BC EAO EAC Application – Tenas Project

Section 13.0 Management Plans
Chapter 17 Surface Erosion Prevention and Sediment Control Plan

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Tenas Project

Section 13.0 Management Plans

Chapter 17 Surface Erosion Prevention and Sediment Control Plan

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ABBREVIATIONS AND ACRONYMS

Abbreviation or Acronym	Long Form of Abbreviation or Acronym
ALR	Agricultural Land Reserve
AQMP	Air Quality Management Plan (S13.0-C2)
BC	British Columbia
BC MEMLI	British Columbia Ministry of Energy, Mines and Low Carbon Innovation
BC MFLNRORD	British Columbia Ministry of Forest, Land, Natural Resource Operations and Rural Development
BC MECCS	British Columbia Ministry of Environment and Climate Change Strategy
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 (S13.0-C4)
CEPA	*Canadian Environmental Protection Act*, SC 1999, c 33 (Government of Canada [GovCan] 1999)
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
EAC	Environmental Assessment Certificate
EMA	*Environmental Management Act*, SBC 2003, c 53 (Government of British Columbia [GovBC] 2003)
EMS	Environmental Management System (S13.0-C1)
ERT	Emergency Response Team
FMSCP	Fuel Management and Spill Control Plan (S13.0-C7)
FSR	Forest Service Road
JAIR	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).
MA/EMA	*Mines Act*, RSBC 1996, c 293 and *Environmental Management Act*, SBC 2003, c 53
MERP	Mine Emergency Response Plan (S13.0-C9)
ML/ARDMP	Metal Leaching/Acid Rock Drainage Management Plan (S13.0-C12)
MOC	Management of Change
MTCP	Minesite Traffic Control Plan (S13.0-C10)

Abbreviation or Acronym	Long Form of Abbreviation or Acronym
MWMP	Minesite Water Management Plan (S13.0-C11)
OHSC	Occupational Health and Safety Committee
OHSP	Occupational Health and Safety Program (S13.0-C13)
PAG	potentially acid generating
Project	Tenas Project
RCP	Reclamation and Closure Plan (S13.0-C15)
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)
SPP	Standard Practices and Procedures
TAC	Tenas Access Corridor
TCL	Telkwa Coal Limited
VCs	Valued Components
VMP	Vegetation Management Plan (S13.0-C18)

UNITS OF MEASURE

Abbreviation or Acronym	Long Form of Abbreviation or Acronym
>	greater than
%	percent
µ	micron
km	kilometre
m	metre
mg/L	milligrams per litre
mm	millimetre

EXECUTIVE SUMMARY

The Surface Erosion Prevention and Sediment Control Plan (SEPSCP) has been developed by Telkwa Coal Limited (TCL) to proactively manage runoff, erosion, and sedimentation throughout the Construction, Operation, Decommissioning and Reclamation, and Post-closure phases of the Tenas Project (Project). The **Construction Environmental Management Plan (Section [S] 13.0-Chapter [C] 4) (CEMP)** provides additional comprehensive surface erosion prevention and sediment control management specific to Construction Phase activities.

The SEPSCP applies to all Minesite Infrastructure including haul roads, Coal Processing Plant (CPP), Explosives Facility and Explosives Magazine, Tenas Control Pond, three (3) management ponds, and the Tenas Access Corridor (TAC) which includes the Bypass Road, Forest Service Road (FSR) upgrades, powerline, and Rail Infrastructure.

The Minesite is situated on gentle slopes, often less than 10 percent (%) gradient, and is comprised predominantly of medium- to fine-textured soils which are moderately drained due to some coarse fragment content. Pockets of poor soil drainage are present, typically noted on near-level and depressional sites that have a high water-table and ephemeral flows.

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 Operation phases. Together, the application of erosion and sediment control best management practices (BMPs), water management planning and potential use of settling aids in the Tenas Control Pond, will maintain discharge water quality.

