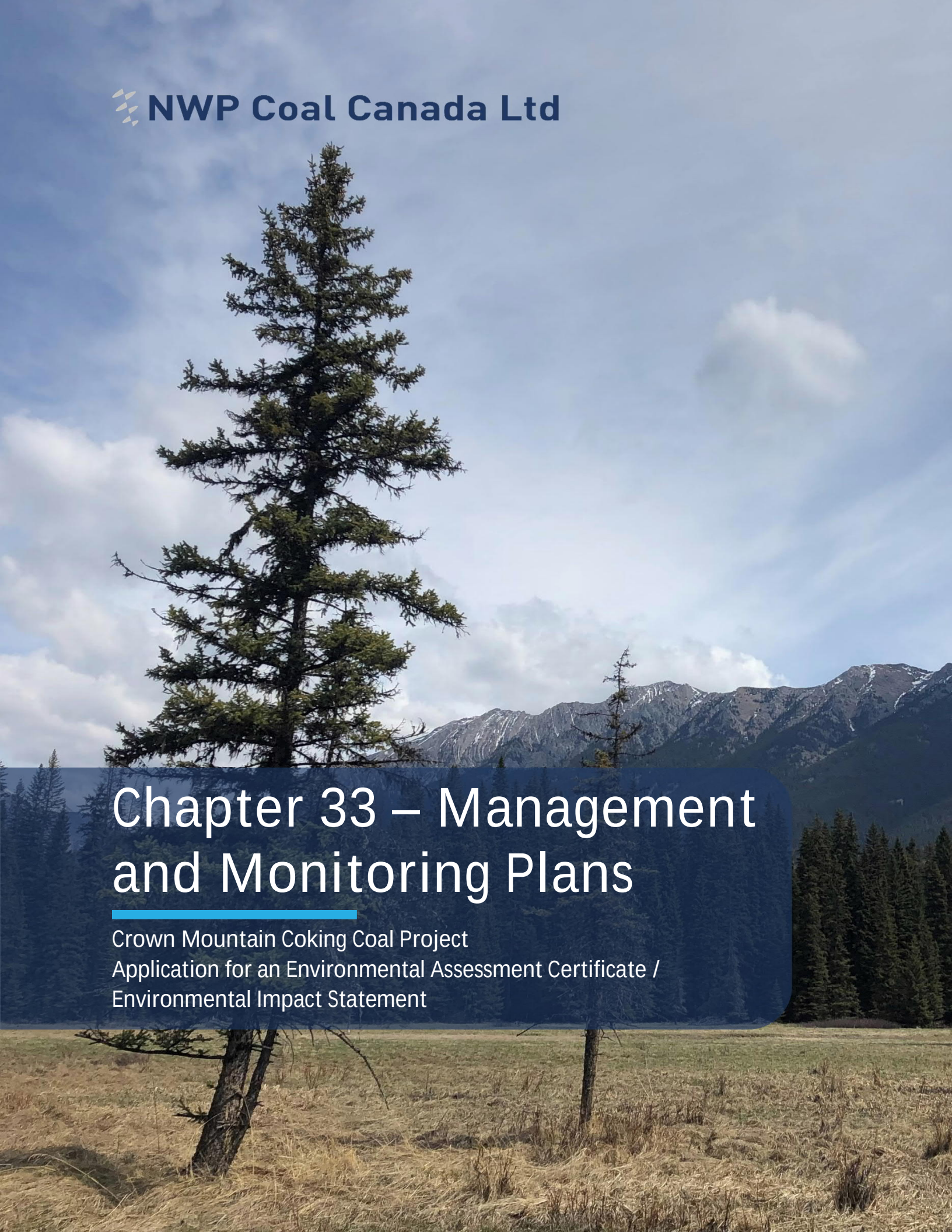
NWP Coal Canada Ltd



Chapter 33 – Management and Monitoring Plans

Crown Mountain Coking Coal Project
Application for an Environmental Assessment Certificate / Environmental Impact Statement

Table of Contents

Figures

Tables

Appendices

33. Management and Monitoring Plans

33.1 Introduction

Chapter 33 describes the proposed Environmental Management System (EMS) and associated Environmental Management Plans (EMPs) for the Crown Mountain Coking Coal Project (the Project) as per requirements outlined in the Guidelines for the Preparation of an Environmental Impact Statement for the Crown Mountain Coking Coal Project (EIS Guidelines; Canadian Environmental Assessment Agency [CEAA], 2015) and the Application Information Requirements (AIR; Environmental Assessment Office [EAO], 2018).

The Project EMS will direct the development and implementation of the EMPs required for environmental protection during the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project (i.e., the EMS will be implemented over the entire life cycle of the Project).

Each EMP describes the scope and objectives and procedures required for the protection of worker, public, and environmental health and safety, and demonstrate how the Project site will meet compliance requirements. The EMPs are a key component of the EMS and will be adjusted and augmented over time to allow for continual improvement.

33.2 Environmental Management System Framework

Prior to starting construction of the Project, NWP will develop a robust EMS that will be based on concepts from International Organization for Standardization (ISO) 14001. The EMS will address all approval and permit requirements, legal requirements, and input from local communities and Indigenous groups so that it reflects the values of communities, is transparent, and goes beyond “business as usual”. As described in Chapter 1, good environmental management involves NWP identifying and controlling their potential environmental risks across all phases of their business from exploration through to Project development, operation, and closure.

33.2.1 EMS Scope

The EMS will provide a structure and procedures for implementing environmental management plans, ensuring compliance with regulations and permit requirements, and continuously improving environmental protection measures and environmental performance. The scope of the EMS will apply to all Project activities from Construction and Pre-Production to Post-Closure and includes the following key components of ISO 14001:

- Environmental Policy: Describes corporate principles, objectives, and targets relating to environmental management and environmental performance;
- Planning: NWP will establish and maintain documented objectives and targets for each EMP, and will update EMPs on an annual basis to target specific issues and areas for continuous improvement;
- Implementation: NWP with establish resource requirements, organizational structure, reporting structure, roles and responsibilities, information and data management, and communication protocols; and
- Evaluation and Corrective Action: NWP will monitor the Project's performance against established objectives and standards and will correct environmental management strategies where necessary by implementing contingency measures, corrective actions, and adaptive management procedures as required.

The EMS, the accompanying Environmental Policy (Section 33.2.2; Appendix 1-F), and the NWP Employee Code of Conduct (Appendix 1-B) form the basis through which NWP will require contractors and sub-contractors to comply with environmental management programs, adhere to regulatory permitting requirements, and achieve auditing programs.

33.2.2 Environmental Policy

NWP's approach to environmental management in the Application/EIS, has been to use a proven science-based approach to identify, quantify and mitigate risks. NWP will also, as applicable, integrate Traditional Ecological Knowledge and input from Indigenous Communities. This robust approach to identifying and, in turn, minimizing environmental impacts will be applied throughout the lifecycle of the Project from development and operation through to closure. NWP will work to achieve industry best practice in managing the environmental and social impacts of mining and processing operations.

Through the objectives of the Environmental Policy, NWP will:

- Manage and control the impacts of the operations on air, water, and land;
- Minimize land disturbance and ecosystem degradation;
- Re-establish disturbed areas as sustainable ecosystems and community assets,
- Use all resources wisely;
- Reduce, reuse, and recycle wastes;
- Partner with suppliers, contractors, and supply chains to identify and implement opportunities to achieve lower carbon emissions from the extraction, processing, transport, and end use of steelmaking coal from the Project;
- Recognize and work to meet the needs of the community; and
- Provide appropriate training to employees and contractors to ensure a clear understanding of environmental impacts and responsibilities.

A copy of NWP's Environmental Policy is provided in Appendix 1-F.

33.2.3 Occupational Health and Safety

NWP operates a healthy and safe workplace with a target of zero harm. NWP considers health and safety a core value and works with all employees and contractors to make being safe more than just words on paper. NWP equips, trains, and supports all employees and contractors to build a culture of safety for themselves and those around them.

Prior to starting construction of the Project, NWP will develop a robust Occupational Health and Safety (OHS) program that borrows concepts from Occupational Health and Safety Assessment Series (OHSAS) 18001 and from Bathurst. The OHS program will address approval and permit requirements, legal requirements, and input from our local communities and Indigenous Communities.

33.2.4 Adaptive Management

Adaptive management is a planned and systematic approach for continuously improving environmental management practices by learning from management outcomes (Canadian Environmental Assessment Agency, 2016). It is a key management tool for achieving continual improvement in environmental performance and long-term management outcomes by providing flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a Project.

NWP is committed to operating the Project in a safe and environmentally responsible manner. The management strategies and mitigation measures outlined in this chapter are anchored in an adaptive management philosophy. As part of continual improvement, the management plans described herein will be updated regularly to account for new and amended legislation, evolving industry standards, concerns from public stakeholders and Indigenous Communities, changes to the Project's design and/or schedule, or changes to mitigation measures based on monitoring results. Through adaptive management, rigorous management plans have been developed early for the Project, based on the best available information, and prior to detailed Project engineering and construction. After the completion of detailed engineering design, management plans will be adjusted, as needed, and monitoring will be implemented to determine whether the actions identified within the management plans are functioning as intended.

33.2.4.1 Adaptive Management Approach

Adaptive management is applicable to all management plans listed in Section 33.4, as well as to the follow-up strategies provided within each VC assessment chapter and will be applied during all Project phases. The objective of the NWP's adaptive management framework is allowing the Project to achieve mitigation commitments and performance goals, resulting in reasonable mitigation measures aimed at avoiding or minimizing adverse effects on the environment.

The development and implementation of the adaptive management framework will be guided by policy, best management practices (BMPs), and guidance documents, including but not limited to the *Environmental Mitigation Policy* and related *Environmental Mitigation Procedures* (Ministry of Environment, 2014a and 2014b) and the *Adaptive Management Measures under the Canadian Environmental Assessment Act* (Canadian Environmental Assessment Agency, 2016), which were

developed prior to the *Canadian Environmental Assessment Act* (2012) but remain applicable as a BMP. The adaptive management framework will consider a wide range of factors, including:

- The results of environmental monitoring and environmental audits;
- Technological advancements; and
- Changing environmental conditions.

33.2.4.1.1 Adaptive Management Practices and Procedures

The strategies and measures outlined in the EMS, the environmental and health and safety management plans, and the follow-up and monitoring programs have been developed following an adaptive management framework. Details of the management and monitoring plans will be refined through discussions with regulatory agencies, Indigenous Communities, local communities, and other stakeholders as the Project progresses. Reporting of follow-up and monitoring programs will be implemented as per the EMS and the Community Relations and Communication Plan. All management plans will be reviewed annually and updated as necessary, based on follow-up programs and monitoring results.

The mitigation measures to be implemented for the Project are based on BMPs and are expected to prevent or minimize adverse effects to human health and the receiving environment. Monitoring programs have been designed to provide early warning of environmental changes that may be of future concern. Through these early warnings, additional mitigation measures will be implemented, and the appropriate management plans and mitigation strategies modified. Adaptive management will accompany effectiveness monitoring as part of the follow-up program for each VC, as adjusting management actions based on the lessons learned from effectiveness monitoring will increase the likelihood of achieving mitigation commitments (Ministry of Environment, 2014b). If any unforeseen adverse effects are identified, intervention measures will be taken as soon as practicable to correct these effects and prevent them from occurring in the future.

Specific monitoring details are provided in each environmental management plan. As part of the adaptive management framework, the monitoring provisions generally include the following:

- Measuring the condition of the VC using selected environmental indicators;
- Setting performance criteria, standards, and thresholds, including alert and action levels; and
- Measures for evaluating root causes and the extent of effects to facilitate selection of appropriate actions.

For the VC being monitored, should the indicator or monitored parameter approach a predefined threshold, this would trigger an adaptive management response, which may include:

- Increasing the frequency of monitoring;
- Conducting studies to identify root causes; and
- Undertaking specific action(s) or mitigation measure(s) to address the concerns.

An auditing program will be developed and implemented prior to the start of construction for compliance verifications and QA/QC. Results of the audits will be included in the EMS reporting system. The adaptive management approach allows for feedback loops, such that monitoring program study designs can be modified based on program results. As part of the adaptive management process, the EMS will support changes and updates through regular review of the adequacy of the environmental policy, environmental management programs, and operational controls. Elements of the EMS and management plans can then

be updated as needed, based on results, including enhancement of employee and contractor training programs to improve the level of environmental protection. This approach is systematic and includes prescribed actions, which will assist in minimizing effects to the environment and allow for continual improvement of the Project EMS and monitoring and follow-up programs.

33.3 Environmental Management Planning and Structure

The environmental management program is an overarching strategy that will be used to translate specific commitments and management measures committed to in the Application/EIS into the planning documents, engineering designs, contract documents and the day-to-day construction and operation of the proposed Project.

Each EMP outlines the plan scope and objectives, applicable legislation, Best Management Practices (BMPs), and industry standards, corporate roles and responsibilities, relevant Project components/activities, environmental protection and mitigation measures, monitoring, evaluation of environmental performance, and individual reporting requirements. The Valued Component (VC) assessment chapters identify proposed monitoring and follow-up programs to verify the predictions of effects and the effectiveness of mitigation measures. Where applicable, further details on the proposed monitoring programs are included in the individual EMPs. Conceptual monitoring programs are outlined in each VC assessment chapter to help ensure that the Project is implemented as presented in the Application/EIS and that mitigation measures are effectively implemented, and conditions and requirements related to laws and regulations are met.

Management plans, which are conceptual in nature, are presented in the following section. Each VC assessment chapter identifies plans relevant to the VC. Management plans included in the Application/EIS include:

- Environmental
  - Air Quality and Greenhouse Gas Management Plan;
  - Archaeology Management Plan;
  - Ecological Restoration Plan;
  - Erosion and Sediment Control Plan;
  - Fish and Fish Habitat Management Plan;
  - Landform Design and Reclamation Plan;
  - Noise and Vibration Management Plan;
  - Site Water Management Plan;
  - Soil Management Plan;
  - Spill Prevention, Control, and Countermeasures Plan;
  - Vegetation and Ecosystems Management and Monitoring Plan
  - Waste Management Plan;
  - Wildlife Management and Monitoring Plan;
- Health and Safety
  - Access Management Plan;
  - Mine Emergency Response Plan;
  - Health and Safety Management Plan;

    - Traffic Control Plan;
- Communication and Reporting
    - Community Relations and Communications Plan;
    - Compliance Reporting Plan;
    - Indigenous Engagement and Reporting Plan; and
    - Indigenous Impact Management Plan.

Preparation of detailed EMPs, building upon the conceptual EMPs presented in the Application/EIS, will occur during permitting and/or after the issuance of the Environmental Assessment Certificate, and will be completed prior to Construction and Pre-Production.

33.4 Management Plans

The conceptual management plans for the Project (Environmental, Health and Safety, and Communication and Reporting) as currently conceived at this planning stage are presented in Section 33.4. The plans will be refined through the environmental assessment process and completed and implemented prior to beginning Construction and Pre-Production activities.

33.4.1 Environmental

33.4.1.1 Air Quality and Greenhouse Gas Management Plan

33.4.1.1.1 Introduction

Throughout all phases of the Project, activities will be undertaken that will involve the potential for changes in ambient air quality, changes in greenhouse gas emissions, and the need for dust control. The Air Quality and Greenhouse Gas Management Plan (AQGHGMP) is intended to provide a framework of:

- Measures that will be employed to minimize the risk of reduced air quality;
- Measures that will be employed to minimize greenhouse gas emissions;
- The response process that will be in place in the event of an air quality exceedance or complaint;
- Reporting procedures; and
- The monitoring program that will be implemented to identify and manage potential degradation of air quality and air quality exceedances before they occur.

This AQGHGMP is a conceptual plan, which NWP will revise and include additional site-specific details prior to construction. Further, NWP will strive to continually improve the AQGHGMP throughout the life of the Project, through the use of advanced technologies and implementation of management practices that will further reduce the risk or potential effects of poor air quality on human health and the environment.

The guidelines presented in the Canadian Environmental Assessment Agency (CEAA) document “Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners” (Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003) dated November 2003 has been used as a framework for incorporating greenhouse gas (GHG) considerations in managing activities of the Project.

33.4.1.1.2 Scope and Objectives

This AQGHGMP involves the practices and procedures associated with management of air quality through dust control mitigation measures, prevention of air quality exceedances, and the incorporation of GHG considerations. These practices and procedures included in this plan are applicable to and will be implemented throughout the Construction and Pre-Production, Operations, and Reclamation and Closure phases of the Project. Further, this AQGHGMP is applicable to the Project footprint, transportation routes, and undeveloped area in the vicinity of the Project.

The AQGHGMP was prepared to meet the following objectives:

- Provide a framework for the appropriate prevention, response, and management of air quality and dust control;
- Define the regulatory requirements, roles, and responsibilities and reporting requirements associated with air quality, dust control, and GHG emissions;
- Describe the environmental protection measures and management practices to be implemented to reduce the risk of degraded air quality or an air quality exceedance that have the potential to impact human health and the environment;
- Describe GHG mitigation measures and management practices to be implemented to reduce the net GHG emissions throughout all phases of the Project;
- Outline the monitoring programs that will be implemented to assess the performance of the AQGHGMP and identify areas in which the plan can be improved through the use of adaptive management strategies; and
- Outline the reporting requirements for Project GHG emissions.

33.4.1.1.3 Regulatory Requirements

There are several federal and provincial legislative requirements applicable to the AQGHGMP. These requirements and their primary components related to the AQGHGMP are provided in Table 33.4-1.

Table 33.4-1: Federal and Provincial Requirements for Air Quality and GHG Emission Management

Regulation/Policy	Year	Applicable Regulation or Permit
International		
Paris Climate Agreement	2016	Canada and 194 other countries reach the Paris Agreement on December 12, 2015 (ratified on October 5, 2016). This agreement was set to strengthen the effort to limit the global average temperature rise to well below 2°C and pursue efforts to limit the increase to 1.5°C.
Federal Legislation		
Canadian Environmental Protection Act (CEPA) (Government of Canada, 1999) Greenhouse Gas Emissions Reporting Program (Environment Canada, 2020)	1999	Through the *Canadian Environmental Protection Act* and the Greenhouse Gas Emissions Reporting Program emissions are to be reported to Environment and Climate Change Canada (ECCC) for facilities that emit over 10 kilotonnes of carbon dioxide equivalent units (CO_2e) (Environment Canada, 2020) under Section 46 of the CEPA (Government of Canada, 1999).

Regulation/Policy	Year	Applicable Regulation or Permit
Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners	2003	This document is a result of federal, provincial, and territorial collaboration and provides guidance for incorporating climate change considerations in project Environmental Assessments (Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003).
Canadian Council of Ministers of the Environment (CCME) Air Quality Management System (AQMS) through the *Canadian Ambient Air Quality Standards* (CAAQS) (CCME, 2020)	2020	The CCME AQMS is a collaborative effort by the federal, provincial, and territorial governments and stakeholders to establish a comprehensive approach to improve air quality in Canada through achievable targets. The CCME develops and issues the CAAQS for the entire country including establishment of air management zones for each region allowing specific air emissions for certain regions (CCME, 2020).
Canadian Net-Zero Emissions Accountability Act	2021	The *Canadian Net-Zero Emissions Accountability Act* establishes a process to set reduction targets (2030, 2035, 2040, and 2045), outlines a 2030 emission reduction plan, and holds the Government of Canada to account by requiring the ECCC to report to Parliament with respect to each target.
Provincial Legislation		
Pollution Control Objectives for the Mining, Smelting, and Related Industries for British Columbia	1979	The Pollution Control Objectives for the Mining, Smelting, and Related Industries for British Columbia establishes dustfall rates for mining, smelting, and related industries for the Province of British Columbia. The ambient air control objective for dustfall has a lower limit averaged over 30 days of 1.7 milligrams per square decimeter per day (mg/dm^2/day) to an upper limit of 2.9 mg/dm^2/day (British Columbia [B.C.] Ministry of Environment, 1979).
Environmental Management Act	2003	Under the *Environmental Management Act*, the B.C. Ministry of Environment has developed limits for contaminants in the atmosphere which are established to protect human health and the environment (Government of British Columbia, 2003).
Climate Change Accountability Act	2007	Includes legislated targets for reducing GHGs, a climate change accountability framework, and requirements for the provincial public sector. B.C.'s overall GHG emissions are to be reduced by at least 40% below 2007 levels by 2030, by 60% by 2040, and by 80% by 2050. GHG emission limits for individual facilities or sectors are not provided, however (*Climate Change Accountability Act*, 2007).
Carbon Tax Act	2008	Puts a price on GHG emissions to provide an incentive for sustainable choices that produce fewer emissions (*Carbon Tax Act,* 2008).
Greenhouse Gas Reduction (Emissions Standards) Statutes Amendment Act	2008	Focuses on reducing GHG emissions from certain industrial operations while creating additional opportunities for the bioenergy sector (*Greenhouse Gas Reduction (Emissions Standards) Statutes Amendment Act*, 2008).

Regulation/Policy	Year	Applicable Regulation or Permit
B.C. Air Quality Objectives and Standards	2009	Through the B.C. Air Quality Objectives and Standards, the Province of British Columbia has established a number of air quality objectives for various contaminants that guide acceptable presence of contaminants in the atmosphere (Province of British Columbia, 2020).
Greenhouse Gas Industrial Reporting and Control Act	2014	The *Greenhouse Gas Industrial Reporting and Control Act* is directly aimed at coal-based electricity generation facilities, providing specific performance standards for industrial facilities (Government of British Columbia, 2014).
Greenhouse Gas Emission Reporting Regulation	2015	Emissions to be reported to the B.C. Ministry of Environment for facilities that emit over 10,000 tonnes CO_2e, and facilities that emit over 25,000 tonnes CO_2e will have emissions verified by an independent and accredited third party (Government of British Columbia, 2015).
Greenhouse Gas Emission Control Regulation	2015	Establishes the infrastructure and requirements for issuing emission offset units and funded units (*Greenhouse Gas Emission Control Regulation*, 2015).
Greenhouse Gas Emission Administrative Penalties and Appeals Regulation	2015	Establishes when, how much, and under what conditions administrative penalties, including administrative monetary penalties, may be levied for non-compliance (*Greenhouse Gas Emission Administrative Penalties and Appeals Regulation*, 2015).

33.4.1.1.4 Project Effects on GHG Reduction Targets

On July 12, 2021, Canada's Nationally Determined Contribution (NDC) to the United Nations was submitted, committing Canada to reduce its greenhouse gas (GHG) emissions by 40-45 percent below 2005 levels by 2030. Provincially, B.C. is committed to reducing GHG emissions by 16% below 2007 levels by 2025, 40% by 2030, 60% by 2040, and 80% by 2050 (B.C. Ministry of Environment [MOE], 2021; Environment Canada, 2009). A review of the 2007 GHG emission summary from the 2007 ECCC National Inventory Report shows that B.C. has an annual total GHG emission of 63.1 Mt CO_2e.

As the Project is a new proposed open pit metallurgical coal mine, inherently, the addition of the Project will not result in provincial GHG reductions. Therefore, this Project will not contribute to the federal 2030 reduction target and provincial targets for 2025, 2030, and 2040.

The predicted future peak of GHG emissions from the Project result in 0.66% of B.C.'s total emissions in 2007. The Project lifespan is for 15 years and is expected to be fully decommissioned prior to 2050. Therefore, any increases in GHG emissions from the Project will cease prior to the 2050 B.C. MOE target date.

33.4.1.1.5 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the AQGHGMP are provided in Table 33.4-2.

Table 33.4-2: Roles and Responsibilities of the AQGHGMP

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the AQGHGMP, including meeting commitments to implement environmental protection measures and monitoring programs. • Lead environmental inspections, audits, and on-site monitoring programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate and effective response to air quality and dust exceedances. • Lead environmental incident investigations. • Report to applicable regulatory agencies, as required. • Update the AQGHGMP, as required
Project Construction Manager	• Implement and ensure compliance with the AQGHGMP during Project construction. • Provide and deploy air quality and dust control materials and equipment at appropriate locations within the Project site during Project construction. • Ensure completion of environmental awareness training by all employees and contractors.
NWP Mine Manager	• Implement and ensure compliance with the AQGHGMP during Project operations. • Provide and deploy air quality and dust control materials and equipment at appropriate locations with the Project site during Project operations. • Ensure completion of environmental awareness training by all employees and contractors. • Oversee personnel resourcing for air quality and dust control management. • Participate in environmental incident investigations.
All employees and contractors	• Complete environmental awareness training. • Compliance with the AQGHGMP.

33.4.1.1.6 Environmental Protection Measures

This AQGHGMP provides a range of environmental protection measures that will be implemented to avoid or reduce the potential for the occurrence of air quality exceedances, to appropriately respond to and mitigate air quality exceedances should they occur and mitigate GHG emissions during any phase of the Project. These environmental protection measures will be further refined and detailed throughout the Project permitting process and will be updated with more Project-specific information prior to the commencement of construction.

Air Quality Exceedance Prevention

Prevention is the preferred manner of addressing air quality exceedances throughout all phases of the Project. Implementation of the following measures will contribute to the effective prevention of air quality exceedances. The Project will incorporate industry standards and best management practices (BMPs) for air quality exceedance prevention during the Construction and Pre-Production phase of the Project, which may include:

- When possible, equipment with low emissions will be selected for on-site use;
- Equipment and engines that are properly maintained have efficiency benefits, all equipment and vehicles used during Project construction will be regularly inspected and maintained at regular intervals. The maintenance schedule and program will be documented;

- On-site vehicles and equipment will use low-sulphur diesel and premium gasoline for more efficient combustion;
- NWP will investigate the possibility of using zero-emission electric vehicles and low emission vehicles as part of its fleet;
- Vehicles and equipment will be turned off when not in use. Idling of equipment and vehicles will be minimized as much as possible, if required, cabin heaters may be added to vehicles and equipment to minimize idling of on-site vehicles and equipment during cold weather conditions;
- When traveling on unpaved roads, minimize rapid starts and stops and obey all local speed limits.
- Unpaved roads will be regularly maintained and kept in good repair, including regular compaction and use of coarse aggregate with low silt content when possible;
- During high traffic periods on unpaved roads in dry seasonal periods, consider watering the road to minimize dust;
- Water or dust suppression methods will be used to mitigate dust generation in areas including unpaved roads, work areas, and storage piles;
- Paved roads will be cleaned, as required, to minimize dust;
- Vegetation clearing will be minimized as much as possible so as to reduce the area of exposed soil susceptible to wind erosion and airborne dust particles;
- Reclamation of exposed soils will occur throughout construction to reduce these areas of exposed soil susceptible to wind erosion including methods such as seeding or hydroseeding, straw, tarps, watering, and use of dust suppressants;
- Soil stockpiles will be stored and shaped in ways to reduce moisture content loss;
- Fences or windbreaks will be considered around soil stockpiles to reduce wind erosion and airborne dust particles;
- Movement of soil will be minimized during windy conditions; and
- If airborne dust particles cannot be reduced, consider installing a fog or sprinkler system to release small droplets into the atmosphere to suppress airborne dust particles.

In addition to the measures to be implemented during the Construction and Pre-Production phase of the Project (discussed above), NWP will incorporate industry standards and BMPs for air quality exceedance prevention during the Operations phase of Project, which may include:

- All conveyor systems will be covered, drop locations will be enclosed, and drop heights from the crusher to conveyor and other material transfer points will be minimized;
- Bin vents or dust collectors will be used along the crushing circuit to help with dust control;
- Conveyor covers will be installed over the top of all exposed conveyor belts that are not within enclosed galleries or structures to minimize potential dust generation;
- A local dust hood will be provided over the raw coal screen and all conveyor transfer points will be enclosed and skirted to mitigate local dust emissions;
- The Coal Handling Process Plant (CHPP) will reside inside a fully enclosed, heated and insulated building which will minimise the potential for fugitive coal dust emissions during processing;
- For the wet CHPP processing facility, or where the clean coal contains residual surface moisture, then the likelihood of airborne dust accumulation is low and dust suppression/extraction systems are not required;
- The CHPP will have a ventilation system, which will provide sufficient air changes per hour;
- Housekeeping procedures will be required to minimise accumulated dust levels inside enclosed spaces and thereby minimize the potential for coal dust accumulation becoming airborne;

- A dustbinder chemical solution will be applied to the rail cars after filling to effectively seal the top layer of coal and mitigate dust during the mine to port journey; and
- The layout of the site will be planned to minimize travel distances between operations in order to reduce vehicle travel distances and speeds resulting in the generation of dust and vehicle emissions.

An air quality monitoring program will be established and implemented to ensure prevention measures are being properly implemented and are effective in minimizing the impact of air quality and dust. See Section 33.4.1.1.10 for further details on the air quality and dust control monitoring program.

Air Quality Exceedance Response

While air quality exceedance prevention is the preferred manner to address air quality exceedances in the AQGHGMP, an air quality exceedance and countermeasures plan is required in the event that an air quality exceedance occurs during any phase of the Project. A key to an effective AQGHGMP is timely implementation of controls and mitigation measures by following clearly established procedures.

The following actions will be taken in the event of an air quality exceedance or air quality complaint, in order of priority:

- Identify source or activities related to the air quality exceedance;
- Notify the Environmental Manager, Health and Safety Manager and/or other appropriate Project personnel of the air quality exceedance or air quality complaint (see Section 33.4.1.1.5);
- Based on parameter exceeded, duration, and nature of work, operations may need to be temporarily shut down, to be determined on a case by case basis;
- Implement mitigation measures to address the air quality exceedance to allow for regular operations to resume;
- Continue to monitor air quality, as needed, and implement additional mitigation measures, as needed; and
- Report on and notify appropriate government agencies, stakeholders, landowners, and nearby communities, as required.

33.4.1.1.7 Countermeasures

Once the appropriate responsible personnel have been notified and the air quality exceedance has been addressed, the extent and severity of the air quality exceedance will be assessed. This includes an assessment of the environmental and human receptors affected or potentially affected. The air quality exceedance will be documented (see Section 33.4.1.1.9) for inclusion in an air quality exceedance incident report and a mitigation plan will be developed and implemented. All air quality exceedances will be documented by the Environmental Manager or a responsible delegate.

33.4.1.1.8 Greenhouse Gas Mitigation Measures

Greenhouse gas emissions are anticipated to be generated through Project activities such as vehicle and mobile equipment use, clearing of the Project footprint, pouring of foundations, the loading, hauling, and stockpiling of soil, coal, and mine rock, and raw and clean coal processing. There are various measures that may be employed to mitigate GHG emissions from a Project. Mitigation measures include avoidance, control, enhancement, and offset. The primary measure to mitigate a GHG emissions during the

Construction and Pre-Production and Operations phases of the Project are through avoidance and control by implementing BMPs to reduce the potential for generation of GHGs. These BMPs may include:

- When possible, equipment with low emissions will be selected for on-site use;
- Equipment and engines that are properly maintained have efficiency benefits, all equipment and vehicles used during Project construction will be regularly inspected and maintained at regular intervals. The maintenance schedule and program will be documented;
- On-site vehicles and equipment will use low-sulphur diesel and premium gasoline for more efficient combustion;
- Vehicles and equipment will be turned off when not in use. Idling of equipment and vehicles will be minimized as much as possible, if required, cabin heaters may be added to vehicles and equipment to minimize idling of on-site vehicles and equipment during cold weather conditions; and
- The layout of the site will be planned to minimize travel distances between operations in order to reduce vehicle travel distances and speeds resulting in the generation of vehicle emissions.

Other strategies that may be implemented to reduce the potential for GHG emissions include:

- Implementation of regularly scheduled maintenance of all fossil fuel burning equipment and monitor fuel consumption;
- The use of, where possible, construction equipment that will meet Tier 2 emission standards for non-road diesel engines (at a minimum);
- NWP will investigate the possibility of using zero-emission electric vehicles and low emission vehicles as part of its fleet;
- Reduce heating by appropriately insulating and operating all relevant facilities;
- Investigation into the potential use of bio-fuels to replace fossil fuels; and
- The incorporation of energy use reduction and efficiencies throughout the Project life cycle.

Enhancement activities include the progressive reclamation and revegetation of forested areas within Project footprint to minimize the temporary loss of carbon sinks. These areas will have a positive effect on GHG emissions as vegetation replanting will result in the re-establishment of some carbon sinks through carbon sequestration.

GHG offsets may be considered for the remaining GHG emissions that cannot be mitigated. Projects must meet provincial regulations in order to have their emission reductions or removals recognized as B.C. Offset Units.

33.4.1.1.9 Reporting Requirements

Air Quality

The NWP Environmental Manager (or a responsible designated alternate) will prepare all reporting requirements and conduct an incident investigation to identify a root cause of the air quality exceedance. Findings of the investigation will be used to improve air quality and dust control management procedures and the AQGHGMP will be updated accordingly.

All reporting will be conducted and completed as per permits and licences, approvals, corporate requirements, and authorizations obtained for air quality and dust control including annual GHG reporting

and National Pollutant Release Inventory (NPRI) reporting. Potential additional reporting may be required based on results from the air quality monitoring program. The monitoring program will be developed prior to construction and implemented, including routine monitoring, compliance checks, and quality assurance and quality control. All monitoring events will be reported on and submitted to the appropriate personnel. See Section 33.4.1.1.10 for further details on the air quality and dust control monitoring program.

As part of corporate reporting, the following air quality reporting requirements will be completed:

- Monitoring event and air quality variables to be collected;
- Air monitoring equipment/instruments used and calibration certificates;
- Monitoring locations;
- Date, time, and duration of monitoring event and weather conditions;
- Records and correspondence of complaints;
- Records of staff training activities related to the AQGHGMP;
- Results and quality assurance/quality control (QA/QC) including analysis of compliance and/or non-compliance based on applicable regulatory criteria, potential reasons and contributions to air quality exceedances, and recommended mitigation measures to be implemented to prevent future air quality exceedances.
- An annual report of all air quality monitoring events will be completed and will include monitoring event results, implemented and effectiveness of mitigation measures, and analysis of non-compliance issues.
- A review of the AQGHGMP and recommendations for additional measures and improvements will be completed.

Records of all documented related to the AQGHGMP will be maintained by the Environmental Manager, including incident reports, actions, countermeasures, investigation findings, training records, complaint records, monitoring program results, and annual air quality reports. This information will be used to facilitate improvements to the AQGHGMP Program through adaptive management practises.

Greenhouse Gases

There are currently no specific regulations that govern GHG emissions from the Project; however, there are relevant reporting thresholds and carbon reduction targets set by the federal and provincial governments. At a federal level, Environment and Climate Change Canada's (ECCC) Greenhouse Gas Reporting Program collects information on GHG emissions from facilities across Canada. It is a mandatory program for facilities that emit 10,000 tonnes or more of GHGs in carbon dioxide equivalent units (CO_2e) per year. At a provincial level, facilities emitting over 10,000 tonnes of CO_2e per year must report to the B.C. Ministry of Environment and Climate Change Strategy under the *Greenhouse Gas Emission Reporting Regulation*. B.C. facilities that emit over 25,000 tonnes of CO_2e per year must have their GHG emission reports verified by an accredited third party.

It is anticipated that the Project will exceed 10,000 tonnes of CO_2e during the first year of construction and over 25,000 tonnes of CO_2e during the last year of construction and each year of operation. Therefore, the Project will be subject to annual reporting requirements to the ECCC and annual reporting and verification to the B.C. MOE.

A year-over-year comparison will be completed for the Project to determine if any trends in GHG emissions appear and if corrective or mitigative actions may be implemented.

33.4.1.1.10 Monitoring Program

The air quality monitoring program is a key component of the AQGHGMP, as it will be used to evaluate the effectiveness of the AQGHGMP prevention measures, mitigation measures, and management strategies throughout all phases of the Project. The air quality monitoring program is expected to evaluate changes in air quality throughout all phases of the Project, to confirm that regulatory compliance measures are met, and allow for the development of adaptive management strategies through continued improvement of mitigation measures. The monitoring program will be established prior to Construction and Pre-Production and implemented and managed by the Environmental Manager; however, a range of Project personnel will be trained to participate in the program.

The monitoring program will include the following procedures:

- Weather and air quality baseline conditions will be collected prior to the commencement of Construction and Pre-Production. These data will include parameters such as air temperature, precipitation, wind speed, wind direction, relative humidity, and solar radiation.
- Prior to the start of the air monitoring program, applicable regulatory air quality parameters and criteria will be established (i.e., non-compliance levels) and monitoring intervals, locations, and methods will be selected.
- Ambient air quality monitoring will be completed during all phases of the Project, occur at regular intervals, and focus mainly on particulate matter.
- Gaseous emissions monitoring will occur periodically, as needed, but will mainly be calculated based on emissions.
- Data will be collected at regular intervals at pre-determined monitoring locations. These intervals will vary based on the phase of the Project.
- If air quality parameters are exceeded or a public complaint is received, additional mitigation measures will be implemented, and additional monitoring intervals may be required.

The monitoring program will be refined and supplemented with additional site-specific details prior to commencement of construction, as the permitting process progresses.

33.4.1.2 Archaeology Management Plan

33.4.1.2.1 Introduction

This Archaeology Management Plan was developed specifically for the Crown Mountain Coking Coal Project (the Project). Implementation of the Project (i.e., Construction and Pre-Production and Operations phases) has the potential to result in adverse residual effects to known archaeological resources in the Project footprint.

The Project's baseline archaeological assessment resulted in the discovery of 28 pre-contact archaeological sites in the Archaeological Local Study Area (LSA) and 9 previously recorded pre-contact archaeological sites were updated. Portions of the Project footprint have not been subjected to an archaeological impact assessment, and a Follow-up Strategy has been identified (Chapter 16,

Section 16.6) and is required to be implemented as a supplemental archaeological assessment under a 12.2 Heritage Inspection Permit.

Project-, phase- and/or site-specific heritage permitting (e.g., Section 12.4 Alteration Permit(s), along with a concurrent Section 12.2 Heritage Inspection Permit[s]) is/are required to facilitate development within archaeological and heritage sites that are protected, on private and public lands, from disturbance under the *Heritage Conservation Act* (*HCA;* 1996). The Archaeology Management Plan is a living document and will require revisions and amendments to address the dynamic state of the archaeological site mitigation process within British Columbia, and as it pertains, but is not limited to, Indigenous consultation requirements. Additionally, the Archaeology Management Plan will be updated to incorporate input and specific commitments during the Application/EIS review process.

33.4.1.2.2 Scope and Objectives

The Archaeology Management Plan describes protocols (i.e., avoidance and mitigation) that will be followed where development (i.e., ground disturbing activity) is required during Construction and Pre-Production and Operations and where the Project encroaches upon the recorded boundaries of pre-contact archaeological sites (pre-dating Anno Domini (A.D.) 1846) that are protected under the *HCA* (1996).

Additionally, the Archaeology Management Plan includes areas of archaeological potential (AOP) zones in the event an archaeological artifact is inadvertently exposed during Project development (i.e., Chance Find).

The objectives of the Archaeology Management Plan are as follows:

1. To identify the appropriate legislative and regulatory frameworks (e.g., Provincial) and to outline the requirement to obtain required heritage permitting (e.g., a Section 12.2 Heritage Inspection Permit [HIP] to facilitate a supplemental archaeological impact assessment, and Project-, phase- and/or site-specific Section 12.4 Site Alteration Permits [SAP] to allow for development to proceed within and immediately adjacent to recorded archaeological sites);
2. Identify Best Management Practices and outline the Initial Response Protocol;
3. To describe protection procedures for recorded archaeological sites within and in proximity to the Project, and mitigative measures for those sites where impacts are anticipated;
4. Provide a Chance Find Procedure for inadvertently exposed archaeological resources in the absence of a Project Archaeologist or delegated field directing archaeologist (i.e., Field Director);
5. Provide protocols for the inadvertence discovery of human remains (e.g., ancestral remains).
6. Define responsibilities of personnel involved in the Project;
7. To describe the effectiveness of the Plan; and
8. To reference other applicable management plans.

33.4.1.2.3 Regulatory Requirements

There are several legislative requirements and contextual provisions applicable to the Archaeology Management Plan. In order to achieve identification and protection of archaeological sites, NWP and construction personnel will comply with the provincial legislation (and subsequent permitting) and Best Management Practices (including the initial discovery protocol) detailed within the Plan.

Provincial Legislation

Whether on public or private land, archaeology sites that predate A.D. 1846 are protected through designation as Provincial Heritage Sites under Section 9 of the *HCA,* or through automatic protection under Section 13 of the *HCA* by virtue of being of particular historical or archaeological value. In addition to locations that contain physical evidence (i.e., artifacts and features) for pre-contact occupation, the following sites are automatically protected under the *HCA* and include, but are not limited to:

- Pre-contact archaeological sites occupied or used before A.D. 1846;
- Aboriginal rock art with historical or archaeological value;
- Burial places with historical or archaeological value;
- Heritage wrecks (i.e., vessel or aircraft); and
- Heritage sites of unknown age with a reasonable possibility of having been occupied or used before A.D. 1846.

Under the *HCA*, the existing physical context of archaeological sites must not be altered or disturbed in any manner without applicable Heritage Permitting, which currently stipulates the requirement of concurrent Section 12.2 and Section 12.4 permits.

33.4.1.2.4 Best Management Practices

The Proponent is committed to implementing Best Management Practices related to the identification and protection of pre-contact archaeological sites, and the mitigation of impacts to these sites, that are present within and immediately adjacent to, the Project footprint, or in any surrounding areas affected by proposed Project activities. The following outlines preferred methods that are considered standard within the archaeological community but are not binding under law.

- The proposed Project is in the asserted traditional territory of the Ktunaxa Nation and the Shuswap Indian Band (SIB). The Proponent will be familiar with the guidelines for archaeological assessment and engagement provided by the Ktunaxa Nation Council (KNC; Ktunaxa Nation Council [KNC], 2020a) and chance find procedures provided by the SIB (2019). Note that in advance (≥30 calendar days) of implementing archaeological inspections, investigations, and monitoring under heritage permitting, the Project Archaeologist or Field Director will issue email notification to applicable Indigenous Communities according to the British Columbia (B.C.) Government Database. Notification will include anticipated date(s) of monitoring and any Project information that may not have been included within the permit application that would have been provided by the B.C. Archaeology Branch prior to the issuance of heritage permits;
- All construction personnel at the proposed Project site will complete an archaeology awareness orientation to understand the types and significance of archaeological resources, along with the appropriate procedures to follow should archaeological remains be inadvertently discovered (i.e., Chance Find Procedure) through the implementation of the Project. Construction personnel will sign off on the archaeology awareness orientation, with records filed and kept on-site;
- The Project Archaeologist(s) will conform to the Guidelines set forth by Indigenous Communities (KNC, 2020a; SIB, 2019); and
- Archaeological crew(s) involved in inspections, investigations, and monitoring will be comprised of the Project Archaeologist(s) or Field Director, field technicians for required tasks, and when stipulated, representatives from applicable Indigenous Communities.

33.4.1.2.5 Roles and Responsibilities

The key roles and responsibilities for the implementation and administration of the Archaeology Management Plan are provided in Table 33.4-3. The role of Project Archaeologist is likely to be held by a contractor reporting to the Environmental Manager.

