government of British Columbia (GovBC). 2002c. *Forest and Range Practices Act*, SBC 2002, c 69. Available at: <https://canlii.ca/t/53lx7>. Accessed July 2021.
- Government of British Columbia (GovBC). 2003. *Environmental Management Act*, SBC 2003, c 53. Available at: <https://canlii.ca/t/54wmd>. Accessed July 2021.
- Government of British Columbia (GovBC). 2014. *Water Sustainability Act*, SBC 2014, c 15. Available at: <https://canlii.ca/t/54qx7>. Accessed July 2021.
- Government of British Columbia (GovBC). 2016. Water Sustainability Regulation, BC Reg 36/2016. Available at: <https://canlii.ca/t/5532n>. Accessed November 2021.
- Government of British Columbia (GovBC). 2017. Spill Reporting Regulation, BC Reg 187/2017. Available at: <https://canlii.ca/t/jk4x>. Accessed July 2021.
- Government of British Columbia (GovBC). 2018. *Environmental Assessment Act*, SBC 2018, c 51. Available at: <https://canlii.ca/t/53j40>. Accessed July 2021.
- Government of British Columbia (GovBC). 2019a. Agricultural Land Reserve Use Regulation, BC Reg. Available at: 30/2019 <https://canlii.ca/t/5552f>. Accessed November 2021.
- Government of British Columbia (GovBC). 2019b. Reviewable Projects Regulations, BC Reg 243/2019. Available at: <https://canlii.ca/t/543v4>. Accessed November 2021.

- Government of British Columbia (GovBC). 2019c. Riparian Areas Protection Regulation, BC Reg 178/2019. Available at: <https://canlii.ca/t/5539l>. Accessed July 2021.
- Government of British Columbia (GovBC). 2021. Water Sustainability Regulation, B.C. Reg. 11/2021. Available at: <https://canlii.ca/t/5532n>. Accessed July 2021.
- Government of Canada (GovCan). 1985a. *Canadian Navigable Waters Act*, RSC 1985, c N-22. Available at: <https://www.canlii.org/en/ca/laws/stat/rsc-1985-c-n-22/latest/rsc-1985-c-n-22.html?resultIndex=1>. Accessed September 2021.
- Government of Canada (GovCan). 1985b. *Canada Water Act*, RSC 1985, c C-11. Available at: <https://canlii.ca/t/527q3>. Accessed August 2021.
- Government of Canada (GovCan). 1985c. *Fisheries Act*, 1985, c F-14. Available at: <https://canlii.ca/t/543j4>. Accessed July 2021.
- Government of Canada (GovCan). 1999. *Canadian Environmental Protection Act*, 1999, SC 1999, c 33. Available at: <https://canlii.ca/t/54tsw>. Accessed September 2021.
- Telkwa Coal Ltd. (TCL). 2021. Terrain and Soil Baseline Report. Prepared by Ardea Biological Consulting Ltd. for TCL Environmental Assessment Application.
- Transportation Association of Canada (TAC). 2005. National Guide to Erosion and Sediment Control on Roadway Projects. Ottawa, Ontario. ISBN: 978-1-55187-203-X.