1. INTRODUCTION

This Surface Erosion Prevention and Sediment Control Management Plan (SEPSCP) provides guidance and prescriptions for erosion prevention and sediment control measures to be used during the Construction, Operation, Decommissioning and Reclamation, and Post-closure phases of the Tenas Project (Project). The **Construction Environmental Management Plan (Section [S] 13.0-Chapter [C] 4) (CEMP)** provides additional comprehensive surface erosion prevention and sediment control management specific to the Construction Phase.

2. PURPOSE AND OBJECTIVES

This SEPSCP 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.

For the purposes of this SEPSCP, "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/or sediment control, depending on when they are implemented.

3. SCOPE AND SCALE

The scope of this SEPSCP is defined within the Project Area and includes all activities, as well as any operation and/or construction activities that are directly associated with the Project and exist outside of the Project Area. The SEPSCP is in effect during the Construction, Operation, Decommissioning and Reclamation, and Post-closure phases and ceases to be in force at the final closure of the Project as approved by the regulatory authorities.

The SEPSCP applies to all phases of the Project, but is particularly important during the Construction, Operation, Decommissioning and Reclamation phases including, but not limited to the following components:

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

4. COMPLIANCE OBLIGATIONS

The environmental assessment (EA) for the Project has considered applicable federal and provincial legislation, regulations, strategies, guidelines, plans, and best management practices (BMPs) relevant to the SEPSCP. Summaries of federal and provincial legislation, regulations, and policy applicable to the management of erosion and sedimentation are summarized in **4.1** and **4.2** below.

4.1 Federal Regulatory Requirements

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

Table 4.1-1: Summary of Federal Legislation Applicable to the Surface Erosion Prevention and Sediment Control Plan (SEPSCP)

Name	Year	Description
Federal		
Canadian Environmental Protection Act, 1999, SC 1999, c 33 (Government of Canada [GovCan] 1999) *(CEPA)*	1999	The *CEPA* focuses on protecting environmental and human health by preventing, controlling, and managing pollutants, wastes, and other toxic substances and contributing to sustainable development.
Canada Navigable Waters Act, RSC 1985, c N-22 (GovCan 1985a)	1985	This Act regulates works that interferes with navigation built in, on, over, under, through, or across navigable waters in Canada.
Canada Water Act, RSC 1985, c C-11 (GovCan 1985b)	1985	This Act provides the framework for joint federal-provincial management of Canada's water resources.
Fisheries Act, 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.

4.2 Provincial Regulatory Requirements

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

Table 4.2-1: Summary of Provincial Legislation, Regulations, Policy and Guidance Documents Applicable to the Surface Erosion Prevention and Sediment Control Plan (SEPSCP)

Name	Year	Description
Agricultural Land Commission Act, 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 Agricultural Land

Name	Year	Description
		Reserve General Regulation sets out the required application procedures for alternative (i.e., non-farm) land uses.
Environmental Assessment Act, SBC 2018, c 51 (GovBC 2018)	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. The Tenas Project (Project) requires an assessment of potential adverse environmental effects under the Reviewable Projects Regulation, BC Reg 243/2019 (GovBC 2019b) of the Act as the Project exceeds the production capacity of 75,000 tonnes per year.
Environmental Management Act, 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 Regulation, BC Reg 375/96 (GovBC 1996a) of the Act provides quantitative standards to define site contamination and to assess reclamation success.
Technical Guidance 3 - *Environmental Management Act* - Developing a Mining Erosion And Sediment Control Plan (British Columbia Ministry of Environment [BC MOE] 2015)	2015	Under the *EMA*, this is a guide to help mining companies develop sound practices for erosion and sediment control.
Forest and Range Practices Act, SBC 2002, c 69 (GovBC 2002b)	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 the Operation Phase, a plan for erosion control and sediment retention and a reclamation plan.
Mines Act, 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 (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
Riparian Areas Protection Act, SBC 1997, c 21 (GovBC 1997)	1997 (updated 2016)	The Act regulates approvals of work in and around watercourses, including provision of directives relating to the protection and enhancement of riparian areas.