Table 33.4-3: Roles and Responsibilities of the Archaeology Management Plan

Role	Responsibilities
Project Archaeologist (Permit Holder) Archaeology Field Director	• Archaeology Branch of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) approved individual. • In cooperation with the Proponent, will be responsible for applying for the required and concurrent heritage permitting (i.e., Section 12.2 and 12.4 permits). • Direct and implement the Project's Follow-up Strategy (i.e., supplemental archaeological impact assessment[s]on un-assessed areas within the Project's footprint under a Section 12.2 HIP). • Inform construction personnel of the significance and location pertinent archaeological resources within the Project footprint (e.g., archaeological awareness training). • Direct and implement all of the supplemental and required inspection or investigative requirements (to be defined with guidance from the B.C. Archaeology Branch and applicable Indigenous Communities) under a Project-, phase, or site-specific Section 12.2 HIP. • Direct and monitor all construction and ground altering works within and immediately adjacent to recorded archaeological sites until the extent of the cultural horizon has been surpassed and ensure that approved methodology and conditions stipulated by the HCA permit(s) are met. • Direct and implement mitigative requirements (e.g., salvage screening, transport of archaeologically-pertinent sediment, capping of an archaeological site) under a Project-, phase-, or site-specific Section 12.4 SAP. • Complete required site updates, interim and final reporting as required under Project-, phase, or site-specific heritage permitting. • Surrender all collected archaeological materials (e.g., lithics, faunal remains) to the designated repository (e.g., the Ktunaxa Nation Regional Repository [Cranbrook, B.C.]). • Update the Archaeology Management Plan as required. • Archaeology Branch (FLNRORD) approved individual(s) who can be delegated by the Project Archaeologist and, in the absence of a Project Archaeologist, can be made responsible for all of the aforementioned responsibilities.
Archaeological Technician	• Implementation of archaeological inspection, investigation, or monitoring obligations under the direction of a Project Archaeologist or Field Director and as stipulated by the applicable and concurrent Section 12.2 and 12.4 permits.
Indigenous Community Representative	• Assigned representative(s) of interested or impacted Indigenous nation who will actively participate in the archaeological inspection(s), investigation(s), and any pertinent mitigative and monitoring obligations. • Oversight of construction activity, archaeological inspection, investigation and mitigation requirements in regard to Best Practices (i.e., KNC, 2020a; SIB, 2019) and reporting back to their affiliated administrative position(s).

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the Archaeology Management Plan. • Ensure that construction activity is in compliance with heritage permitting. • Report to contraventions to archaeological resources as required.
Project Construction Manager	• Implement and ensure compliance with the Archaeology Management Plan during Project construction. • Schedule equipment and operators as required to facilitate archaeological inspection, investigation and monitoring requirements. • Ensure completion of archaeological awareness training by all employees and contractors.
NWP Mine Manager	• Implement and ensure compliance of the Archaeology Management Plan during Project operations. • Ensure completion of archaeological awareness training by all employees and contractors. • Oversee construction personnel involved in work within an archaeological site(s).
Security Personnel	• Limit access to Project areas following a Chance Find, as required. • Contact local law enforcement authorities for assistance, as required.
All employees and contractors	• Complete archaeological awareness training. • Compliance with the Archaeology Management Plan.

33.4.1.2.6 Mitigation and Protection Measures

Project-Specific Mitigation

The archaeological inventory within the Project footprint is comprised of 15 pre-contact archaeological sites. Through Project design, multiple archaeological sites were avoided and protection strategies to avoid inadvertent disturbance to these sites are detailed below. Although implementing avoidance strategies is preferred, circumventing 15 recorded archaeological sites (Table 33.4-4) is currently considered unfeasible, and impacts to each site are anticipated during development; therefore, appropriate mitigation strategies are provided below. Note that this list of archaeological sites may not be exhaustive based on the results of the follow-up program (Chapter 16, Section 16.6).

Table 33.4-4: Recorded Pre-contact Archaeological Sites within the Project Footprint

Archaeological Site	Site Type	Site Dimensions
DlPr-8	Pre-contact, Cultural Material, Surface/Subsurface Lithics, Faunal, and Fire-Altered Rock Pre-contact, Ancestral Remains (burial mounds)	±656 m x 495 m
DlPr-80	Pre-contact, Cultural Material, Subsurface Lithics and Faunal	±29 m x 10 m
DlPr-83	Pre-contact, Cultural Material, Subsurface Lithic	5 m x 5 m
DlPr-84	Pre-contact, Cultural Material, Subsurface Lithic	5 m x 5 m
DlPq-10	Pre-contact, Cultural Material, Subsurface Fire-Altered Rock and Faunal Remains	±20 m x 13 m
DlPq-13	Pre-contact, Cultural Material, Subsurface Lithics	16 m x 15 m

Archaeological Site	Site Type	Site Dimensions
DlPr-42	Pre-contact, Cultural Material, Surface/Subsurface Lithics, Fire-Altered Rock, and Faunal Remains Pre-contact, Ancestral Remains (burial mounds)	±700 m x 200 m
DlPr-43	Pre-contact, Cultural Material, Surface/Subsurface Lithics	±248 m x 145 m
DlPr-46	Pre-contact, Cultural Material, Subsurface Lithics, Faunal Remains and Fire-Altered Rock	±295 m x 143 m
DlPr-68	Pre-contact, Cultural Material, Subsurface Lithics	±32 m x 24 m
DlPr-75	Pre-contact, Cultural Material, Surface/Subsurface Lithics, Faunal Remains and Fire-Altered Rock	610 m x 190 m
DlPr-78	Pre-contact, Cultural Material, Subsurface Lithics	5 m x 5 m
DkPq-16	Pre-contact, Cultural Material, Subsurface Lithics	5 m x 5 m
DkPq-17	Pre-contact, Cultural Material, Surface/Subsurface Lithics & Fire-Altered Rock	5 m x 5 m
DkPq-18	Pre-contact, Cultural Material, Subsurface Lithic	±213 m x 121 m

Upon notification by the Proponent that construction activities are about to commence under applicable heritage permitting, the Project Archaeologist(s) or Field Director will confirm previously delineated site areas (including an appropriate buffer zone). Site identification strategies may include flagging tape or the placement of barriers (e.g., pylons, wooden stakes, saw-horses) around the periphery of the site(s) to assist construction personnel in identifying and avoiding these areas during construction.

Prior to the commencement of ground disturbing activity within or in proximity to recorded archaeological site(s), a tailgate meeting involving the Project Archaeologist(s) or Field Director, and all construction personnel working within the locality, will occur to clarify the protection and mitigation measures detailed below. In collaboration with construction personnel, the Project Archaeologist(s) or Field Director will determine feasible construction methods that are in accordance with methodology (e.g., depth and reach of mechanical pulls and sampling amounts) stated within heritage permitting and Best Practices (Section 33.4.1.2.4).

Before the onset of construction activity, the Follow-Up Strategy (i.e., supplemental archaeological assessment[s] on un-assessed terrain with the Project footprint) will be completed. Additionally, supplemental inspection and investigation of all 15 sites, to be conducted under applicable heritage permitting, will be required to ensure that a thorough understanding of the archaeological sites is had and adequate (i.e., representative) artifact assemblages with contextual information have been obtained. The extent of the pre-construction inspection and investigation of the 15 sites within the Project footprint cannot be detailed within this version of the Archaeology Management Plan, due to the dynamic state of the mitigative process, based in part on evolving legislation (i.e., *HCA*) and Indigenous consultation requirements.

Implementing Construction within Archaeological Sites within the Project Footprint

Based on the anticipated impacts on 15 pre-contact archaeological sites (Table 33.4-4) by the Project, the following mitigation measures are provided to salvage archaeological materials (i.e., artifacts) and pertinent contextual information under applicable heritage permitting.

Construction will involve impacts to the ground surface, the fine sediment cap, and any underlying matrices, and therefore a Project Archaeologist or Field Director must be on site during alteration of the fine sediment cap that has been confirmed or has the potential to contain the pre-contact cultural horizon (i.e., sediment containing or having the potential to contain pre-contact archaeological artifacts or features). On occasion, a Project Archaeologist(s) or Field Director may not be required on site during construction activity; this is if they have deemed that a sufficient amount of archaeological inspection has been completed (i.e., sampling inspection has met the conditions of the applicable heritage permitting), machinery operators have fulfilled the archaeological training component, are competent to carry out the tasks required and aware of site-specific constraints, and a follow-up visit to the locality, site, or road segment in question is planned by a Project Archaeologist or a Field Director.

The Project Archaeologist(s) or Field Director, in cooperation with the Construction Manager, will direct, observe, and assess ground alterations until the extent of the pre-contact cultural horizon has been surpassed within a locality that encompasses an archaeological site(s). In-field archaeological direction may include but is not limited to determining the depth and length of mechanical excavation (e.g., segregated windrows through multiple passes [grader or bulldozer] or side-cast in discrete piles [excavator]) and identifying adequate location(s) for side-cast sediment to facilitate subsequent archaeological inspection (i.e., sample or complete mitigative screening).

Should a relatively dense and/or uniquely intact, scientifically- or culturally-significant archaeological deposit(s) be encountered during monitoring, construction activities in the vicinity of the discovery location will temporarily suspended to allow for subsequent archaeological mitigation (i.e., systematic data recovery) via manual investigation (e.g., excavation of evaluative unit[s]). In the event that a culturally-sensitive archaeological deposit (e.g., ancestral burial) is inadvertently exposed, an indefinite halt to construction activity in the vicinity of the discovery location may be required. Construction activity will only continue upon the completion of a manual investigation or based on approval provided by the Project Archaeologist(s) or a Field Director.

Upon the conclusion of archaeological inspection(s), monitoring activity within a delineated site area (in cooperation with the Construction Manager) will shift to the determination of a final depositional location(s) for archaeologically-pertinent sediment that contains or is suspected to contain the pre-contact cultural horizon. All archaeologically-pertinent sediment is required to be retained within, or immediately adjacent to previously or updated delineated site boundaries and requires official documentation (detailed mapping) to fulfill conditions of the applicable heritage permitting. Note that any sediment that requires removal from the immediate locality of an archaeological site(s) will require 100% inspection via raking and/or screening through 6 mm (1/4”) mesh to ensure that archaeological materials are not present and inadvertently re-deposited elsewhere within or adjacent to the Project and resulting in the creation of an undocumented archaeological site.

The mitigation of pre-contact archaeological sites encompassed by the Project may require the development of adaptive strategies. If required, adaptive strategies that are not identified within the Archaeology Management Plan, will be developed in conjunction with the Project Archaeologist(s) or Field Director and Construction Manager, and have consideration for the location(s) of an archaeological site(s) and various engineering, development, and/or seasonal constraints. Adaptation of methodologies or conditions stipulated by a heritage permitting may require approval, in the form of a permit amendment, by the B.C. Archaeology Branch.

Protection of Archaeological Sites

As currently defined by the baseline archaeological assessment (Appendix 16-B; Tamasi, 2021; Tamasi and Sherwin, 2021), 23 pre-contact archaeological sites are recorded in proximity to the Project, but do not overlap with the Project footprint (Table 33.4-5). Although negative impacts to the archaeological sites are not anticipated, the following protocol is provided to mitigate inadvertent disturbance. As currently recorded, all 23 sites consist of relatively sparse, subsurface artifact scatters, and are indicative of extensive use of the Alexander Creek and Grave Creek watersheds for millennia.

Table 33.4-5: Recorded Pre-contact Archaeological Sites in Proximity to the Project Footprint

Archaeological Site	Site Type	Site Dimensions
DkPr-12	Pre-contact, Cultural Material, Surface Lithics and Fire-Altered Rock Pre-contact, Feature, Petroform (cairn)	±135 m x 36 m
DkPr-13	Pre-contact, Cultural Material, Surface Lithics and Fire-Altered Rock	±111 m x 85 m
DkPr-18	Pre-contact, Ancestral Remains (burial mound)	±25 m x 25 m
DkPr-34	Pre-contact, Cultural Material, Subsurface Lithics and Fire-Altered Rock	±132 m x 83 m
DkPr-35	Pre-contact, Cultural Material, Subsurface Lithics and Fire-Altered Rock	±20 m x 14 m
DkPr-36	Pre-contact, Cultural Material, Surface Lithics	±21 m x 18 m
DkPr-37	Pre-contact, Cultural Material, Subsurface Lithics	±18 m x 13 m
DkPr-38	Pre-contact, Cultural Material, Subsurface Lithics	±37 m x 10 m
DkPr-39	Pre-contact, Cultural Material, Subsurface Lithics	±34 m x 28 m
DlPr-81	Pre-contact, Cultural Material, Subsurface Lithics	±19 m x 12 m
DlPr-82	Pre-contact, Cultural Material, Subsurface Lithics and Fire-Altered Rock	±220 m x 144 m
DlPr-85	Pre-contact, Cultural Material, Subsurface Lithics, Faunal, and Fire-Altered Rock Pre-contact, Ancestral Remains (burial mounds)	±146 m x 80 m
DkPq-19	Pre-contact, Cultural Material, Subsurface Lithics	±15 m x 10 m
DkPq-20	Pre-contact, Cultural Material, Subsurface Lithics and Faunal Remains	±34 m x 10 m
DlPq-8	Pre-contact, Cultural Material, Surface/Subsurface Lithics and Fire-Altered Rock	±470 m x 40 m
DlPq-11	Pre-contact, Cultural Material, Subsurface Lithics	±13 m x 9 m
DlPq-12	Pre-contact, Cultural Material, Subsurface Lithics and Ceramic Sherds	±66 m x 10 m
DlPq-13	Pre-contact, Cultural Material, Subsurface Lithics	±16 m x 15 m
DlPr-65	Pre-contact, Cultural Material, Subsurface Lithic and Fire-Altered Rock	5 m x 5 m
DlPr-66	Pre-contact, Cultural Material, Subsurface Lithic	5 m x 5 m

Archaeological Site	Site Type	Site Dimensions
DlPr-67	Pre-contact, Cultural Material, Subsurface Lithic	5 m x 5 m
DlPr-75	Pre-contact, Cultural Material, Surface/Subsurface Lithics, Faunal Remains and Fire-Altered Rock Pre-contact, Cultural Material, Surface, Quarry	±610 m x 190 m
DlPr-76	Pre-contact, Cultural Material, Subsurface Lithics	±19 x 10 m
DlPr-77	Pre-contact, Cultural Material, Subsurface Lithics	±23 m x 6 m
DkPq-11	Pre-contact, Cultural Material, Surface Lithic	±30 m x 15 m
DkPq-16	Pre-contact, Cultural Material, Subsurface Lithics	±106 m x 60 m

Protecting Archaeological Sites Located Adjacent to the Project

To reduce the potential for inadvertent impacts to pre-contact archaeological sites that are in proximity to the Project, all construction equipment must stay within the identified (i.e., staked) boundaries of the Project. Although a thorough Archaeological Impact Assessment (AIA) was previously completed on the Project (Tamasi, 2021; Tamasi and Sherwin, 2021), there is potential for undiscovered pre-contact artifacts to be present in a subsurface context within the Project area. In the event that an archaeological artifact, feature, or dense cultural deposit is inadvertently exposed or identified by construction personnel, the Chance Find Procedure (Section 33.4.1.2.7) will be enacted.

Periodic surveillance of mechanical activity and implemented ground disturbance beyond recorded archaeological sites will be conducted at the discretion of the Project Archaeologist(s) or Field Director; this is to ensure that any inadvertently exposed and unidentified archaeological material is handled appropriately and adheres to Best Practices, Chance Find Procedure, and methodology and conditions of heritage permitting.

33.4.1.2.7 Incident Response

Although baseline archaeological assessment has been completed on the Project footprint (i.e., Tamasi 2021; Tamasi and Sherwin 2021), and a Follow-up Strategy (i.e., supplemental archaeological assessment) has been defined, it is possible for previously undiscovered artifacts and site areas to be encountered inadvertently through the implementation of the Project and in the absence of a Project Archaeologist or Field Director.

To ensure that personnel working on the Project are aware of the presence and significance of pre-contact archaeological sites on the Project, an archaeological awareness orientation(s) will be required prior to the commencement of ground-altering work within portions of the Project footprint that contain a known archaeological site(s). The orientation(s) must include any pertinent contractors, construction personnel, and the Project Archaeologist(s) or Field Director, who will discuss aspects of the regional archaeological record and review the Archaeology Management Plan, including conditions of the Section 12.2 and 12.4 permits and the Chance Find Procedure. Documentation of the meeting(s) will be kept on file by the Project Archaeologist(s), Prime Contractor, and the Proponent. Should new employees or contractors be assigned to this Project, an abbreviated meeting (e.g., tailgate meeting) will be required to ensure adequate comprehension of pre-contact archaeology as it pertains to the Project.

Chance Find Procedure

In the event that construction personnel encounter archaeological resources (either suspected or confirmed), the following response is required. Note that emergency management procedures for suspected human remains are presented separately below.

- The construction crew must immediately halt all construction in the vicinity of the discovery and notify the Construction Manager;
- The Construction Manager must contact the Project Archaeologist(s) or Field Director; based on a telephone description of the incident, the Project Archaeologist may decide that there are no further concerns, allowing construction to continue as planned; or
- A field visit by the Project Archaeologist(s) or Field Director may be required. In this case, the environmental monitor will notify the Mine Manager, and the appropriate Indigenous Communities. A suitable response will be established in consultation with all interested parties. It may be possible for construction to continue at another location during this time.

In consultation with the Proponent and applicable Indigenous Communities, the Project Archaeologist(s) and/or the Field Director will consider the following in how to proceed:

- Avoidance of archaeological site(s) and/or features (e.g., ancestral remains) through adaptive, site-specific recommendations that may result in partial or complete Project redesign or relocation. This approach, if/where feasible, will be implemented to minimize impacts to the archaeological site(s) and is the preferred option from a site management perspective. Appropriate protection measures will be identified on a site-specific basis and reported on with the subsequent reporting to fulfill conditions of heritage permitting; and
- Should avoidance strategies not be feasible, the development of adaptive strategies by the Project Archaeologist(s) or Field Director may be required; this includes, but is not limited to, revising archaeological monitoring strategies that are still in accordance with methodologies stipulated within the applicable heritage permitting. Alternatively, emergency archaeological excavation under amended heritage permitting may be necessary if an archaeological discovery is situated beyond (≥50 m) previously defined or any updated site areas. In the event a permit amendment is required, a delay in construction activity may occur, regardless if “systematic data recovery” is required.

Discovery of Human Remains

The Proponent will be familiar with the Archaeology Branch Found Human Remains Policy (FLNRORD, 1999), which is summarized below. It must be recognized that the appropriate course of action may differ depending on whether remains are found in an undisputed pre-contact archaeological context (e.g., with artifacts) or are contemporary (i.e., forensic).

If the Proponent or contractors have any concerns about possible archaeological or ancestral burial locations, applicable Indigenous Communities, along with the Project Archaeologist, will be contacted for direction.

Human Remains - Fortuitous Discovery

In the event that human remains are inadvertently exposed in the absence of a Project Archaeologist and/or Field Director, the following procedure, as stipulated by the Archaeology Branch (FLNRORD, 1999), is applicable:

- Immediately halt construction in the vicinity of the remains;
- Contact the Mine Manager;
- Secure discovery location by erecting physical barriers and restrict visual exposure to employees, contractors or the general public;
- Contact the local Coroner's office and policing agency (i.e., Royal Canadian Mounted Police [RCMP]);
- Should the Coroner's Office determine the remains are not of a forensic nature, the Archaeology Branch and the Project Archaeologist will be contacted to facilitate disposition of the remains;
- If the remains are determined to be of Indigenous ancestry, the Archaeology Branch will attempt to contact the relevant Indigenous community(s);
- Generally, if remains are still interred and are under no immediate threat of further disturbance, they are to remain in place and will not be excavated or removed;
- If the remains have been partially or completely removed, the Archaeology Branch will facilitate disposition through discussions with applicable Indigenous Communities;
- If removal of the remains is determined to be appropriate, they will be removed under authority of a permit issued pursuant to Sections 12.2 and/or 12.4, or an order under Section 14 of the HCA, respecting the expressed wishes of the cultural group(s) represented to the extent this may be known or feasible; and
- The removal of human remains, and subsequent reburial may require additional permits, and may involve ceremonies or procedures that could delay construction.

Human Remains - Discovery during Permitted Archaeological Projects

In the event that human remains (ancestral or forensic) are encountered over the course of a permitted project (e.g., inspection, investigation, monitoring or systematic data recovery within the Project footprint) and in the presence of a Project Archaeologist and/or Field Director, the following procedure, as stipulated by the B.C. Archaeology Branch (FLNRORD, 1999), must be followed:

- The assigned Project Officer at the Archaeology Branch will be contacted as soon as possible;
- The remains are to be handled in accordance with the methods specified in the permit, respecting concerns of Indigenous community representatives in-field and protocols provided by local Indigenous Communities, to the extent that these may be known or feasible; and
- Analysis of the discovery will be limited to basic recording and in-field observations, until consultation between the Archaeology Branch and appropriate Indigenous Communities has been concluded and disposition of the remains has been determined.

33.4.1.3 Ecological Restoration Plan

33.4.1.3.1 Introduction

NWP is committed to creating a post-mine environment that is ecologically diverse, biologically productive, and broadly mimics local natural ecosystems using advanced techniques in ecological restoration. The Ecological Restoration Plan (ERP) for the Project is designed to provide guidance on

creating and sustaining healthy and biodiverse ecosystems before and during mine closure. The ERP outlines efforts for biomass and soil salvage in the Construction and Pre-Production phase, soil and biomass storage through the Operations phase, and replacement of soils and biomass during both the Operations and Reclamation and Closure phases. Revegetation with native species will be guided by an interpretation of the post-mine environment by means of a post-mine terrestrial ecosystem map (TEM) that takes elevation, aspect, slope steepness, slope position, and proximity to surface water into account. Culturally important species are included in the revegetation prescription. The ERP was developed with the intention of fostering long-term dialogue with the Ktunaxa Nation, the provincial and federal governments, as well as key stakeholders.

The Project-specific post-mine TEM has been developed to detail the projected post-mine environment functioning and successional trajectory as well as to guide the selection of appropriate species to revegetate areas of disturbance. The post-mine TEM accounts for factors such as elevation, aspect, soil, and plant ecology, and as such, provides a framework for post-mine reclamation. The post-mine TEM relates to the baseline TEM and the local Biogeoclimatic Ecosystem Classification (BEC) by MacKillop et al. (2018) to ensure that locally adapted species are selected for reclamation and the post-mine ecosystems mimic natural ecosystems.

Revegetation (reclamation) activities will begin during the Operations phase, soon after stable topography is created within the mine footprint and will proceed progressively as the area of stable topography grows during the Operations phase. Revegetation is planned to start in Year 6 of the Operations phase, with other revegetation taking place in Years 8, 10, 11, and 15 of the Operations phase and continuing into the Post-Closure phase. Throughout the Construction and Pre-Production and Operations phases of the Project, changes to the landscape will include vegetation removal and grubbing, soil salvaging, infrastructure construction, open pit overburden and coal excavation and transportation, mine rock placement, and ecological restoration (creation of stable landforms, microtopography creation, soil and large woody debris replacement, propagation of reclamation vegetation and out-planting/seeding). Progressive reclamation activities will begin to occur during the Operations phase, as mining progresses and the mine layout achieves final configuration and is subject to no further disturbance. The progressive restoration over the course of the Project allows for vegetation to establish as soon as possible in disturbed areas and for primary succession to re-establish the ecological processes found in the local undisturbed ecosystems. The progressive approach also allows for adaptive refinement of restoration treatments. Another priority in reclamation of the Project footprint is that soil will be salvaged wherever soil conditions are suitable both in terms of operational feasibility of salvage operation and soil properties to provide a good growing medium.

The ERP is a conceptual plan that will be updated to include additional site-specific details and refined end land use objectives prior to construction, as needed, and throughout the mine permitting phase. NWP is committed to continuously improving the ERP throughout the life of the Project through the use of specific restoration planning for post-mine ecosystems and environmental protection measures outlined in the ERP.

33.4.1.3.2 Scope and Objectives

The ERP focuses on the practices and procedures to create the most suitable conditions for the creation of a biologically diverse post-mine environment such as slope recontouring, the replacement of topsoil

and woody debris, the creation of biodiversity features, and the revegetation of the landscape with native and culturally important plant species. The ERP applies to all areas of disturbance resulting from Project construction and operation, open pits, and Mine Rock Storage Facility areas.

The Project footprint will be reclaimed to as natural a state as practical upon completion of mining activities. Implementation of the ERP will allow for successful natural processes in reclaimed areas and for those areas to mimic undisturbed ecosystems in as short a time as possible. In general, the goal of reclamation is to restore, where practicable, the equivalent land capability so that end land use objectives can be achieved.

The objectives of the ERP include:

- Define the regulatory requirements, roles and responsibilities and reporting requirements associated with the ERP;
- Outline the framework and prescription for onsite reclamation activities including slope recontouring of post-mine areas, soil salvage and replacement, woody debris salvage and placement, as well as revegetation;
- Describe the necessary measures and management practices to implement the ERP with the goal of achieving a diverse and productive reclaimed post-mine environment; and
- Align with site closure plans as outlined in the Landform Design and Reclamation Plan (Section 33.4.1.6).

Current land use surrounding the proposed Project site is predominantly wildlife habitat and recreational use for hunting, fishing, horseback riding, biking, hiking, all-terrain vehicle use, and camping. There is also commercial forestry within the Alexander and Grave Creek drainages and throughout the Elk Valley and established coal mining operations in the Elk Valley.

The end land use objectives of the ERP aim to restore the pre-existing landscapes and uses, and include:

- Create a vegetation mosaic of coniferous forest, open alpine tundra, rock outcrops, shrub and graminoid dominated brushland, talus slopes, wetlands, and riparian areas;
- Establish habitat capability for key wildlife species, such as elk, moose, mountain goat, and bighorn sheep;
- Create areas for hunting, trapping and other recreation uses;
- Include culturally important species; and
- Enhance the distribution of the critically endangered whitebark pine (*Pinus albicaulis*) by cone collection of potentially naturally rust resistant trees, screening for resistance to the white pine blister rust, propagation, and out planting of these resistant trees over a large area of the reclaimed mine where environmental conditions are conducive.

General details of the Project ERP are provided in Section 33.4.1.3.5.

33.4.1.3.3 Regulatory Requirements

Applicable federal and provincial legislative requirements applicable to restoration of the Project site following mining are provided in Table 33.4-6.

Table 33.4-6: Federal and Provincial Regulatory Requirements for Reclamation and Closure

Regulation/Policy	Year	Applicable Regulations or Permits
Federal Legislation		
Fisheries Act	1985	The *Metal and Diamond Mining Effluent Regulations* require that closure activities be conducted in a manner that prevents introduction of substances into the receiving environment that may have deleterious effects on fisheries resources. Though the Project is not subject to these regulations, they do provide an indication of the possible requirements associated with the draft *Coal Mining Effluent Regulations* recently proposed.
Environmental Protection Act	1999	The Environmental Code of Practice provides objectives for mine closure relating to public and wildlife safety, storage of waste rock and tailings, sustainability and the prevention or minimization of environmental impacts, and reclamation for desired end land use.
Provincial Legislation		
Mines Act	1996	Section 10 requires mining operations to carry out a program of environmental protection and reclamation to return areas disturbed by mining operations to pre-mining land use and capability. Permit applications must include a plan outlining the details of the proposed work and a program for the conservation of cultural heritage resources and for the protection and reclamation of the land, watercourses and cultural heritage resources affected by the mine. Financial security is required for all, or part of, outstanding costs associated with mine reclamation and the protection of land, watercourses, and cultural resources, including post-closure commitments.
Environmental Management Act	2003	Prescribes requirements for environmental assessment, monitoring, reporting and mitigation measures for environmental protection. There are specific regulations relevant to mine reclamation including contaminated sites, hazardous waste, and spill-reporting regulations.
Health, Safety and Reclamation Code for Mines in British Columbia	2017	Part 10 requires mining operations to carry out a program of environmental protection and reclamation to return areas disturbed by mining operations to pre-mining land use and capability (British Columbia Ministry of Energy and Mines, 2021). Provides standards for long-term stability of mining disturbances, as well as requiring that land and watercourses be reclaimed to resemble the topography and ecology of adjacent areas. States that reclamation must occur in a manner that preserves water quality in the receiving environment and that monitoring programs be conducted to demonstrate reclamation success and environmental protection.
Forest Act	1996	Authorizes the cutting of timber on Crown Land through an Occupant License to Cut.
Water Sustainability Act	2014	Requires protection of habitat and water quality.
Standards and Best Practices for Instream Works	2004	Provides best management practices to avoid causing damage to instream habitat during construction (British Columbia Ministry of Water, Land, and Air Protection, 2004).

33.4.1.3.4 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the ERP are provided in Table 33.4-7.

Table 33.4-7: Responsibilities for the Ecological Restoration Plan

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the ERP, including meeting commitments to implement the reclamation research and monitoring programs. • Manage and implement environmental inspections, audits and on-site monitoring programs. • Manage the implementation of the revegetation plan, practice adaptive management through ERP research and monitoring programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate response to and effective remediation of environmental incidents, including spills. • Report to applicable regulatory agencies, as required. • Update the ERP, as required.
Project Construction Manager	• Implement compliance with the ERP during Construction and Pre-Production, particularly in regards to soil and biomass salvaging, taking guidance from the Soil Management Plan (Section 33.4.1.9). • Designate soil and biomass storage areas during Construction and Pre-Production. • Facilitate completion of environmental awareness training by all employees and contractors.
NWP Mine Manager	• Implement compliance with the ERP during Operations. • Designate soil and biomass storage areas during Operations. • Implement environmental awareness training by all employees and contractors. • Manage personnel resourcing for mine closure related activities. • Participate in environmental incident investigations.
Health and Safety Manager	• Manage health and safety of personnel during activities such as slope recontouring, soil replacement and revegetation. • Lead environmental incident investigations. • Complete health and safety investigations related to the activities outlined in this plan. • Implement the Mine Emergency Response Plan (Section 33.4.2.2), as required.
First Aid Personnel	• Apply first aid to personnel, as required. • Mobilize emergency transportation of personnel, as required.
Security Personnel	• Limit access to Project site when activities such as slope recontouring are taking place, as required. • Contact local law enforcement authorities for assistance, as required.
All employees and contractors	• Complete environmental awareness training. • Comply with the ERP.

33.4.1.3.5 Ecological Restoration Plan

Restoration Research Program

A research program will be established prior to the Construction and Pre-Production phase and implemented over the course of the Project to evaluate the effectiveness of environmental protection measures specific to the ERP and the success of the restoration objectives, such as the post-mine TEM and related site-specific ecological restoration. The Restoration Research Program will be carried out as part of a monitoring program over the course of the Project, focusing on an adaptive management approach to restoration of the mine site.

As part of the research program, small scale trials will be carried out initially through soil salvage and soil storage activities. A small area within the Project footprint will be designated for restoration trials, initially including some of the treatment suggested in the following paragraph. Soil stockpile storage will also be subject to trials of alternate treatments such as seeding with a variety of species, mulching with wood chips use of tackifiers or soil stabilizers. A detailed research plan will be provided during the permitting process of the Operations phase.

Components of the Restoration Research Program may include but not be limited to evaluation of the following elements of the ERP and restoration objectives:

- Plant species trials including planting into different substrates;
- Comparison of seeding to planting of plugs;
- Pelletized versus non-pelletized seed;
- Layering versus mixing of salvaged soil; and
- Incorporation of smaller diameter woody debris into subsoil, chipping vs. mixing while whole incorporation of coal parent material into till to differing ratios and placing this material on a variety of aspects.

Environmental Protection Measures

The Project ERP provides a range of environmental protection measures that will be implemented to reduce and mitigate on-site environmental changes (e.g., changes in soil quality and quantity, ecosystems, and terrain features) and to avoid or reduce potentially adverse off-site environmental changes (e.g., erosion and sedimentation) over the course of restoration activities. The environmental protection measures detailed in the ERP will be further refined and detailed throughout the Project permitting process. Environmental protection measures will be used in tandem with various management and monitoring plans established for the Project, including but not limited to:

- Soil Management Plan;
- Site Water Management Plan;
- Erosion and Sediment Control Plan;
- Wildlife Management and Monitoring Plan;
- Vegetation and Ecosystems Management and Monitoring Plan;
- Spill Prevention, Control, and Countermeasures Plan;
- Air Quality and Greenhouse Gas Management Plan;
- Fish and Fish Habitat Management; and
- Landform Design and Reclamation Plan.

Biomass Salvage

Merchantable timber will be removed by conventional logging, (or push-over harvest, to facilitate removal of root systems prior to soil salvage), under an Occupant License to Cut for the Project. If merchantable timber is conventionally harvested, root systems will be extracted mechanically prior to soil salvage. All non-merchantable tree harvest will be accomplished by push felling to allow for more efficient and thorough soil salvaging. Push felling will also allow for more efficient salvage of tree root material to serve as structure to create sheltered microsites for vegetation establishment and micro-topography diversity. Biomass without commercial value to the forest industry will be salvaged through:

1. Non-commercial logging where material is removed and stored as logs; and
2. Smaller woody material will be push-felled and stored separately for subsequent incorporation into the salvaged subsoil.

Additional treatments of incorporating woody debris into the soil salvage, such as breaking up the wood or chipping to allow for efficient handling by equipment, will be investigated in the Restoration Research Program.

Soil Salvage

Soils within the Project footprint will be salvaged where it is operationally feasible and safe (i.e., sufficient depth and suitable terrain). Seasonality is key to successful soil salvage both in terms of safety and productivity. As such, soils will be salvaged in relatively dry conditions to minimise the risk of compaction upon placement but not so dry that soil loss occurs through fugitive dust.

Prior to soil salvage activities there will be a resource identification process that uses the existing soil mapping, supplemented with field surveys, to locate:

- Soils that are best suited as topsoil and should be segregated from lower productivity soils;
- Soils that would benefit from mixing with biomass or higher productivity soil;
- Soils with relatively low albedos that should not be placed on warm aspects or should be mixed with higher albedo soils; and
- Other soil conditions that may warrant special storage or manipulation before final replacement.

Soils will be stripped with a combination of excavators and dozers and windrowed to facilitate loading and hauling. Soils in the productive upper soil will be salvaged separately from the underlying parent material. Based on soil mapping of the Project footprint, developed (and hence more productive) soil is found to a depth of about 60 centimetres (cm) with parent materials occurring below this depth. The upper approximately 60 cm of soil will be stripped and stored separately from the underlying salvaged soil. The parent soil material (>60 cm depth) will be stripped either to bedrock or where unconsolidated rock becomes dominant over < 2 millimetres (mm) particle size soil (coarse fragment content exceeds 50%). Soil salvage will occur where soil is disturbed as a result of Project activities, including areas outside of the main mine area, such as footings for the conveyor and powerline towers and the road and area for the explosives storage facility. Salvaged soil in these smaller disturbances will be stored locally for replacement in the Reclamation and Closure phase.

There are extensive areas of coal-derived soils that may be salvaged at the upper elevations of Crown Mountain (main Project footprint). The moisture holding capacity of the coal-derived subsoil is relatively poor. For Project restoration activities, there is potential to mix the coal-derived subsoils with till

(morainal) parent material to increase the moisture holding capacity of the coal-derived soil while adding a humic acid source to the till. An additional benefit of mixing the coal-derived subsoil with till parent material is that the resultant soil material will be a lighter color than the coal-derived soil. On warm aspect slopes, soil temperatures can become limiting to plant growth on coal-derived soil (J. Przeczek, pers. comm. May 3, 2021). Testing the effect of this soil mixing on reclaimed vegetation productivity will be evaluated as part of the Restoration Research Program.

Soil and Biomass Storage

Designated areas for long and short-term soil and biomass storage (Figure 33.4-1, Figure 33.4-2) will be established. During the Operations phase, salvaged soil storage will occur temporarily in areas not actively mined. Soil stockpiles will be constructed in lifts (layers) with a maximum of 3 horizontal:1 vertical (33%) slopes to a maximum height of 15 metres (m) to stabilize the stockpile and reduce the potential for slumping or failure. The stockpile surfaces will be loosely constructed to produce surface roughness, protectively matted or tackified when required, and revegetated to limit erosion from wind, snow melt, and precipitation.

Revegetation of stockpiles will enhance soil organic matter accumulation over time. Revegetation will be done using species that do not have persistently viable seed, to reduce the potential for seed germination after salvaged soil has been placed for use in site restoration. Stockpiles will be revegetated in the spring or fall, as soon as possible following their establishment to achieve a stable vegetation cover. Natural revegetation is anticipated to supplement the initial revegetation measures.

Best management practices will be implemented for stockpiles, such as at the toe of the stockpiles (e.g., silt fencing, bale barriers), to limit the loss of fines by erosion. Perimeter ditching will also be constructed around the stockpiles to capture erosion and direct runoff around the stockpiles from uphill sources. Stockpiles will be monitored such that eroded areas can be addressed as soon as practical; the stockpiles will also be monitored for vegetation establishment, control of invasive species and sediment release.

Stockpiles of biomass material will be placed adjacent to soil stockpiles. Some of the biomass material may be stored on top of soil stockpiles in order to stabilize the soil stockpiles, if feasible.

Soil and Biomass Placement

Upon establishment of stable post-mining landforms, anticipated to begin in Year 6 of Operations phase, the created landforms will be covered with salvaged soil. The following strategies will be used for soil and biomass placement:

- Gently sloping (<25% slope) terrain will have subsoil (parent material) laid down first and then be capped with an upper soil horizons to a total depth of about 30 cm;
- Steeply sloping terrain (>25% slope) will have the upper and subsurface soils mixed before placing on the mine rock landform and placed to a depth of approximately 30 cm;
- Dark-colored salvaged soil material will not be placed on warm-aspect sloping ground to avoid creating temperature stress;
- Surfaces covered with salvaged soil will be roughened to create microtopography (approximately 50 to 100 cm relief) across restored areas;
- Surfaces will be loosened by ripping if they are compact and may provide a barrier to root or water infiltration;

Crown Mountain Coking Coal Project

Figure 33.**4-1**
Long-term Soil Storage Locations

LEGEND

- Project Footprint
- Soil Stockpile Area
- Arterial/Collector Road
- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- British Columbia/Alberta Border

0 1 2
Kilometres

N W E S

Scale 1:42,000

Map Drawing Information:
Data Provided By NWP Coal Canada Ltd, Dillon Consulting Limited, Province of British Columbia GeoBC Open Data, Government of Alberta Open Data, Natural Resource Canada.
Imagery Provided By GeoBC OrthoImagery (Aug 2016).

Map Created By: JFC
Map Checked By: LKD
Map Coordinate System: NAD 1983 UTM Zone 11N

NWP Coal Canada Ltd

Project: 12-6231
Status: FINAL
Date: 2022-04-11

Document Path: \\42dillon\CAD\GIS\2012 and Prior\126231 Crown Mountain\EA_Report\Miscellaneous\126231_MS_LongTermSoilStorageLocations.mxd

652000 654000 656000 658000 660000 662000 664000

5524000 5522000 5520000 5518000 5516000

Harriet Lake
Grave Lake
Lower Elk Valley Road
Grave Creek Road
Grave Creek
Elk River
Hazel Creek
Hamer Creek
North Pit
East Pit
Soil Stockpile Cumulative
Soil Stockpile Cumulative
South Pit
Alexander Creek
Alexander Creek
Elk River

652000 654000 656000 658000 660000 662000 664000

Crown Mountain Coking Coal Project

Figure 33**.4-2**
Year 10 Reclaimed Ecosystem Units and Soil Storage

LEGEND

- Project Footprint
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- British Columbia/Alberta Border
- Infrastructure Year 10
- Water feature
- Wetland

ESSFdk1

- ESSFdk1 Cool Neutral
- ESSFdk1 Gentle
- ESSFdk1 Mine rock veneer, sparse veg
- ESSFdk1 Riparian
- ESSFdk1 Warm

ESSFdkw

- ESSFdkw Cool Neutral
- ESSFdkw Gentle
- ESSFdkw Warm
- ESSFdkw Wind Exposure

Other Features

- Buffer
- Pit Wall

0 1 2
Kilometres

N W E S

Scale 1:42,000

Map Drawing Information:
Data Provided By NWP Coal Canada Ltd, Dillon Consulting Limited, Keefer Ecological Services Ltd., Province of British Columbia
GeoBC Open Data, Government of Alberta Open Data, Natural Resource Canada.
Imagery Provided By GeoBC OrthoImagery (Aug 2016).

Map Created By: JFC
Map Checked By: LKD
Map Coordinate System: NAD 1983 UTM Zone 11N

NWP Coal Canada Ltd

Project: 12-6231
Status: FINAL
Date: 2022-04-11

Document Path: \\42dillon\CAD\GIS\2012 and Prior\126231 Crown Mountain\EA_Report\Miscellaneous\126231_MS_Year10ReclaimedEcosystemUnitsSoilStorageLocation.mxd

- Salvaged soil will be laid down in such a manner that ensures soil compaction does not occur;
- Small diameter salvaged biomass will be incorporated into salvaged soil prior to its placement, with larger amounts being incorporated into the organic-matter-poor subsoil and locations where plants tolerant of higher carbon/nitrogen (C/N) ratios (e.g., black huckleberry) are to be established in vegetation restoration;
- Coarse woody debris (CWD) (i.e., large diameter debris) and tree root wads will be placed on the ground surface in locations where it will function as erosion control, to provide favorable microsites for establishment of vegetation, and provide wildlife habitat, this is especially relevant to areas subject to high winds;
- Greater amounts of CWD will be placed in ecosystems with greater productivity (e.g., cool aspect, lower elevations); and
- Coarse woody debris will be placed in shallow open water wetlands and wetland margins to create habitat diversity and areas of refuge.

The Restoration Research Program will be used to evaluate the above strategies and the success of placing soils using different scenarios of layering or mixing of upper and lower soils layers and the response of revegetation to these different approaches to laying down salvaged soil.

Sediment and Dust Control Measures

Erosion, sedimentation, and dust control measures will be implemented over the course of restoration activities. Details of the Project-specific measures are provided in the Erosion and Sediment Control Plan (Section 33.4.1.4). During restoration, erosion controls will be implemented to achieve the following objectives:

- Conservation of soil quantity and quality;
- Minimizing erosion along access roads and in non-vegetated areas around mine infrastructure;
- Stabilizing exposed erodible materials (with a focus of using native plant species); and
- Minimizing sediment delivery into watercourses.

Dust controls, detailed in the Project-specific Air Quality and Greenhouse Gas Management Plan (Section 33.4.1.1), will be implemented to mitigate emissions from the Project activities. Over the course of the Project and restoration activities, dust may be generated by wind erosion if stockpiled soils have fine sand to silt particle sizes. Dust from soil stockpiles will be mitigation through the following:

- Revegetation of soil stockpiles;
- Apply chipped woody debris as a mulch on stockpiles, as needed;
- Apply soil tackifiers, where needed;
- Place CWD to create breaks in surface wind speeds and sediment traps on slopes; and
- Optimize the shape of the stockpiles to reduce loss in moisture content in the stockpiled soils.

Revegetation and Post-Mine Ecosystems

Areas with direct soil and vegetation impacts as a result of Project will be restored to create self-sustaining ecosystems. Approximately 790 hectares (ha) will be restored within areas of disturbance as a result of Project footprint development (Table 33.4-8). The Project footprint includes approximately 850 ha of direct soil and vegetation impacts with a buffered area that includes potential indirect impacts of approximately 1,300 ha.

Table 33.4-8: Post-Mine Ecosystem Unit Descriptions

Ecosystem Type	Post-mine Ecosystem Units[1]	Restored Area (ha)	Ecosystem Description	Ecosystem Objectives	Successional Trajectory (5-, 25-, 50-, and 100-years Post-Establishment)
High Elevation Forest	• ESSFdk1 Cool Neutral Moderate • ESSFdk1 Gentle • ESSFdkw Cool Neutral Moderate • ESSFdk1 Cool Neutral Steep • ESSFdkw Cool Neutral Steep	214	Low productivity lodgepole pine, subalpine fir, Engelmann spruce, with cottonwood and whitebark pine at appropriate elevations and aspect; moderate crown closure with, mixed shrub, graminoids, and forbs	• Ungulate habitat • Grizzly bear where grouseberry established • Restoration of federally-listed whitebark pine Seed Dispersal Critical Habitat • Pollinator habitat	• Year 5 - graminoid/ forb dominant • Year 25 - open young forest (cottonwood dominated at lower elevations) • Year 50 - mixed open forest • Year 100 - conifer forest, closed canopy, some natural regeneration established in understory, mature canopy structure developing
Grassland	• ESSFdk1 Warm Moderate and Steep • ESSFdkw Warm Moderate and Steep • MSdw Warm • ESSFdkw Wind Exposure	181	Graminoid dominated, dry shrubs, at lower elevations with few scattered trees	• Ungulate habitat • Small mammal and carnivore habitat • Pollinator habitat • Restoration of federally-listed whitebark pine Seed Dispersal Critical Habitat	• Year 5 - sparse grassland • Year 25 - moderate cover grassland, significant shrub component, recruitment through of natural regeneration • Year 50 - Moderate cover grassland, significant shrub component, continued recruitment from adjacent undisturbed ecosystems / natural regeneration • Year 100 - Grassland/shrubland with significant component of non-planted species
Whitebark Pine Dominated Forest	• ESSFdkw Gentle	148	Open Whitebark pine forest with some lodgepole pine, subalpine fir and Engelmann spruce, shrub, graminoids, and forbs	• Restoration of federally-listed whitebark pine Seed Source Critical Habitat (and hence for Clark's nutcracker) • Ungulate habitat • Grizzly bear where grouseberry established • Pollinator habitat	• Year 5 -Graminoid and forb dominated with planted trees • Year 25 - Young tree dominated open stands, with moderate cover shrub and herb understory • Year 50 - Young tree dominated whitebark pine starting to produce seed • Year 100 - Open whitebark pine forest with moderate cover understory, occasional whitebark pine seedlings and young trees
Low Elevation Forest	• MSdw Gentle • MSdw Warm	122	Douglas fir, lodgepole pine, trembling aspen forest, very open on warm aspect, wide variety of species in understory	• Old growth forest in normal time frame (140 years) given minimal disturbance on these site • Ungulate habitat • Pollinator habitat, ungulate habitat	• Year 5 - Scattered mixed young trees emerging above dense understory • Year 25 - Sites dominated by young trees with dense understory • Year 50 - Tree canopy starting to close with understory decreasing in density • Year 100 - Mature MSdw forest
Sparsely Vegetated Talus	• ESSFdkw Mine Rock veneer Sparse veg	91	Graminoid and pioneer forbs,	• Sheep and goat habitat • Restoration of federally-listed whitebark pine Seed Dispersal Critical Habitat	• Year 5 - Very scattered vegetation established in few favorable micro-sites • Year 25 - Still scattered vegetation but some with recruitment from windblown seed • Year 50 - Similar to Year 25 with continued slow recruitment • Year 100 - Sparse vegetation cover only increasing if rock placed breaks down rapidly

[1]See Appendix 1 for detailed descriptions of post-mine ecosystems to be created through site ecological restoration.

Ecosystem Type	Post-mine Ecosystem Units[1]	Restored Area (ha)	Ecosystem Description	Ecosystem Objectives	Successional Trajectory (5-, 25-, 50-, and 100-years Post-Establishment)
Riparian	• ESSFdk1 Riparian • MSdw Riparian	19	Cottonwood and tall shrub dominated	• Moose habitat • Gillette's checkerspot habitat • Bat feeding habitat	• Year 5 - Tall shrub dominated with variety of forbs and low shrubs • Year 25 - Young cottonwood dominated site with considerable component of tall shrub and planted forbs and low shrubs • Year 50 - Young cottonwood and tall shrubs, planted understory being supplemented by recruitment from natural fill in from undisturbed sites adjacent areas • Year 100 - Mature cottonwood with some conifer tree establishment, tall shrub and diverse understory
Wetland Ecosystems	• Swamp • Marsh • Shallow open water	10	Complexes of shallow open water, marsh, and swamp wetlands	• Ecological/habitat wetland functions related to amphibian, moose and checkerspot habitat • Biochemical wetland functions including biomass production and sediment/particulate retention • Hydrological wetland functions through water storage/retention and waterflow moderation • Bat feeding habitat	• Year 5 - Sedge and grasses established and dominant in marsh and swamp, tall shrubs in swamp moderate cover • Year 25 - Sedges and grasses dominant in understory in marsh and swamp, dense tall shrubs dominant in swamp • Year 50 - Sedges and grasses dominant in understory in marsh and swamp, dense tall shrubs dominant in swamp, potential for establishment of trees in swamp from seed brought in by birds or wind • Year 100 - Sedges and grasses dominant in understory in marsh and swamp, dense tall shrubs dominant in swamp, potential for establishment of trees from seed brought in by birds or wind

Revegetation will use, as appropriate, locally sourced native plant species as required by the Health, Safety and Reclamation Code for Mines in British Columbia. Revegetation is based on a Project-specific post-mine TEM developed for the Project footprint, which consists of 7 restored ecosystem types and 18 ecosystems units (Figure 33.4-3; Table 33.4-8; Appendix 33-A). Ecosystem types to be created through implementation of the ERP and the post-mine TEM include:

- High elevation forests;
- Grasslands;
- Whitebark pine dominated forests;
- Low elevation forests;
- Sparsely vegetated talus;
- Riparian habitat; and
- Wetland ecosystems

Note that information shown on Figure 33.4-3 has been simplified due to the mapping scale and some ecosystems are combined (i.e., some small areas of steeper ground were not large enough to display). Plant species prescribed for revegetation reflect those found in similar local natural ecosystems and those present within the Project footprint or local area prior to disturbance, with the consideration of successional processes. A wide variety of plant species will be established in the revegetation during Reclamation and Closure to provide enhanced resilience to disturbance and climate change induced stress (e.g., herbivory, disease, insects). Additional plant species may be used in restoration if they are deemed appropriate, are feasible to propagate, and will provide additional benefits to site restoration.

Restored Ecosystem Types

Seven ecosystem types consisting of 18 ecosystem units will be restored through implementation of the ERP and the post-mine TEM, covering approximately 790 ha (Table 33.4-8; Appendix 33-A). The restored post-mine ecosystems are based on:

- Elevation (corresponding to local biogeoclimatic subzone and variant elevations);
- Aspect (for slopes > 25%, warm corresponds to 135° to 270°, cool to neutral 271° to 134°);
- Slope steepness (steep >55%, moderate 25-55%, gentle <25%); and
- Proximity to water features (for riparian and wetland ecosystems).

Each restored post-mine ecosystem has specific restoration objectives in terms of dominant vegetation strata and overall vegetation cover (Table 33.4-8; Appendix 33-A). For example, ESSFdkw warm steep ecosystem, one of the highest elevation and harshest reclaimed ecosystems in the post-mine environment, is projected to be relatively sparse (30% cover), grass dominated, with a low cover of shrubs and trees within 25 years. Locally adapted vegetation species are suggested for establishment. Density of planted vegetation is designed to mimic analogous natural ecosystems and allow for ingress of native species from neighbouring undisturbed ecosystems.

Ecosystems projected to be forested, such as the ESSFdk1 moderate cool neutral ecosystem, will undergo “natural” succession as tree and shrub species will be planted during the initial out-planting/seeding in these ecosystems; however, the sites will be dominated for the initial 5 to 10 years by graminoids and forbs. For an additional 5 years, shrubs and small (< 5 m tall) trees will co-dominate on the site. Approximately 15 years after the initial out-planting/seeding, trees are projected to dominate the site. On tree-dominated ecosystems, tree seedling densities will be kept to levels where they do not inhibit

Crown Mountain Coking Coal Project

Figure 33.4-3
Post-Mine Terrestrial Ecosystem Mapping

LEGEND

- Project Footprint
- Arterial/Collector Road
- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- British Columbia/Alberta Border

Treatment Units

ESSFdk1

- ESSFdk1 Cleared
- ESSFdk1 Cool Neutral
- ESSFdk1 Gentle
- ESSFdk1 Mine rock veneer, sparse veg
- ESSFdk1 Riparian
- ESSFdk1 Warm

ESSFdkw

- ESSFdkw Cool Neutral
- ESSFdkw Gentle
- ESSFdkw Warm
- ESSFdkw Wind Exposure

MSdw

- MSdw Gentle
- MSdw Riparian
- MSdw Warm

Other Features

- Buffer
- Pit Wall
- Water feature
- Wetland

Biogeoclimatic Unit

- ESSFdk1
- ESSFdkw
- MSdw

0 1 2
Kilometres

N W E S

Scale 1:42,000

Map Drawing Information:
Data Provided By NWP Coal Canada Ltd, Dillon Consulting Limited, Keefer Ecological Services Ltd., Province of British Columbia
GeoBC Open Data, Government of Alberta Open Data, Natural Resource Canada.
Imagery Provided By GeoBC OrthoImagery (Aug 2016).

Map Created By: JFC
Map Checked By: LKD
Map Coordinate System: NAD 1983 UTM Zone 11N

NWP Coal Canada Ltd

Project: 12-6231
Status: FINAL
Date: 2022-04-11

Document Path: \\42dillon\CAD\GIS\2012 and Prior\126231 Crown Mountain\EA_Report\Miscellaneous\126231_MS_PostMineTerrestrialEcosystemMapping.mxd

understory vegetation development and promote the recruitment of naturally regenerated trees from adjacent undisturbed forest. The end use objective for forested ecosystems is primarily the provision of wildlife habitat and not timber production and as such, tree densities will be lower than for timber production forests. For example, in the ESSFdk1 moderate cool neutral ecosystem, maximum tree densities will be approximately 700 stems per hectare at 20 years after establishment (the minimum level suggested for a comparable site series in the Reference Guide for Forest Development Plan Stocking Standards [Government of B.C., 2019]). Reclaimed vegetation will be monitored closely upon establishment in the Reclamation and Closure phase, as well as Post-Closure, to monitor success and implement strategies to increase survival and vigor, such as fertilization, fencing, or replanting. If herbivory poses a threat to the survival of restored ecosystems, fencing will be erected to allow vegetation to establish.

High elevation forest will cover the largest restored area, covering approximately 214 ha (Table 33.4-8). Restored high elevation forests will be relatively open (target 700 stems per ha at 20 years) and have a mix of tree species, including cottonwood at lower elevations less than 1,750 m and whitebark pine above 1,750 m in elevation. Grassland ecosystems are projected to cover approximately 181 ha and be dominated by a variety of graminoid species based on the elevation of the restored grassland area. A relatively diverse shrub and forb component will also be present in grassland ecosystems. A substantial area of the ESSFdkw subzone (areas post-mine greater than 1,950 m in elevation) is planned to become whitebark pine forest (approximately 148 ha), in addition to the portions of the ESSFdk1 variant that are at an appropriate elevation for whitebark pine as noted above.

Whitebark pine forest will be dominated by whitebark pine with a minor component of one or more species of lodgepole pine, subalpine fir, or Engelmann spruce. Again, stocking will be relatively open as above and a variety of shrubs, graminoids, and forbs appropriate to the elevation of the whitebark pine forest will also be used to vegetate this type. The goal of the whitebark pine forest is to maximize the extent of Seed Source critical habitat within the reclaimed extent of the Project footprint. Remaining areas of high elevation forest, grassland (subalpine and alpine types only) and sparsely vegetated talus are intended to replace the extent of seed dispersal critical habitat in the Project footprint. Stocking rates/densities of planted whitebark pine shall be planned and adaptively managed over the life of the Project and Post-Closure phase to account for the anticipated loss of planted trees associated with natural self-thinning as well as white pine blister rust. All planted whitebark pine shall be from white pine blister rust-resistant phenotypes, or if from unverified resistant stock, to be treated for white pine blister rust as technologies become available over the life of the Project.

The next most widespread reclaimed ecosystem type would be sparsely vegetated talus slopes, including the mine rock, veneer, sparse vegetation ecosystem that is planned for slopes less than 34% on the footwall of the Project's South Pit (Figure 33.4-3). The sparsely vegetated talus slopes ecosystem will cover approximately 91 ha and consist of scattered graminoids and forbs established where sufficient growth medium accumulates after deposition of mine rock.

Restored riparian ecosystems will be dominated by deciduous tree species, mostly cottonwood and tall shrubs, such as willows and red-osier dogwood and cover approximately 19 ha. Riparian ecosystems will be restored on either side of the channel from the southern toe of the mine rock storage facility to the Main Sediment Pond. A wetland complex of shallow open water, marsh, and swamp ecosystems is planned to cover approximately 10 ha. This complex will provide a wide variety of plant species and

structural diversity. Each of the ecosystems have specific native plant communities envisioned that include key native forage species, plants of cultural importance as well as a diversity of flowering plants to attract beneficial insects and other pollinators. Appendix 33-A provides a detailed description of the desired initial plant communities.

The buffer area noted on Figure 33.4-3 is planned to be undisturbed, but it is demarcated as a contingency area if the mine design is altered to take in some of the buffer. If areas within the buffer are disturbed, they will be reclaimed to the appropriate post-mine ecosystem based on their elevation and topography.

The ERP focuses on restoring biodiversity and habitat linkages through the creation of diverse post-mine landforms and a diverse post-mine landscape. For example, the ERP includes the creation of wetlands in a former pit and around the Main Sediment Pond, the restoration of a stream, the covering with broken rock of a bare footwall to encourage the establishment of xeric native species to imitate a talus/low productivity sub-alpine environment, as well as features conducive to bighorn sheep, such as escape terrain.

Restored Landform Features

Four main landform features resulting from the Project that will be restored in Reclamation and Closure include:

- Mine Rock Storage Facilities;
- Pits, pit walls, and benches;
- Access roads, a powerline, and shop/laydown areas; and
- Main Sediment Pond and a diversion ditch.

In general, all post-mine landforms will be restored in a manner that is consistent with the adjacent, undisturbed landforms.

Mine Rock Storage Facility (MRSF)

The Mine Rock Storage Facility (MRSF) will be created during Operations through a “layer cake” approach where dump faces are kept to a maximum of 50 m in height. In Reclamation and Closure, the MRSF terrace faces will be re-sloped to 2 horizontal:1 vertical or 50% slope or less, in accordance with the Health, Safety and Reclamation Code for Mines in British Columbia, creating long-term stability and erosion control. Final platforms of the storage terraces will be graded to slope gently (1-2%) outwards to direct flow away from the MRSF surface and will be contoured to fit into the adjacent natural environment. Mine Rock Storage Facilities will be covered with approximately 30 cm of salvaged soil to facilitate revegetation of productive and diverse plant communities. Coarse woody debris will be placed on the sloping portions of the rock storage terraces following placement of salvaged soil. CWD will support erosion and sediment control, provide habitat a range of organisms, and provide protected microsites for vegetation establishment.

Pit Walls and Benches

There are two types of pit walls to be considered, highwalls (unexcavated face of exposed overburden and coal in an opencast mine) and footwalls (wall or rock under a vein) and they will receive different reclamation treatments. Pit walls total about 103 ha. Highwalls are to be left in their post-mine configuration with the intention of creating escape terrain habitat features for bighorn sheep (and mountain goats, slope dependent). In the South Pit there is a major footwall that was originally engineered

to be left non-vegetated, this area is now planned to be covered on slopes less than 19 degrees (34%) with benign mine rock (rock not producing metal leaching or acid rock drainage) and revegetated with the goal of developing a low productivity higher elevation sparsely vegetated talus ecosystem (Appendix 33-A; Mine rock veneer, sparse veg ecosystem).

Access Roads, Powerline, and Shop/Laydown Areas

In Reclamation and Closure, all buildings and machinery, the transmission line, conveyor, storage tanks and other infrastructure (including scrap metal) will be dismantled, demolished, or disposed of appropriately (Landform Design and Reclamation Plan; Section 33.4.1.6). Concrete foundations will be broken up or buried under a suitable depth of cover (soil resources permitting) prior to revegetation. Roads and shop/laydown areas will be ripped by dozers to remove compaction and recontoured prior to soil placement to effectively manage water runoff and potential for erosion and sedimentation. Soil placement, to an average depth of 30 cm, will occur prior to revegetation in these areas. The power line and conveyor corridors are likely to experience less impact to soils and vegetation, with timber harvested and understory vegetation left largely intact. Areas of soil disturbance, within the powerline and conveyor corridors, will be restored to post-mine ecosystems appropriate to the elevation and topography of the site, with vegetated areas left to continue their successional trajectories, apart from treatment of invasive plants as required.

Water Management Infrastructure

During Reclamation and Closure, water management structures, including the Main Sediment Pond and conveyances (if constructed), will remain in place until the reclamation earthwork activities have been completed (e.g., re-sloping dump faces and re-establishing vegetation to prevent surface erosion across the site). Upon decommissioning of water management infrastructure during the Reclamation and Closure phase, reclamation would proceed as detailed in the Landform Design and Reclamation Plan (Section 33.4.1.6).

Progressive Reclamation Opportunities

Progressive reclamation will be initiated in the Operations phase through the use of a site restoration research program and restoration of landforms as they become stable. Initially, over the course of Operations, soils and woody debris will be stockpiled for restoration in the later years of the mine. The site restoration research program will be initiated on an area established as the test dump for mine rock, with revegetation treatment options being monitored in this area (Figure 33.4-2). A portion of the test dump will be used to evaluate the effectiveness of various revegetation treatments proposed as part of site restoration. The test dump will also provide a test of the layer cake method of mine rock disposal on water quality. This “layer cake” method utilizes thin layers of process reject material over layers of mine rock to reduce selenium release from the mine rock area. Mine rock lifts (terrace segments) will be limited to 50 m in height with the overlying lift creating a step or layer of about 50 m in height. The terraced landscape will reduce the unbroken length of the dump steep terrace faces that present challenges for reclamation.

33.4.1.3.6 End Land Use Objectives

End land use objectives for the Project and implementation of the ERP is diverse and stable terrestrial and aquatic ecosystems that provide suitable and diverse habitat for a variety of flora and fauna of the area,

habitat for species at risk (e.g., whitebark pine), areas of recreational use (e.g., hiking, snowmobiling), and opportunities for traditional use of the land by local Indigenous groups.

The restoration of diverse ecosystems will achieve land use goals through the creation of the following ecosystems:

- Deciduous-leading (cottonwood and trembling aspen) forest succeeding to lodgepole pine, subalpine fir and spruce at elevations below 1,750 m, with cottonwood providing soil building organic matter; deer, moose, elk, and sheep, grizzly bear (where grouseberry established) habitat.
- Whitebark pine forest with minor components of lodgepole pine, subalpine fir and spruce at elevations above 1,750 m, contributing to the restoration of this federally listed endangered species and the wildlife assemblage reliant on it, including Clark's nutcracker.
- Warm aspect wildlife forage habitat (i.e., grasslands, brushlands), sheep and ungulate habitat, small mammal and carnivore habitat, pollinator habitat.
- Cooler aspect shrubland to forest (deciduous dominated at elevations of 1,750 m and below, and with a component of cottonwood from 1,750m to 1,950m), snowshoe hare habitat.
- Wetlands, specifically shallow open water, marsh, swamp complexes, that will create bird, bat, amphibian, moose, Gillette's checkerspot habitat,
- Wetland functions, including various biochemical and hydrological functions to support water retention, water quality, and water storage;
- Riparian habitat areas dominated by tall shrubs, bird, bat, moose, and Gillette's checkerspot habitat; and
- Footwall escape terrain for bighorn sheep and mountain goat.

33.4.1.3.7 Restoration Monitoring

Restored vegetation and ecosystems will be monitored on a yearly basis to ensure successful establishment for the first five years after installation and then at 8-, 10- and 15-years post-reclamation and then at 5 year intervals until closure obligations are met. Measures of success for the ERP will include:

- Species diversity, including a measure of structural diversity;
- Biomass;
- Propagule production;
- Pollinator evidence;
- Health and growth of whitebark pine;
- Growth of culturally important plants; and
- Use of reclaimed areas by wildlife.

Monitoring plot location will be guided by the post-mine TEM polygons. TEM polygons will be stratified based on reclamation treatments applied if these varied within the TEM polygon. Strata more than 10 ha will have monitoring plots measured within them. Vegetation patterns within these TEM/treatment polygons will be assessed and stratified through drone-assisted mapping. The area covered by different vegetation patterns revealed in the drone mapping will guide the number of monitoring plots to describe variation within the TEM/treatment unit. Monitoring plots will be permanently marked to facilitate re-measurement.

33.4.1.3.8 Annual Reporting Requirements

The NWP Environmental Manager (or a responsible designated alternate) will prepare an annual ecological restoration report which will detail the following items: monitoring results, research activities and results, restoration activities, and summary of updates to the Ecological Restoration Plan. The Ecological Restoration Plan will evolve over the life of the Project based on the research and results of ongoing monitoring.

33.4.1.4 Erosion and Sediment Control Plan

33.4.1.4.1 Introduction

Throughout the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project, soils within the Project footprint can be disturbed, eroded, and transported as sediment via intermittent drainage pathways. This Erosion and Sediment Control Plan (ESCP) is intended to provide a framework of the measures that will be employed to minimize the risk of erosion or sediment transport and its release into the receiving environment, the emergency response processes that will be in place to control and remediate erosion or sediment loss events, the procedures by which a release will be reported, as well as the monitoring programs that will be implemented to identify and manage potential erosion and sediment issues before they occur.

This ESCP is a conceptual plan, which NWP will revise and include additional, site-specific details prior to construction. Further, NWP will strive to continually improve the ESCP throughout the life of the Project, through the use of advanced technologies and implementation of management practices that will further reduced the risk or potential effects of erosion or sediment releases on human health and the environment.

33.4.1.4.2 Scope and Objectives

The ESCP includes the practises and procedures associated with prevention and management of erosion and sediment releases to terrestrial and aquatic receiving environments. The purpose of the ESCP is to provide strategies to prevent or minimize erosion and sediment transport, to conserve soil quality and quantity, and to minimize adverse effects to waterbodies, aquatic habitat, riparian habitat, surface water quality, and land use within and adjacent to the Project footprint. The practices and procedures included in this plan are applicable to and will be implemented throughout all phases of the Project. Further, this ESCP is applicable to the Project footprint, transportation routes, and undeveloped area in the vicinity of the Project.

The ESCP was prepared to meet the following objectives:

- Provide a framework for the appropriate prevention, response and management of erosion and sediment transport into the receiving environment;
- Define the regulatory requirements, roles and responsibilities and reporting requirements associated with erosion or a sediment control;
- Describe the environmental protection measures and management practices to be implemented to reduce the risk of potential impacts of erosion or sediment release on human health and the receiving environment; and

- Outline the monitoring programs that will be implemented to assess the performance of the ESCP and identify areas where the plan can be improved through the use of adaptive management strategies.

33.4.1.4.3 Regulatory Requirements

There are several federal and provincial legislative requirements applicable to erosion and sediment control management and planning. These requirements and their primary components related to erosion and sediment prevention and management are provided in Table 33.4-9.

Table 33.4-9: Federal and Provincial Regulatory Requirements for the ESCP

Regulation/Policy	Year	Applicable Regulations or Permits
Federal Legislation		
Fisheries Act	1985	The *Fisheries Act* protects all fish and fish habitat through protection of oceans and water bodies. This Act provides permitting and code of practice to allow for responsible development around fish and fish habitat. The Act restores protection against activities such as harmful alteration, disruption, or destruction of fish habitat while protecting biodiversity and addressing urgent threats to conservation and fisheries.
Canadian Environmental Protection Act	1999	The *Canadian Environmental Protection Act* addresses pollution prevention to allow for the protection of environmental and human health. The Act is directly relevant to sustainable development. The Act imposes timelines for managing toxic substances, establishes processes to assess risk based on substances, provides tools to manage toxic substances and ensures harmful substances are phase out and not released into the environment.
Provincial Legislation		
Environmental Management Act	2003	The *Environmental Management Act* regulates industrial waste discharge, pollution, hazardous waste and contaminated site remediation. This Act provides the authority to introduce waste into the environment while protecting environmental and human health. The Act enables permits, regulations, and codes of practice to authorize this discharge and details enforcement options including administrative penalties, orders, and fines to encourage compliance.
Forest and Range Practices Act	2002	The *Forest and Range Practices Act* addresses all forest and range practices including resource-based activities that are conducted on Crown lands in the Province of British Columbia. Through this Act, high levels of protection are provided to the environment. The Act provides a streamlined planning process for all development. Forest and range licensees' are subject to the Act during all stages of the Project.
Water Sustainability Act	2014	The *Water Sustainability Act* ensures fresh and clean water remains at a sustainable supply to meet the needs of the Province of British Columbia. This Act addresses the management including diversion and use of water resources. The goal of the Act is to protect, manage and use water efficiently.

Regulation/Policy	Year	Applicable Regulations or Permits
Mines Act	1996	The *Mines Act* protects both employees and the general public to minimize health and safety and environmental risks associated with mining related activities.
Health, Safety and Reclamation Code for Mines in British Columbia	2008	The Health, Safety and Reclamation Code for Mines in British Columbia details the potential health and safety issues attributed to waste handling and storage to human health and the environment. Provides details on how to handle, store, and manage these waste materials on site (British Columbia Ministry of Energy and Mines, 2021).
Standards and Best Practices for Instream Works	2004	The Standards and Best Practices for Instream Works is a document that summarizes provincial standards and recommended best practices that should be included in an application for instream work. The document assists in developing plans to address fish and wildlife populations as well as habitat protection during instream work (British Columbia Ministry of Water, Land, and Air Protection, 2004). Provides suggested best practices in the development of ESCP and the application for instream works.

33.4.1.4.4 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the ESCP are provided in Table 33.4-10.

Table 33.4-10: Roles and Responsibilities of the ESCP

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the ESCP, including meeting commitments to implement environmental protection measures and monitoring programs. • Lead environmental inspections, audits, and on-site monitoring programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate and effective response to erosion and sediment control issues. • Lead environmental incident investigations. • Report to applicable regulatory agencies, as required. • Update the ESCP, as required.
Project Construction Manager	• Implement and ensure compliance with the ESCP during Project Construction and Pre-Production. • Provide and deploy erosion and sediment control materials and equipment at appropriate locations within the Project site during Project Construction and Pre-Production. • Ensure completion of environmental awareness training by all employees and contractors.

Role	Responsibilities
NWP Mine Manager	• Implement and ensure compliance with the ESCP during Project Operations. • Provide and deploy erosion and sediment control materials and equipment at appropriate locations with the Project site during Project Operations. • Ensure completion of environmental awareness training by all employees and contractors. • Oversee personnel resourcing for erosion and sediment control management.
All employees and contractors	• Complete environmental awareness training. • Compliance with the ESCP.

33.4.1.4.5 Environmental Protection Measures

This ESCP provides a range of environmental protection measures that will be implemented to avoid or reduce the potential for the occurrence of erosion or a sediment release on the Project, and to appropriately respond to and mitigate erosion or a sediment release should they occur during any phase of the Project. These environmental protection measures will be further refined and detailed throughout the Project permitting process and will be updated with more site-specific information prior to the commencement of construction.

Preventative Measures

Prevention is the preferred manner of addressing erosion or a sediment release throughout all phases of the Project. Implementation of the following measures detailed in Table 33.4-11 will contribute to the effective prevention of erosion or sediment releases.

Table 33.4-11: Erosion and Sediment Control Prevention Measures

Controls	Purpose	Control Prevention
Construction Scheduling	Develop erosion and sediment controls prior to construction and assess and anticipate the needs for additional controls.	• Schedule construction activities to ensure limited durations of exposed soils as exposed soils are susceptible to both water and wind erosion. • Consider the time of year when developing construction schedule so as to avoid particularly wet and or windy seasons.
Construction Phasing	Allows for a phased approach to revegetation of exposed soils, resulting in a reduction in the length of time soils are subject to water and wind erosion.	Consider phasing construction activities to allow for phased revegetation and stabilization of exposed soils.
Benching	Reduces slope lengths, which reduces water erosion through slowing water velocity, allowing for the settling of sediment.	Implement benching techniques to reduce slope length when possible.

Controls	Purpose	Control Prevention
Ditching	Assists in moving surface water away from the construction site to designated locations to reduce water erosion and sedimentation.	The development of ditches should occur along roads and the perimeter of the work site.
Check Dams	Reduces the velocity of water to allow for temporary retention of water that allows sediment to settle out of the flow.	Check dams will be installed in allocations with limited drainage areas to reduce water velocity.
Retention and Settling Ponds	Allow for the collection of water, slowing the flow of water, and allowing for sediment to settle out prior to spilling over the edge to enter the natural environment.	• Retention or settling ponds will be established at the base of steep slopes that have high potential for water erosion and sedimentation. • Several retention or settling ponds may be required in a series to be effective. • Additional treatment prior to discharge may be needed. • Numbers and sizes of retention or settling ponds will be dependent on flow rate and volume of water and sediment.
Re-contouring and Surface Features	Reduces the amount of sheet and rill erosion by surface water runoff and slow surface water velocity to allow for sediment to settle.	• Re-contour when possible, by reducing the length pf the slope and decreasing the angle of the slope. • Establish undulation or troughs parallel to the slope.
Stabilized Construction Exits	Limit the spread of sediment off-site via vehicle traffic.	• Stabilize site access and exit points and temporary roads using common stabilizers such as gravel or wood chips.
Mulching, Hydromulching, and Hydroseeding	Protects soil surface from erosion and if seed is included, aids in enhanced germination and revegetation to exposed soils.	• Apply mulch through hydromulching and/or hydroseeding in areas with high potential for erosion. • Stabilized exposed slopes by hydroseeding or seeding as soon as possible to avoid erosion and sedimentation. • Prior to hydroseeding or seeding, track walking slopes will be completed in order to slow water runoff and reduce erosion and sedimentation.
Revegetation	Stabilize exposed soils to reduce wind and water erosion.	• Establish permanent vegetation or temporary seeding in areas of exposed soils as soon as possible. • Consider using fast growing vegetative species to provide faster stabilization and erosion control. • Vegetative species selection will be selected based on slope, aspect, growth medium, and stabilization goals.

Controls	Purpose	Control Prevention
Erosion Blankets	Stabilizes slopes and exposed soils to reduce erosion.	• Consider the use of erosion blankets on steep slopes with exposed soils.
Silt Fencing	Protects downslope areas by preventing further movement of sediment being transported by water.	• Consider using silt fencing to reduce soil erosion on gentle slopes. • If sediment has the potential to enter a waterbody, silt fencing will be properly installed along the base of the cut or fill.
Straw Bales and Waddles	Protects downslope areas by slowing the velocity of water and collecting sediment.	• Consider using straw bales on gentle slopes to slow the velocity of water and collect sediment. • Straw waddles can be on exposed slopes to slow water erosion and sedimentation. • Ensure bales or waddles have been approved and are weed free.
Sheeting	A temporary erosion control method used for emergency situations and intended to be replaced by a more permanent application in the near future.	• Consider the use of sheeting using impermeable polyethylene sheets, in areas with exposed soils that require immediate, temporary and short-time erosion prevention. • Regular maintenance of Polyethylene sheets will be required as they are susceptible to tears and movement by wind or heavy precipitation events.
Dust Control	Soil erosion can occur by wind, through the transportation of fine-textured materials from exposed soils including roads and soil stockpiles. The fine-textured particles have the potential to be deposited in water bodies.	During windy seasons, consider applying dust control methods such as calcium chloride or water to reduce wind erosion.
Rock, Riprap, or other Materials	Reduces exposed soil surfaces that have the potential to enter waterbodies.	Use rock, riprap or other materials on exposed soil surfaces the bank of waterbodies to reduce erosion and sedimentation.

Response Measures

While prevention is the preferred manner to manage erosion and sediment transfer, a response and countermeasures plan is required in the event of an erosion or sediment release occurrence during any phase of the Project. A key to effective response is the timely implementation of controls and mitigation measures by following clearly established procedures.

The following actions will be undertaken in the event of an erosion or sediment release occurrence, in order of priority:

- Immediately identify and control dangers to human life and environmental health, and secure the site to ensure the safety of all personnel and members of the public;
- Identify the source or activities related to the erosion or sediment release;

- Notify the Environmental Manager, Health and Safety Manager and/or other appropriate Project personnel of the event;
- If safe to do so, address areas of eroded or unstable terrain, or construct barriers to isolate the released sediment to control its transport into the receiving environment;
- Based on the nature of work, operations may need to be temporarily shut down, determined on a case-by-case basis;
- Implement mitigation measures to address the erosion or lost sediment to allow for regular operations to resume;
- Continue monitoring the areas of occurrence and any areas affected by the erosion or sediment release event, and implement additional mitigation measures, as needed; and
- Report on and notify appropriate government agencies, stakeholders, landowners, and nearby communities, as required.

33.4.1.4.6 Reporting Requirements

The NWP Environmental Manager (or a responsible designated alternate) will be responsible for the reporting requirements relevant to erosion and sediment control throughout all phases of the Project. This reporting will be conducted in accordance with the requirements and conditions of all permits, approvals, and authorizations obtained for the Project with relevance to erosion and sediment control, including annual permit and license reporting, corporate reporting, and potential additional reporting requirements based on the occurrence of erosion and sediment release events.

A monitoring program will be developed and implemented prior to the Construction and Pre-Production phase, which will include routine inspections of the Project footprint, compliance checks, and quality assurance and quality control. All monitoring events will be documented in monitoring reports, which will be submitted to the appropriate personnel. See Section 33.4.1.4 for further details on the erosion and sediment control monitoring program.

Records of all documented erosion or sediment release events on the Project will be maintained by the NWP Environmental Manager, including the incident report, all response action and countermeasures, investigation findings, subsequent remediation, and monitoring program records. This information will be used to facility improvements to the ESCP through adaptive management strategies.

33.4.1.4.7 Monitoring Program

A monitoring program is a key component of the ESCP, as it will be used to evaluate the effectiveness of preventative erosion and sediment control strategies throughout all phases of the Project. The monitoring program will be implemented and managed by the NWP Environmental Manager; however, a range of Project personnel will be trained to participate in the program. The monitoring program will be established prior to the Construction and Pre-Production phase, and may include the following components:

- A schedule for routine inspections of the Project footprint, which will include inspection of developed areas to identify areas of unstable or potentially unstable terrain, early signs of erosion (particularly following precipitation events), and evidence of sediment transport within or adjacent to wetlands and watercourses;

- Guidelines outlining when work would be temporarily shut down due to substantial precipitation events, including rainfall and snow-melt events. These guidelines will be developed based on risk for erosion and sedimentation into nearby streams, rivers, watercourses, and/or wetlands;
- Installation and inspection of erosion and sediment control measures;
- Established monitoring stations at rivers, streams, watercourses, and/or wetlands adjacent to the Project footprint and along access roads. Documentation of relevant erosion and sediment control measures will be completed at each station, including station location, evidence of erosion or sediment transportation, established control measures, and assessment of control measure performance;
- A communication plan that is developed and agreed upon by the Mine Manager and Environmental Manager regarding reporting on the effectiveness of erosion and sediment controls. Immediate communication and notification will be established regarding erosion or sediment control failure, incidents related to adverse effects on fish and aquatic habitat, and potential geohazards resulting from erosion and sedimentation events; and
- A reporting plan, in which the documented monitoring results and observations will be submitted to senior management and applicable regulatory agencies, as required. Reports will include information regarding the occurrence of erosion and sediment release, the intensity of the event, turbidity readings (if applicable), existing control measures, assessment of control measure performance, extent of area affected, additional mitigation measures implemented, dates, and photographic records.

The monitoring program will be refined and supplemented with additional site-specific detail prior to commencement of the Construction and Pre-Production phase, as the permitting process progresses.

33.4.1.5 Fish and Fish Habitat Management Plan

33.4.1.5.1 Introduction

The Fish and Fish Habitat Management Plan (FFHMP) outlines the Project's strategies to responsibly manage fish and fish habitat in the Fish and Fish Habitat LSA. The phases of the Project development that will be addressed in the FFHMP include:

- Construction and Pre-Production;
- Operations;
- Reclamation and Closure; and
- Post-Closure.

The FFHMP is considered to be a living document that will be updated periodically during subsequent stages of design and construction. Updates will supersede any prior description of fish and fish habitat management for the Project.

33.4.1.5.2 Scope and Objectives

The primary objective of the FFHMP is to describe the Project strategies that will be implemented for managing fish and fish habitat.

The objectives of the FFHMP are to:

- Identify the regulatory requirements, stakeholder and Project commitments;

- Identify the Project activities and potential environmental effects associated with fish and fish habitat;
- Identify the necessary protective measures and management requirements and strategies to avoid, manage or mitigate the potential environmental effects associated with fish and fish habitat during different Project phases;
- Act as a reference document when planning or conducting specific Project activities;
- Monitor aquatic habitats downstream of the Project during different Project phases to assess if mitigation is effective to ensure water releases meet water quality guidelines for protecting aquatic life;
- Manage any work in and about streams by appropriate application and permitting required to undertake such works which will ensure fish and fish habitat are protected; and
- Identify any possible threats to fish and fish habitat to support adequate trigger responses such as developing adaptive management strategies.

33.4.1.5.3 Regulatory Requirements

There are several federal and provincial legislative requirements applicable to fish and fish habitat management. These requirements and their primary components related to the management of fish and fish habitat are provided in Table 33.4-12.

Table 33.4-12: Federal and Provincial Regulatory Requirements for Fish and Fish Habitat Management

Legislation/Policy	Year	Applicable Regulations or Permits
Federal Legislation		
Fisheries Act	1985; amended 2019	The *Fisheries Act* includes measures to protect fish and fish habitat that must be followed to prevent entry of deleterious substances in water, harmful alteration, disruption, or destruction of fish habitat, or the death of fish by means other than fishing, among other requirements.
Canadian Environmental Protection Act	1999; amended 2020	Provides pollution prevention measures for the protection of human and environmental health, while promoting sustainable development and use of resources in Canada.
Species at Risk Act (SARA)	2002; amended 2020	Protects wildlife species (including fish) in Canada from decline or disappearance, and their critical habitat. Aids in the recovery of species that are Extirpated, Threatened, or Endangered resulting from anthropogenic activities, and to manage species of Special Concern.
Provincial Legislation		
Water Protection Act	1996	Protects the province's water by reconfirming B.C.'s ownership of both surface and groundwater, limiting bulk water removal, and not permitting large-scale water diversion amongst watersheds and outside of B.C.
Wildlife Act	1996	The Wildlife Act protects all native and some non-native wildlife species found in B.C. from direct harm or harassment, except as allowed by regulation (e.g., hunting or trapping).

Legislation/Policy	Year	Applicable Regulations or Permits
Riparian Areas Protection Act (formerly the Fish Protection Act)	1997, Retitled in 2016	Protects fish and fish habitat to ensure their sustainability.
Environmental Management Act	2003; amended 2004	Regulates waste discharge, hazardous waste, pollution, and contaminated sites remediation.
Mines Act	1996; amended 2019	Applies to permitting and operating procedures of mining operations in B.C., including environmental compliance (i.e., monitoring, metal leaching, acid rock drainage [ARD] generation and erosion control), health and safety and accident reporting, and abandonment and reclamation requirements.
Water Sustainability Act	2016	Manages the use and diversion of water resources in B.C.
Forest and Range Practices Act	2002	Provides guidance on riparian management around fish bearing streams, lakes, and wetlands, and on the size of harvestable forest and allowable harvesting rates.

33.4.1.5.4 Roles and Responsibilities

The key roles and responsibilities for the implementation and administration of the Fish and Fish Habitat Management Plan are provided in Table 33.4-13.

Table 33.4-13: Roles and Responsibilities of the Fish and Fish Habitat Management Plan

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the FFHMP, including meeting commitments to implement environmental protection measures and monitoring programs. • Lead environmental inspections, audits and on-site monitoring programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate response to and effective remediation of environmental incidents. • Lead environmental incident investigations. • Report to applicable regulatory agencies as required. • Update the FFHMP as required.
Project Construction Manager	• Implement and ensure compliance with the FFHMP during Project Construction and Pre-Production. • Designate hazardous materials storage areas during Construction and Pre-Production. • Provide and deploy spill response materials and equipment at appropriate locations within the Project site during Construction and Pre-Production. • Ensure completion of environmental awareness training by all employees and contractors.

Role	Responsibilities
NWP Mine Manager	• Implement and ensure compliance with the FFHMP during Project Operations. • Designate hazardous materials storage areas during Operations. • Provide and deploy spill response materials and equipment at appropriate locations within the Project site during Operations. • Ensure completion of environmental awareness training by all employees and contractors. • Oversee personnel resourcing for spill response. • Participate in environmental incident investigations.
All employees and contractors	• Complete environmental awareness training. • Compliance with the FFHMP.

33.4.1.5.5 Other Management Plans linked to the FFHMP

The FFHMP works in tandem with the following management plans:

- Ecological Restoration Plan;
- Erosion and Sediment Control Plan;
- Landform Design and Reclamation Plan;
- Noise and Vibration Management Plan;
- Site Water Management Plan;
- Spill Prevention, Control and Countermeasures Plan; and
- Vegetation and Ecosystem Management and Monitoring Plan.

33.4.1.5.6 Environmental Protection Measures and Best Management Practices

NWP will apply best management practices to instream work to confirm that it fulfills the terms and conditions for protecting fish and fish habitat. Best Management Practices are guidelines that help development projects meet necessary legislation, regulations and policies. For example, legislation might dictate that projects cannot harm a stream, while best management practices provide practical methods to avoid harming a stream.

Best Management Practices can be relied on to help improve operations because they are based on science, and they have been proven to work. They also help developers act as environmental stewards – completing projects on land or water in a way that minimizes interactions with living resources and their habitats.

Often an approval will be issued with specific conditions, one being that an environmental management plan be provided for the specific instream work, and that an environmental monitor be present on site during the construction/work being carried out. The environmental monitor will be a qualified professional with the necessary experience to provide guidance to appropriately manage and monitor the instream area endeavoring that no harm is caused to fish and fish habitat.

Standards and Best Practices:

- Standards and Best Practices for Instream Works (B.C. MWLAP, 2004);
- Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life;

- Fisheries and Oceans Canada's Land Development Guidelines for the Protection of Aquatic Habitat (1992);
- Fisheries and Oceans Canada's Fish and Fish Habitat Protection Policy (2019) - Measures to Protect Fish and Fish Habitat;
- Fisheries and Oceans Canada's Fish and Fish Habitat Protection Policy (2019) - Standards and Codes of Practice;
- Fisheries and Oceans Canada's Fish and Fish Habitat Protection Policy Statement (2019a); and
- Fisheries and Oceans Canada's Interim Code of Practice: End-of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater (2019).

Although the federal government provides an overview on how to enhance and preserve the environment, it delegates the responsibility to each province to protect the local environment and address specific issues that may negatively affect its fish and fish habitat.

Table 33.4-12 identified provincial Acts and regulations applicable to the Project relevant to fish and fish habitat. Under the B.C. *Wildlife Act*, authorization is required to conduct fish collection and/or fish salvage activities. Specific to freshwater fish and fish habitat, approval is required to undertake any works in and around a stream through the *Water Sustainability Act*. Per the *Water Sustainability Act*, a person making a change in or about a stream, must make that change in accordance with the timing window or periods of time in the year during which the change can proceed without causing harm to fish or fish habitat.

Instream Work Windows

Instream work windows specify the recommended period(s) of time in the year to carry out services in order to reduce the effect on species and habitats in each region. The particular timing may be set by the Habitat Officer for a notification or set as a condition of the change approval. Table 33.4-14 represents the general time period or 'window' in which changes in and about a stream would cause the least risk to Project VC fish species in the Fish and Fish Habitat LSA which falls within the Kootenay Region. Terms and conditions related to the protection of fish and fish habitat must be employed even when works are conducted within the appropriate instream work window. Knowledge of fish behaviour in specific streams, unusual weather, natural phenomena, specific events, unusual circumstances or activities that do not create disturbance below the high-water mark in fish bearing streams could allow for work to occur outside these windows. If works in fish bearing streams that involve activities that create disturbance below the high-water mark must be conducted outside of these windows, the services of a Qualified Professional will be required (refer to "Terms and Conditions for Changes In and About a Stream Specified by Ministry of Environment [MOE] Habitat Officers, Kootenay Region [Region 4]" dated June 2009). In the Kootenay Region, the "delayed instream work window zone" is designated as those streams or portions thereof that are within areas generally greater than 1,100 metres above sea level, with the exception of streams north of the Pingston/Donald Boundary which are within the delayed instream work window zone regardless of elevation. Fish bearing streams potentially impacted during the Project lifecycle fall within the delayed instream work window zone.