Name	Year	Description
Riparian Areas Protection Regulation, BC Reg 178/2019 (GovBC 2019c)	2004 (updated 2019)	The Regulation aims to protect riparian areas from development, thus preserving riparian heath, features, and functions.
Wildlife Act, RSBC 1996, c 488 (GovBC 1996c)	1996 (updated 2019)	The Act provides for conservation of specific ecosystems and ecosystem components that provide habitat for wildlife species managed by the BC MOE.
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.
Water Sustainability Regulation, BC Reg 36/2016 (GovBC 2016)	2016	Under the *Water Sustainability Act,* SBC 2014, c 15 (GovBC 2014), the regulation authorizes permits for designated uses of water for industrial purposes.

The Joint Application Information Requirements for *Mines Act* and *Environmental Management Act P*ermits (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) provides direction for an SEPSCP as follows:

- Provide 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 be submitted to the Chief Inspector prior to the commencement of construction activities. See the **CEMP.**
- Include the following specific areas: the Minesite, including the Coal Processing Plant [CPP] sites, open pits, stockpiles, management ponds; all access roads; and any utility corridors.
- Provide information on roles, responsibilities, and training requirements; an assessment of erosion potential (i.e., risk) and consequence; a description of how erosion and sediment control will be managed throughout the Project life; descriptions of methods to be used; drawings and/or maps of where prescriptions will be applied; erosion and sediment control plans for disturbed surfaces and soil stockpiles; a detailed event-based effectiveness monitoring program including locations and frequencies; and a response plan including specific permit triggers, actions to be taken, and reporting protocols.
- Address the potential for sediment release from internal sloped structures such as material stockpiles, embankments, and any segments of open pit walls through the **Minesite Water Management Plan (S13.0-C11) (MWMP).**

4.3 Standard Practices and Procedures (SPP)

Telkwa Coal Limited (TCL) Standard Practices and Procedures (SPPs) will conform to the Health, Safety and Reclamation Code in British Columbia (British Columbia Ministry of Energy, Mines and Low Carbon Innovation [BC MEMLI] 2021) (Code). In addition to regulatory requirements, the Project will implement SPPs that meet or exceed the required laws and regulations.

5. RELATIONSHIP TO OTHER MANAGEMENT PLANS

The Project is governed by an **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 SEPSCP has a relationship with other management plans that contain mitigation measures. Those management plans and their relationship to this SEPSCP are listed in **Table 5-1**.

Table 5-1: Management Plans with a Relationship to the Surface Erosion Prevention and Sediment Control Plan (SEPSCP)

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).
Construction Environmental Management Plan (S13.0-C4) (CEMP)	The Surface Erosion Prevention and Sediment Control Plan (SEPSCP) is a component of the CEMP.
Discharge Management Plan (S13.0-C5) (DMP)	Water collected in control ponds may be discharged from the Minesite.
Minesite Traffic Control Plan (S13.0-C10) (MTCP)	Active roads are a source of erosion and sediment mobilization.
Minesite Water Management Plan (S13.0-C11) (MWMP)	Water management is an important component associated with erosion and sediment control.
Metal Leaching/Acid Rock Drainage Management Plan (S13.0-C12) (ML/ARDMP)	Management of potentially acid generating (PAG) material contact water from the management ponds.
Reclamation and Closure Plan (S13.0-C15) (RCP)	Reclamation and closure of the Tenas Project (Project) will need to consider establishing sustainable and stable slopes to prevent erosion and sediment mobilization.
Vegetation Management Plan (S13.0-C18) (VMP)	Seeding of piles and slopes and reclaiming previously disturbed areas as an erosion and sediment control strategy.

6. DETAILS OF SURFACE EROSION AND SEDIMENT CONTROL PLAN (SEPSCP)

6.1 Project Phases

This SEPSCP has been developed to apply to all phases (**Table 6.1-1**) with the Construction Phase approach further outlined in the **CEMP**. The SEPSCP will be tailored to site conditions through adaptive management (see **11.2**).