Table 33.4-14: Project Timing Windows for Least Risk for Instream Works (B.C. MOE 2009)

Fish Species	Least Risk Work Window for Project Area
Westslope Cutthroat Trout	August 20 – October 15
Bull Trout	June 1 – August 31
Mountain Whitefish	May 1 – September 30

Works within and outside of these windows shall be conducted in accordance with the approved Department of Fisheries and Oceans Canada (DFO) Authorizations obtained by the Project.

Mitigation Measures

A summary of key mitigation measures that address pathways of effects to fish and fish habitat include:

- Transportation, storage, and use of hazardous materials will be conducted in a manner to mitigate spills;
- Washing, refueling and servicing machinery and storage of fuel and other materials will be conducted in a manner that prevents deleterious substances from entering water bodies;
- Spills will be quickly and effectively responded to and cleaned up to mitigate hazardous materials from entering water bodies;
- Regular inspections to allow for early identification of problematic areas, and stabilization;
- Avoidance of earthworks during heavy rainfall events;
- Implementation of dust control measures including road watering and application of benign dust suppressants as needed;
- Implementation of erosion control measures (erosion control fencing, ditching, and sediment control ponds);
- Seeding and stabilization of topsoil stockpiles;
- Effective placement and design of sediment control ponds;
- Fill or other temporary or permanent structures will only be placed above the high-water mark;
- Materials such as sand, rocks, aquatic vegetation and natural woody debris from banks, shoreline, and waterbodies will not be disturbed or removed;
- Structures will not be built in areas that are inherently unstable like riverbeds, meanders, floodplains, alluvial fans, and braided streams unless appropriate permitting has been obtained to do so;
- The Erosion and Sediment Control Plan (ESCP; Section 33.4.1.4) will be implemented throughout the lifecycle of the mine (including settling ponds) and will be installed to stabilize erodible and exposed areas to prevent impacts to receiving bodies such as the downstream fish habitat;
- Hazardous wastes will be appropriately cleaned up, stored, transported, and disposed of in a manner that keeps hazardous materials away from waterways and protects fish and fish habitat;
- Solid waste, including sewage treatment product will be appropriately cleaned up, stored, transported, and disposed of in a manner that keeps hazardous materials away from waterways and protects fish and fish habitat;
- Design and construction of ditches and ponds in a manner that minimizes the potential for erosion;
- Construction of clean water diversions to lessen water interaction with mine-related disturbances;

- If required, organic phosphate anti-scalants will be added to protect receiving fish habitat from calcite precipitation and concretion;
- Where fish habitat will be permanently removed due to the design constraints of the Project, fish salvages will be utilized to move fish. Specific plans will be developed in coordination with Fisheries and Oceans Canada to move the suspected resident population of Westslope Cutthroat Trout to a new suitable location given that their habitat will be removed. Preliminary details regarding the fish salvage are located in Appendix 12-E;
- Blasting will be controlled and conducted in a manner to meet the vibration criterion of less than 100 kilopascals (kPa) and peak particle velocity (PPV) of 13 millimetres per second (mm/s) in Alexander Creek Watershed;
- Large charges will be subdivided into a series of smaller discrete detonations or explosions using time-delay detonation initiators (a procedure known as decking) to reduce the overall detonation to a series of smaller discrete detonations or explosions (Wright and Hopky 1998). Monitoring of fish and fish habitat will be conducted during blasting to determine if there are any negative impacts associated with this disturbance;
- Selenium concentrations will be monitored in water quality, sediments and periphyton, benthic invertebrates, and fish;
- If selenium results for a given compartment (i.e., water, sediment, periphyton, benthic invertebrates or fish tissue) indicate an increased risk of selenium-related effects, additional actions and monitoring are triggered. The monitoring program is designed so that monitoring and mine actions may be escalated depending on the relative selenium risk observed;
- Activities around water will only be conducted during periods that will not harm fish, their eggs, juveniles, spawning adults, and the organisms they feed on. Table 33.4-14 presents the least risk timing windows for service in and around water for VCs occurring in the Fish and Fish Habitat LSA;
- Undisturbed riparian vegetation buffers will be retained between areas of on-land activity and the high-water mark of any water body; and
- Flow volumes downstream of the Main Sediment Pond will be monitored to ensure B.C. IFG are achieved.

33.4.1.5.7 Monitoring Program

Fish and Fish Habitat Monitoring Program

The monitoring program will verify whether the Project is successfully avoiding and mitigating adverse effects on fish and fish habitat. The Fish and Fish Habitat Monitoring Program will help estimate if performance and compliance objectives are being achieved. This enables management to understand if mitigation and management measures are meeting their objectives. Monitoring goals include:

- Documenting actual effects of the Project on fish and fish habitat;
- Evaluating the accuracy of the original effects predictions;
- Verifying whether proposed mitigation measures are implemented and are having the desired outcome; and
- Identifying areas where adaptive management is required.

The Fish and Fish Habitat Monitoring Program will be enhanced throughout the Project development in consultation with the B.C. ENV, Fisheries and Oceans Canada, and Indigenous groups, and will be treated as a 'living document' that will be re-evaluated based on performance and updated throughout the life of

the Project. Potential effect on fish and fish habitat from direct habitat loss as well as changes in habitat such as water quality, flow and substrate (sediment and calcite) will be assessed throughout the Project duration (all Project phases).

The Project will keep records of monitoring activities and associated management action, including operational controls and mitigations. Financial resources associated with the monitoring program will be provided in the future as part of the permitting process and cannot be provided at this time as the extent of monitoring programs will be dictated to a large degree by specific certificate and permitting conditions developed in collaboration with Indigenous groups and regulatory agencies. The fish and fish habitat monitoring program and related mitigation measures are not expected to pose a risk to the environment and as such, no additional intervention measures are presented at this time as it relates the program. Details on the approach to interventions and strategies to protect the environment is provided in Section 33.2.4 as it relates to the adaptive management framework.

Over the course of the Project, NWP will use an Environmental Management System (EMS) based on key components of International Organization for Standardization (ISO) 14001 (see Chapter 33, Section 33.2 for more information). The EMS will provide the structure and procedures for implementing environmental management plans, ensuring compliance with regulations and permit requirements, and continuously improving environmental protection measures and environmental performance. The EMS, the accompanying Environmental Policy (Appendix 1-F), and the NWP Employee Code of Conduct (Appendix 1-B) form the basis through which NWP will require contractors and sub-contractors to comply with environmental management programs, adhere to regulatory permitting requirements, and achieve auditing programs. Through the EMS, NWP will monitor the Project's performance against established objectives and standards and will correct environmental management strategies where necessary by implementing contingency measures and corrective actions.

Monitoring Team

The NWP Environmental Manager or their delegate will be responsible for implementing conditions and commitments associated with permits including carrying out implementation of monitoring programs (contractors, site personnel, KNC environmental monitors).

Monitoring Schedules

Monitoring will take place over the life of the Project. Monitoring will be conducted during Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases. Monitoring frequency for impacts to fish and fish habitat will be species specific and will be timed to coincide with fish lifecycle requirements, including spawning assessments/redd assessments, overwintering assessments, and young-of-year surveys. Specific details including the timing and frequency of monitoring will be determined through engagement with Indigenous groups and regulatory stakeholders. Table 33.4-15 outlines the annual and periodic monitoring anticipated to be conducted during each Project phase as part of the Fish and Fish Habitat Monitoring Program.

Table 33.4-15: Proposed Monitoring Sites for the Fish and Fish Habitat Monitoring Program (CA – Community Assessment, HA – Habitat Use Assessment, including but not limited to Spawning Surveys, A – Annual, NA – Not Applicable, P – Periodic as required)

Sampling Location	Description	Rationale for Selection	Construction and Pre-Production		Operations		Reclamation and Closure		Post-Closure	
			CA	HA	CA	HA	CA	HA	CA	HA
ALE1	From Confluence with Michel Creek to ALE2	The stretch of Alexander Creek along Highway 3 upstream of the confluence with Michel Creek. Mountain Whitefish is confirmed to occur in these sections of Alexander Creek. Fish population will be continually monitored along this section of Michel Creek.	A	NA	A	P	P	P	P	P
ALE3	Alexander Creek upstream of HWY3	Alexander Creek upstream of Highway 3 has confirmed Bull Trout habitat and will require continued monitoring.	A	NA	A	P	P	P	P	P
ALE7	Alexander Creek below the confluence with West Alexander Creek	This creek is anticipated to be significantly impacted by the Project and will require continued monitoring.	A	NA	A	P	P	P	P	P
WAL1 u/s	West Alexander upstream of the Main Sediment Pond and downstream of the Interim Sediment Pond	This section of habitat will require monitoring during certain phases of the project only, seeing as it will be removed permanently by the mine footprint. A fish salvage and removal will need to occur prior to the construction of the Main Sediment Pond. Monitoring will discontinue for this site at that time.	A	NA	A	P	NA	NA	NA	NA
WAL1 d/s	West Alexander Creek upstream of the confluence with Alexander Creek	This creek is anticipated to be significantly impacted by the Project and will require continued monitoring.	A	NA	A	P	P	P	P	P
Tributaries and Reference Areas	To be confirmed	Continued Fish and Fish Habitat LSA based monitoring to verify the fish populations are in good condition and mitigation measures are having the desired outcome.	A	NA	A	P	P	P	P	P

Monitoring Sites

Fish community monitoring will target sentinel species to monitor for potential changes. Single-pass backpack electrofishing will be conducted to capture fish. Fish will be identified to species and fork length and total weight will be measured in the field. Growth stage (i.e., juvenile/immature, maturing, ripe, or spent) and sex (where identifiable from external characteristics) of each fish will be recorded. Each fish will be inspected for external abnormalities, including fin erosion, skin aberration, bleeding or swollen eyes, clubbed or frayed gills, craniofacial deformity, spinal deformity, and edema.

Table 33.4-15 shows the locations at which sampling is anticipated to occur but may change as the monitoring program develops.

Aquatic Effects Monitoring Program

The Aquatic Effects Monitoring Program (AEMP) is designed to evaluate water and sediment quality, periphyton, benthic invertebrates, and fish, in addition to tissue metal concentrations. These components in receiving aquatic environments will be monitored to validate that the Project is meeting applicable standards and guidelines as well as conditions associated with relevant permits. The AEMP aligns with the Site Water Management Plan (Section 33.4.1.8) and the Fish Habitat Monitoring Plan in order to provide a holistic evaluation of the Project's performance and the health of aquatic systems. General monitoring goals include:

- Documenting the health of receiving aquatic systems to allow for the early identification of Project related changes or effects;
- Evaluating the assumptions and accuracy of applicable environmental assessment predictions;
- Verifying the effectiveness of applicable mitigations and/or the need for further mitigations to be implemented; and
- Identifying areas where adaptive management is required.

The Project will keep records of monitoring activities and associated management actions, including operational controls and mitigations. The AEMP will be updated throughout the Project development in consultation with the B.C. MOE and Indigenous groups and will be treated as a 'living document' that will be re-evaluated based on performance and updated throughout the life of the Project. The AEMP will also be updated with industry stakeholder input as part of the Elk Valley Watershed management, focussing on cumulative effects downstream of the Project.

The AEMP and the practices described herein as they relate to selenium releases and cumulative selenium loading may be integrated into and/or influence future iterations of the EVWQP.

Monitoring Team

The NWP Environmental Manager or their delegate will be responsible for implementing conditions and commitments associated with permits including carrying out implementation of monitoring programs (contractors, site personnel, KNC environmental monitors).

Monitoring Schedules

Monitoring will take place over the life of the Project. Monitoring will be conducted during Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases. Specific timing and frequency of monitoring will be determined after engagement with KNC and regulatory stakeholders and as a condition under the provincial *Environmental Management Act* (2003) Liquid Effluent Discharge Permit. The proposed federal *Coal Mining Effluent Regulations* (CMER) under the *Fisheries Act* (1985) will also set requirements for monitoring frequency, including aquatic environmental effects monitoring provisions.

Table 33.4-16 outlines the annual and periodic monitoring anticipated to be conducted during each Project phase as part of the AEMP.

Monitoring Sites

The proposed sampling locations include habitats located on Alexander, West Alexander and Grave Creeks. Additional sampling is proposed to occur at designated wetlands that will incur Project effects (to be confirmed) and reference locations (to be confirmed). Final sampling locations included in the AEMP will be determined upon final permitted discharge points, in addition to Indigenous groups, stakeholders and regulatory inputs.

Table 33.4-16 shows the locations at which sampling is anticipated to occur but may change as the monitoring program develops.

33.4.1.5.8 Reporting Requirements

The Fish and Fish Habitat Monitoring Program and AEMP will be implemented and will include monitoring, especially during Construction and Pre-Production and Operations phases. Utilizing a monitoring program enables the Project to understand ongoing effects, effectiveness of mitigation measures, and options for adaptive management. To verify that compliance is documented appropriately, measurement reports will be completed after a monitoring session. Reports for monitoring sessions will be used to:

- Demonstrate compliance (or variance); and
- Identify areas for improvement.

Additional reporting is also anticipated which will be required for the Fish Habitat Offsetting requirements.

Reporting will document methods, sampling locations, data analyses and supporting interpretation. Reporting is anticipated to occur on a monthly and bi-annual scale at varying degrees needed to achieve the aims of use listed above.

Internal

Reports will be reviewed internally by the responsible line manager and the NWP Environmental Manager to identify corrective action, and/or areas for improvement.

External

Where required, reports will be forwarded to relevant government agencies and/or Indigenous groups as stipulated by regulations, licences, and agreements. If monitoring takes place in response to an external complaint, the original complainant may receive relevant information from the monitoring report as part of the Project's formal complaint response system.

Table 33.4-16: Proposed Monitoring Stations for the AEMP (WQ – Water Quality sampling, AH – Tissue and sediment samples, A – Annual, NA – Not Applicable, P – Periodic as required)

Sampling Location	Description	Rationale for Selection	Construction and Pre-Production		Operations		Reclamation and Closure		Post-Closure	
			WQ	AH	WQ	AH	WQ	AH	WQ	AH
ALE1	From Confluence with Michel Creek to ALE2	The stretch of Alexander Creek along Highway 3 upstream of the confluence with Michel Creek. Mountain Whitefish is confirmed to occur in these sections of Alexander Creek. Fish population will be monitored along this section of Michel Creek.	A	A	A	P	P	P	P	P
ALE3	Alexander Creek upstream of HWY3	Alexander Creek upstream of Highway 3 has confirmed Bull Trout habitat and will require monitoring.	A	A	A	P	P	P	P	P
ALE7	Alexander Creek below the confluence with West Alexander Creek	This creek is anticipated to be significantly impacted by the Project and will require monitoring.	A	A	A	P	P	P	P	P
WAL1 below the Main Sediment Pond	West Alexander Creek upstream of the confluence with Alexander Creek	This creek is anticipated to be significantly impacted by the Project and will require monitoring.	A	A	A	P	P	P	P	P
WAL2 below the Interim Sediment Pond	West Alexander Creek below the Interim Sediment Pond	This section of West Alexander Creek will act as the immediate receiving environment for the first 4-5 years of the Project life and will require monitoring up to the point of instream habitat removal.	A	A	A	P	NA	NA	NA	NA
GRA3	Grave Creek upstream of Harmer Creek Confluence	Monitored to determine effectiveness of mitigation measures and if predictions are accurate in anticipating no effect to Grave Creek due to the Project	A	A	A	P	P	P	P	P
Tributaries and Reference Areas	To be confirmed through finalizing of the monitoring sites	Fish and Fish Habitat LSA-based monitoring to verify the fish populations are in good condition and mitigation measures are having the desired outcome.	A	A	A	P	P	P	P	P

33.4.1.5.9 Management Review

The NWP Environmental Manager and their delegated staff will be responsible for reviewing the FFHMP processes, policies, and records on a regular basis to identify potential areas for improvement.

Monthly Report

A monthly report will be prepared by the Environmental Department and approved by the NWP Environmental Manager. The report will act as the first location where derivations from expected conditions are documented, outside of an apparent alteration at the sites.

Biannual Report to Management

A biannual report will be prepared by the Environmental Department and approved by the NWP Environmental Manager and the NWP Mine Manager. The report will provide a more in-depth review of information collected over the previous six months and provide the opportunity for an adaptive management approach to be applied, if required.

Actions for Improvement

Thresholds will be developed for monitoring parameters (using B.C. Water Quality Guidelines [WQG], Elk Valley Water Quality Plan [EVWQP] and other relevant regulatory guidelines in consultation with regulators and Indigenous stakeholders) which, if exceeded, would trigger corrective measures or adaptive management strategies and actions to be enacted. Other trends or variations in data, outside of the developed threshold, may also be identified and addressed in the review of regular reporting and serve to inform continued monitoring programmes and adaptive management strategies.

33.4.1.5.10 Plan Review and Revision

Frequency of Review

This FFHMP will be updated on a regular basis throughout the life of the Project, as well as when any changes to regulations or good industry practice suggest a review would be appropriate. Material changes to the Project such as configuration and processes, may trigger the need for changes to the FFHMP.

33.4.1.5.11 Adaptive Management

Adaptive management will be applied for fish and fish habitat management activities. The monitoring and follow-up program will be developed in collaboration with KNC, regulatory and stakeholders. This plan will be implemented to estimate the success in meeting the objectives of protection of fish habitat and no net loss of fish habitat while maintaining linkages to the Site Water Management Plan as well as other management plans relevant to fish and fish habitat.

33.4.1.5.12 Fish Habitat Trigger Action Response Plan

A Trigger Action Response (TAR) is proposed for FFHMP (Figure 33.4-4). The TAR table defines a set of conditions (or “triggers”) and a set of actions that mine personnel will follow when those trigger events occur.

33.4.1.6 Landform Design and Reclamation Plan

33.4.1.6.1 Introduction

NWP is committed to meeting its post-mining land use objectives to ensure the reclamation landscape is safe, appropriate for the intended land uses, and is protective of the surrounding environment. NWP's vision calls for progressive reclamation of disturbed lands as they become available during mining operations. Progressive reclamation is intended to reduce Project footprint and enable sustainable, healthy, and biodiverse ecosystems as outlined in the Project's Landform Design and Reclamation Plan (LDRP). The NWP reclamation vision also includes a comprehensive monitoring and maintenance program for the reclaimed landscape. The monitoring and maintenance program is designed to get smaller over time as deficiencies are identified and remediated in the early phases of reclamation.

The LDRP integrates the existing management plans provided in previous sections and provides a safe and stable foundation for the Ecological Restoration Plan (ERP; Section 33.4.1.3). The LDRP is a conceptual framework that will be updated with more details at the next level of design. It includes a monitoring program to determine whether the mining landforms and reclaimed landscape are meeting hydrological, geochemical, and ecological goals, and to provide adequate warning should contingency measures be necessary. The site has been designed to accelerate learnings, including learnings related source control of contaminants from mine waste landforms, through the use of a Test Dump, progressive reclamation and monitoring of the East and North Pit Dumps, staged construction and progressive reclamation of the West Dump, construction that takes into account metal leaching and acid-rock drainage (ML/ARD) and hydrological processes, and the inclusion of realistic contingency measures. The site is divided into seven landforms / management units identified in Table 33.4-17.

Table 33.4-17: Landform/Management Units

Landform/Management Unit	Description
Access Road and Service Corridor	Linear infrastructure
Plantsite + Run-of-mine (ROM) Stockpile	Flat areas to be decommissioned at closure
East Pit + Backfill	Pitslope with sizable, saturated mine rock toe
North Pit + Backfill	Predominantly pitslope with a sizable, saturated mine rock toe
South Pit + Backfill	Predominantly pitslope with a small, saturated mine rock toe, abuts West Dump
West Dump	Main dumping area, includes Test Dump area
Main Sediment Pond	Dyke and backfilled pond and feeder stream downstream of Project

33.4.1.6.2 Scope and Objectives

The LDRP sets out the reclamation goals, describes the progressive reclamation practices, and provides an overview of the decommissioning activities, including infrastructure removal. It also provides additional details on dump construction and monitoring to manage water and seepage, control oxygen ingress, and provide ongoing assessment of the dump performance. Relevant guidelines will be adhered to utilizing an objectives-based approach, ensuring that the broad objectives of physical stability, chemical stability, and future use and aesthetics are met.

	ACTIVITY OR LOCATION Fish Sampling locations from Table 33.4-15	ACTIVITY OR LOCATION Fish Sampling locations from Table 33.4-15	ACTIVITY OR LOCATION AEMP Sampling location from Table 33.4-16
	RESPONSIBILITY NWP Environmental Manager, NWP Mine Manager, or their delegate	RESPONSIBILITY NWP Environmental Manager, NWP Mine Manager, or their delegate	RESPONSIBILITY NWP Environmental Manager, NWP Mine Manager, or their delegate
Normal	TRIGGER: Fish species abundances do not differ relative to established thresholds.	TRIGGER: External abnormalities observed on fish species do not differ relative to established thresholds.	TRIGGER: Water quality and biological tissue results does not differ relative to established thresholds.
	ACTION/RESPONSE: Continue monitoring as outlined in the Fish and Fish Habitat Monitoring Program.	ACTION/RESPONSE: Continue monitoring as outlined in the Fish and Fish Habitat Monitoring Program.	ACTION/RESPONSE: Continue monitoring as outlined in the AEMP.
Exceedance Event(s)	TRIGGER: Fish species abundances decline relative to established thresholds at any site.	TRIGGER: External abnormalities observed on fish species increase in prevalence at any site.	TRIGGER: Metal and other mine related chemical constituents increases relative to established thresholds at any site.
	ACTION/RESPONSE: Increased frequency of monitoring to confirm results in subsequent sampling. Implement mitigation measures appropriate for the cause.	ACTION/RESPONSE: Increased frequency of monitoring to confirm results in subsequent sampling. Implement mitigation measures appropriate for the cause.	ACTION/RESPONSE: Increased frequency of monitoring to confirm results in subsequent sampling. Implement mitigation measures appropriate for the cause.
Level 2 Sustained Event	TRIGGER: Continued fish species abundances decline relative to established thresholds at one or multiple sites.	TRIGGER: Continued observation of external abnormalities on fish species increasing in prevalence and intensity at any site.	TRIGGER: Continued increases in metal and other mine-related chemical constituents relative to established thresholds at one or multiple sites.
	ACTION/RESPONSE: Notify relevant regulatory bodies and Indigenous groups. Assess results of water quality and quantity monitoring programs for possible correlations and identify mitigation options. Implement mitigation measures appropriate for the cause.	ACTION/RESPONSE: Notify relevant regulatory bodies and Indigenous groups. Assess results of water quality and quantity monitoring programs for possible correlations and identify mitigation options. Implement mitigation measures appropriate for the cause.	ACTION/RESPONSE: Notify relevant regulatory bodies and Indigenous groups. Assess results of water quality and quantity monitoring programs for possible correlations and identify mitigation options. Implement mitigation measures appropriate for the cause.
Level 3 Emergency Event	TRIGGER: Absence of sentinel species abundances at any site.	TRIGGER: Fish mortality observed at any site.	TRIGGER: Absence of fish species or fish mortality observed at any site.
	ACTION/RESPONSE: Emergency response related to cause. Continued mitigation actions until corrective measures are implemented and conditions return to normal.	ACTION/RESPONSE: Emergency response related to cause. Continued mitigation actions until corrective measures are implemented and conditions return to normal.	ACTION/RESPONSE: Emergency response related to cause. Continued mitigation actions until corrective measures are implemented and conditions return to normal.

Figure 33.4-4: Trigger Action Response for Fish and Fish Habitat Management

The LDRP accomplishes the following:

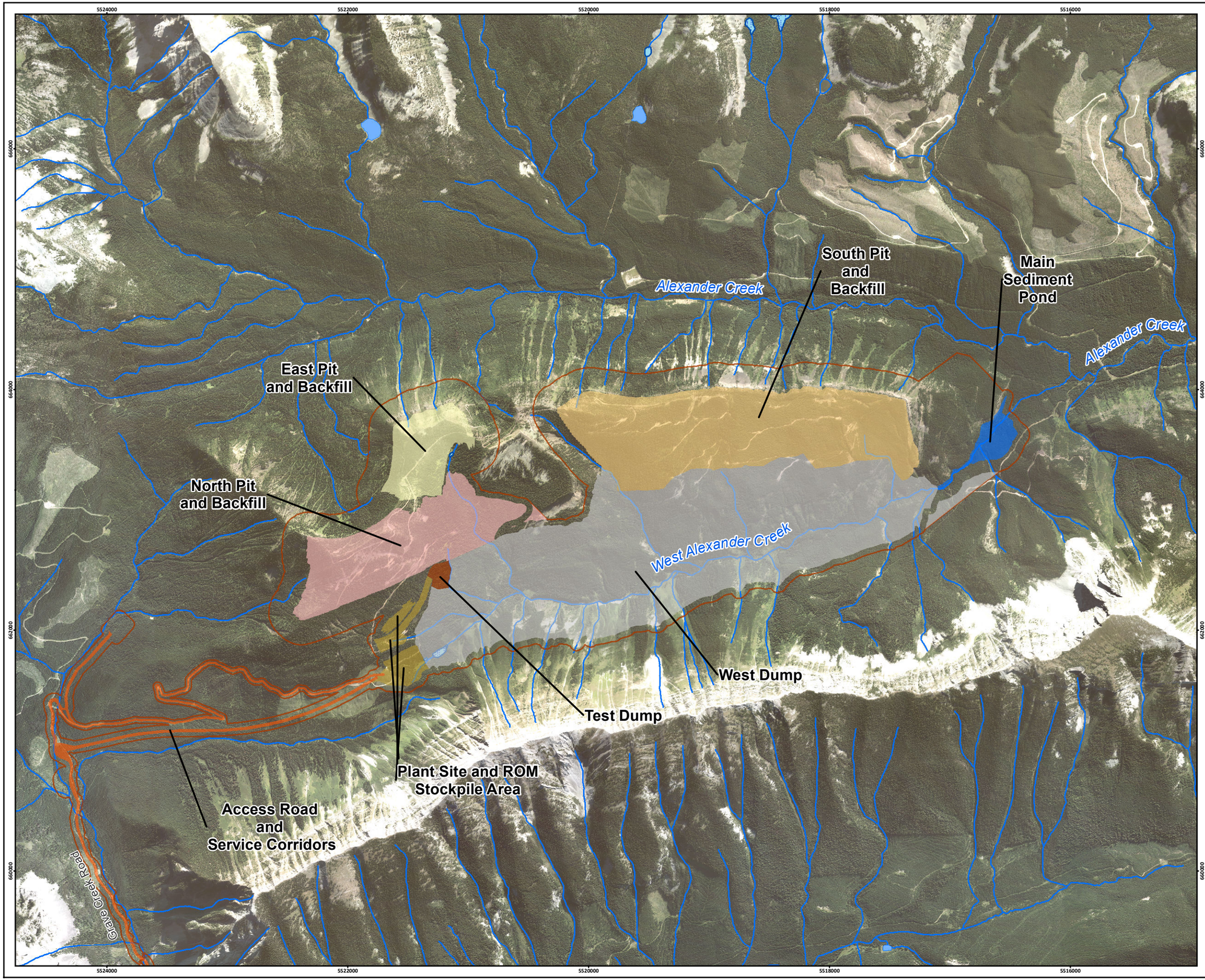
- Summarizes the design intent for providing a safe and stable set of landforms / landscapes to support reclamation activities;
- Provides a framework for the design, construction, regrading, placement of cover soils, and reclamation of the site to ensure appropriate prevention of response to, and management of erosion and sediment transport into the receiving environment;
- Introduces the position of landform designer of record to ensure mine waste structures are designed for closure, built according to design, and performing as intended;
- Consolidates and clarify some of the design elements not detailed in other Project plans;
- Outlines the monitoring system; and
- Describes contingency measures should landscape performance deviate from intended trajectories.

NWP will continue to engage and collaborate with the Ktunaxa Nation and local communities in refining the alignment of the Project's landform design and reclamation. Many of the goals and objectives are detailed in other management plans and designs, in particular the ERP. Those related to landform design and reclamation include:

- Mining landforms can be reclaimed such that they foster trust in the land by the Ktunaxa and local communities and support safe and stable land uses far into the future;
- Mining landforms are designed and constructed to be easy to reclaim by minimizing the amount of regrading after bulk-fill placement is complete, allowing for easy placement of covers, and ensuring they are conducive to monitoring and require minimal maintenance;
- Water is managed to minimize ingress into the mine rock dumps;
- Internal dump stratigraphy and covers are used to limit oxygen ingress and restrict gas transport within the landforms in an attempt to produce large suboxic zones that limit production and transport of oxidized contaminants such as selenium;
- The site is progressively reclaimed and monitored such that any deviation from the predicted acceptable performance can be remediated or, more specially, that the models can be calibrated to inform design of future areas to improve performance; and
- Deficiencies can be recognized in time to allow for implementation of pre-planned contingencies, particularly for the control of selenium, nitrates, and calcite production, as needed.

33.4.1.6.3 Regulatory Requirements

Table 33.4-18 provides a list of regulatory requirements that relate to the LDRP.



Crown Mountain Coking Coal Project

Figure 33.**4-5**
Landform Managment Units

LEGEND

- North Pit and Backfill
- East Pit and Backfill
- South Pit and Backfill
- Plant Site and ROM Stockpile Area
- Access Road and Service Corridor
- Main Sediment Pond
- West Dump
- Test Dump
- Project Footprint
- Watercourse
- Waterbody
- Wetland

0 0.5 1
Kilometres

Scale 1:30,000

Map Drawing Information:
Data Provided By NWP Coal Canada Ltd, Dillon Consulting Limited, Province of British Columbia GeoBC Open Data, Government of Alberta Open Data, Natural Resource Canada.
Imagery Provided By GeoBC OrthoImagery (Aug 2016).

Map Created By: LMM
Map Checked By: HEB
Map Coordinate System: NAD 1983 UTM Zone 11N

NWP Coal Canada Ltd

Project: 12-6231
Status: FINAL
Date: 2022-04-04

Document Path: \\42dillon\CAD\GIS\2012 and Prior\126231 Crown Mountain\EA_Report\Miscellaneous\126231_MS_LandformManagmentUnits.mxd

Table 33.4-18: Federal and Provincial Regulatory Requirements for the LDRP

Regulation/Policy	Year	Applicable Regulations or Permits
Federal Legislation		
Fisheries Act	1985	The *Metal and Diamond Mining Effluent Regulations* require that closure activities be conducted in a manner that prevents introduction of substances into the receiving environment that may have deleterious effects on fisheries resources. Though the Project is not subject to these regulations, they do provide an indication of the possible requirements associated with the draft *Coal Mining Effluent Regulations* recently proposed.
Environmental Protection Act	1999	The Environmental Code of Practice provides objectives for mine closure relating to public and wildlife safety, storage of waste rock and tailings, sustainability and the prevention or minimization of environmental impacts, and reclamation for desired end land use.
Provincial Legislation		
Mines Act	1996	Section 10 requires mining operations to carry out a program of environmental protection and reclamation to return areas disturbed by mining operations to pre-mining land use and capability. Permit applications must include a plan outlining the details of the proposed work and a program for the conservation of cultural heritage resources and for the protection and reclamation of the land, watercourses and cultural heritage resources affected by the mine. Financial security is required for all, or part of, outstanding costs associated with mine reclamation and the protection of land, watercourses, and cultural resources, including post-closure commitments.
Environmental Management Act	2003	Prescribes requirements for environmental assessment, monitoring, reporting and mitigation measures for environmental protection. There are specific regulations relevant to mine reclamation including contaminated sites, hazardous waste, and spill-reporting regulations.
Health, Safety and Reclamation Code for Mines in British Columbia	2017	Part 10 requires mining operations to carry out a program of environmental protection and reclamation to return areas disturbed by mining operations to pre-mining land use and capability (British Columbia Ministry of Energy and Mines, 2021). Provides standards for long-term stability of mining disturbances, as well as requiring that land and watercourses be reclaimed to resemble the topography and ecology of adjacent areas. States that reclamation must occur in a manner that preserves water quality in the receiving environment and that monitoring programs be conducted to demonstrate reclamation success and environmental protection.
Forest Act	1996	Authorizes the cutting of timber on Crown Land through an Occupant License to Cut.
Water Sustainability Act	2014	Requires protection of habitat and water quality.

Regulation/Policy	Year	Applicable Regulations or Permits
Standards and Best Practices for Instream Works	2004	Provides best management practices to avoid causing damage to instream habitat during construction (British Columbia Ministry of Water, Land, and Air Protection, 2004).

33.4.1.6.4 Roles and Responsibilities

Table 33.4-19 outlines the key roles and responsibilities for the implementation and management of the LDRP.

Table 33.4-19: Roles and Responsibilities of the LDRP

Role	Responsibilities
Landform Designer of Record	• Take professional responsibility for the design, construction, monitoring, and reclamation of all mining landforms. • Establish a multidisciplinary landform design team. • Work with long-range and short-range planners and mine operations to build mining landforms to design, provide quality control and quality assurance on the bulk materials handling / construction of the landforms, and implement the cover and revegetation designs. • Monitor the performance to confirm the landforms are performing as intended and implement contingency measures if required. • Provide an annual update to the NWP Mine Manager in support of NWP regulatory submissions. • Update the plan as required. • Maintain a construction records report, updated monthly, and published annually for every mining landform.
Landform Design Team	• Prepare a planning-level landform design for each of the mining landforms, followed by issued-for-construction drawings. • Implement and steward the monitoring program. • Optimize the designs over time based on evolving objectives, operational changes, and performance.
NWP Environmental Manager	• Lead the LDRP governance team. • Supervise overall implementation and review of the ESCP, including meeting commitments regarding implementing maintenance and contingency measures as required. • Review environmental inspections, audits, and on-site monitoring programs. • Ensure that all areas ready for reclamation are reclaimed within two years.
NWP Mine Manager	• Establish an LDRP governance team and ensure it has the expertise and authority to oversee implement of the plan. • Ensure there is sufficient budget, time, and materials to execute the plan.

33.4.1.6.5 Additional Design Elements

Mining will start with the East Pit. The Test Dump will be constructed, instrumented, and monitored as one of the earliest mining activities to provide field-scale experience and data for calibration of the source-control geochemical model. The North Pit will be mined next, followed by the South Pit. The East, North, and South Pit backfills will be built using a layer-cake design to create large suboxic zones that limit

oxidation and selenium production. Each will also create flooded mine rock toes that have been shown elsewhere to create reducing conditions and precipitate selenium (Bianchin et al., 2013; Claridge et al., 2012; Kennedy et al., 2015; Kirk et al., 2017). Selenium management at Crown Mountain does not rely on the efficacy of these saturated rock backfill zones but will benefit from their presence. Progressive monitoring of the Test Dump and the backfills will indicate the efficiency of source control measures and the backfill zones should precipitate the small quantities of selenium expected to be produced. They will allow progressive calibration of the hydrologic / geochemical model and optimization of the mine rock designs, as described in more detail below.

The management of risks and uncertainties follows an approach prescribed by the Landform Design Institute (see LDI 2021). It is a form of adaptive management based on Peck's (1969) geotechnical observational method, which has been successfully applied to dams and other facilities worldwide for decades. Figure 33.4-6 depicts the general framework.

The following additional design elements will be included in the next phase of reclamation design before construction begins:

- A small central rock drain to manage flows under the West Dump along the thalweg of West Alexander Creek. This will supplement existing flows in the shallow aquifers. The rock drain may be constructed by selective placement of quarried rock or by dumping mine rock in high lifts and allowing the boulders to segregate and form the drain;
- Small feeder rock drains in a dendritic network to intercept water running down the natural hillslopes, the pit walls, and the dump surfaces, and direct that water to the central rock drain.
- If needed, a graded filter on the rock drains to limit ingress of fines from the mine rock dump into the rock drain;
- If needed, a barrier of compacted fine-grained mine rock to reduce oxygen ingress into the mine rock dump from the rock drains;
- Domed topography for narrow mine rock dumps to shed water, thereby avoiding ponding and excessive net percolation into the mine rock dump;
- Dished topography on the large mine rock dump plateaus to direct water to a lined and armoured central swale that transmits water to the dump perimeter and a soak-away inlet to the rock drain. A system of mounds on the plateaus can direct water to the swales and provide sufficient topographic diversity to support the intended land uses. Watershed berms will be designed to limit water running off the plateaus onto the slopes where concentrated flows may erode the cover materials;
- A surface-water conveyance system to carry run-off from the East Pit and West Pit landform units to the central rock drain under the West Dump;
- A Test Dump monitoring program;
- Contingency measures for all potential failure modes;
- A decommissioning plan for the plant site and all operational infrastructure; and
- A road and trail network to provide access for monitoring and maintenance of the reclaimed landscape as well as the public.

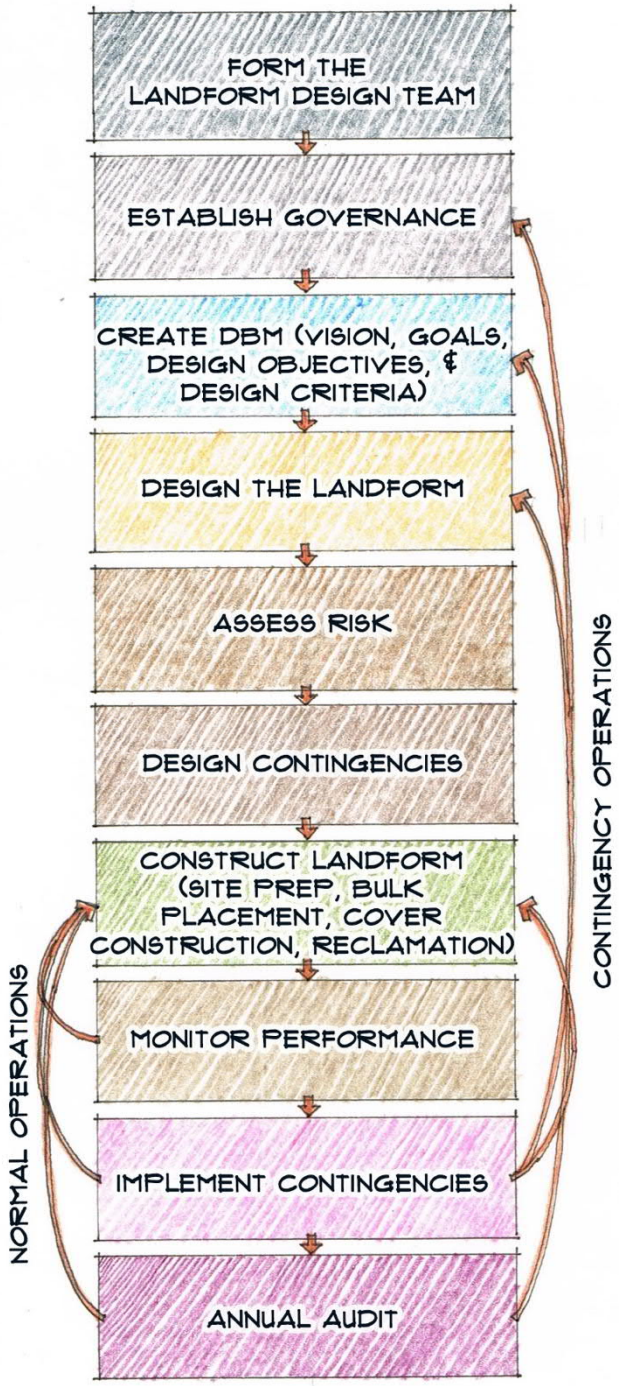


Figure 33.4-6: Landform Design Flowchart (from LDI 2021).

33.4.1.6.6 An Adaptive Management Strategy for Controlling Selenium Production

Avoiding excess production of selenium (and other leachates) from the mine rock piles is a central design element in the Elk Valley. Gilron and McKenna (2021) provide a list of selenium management techniques (Figure 33.4-7), many of which are employed as a defence-in-depth strategy in the Crown Mountain Landform Design. An example of deployment of such technologies in landform design is provided in Figure 33.4-8.

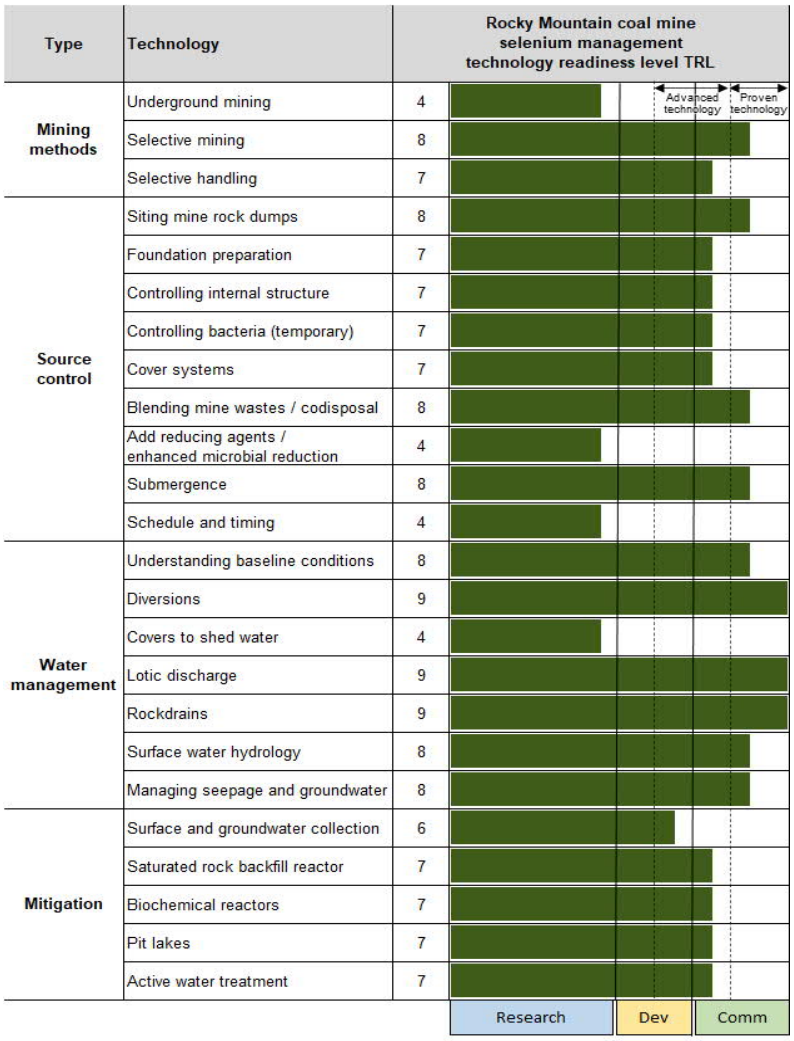


Figure 33.4-7: Selenium Management Technologies for Rocky Mountain Coal Mines (Gilron and McKenna, 2021)

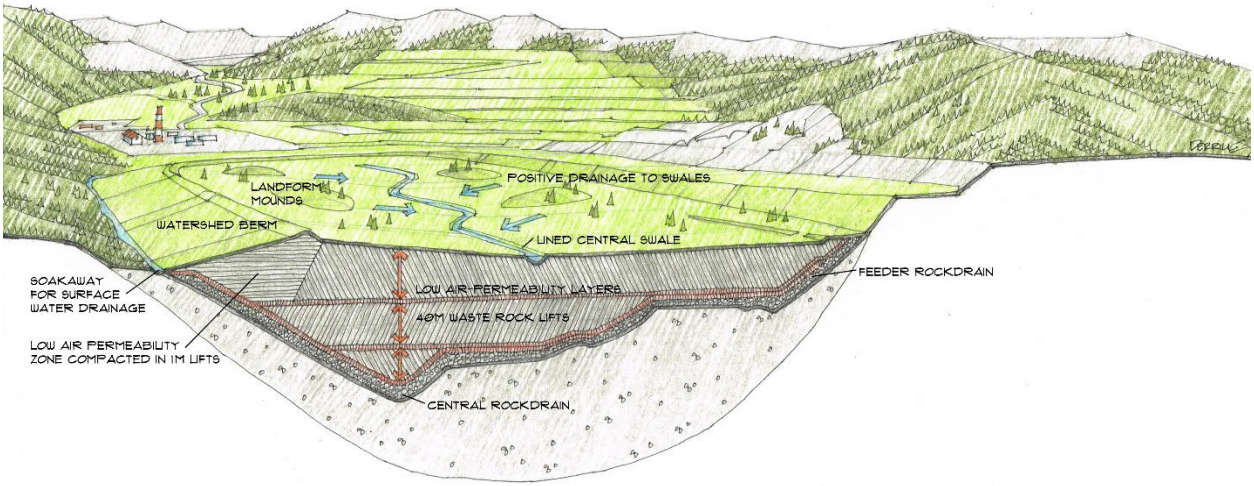


Figure 33.4-8: Controls to Create a Suboxic Mine Rock Dump to Limit Selenium Production

Additional landform design elements are detailed below.

- The amount of water contacting mine rock is minimized through:
  - Surface water diversion and rock drains; and
  - Covers and topographic landform design to minimize net percolation.
- Oxidation and subsequent transport of solutes from the mine rock dumps is limited by:
  - Properly sited rock dumps that facilitate landform design, manage water and oxygen ingress, limit the potential for groundwater contamination, and provide hydraulic containment to encourage groundwater and surface water collection if needed.
  - Source control, including:
    - Restricting the quantity of water moving through the dumps;
    - Restricting oxygen ingress through the plateaus and slopes and from the rock drains;
    - Restricting oxygen migration through the mine rock by controlling lift height and using low-air permeability layers to limit flow patterns;
    - The use of rejects to form oxygen-consuming layers that remain moist and restrict gas movement; and
    - Progressive regrading and placement of covers.
  - Use of saturated rockfill bioreactors (they would not be relied upon unless/until they become a proven technology).
- Construction of test fills and instrumented watersheds allow for intensive monitoring of the performance of mine rocks which are complemented by other instrumentation that allows for extensive monitoring.
- Staged learning / continuous improvement / adaptive management:
  - Published information from other sites in the Elk Valley and internationally has been analyzed and used to inform the designs. Monitoring of developments elsewhere will continue and results will be incorporated into selenium management at Crown Mountain. Performance data from the Crown Mountain rockpiles will be published and available to others in the industry.
  - Useful baseline information is already available from the largely undisturbed catchment.
  - Extensive state-of-the-art modelling backed up by laboratory testing has been employed to understand mechanisms, inform design, and predict performance.

- The Test Fill constructed during mine development will provide early data to confirm and calibrate source control models and develop and refine instrumentation and monitoring techniques.
- Monitoring of the East Pit Backfill, North Mine Backfill, and, the West Dump will provide performance measurements of the boundary conditions (covers, water ingress, effluent volumes, and quality), and internal performance (monitoring pore-gas composition, changes in water content, changes in isotope ratios of the water). Combining these data will make it possible to refine models and predictions and adjust the designs as needed.
- Monitoring will continue over several decades and new instruments will be installed as the West Dump grows in size.
- The monitoring will include a Trigger Action Response Plan (a common feature in dam safety monitoring) that will indicate which pre-planned contingencies will be triggered if measured performance is less than intended.
- Contingencies, including design changes and water collection and treatment, will be employed in a timely manner, if and when needed, and before environmental degradation results.

Pre-planned contingencies and a monitoring program that allows for the time to trigger them are critical to landform design and are consistent with the requirements of the geotechnical observational method. While detailed assessments have not been done, the following contingencies have been examined at a high level for use at Crown Mountain if required:

- Maintenance of covers in the event of excessive erosion leading to gullying and loss of cover integrity;
- Addition of a low-air-permeability barrier at the dump slopes to limit lateral ingress of oxygen. Such zones may require wrap-around berms of mine rock compacted in 1-m lifts and would be applied during active construction (rather than during a retrofit). Modelling indicates these should not be required but should remain a contingency if required to enlarge the suboxic zone;
- Reduction of the lift height to between 5 and 10 m if the proposed 40-m lifts show too much gas transport and an insufficiently large anoxic zone;
- Beefing up the cover design to further reduce oxygen and water ingress for areas yet to be reclaimed;
- Construction of a low-permeability barrier in the West Dump to create a large saturated backfill reactor. The various methods of construction would all likely involve a cut-off wall down to the till layer or into competent bedrock; and
- Surface-water management combined with a seepage interception system and on-site management of waters in the short term and active water treatment in the long term as a final contingency option if implementation of the above options is insufficient to meet water quality objectives. The hydrogeology of the West Alexander Creek Valley is favourable to containment and collection of selenium-rich waters, unlike the hydrological conditions of many mine sites elsewhere.

Figure 33.4-9 provides a conceptual view of these contingencies. Modelling indicates these contingencies are not required and plans for implementation incorporate a go-forward approach (rather than retrofitting reclaimed areas). The current level of management plans is expected to be sufficient, and precautionary implementation of the above contingencies is not warranted.

Figure 33.4-9: Potential Contingency Measures in the Event of Inadequate Source Control

33.4.1.6.7 Water Management

Details of water management are covered in the Site Water Management Plan (Section 33.4.1.8). Each component of site water management will be decommissioned when it is no longer necessary. The Main Sediment Pond will be maintained until water quality objectives are demonstrably met, at which time the impoundment will be decommissioned, and the area reclaimed.

33.4.1.6.8 Progressive Decommissioning, Reclamation, Access, and Signoff

As soon as it is no longer required, infrastructure will be decommissioned and repurposed, reused, resold, recycled, re-warehoused, or disposed of. However, most of the infrastructure will be required for the life of the mine and will be selected, designed, and constructed with waste reduction in mind. It may be appropriate to leave some infrastructure (a few buildings and some roads or trails) on-site for the proposed land use after Closure.

All infrastructure not part of the land use or needed for ongoing monitoring and maintenance will be decommissioned. Examples of infrastructure to be decommissioned include disused roads and trails, powerlines and substations, pumps and pipelines, buildings, plant equipment, sumps and ditches, laydown areas, fences, and refueling areas. All decommissioned areas will be assessed for contamination, surface water drainage will be re-established, and any dense materials will be ripped, covered, and revegetated.

The facilities and specific disturbed areas of concern with the goal of specific restoration practices is to minimize, or preferably eliminate degradation of disturbed areas and to initiate, encourage and accelerate the natural recovery. Key components of the proposed Project during Reclamation and Closure include the following:

Water Management Infrastructure: A series of two sedimentation ponds are proposed for managing the combined run-off from the mine footprint and undisturbed ground as the mine development advances. These ponds will be placed downstream of the main mine rock dump and will be decommissioned and reconstructed through the mine life to accommodate the advancing mine rock placement. Sedimentation ponds were sized for two phases of mining: an Interim Sediment Pond for Operations up to the end of Year 4 (EOY 4) and the Main Sediment Pond for the full mine footprint into Post-Closure. Decommissioning of water management infrastructure is detailed in the ERP (Section 33.4.1.3).

Plant Area: The Coal Handling Process Plant (CHPP), all fixed equipment, and internal components inside the plant will be cleaned (if required), dismantled and removed from the building. These items will either be transported off-site for use at other facilities or sold as scrap where possible, recycled or disposed of off-site. Concrete foundations will remain in place. The floor slabs will be punched with a hoe ram and then covered and contoured to provide positive drainage.

Overland Conveyor, Rail Loadout Facility, and Clean Coal Haul Road: The overland conveyor, rail, and rail loadout system will be removed at closure and either recycled or disposed of off-site. Rail siding and associated infrastructure and facilities will be dismantled, demolished, or disposed of appropriately.

Site Support and Auxiliary Facilities: Various auxiliary facilities (e.g., gate house, light vehicle wash, drug and alcohol testing/orientation building, sewage treatment, water supply and a small dry) will be dismantled, demolished, or disposed of appropriately. Concrete foundations will be broken up or buried under a suitable depth of cover (soil resources permitting) prior to revegetation. Water supply wells would be decommissioned and closed in accordance with applicable regulations. Plant area roads and shop/laydown areas will be ripped by dozers to remove compaction and recontoured prior to soil placement to effectively manage water runoff and potential for erosion and sedimentation.

Natural Gas Supply: Underground natural gas supply lines will be purged and cleaned in accordance with Federal and Provincial requirements. To reduce soil disturbance during Reclamation and Closure, it is anticipated that underground natural gas supply would be abandoned in place. Above-grade natural gas supply components would be dismantled for off-site disposal.

Explosives Storage: Any unused explosives will be safely removed from site. The explosive storage building will be decommissioned and will be sold as scrap where possible, recycled or disposed of off-site. Any concrete foundations will remain in place. The floor slabs will be punched with a hoe ram and then covered and contoured to provide positive drainage.

Fuel Storage: Any fuel remaining on site at the time of closure will be removed from site. The empty tanks would then be withdrawn from service and disposed of in accordance with the *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations* (2008) under *the Canadian Environmental Protection Act*. Any contaminated soils and related materials encountered during decommissioning

activities would be managed in accordance with applicable regulations and site-specific clean-up plans in coordination with regulatory agencies.

Surface Extraction Areas: Open pit surface mining operation using conventional truck and shovel mining methods with capacity for production of up to 4.0 million tonnes per year (Mtpa) ROM coal. As described in Chapters 2 and 3, the surface mine has been sequenced to limit the creation of external mine rock storage facilities (MRSF) and allow for on-going progressive reclamation.

Mine Rock Storage Facilities: As described in Chapters 2 and 3, the Layer Cake method will be applied within the Mine Rock Storage Facility areas (MRSFs). The site is already partially optimized to foster progressive reclamation (Figure 33.4-10). Inactive areas will be regraded and reclaimed within two years and the plan will be further optimized to make some areas available sooner. Crown Mountain recognizes the value of progressive reclamation, as recently outlined by the Landform Design Institute (LDI, 2021). Reclamation of the MRSFs (mine rock dumps) is briefly summarized as follows:

- The mine rock dump slopes, constructed in lifts, will be regraded with large dozers to meet land use objectives, control erosion, and provide a stable slope for the cover soils; Dump plateaus will be domed or dished to provide positive surface water drainage as described above;
- Most areas will shed water by sheet flow. Where needed, a surface water drainage system will be established and armoured. Some areas will see coarse rock “soakaways” to direct surface water into the rockdrain system under the dump;
- The dumps will be capped with a minimum depth of 30 cm of suitable cover soil;
- The cover soils will be revegetated using native species; and
- The cover soil and vegetation performance will be monitored and preplanned corrective measures employed where performance does not meet design objectives.

The mine will also work with the Ktunaxa and local communities to ensure access to reclaimed land, returning some of the land use values shortly after revegetation. This allows people to assess the safety and usefulness of the land and provide feedback on future reclamation plans.

NWP plans to work with the Ktunaxa Nation on a process to allow for a joint progressive sign-off on the land as being adequately reclaimed and meeting the needs of the local community.

33.4.1.6.9 Environmental Protection Measures, Preventative Measures, Protection, and Incident Response

The environmental protection measures relevant to reclamation are addressed under other management plans: ERP (Section 33.4.1.3), Waste Management Plan (Section 33.4.1.12), and the Site Water Management Plan (Section 33.4.1.8).

33.4.1.6.10 Reporting Requirements

The NWP Environmental Manager (or a responsible designated alternate) will be responsible for the reporting requirements relevant to the LDRP throughout all phases of the Project. This reporting will be conducted in accordance with the requirements and conditions of all permits, approvals, and authorizations obtained for the Project relevant to landform design and reclamation, including annual permit and license reporting, corporate reporting, and any additional reporting requirements.

A major component of reporting will be the LDRP monitoring report, which will include an annual assessment of performance and risks. A key element of landform design is the production of a construction records report. Data will be updated regularly (i.e., monthly) and an annual report will include as-built construction details, an analysis of the monitoring data, a record of maintenance and repair activity, and a statement of assurance on whether the landforms are being built to design and performing as intended. This is a common process for mining dam construction (CDA, 2019).

Figure 33.4-10: Progressive Reclamation (LDI, 2021)

33.4.1.6.11 Monitoring Program

A monitoring program is integral to successful landform design and provides timely warning of any need to implement contingency measures. NWP will develop the monitoring program during future design stages; it will follow guidance provided by INAP (2017) and include:

- Climate monitoring using several climate stations at different elevations; climate stations will include instruments to allow for closure of the water and energy balances;
- Visual inspections and surveys of site preparation;
- Monitoring of rock drain construction, including surveys, volumetrics, grain size, and placement methods;
- Daily monitoring of mine rock dump construction that includes both quality control and quality assurance components;
- Timely as-built topographic surveys of excavations and mine rock and reject placement;
- Periodic geo-environmental testing of mine rock and rejects;
- Monitoring of water flows and water quality (especially existing any rock drains) as detailed elsewhere;
- Monitoring of pore-gas composition and moisture content at various locations within each mine rock landform as described below;
- Completion of an annual water balance around each landform;
- Monitoring of cover performance through the use of permanent large, instrumented cover trials including the use of soil suction, moisture content measurements, soil gas and mine rock gas measurements, and changes in the physical properties of the covers;
- Visual monitoring of cover erosion;
- Settlement monitoring;
- visual monitoring of the performance of surface water drainage systems; and
- Monitoring of vegetation performance and wildlife use of the land.

Data management is an important element of this monitoring program. Quality control, quality assurance, and data security will be central elements further defined prior to Construction and Pre-Production. The monitoring data will be used to conduct an annual evaluation of the water balance for each landform and for the site.

A test dump will be constructed as part of pit development and is an integral part of the source-control program. It will be constructed using the techniques proposed for other mine rock dumps on the site and will be rigorously instrumented and monitored. The dump will provide performance data to refine and calibrate the geochemical source-control models, determine whether designs for future mine rock dumps should be modified, and answer specific questions, including:

- What is the water balance for a dump constructed with the latest technology and strategy to control oxidation and release of contaminants?
- What is the nature of oxygen ingress and movement within the dump, what are the mechanics, how large of a suboxic zone can be created, and how does the size of the zone change seasonally and over time?
- What are the production rates of selenium and other elements of concern?
- How should the design and construction of future dumps be optimized?
- How can the uncertainty regarding source control be better managed?

Figure 33.4-11 depicts some of the instrumentation likely to be employed on the test dump.

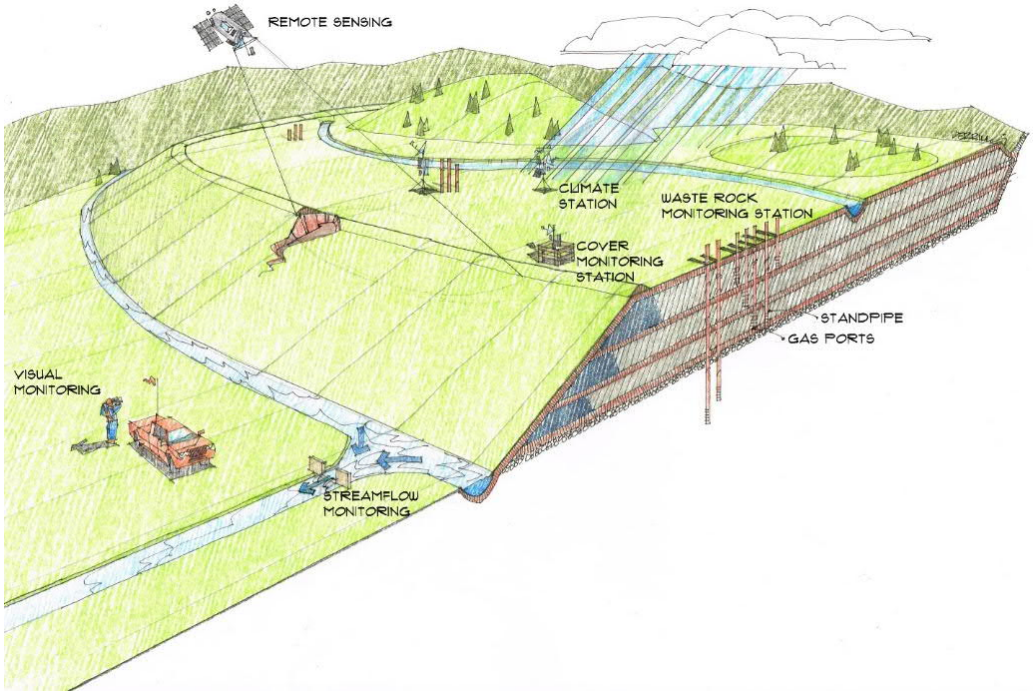


Figure 33.4-11: Example of Dump Monitoring Instrumentation and Techniques

33.4.1.7 Noise and Vibration Management Plan

33.4.1.7.1 Introduction

Throughout the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project, many activities will be undertaken that will involve the potential for increased noise and vibration that may lead to incidents and complaints and therefore require noise and vibration control measures. This Noise and Vibration Management Plan is intended to provide a framework of the measures that will be implemented to control or minimize the effects of noise and vibration from the Project, the processes that will be in place to track and address incidents or complaints, reporting procedures, as well as the monitoring program that will be implemented to monitor noise and vibration emissions from Project activities and compare against applicable compliance criteria.

The Noise and Vibration Management Plan is a conceptual plan, which NWP will revise to include additional site-specific details prior to Construction. Further, NWP will strive to continually improve the Noise and Vibration Management Plan throughout the life of the Project, through the use of advanced technologies and implementation of management practises that will further reduce the risk of complaints and potential effects to human health and the environment. Noise and vibration effects from the Project are primarily assessed in Chapter 7.

33.4.1.7.2 Scope and Objectives

The Noise and Vibration Management Plan involves the practises and procedures associated with management of noise and vibration through mitigation measures and prevention of incidents or complaints. These practises and procedures included in this plan are applicable to, and will be

implemented throughout, the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project. Further, this Noise and Vibration Management Plan is applicable to the Project development area, transportation routes, and undeveloped area in the vicinity of the Project.

The Noise and Vibration Management Plan was prepared to meet the following objectives:

- Provide a framework for appropriate prevention, response, and management of noise and vibration;
- Define the regulatory requirements, roles and responsibilities, and reporting requirements associated with noise and vibration control;
- Describe the environmental protection measures and management practises to be implemented to reduce the risk of incidents or complaints that have the potential to impact human health and the environment; and
- Outline the monitoring programs that will be implemented to assess the performance of the Noise and Vibration Management Plan and identify areas in which the plan can be improved through the use of adaptive management strategies.

33.4.1.7.3 Regulatory Requirements

There are several federal and provincial legislative requirements applicable to noise and vibration management planning. These requirements and their primary components related to noise and vibration prevention and management are provided in Table 33.4-20.

Table 33.4-20: Federal and Provincial Regulatory Requirements for the Noise and Vibration Management Plan

Regulation/Policy	Year	Applicable Regulations or Permits
International		
International Organization for Standardization (ISO) 1996-1:2016: Acoustics — Description, Measurement and Assessment of Environmental Noise — Part 1: Basic Quantities and Assessment Procedures	2016	Defines basic quantities to be used for the description of noise in community environments and basic assessment procedures (ISO, 2016).
ISO 9613-2:1996: Acoustics — Attenuation of Sound During Propagation Outdoors — Part 2: General Method of Calculation	1996 (Under Review)	Describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources (ISO, 1996).
World Health Organization Guidelines for Community Noise	1999	Defines basic aspects of acoustic measurement, adverse effects, guideline values, and noise management (Berglund et al., 1999).
American National Standards Institute (ANSI) S2.71-1983: Guide to the Evaluation of Human Exposure to Vibration in Buildings	1983	Assesses reactions of humans to vibrations of 1 to 80 Hertz (Hz) inside buildings by use of degrees of perception and associated vibration levels and durations (ANSI, 1983).

Regulation/Policy	Year	Applicable Regulations or Permits
Report of Investigations (RI) 8485: Structure Response and Damage Produced by Airblast from Surface Mining.	1980	Indicates safe levels of ground vibration that would ensure high probability of non-damage to structures (Siskind et al., 1980a).
Report of Investigations (RI) 8507: Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting	1980	Indicates safe levels of airblast that would ensure high probability of non-damage to structures (Siskind et al., 1980b).
Federal		
Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment	2019	Provides guidance on conducting human health risk assessment for environmental assessment in Canada (Health Canada, 2019).
Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise	2017	Health Canada characterizes noise, exposure, and health endpoints where they reference internal standards for acoustics. However, Health Canada does not have guidelines for enforceable noise thresholds or standards (Health Canada, 2015). Health Canada does provide generic guidelines to predict health risks related to different types of sounds related to different projects requiring an Environmental Assessment (Health Canada, 2017).
Environmental Code of Practice for Metal Mines	2009	The Environmental Code of Practice for Metal Mines outlines measures to control noise and ambient noise from mining operations. This document suggests that residential areas should not exceed an ambient noise level of 55 A-weighted decibels (dBA) during the day and 45 dBA at night. It is also noted that ambient noise also has the potential to affect wildlife (Environment Canada, 2009).
Provincial		
British Columbia (B.C.) Noise Control Best Practices Guidelines	2018	The B.C. Noise Control Best Practices Guidelines was developed for the oil and gas industry. However, best management practices and acceptable noise levels discussed in the document can be applied to other industries in B.C. (B.C. Oil and Gas Commission, 2018).
Ontario Ministry of Environment Noise and Vibration Limits for Blasting, Publication NPC-119.	1985	Provides cautionary and standard limits for ground-borne vibration and overpressure sound levels from blasting operations (Ontario Ministry of Environment, 1985).
Occupational Health and Safety Regulations (B.C. Reg. 297/97)	1997	The Occupation Health and Safety Regulations states that a worker is not to be exposed to noise levels of a daily exposure limit of 85 dBA Lex or a peak sound level of 140 C-weighted decibels (dBC). This document also summarizes an employer's responsibilities to the worker regarding noise control, exposure limits, and follow up actions.
Mines Act	1996	The *Mines Act* protects both employees and the general public to minimize health and safety and environmental risks associated with mining related activities.

Regulation/Policy	Year	Applicable Regulations or Permits
Health, Safety, and Reclamation Code for Mines in British Columbia	2017	The Health, Safety, and Reclamation Code for Mines in British Columbia summarizes acceptable noise exposure limits in a table from a 16 hour period (i.e., 82 dBA) through to a ¼ hour period (i.e., 100 dBA). Additional noise guidelines are provided throughout the document (British Columbia Ministry of Energy and Mines, 2021).
Municipal		
District of Sparwood Community Standards Bylaw 1194	2018	Outlines designated hours for noise related to construction and excavation (District of Sparwood, 2018).

33.4.1.7.4 Roles and Responsibilities

The key roles and responsibilities for implementation and management of the Noise and Vibration Management Plan are provided in Table 33.4-21.

Table 33.4-21: Roles and Responsibilities of the Noise and Vibration Prevention, Control and Countermeasures Plan

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the Noise and Vibration Management Plan, including meeting commitments to implement environmental and human health protection measures and monitoring programs. • Lead inspections, audits and on-site monitoring programs. • Implement awareness training for all employees and contractors. • Ensure appropriate response to incidents and complaints. • Lead incident investigations. • Report to applicable regulatory agencies, as required. • Update the Noise and Vibration Management Plan, as required.
Project Construction Manager	• Implement and ensure compliance with the Noise and Vibration Management Plan during Project Construction and Pre-Production. • Provide and deploy response mitigation measures within the Project site during Construction and Pre-Production. • Ensure completion of noise and vibration awareness training by all employees and contractors.
NWP Mine Manager	• Implement and ensure compliance with the Noise and Vibration Management Plan during Project Operations. • Ensure completion of noise and vibration awareness training by all employees and contractors. • Oversee personnel resourcing for response. • Participate in noise and vibration incident investigations.
Health and Safety Manager	• Oversee health and safety of personnel during the occurrence of an incident. • Participate in noise and vibration incident investigations. • Implement the Mine Emergency Response Plan, as required. • Complete health and safety investigations related to noise and vibration incidents.

Role	Responsibilities
All employees and contractors	• Complete environmental awareness training. • Compliance with the Noise and Vibration Management Plan.

33.4.1.7.5 Environmental Protection Measures

This Noise and Vibration Management Plan provides a range of protection measures that will be implemented to avoid or reduce the potential for the occurrence of an incident or complaint on the Project, and to appropriately respond to and mitigate the incident or complaint should they occur during any phase of the Project. These protection measures will be further refined and detailed throughout the Project permitting process and will be updated with more site-specific information prior to the commencement of construction.

Noise Prevention

Prevention is the preferred manner of addressing noise and vibration throughout all phases of the Project. Implementation of the following measures will contribute to the effective mitigation of noise and vibration:

- Implement industry standards and best management practises (BMPs) to minimize noise and vibration during Project construction;
- Limit construction, especially those projects with higher noise levels, to daylight hours;
- When selecting construction equipment consider the noise ratings of the machinery;
- Use equipment that is appropriate for each task;
- Maintain equipment and machinery at regular intervals, including lubrication and replacement of old and worn out parts, as well as maintenance of exhaust systems in order to minimize noise;
- Equip all diesel-powered equipment with silencers (i.e., mufflers) that meet manufacturers' recommendations to meet optimal attenuation. Mufflers will be regularly maintained and inspected;
- Operate equipment and machinery in a manner that minimizes noise such as reducing speeds;
- Install acoustic barriers or building enclosures around Project activities that may generate substantial noise, where possible;
- Install and maintain noise mitigation measures, where possible, on and around Project infrastructure. They may include silencers, acoustic louvers, and barriers;
- Schedule construction activities appropriately to minimize cumulative noise impacts;
- Avoid and discourage unnecessary idling of equipment when possible;
- Place stationary equipment (i.e., generators, incinerators, etc.) away from human receptors, when possible;
- Outfit bins and conveyor systems with cladding to reduce noise propagation;
- Reduce drop material heights to piles or bins as much as possible;
- Select low noise conveyor systems;
- Restrict indoor operations and equipment so that an interior reverberant level of 85 dBA to the unprotected ear is not exceeded;
- If further controls are required for controlling noise at receptors, consider increasing window glaze thickness, reviewing the heating, ventilation, and air conditioning (HVAC) system, or improving construction of exterior facades;

- Implement training programs for employees on noise and vibration impacts, and the mitigation measures and controls to be implemented;
- Ensure nearby residents are aware of construction activities and construction schedules that may generate significant noise or vibrations which mitigation may not be feasible. Residents will be notified prior to any activities that many cause disturbances including blasting operations;
- Blasting will be completed by qualified explosives technicians that are trained and licensed to do so;
- The quantity of charge used per delay will not exceed 2,300 kilograms (kg) throughout the Project and the time delay will not be less than 25 milliseconds (ms);
- NWP will coordinate with neighbouring mining operations to ensure that blasting operations do not coincide; and
- Strictly enforce the Noise and Vibration Management Plan by all on-site personnel.

Noise Response

While prevention is the preferred manner to address noise and vibration in the Noise and Vibration Management Plan, a response and countermeasures plan is required in the event that an incident or complaint occurs during any phase of the Project. A key to effective noise and vibration response is the timely implementation of controls and mitigation measures by following clearly established procedures.

The following action will be taken in the event of a noise or vibration incident or complaint:

- A detailed report will be completed for the incident or complaint;
- An individual or department will be assigned to complete an investigation;
- The investigation will attempt to identify the cause of the incident or complaint which will be accomplished by reviewing the incident or complaint, relating it to the activities being completed at that time and relating it to climatic conditions;
- Depending on the nature of the incident or complaint, follow up noise and vibration monitoring may be required; and
- Follow up and notify the compliant of the results and outcomes of the investigation.

Countermeasures

Once the appropriate responsible personnel have been notified and the incident or complaint has been addressed, the extent and severity of the incident will be addressed. This includes an assessment of the environmental and human receptors affected or potentially affected. The incident or complaint will be documented (see Section 33.4.1.7.6) for inclusion in a noise and vibration incident report and a mitigation plan will be developed and implemented. All incidents or complaints will be documented by the Environmental Manager or a responsible delegate.

33.4.1.7.6 Reporting Requirements

The NWP Environmental Manager (or a responsible designated alternate) will prepare an incident or complaint report and conduct an investigation to identify the root cause of the incident or complaint. The findings of the investigation will be used to improve noise and vibration mitigation procedures, and the Noise and Vibration Management Plan will be updated accordingly.

A detailed report will be completed for the incident or complaint by the NWP Environmental Manager, Mine Manager, Construction Manager, or a responsible designated alternate. The report will include, to the extent practical, the following information:

- Name of compliant;
- Address of compliant;
- Date and time of compliant;
- Date and time when noise or vibration occurred;
- Subjective assessment of magnitude of noise or vibration; and
- Description of noise or vibration and follow up measures taken.

All reporting will be conducted and completed as per permits, approvals, and authorizations obtained for noise and vibration reporting based on annual permits and license reporting, corporate reporting, and potential additional reporting requirements based on result from the noise and vibration monitoring program. The monitoring program will be developed prior to construction and implemented, including routine monitoring, compliance checks, and quality assurance and quality control. All monitoring events will be reported on and submitted to the appropriate personnel. See Section 33.4.1.7.7 for further details on the noise and vibration monitoring program.

As part of regular monitoring and corporate reporting the following noise and vibration reporting requirements will be completed and include:

- Monitoring event (i.e., regular monitoring or complaint) and noise and vibration variables to be collected;
- Noise and vibration monitoring equipment/instruments used and calibration certificates;
- Monitoring/measurement locations;
- Date, time, and duration of monitoring event and weather conditions (i.e., wind direction and speed, temperature, cloud conditions, etc.);
- Records and correspondence of complaints, if applicable;
- Detailed notes on the observable sound environment at each monitoring location (i.e., audible sounds, tones, residual sounds, noticeable vibrations, etc.);
- Figures illustrating monitoring setup;
- Results, including recorded sound, overpressure, and vibration levels and quality assurance/quality control (QA/QC) including analysis of compliances and/or non-compliance based on applicable regulatory criteria, potential reasons and contributions to the noise or vibration incident or complaint, if applicable, and recommended mitigation measures to be implemented to prevent future incidents or complaints;
- Records of staff training activities related to the Noise and Vibration Management Plan;
- An annual report of all noise and vibration monitoring events will be completed and will include monitoring event results, implemented and effectiveness of mitigation measures, and analysis of non-compliance issues; and
- A review of the Noise and Vibration Management Plan and recommendations for additional measures and improvements will be completed.

Records of all documents related to the Noise and Vibration Management Plan will be maintained by the NWP Environmental Manager, including incident reports, actions, countermeasures, investigation findings, training records, complaint records, monitoring program results, and annual noise and vibration

reports. This information will be used to facilitate improvements to the Noise and Vibration Management Plan through adaptive management practises.

33.4.1.7.7 Monitoring Program

A monitoring program is a key component of the Noise and Vibration Management Plan, as it is used to evaluate the effectiveness of noise and vibration prevention measures, mitigation measures, and management strategies throughout all phases of the Project. The noise and vibration monitoring program is expected to evaluate changes in noise and vibration levels throughout all phases of the Project, to ensure that regulatory compliance measures are met, and allow for the development of adaptive management strategies through continued improvements of mitigation measures. The monitoring program will be established prior to construction and implemented and managed by the NWP Environmental Manager; however, a range of Project personnel will be trained to participate in the program.

The monitoring program will include the following procedures:

- Weather and noise and vibration baseline conditions will be collected prior to commencement of Construction and Pre-Production. These data will include parameters such as temperatures, precipitation, wind speed, wind direction, relative humidity, and solar radiation;
- Prior to the start of the noise and vibration monitoring program, applicable regulatory noise and vibration parameters and criteria will be established (i.e., non-compliance levels) and monitoring intervals, locations, and methods will be selected;
- Noise and vibration monitoring equipment will be selected prior to the start of the noise and vibration monitoring program. This equipment will be selected to ensure all parameters can be appropriately collected;
- Noise and vibration monitoring will be completed during all phases of the Project and occur at regular intervals. Implementation of the noise and vibration monitoring program will be completed at representative nearby receptors to compare against the already established background noise levels and to confirm modelled noise level predictions at the receptor locations;
- Data will be collected at regular intervals at three pre-determined monitoring locations. These intervals will vary based on the phase of the Project and monitoring locations will change based on pit size, locations, and operations;
- Noise data will be collected and downloaded at regular weekly intervals or in the event of a complaint, while vibration data will be collected only during blasting operations; and
- If noise and vibration parameters are exceeded, a noise or vibration incident occurs, or a public complaint is submitted, additional mitigation measures will be implemented, and additional monitoring intervals may be required.

The monitoring program will be refined and supplemented with additional site-specific details prior to commencement to construction, as the permitting process progresses.

33.4.1.8 Site Water Management Plan

33.4.1.8.1 Introduction and Background

NWP is applying to develop a metallurgical coal mine in the Elk Valley region of southeastern British Columbia. This is to be one of several mines that will potentially operate in the area, creating the need to

address cumulative impacts and manage development in a way that respects the land and water for future generations.

Surface water is a key component of the biophysical environment. The timing and magnitude of surface water flows (hydrology) are essential to the health and well-being of aquatic ecosystems, vegetation, and wildlife through direct influences on physical habitat and water quantity and quality. Surface water quantity also influences other environmental conditions, including groundwater availability and quality and climate feedbacks. Climate change is also increasingly recognized as a factor that affects hydrology and surface water availability through alterations of the conditions that influence the hydrologic cycle. Given the complex relationship between hydrology and the natural environment, hydrology has been identified as an intermediate valued component (VC) for the Project. An understanding of hydrologic characteristics within and downstream of the Project area is critical to the design, engineering, and assessment of potential environmental effects of the Project.

Surface water quality is equally essential to the maintenance of aquatic ecosystems, vegetation, wildlife, and human health. Water quality constitutes the physical, chemical, biological, and aesthetic characteristics of water as determined by regional and local factors, including surficial and bedrock geology, rock weathering, surface transport, biological processes, and anthropogenic influences (Khatri and Tyagi, 2015). The physical and chemical compositions of water and sediment vary, with factors such as pH and temperature driving a dynamic exchange of molecules between the water column and underlying sediments. Given the complex relationship between surface water quality and the natural environment, surface water quality was identified as an intermediate VC for the Project; it constitutes a critical pathway for receptor VCs such as fish, wildlife, vegetation, and humans. An understanding of surface water quality within and downstream of the Project is critical to the Project design, engineering, and operations, as well as assessment and mitigation of potential environmental effects.

Groundwater quantity and quality are also key components of the biophysical environment, as they interact with the creeks and drainages in the vicinity of the Project. As a component of baseflow, groundwater contributes to the creeks and drainages in the area, which are both gaining and losing groundwater quantity along their lengths. Because groundwater quality and quantity are intrinsically tied to surface waters in the vicinity of the Project, groundwater flows are essential to the maintenance of aquatic ecosystems, vegetation, wildlife, and human health. Within the Elk Valley, groundwater is a primary source of drinking water for residents (Teck Resources Limited, 2014), which is a potential future use of water within the vicinity of the Project.

Concerns regarding the potential short- and long-term impacts to the area are centred around certain VCs. These include:

- Local and downstream fish and fish habitat;
- Benthic communities that support local fish populations;
- Vegetation ecosystems connected to the local water systems;
- Wildlife reliant on the local water systems; and
- Human health.

Surface water and groundwater resources in the Project area have links to these VC receptors and are examined more fully in the following chapters of the Application/EIS documentation:

- Chapter 9: Groundwater Assessment;
- Chapter 10: Surface Water Quantity Assessment;
- Chapter 11: Surface Water Quality Assessment;
- Chapter 12: Fish and Fish Habitat Assessment;
- Chapter 13: Landscapes and Ecosystems Assessment;
- Chapter 14: Vegetation Assessment;
- Chapter 15: Wildlife and Wildlife Habitat Assessment;
- Chapter 22: Human and Ecological Health Assessment; and
- Indigenous Communities discussed in Chapters 23 through 31.

This document represents a distillation of components of these chapters and outlines NWP's approach to water management for the Project.

33.4.1.8.2 Purpose, Philosophy, and Considerations

The overall purpose of the SWMP is to ensure environmental protection, pollution avoidance, alignment with Indigenous Communities, successful closure, and no long-term liability to NWP, Indigenous Communities, local stakeholders and residents, or the Provincial/Federal governments.

Corporate Philosophy

NWP's corporate vison for the Project is to design, operate, and successfully close a metallurgical coal mine in a manner that ensures the preservation of the surrounding area and avoids long-lasting legacy issues that have been associated with past coal mining activities in the region. NWP intends to realize this vision by ensuring the use of:

- State-of-the-art mining and materials-handling techniques;
- Mine rock segregation;
- Thoughtful water management;
- Effective monitoring systems;
- Useful modelling to project future impacts;
- Robust management systems to ensure alignment between modelling and monitoring results; and
- Adaptive management to respond to unanticipated changes that threaten the success of the overall vision.

NWP's mission to support the vision for the Project is encapsulated in four desired outcomes:

- Keep clean water clean;
- Protect sensitive aquatic habitat;
- Effectively manage mine rock stored on-site so it does not present a long-term liability to future generations; and
- Ensure a functioning and acceptable post-closure landscape that meets the needs of local Indigenous peoples and other users in the region.

Stakeholder Engagement

NWP has engaged with local regulators and stakeholders throughout the Project development process to ensure alignment with the goals and expectations for sustainable development of British Columbia's

natural resources, in this case metallurgical coking coal. Open and honest dialogue through workshops and other forms of knowledge- and experience-sharing have been part of NWP's approach since the inception of this Application/EIS. NWP has also openly engaged with Indigenous groups and participated in similar dialogues and meetings to discuss concerns related to water management challenges associated with the Project. A summary of all consultation and engagement activities undertaken to date is presented in Chapter 4.

NWP acknowledges the rights and freedoms of Indigenous peoples and respects their connection to the land and water. NWP has openly engaged with the Ktunaxa Nation Council to obtain their input on mine design and reclamation concepts. This is meant to ensure that the land and water at end of mine and long-term closure is in an acceptable state for future uses consistent with their ways, needs, and culture.

33.4.1.8.3 Scope and Objectives

The scope of the Site Water Management Plan (SWMP) is to provide a holistic system of modelling, monitoring, and management whereby both surface water and groundwater can be managed and protected in a manner consistent with the Project's Vision and Mission. This chapter outlines how data will be collected, evaluated, and communicated, and describes prevention, mitigation, and contingency measures to avoid the creation of water-related challenges during the life of this Project or afterward.

Hydrologic conditions can be affected by reductions in streamflows associated with alterations of natural flow regimes that could result from proposed water withdrawals and other mine-related activities. Changes to surface water hydrology can directly affect aquatic and terrestrial ecosystems, vegetation, wildlife, and human receptors by changing physical habitats and water quality.

Activities during Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project can also influence surface water quality within and downstream of the Project footprint. Changes to surface water quality from mining activities may affect receptor VCs, including aquatic health, vegetation, wildlife, and human and ecological health.

With respect to groundwater, existing baseline conditions may be affected by mine development and dewatering activities, mine rock management, and other mine-related activities. Changes in groundwater quantity may result in streamflow reductions or changes in peak flow, which may affect downstream surface water quantity. Potential changes in groundwater quality and quantity can also affect sources of drinking water. Groundwater levels and concentrations of metals and non-metal constituents were selected as measurement indicators for groundwater quantity and quality.

The overarching objective of this SWMP is to identify the links between surface water, groundwater, and the planned site activities to identify potential threats in a proactive manner and ensure the land and connected waters can be restored to an acceptable and functioning state.

33.4.1.8.4 Management Plan Outline

This plan has been designed to address the management of waters on and around the Project development area and ensure that influences from mining, waste management, and reclamation activities are effectively managed, and mitigated where necessary. Sections have been provided to:

- Outline the main pieces of legislation governing this aspect of the development;

- Identify roles and responsibilities of NWC management, employees, and external counsel;
- Introduce the approach to water management, including:
  - Key performance indicators (KPIs);
  - Baseline identification;
  - Effects forecasting; and
  - Action triggers;
- Describe the monitoring and response process;
- Layout the trigger action and response plan; and
- Provide individual management plans for:
  - Contact and non-contact waters;
  - Surface water – streamflows;
  - Surface water – quality;
  - Groundwater levels and quality;
  - Metal leaching and acid rock drainage;
  - Selenium;
  - Nitrate; and
  - Calcite.

The SWMP is guided by several pieces of legislation and guiding documents regarding the development, operation, and closure of metallurgical coal mines, both provincially and federally. Each aspect of water management, whether it be surface water, groundwater, or mine contact water, is governed by this legislation to ensure the sustainable development of British Columbia's natural resources and the protection of the surrounding area for current and future generations using the land.

33.4.1.8.5 Applicable Legislation and Guidance

Table 33.4-22 summarizes the major pieces of legislation associated with the Project that fulfill the needs of the Environmental Assessment Office of British Columbia, Environment and Climate Change Canada (ECCC), and the federal Department of Fisheries and Oceans.

Table 33.4-22: Federal and Provincial Regulatory Requirements for Water Management

Legislation/Policy/Guidance	Applicable Regulations or Permits
Federal	
Canada Water Act (1985)	The *Canada Water Act* legislates water resources by providing a framework for collaboration among federal, provincial, and territorial governments in matters relating to water resources, including programs relating to research, conservation, development, and utilization of water resources
Canadian Environmental Protection Act (1999)	The purpose of the Act is to contribute to sustainable development through pollution prevention. It provides the legislative basis for a range of federal environmental and health protection programs.
Fisheries Act (2019)	The *Fisheries Act* provides protection against the death of fish other than by fishing, release of deleterious substances, and the harmful alteration, disruption, or destruction of fish habitat, among other threats.

Legislation/Policy/Guidance	Applicable Regulations or Permits
Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2022)	Summary of the values and key information from each of the guidelines relating to constituents in waters supporting aquatic habitat and fish.
Guidelines for Canadian Drinking Water (Health Canada, 2020)	Summary of the values and key information from each of the guidelines relating to constituents in drinking water.
Coal Mining Effluent Regulations (ECCC, 2022; draft)	Describes an approach for all coal mines (other than current coal mines located in the Elk Valley), outlines the proposed environmental effects monitoring requirements, proposes requirements for public availability of information, and describes the regulatory review process.
International Boundary Waters Treaty Act (1985)	Establishes the legal rights of parties pertaining to the impacts on and diversion of surface water in Canada that flows to the United States.
Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (online)	Comparison values for surface water quality for the protection of human health, aquatic life, and for agricultural use.
Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (online)	Comparison values for surface water quality for the protection of human health, aquatic life, and for agricultural use. Applicable where groundwater discharges to surface water.
Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ, 2020)	These guidelines are based on current published scientific research related to health effects, exposure levels, aesthetic qualities (i.e., odour and taste), and operational considerations (i.e., treatment and analytical technologies and adverse effects on drinking water infrastructure).
Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites (2012)	These guidelines were developed for the assessment, remediation, and risk management of contaminated groundwater at federal sites. The document provides interim guideline values for groundwater quality assessment until Canadian groundwater quality guidelines become available.
Provincial	
Ambient Water Quality Guidelines for Selenium Update (2014)	Provides updated Water Quality Guidelines for selenium in water for the protection of aquatic life. Analytical results can be compared to the guideline and alert values for selenium in water.
B.C. Water Quality Guidelines (WQG; Approved and Working) (2019, 2020)	Provide short-term maximum "acute" and long-term "chronic" comparison values for surface water quality, for the protection of aquatic organisms against severe effects such as lethality due to short-term intermittent or transient exposures to contaminants, and from lethal and sub-lethal effects over long-term indefinite exposures.
Contaminated Sites Regulation (1996)	The *Contaminated Sites Regulation* (B.C. Reg. 375/96) Schedule 3.1 under the *Environmental Management Act* (2003) lists soil quality and groundwater standards for human health and environmental protection. These criteria are used to determine whether a specific site is contaminated and liability for site remediation and assess the effectiveness of remediation and reclamation efforts.