Table 6.1-1: Temporal Boundaries for 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.
Operation	1 to 21	21	Development of the open pit through drilling, blasting, loading, and hauling functions. 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 PAG storage. Conducting coal processing, stockpiling of raw coal prior to processing, and stockpiling of processed coal prior to shipping. Progressive reclamation will be accomplished during operation including, where available, reclamation activities such as sloping, topsoil placement and revegetation.
Decommissioning and Reclamation	22 to 25	4	Tear-down of infrastructure onsite plus reclamation activities, including sloping of storage piles, backfill materials, and placement of reclamation materials including growth media, overburden and non-PAG rock for management pond covers and revegetating surfaces that are planned to be reclaimed.
Post-closure	26 to 50	10	Active: This involves the filling of the open pit with water, monitoring of vegetation growth and water quality for both groundwater and surface water and wildlife. Control and sedimentation ponds may still be needed for settling of total suspended solid levels. The management ponds are left as dry land reclamation except for portions that will be left as open water.
		15	Passive: This stage is when the control and sedimentation ponds are no longer required for settling of total suspended solid (TSS) levels and the management ponds are left as dry land reclamation except for portions that will be left as open water. Telkwa Coal Limited (TCL) is now simply monitoring the site.

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 British Columbia (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 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 Erosion Prevention Sediment Control Approach

The primary focus of the SEPSCP is to minimize the potential for sediment entrainment (source control) and transport into watercourses or other environmentally sensitive features. Runoff management is considered and implemented first, erosion prevention second, and sediment control third (**Figure 6.3-1**).

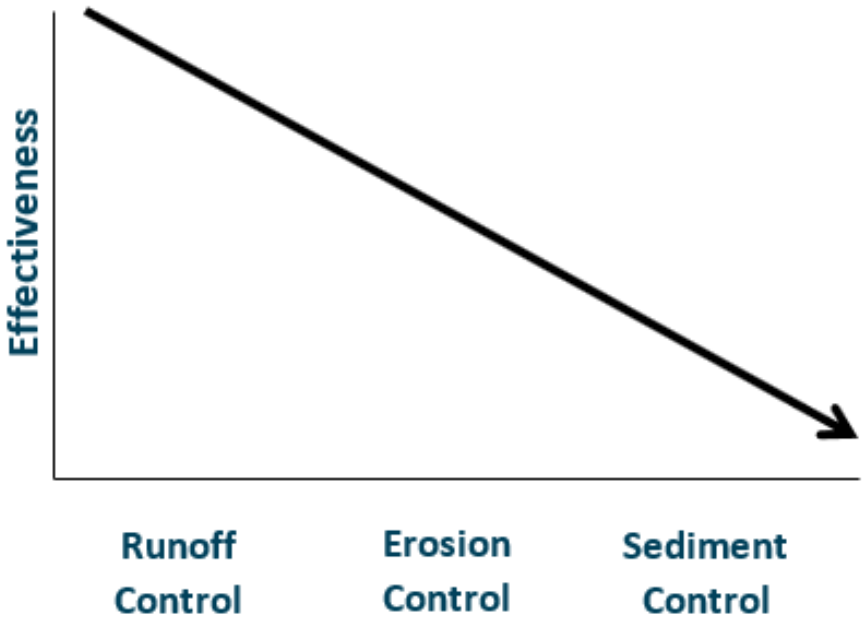

Figure 6.3-1: Best management practices (BMPs) effectiveness

Key elements of effective erosion and sediment control planning include:

- minimizing Project footprint;
- 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;
- educating and training all workers of the SEPSCP and make sure they are familiar with the implementation, inspection, and maintenance of the required practices;
- continually inspect and maintain practices, complete risk assessments as construction proceeds and update the SEPSCP accordingly; and
- build contingency measures into the SEPSCP to address events such as substantial rainfall or rain on snow and winter shutdowns.

6.3.1 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.

6.3.1.1 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. **Possibl**e, 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.

6.3.1.2 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.

6.3.1.3 Risk Assessment Table

Using the definitions and approach outlined above, a Risk Matrix has been developed (**Table 6.3.1**). Erosion potential, or likelihood is evaluated with consequence, and a risk value is assigned.

Table 6.3-1: 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 6.3.2**). Risk is typically highest during the Construction Phase.