Legislation/Policy/Guidance	Applicable Regulations or Permits
British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (2021)	Guidelines obtained from various Canadian provincial and federal jurisdictions (primarily the CCME), as well as the United States, Europe, Australia and New Zealand, and from published scientific literature. They provide benchmarks for those substances that have not yet been fully assessed and formally endorsed by the B.C. Ministry of Environment.
Derivation of Water Quality Guidelines for the Protection of Aquatic Life in British Columbia (2019)	Provides references for the derivation of water quality guidelines for use in B.C.
Drinking Water Protection Act (2001)	Provides guidelines and directives for the use and development of water supply systems used for domestic purposes, for the protection of public health.
Environmental Management Act (2003)	Regulates industrial waste discharge, pollution, hazardous waste, and contaminated site remediation. Provides the authority to introduce waste into the environment while protecting environmental and human health. The Act enables permits, regulations, and codes of practice to authorize discharges and details enforcement options, including administrative penalties, orders, and fines to encourage compliance.
Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities of the British Columbia Ministry of Environment (2012)	These guidelines address the broader concepts of groundwater modelling related to the environmental assessment process in B.C. Guidelines for using models as a tool to identify and assess the impacts of natural resource projects in B.C., including generally accepted best practices in groundwater modelling for development and use of groundwater models by resource industry groundwater professionals, and review of groundwater models by regulators.
Health, Safety and Reclamation Code for Mines in British Columbia (2021)	Provides a foundation for the protection of terrestrial landscapes and ecosystems through requirements that minimize environmental risks associated with mining activities, in addition to reclamation requirements for disturbed areas.
*Mines Act (*1996)	Regulates the stability of stream, river, wetland, and seepage-area crossings (Section 9) and requires that the stability of artificial structures (e.g., impoundments, dumps, and slopes) are planned in advance, inspected, monitored, and maintained throughout the operations and at the time of project closure (Section 10). It requires that all surficial soil materials removed for mining be salvaged for use in reclamation (Sections 6, 9, and 10).
Riparian Areas Protection Act (1997)	Establishes directives to protect and enhance riparian zones in the vicinity of development, including industrial activity.
Source Drinking Water Guidelines (2020)	Guidelines developed for a variety of water values; aquatic life, agriculture, drinking water sources, recreation, aesthetics, and wildlife using the best available science to aid in the management of B.C.'s water resources.
Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (2016)	Guidance that defines the requirements of baseline studies and monitoring programs for surface water and air effluents for proposed and operating mineral developments in B.C.

Legislation/Policy/Guidance	Applicable Regulations or Permits
Water Sustainability Act (2014)	Ensures fresh and clean water remains at a sustainable supply to meet the needs of the Province of British Columbia. This act addresses the management, including diversion and use, of water resources. The goal of the act is to protect, manage, and use water efficiently.
Water Protection Act (1996)	The *Water Protection Act* confirms the province's ownership of surface and groundwater, defines limits for bulk water removal, and prohibits large-scale diversions of water between major provincial watersheds and/or to locations outside the province.
Other Supporting Documents	
Elk Valley Water Quality Plan	Developed under an Order of the Minister of Environment via the B.C. *Environmental Management Act*; provides a framework for decision-makers to consider future regulatory applications regarding metallurgical coal mining in the Elk Valley.
Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (1998)	Provides general direction on metal leaching and acid rock drainage issues and management without limiting options and approaches.
Manual of British Columbia Hydrometric Standards (Ministry of Environment and Climate Change Strategy, 2018)	Procedures for all aspects of hydrometric surveys in an open channel: fundamentals of hydrometric operations, stage measurement, discharge measurement, and stage-discharge rating and discharge calculations.
MEND Report 1.20.1: Prediction Manual for Drainage chemistry and Sulphidic Geologic Materials (2009)	Guidelines to facilitate a comprehensive, in-depth understanding and conduct a prediction program for the effects of metal leaching and acid rock drainage.
Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (1998)	Set discharge quality requirements through the *Waste Management Act,* which prohibits the introduction of waste which may substantially alter or impair the usefulness of the environment.
Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators Ministry of Environment and Climate Change Strategy, 2016)	Specific studies and information requirements for geology/geochemistry, meteorology and air quality, surficial hydrology, hydrogeology, water quality (physical and chemical parameters, aquatic sediments, tissue residues, and aquatic life), fish and fish habitat, and initial environmental impact assessment.

33.4.1.8.6 Roles and Responsibilities

Reaching the goals of "keeping clean water clean" and "effectively managing unacceptable mine waters" requires appropriate site-specific training of management, staff, and contractors. This training addresses specific measures relating to work activities inside and outside of the working mine to ensure that water resources and reliant ecosystems are protected from adverse effects during Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project.

Key roles in the NWP management and staffing structure for this SWMP, along with a description of the roles that each play in executing the plan to ensure its effectiveness, are listed in Table 33.4-23.

Table 33.4-23: Roles and Responsibilities for the Site Water Management Plan

Role	Responsibilities
External Mine Review Panel	Manage third-party review and validation of management system efficacy and performance as stated in Application/EIS documents; make recommendations for system upgrades to facilitate adaptive management activities, where necessary.
NWP Environmental Manager	Implement and review the water management plans (WMPs), including meeting commitments to implement environmental protection measures and monitoring programs. Lead environmental inspections, audits, and on-site monitoring programs. Implement environmental awareness training for all employees and contractors. Ensure appropriate response to, and effective remediation of, unacceptable incidents that may affect water quantity or quality. Lead incident investigations and follow-up actions. Report to applicable regulatory agencies as required. Updating the WMP, as required.
Project Construction Manager	Implement and ensure compliance with the WMP during Project Construction and Pre-Production. Ensure completion of awareness training by all employees and contractors to protect non-contact waters and appropriate management of internal contact waters.
NWP Mine Manager	Ensure completion of awareness training by all employees and contractors. Participate in incident investigations. Implement and ensure compliance with the WMP mining operations, progressive reclamation, and closure.
Health and Safety Manager	Oversee the health and safety of site personnel during any incident. Participate in incident investigations. Implement the Mine Emergency Response Plan, as required. Complete health and safety investigations related to incidents.
First Aid Personnel	Apply first aid to personnel during incidents, as required. Mobilize emergency transportation of personnel during incidents, as required.
Security Personnel	Limit access to Project areas following an incident, or identified geohazard risks, as required. Contact local law enforcement authorities for assistance, as required.
All employees and contractors	Complete environmental awareness training and adhere to requirements of WMP and any associated SOPs.

33.4.1.8.7 Approach to Water Management

Standard Operating Procedures

When developing and implementing a site-wide performance monitoring program it is important to provide a consistent framework for data collection, management, evaluation, and reporting. This ensures

that the most meaningful and relevant information will be captured in a standard format so that useful comparisons and timely changes from baseline conditions can be identified.

NWP recognizes this need for standardization of its water modelling, monitoring, and management programs. As such, NWP will develop a standard operating procedures (SOP) manual that will outline the requirements for site personnel or contractors brought on to support NWP's monitoring and assessment efforts during the field data collection and laboratory analysis phases. The procedures will outline (among other things):

- Mine access and safe routes to and from monitoring stations within and outside the mine footprint;
- Requirements for proper communications to address remote working conditions (i.e., communications plan);
- Importance and methods of equipment calibration (including proper standards);
- Operation of field equipment;
- Method-based purging requirements for groundwater monitoring wells (including the proper disposal of purged water and any other materials used);
- Proper collection and preservation of surface water and groundwater samples (e.g., ultra-clean sampling methods, field filtering, acidification, and temperature requirements);
- Proper collection of blind duplicates;
- Documentation of field-measured parameters;
- Procedures for decontamination of field equipment prior to use at other monitoring locations;
- Proper sample-handling and shipping techniques (including chain of custody protocols);
- Required methods of analysis (i.e., analytical techniques and desired method detection limits [MDLs]) to be used once delivered to the laboratory; and
- How the laboratory data will be reported to NWP upon completion (i.e., digital and hardcopy).

The field SOP manual will be made available to all personnel executing field work on behalf of NWP, and they will be required to be familiar with it before they begin working. Field crews will be subject to periodic third-party audits to ensure that all aspects of the SOP are being adequately followed.

Key Performance Indicators

Many aspects of the mining process can affect water quality and quantity. When faced with the multitude of physical, chemical, and biological constituents that can be measured, it is common practice to select appropriate KPIs that clearly link to a project's related effects.

For surface water quantity, the implications of changes to the water balance of the area will manifest themselves in the amount and magnitude of runoff recorded in tributary creeks and higher-order streams. As for groundwater, fluctuations in water levels—mostly in the unconfined aquifer intervals—may be expected from landscape changes and altered recharge and discharge characteristics that occur as mining and reclamation activities proceed.

With respect to water quality, a number of physical and chemical parameters will change as a result of project activities. Of particular importance is pH, given the risk of acid rock drainage from the mine rock and reject materials stockpiled onsite. Another is turbidity, which can damage stream habitat if not managed effectively. With respect to chemical parameters, the most important constituents to track are

those that capture the effects of site disturbance and waste management activities. NWP currently tracks three KPIs commonly associated with metallurgical coal mining in the Elk Valley:

- Selenium – a trace element released by the weathering of sulphide minerals present in the rock deposits;
- Nitrate (NO_3) – a nutrient associated with blast residue generated during coal mining; and
- Sulphate (SO_4) – a by-product of the sulphide mineral weathering process.

Although these constituents are indicative of effluents that may originate from coal mining activities, this list does not preclude the incorporation of other constituents that have been detected outside of their normal ranges at other mining operations (e.g., Teck's Elk Valley operations). The data collected as part of NWP's ongoing surveillance monitoring programs will be enhanced with additional KPIs that warrant tracking to ensure that contaminants of concern (COCs) are detected in a timely manner and managed accordingly.

Because so much attention is placed on selenium and nitrate mobilization, it is important to incorporate a wider range of constituents to ensure that unanticipated mobilization of other constituents is not occurring as a result of the abatement methods being used (i.e., layered mine rock storage facilities [MRSFs]). In the past, this has led to unanticipated consequences that NWP does not intend to repeat. Based on results from other Elk Valley operations, constituents related to sulphide mineral and mine rock weathering suggested for inclusion in the KPI list include cadmium, cobalt, mercury, uranium, and zinc.

Baseline Identification

To identify future influences from the Project and any departures from natural conditions in the development area, a clear baseline must be established for the indicators selected for monitoring. This requires the collection of a suitable amount of pre-development monitoring data to determine the spatial and temporal variability of the site conditions and their dynamics. The constraining features of the West Alexander Creek valley make it easy to collect data for the Project. Ridges on both sides focus surface runoff and groundwater flow toward the base of the valley and then southward to the confluence with Alexander Creek. The positioning of monitoring stations in a longitudinal or quasi-longitudinal fashion provides the ability to assess changes in baseline with distance from mine areas and waste management structures.

NWP has spent the last few years collecting baseline data associated with the surface water, groundwater, and climate to provide the necessary baseline to identify and track any changes that occur to the local project setting, specifically the West Alexander Creek valley and areas downstream or downgradient of the valley (i.e., Grave Creek, Alexander Creek, Michel Creek, and Elk River).

Although the baseline data collected to date does not extend back in time for the decades that would be necessary to capture a greater range of variability, they are still considered representative for the purpose of the Environmental Assessment (EA). This is less of a concern for groundwater due to its generally slow movement through the subsurface and generally consistent nature across similar aquifer intervals. Nevertheless, NWP will continue to collect baseline data at monitoring stations strategically located within the Project area or outside the area of influence in nearby settings to continue building a database of information that captures the natural variability of the area.

Surface Water

NWP has been monitoring seasonal streamflow conditions at a number of dedicated stations for several years, creating a robust baseline. This assessment includes the influence of groundwater baseflow contributions. The locations of the monitoring stations were selected to ensure that future collection and management of mine contact waters from areas within the development footprint are successful.

Included in the baseline monitoring effort are the physical and chemical qualities of the surface water, such as pH, temperature, electrical conductivity, and dissolved oxygen content, as well as the level of turbidity, presence of nutrients (i.e., nitrogen and phosphorus), other major ions or parameters of interest or concern (e.g., calcium, sulphate, and hardness), and trace elements such as selenium and other harmful constituents associated with metallurgical coal mining in the region (e.g., cadmium, cobalt, uranium, and zinc).

To date NWP has collected streamflow data from the following dedicated stations, and for the associated time periods:

- A1 2012 to 2019;
- A3B 2014 to 2016;
- WA1 2012 to 2016; and
- G2 2012 to 2019.

Locations of the various hydrometric baseline monitoring stations are shown as red symbols in the left image of Figure 33.4-12. Also shown are the locations of ECCC stations, in purple symbols, and the locations of climate stations in light orange.

The streamflow stations established by NWP and ECCC have captured useful baseline information, including streamflow characteristics in the proposed development area that have been used to develop effective surface water management strategies to ensure that the project has as little impact as possible on the area. This baseline information includes annual and monthly runoff; peak flows; mean, minimum, and maximum daily flows; and seven-day low flows.

The dataset collected over the years also includes a high-flow event in 2013 that was recorded throughout the southern region of Alberta, extending into southeast B.C. Water levels in some streams reached peak levels that had not been reported for the last 60 years, with others experiencing levels that have not been seen since the late 1800s (Pomeroy et al., 2015). Although the event was destructive, it provided valuable information on how similar extreme runoff events could interact with future mine development and related water- and waste-management efforts.

In addition to all the streamflow monitoring that is occurring in the area, a number of surface water–quality stations have also been established in the proposed development area to help gather baseline data on the natural variability of physical and chemical qualities. The left image in Figure 33.4-12 shows the locations of water quality stations that NWP has been monitoring within the West Alexander Creek valley and adjacent watersheds.

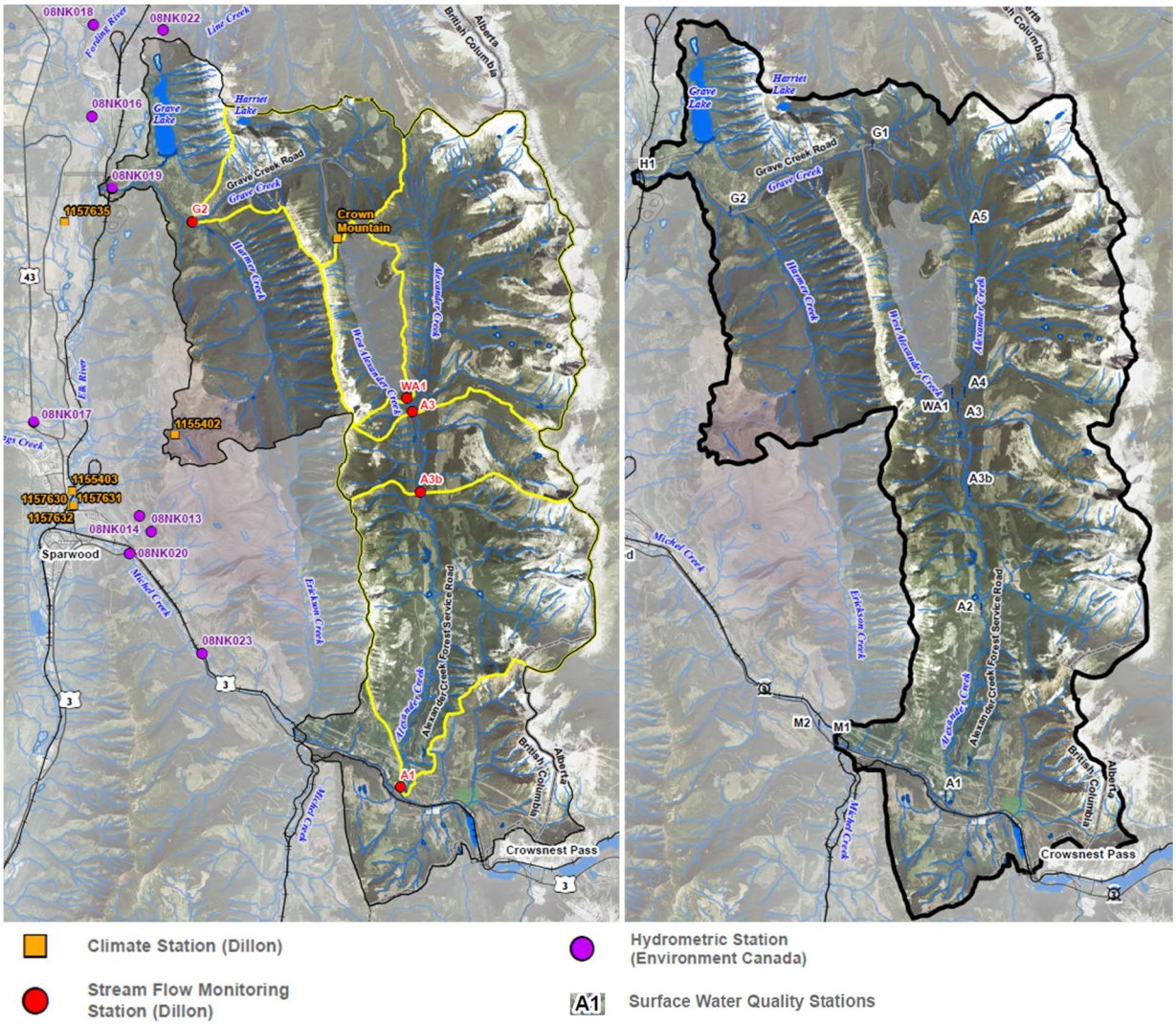


Figure 33.4-12: Location of Hydrometric and Climate Stations in the Proposed Mine Development Area (Left) and Water Quality Monitoring Stations (Right)

Groundwater

With respect to groundwater, the natural variability of water levels within shallow unconfined (water table) and deeper confined aquifer intervals is an important element of hydraulic gradients and the movement of groundwater underneath the planned development and waste management areas. A proper understanding of groundwater discharge characteristics to local streams or, conversely, the recharging of the groundwater by local streams, ensures operators can anticipate and monitor subsurface movement of water and any constituents associated with it, natural or otherwise. Such information is critical to gauging the short- and long-term risks to local aquatic receptors during the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project. An understanding of the natural variability of groundwater quality, particularly from a spatial perspective, is equally critical and will make it possible to distinguish potential changes due to mine operations and waste management practices from natural variability.

NWP has established 25 monitoring wells and 6 seepage monitoring stations where the spatial variability of groundwater quality has been documented in support of this Project. Locations of those monitoring stations are provided in Figure 33.4-13. The number of measurements collected at the various groundwater monitoring stations has ranged from 1 to 16, with an average and median of 7. An additional 12 seepage points have been assessed to provide more information on baseline groundwater quality.

To facilitate proper analysis of monitoring data, it is important that NWP collect and document enough measurements to detect changes beyond natural variability.

With the exception of a few monitoring wells, enough data have been collected to capture the natural variability of water quality and facilitate the use of statistical analysis to identify any departures from anticipated variability that may be related to future mine development and closure activities.

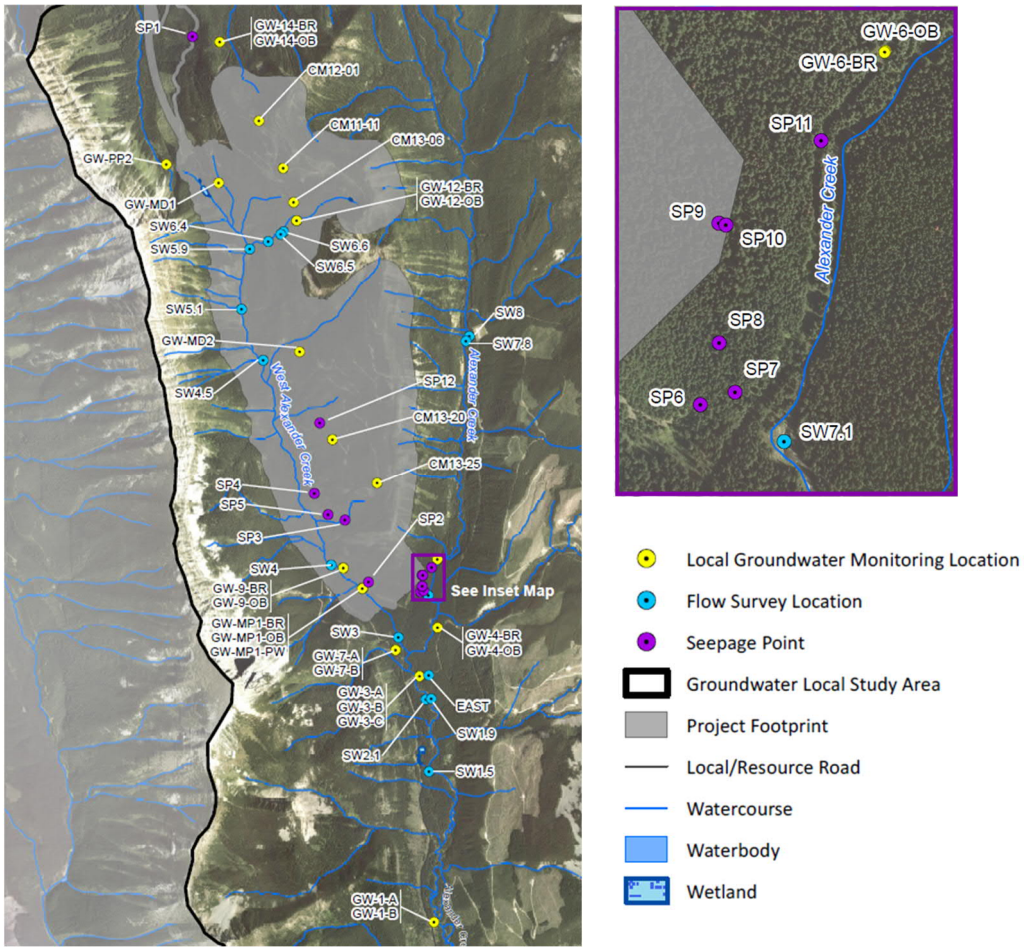


Figure 33.4-13: Locations of Groundwater and Seepage Baseline Monitoring Stations

Effects Forecasting

NWP has created numerous models to forecast the potential effects of the Project, including:

- Surface water flow;
- Groundwater (FEFLOW);
- Water and load balance (HYDRUS; GoldSim); and

- Calcite saturation (PHREEQCi).

The simulations that have been conducted in support of this Application/EIS, and in accordance with industry practices, are meant to provide a reasonable estimate of the effects that project may have on the surface water and groundwater resources of the Project area. Although assumptions often have to be made to address gaps in data and information, the professional judgment applied by the modelling practitioners and sensitivity analysis performed are meant to provide some degree of confidence in the assessment outputs. These outputs have informed approaches and site designs to achieve the environmental protection, prevention and avoidance, and mitigation measures for the surface water and groundwater risks.

NWP has been monitoring the surface water and groundwater for several years and it has completed some degree of comparison between simulated results and observed data. The results provide confidence that the models are representing the site conditions reasonably well. Given the complexities of the site, including the catchment characteristics and how water is conveyed during normal and extreme events, how groundwater moves through the subsurface, and how mine rock will react when buried, the simulations and the monitoring data collected provide a reasonable level of confidence that the proposed environmental protection, prevention and avoidance, and mitigation measures will achieve the intended goals.

Action Triggers

With any monitoring plan there is a need to establish points at which action is taken to better understand deviations from what is considered a natural range of variability and address unacceptable conditions. This can entail a numerical limit beyond which impacts on valued components are expected, or a temporal trajectory that falls outside of natural variability when compared with baseline data.

When such situations occur, NWP will initiate a structured follow-up process during which the situation is scrutinized to better understand the source and cause of the deviation. This will be guided by a system of criteria, whether provincially or federally mandated, locally derived, or site-specific. Upon detection and validation of a deviation from natural variability, NWP will follow a series of steps to explore the reason, or reasons, for the deviation, the likelihood of connection to its operations, the degree of risk posed by the deviation, and the need to initiate active or passive mitigation to stabilize and reverse the trend to ensure protection of the surrounding environment.

Provincial and Federal Criteria and Guidelines

The background level of a substance is the natural concentration of that substance in the absence of any effect from human activities. Identifying a true background is challenging given the amount of potentially influential human development that has occurred, not only in the Elk Valley, but in surrounding areas. This leads to the concept of a baseline, or a pre-development state of the system from which changes can be identified when monitored over a long enough period of time.

The baseline concentration of some substances can exceed published criteria or guidelines, and applying these criteria and guidelines globally can lead to the flagging of constituent concentrations that can be explained by natural processes. It is therefore important to identify naturally occurring substances and consider them in the management approach.

NWP acknowledges this challenge, as the occurrence of natural contaminants in the surface water and groundwater resources of the region is known. For situations where the amount of data at a given monitoring station precludes the use of statistical methods to identify conditions outside of natural variability (typically fewer than 8 to 10 measurements), the results will first be compared to a B.C. Ministry of Environment and Climate Change Strategy's (ENV) *Contaminated Sites Regulation* (CSR) and any exceedances will be flagged for investigation. In the absence of guidance by the CSR for aquatic life and drinking water (Contaminated Sites Regulation, 1996), CCME Aquatic Life and/or Drinking Water guidelines (CCME, 2014), or the Guidelines for Canadian Drinking Water Quality (Health Canada, 2020) and the pending *Coal Mining Effluent Regulations* (CMER, currently in draft), other criteria will be used to guide management actions.

Elk Valley Water Quality Plan

The Elk Valley Water Quality Plan (EVWQP) was brought into force by Ministerial Order to address operational challenges associated with Teck's Elk Valley operations and related releases. The purpose of the EVWQP is to identify a strategy and implement solutions to address increasing selenium and nitrate water concentrations within the Valley and assess and track levels of cadmium and sulphate in waters, while at the same time allowing for continued sustainable mining in the Valley. The plan also lays out a strategy to address calcite formation associated with historical and current mining activity.

In addition to other provincially and federally mandated criteria and/or guidance documents relating to coal mining effluent (ECCC, 2022), NWP intends to manage waters influenced by their development activities in alignment with the EVWQP to ensure that the overall goals of the plan are met and maintained. Projections made in the Application/EIS documents prepared by NWP and its consultants indicate that this should not be a challenge. Nevertheless, monitoring planned by NWP will provide the information necessary to validate this position or cause necessary mitigation measures to be put into place to ensure that the goal of the EVWQP and NWP's own internal goals are achieved.

Risk-Based Approach

Detection of a particular constituent at an elevated concentration, or one exceeding a published criterion or guideline, may not necessarily present a situation that requires mitigation. Many natural systems have the ability to assimilate constituents discharged to them without having adverse impacts—an ability that municipal wastewater systems rely on. An example in the metallurgical coal mining sector is the risk-based development of site-specific selenium criteria developed for the Elk Valley.

NWP understands and appreciates these challenges, and the fact that some uncertainty exists in their modelled forecasts respecting water quantity and quality. NWP also understands that some locations in its proposed mine development may present a higher risk to the integrity of local environmental receptors. For the most part, these higher-risk areas have been identified through the environmental impact assessment process, and strategic locations have been identified for routine monitoring.

Given the geographical layout of the Project and the current design of onsite water- and waste-management systems, much of the risk related to discharges to the local surface water and groundwater resources has been identified and mitigated to some degree. Nevertheless, NWP intends to employ a risk-based approach, in consultation with key regulatory agencies, the Ktunaxa, and other stakeholders, and

adaptively manage any situation that is considered unacceptable or may lead to changes in the local water systems that will result in long-term impacts.

Monitoring and Response Process

Monitoring is a process in which the condition of a performance parameter (i.e., physical, chemical, biological, or other) is observed systematically over time to ensure that no deviations beyond what is considered normal or natural are occurring. There will always be some degree of variability in monitoring data collected over time, whether due to natural forces or the result of issues that occur in the field or in the laboratory. The data used to make statements about changes to the performance parameters must be accurate, precise, and reproducible.

NWP understands the challenges posed by collecting, managing, and evaluating monitoring data and has been gathering timely, useful, and elucidating data that will allow natural conditions to be decoupled from Project impacts so that proper management decisions can be made.

Suite of Analyses

NWP understands the importance of having a suitable and comprehensive database of measured physical and chemical parameters to facilitate comparison of monitoring data and the identification of changes that warrant follow-up actions. To this end, NWP will collect a standard suite of measurements at each monitoring site to provide the information necessary to frame the local setting and distinguish between project-related effects and natural variability in future monitoring programs. This suite of analytes will include:

- Field measured parameters:
  - Water levels, flow rates, turbidity (where applicable); and
  - Temperature, pH, electrical conductivity, dissolved oxygen, and oxidation-reduction potential, where applicable;
- Total suspended solids (TSS);
- Total dissolved solids (TDS);
- Alkalinity;
- Hardness (as CaCO3);
- Major ions (Ca, Mg, Na, K, HCO3+ CO3, SO4, Cl);
  - Total and dissolved metals and trace elements, including arsenic, cadmium cobalt, selenium, mercury, uranium, and zinc;
  - Nitrogen species, including ammonium, nitrite, and nitrate;
- Phosphorous;
- Dissolved organic carbon (DOC);
- Petroleum hydrocarbons:
  - Fraction 1 (C_6-C_{10}) and 2 (C_{11}-C_{16}); and
  - Benzene, toluene, ethylbenzene, and xylene (BTEX) (if warranted) – benzene, toluene, ethylbenzene, xylenes (total); and
- Polycyclic aromatic hydrocarbons (PAHs), where required.

Once a suitable amount of data have been gathered at each monitoring location to facilitate statistical comparisons, and no excursions beyond statistical or natural variability are noted, the schedule may be

reduced to include KPIs that sufficiently capture the influences that may be caused by others. This would include:

- All field-measured parameters;
- TSS and TDS (field- or laboratory-measured);
- Hardness (field- or laboratory-measured);
- Nitrogen species (nitrate in particular);
- Dissolved metals; and
- DOC.

In the event of a change that warrants a closer review to determine the reason, or reasons, for the change, the analytical schedule may be enhanced by analyzing the original suite of parameters, or more sophisticated approaches to resolving the source and cause of the event may be taken.

Frequency of Measurements

Sampling frequency plays an important role in capturing events in a manner that may lead to timely management action. The temporal nature of the system being monitored will influence the frequency at which measurements will be taken. For example, surface water can flow through a basin in a matter of hours or days, depending on the size of the basin. In the case of the West Alexander Creek catchment, this is likely on the order of hours. Groundwater, by comparison, typically moves slowly through the subsurface at rates of centimetres to metres per year. With respect to the local setting, flow through the glaciolacustrine deposits blanketing the base of the valley and the fractured bedrock are expected to be quite slow, while rates of movement through the colluvium on the valley sides is expected to be greater due to their permeable nature. With this in mind, the planned frequency of monitoring to determine changes in surface water flows and groundwater levels, as well as chemical quality of the surface water and groundwater, is as presented in Table 33.4-24.

Table 33.4-24: Sampling Frequencies

Medium	Parameter	Frequency of Measurement When No Deviation from Baseline	Tolerance Before Initiating Follow-Up Investigation	Frequency of Measurement When Deviation from Baseline Detected
Surface Water	Flow	Minimum: daily	–	–
	Field parameters	Minimum: monthly and event-based	> 20% increase in electrical conductivity; pH < 6; dissolved oxygen < 5 milligram per litre (mg/L)	Weekly
	Turbidity (TSS)	Minimum: monthly and event-based	> 35 mg/L (average) and > 70 mg/L (grab)	Daily
	Chemical quality	Minimum: monthly and event-based	KPI more than ± 20% from previous reading; Se > 0.01 mg/L (average) and 0.02 mg/L (grab); NO_3 > 5 mg/L (average) and 10 mg/L (grab)	Weekly

Medium	Parameter	Frequency of Measurement When No Deviation from Baseline	Tolerance Before Initiating Follow-Up Investigation	Frequency of Measurement When Deviation from Baseline Detected
Groundwater	Water levels and hydraulic gradients	Minimum: monthly for at least 1 year after mine commissioning then quarterly (Note: use of pressure transducers to capture higher resolution readings would be beneficial)	Decline of more than 1 m outside established range of natural variability	Weekly
	Field parameters	Minimum: quarterly and event-based	> 20% increase in electrical conductivity; pH < 6; dissolved oxygen < 5 mg/L redox < −200 millivolt (mV)	Monthly
	Chemical quality	Minimum: quarterly during mine development until n = 10, then semi-annually	KPI more than ± 20% from previous reading	Monthly for first year then quarterly until event resolved

Data Validation Process

NWP employs a stringent data validation process to ensure collection and use of high-quality data to assist in effects monitoring efforts. Questions can often come up during the data evaluation process with regard to sample quality and integrity. The goal of NWP's validation process is to resolve these questions before the data enters the project database and is used to make management decisions. This will be achieved using the processes described below.

Chain of Custody Review

NWP requires proper chain-of-custody documentation to track sample history and support any required legal verification. The chain of custody is meant to track the following standard requirements:

- Transit time (ensuring hold time exceedances do not occur);
- Appropriate signature approval;
- Arrival temperature (< 10°C);
- Sample name (sample name meeting analytical schedule); and
- Suitability for analysis:
  - Sufficient volume; and
  - Sediment volume does not result in laboratory issues.

Review of chain-of-custody forms and the recording of issues identified on a Data Quality Review (DQR) checklist will be used to track issues. Any identified issues will be assessed for intrinsic or systemic problems through an audit, and follow-up with the field or laboratory personnel will occur depending on the issue identified. Tracking of laboratory issues via the Sample Integrity Failure (SIF) reporting will be used to reconcile any issues that may compromise NWP's data quality and integrity.

Laboratory Report Validation

Data received from the laboratory typically come with a Certificate of Analysis with a Quality Assurance Report at the end to confirm the integrity of the results. NWP will continue to employ a system that confirms:

- Hold times are met (as per analytical requirements);
- Method blanks meet appropriate criteria;
- Control samples fall within appropriate ranges (matrix spikes, and surrogate recovery percentage);
- Appropriate MDLs are used; and
- Lab qualifiers, including matrix interference and dilution requirements, are present.

Consistency in units, detection limits, and laboratory methods or field-reported data will be confirmed prior to further data evaluation. The analytical schedule will meet specified units of measure, detection limits, and laboratory methods. These details are typically confirmed with the laboratory before sampling begins. Each sampling program commissioned by NWP will confirm these aspects in advance to ensure alignment. Once the results have been received from the laboratory, the Certificates of Analysis will be inspected for the following:

- Appropriate analytical methods of analysis;
- Appropriate MDLs;
- Consistent measurement units;
- Acceptable surrogate recoveries; and
- Acceptable laboratory method blanks or spikes.

If results are inconsistent with expectations, data will first be rejected and updated where possible, and then marked within the database itself for irregularities in sample methodology. Possible follow-up actions include having the laboratory reanalyze the sample, if a sufficient volume of water remains. If this is not possible, it may be necessary to collect, analyze, and submit another sample.
Laboratory-reported validation issues will be noted in the project database with respect to the parameters flagged. This is typically done for the KPIs only, but if the need arises to investigate other constituents, a separate process will be carried out.

Quality Assurance and Quality Control Review

An effective quality assurance and quality control (QA/QC) program requires high-quality data. This mainly relevant to water quality monitoring programs and will involve the collection of a number of sample checks to facilitate the assessment of data precision, accuracy, and any internal or external interference that could compromise data quality.

NWP will ensure that enough duplicate samples are collected to assess the reproducibility of measured values. This typically entails the collection of a sample split from a bailer, an inertial lift system (e.g., Waterra), peristaltic pump, or electric submersible pump. NWP will collect at least 1 blind duplicate for every 10 samples, or at least 1 duplicate for every sample batch.

Blanks of laboratory-grade deionized water will be used at various stages of monitoring to test for interference from improperly cleaned sampling equipment (i.e., equipment blanks), influence from field

conditions (i.e., field blanks), and any issues that may arise during sample bottling and shipping (i.e., trip blanks).

Results from the duplicates and blanks will be used to identify any systemic issues in the surface water or groundwater monitoring programs, and appropriate corrective actions will be taken. Sample-integrity review methods and actions will be as follows:

- For field duplicates (blinds), the relative percent difference (RPD) should be less than ± 20% when concentrations exceed five times the MDL. If the results are between ± 20% to 50%, use with caution; if they are greater than ± 50%, a follow-up is required (reconfirm sampling procedures, and in extreme cases resample);
- Trip blanks should report non-detect values, or values within five times the MDL. If not, discount (but do not correct) results associated with the failure; review method blank to determine source of contamination; and potentially re-sample to confirm; and
- Field blanks should report non-detect values, or values within five times the MDL. If not, flag (but do not correct) results associated with the failure and retain in database; review trip blanks and method blanks to determine source or cause of issue; and potentially resample.

Data that receives a "flag" will be tracked through a DQR for future reference, if needed. This will assist in any investigations to correct recurring issues.

Appropriate reporting limits for data measurement are an important aspect of communicating meaningful results and avoiding unnecessary reactions to a particular data measurement that identifies triggers or sets criteria. MDLs are established in the laboratory to ensure that analytical methods are used appropriately to determine concentrations of constituents being assessed.

Laboratories will sometimes note a reported detection limit (RDL). This is not to be confused with an MDL, which is the concentration of an analyte that can be measured within specific limits of precision and accuracy. Depending on the type of analyte, the industry standard is to use anywhere from 3 to 10 times the MDL as a reliable measurement. NWP requires that the RDL be defined for each indicator parameter as follows:

$$RDL = 5 \times MDL$$

Data Evaluation and Response Process

A standard approach to data evaluation will be used to assess monitoring data that has been collected to date, and data that will be generated from future monitoring programs. This will ensure consistency in approach and the ability to decouple project effects from natural variability.

The following sections describe the process to be followed when assessing data collected from NWP's established site-wide water monitoring system.

Correctness of Analyses

NWP's intent in all monitoring programs is to employ a rigorous review of correctness of analyses to ensure the highest quality results. This will apply to both modelled forecasts and monitoring data collected as part of the performance assurance aspect of the mine water management program.

Monitoring Data

The most common approach is to assess the RPD for original sample results and their duplicates that are routinely collected as part of the water monitoring programs. RPD values are calculated using the following equation:

$$\text{RPD} = \frac{(\text{sample result} - \text{duplicate}) \times 100}{(\text{sample result} + \text{duplicate})/2}$$

Acceptance criteria for RPD values will be ± 20%.

For water quality analyses involving the measurement of major ions (including Ca, Mg, Na, K, $HCO_3 + CO_3$, SO_4, and Cl) NWP will assess ion balances to ensure that the values are within the acceptance criteria. Ion balance will be calculated using the following equation:

$$\%\ \text{difference} = \frac{\sum\text{cations} - \sum\text{anions}}{\sum\text{cations} + \sum\text{anions}} \times 100$$

Acceptance criteria for percent difference will be based on the following:

Anion sum (meq/L)	Acceptance difference
0 to 3	± 0.2 meq/L
3 to 10	± 2%
10 and greater	5%

Another helpful check compares the calculated versus measured total dissolved solids (TDS) content of a sample. Calculated TDS values can be obtained using the following equation, using milligrams per litre (mg/L) of the various constituents:

$$\text{TDS} = \text{Ca} + \text{Mg}, + \text{Na} + \text{K} + SO_4 + \text{Cl} + (0.6 \times \text{total alkalinity})$$

Once obtained, calculated TDS values will be compared to measured TDS values to ensure the following acceptance criterion:

$$1.0 < \text{TDS measured} < 2.0$$

TDS calculated

A final check will be performed for measured TDS versus field-measured electrical conductivity (EC) values. The following acceptance criterion will apply:

$$\text{TDS/EC ratio} = 0.55 \text{ to } 0.70$$

Results falling outside of any of these criteria will be considered suspect and subject to further checks or reanalysis to ensure the highest quality measurements are obtained for subsequent data analysis.

Addressing Data Anomalies

False Detections

False detections are a risk to any monitoring program and can lead to unnecessary follow-up action. Possible errors that can occur in the field and the laboratory include mislabelling, sample contamination, inappropriate procedures, misinterpretation of results, and transcription error. Such errors can lead to false-positive detections, when in actual fact there would normally be no such detection.

When a false-positive detection occurs, it will be necessary to conduct verification steps, including a review of field notes, equipment calibrations, laboratory QA/QC results, field duplicates, and blanks to resolve the issue. If the detection is confirmed to be false, then the data are censored from further use. However, if the detection is confirmed to be real, the evaluation process must follow the steps documented in this monitoring plan to investigate the source and cause.

Non-detects

Some indicator parameters exhibit a high frequency of measurements that fall below the RDL. This typically occurs for some naturally occurring trace elements as part of the routine metal and trace-element analytical package, or other constituents that can be naturally occurring or project-related. High-frequency non-detect readings for indicators present a challenge when setting quantifiable trigger levels. When non-detect data are encountered, NWP will replace the values with one-half of the RDL (e.g., if RDL = 1 mg/L, then 0.5 mg/L will be used) to allow for statistical analyses to be performed.

Outliers

Outlier data are often discounted because of their departure from expected conditions. In more strict terms, outliers may be described as values that fall outside of an established range or statistical confidence interval (CI), such as a 95% or 99% CI, depending on the situation. This does not necessarily mean something is wrong with the results, but it is an indication that something is not consistent with an expected outcome.
Outliers can signal events that transcend current understanding and therefore should not be discounted without good reason. Monitoring data do not always behave well with respect to temporal variability. In particular, analytes that are detected at lower concentrations, such as the microgram per litre (µg/L) or nanogram per litre (ng/L) level, can sometime display wildly varying concentrations from one sample to the next.

The occurrence of a data outlier may not be an uncommon occurrence at the Project. The approach to be used when outliers are detected is to flag the data for a verification review with the field personnel and/or laboratory contact. Review of field calibrations or notes may indicate a reason for the outlier. Similarly, a review of the laboratory QA/QC procedures or a reanalysis of the sample may resolve the issue. If the outlier passes the necessary verification step, it is retained and used in the data evaluation process. This will likely provoke further responses (e.g., resampling and reanalysis).

Where the data validation stage of evaluation indicates that a measurement may be an outlier, and this interpretation is confirmed by two successful sample events within statistical control limits, the data point will then be classified as an outlier and flagged accordingly in the data management system to warn evaluators. Data that do not the pass the verification steps employed by NWP will be flagged as:

- "Data Quality Review Pending" – the data may or may not be fit for purpose as no assessment has been completed;
- "Data Quality Concern" – the data may be used with caution and the user should review the DQR for details regarding the concern; or
- "Outlier" – the results associated with this sample have been determined to be an outlier.

Only clear and obvious errors will be removed from NWP's database using documented rationale. When flagged, such data are removed from further use in the evaluation process until cleared. Regardless, all anomalous data values will be retained in the database for future reference checks if needed, as with a system audit.

Assessing Modelling Results

NWP has employed a number of analytical and numerical models to assess the potential effects of the Project on the surface water and groundwater resources of the area. Observed and simulated results will be compared to ensure the suitability of modelled projections in relation to actual measurements. A commonly used approach is the Nash–Sutcliffe Efficiency (NSE). This statistic is determined using the following equation:

$$NSE = 1 - \frac{\sum_{t=1}^{t=T}(Q_{sim}(t) - Q_{obs}(t))^2}{\sum_{t=1}^{t=T}(Q_{obs}(t) - \overline{Q_{obs}})^2}$$

where Q_{obs} is the mean of observed values, $Q_{sim(t)}$ is the simulated result at time t, and $Q_{obs(t)}$ is the observed values at time t. A perfect alignment between simulated and observed values will yield a value of 1. A value of 0 indicates that a mean value would have produced the same level of accuracy. As a goodness-of-fit measure, an acceptable threshold NSE coefficient of 0.65 has been reported for hydrological models. The same reasoning would apply to other temporal data.

Unfortunately, an NSE calculation can be adversely affected by extreme data values (outliers), and NWP expects that some of the data collected from the field monitoring programs will exhibit extreme variability (e.g., flashy streamflows or highly variable water chemistry). This will present a challenge when using the NSE statistic. To address this concern, NWP will employ the Kling–Gupta Efficiency (KGE) value, where applicable. The KGE statistic is less sensitive to data that experience extreme variability. Calculation of KGE values uses the following equation:

$$KGE = 1 - \sqrt{(r-1)^2 + \left(\frac{\sigma_{sim}}{\sigma_{obs}} - 1\right)^2 + \left(\frac{\mu_{sim}}{\mu_{obs}} - 1\right)^2}$$

where r is the linear correlation between observations and simulations, σ_{obs} the standard deviation in observations, σ_{sim} the standard deviation in simulations, μ_{sim} the simulation mean, and μ_{obs} the observation mean (i.e., equivalent to σ_{obs}. As with the NSE, a KGE value equal to 1 indicates perfect agreement between simulated and observed values. Similar to NSE = 0, certain authors state that a KGE < 0 indicates that the mean of observations provides better estimates than simulations (Knoben et al., 2019). NWP's acceptance criteria for KGE will be 0.5 or greater.

Use of the NSE of KGE will also be accompanied by an evaluation of percent bias, or PBIAS. This measures the average tendency of a simulated value to be larger or smaller than the associated observed value. The optimal PBIAS value is 0.0, with low-magnitude values indicating accurate model simulation. The bias for each level is obtained by subtracting the calculated mean (Y values) from the theoretical values. Percent error is then calculated by dividing the bias by the theoretical value and multiplying by 100. NWP's acceptance criteria for PBIAS will be 0.50 or less.

Assessing Monitoring Data

Test for Normality

The key to a successful and relevant management plan is the timely detection of monitoring data that fall outside of anticipated baseline conditions. Equally important is the ability to decouple detected incidents from natural phenomena not related to the mining process. NWP intends to implement a robust incident detection system that will identify examples of KPI parameters outside of statistically established limits defined by spatial (inter-station comparisons) or temporal (intra-station comparisons) data collected as part of the routine monitoring programs.

Prior to employing any statistical analysis, dataset normality will be confirmed to ensure that the appropriate statistical method of analysis is used. For normally distributed datasets, parametric tests will be used, so long as sufficient data exist (i.e., n ≥ 10). If the dataset under review is not normally distributed (i.e., skewed) then nonparametric tests will be employed. The test for normality can be done using the Skewness method to determine how asymmetrical a data set may be. The equation for calculating the values is provided below:

$$\frac{n}{(n-1)(n-2)}\sum_{i=1}^{n}\frac{\left(X_i-\bar{X}\right)^3}{s^3}$$

where n is the number of measurements, and the right hand term is the cube of the standard deviation (SD). Datasets exhibiting a frequency distribution with a skewness value greater than or less than 0 are right- and left-skewed, respectively. Other tests can be applied, but the skewness test is a relatively simple and straightforward method, and it is included in the standard Excel package of statistical equations. However, the normal computation of skewness typically requires a large number of values to be effective (on the order of 100).

In most cases, the amount of NWP monitoring data will be insufficient to meet the requirements of the Skewness test. In such cases NWP will employ the quartile skew (Qs) method documented by Kenney and Keeping (1954) and the USGS (2020). It is a robust way to determine how asymmetrical a dataset may be and a way to determine if a dataset is centred about the mean. It can be obtained by:

$$\frac{(P_{0.75}-P_{0.50})-(P_{0.50}-P_{0.25})}{P_{0.75}-P_{0.25}}$$

where $P_{0.75}-P_{0.50}$ is the difference between the upper quartile and the median, $P_{0.50}-P_{0.25}$ is the difference between the median and the lower quartiles, and $P_{0.75}-P_{0.25}$ is the interquartile range (IQR).

In a symmetric distribution, like the normal distribution, the first and third quartiles (Q_1 and Q_3) are at equal distances from the mean (Q_2). In other words, ($Q_3 - Q_2$) and ($Q_2 - Q_1$) will be equal. If the data distribution is skewed, the two values will differ. A positive *Qs* value indicates a data distribution skewed to the right and a negative *Qs* value indicates a data distribution skewed to the left. Conversely, if the bulk of the measurements fall to the right, then it is referred to as being positively skewed (i.e., a positive *Qs* value). Other tests can be applied, but the *Qs* test is relatively simple and robust.
NWP's acceptance criteria for the two skewness methods will be as follows:

- For skewness values derived using the parametric method, values between –0.5 and 0.5, the data are considered fairly symmetrical. If skewness is between –1 and –0.5, or between 0.5 and 1, the data are considered moderately skewed. If the skewness is less than –1 or greater than 1, the data are considered highly skewed.
- For skewness values derived using the non-parametric method, values between –0.1 and 0.1, the data are considered fairly symmetrical. If skewness is between beyond –0.2 or above 0.2 then the data are considered moderately skewed, and beyond this the data are considered highly skewed.

Control Charting

Composite hydrochemical trend charts are typically used to highlight key water quality indicators, such as chloride, fluoride, and NAs. On each trend chart, control limits are shown as horizontal lines, along with any other applicable guidelines (e.g., AB Tier 1). Statistical control limits are commonly used to determine whether an observed value, within a set of measurements from a given well, differs significantly from historical values (Gibbons, 1994).

NWP will employ one of two methods of control charting, depending on data distribution identified prior to selection of appropriate statistical methods of analysis. Datasets that are determined to be normally distributed will employ the Shewhart Control Charting process, while datasets that are determined to be non-normally distributed will employ the quartiles and interquartile-range process.
In this approach, an upper control limit (UCL) is calculated for each well for which a sufficient number of data points exist. Similarly, a lower control limit (LCL) will be calculated, with both plotted on the chart. Any data point outside of the established UCL or LCL for a given indicator signals that something unusual may have occurred. This could be due to a sampling issue or laboratory problem, a natural change, or the detection of false-positive or false-negative readings. It can also signal the occurrence of a change related to mining operations.

When anomalous conditions are noted at a monitoring station, verification of the measurement is required first and may be followed by a more in-depth review of the chemistry. This may include a review of statistical power to determine "practical significance." The equations to derive Shewhart Control Charting UCLs and LCLs (Gibbons 1994) are:

$$UCL = Mean + 4.5 \times SD$$
$$LCL = Mean - 4.5 \times SD$$

The multiplier of 4.5 is derived from the table of Student's t-statistics, in which a 95% overall confidence for 35 future comparisons is established (Gibbons 1994). A small selection of those multiplier values is provided in Table 33.4-25, with the 4.5 multiplier in bolded red text. In certain circumstances, reducing the multiplier used to establish UCL and LCL values may be warranted. Doing so provides a more conservative assessment; however, it runs the risk of triggering the need for more verification and/or follow-up actions. Altering the 4.5 multiplier should be evaluated on a site-by-site or case-by-case basis to ensure that the intent of the monitoring program is being met.

It is important to keep in mind that, as the number of data measurements or desired number of future comparisons increase at a given monitoring station, the multiplier required to ensure a 95% CI also changes. This is shown in Table 33.4-25. Adjustments to the multiplier should be made at pre-defined intervals to ensure the efficacy of this approach.

Table 33.4-25: Multiplier Values for Various Number Readings and Future Comparisons

Number of Readings	Future Comparisons			
	5	10	20	35
8	3.00	3.50	4.03	4.48
12	2.71	3.10	3.48	3.79
16	2.60	2.94	3.28	3.55
20	2.54	2.86	3.17	3.42

When there are insufficient data for a monitoring well to establish acceptable statistical power, or when a comparison to a monitoring well's baseline is inappropriate (e.g., a monitoring well installed within a known impact), analysis will be performed using PSLs, defined using site-wide background or baseline data. This will require the separation of monitoring stations into distinct and comparable units anticipated to have similar physical and chemical characteristics. For subsurface environments, this will be related to hydrostratigraphic units. For surface environments, this will relate to hydrologic units, or areas having consistent characteristics associated with a given catchment.

To address this simplification, an inter-station comparison will be employed where quartile values are calculated, and the IQR is determined. This approach is analogous to the parametric statistical approach of using the mean ± 2 SDs to reflect the 95% CI (Figure 33.4-14).

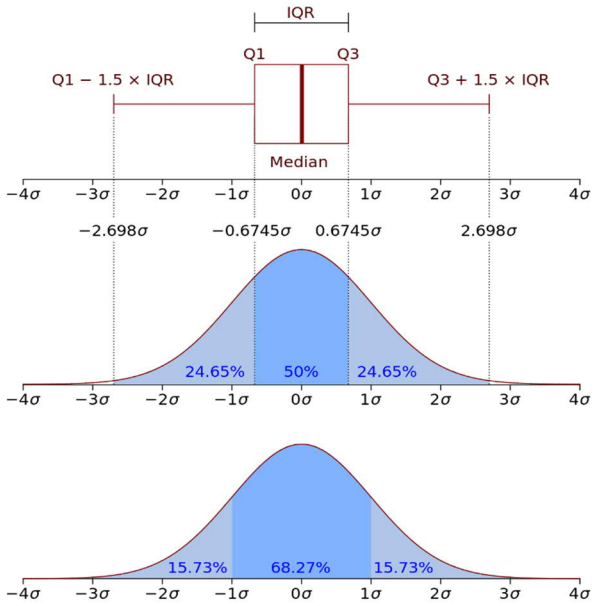


Figure 33.4-14: Comparison of Parametric and Non-Parametric Significance Levels

Once the background conditions have been defined, newly acquired results will be compared to the background conditions and anomalies can be flagged and attributed accordingly. Determining the upper and lower PSL values will utilize the non-parametric approach employing the Q_3 and Q_1 and the IQR of Q_3–Q_1 as follows:

USL: $Q_3 + 1.5$ (IQR)
LSL: $Q_1 – 1.5$ (IQR)

This approach will be used to address monitoring stations with a limited amount of data (< 10 readings) and will capture any variability that would naturally occur with a given stream or groundwater interval. To facilitate proper screening of monitoring data from such wells, and ensure confidence in the assessment results, it is imperative that hydrochemical stability at the monitoring station be established. For groundwater monitoring wells this may take some time, depending on the degree of development and number of sampling events. Hydrochemical stabilization will be confirmed prior to making any conclusions regarding the condition of the groundwater.

Trend Analysis

NWP will employ the Mann–Kendall test for trends (Mann, 1945; Kendall, 1975) to assess data with at least four readings as part of its monitoring efforts. This approach is predicated on a series of comparisons between data values in a given data set to determine the total number of increasing versus decreasing values from those comparisons, as described in Table 33.4-26.

The process involves ordering the data by sampling date: x_1, x_2.... x_n where x_1 is the measured value on occasion *i.* Next, the signs of each of the *N'* possible differences, $x_{i'} – x_i$, where if $i' > I$, are recorded based on the following criteria:

- Each comparison of a data point with another is scored a value of 1 if the earlier measurement is less in magnitude than the later one. Similarly, if the earlier value is greater than the later value, then a value of −1 is used. Meanwhile, two identical values will generate a value of 0. Once completed, the values are tallied, and an S statistic is provided. If the number of comparisons between earlier and later measurements generated a positive number, then there is evidence of an increasing trend, and vice versa. The larger the calculated value of S, the greater the evidence for a trend.
- To be conservative, in cases where field duplicate samples are collected, the Mann–Kendall calculation will be completed for the samples yielding the higher values.
- This version of the Mann-Kendall test presented is recommended for no fewer than 4 measurements, and no more than 40 (Gilbert, 1987). This range is adequate for virtually all monitoring applications but has limited utility for datasets with numerous non-detects (i.e., > 50%).

Table 33.4-26: Mann–Kendall Test Comparisons

Measurements Ordered by Time							
x_1	x_2	x_3	$\cdots$	x_{n-1}	x_n	No. +	No. –
	$x_2 - x_1$	$x_3 - x_1$		$x_{n-1} - x_1$	$x_n - x_1$		
		$x_3 - x_2$		$x_{n-1} - x_2$	$x_n - x_2$		
				$x_{n-1} - x_3$	$x_n - x_3$		
				$\vdots$	$\vdots$		
				$x_{n-1} - x_{n-2}$	$x_n - x_{n-2}$		
					$x_n - x_{n-1}$		
						Sum of +	Sum of –

where

$$\operatorname{sgn}(x_{i'} - x_i) = \begin{cases} 1 & \text{if } x_{i'} - x_i > 0 \\ 0 & \text{if } x_{i'} - x_i = 0 \\ -1 & \text{if } x_{i'} - x_i < 0 \end{cases}$$

The Mann–Kendall statistic is then computed as follows:

$$S = \sum_{i=1}^{n-1} \sum_{i'=k+1} \operatorname{sgn}(x_{i'} - x_i)$$

To establish trends, NWP will use a 95% confidence that a trend exists.
As part of the assessment process, the potential for seasonality in the data will be considered so that inadvertent identification of trends does not occur. Seasonality in a dataset will usually present itself

visually in graphed data in the form of regularly fluctuating values. The seasonal Mann–Kendall test involves separating the data out by each season of each year and then performing the same procedures of comparisons and value attribution to get the *S* statistic for each season.

Theil–Sen Slope Estimator

The Mann–Kendall test for trends can determine whether a set of measurements is changing but makes no statement about the magnitude or rate of change. For example, a Mann–Kendall test at a well with a change in chloride concentration from 10 to 13 mg/L would give the same result as a change from 10 to 130 mg/L. To better understand the magnitude of an identified trend, a Theil–Sen slope estimator is required (Sen, 1968a and 1968b; Theil, 1950). This non-parametric method uses the median versus arithmetic average of pairwise slopes from individual trend lines between data comparisons using the same approach as that used for the Mann–Kendall test. The equations to describe this method are:

$$Q = \frac{x'_i - x_i}{i' - i} \quad \text{and} \quad N' = \frac{n(n-1)}{2}$$

where *x* is the measured concentration of individual monitoring events i and $i' > i$, and N' is the number of data pairs where $i' > i$. For non-detect data, the process described in this SOP will be followed. To obtain the median value for Q, the N' values of Q are ranked from smallest to largest and the median slope is computed by:

$$S = Q_{[(N'+1)/2]} \text{ if } N' \text{ is odd}$$

Or

$$S = \frac{Q_{[N'/2]} + Q_{[(N'+2)/2]}}{2} \text{ if N' is even}$$

A significant change will require a normalized slope greater than or equal to 10% per year.

Correlation Analysis

There are situations in which the change in one indicator will align with the change in another. This can be both positive (a consistent change in one direction) and negative (a consistent change in opposite directions). Correlation analysis evaluates the strength of this relationship and provides additional information to understand the processes that may be causing the detected change.

Pearson's correlation coefficient (or *r* value) is a statistic that measures the linear correlation between two continuous variables with numerical values. The output values for this statistic range from –1 to 1, with the former indicating a perfect negative correlation (i.e., when one constituent increases the other decreases) and in the latter case a perfect positive correlation (i.e., both constituents increase in tandem). This parametric method requires datasets to be normally distributed.

Should the data be non-normally distributed, application of the non-parametric statistic, Spearman's ρ value, is used. This statistic produces a similar output value of –1 to 1 and is based on ranked values of ordinal variables. For the purpose of evaluating NWP monitoring data, the degree of positive or negative correlation between variables will be assessed as follows:

0.33 or less = Low
0.33 to 0.67 = Medium
> 0.67 = High

Regression Analysis

A graphical comparison may be required to determine the degree of association between individual constituents. The typical approach is to employ linear regression, which results is an R^2 value (i.e., a coefficient of determination). This statistic describes the proportion of variance for a dependent variable that can be explained by an independent variable. For example, a value of 1.0 indicates a perfect fit, and therefore a highly reliable model for future projections. A value of 0.0 indicates a model that fails to describe the relationship between the two variables and is therefore not useful for future projection.

When evaluating NWP data for linear regression lines in graphical comparisons, the same levels of significance identified for the correlation analysis (low, medium, and high) will apply, and the following acceptance criteria will be used to establish significance: R^2 of 67% or greater (high to very high), and an associated p value of < 0.05 (i.e., 95% confidence that the graphical model fits the data well).

Certain instances may require non-linear regression. These will be assessed on a case-by-case basis and will follow a similar set of criteria to establish significance.

Cluster Analysis

NWP will apply cluster analysis where applicable. Cluster analysis identifies relationships between multiple parameters. It starts by treating each observation as a separate cluster, and then repeatedly executes the following steps: identify the two clusters that are closest together and merge the two most similar clusters.

The process continues iteratively until all clusters merge The distance between two clusters is based on the length of a straight line drawn from one cluster to the other in what is commonly referred to as the Euclidean distance. No other distance metrics are utilized here.

Once parameters are clustered, a review of the associations can reveal useful information about the sources or causes of these associations, as well as the physical or chemical processes that may lead to the given associations. An example of a hierarchical cluster analysis tree is provided in Figure 33.4-15.

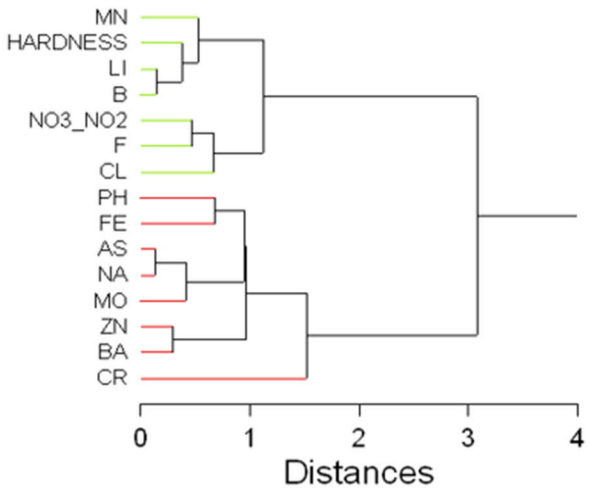


Figure 33.4-15: Example of a Hierarchical Cluster Tree Showing Parameter Groupings

NWP will use this method of analysis, where needed, to enhance the data evaluation process and reveal the source and cause of changes to surface water and groundwater quality within the mine footprint and the MRSF, as well as areas monitored outside.

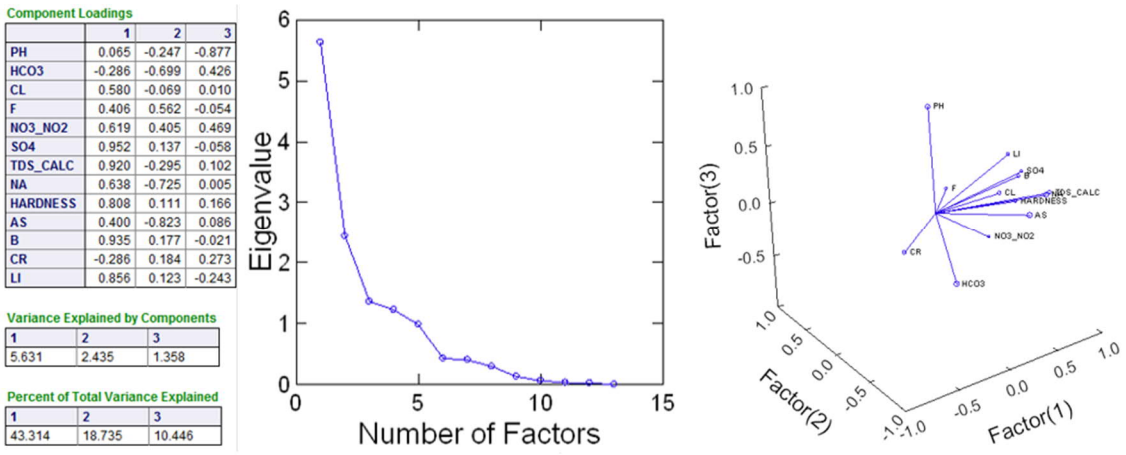
Factor Analysis

Factor analysis is another multi-parameter assessment method for grouping variables and assessing their associations. It is used to reduce a large number of variables to a smaller set of "factors," extracting the maximum common variance from all variables and assigning them a common score. The most commonly employed method is principal component analysis (PCA).

A PCA is used to emphasize variation and bring out strong patterns in a dataset. It is often used to make data easier to explore and visualize. The covariance of variables is calculated to determine the extent to which corresponding variables of ordered data move in the same direction. A positive covariance means X and Y are positively related (i.e., as X increases, Y also increases). A negative covariance indicates the opposite relationship, and a zero covariance means X and Y are not related. The results are often rotated to identify associations between variables and will fall into groupings called factors, with each factor explaining a certain amount of the variance. Typically, the first factor will explain most of the variance, with each subsequent factor explaining slightly less. Datasets must be normalized before conducting the PCA to limit scale effects.

An example of the output generated by PCA is provided in Figure 33.4-16, which includes a table of factor values, a scree plot for the related eigenvalues, and a factor loading plot illustrating how the variables are associated.

NWP will again employ this method of analysis, where needed, to enhance the data evaluation process and determine the source and cause of changes to surface water and groundwater quality within the mine footprint and the MRSF, as well as areas monitored outside.



Component Loadings

	1	2	3
PH	0.065	-0.247	-0.877
HCO3	-0.286	-0.699	0.426
CL	0.580	-0.069	0.010
F	0.406	0.562	-0.054
NO3_NO2	0.619	0.405	0.469
SO4	0.952	0.137	-0.058
TDS_CALC	0.920	-0.295	0.102
NA	0.638	-0.725	0.005
HARDNESS	0.808	0.111	0.166
AS	0.400	-0.823	0.086
B	0.935	0.177	-0.021
CR	-0.286	0.184	0.273
LI	0.856	0.123	-0.243

Variance Explained by Components

1	2	3
5.631	2.435	1.358

Percent of Total Variance Explained

1	2	3
43.314	18.735	10.446

Figure 33.4-16: Example of a PCA Component Loading (Factor) Table, Scree Plot, and Factor Loading Plot Showing Associations Among Variables in Factor 1, 2, and 3

Hydrochemical Typology

NWP recognizes the need to apply water quality assessments in a standardized and consistent manner. The intent is to use appropriate methods to evaluate hydrochemical results from monitoring programs. A Piper plot is one way to characterize surface water and groundwater across the Project site. This approach to hydrochemical typology plots the distribution of major ions (Ca, Mg, Na + K, HCO_3 + CO_3, SO_4, and Cl) as a percentage of the total ion make-up of a water sample. First, ion concentrations are converted to milli-equivalents, taking into consideration the mass and charge of the element, and presented as a percentage of the total anion or cation group. When typing water samples, the selected cut-off to accept an ion as a major contributor to the hydrochemical type is 20% or more of its anion or cation group. An example is provided in Figure 33.4-17.

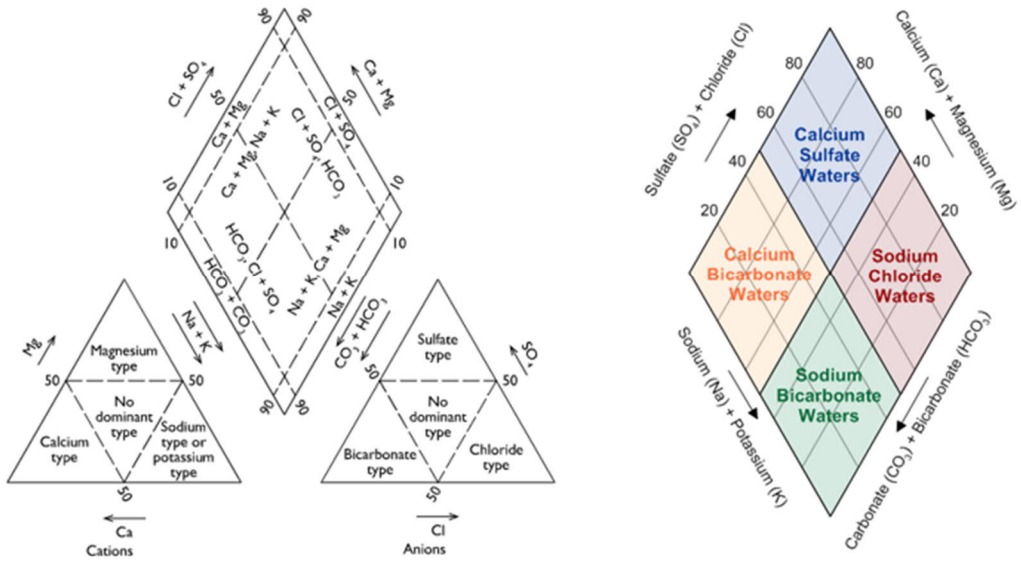
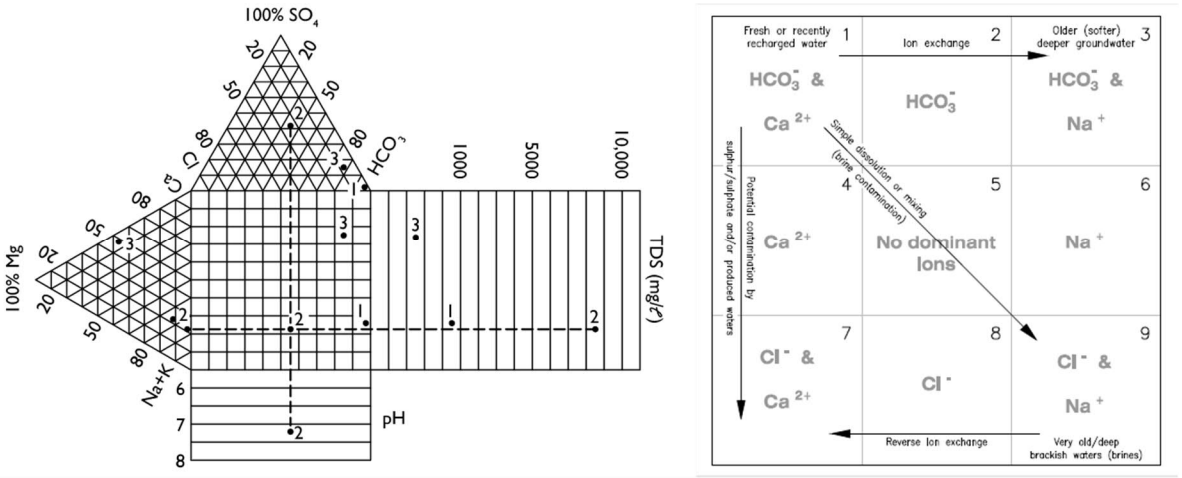


Figure 33.4-17: Example of Piper Plot

Another useful approach is the extended Durov plot (Figure 33.4-18). Such plots follow a similar methodology as the Piper plot, using milli-equivalents for major cations and ions. Major ion species or groupings are then organized in tri-linear plots, with the major cations (i.e., Ca, Mg, and Na) and the major anions (i.e., HCO_3, SO_4, and Cl) at the top and the left. The point in each tri-linear plot is projected into the middle box; the intersection of the points will provide the groupings consistent with certain water types (e.g., Ca-HCO_3 and Na-Cl). The added benefit of this plot is the inclusion of pH and TDS, which extends the information provided compared with the Piper plot.

NWP will employ these methods of assessing water types to identify, track, and communicate major changes in chemical character so that management actions can be initiated in a timely manner. Doing so will minimize the risk of adverse effects on VCs from mining operations and waste management areas.



Field 1: HCO_3^- and Ca^{2+} dominant, frequently indicates recharging waters (or "fresh" groundwater) in many aquifers.

Field 2: HCO_3^- dominant and cation indiscriminant, with Mg^{2+} often being the dominant cation. However, those samples in which Ca^{2+} and Na^+ are significant, an important partial ion exchange is presumed.

Field 3: HCO_3^- and Na^+ are dominant, indicating ion exchanged water.

Field 4: Ca^{2+} dominant and anion indiscriminant or SO_4 dominant. Frequently indicates a mixed water or water exhibiting simple dissolution.

Field 5: No dominant anion or cation, indicating water exhibiting simple dissolution or mixing.

Field 6: Na^+ dominant and anion indiscriminant or SO_4 dominant. This is a water type that is not frequently encountered and indicates probable mixing influences.

Field 7: Cl^- and Ca^{2+} dominant is frequently encountered, the water may result from reverse ion exchange of Na–Cl waters.

Field 8: Cl^- dominant anion and no dominant cation, indicate that the groundwater is related to reverse ion exchange of Na–Cl waters.

Field 9: Cl^- and Na^+ dominant frequently indicate end–point waters (i.e., brackish–type water).

Figure 33.4-18: Example of an Extended Durov Plot Diagram (from Lloyd and Heathcote 1985)

33.4.1.8.8 Trigger Action and Response Plan (TARP)

NWP will follow a structured process of response to data excursions to ensure a proper understanding of the situation and facilitate the deployment of suitable follow-up actions, ranging from investigation through to quantification, evaluation, and/or mitigation, if required. This process has been used

successfully in groundwater management plans developed for other large industrial projects (e.g., oil sands mining). The various steps of the process are described below.

Detection

The investigative process will begin once a data excursion or a situation outside of normal conditions is detected. This may be field-based or the result of laboratory measurements. If a deviation from normal conditions occurs, NWP's first step will be to determine whether the event or data excursion is the result of site operations. This will require a verification step.

Verification

Data verification is necessary to ensure that any detected event is real prior to initiating an investigation. The process begins with a check on the integrity of the measurement, including a review of data-collection procedures and sample integrity. In cases involving measurement of a quality parameter, the laboratory may be contacted to verify sample results, which could include reanalyzing the sample. If the sample hold time has been exceeded, or the sample has been discarded, then the monitoring station is usually resampled and submitted for follow-up analysis. If the detected event is found to fall within the historical range or an acceptable variability, the new value is honoured, the previous value is discarded or flagged as anomalous, the investigation is documented, and routine monitoring continues.

Investigation

The purpose of the investigation phase is to assess the source and cause of an anomalous detection to determine if it is due to natural variability or a development-related effect. If the original detection is found to be correct, then an assessment of results will be conducted, and an initial evaluation completed. If the situation is deemed acceptable, the results are documented, and regular monitoring continues. If the results are deemed unsatisfactory, a more refined Investigation will be initiated to identify the source and/or cause of the issue.

Any follow-up investigation will be designed to determine whether the issue is a natural aberration of the system. If so, the result will be documented, and the area characterization updated. This may lead to revision of a KPI trigger value or identification of an area that displays conditions beyond expected baseline conditions. Situations such as these may necessitate supplementary characterization using more sophisticated analytical techniques (e.g., isotopes) and/or predictive modelling to assess potential future effects.

Evaluation

Once all the relevant data have been obtained from an investigation, they will be evaluated to determine the source and cause of the incident and determine the level of impact in relation to NWP objectives and goals for the site, as well as performance criteria. This evaluation process may include a risk assessment to frame the situation and ensure the most appropriate steps are taken to address the situation.

Mitigation

If the result of investigative work shows conclusively that the detected event is the result of mine-related activities, and it is considered to be outside of acceptable risk tolerance levels, a mitigation phase will be initiated. This will include identification of the best approach to rectify the situation. At this stage, options

for engineered controls, risk-based approaches, or modified operations will be assessed and the best solution chosen. If it is shown that the desired outcome has been achieved, the case can be closed. If not, supplemental mitigation and assessment may be required until such time as the defined outcome is achieved.

The time between mitigation and closure of the event can be lengthy, and predictive modelling can help determine how long this might take. Post-Closure monitoring will be required to verify any model simulations against observed values and to provide the necessary level of comfort to close the case. Again, the time frame could be lengthy depending on the scale of the event and degree of action required.

Approaches to mitigation may be active or passive. Active mitigation may include establishing an engineered treatment system, if needed, to deal with water quality issues that are not being addressed with the systems in place. Groundwater recovery using strategically placed pumping wells may also be required in situations that are deemed unacceptable. Passive mitigation is already planned in the form of a layered, bottom-up MRSF. Bench-scale testing indicates that the sequestering of selenium and abatement of nitrate is possible, but this will need confirmation under scaled-up field conditions. Other approaches to water management include site-engineered drainage to ensure water is segregated and routed accordingly and to maintain integrity of aquatic systems. How any passive management systems manifest during the operational year will determine the need for additional measures.

Adaptive Management

Adaptive management allows an operator to make changes to a project should unanticipated events or changes in pre-determined conditions occur. NWP fully understands the challenges presented by coal mining in a mountainous terrain and the possibility of unanticipated events or conditions. Despite all of the supportive modelling and monitoring that has occurred to date, not everything can be known about a site and its associated water systems, including how they will respond to change, until some of that change occurs.

Adaptive management has been used over the years to address uncertainty and provides a means to respond to unanticipated events by enhancing existing monitoring, recalibrating models, and improving designs using the knowledge acquired during site operations. The measures often put into place are a contingency for what might occur, although there is no reasonable way to know if they will.

Each of the specific management plans included in this SWMP have identified contingency measures that NWP will consider (in consultation with key regulatory agencies and stakeholders) and employ if the need arises. Implementation of any contingency measure would, of course, require a high degree of investigation before initiating, but this would be done in the timeliest manner possible to ensure achievement of the overarching objective and goals of this Plan.

33.4.1.8.9 Individual Management Plans

Management of water generated at open-pit coal mines in British Columbia is critical to ensure that activities do not adversely affect the surrounding environment and downstream habitats or users. There are two types of waters at the Project to consider in this regard: “contact” and “non-contact” waters.

NWP’s approach to managing these waters is to segregate them from each other as much as possible.

The Project is in a relatively constricted valley of West Alexander Creek. This geographical configuration gives NWP the ability to use engineered control structures and diversion channels to manage waters both inside and outside the development area. Of most concern are the slopes on the west side of the valley, where the MRSF will be located. Steep slopes and permeable colluvium and scree deposits make management of runoff waters from snowmelt and precipitation—and infiltration of groundwater into the base of the MRSF—a challenging task.

The following sections provide some background on the water types that NWP will have to manage during operations, how the company intend to manage them, and what measures will be put in place or be considered to address unanticipated deviations from modelled forecasts or performance targets.

Supporting information for this SWMP is provided in the Application/EIS and include:

- Chapter 9: Groundwater Assessment;
- Chapter 10: Surface Water Quantity Assessment;
- Chapter 11: Surface Water Quality Assessment;
- Appendix 9-A: Groundwater Technical Report;
- Appendix 9-B: 2018 Hydrogeological Field Data Report;
- Appendix 9-C: Crown Mountain Property Baseline Groundwater Investigation Results;
- Appendix 10-B: Hydrology Baseline Report;
- Appendix 11-B: Surface Water Quality Baseline Report;
- Appendix 11-C: Geochemical Baseline;
- Appendix 11-D: Calcification Assessment; and
- Appendix 11-E: Water Quality Prediction Model.

Details of NWP's plans to manage mine site waters are also included in Sections 7.4 and 7.5 of the Crown Mountain Bankable Feasibility Study (Stantec, 2020). Additional aspects are provided in the sections that follow.

Contact and Non-Contact Waters

Background

The mining process will generate large volumes of mine rock that will be stored in dedicated, engineered waste management areas (the North Pit and the MRSF). The development of access roads, operation of machinery, and siting of mining equipment will expose large areas to potential spills and leaks of fuels, lubricants, and chemicals. These exposed areas will be subject to infiltration of precipitation in the form of melting snow or rainfall, generating water influenced by mining activities. Issues associated with mine contact waters include increased turbidity that can eventually discharge to aquatic receptors if not managed and contained properly. Of equal concern is the exposure of mine rock to atmospheric oxygen and subsequent mineral weathering that can release harmful elements into water systems and eventually VC receptors.

Linkages to ecosystem function and VCs in the affected area include surface water receptors such as springs, tributary creeks and higher-order streams draining the area, aquatic and terrestrial habitat including fish and resident wildlife that may use and rely on these surface water systems, and people and communities located downstream. To ensure against adverse impacts from mine contact waters and

protect the surrounding environment and downstream receptors, NWP will collect and manage this water using appropriate technologies.

Project activities that will lead to the formation of contact water are outlined in Chapters 3, 9, and 11. This portion of the SWMP provides an overview of the framework that NWP will use to manage this water and detect, in a timely manner, any compromises or breaches of the management system so that proper mitigation can be taken to ensure the health of the surrounding environment and isolate Project influences. This will be accomplished by:

- Minimizing the interaction between contact water and all other surrounding waters that are not directly influenced by the mining process, both during mine development and after closure;
- Isolating contact waters in suitable lined holding areas and reusing that water in coal processing to minimize pressures on clean water systems;
- Conducting bench-scale testing and modelling of water/rock reactions that change local water quality and identifying the most likely constituents to become mobilized, along with the timing and magnitude of release;
- Monitoring water quality to identify the presence of any harmful substance mobilized due to the exposure of rock formations or mine rock and comparing the results against modelled forecasts to ensure alignment with knowledge of site impacts;
- Intercepting any water that may have bypassed diversions or containment systems through passive means or active collection so that it can be returned to proper containment and management areas;
- Managing contact water generated over the life of the mine and implementing closure activities that will reduce the risk of future generation of more contact water, using progressive reclamation activities and placement of soil and vegetation covers to isolate exposed rock and associated soils from oxidation and weathering reactions; and
- Diverting all non-contact water away from working mine areas to ensure that physical and chemical quality is maintained within natural conditions.

Environmental Protection Measures

Managing contact and non-contact waters presents several challenges. These include the geotechnical suitability of any drainage channel along the west side of the MRSF due to the steep side slopes and high exposure to avalanche risk, the presence of bedrock outcroppings, and other issues that hinder the construction of successful diversion channels. The design and operation of all water management structures must consider the contributions of surface runoff from the upper slope areas, mine disturbed areas, mine rock dumps, and haul roads.

NWP's strategy for surface water management and segregation includes limiting the mine disturbance footprint through progressive reclamation activities and avoiding impacts to drainages beyond Grave Creek and West Alexander Creek. A key part of this strategy is to limit placement of mine rock to the West Alexander Creek basin. Grading and site drainage around the CHPP, maintenance/office complex, and run of mine (ROM) pad will be designed to ensure that runoff from these areas is also directed to, and maintained within, the West Alexander Creek catchment. The infrastructure in question includes haul roads, the plant and warehouse/shop site, coal transfer areas, and any stockpiled rock and soil materials.

The CHPP is located close to the divide between the Grave Creek and West Alexander Creek catchments. Runoff in that area will be directed to small catchment sumps prior to release or managed using localized erosion mitigation systems for areas of disturbance that require TSS risk reduction. This would include minor road cuts and cleared areas that shed runoff during snowmelt and rainfall events.

NWP has been monitoring baseline water quantity and quality conditions in the proposed mine area for several years and has established several monitoring stations that have yielded a relatively comprehensive database to guide future monitoring, detection, and responses. Where feasible, the same monitoring stations will be used to capture future data to identify any changes in mine contact and non-contact waters that exceed normal variability and that may signal a breach of established management systems. However, it is likely that some monitoring stations will need to be decommissioned as the mine area expands to make way for new waste management areas or necessary infrastructure. NWP will ensure that key monitoring stations are protected from damage to ensure the continuity of historical records.

As the mine develops, NWP will establish additional monitoring stations to assess the physical and chemical quality of contact and non-contact waters. These waters will be tested for a comprehensive suite of analytes as listed in Section 33.4.1.8.7. This additional monitoring will be established at strategic locations within, and outside of, active mining areas to facilitate data collection and provide baseline quality conditions and modelled projections. This will ensure alignment with modelled projections or detection of any departures from acceptable tolerance levels (e.g., ± 20%). Any departures beyond acceptable and natural variability that may signal a breach of established management or containment systems will trigger response actions to ensure that the risk is properly understood, managed, and/or mitigated, and that future events are avoided through continuous improvement processes.

Monitoring performance in the MRSF in particular will be critical to ensuring that the structure is operating as planned. Bench-scale testing indicates NO_3 levels are abating, and selenium is being sequestered. There is also an opportunity to conduct a pilot test of a smaller MRSF during the initial development of the mine (Years 1 and 2). The test area would be located between the southwest corner of the North Pit and the area identified for the main MRSF and would include the construction of three or four lifts of mine rock material, roughly 30 m in height, 200 m wide, and 450 long, with lower-permeability reject material and a capillary break placed between lifts of mine rock to simulate a larger mine rock dump.

The pilot dump will allow the degree of oxygen (O_2) exclusion and decline within the test dump to be measured, along with the effectiveness of intervening finer reject material chosen to attenuate infiltration. The test structure will also be monitored to determine the oxidation state and any gas production (nitrogen [N_2] and carbon dioxide [CO_2]). All data collected will be compared with modelled forecasts developed for the Application/EIS to ensure alignment with simulation results or assumed outcomes. It may be possible to test the effect of water inundation in the lower lift to anticipate how internal conditions might change if this was to occur in the main MRSF and whether sulphide mineral oxidation reactions might proceed, if at all.

Completion of a pilot test such as this will allow assumptions to be tested and design changes to be considered in advance of constructing a larger MRSF. This is considered a proactive approach to adaptive management, one that maintains design efficacy for waste management at the site.

Prevention and Avoidance Measures

To ensure the protection of water and avoid unnecessary water issues, detection of incidents that require response actions will be made through a monitoring and data evaluation process. This includes the identification of any departures of field-measured parameters and/or laboratory-generated results outside of statistically established bounds based on baseline conditions or specified target criteria required by provincial and/or federal agencies or agreed to by key stakeholders (i.e., the Ktunaxa Nation). Any identified trends in KPIs that remain within statistical control will also be a flag for follow-up investigations so that actions can be taken to stabilize and reverse those trends if necessary.

Segregation of contact and non-contact waters will go a long way toward addressing issues relating to mixing, and routing contact waters to the lined Interim Sediment Pond and/or the Main Sediment Pond will maximize the likelihood of maintaining this condition. Groundwater monitoring will ensure that the waters are being contained and are not bypassing the lined ponds or other collection systems.

Mitigation Measures

Mitigation to address the segregation of non-contact and contact waters involves establishing a diversion channel between the western slopes of Erickson Ridge and the West Alexander Creek valley to intercept runoff from that slope before it can interact with the large MRSF. This is complicated by the presence of permeable colluvial and scree deposits along the sides of that slope, which comprises very coarse (and therefore permeable) material. These scree chutes also focus avalanches falls in the winter, increasing snow accumulation in those areas. Melting of this snow in the springtime, along with precipitation events later in the season, will recharge permeable slope deposits and convey the resulting groundwater to the valley floor. As a result, bypassing of infiltrated groundwater will undermine the success of any diversion channel.

NWP's approach to mitigating groundwater ingress into the mine rock dump is to create a granular rock drain at the base of the slope and up along the west side of the mine rock dump by end-dumping off of the mine rock lifts. This will encourage the collection of coarser rock at the base as the MRSF and west slope as the rock cascades down. Each successive mine rock lift will facilitate further accumulation of this coarse rock in the area between the colluvial deposits and the MRSF. This style of permeability drain ensures that any groundwater that issues out of the colluvium will be intercepted and drain along the length of the mine rock dump downslope to the Main Sediment Pond.

An additional design option is to place fine reject material along the west slope of the MRSF to impede oxygen ingress and to some degree groundwater entry. Construction of an underdrain system mimicking the natural tributaries feeding into West Alexander Creek and running the length of the creek thalweg would also facilitate collection and diversion of any groundwater entering the basal layers of the MRSF to either the Interim or Main Sediment Pond.

Contingency Plans

NWP will be monitoring conditions in the various levels of the MRSF to confirm that the structure is operating as described in the Application/EIS and supporting materials. Any water ingress into the basal layer, or layers, of the MRSF despite the previously mentioned design considerations has the potential to adversely affect the intended performance of the structure for selenium retention and nitrate abatement. Introduction of oxygenated water has the potential to facilitate sulphide mineral weathering reactions

and the release of metals and trace elements, including selenium. However, this may also enhance selenium sequestration under the right geochemical conditions. Performance monitoring will provide the information necessary to determine how things change, and if so what types of constituents might mobilize.

If conditions arise that lead to the mobilization of selenium, or other harmful trace elements or constituents (as a secondary effect), the placement of a low-permeability barrier downslope from the initial MRSF area and upgradient of the Interim Sediment Pond would facilitate retention of the affected water much like a saturated rock fill. The expected effect would be for redox conditions to form where selenium is transformed from selenate (SeO_4^-) to selenite (SeO_3^{2-}) and finally elemental selenium (Se^0), while nitrate is converted to nitrogen gas. Such effects would need to be confirmed by a properly configured monitoring system.

Surface Water Management – Streamflows

Background

The Project will influence, to some degree, surface water flows in local watercourses as a result of alterations to the West Alexander Creek watershed. The largest impact will be felt in the West Alexander Creek catchment due to the establishment of the MRSF, which will occupy approximately 30% of the valley. Alexander Creek, to the east and on the other side of the ridge separating the two catchments, will be affected by a change in the contribution from the West Alexander Creek tributary. However, this change will only be noted at the confluence and in downstream areas and will be small given the larger flows in Alexander Creek.