Table 6.3-2: 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 plan; ESC=Erosion and Sediment Control*

6.3.1.4 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 6.3-3.**

Table 6.3-3: 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 (see **CEMP**).	Likely	Minor	Moderate

Note: *Construction Environmental Management Plan (S13-C4)*

6.3.1.5 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 6.3-4.**

Table 6.3-4: 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

6.3.1.6 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 6.3-5.**

Table 6.3-5: 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*

6.3.1.7 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, ditches, and cross drains are found in **6.4.3.**

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 6.3-6.**

Table 6.3-6: 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

6.3.1.8 Landform Design and Erosion Control

The design of final Project landforms at 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)**.

6.4 Best Management Practices (BMPs)

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

- The 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. 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, Thurber Environmental Consultants Ltd. 1997).

The BMPs are intended to be used throughout the Project during the Operation, Reclamation and Decommissioning and Post-closure phases. For the Construction Phase, the **CEMP** provides the stand-alone management plan and BMPs.

6.4.1 Watercourse Crossings

Maintenance 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:

- Mitigation measures that were installed concurrent with ground disturbance activities near watercourses, will be checked for adequacy;
- Riprap, rock, or other material placed on the banks or within the active channel are to be checked to ensure they are free from debris and fines and are stable;
- Culverts will be checked for blockages or flooding regularly and especially after a high precipitation or snowmelt event;
- Stockpiled soil 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 (British Columbia Ministry of Forests [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).

6.4.2 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 practical effort will 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 ditches.

6.4.3 Road Surfaces, Channels and Cross Drains

Road 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 maintenance:

- 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 or other channels;
- Small sumps and sediment catch basins are used to protect the upstream end of culverts from plugging with sediment and debris. The culvert is installed deep enough to prevent it from being crushed by traffic loads;
- Culvert inlets and outlets are armoured up to just below the road surface;
- Direct connection of permanent road ditches to watercourses will be avoided where possible. When ditches must be connected to watercourses, sufficient erosion control is implemented in the ditch bottom using **Standard BMPs** provided in **Appendix 13.7-A**;
- 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.

6.4.4 Topsoil and Overburden Management

Topsoil will be separated and stockpiled for reclamation use in the Construction Phase **CEMP** and details on its use in the **RCP**.

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 and/or excess overburden at 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;
- Silt fencing will be installed around the perimeter of the stockpiles, where practical to minimize sheet erosion off the piles;
- Inspect frequently to ensure stockpiles are vegetated and stable and runoff is directed away from watercourses or the stockpile; and
- If silt fencing is no longer needed (stockpiles are revegetated and stable) these should be removed.

6.4.5 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;

- All quarries will be resloped to a stable configuration and re-vegetated or otherwise reclaimed after construction is complete; and
- Perimeter ditches or berms will be placed upslope of the area prior to the start of construction activities to divert non-contact water from entering the quarry, where feasible.

6.4.6 Dust Management

Equipment driving across surfaces and strong winds are both contributors to dust development. The following BMPs will be used to manage dust:

- Cover and/or seed large stockpiles to the extent practical, and
- Implement approved dust suppression measures on active roads and open areas. Avoid applying excessive volumes of water or product, as this can contribute to the mobilization of sediment.

Detailed dust management measures are provided in the **Air Quality Management Plan (S13.0-C2) (AQMP).**

6.4.7 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, and then they could 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 mapping, and operators will be trained to use them;
- 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.

6.4.8 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, and
- burlap sandbags (unfilled is appropriate).

6.5 Operation, Decommissioning and Reclamation, and Post-closure Surface Erosion and Sediment Control

The BMPs outlined in **6.4** will be implemented during the Operation, Reclamation and Decommissioning and Post-closure Phases. TCL's **CEMP** will provide guidance on detailed designs and planning during the Construction Phase. The Environmental Coordinator will be responsible for inspections and implementation of erosion and sediment control measures as outlined in **7. Monitoring**.

6.5.1 Flocculant Management Plan

Refer to **Appendix 13.17-B Initial Bench Testing Report for Flocculant – Stormtec** for the flocculent testing that was completed by Stormtec on site specific material. The following provides a summary of the Flocculant Management Plan that is part of this SEPSCP.

6.5.1.1 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.

6.5.1.2 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 10µ filters) was ineffective at reducing turbidity levels to meet discharge criteria (assuming permit condition of 50 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 13.7-B)**.

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.

6.5.1.3 Flocculant Use and Risk

Flocculant application and 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 Tenas Control Pond.

Acute ecological toxicity testing has been completed for *Oncorhynchus mykiss, Danio rerio* and *Daphnia magna* and the product has been determined to of low toxicity. Refer to **Appendix 13.17-C** for the **Safety Data Sheet (SDS)** which presents ecological toxicity details including:

- LC50[1] *Oncorhynchus mykiss*/96 hour greater than (>) 100 milligrams per litre (mg/L) (OECD 203[2]);
- LC50 *Danio rerio*/96 hour >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 (BC MOE) 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.

[1] LC50=medial lethal concentration dose that is lethal to 50% of test organisms, EC50=acute toxicity in algae where 50% reduction in growth occurs
[2] OECD= Organisation for Economic Co-operation and Development

7. MONITORING

TCL personnel will undertake weekly and more frequent inspections as required of the SEPSCP BMPs in **6.4**.

Reporting and record keeping on the status, repairs, and general maintenance of implemented erosion and sediment control measures will be conducted and reported to the Environmental Coordinator. Please see attached **Appendix 13.17-D Weekly Environmental Monitoring Report** form.

Installed erosion and sediment control measures will be monitored and repaired per the performance objectives in **Table 7.1-1**.

7.1 Performance Objectives

In addition to extensive inspections and monitoring to ensure the objectives of the SEPSCP are met, performance objectives and targets are set to guide the proper implementation of the SEPSCP. They are shown in **Table 7.1-1**:

Table 10.1-1: Performance Objectives

Objective	Target
Inspection is regularly scheduled and implemented	▪ Inspected daily during wet and freshet conditions ▪ Inspected weekly during normal open water conditions ▪ Inspected and or repaired prior to spring melt (freshet) season ▪ Inspected and repaired after heavy rain events
Maintenance records are maintained	▪ Maintenance logs maintained for all sediment and erosion contrail structures ▪ Preventative maintenance plans developed annually
Repairs are completed promptly	▪ All sediment and erosion control structures repaired within 48 hours of identification of need for repair
Training is provided to employees	▪ All personnel attend annual sediment and erosion control training
Total suspended solids (TSS) compliance targets are met	▪ Meeting regulatory compliance for TSS
Flocculant and coagulants are tracked, and alternatives evaluated	▪ Tracking of flocculant and coagulant usage ▪ Testing of alternate flocculants and coagulants every two (2) years

8. REPORTING

8.1 General Reporting

Reporting completed by TCL will confirm the consistent implementation of the SEPSCP. Summary reports of monitoring activities and results will be compiled and reviewed annually.

8.2 Compliance Reporting

Compliance reporting will be subject to the Environmental Assessment Certificate (EAC), *Mines Act*, RSBC 1996, c 293 and *Environmental Management Act*, SBC 2003, c 53 (*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 *MA/EMA* **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 .

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

The Mine Manager will:

- implement the SEPSCP; and
- facilitate the annual review of the SEPSCP.

9.2 Mine Superintendent

The Mine Superintendent reports to the Mine Manager and bears the responsibility to provide adequate resources for personnel to follow the SEPSCP. The Mine Superintendent also provides support to the Environment Department, including the Environmental Coordinator.

9.3 Environmental Coordinator

The Environmental Coordinator bears overall responsibility for ensuring the SEPSCP is followed and supervises the Environment Department's environmental monitoring and inspection programs. The Environmental Coordinator reports to the Mine Superintendent.

The Environmental Coordinator will:

- act as a resource to the Project by providing guidance relating to permit conditions, commitments, regulations, acts, interpretation of legislation and SEPSCP BMP's;
- be the liaison for government agencies for permitting and non-compliance incidents;
- be the liaison for Indigenous groups, through their designated representatives, for permitting as well as non-compliance issues;
- manage the inspection of SEPSCP BMPs and ensure corrective actions are documented and addressed;
- prepare an Annual Environmental Management Summary Report and upon permitting completion, the Annual Environmental Reports as required by *MA/EMA* permit conditions;
- distribute the annual report via community engagement activities per the **Socio-economic Management Plan (S13.0-C16) (SEMP).** The **SEMP** will have requirements related to reporting on community engagement programs**;**
- conduct an annual review of the SEPSCP, and
- responsible for inspections, monitoring. and implementation of erosion and sediment control measures as outlined in this SEPSCP.

9.4 Environmental Technician

The Environmental Technician reports to the Environmental Coordinator and will:

- gather data as required at prescribed monitoring sites;
- assist the Environmental Coordinator as required; and
- perform weekly inspections of the adequacy of SEPSCP BMPs and ensure corrective actions are documented and addressed and advise the Environmental Coordinator of actions. Inspection reports will be maintained in a logbook.

9.5 Health, Safety, and Human Resources Superintendent

The Health, Safety, and Human Resources Superintendent bears overall responsibility for the **Occupational Health and Safety Program (S13.0-C13) (OHSP)**, and for reporting any related incidents to BC MEMLI. Specifically, Health, Safety, and Human Resources Superintendent will:

- maintain health and safety incident records and reporting;
- act as a resource to the Joint Occupational Health and Safety Committee (OHSC) by providing guidance relating to permit conditions, commitments, regulations, acts, interpretation of legislation, company policy, BMPs for prevention of surface erosion, and safe work procedures;
- maintain health and safety training, safety meeting minutes and SPP training records for employees, and,
- manage the Emergency Response Team (ERT), implement the **Mine Emergency Response Plan (S13.0-C9) MERP, Fuel Management and Spill Control Plan (S13.0-C7)** (**FMSCP),** and act as MERP Coordinator.

9.6 Employees and Contractors:

All employees and contractors, in accordance with the environmental and safety induction, will:

- follow BMPs and other aspects of the SEPSCP, and all other related SPPs; and
- report all environmental and safety incidents or dangerous occurrences to their Supervisor.

10. COMMUNICATION

Any change to the SEPSCP will be communicated to Minesite employees and contractors through a site-wide email, and bulletins posted around the Minesite and in temporary site offices. When effective to do so, maps will be marked with changes and posted.

10.1 Training and Awareness

Training of TCL employees will be conducted using the SEPSCP, along with the BMPs that will be implemented during all phases in the various areas previously detailed.

10.1.1 Employee and Contractor Training

Employees are required to review all relevant the SEPSCP and related SPP and their associated training modules at the start of employment and on annual basis. Employee training is tracked and managed.

Contractors will review the relevant SPP at the start of their contract and on an annual basis if contracts are longer than 13 months in duration to ensure their compliance with these requirements. Visitors will receive an overview of the relevant SPP during their visitor induction session prior to accessing the Minesite or from their Contract Manager.

10.1.2 Visitor Training

Visitors will not be required to be knowledgeable of this SEPSCP as they will be under the direction of TCL employees and will not be allowed to be a situation involving erosion prevention and sedimentation control.

11. EVALUATION AND ADAPTIVE MANAGEMENT

11.1 Evaluation

A review of the SEPSCP will be completed by the Environmental Coordinator on an annual basis to compare data, trends, and implementation of the management plans and their objectives. This process will include a review of the management plan deliverables and input received from Indigenous groups through the **SEMP** and community engagement programs.

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 SEPSCP and the results of monitoring programs.

The SEPSCP is to be viewed as a living document that will be reviewed and improved as conditions change and following the evaluation of inspection results, monitoring and sampling data collected through the life of the Project.

TCL will work towards continual improvement at the Project. The Mine Manager or their delegate 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 Mine Manager or their delegate will implement a suitable corrective action. Examples of corrective actions could include:

- additional training of employees and contractors on procedures;
- enhancement of maintenance or monitoring measures; and/or
- additional supervisory oversight.

TCL will amend the SEPSCP as required based on annual evaluations and feedback from stakeholders and Indigenous groups. Any proposed changes will be sent out for review by Indigenous groups before being finalized and implemented into the SEPSCP.

12. CHANGE MANAGEMENT

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

13. CONCLUSION

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

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