Regardless, mining activities will alter the water balance of the area due to clearing of vegetation cover, excavation of the coal, stockpiling of the mine rock, and collection and retention of mine-affected waters. This will have some form of impact on streamflow characteristics (rates, volumes, and timing) due to the construction of controlled drainage systems to segregate contact and non-contact waters. Although the contact water will be collected and recycled into the coal cleaning and preparation process, any additional surface water withdrawals that are required will influence streamflow, depending on how much is diverted, where the diversion occurs, and when.

Specifically, the Project has the potential to affect surface water quantity as a result of:

- Modifications to the contributing watershed area for West Alexander Creek and Alexander Creek due to mining in the upper watershed;
- Construction of the Grave Creek Reservoir and backup reservoir to act as a source of process make-up water;
- Withdrawals of water from Grave Creek for use as process make-up water;
- Clearing and grubbing of vegetation from the pre-production development footprint;
- Site water management and discharge to the receiving environment, including construction, operation, and decommissioning of the Interim and Main Sediment Ponds;
- Mining operations, including loading, hauling, and stockpiling of soil, removal of unconsolidated soil and rock materials and loading, hauling, and stockpiling/dumping of coal and mine rock;

- Collection and retention of mine contact waters in lined sediment ponds, and to a lesser extent in open excavations during operations and following closure, reducing local streamflow contributions;
- Alterations to interactions between surface water and groundwater; and
- Completion of reclamation activities for the mine rock dump areas.

Further details of the implications to surface water flows are provided in Chapter 10.

Environmental Protection Measures

NWP has conducted extensive streamflow modelling in support of its Application/EIS. This continuous long-term water balance model was developed to understand the possible implications of the Project on flow characteristics within the West Alexander Creek watershed and downstream areas. The modelling methodology is outlined in Section 10.5.4.1 of Chapter 10 and is discussed in further detail in the Crown Mountain Flow and Water Quality Impact Assessment Modelling Technical Memo (SRK, 2021; Appendix 10-B).

The modelling anticipates a reduction in annual flows between the baseline and mine development scenarios over the duration of the assessment period. The following changes were simulated for the various phases of development, from Construction and Pre-Production through to Post-Closure:

- For the Alexander Creek Upstream of Highway 3 (node AC-1) a change in mean monthly flows in the range of –4% to –1%;
- For the Alexander Creek downstream of West Alexander Creek (node AC-3) a change in mean monthly flows on the order –8% to –2%; and
- For West Alexander Creek downstream of the Main Sediment Pond Outlet (node AC-6) a change of anywhere from –12% during Construction and Pre-Production to as much as –40% during the Post-Closure phase.

When considering the effects of climate change, there is also a marked shift in the simulated timing of peak flow from late spring (May to June) to mid-spring (April to May). This is a result of the warming winter season and anticipated increase in rain-on-snow events as a result. As such, the effects of climate change are anticipated to have a substantial effect on timing and magnitude of flows leading to higher spring peak flows and more extended and lower flow periods following the spring freshet period.

Model projections indicate that Grave Creek is affected to a much lesser degree than West Alexander Creek, given its geographical position relative to the mine development and mine rock management areas. From construction through to Post-Closure, the implications of climate change for mean flows are from –0.3 up to –5.4%, and from –0.1 % to +13.9%.

Overall effects on the Elk River system are generally negligible, and much less than 1%.

Prevention and Avoidance Measures

As required by the CEA Act, 2012, a follow-up program must be defined to verify the predicted effects or the effectiveness of mitigation. A comprehensive hydrometric monitoring program will be developed and implemented to facilitate an ongoing examination of streamflow conditions within the receiving watercourses downstream of the Project footprint.

NWP will conduct a hydrometric monitoring program to prevent and avoid adverse influences from development. This will involve the installation and/or maintenance of water-level gauging stations at the locations identified in Table 33.4-27 (i.e., Table 10.5-1 of Chapter 10). Each station will be equipped with a water level logger and staff gauge to facilitate automated and manual readings. Stream gauging will also be performed to measure discharge rates so that rating curves (water level [m] vs. flow rate, [cubic metres per second {m^3/s}]) relationship) can be established at each location.

Table 33.4-27: Hydrometric Monitoring Stations

Watercourse	Location	Development Effects Being Monitored
Alexander Creek	Upstream of Erickson Creek	• Crown Mountain Coal Coking Project (NWP)
	Upstream of Michel Creek	• Crown Mountain Coal Coking Project (NWP) • Elkview Operations (Teck)
Grave Creek	Upstream of Harmer Creek	• Crown Mountain Coal Coking Project (NWP)
	Upstream of Elk River	• Crown Mountain Coal Coking Project (NWP) • Elkview Operations (Teck)
Michel Creek	Downstream of Alexander Creek	• Crown Mountain Coal Coking Project (NWP) • Elkview Operations (Teck) • Coal Mountain Operations (Teck) • Michel Coal Project (North Coal)

Data collected at each hydrometric station will be compared against simulated hydrographs to ensure alignment between observed and simulated readings (i.e., using NSE or KGE statistical methods). Departures beyond acceptable variance from simulated results will prompt further review and possible deployment of mitigation measures to ensure critical flows are maintained and preserve existing aquatic habitat in undisturbed reaches of the local creeks and downstream areas.

Mitigation Measures

NWP has identified mitigation measures for each potential effect on surface water quantity, including project design features, procedures, or practices that will reduce or eliminate development-related effects on local streamflows. Potential development-related changes to surface water quantity will be reduced through design mitigations, adherence to regulatory requirements, best management practices, continued modelling and monitoring efforts, and adaptive management processes. The mitigation of unacceptable effects will apply to:

- Site construction activities;
- Surface water withdrawals;
- Operational activities; and
- Mine closure and reclamation activities.

Implementation of the operational practices and procedures that are identified in this SWMP will be the primary means through which adverse effects on surface water quantity are addressed. This plan includes a combination of mitigation measures that will be executed and adapted to accommodate site conditions throughout the various phases of the Project.

In general, the SWMP includes a range of drainage features and facilities for the conveyance, diversion, and retention of surface water runoff within the development footprint. One of the principal goals of this SWMP is to minimize disruptions to streamflow conditions in the receiving watercourses, which will be achieved through:

- Segregation and diversion of non-contact surface runoff around mine disturbed areas and water control facilities;
- Controlling outflows from water management facilities to maintain streamflow conditions in the receiving watercourses (to the extent possible), particularly during low-flow conditions;
- Limiting surface water withdrawals to minimize effects on streamflows;
- Implementation of progressive contouring and reclamation of dump site areas to minimize changes in land cover and hydrological characteristics; and
- Decommissioning and reclaiming water management facilities to restore natural streamflow conditions in the receiving watercourses (to the extent possible).

NWP intends to develop a project-specific follow-up program to verify the effects predictions and the effectiveness of mitigation measures. This will help refine the level of confidence assigned to the assessment of residual effects (both Project-specific and cumulative) and allow any adaptive management processes to be commissioned. The follow-up program will assess the results of hydrometric monitoring at the stations established within the Project footprint.

The hydrometric monitoring program will also involve the installation and operation of a climate station to collect meteorological data representative of the Project area. The results of the monitoring program will be used to determine whether additional mitigation measures or adaptive management strategies are needed. Data from the climate station will also allow the potential damage from extreme events (e.g., large snowpacks) to be assessed in advance so that management provisions can be put into place in as a precautionary measure. Data from surrounding meteorological stations for approaching storms or developing droughts—and synoptic patterns that could lead to these types of events, such as the phases of the Pacific North American Pattern (i.e., jet-stream activity and storm track), phases of the El Niño Southern Oscillation and phases of the Pacific Decadal Oscillation—will be reviewed.

With respect to assessments of cumulative effects, the assumption is that similar mitigation efforts are being adopted to minimize or eliminate potential surface water effects associated with other projects and activities currently operating in or planned for the region. In the case of other mines in the Elk Valley, this includes the implementation of appropriate best practices and measures to mitigate changes in surface water quantity. Similarly, hydroelectric dams that have the potential to affect streamflow conditions on the Elk River system (i.e., Elko, Libby Dam/Lake Koocanusa) have incorporated various design and operational mitigation strategies.

Table 33.4-28 provides a summary of the potential effects and mitigations to address adverse impacts to surface water quantity as a result of the Project.

Table 33.4-28: Summary of Effects and Mitigation for Surface Water Quantity

Potential Effect	Mitigation Measures	Rationale	Applicable Project Phase(s)	Residual Effect
Change to Surface Water Quantity due to Site Construction Activities	Site Water Management Plan	To maintain streamflow conditions (flows and water levels) within the receiving watercourses	Construction and Pre-Production	Yes
Change to Surface Water Quantity due to Surface Water Withdrawals	Application of limitations on water withdrawals	To maintain flows and water levels in the downstream reaches of Grave Creek	Operations	No
Change to Surface Water Quantity due to Operational Activities	Site Water Management Plan	To maintain streamflow conditions (flows and water levels) within the receiving watercourses	Operations	Yes
Change to Surface Water Quantity due to Mine Closure and Reclamation Activities	Site Water Management Plan, Site Reclamation, and Reclamation Monitoring	To maintain streamflow conditions (flows and water levels) within the receiving watercourses	• Reclamation and Closure • Post-Closure	Yes

Contingency Plans

In the event that project influences on the local hydrometric conditions result in unacceptable impacts on streamflow characteristics, sensitive fish, and aquatic habitat relying on those streamflows, NWP will consider the following contingency measures to reconcile the situation:

- Identify alternate sources of supply water to remove pressure from adversely affected streamflows;
- Alter site drainage operations to ensure that sufficient quantities of water of suitable quality are reaching downstream and undisturbed portions of the Project footprint;
- Identify the need and feasibility to enhance streamflows during critical times of the year with water of suitable quality; and
- Consider the development of offset habitat (e.g., fish spawning, over-wintering) to address any unacceptable losses to streamflows that occur during the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases.

Surface Water Quality Conditions

Background

Project activities during Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases may influence surface water quality within and downstream of the Project footprint. Changes to surface water quality from mining activities may result in potential effects on receptor VCs, including:

- Aquatic health (including fish and benthic invertebrate habitat);
- Vegetation;
- Wildlife; and

- Human health.

Simulations have identified loadings and concentrations of metal and non-metal constituents as KPIs for surface water quality. They include constituents of interest from the EVWQP, specifically selenium, cadmium, nitrate, and sulphate.

In general, the Project may affect surface water quality through:

- Non-contact water runoff during site clearing, construction, soil movement/salvage, maintenance, and reclamation activities;
- Dust deposition from transportation, mining, and coal processing activities;
- Contact water runoff from mine disturbed areas and infrastructure;
- Nitrogen loading from explosives use;
- Small releases of hydrocarbons (spills and leaks of fuels and lubricants);
- Disposal of mine rock and coal rejects;
- Alterations to surface water–groundwater interactions; and
- Sediment pond discharge to the receiving environment.

Erosion and sedimentation may occur during all phases of the Project, elevating levels of turbidity (measured as TSS) in waterbodies within, adjacent to, and downstream of the Project footprint. Where feasible, surface water diversions will be constructed to divert clean runoff from undisturbed areas north of the Grave Creek–West Alexander Creek drainage divide and avoid TSS discharges using appropriate measures (e.g., silt fences).

Environmental Protection Measures

Two temporary sediment ponds will be constructed to capture construction runoff water during the construction of the ROM pad and facilities pad. Construction of smaller, local water management structures (i.e., ditches and sumps) will begin prior to mining in the North Pit. Discharge from the temporary sediment ponds will join a drainage ditch adjacent to the Lower Haul Road and discharge to the West Alexander Creek catchment.

Where possible, non-contact water runoff will be directed away from the active mining areas by means of small catchment sumps and dedicated drainage ditches draining to the natural catchment watercourses. However, due to localized challenges such as geotechnical stability and avalanche risks, channel construction is not feasible in all areas of the site, such as the upper western slopes of West Alexander Creek above the MRSF. As a result, it is expected that water management structures will intercept some surface runoff from undisturbed areas, as well as runoff from mine disturbed areas at these locations.

Two larger sediment ponds are proposed for managing the combined runoff from the mine footprint and non-contact water from the upper western slopes of West Alexander Creek. These ponds will be placed downstream of the MRSF and will be developed through the mine's expected life to accommodate the advancing mine rock placement. These ponds are meant to collect and temporarily retain mine-affected water to meet the requirement of Technical Guidance 7 of the *Environmental Management Act* requirements (ENV, 2015). Initially, the Interim Sediment Pond will capture seepage and runoff from the mine rock piles up until Year 4. During Year 5, the Main Sediment Pond will be built downstream of the

advancing MRSF structure. Both the Interim Sediment Pond and the Main Sediment Pond will be lined to prevent infiltration of collected waters into the local groundwater.

In addition, grading and site drainage around the Coal Handling Process Plant, maintenance/office complex, and ROM pad will be designed to direct runoff from those areas to the West Alexander Creek catchment. This infrastructure includes haul roads, the plant and warehouse/shop site, and coal transfer and stockpile areas. During Year 5, the Interim Sediment Pond will be decommissioned. The Main Sediment Pond will remain active throughout the life of the mine into the Post-Closure phase. Once site Reclamation activities are complete, and water quality objectives are met. Specific details on the sediment pond designs are provided in Chapter 3.

Discharge from the sediment ponds has the potential to contain elevated levels of TSS, selenium, nitrate, sulphate, hard cations, and other trace elements. Flows entering West Alexander Creek from the sediment ponds have the potential to result in erosion of the natural creek bed, causing additional TSS loads downstream. In addition, calcite formations can change the characteristics of stream substrates by cementing them together, adversely affecting habitat for fish and invertebrates. Calcite formation on local streambeds has been observed in the Elk Valley downstream of mining activities (Robinson and MacDonald, 2014).

During Reclamation and Closure, some localized erosion and sedimentation may occur from the decommissioning of mine-site infrastructure and reclamation of remaining disturbed areas. The Main Sediment Pond and associated sediment control structures will remain intact until the final Closure phase of the site to manage the potential movement of sediment into the receiving environment.

No potential adverse effects on surface water quality from non-contact water runoff are anticipated during Post-Closure, as all activities with the potential to result in erosion and sedimentation to the receiving environment will be completed prior to mine closure.

Prevention and Avoidance Measures

Specific prevention and avoidance measures have been developed to protect surface water quality, including:

- Earth-moving activities throughout the life of mine will be scheduled to ensure limited durations of exposed soils and to avoid such activities during wet and/or windy seasons, where possible;
- Sediment loading in runoff will be reduced by the application of standard industry practices (e.g., benching, erosion blankets, and silt fencing) to intercept sediment before it reaches the receiving environment; and
- Regular inspections will be conducted to ensure drainage, erosion, and sediment control measures are effective and functioning properly, which will allow for timely repairs and adjustments as required.

Measures have also been put into place to minimize:

- Mine disturbance footprints and additional drainages beyond West Alexander Creek and Grave Creek;
- Drainage further to the north of the Grave Creek-West Alexander Creek drainage divide (this has been achieved by directing runoff to small catchment sumps prior to release);

- Localized erosion measures for small, isolated areas of disturbance (e.g., minor road cuts); and
- Release of surface water of insufficient quality by capturing it in sediment ponds prior to release into the West Alexander Creek drainage.

NWP will also restore landscape features through progressive reclamation and revegetation throughout the life of the mine to minimize erosion potential, reduce the Project footprint, and manage runoff effects on local surface waters.

Mitigation Measures

The mitigation measures proposed for surface water quality are based on available BMPs, provincial and federal guidance documents, mitigation measures conducted and accepted for similar projects, input from local stakeholders, and professional judgment. The identification and selection of technically and economically feasible mitigation measures follow the mitigation hierarchy approach outlined by the provincial *Environmental Mitigation Policy* and related *Environmental Mitigation Procedures* (Ministry of Environment, 2014a and 2014b). Technical and economic constraints dictated the highest level of the mitigation hierarchy that could be achieved for managing each potential effect. Table 33.4-29 provides a summary of the potential effects and mitigations to address adverse impacts to surface water quality as a result of Project.

The primary approach to mitigating changes in surface water quality from non-contact water runoff is to reduce the potential for erosion and the transportation of material in surface runoff to the West Alexander Creek, Alexander Creek, Grave Creek, and Elk River drainages through implementation of the Erosion and Sediment Control Plan. The existing site drainage controls should be able to address this challenge, and additional mitigation measures should not be required.

Contingency Plans

Contingency plans for site drainage will include as-needed responses to events that may circumvent established drainage controls. This may include the development of temporary drainage control features during unanticipated runoff events, but attention will be given to the possibility of such events by monitoring the snowpack and seasonal storm activity. If such contingencies are needed, they will be deployed in an adaptive management style during site development and closure.

Groundwater Management

Background

Physical disturbances to any landscape can have notable influences on associated groundwater systems. Topography exerts a strong control on groundwater flow patterns, and alteration of terrain features will affect how groundwater moves. The Project is expected to influence groundwater conditions only in the Groundwater LSA during all stages of development. Most, if not all, of these effects will be limited to the West Alexander Creek valley, given the natural hydraulic constraints imposed by the mountain ridges to the west and east, and the drainage divide between West Alexander Creek and Grave Creek located near the CHPP.

Table 33.4-29: Summary of Effects and Mitigation for Surface Water

Potential Effect	Key Mitigation Measure(s)	Rationale	Applicable Project Phase(s)	Residual Effect
Change in Surface Water Quality from Non-Contact Water Runoff	• Limit erosion and contain sediment through the application of standard industry practices. • Conduct regular inspections to ensure control measures are effective and functioning properly. • Divert clean runoff around mine disturbed areas, where possible • Capture clean surface water that cannot be diverted in sediment ponds prior to release. • Limit the mine disturbance footprint through Project design and progressive reclamation.	• Erosion and sediment control measures (e.g., silt fencing) are standard industry practice and proven to be effective. • Regular inspection of erosion and sediment control measures allows for timely repairs and adjustments as required. • Minimizing the Project Footprint minimizes potential erosion and sedimentation effects on surface water.	• Construction and Pre-Production • Operations • Reclamation and Closure	No
Change in Surface Water Quality from Dust Deposition	• Limit dust generation and emissions through the application of standard industry practices and emissions control measures. • Conduct regular inspections to ensure control measures are effective and functioning properly. • Limit the mine disturbance footprint through Project design and progressive reclamation.	• Emission control measures (e.g., fabric covers, dust suppression) are standard industry practice and proven to be effective. • Regular inspection of emission control measures allows for timely repairs and adjustments as required. • Minimizing the Project Footprint, particularly exposed soils, minimizes potential wind erosion and dust generation.	• Construction and Pre-Production • Operations • Reclamation and Closure	No
Change in Surface Water Quality from Mine Site Drainage	• Nitrogen Loading: o Following provincial and federal requirements for the storing and handling of explosives.	• Standard industry practices are proven to be effective to reduce the potential for nitrogen loading from explosives use. However, some nitrogenous residues are likely to remain after blasting on mine rock placed in the Mine Rock Storage Facility.	• Construction and Pre-Production • Operations	No

Potential Effect	Key Mitigation Measure(s)	Rationale	Applicable Project Phase(s)	Residual Effect
	○ Collection and disposal of decontamination water off site. ○ Minimizing the use of emulsion bulk explosives. ○ Optimizing the blast-hole size and pattern design. ○ Limiting the sleep time of a loaded pattern to one week. ○ Training of employees to limit spillage of explosive agents on the blast pattern.			
	• Hydrocarbons: ○ Restricting the storage and transfer of fuel will be restricted to certain areas. ○ Implementing procedures for handling and storing fueling and fuel transfer. ○ Conducting regular site and vehicle inspections. ○ Preventative maintenance for all vehicles and equipment on site.	• Standard industry practices for handling, storing, and transferring fuel are proven to be effective at reducing the release of hydrocarbons to the receiving environment. • Regular inspections of the site, vehicles, and equipment allows for timely repairs and adjustments as required.	• Construction and Pre-Production • Operations • Reclamation and Closure	No
	• Pit Dewatering: ○ During active mining, dewatering will be carried out using drainage ditches, berms, sumps, and pumps. Pit dewatering will be coordinated to meet overall water quality objectives.	• Standard industry practices for dewatering are proven to be effective at reducing effects in the receiving environment.	Operations	No

Potential Effect	Key Mitigation Measure(s)	Rationale	Applicable Project Phase(s)	Residual Effect
	o Once a pit is backfilled and allowed to fill with groundwater inflows, selenium and nitrate are effectively reduced in mildly suboxic saturated rock fill.			
Change in Surface Water Quality from Disposal of Mine Rock and Coal Rejects	• Engineered layering of coal rejects and mine rock to limit metal leaching and acid-rock drainage. • Saturated backfill of mine rock in the East and North Pits. • Progressive reclamation of the Mine Rock Storage Facility.	• The mine rock placement outside of the pits will blend potentially acid generating (PAG) and non-PAG materials such that the resulting mixture performs as non-PAG. The reject layers will act as suboxic environments where oxygen, nitrate and selenate will be reduced. The proposed design will be evaluated during the first few years of Operations to determine if successful. • Selenium removal from contact waters has not been demonstrated directly, but selenium concentrations from saturated backfills are much lower than observed for conventional ex-pit mine rock at several operating mines. • Progressive reclamation will limit exposure time of the Mine Rock Storage Facility.	• Operations • Reclamation and Closure • Post-Closure	Yes
Change in Surface Water Quality from Surface Water–Groundwater Interactions	Installation of impermeable liners in the Interim and Main Sediment Ponds.	• Impermeable geomembrane liners have proven effective in preventing leakage/seepage to groundwater. However, the potential for seepage of contaminated groundwater to surface water downstream of the sediment ponds remains.	• Operations • Reclamation and Closure • Post-Closure	Yes

Potential Effect	Key Mitigation Measure(s)	Rationale	Applicable Project Phase(s)	Residual Effect
Change in Surface Water Quality from Sediment Pond Discharge	• Diverting clean, non-contact water away from the sediment ponds where possible. • Appropriate sizing of sediment ponds to minimize seepage losses and convey runoff during storm events. • Limit the mine disturbance footprint through Project design and progressive reclamation. • Monitoring and adaptive management.	• Appropriately sized sediment ponds have proven to settle particles. • Anti-scaling agents are proven effective in reducing calcite formation. • Minimizing the Project Footprint reduces the amount of surface runoff from mine disturbed areas, reducing the burden on the sediment ponds. • Discharge of water containing elevated concentrations of TSS, selenium, nitrate, or other parameters may exist should other upstream mitigation methods (e.g., mine rock management) not operate as intended.	• Operations • Reclamation and Closure • Post-Closure	Yes

In general, several elements of the Project have the potential to affect groundwater quantity, including:

- Construction of the Interim Sediment Pond, Main Sediment Pond, and Grave Creek Reservoir and influences on the underlying groundwater systems;
- Detonation of explosives in the subsurface;
- Excavation of pits by removing fragmented rock masses, dewatering mine pits, and altering the local terrain;
- Loading, hauling, and dumping of mine rock at the MRSF, and physical changes to the site drainage;
- Alteration of the local topography and land cover, leading to changes in infiltration conditions, springs, and the local water balance in the disturbed area;
- Management of the Main Sediment Pond discharge to West Alexander Creek during operation through to decommissioning; and
- Reclamation and filling of pits to spill-point levels followed by re-equilibration of local groundwater flow systems to a state different from baseline conditions.

The most substantive effect on groundwater quantity is projected to occur in the West Alexander Creek valley, where all the disturbance will be occurring. As documented in Chapter 9, modelled changes to baseflow contributions in undisturbed portions of that creek are on the order of −30% at end of mine and −21% for long term closure. However, effects are not expected to be substantive in Alexander Creek or within the upper Grave Creek catchment (simulated decreases were less than 5% in general), and any effects should decrease with increasing distance downstream and more groundwater baseflow contributions. As such, effects on groundwater baseflow contributions to the local streams are not expected to be substantive, if measurable at all, at the confluence of Alexander Creek with Michel Creek, or at Grave Creek where it intersects Harmer Creek.

No change to groundwater flow quantity through the bedrock is predicted to occur as a result of the Project. This is due to the generally low hydraulic conductivity of bedrock units, the presence of low-permeability glaciolacustrine deposits blanketing the valley floor, and the limited area of impact due to pits being located on elevated ridges. There are no mapped aquifers within the Project footprint or Groundwater LSA based on a search of the B.C. Water Resources Atlas (https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-science-data/water-data-tools). Some uncertainty does exist with respect to the range of inflow to pits and change in valley bottom groundwater flow (or baseflow) due to limited understanding of material hydraulic properties and groundwater recharge. Faults and fractures are known in the area, making an understanding of the role they play in groundwater movement important.

With respect to groundwater quality, potential impacts from the Project include:

- Infiltration of mine contact water generated in disturbed areas of the mine;
- Impacts from the handling, loading, and detonation of explosives, resulting in potential leaching of nitrogen-based residues into the groundwater;
- Routine handling, transferring, dispensing, storage, and possible leaks or spills of hydrocarbon fuels and machinery lubricants used on-site;
- Disposal of mine rock and coal rejects and the possible infiltration of seepage waters generated by these wastes into the subsurface;
- Collection of contact water in the Interim Sediment Pond or Grave Creek Reservoir, and potential for infiltration of that water into the subsurface;

- Washing and stockpiling of coal, the potential for leachate (e.g., sulphate and selenium), and infiltration of the wash/leachate water into the subsurface;
- Infiltration of water collected in quarry excavations for construction of the Grave Creek Road and Grave Creek Reservoir, the Interim and Main Sediment Ponds, and other areas during general site clearing, construction, soil movement/salvage, maintenance, and reclamation; and
- Management of the Main Sediment Pond discharge to West Alexander Creek, including surface water-groundwater interactions and potential seepage/leakage of waters accumulated in that pond into the local groundwater.

All these effects can manifest during the Construction and Pre-Production, Operations, and Reclamation and Closure phases. Detecting their occurrence and responding to unacceptable situations in a timely manner will be critical.

With particular reference to the mobilization of trace elements, characterization of the Project indicates that the potential for leaching from mine rock is similar to what is found at other sites in the Elk Valley. The primary constituent of concern is selenium, but other elements, such as antimony, arsenic, barium, cadmium, cobalt, copper, mercury, molybdenum, nickel, and zinc, have been found at elevated levels in mine rock. Sulphate, which is associated with the oxidation of pyrite, as well as chloride and nitrate can be present at elevated concentrations; however, they have been found to be of short-term concern and are associated with initial flushing of solutes.

Environmental Protection Measures

As specified in NWP's Groundwater Assessment (Chapter 9), the detection of significant effects on local groundwater quantity will be identified by any one of the following ways:

- A change of greater than 10% in baseflows in local streams relative to baseline conditions (Locke and Paul, 2011);
- Reduction in the quantity of groundwater recoverable from an aquifer on a sustainable basis, such that it no longer meets present or future needs of connected ecosystems or users;
- Reduction in groundwater discharge and consequent adverse effects on baseflow to a stream, preventing current users (including aquatic receptors) from meeting present and future needs on a sustainable basis; and
- Absolute changes of greater than 1 m to groundwater levels relative to baseline conditions.

For groundwater quality:

- Exceedance of a guideline value (except an exceedance related to baseline concentrations). Significance thresholds for groundwater quality consider the Teck's EVWQP (for the four Order constituents), the B.C. Water Quality Guidelines for Aquatic Life and the ENV CSR Schedule 3.2 Aquatic Life Standards over a given season, and the Coal Mine Effluent Regulations discussion document (ECCC, 2022);
- An increase of greater than 10% from the mean of baseline conditions over a given season (KNC, 2020b); and
- An increase of greater than 10% from the 95th percentile of baseline concentrations over a given season for constituents that have been demonstrated to exceed these criteria during the baseline assessment (e.g., lithium and cobalt).

A more complete description of the potential impacts from this proposed mine development is provided in Table 9.5-2 of Chapter 9.

Groundwater is expected to interact with creeks and drainages within the Project footprint. Based on the conceptual model and field observations, drainages and creeks in the area are expected to be both gaining groundwater (as it enters the system and contributes to baseflow) and losing it (as surface water from watercourses recharges the sub-surface, reducing baseflow). No potential adverse effects on surface water quality as a result of these interactions are anticipated during Construction and Pre-Production, as groundwater effects are anticipated to be limited to changes in local groundwater flow patterns due to construction of the quarry, Interim Sediment Pond, and Grave Creek Reservoir.

The majority of the effects on groundwater are anticipated to be related to the MRSF, primarily in the near-surface groundwater in close proximity to the structure. Seasonal distributions of groundwater flows may be altered somewhat by attenuation of infiltrating waters through the dump, and diversion of runoff around the dump and back into creeks within gaining reaches. This should reduce the effects on creek flow.

Some seepage of groundwater is expected from the south end of the South Pit and could move in a southerly direction toward Alexander Creek. However, flow would be completely within bedrock, and the rate of movement is anticipated to be relatively low due to the low hydraulic conductivity. Potential effects on cumulative groundwater quantity are not expected. Potential effects on groundwater quality across the site are expected to be less substantive than those related to MRSF seepage.

Seepage of contact water along the base of the MRSF is anticipated but will likely be directed toward the thalweg of West Alexander Creek. Seepage from the Interim Sediment Pond is not expected to be significant given the presence of a liner, but if water successfully bypasses the liner, it could return to the surface along West Alexander Creek down to the lined Main Sediment Pond, where it will be contained. Model simulations that assume the Interim Sediment Pond as a source (for example, from leakage) suggest contact water could travel as far as 2,500 m downstream, and much farther than seepage from the MRSF.

A percentage of discharge from the Main Sediment Pond is expected to infiltrate the groundwater system if it successfully bypasses the liner but is anticipated to remain in the shallow zone due to the low hydraulic conductivity of the underlying soil and rock materials. Discharge back to Alexander Creek is expected to occur within 3,000 m of the pond discharge area. Water quality projections indicate no substantial change to water quality in Grave Creek due to groundwater contributions. Seepage and impacts on groundwater quality are not expected to be substantive at any appreciable distance from the area of the North Pit.

Management of the Main Sediment Pond discharge, including associated sediment control structures, will remain in place during the Post-Closure phase until all water quality objectives have been met. The Main Sediment Pond will then be decommissioned to re-establish flows in West Alexander Creek. This will require removal of sediment from the dam structure, construction of additional spillways, and a breach of the main dam. Sediment removed from the pond will be placed in the MRSF for disposal. Under this scenario, groundwater flow quantity, which is a small percentage of total flow at the Project, is not estimated to have a substantial effect on total flow quantity. Surface flows are routed back to receiving streams, and groundwater will combine with this flow. A combination of mixing with other groundwater

inputs and natural attenuation should further reduce the effects of groundwater discharging back to surface water systems.

Potential effects from hydrocarbon release may occur during Construction and Pre-Production, Operations, and Reclamation and Closure, with the majority of fuel usage occurring during Operations. No effects are anticipated during Post-Closure as the fueling stations and all heavy equipment and vehicles will be removed from the site prior to final decommissioning.

The proposed monitoring program for groundwater at the site includes several components:

- Groundwater levels will be monitored, and samples taken for laboratory analysis on a seasonal basis (three times annually in summer, winter, and spring) through Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure;
- Monitoring wells in the monitoring program will include GW-9 and GW-7 (West Alexander Creek catchment), GW-4 (Upper Alexander Creek catchment), GW-3 and GW-1 (Lower Alexander Creek catchment), GW-14 (Grave Creek catchment), and GW-PP2 (background);
- Monitoring wells GW-9 and GW-7 will be used for early detection of elevated concentrations of COCs in groundwater within the Alexander Creek catchment as they are located immediately downstream of mine infrastructure and are upstream of peripheral monitoring wells;
- GW-14, located within the Grave Creek catchment, will act as a sentinel monitor of groundwater flowing to the north from the Project footprint, with groundwater monitoring data enabling verification of the accuracy of the predicted Project effects at each potentially affected catchment;
- A comparison to the existing model and periodic model updates (if necessary) will be conducted to improve the level of confidence in the predicted effects of the Project. Groundwater quality data will be used in conjunction with other water quality monitoring to confirm geochemical predictions. Groundwater monitoring would cease following Post-Closure (at Year 34);
- The data evaluation approach outlined in Section 8 will be used to identify trigger values for levels and COCs in groundwater monitoring results and response actions predicated on the phased approach outlined. Trigger values lower than applicable criteria or significance thresholds will be established and selected to ensure regulatory compliance for the duration of the Project;
- Detection of events that fall outside of normal variability will define response actions, such as the evaluation of existing mitigation measures and evaluation of potential additional measures, such as effluent treatment during Operations and prior to pond discharge; and
- The monitoring well network will be maintained and adjusted if wells are destroyed or added, or in the event that mine plans change.

Locations of proposed monitoring wells are provided in Figure 33.4-13. New wells will be installed in a manner similar to that used for prior well installation and in accordance with standard industry practices. This will include limiting the well screens to avoid connection of otherwise separate groundwater zones, and a hydraulic seal in the annular space between the well pipe and the rock/soil formations to negate movement of water from discrete groundwater zones and surface infiltration down into the completion interval.

The EVWQP is designed to manage the cumulative effects of coal mining on water quality within the Elk Valley (Teck, 2014). The plan was developed by Teck in response to a Ministerial Order issued in April 2013 under the *Environmental Management Act, 2003* (EMA). The Project will adhere to the Water Quality

Targets provided in the EVWQP to mitigate potential cumulative effects on groundwater caused by the Project at the boundary of the Groundwater LSA. Best Achievable Control Technology contingency measures and adaptive management strategies will be included in the monitoring program.

Prevention and Avoidance Measures

NWP will avoid affecting groundwater by using best management practices for mining, contact water management, mine rock storage, fuel handling, chemical storage, and explosive management. Many aspects are contained in the individual management plans described in this section. Measures that will be taken include:

- Mapping major subsurface pathways for groundwater movement (as best as possible);
- Understanding linkages of groundwater to surface water receptors, including exchange rates (physical and chemical);
- Managing mine rock with potential acid-generating properties to ensure that any leachate that might be generated does not adversely affect groundwater beyond the mine footprint;
- Establishing lined fueling areas with spill kits and providing proper training and incident tracking to address spills of fuels and/or leaks of lubricants and hydraulic fluids;
- Storing chemicals and explosives in dry, lined storage areas and not on bare ground;
- Establishing groundwater monitoring in key locations to ensure timely detection of quality changes that warrant investigation and/or mitigation;
- Keeping clean water out of the mine areas to avoid mixing with mine contact water and enhanced infiltration across the mine footprint; and
- Developing mine rock storage areas that remain unsaturated and/or diverting any basal waters through established drainage systems to avoid extended contact, leachate generation, and infiltration of leachate into the local groundwater.

Mitigation Measures

The mitigation measures proposed for groundwater quality and quantity are based on best available management practices, provincial and federal guidance documents, mitigation measures conducted and accepted for similar projects, and professional judgment. The identification and selection of technically and economically feasible mitigation measures follow the mitigation hierarchy approach outlined by the provincial Environmental Mitigation Policy and related Environmental Mitigation Procedures and Climate Change Strategy (https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/environmental-guidance-and-policy/environmental-mitigation-policy).

For the purposes of this assessment, mitigation measures include Project design features, procedures, or practices that will reduce or eliminate Project-related effects on groundwater. Where mitigation measures are considered highly effective, potential Project effects on groundwater quantity and quality are not identified as residual effects.

With respect to groundwater quantity, mitigation measures are not expected to be necessary during Operations as groundwater flows beyond the immediate vicinity of the Project footprint are not expected to be affected substantively. The use of liners in the Interim and Main Sediment Ponds and the Grave Creek Reservoir will dampen local interactions with groundwater, including changes to local groundwater levels and gradients.

During active mining of the pits during Operations, it will be necessary to dewater each pit through the use of drainage ditches, berms, sumps, and pumps. Water collected and pumped out of the North and East Pits will be routed through internal ditches and directed to the Interim Sediment Pond until Year 5. Following construction of the Main Sediment Pond, all water, including water originating from the South Pit, will be routed around the MRSF to this retention feature. Pit dewatering will be coordinated to meet overall water quality objectives, with groundwater monitoring continuing throughout the life of the Project into Post-Closure. After mining has ceased, each pit will be backfilled in accordance with mined rock. Pits will be allowed to fill to their spill-point levels and re-equilibrate with the surrounding local groundwater environment. Once the pits are full and equilibrium has been achieved, there should be no further interaction between the Project and groundwater quantity.

Handling, ROM sizing, and general processing of coal will be conducted within designated areas on controlled surfaces or indoors. Coal stockpiling and processing will be contained within a building with concrete floors and water collection systems, where process water enters via an interior sump and is recycled within the plant. Wash water will be recirculated and reused in a closed circuit, with the exception of dryer by-products, clean coal product, and plant rejects. No residual effects are expected due to processing and stockpiling of coal product with these mitigation measures in place.

The primary measure to mitigate effects on groundwater quality from non-contact water runoff is to reduce the potential for erosion and the transportation of material in surface runoff through implementation of the Erosion and Sediment Control Plan (Section 33.4.1.4).

The primary measure to mitigate potential effects on groundwater quality from other constituents contained in mine-site drainage will be to direct all contact water to the Interim and Main Sediment Ponds for settling and removal of suspended solids, followed by testing of water quality prior to discharge into West Alexander Creek. In addition, effects from mine site drainage will be reduced by limiting the mine disturbance footprint and avoiding affecting additional drainages beyond West Alexander Creek and Grave Creek.

Research shows that selenium and nitrate are effectively reduced in mildly suboxic saturated zones once open pits are backfilled and saturated with groundwater inflow (Kirk et al., 2017), limiting the potential for effects on surface water and groundwater quality. Residual effects from pit dewatering and infiltration of mine contact water to groundwater are anticipated to be low due to the concentrations of KPIs less than established triggers or guidelines. Any residual effects will be identified by site monitoring and addressed through adaptive management.

Groundwater seepage and effects on groundwater quality are also not expected to be significant at any appreciable distance from the area of the North Pit or East Pit. As any groundwater originating from these two pits will naturally flow through the South Pit area, monitoring of conditions south of the South Pit should identify any constituents of concern present in groundwater from those areas. If any are identified, and if mitigation is required, the water will be intercepted and routed to the Main Sediment Pond for containment and treatment if necessary.

Infiltration and seepage from ponds into the groundwater has the potential to adversely affect groundwater quality. However, NWP intends to use liners to prevent losses from those containment structures. Even if the groundwater quality is assumed to be the same as that in the sediment ponds, the

low flow rates through the underlying soil and rock materials will constitute a significantly low chemical load to the subsurface water systems compared with other challenges on site. Water treatment, if necessary, can be used to lower contaminants of potential concern in the pond water to either below the provincial and/or CCME water quality guidelines, or to within the range of natural variability of the baseline concentrations in the receiving environment. The Interim Sediment Pond will eventually be buried by the MRSF and integrated into the management system for that structure, with all water routed to the Main Sediment Pond. At the end of mining activities, and once effluent quality objectives have been met, the Main Sediment Pond will be decommissioned.

Table 33.4-30 summarizes the mitigation measures planned to address groundwater quantity and quality effects including the rationale, applicable project phases, and expected residual effects.

Contingency Plans

The detection of groundwater level or quality effects beyond established trigger levels requiring action will prompt the investigative process outlined in Section 33.4.1.8.8. If required, additional monitoring will be employed to better understand the situation. Installation of any wells will be consistent with previous approaches and standard industry practices. Groundwater conditions warranting mitigation will be addressed through the investigative process outlined in Section 33.4.1.8.8. Any active groundwater recovery will have the waters routed back into coal processing activities and any residual sent to the lined sediment ponds. Deployment passive engineered systems, both above ground (e.g., constructed wetlands) and below ground (e.g., permeable reactive barrier), will also be explored for viability and long-term efficacy.

Metal Leaching and Acid Rock Drainage Management

Background

NWP will be blasting substantial amounts of rock in the project area to access the coal it desires to mine. This will create fragmented rock that, when exposed to oxygen and moisture, has the potential to leach certain metals and trace elements (ML), and possibly lead to acid rock drainage (ARD) if the appropriate conditions prevail.

Work completed by SRK in its 2021 report *Geochemical Baseline Crown Mountain Project* indicates that the risk of ML/ARD is low. However, the Morrissey Formation on the footwall of the mine has been shown to have the potential to produce acid-generating conditions due to the presence of sulphide minerals. The use of a layered MRSF is meant to address this concern by producing conditions in the structure that will mitigate this risk and the generation of any other metal leachate that may occur. By limiting oxygen ingress to the mine rock materials and managing any water that may enter the dump itself, ML/ARD will be effectively mitigated before it can become an issue. This approach is based on bench-scale column tests and water and load balance modelling that are subject to certain assumptions and may not fully address issues of scale. NWP acknowledges this challenge and will be putting into place robust monitoring and detection systems to ensure that MRSF operations remain true to the conclusions of the Application/EIS. Should the assumptions be shown to be incorrect, any issues that present themselves will be managed adaptively well before they exceed any acceptable level, criterion, or action trigger point.

Table 33.4-30: Summary of Effects and Mitigation for Groundwater

Potential Effect	Mitigation Measure	Rationale	Applicable Phase(s)	Residual Effect
Groundwater Quantity				
Changes in groundwater quantity from Construction and Operation of Interim Sediment Pond, Main Sediment Pond, and Grave Creek Reservoir.	Installation of impermeable liners in the Interim and Main Sediment Ponds.	Impermeable geomembrane liners are proven to be effective in preventing interaction with groundwater. However, the potential for seepage of contaminated groundwater to surface water downstream of the sediment ponds remains. Alteration to local groundwater conditions expected due to development of the Grave Creek Reservoir.	• Construction and Pre-Production • Operations	No
Changes in groundwater quantity from development of pits, blasting and dewatering.	• During active mining, dewatering will be carried out using drainage ditches, berms, sumps, and pumps to sedimentation ponds. Pit dewatering will be coordinated to meet overall water quality objectives. • Groundwater monitoring.	Standard industry practices for dewatering are proven to be effective at reducing impacts in the receiving environment.	Operations	Water table drawdown, alteration of groundwater flow pattern (flow direction, hydraulic gradient), reduced horizontal flux and baseflows to creeks at valley bottom.
Changes to groundwater quantity through altered drainage patterns and groundwater–surface water interaction associated with loading, hauling, and dumping of mine rock at the MRSF.	Engineered layering of coal rejects and mine rock at the MRSF, and progressive reclamation by revegetation and resloping. Establishment of groundwater monitoring in strategic locations.	• Increased infiltration. • Water recharging groundwater from infiltration through the dumps is assumed to be double natural recharge (from slow release of storage) and will be conveyed around the MRSF to sedimentation ponds. Reclamation activities limit exposure time of seepage water.	• Construction and Pre-Production • Operations • Reclamation and Closure	Locally increased infiltration and elevated water table; reduced horizontal flux and baseflows to creeks at valley bottom.

Potential Effect	Mitigation Measure	Rationale	Applicable Phase(s)	Residual Effect
Changes to groundwater quantity due to use of water as primary process make-up water from the Interim Sediment Pond (Year 1 to 5) and from the North Pit (Year 5 to 15. Grave Creek Reservoir may be used as a secondary source of process make-up water.	Establishment of groundwater and surface water monitoring.	Increased infiltration is expected to be offset by the use of water at the Site. Effects on groundwater quality are anticipated to be minimal. Increased water within North Pit from precipitation is expected to be offset by the use of water at the Site, effects on groundwater quality are anticipated to be minimal. Use of water from Grave Creek is a secondary source and expected to be minor.	Operations	None
Changes to groundwater quantity associated with surface water-groundwater interactions during discharge of effluent from the Interim Sediment Pond and Main Sediment Pond during operation and decommissioning.	Installation of impermeable liners in the Interim and Main Sediment Ponds.	Liners will minimize interaction of pond water with groundwater and minimize effect on local water levels. Pond water will be released to West Alexander Creek when of sufficient quality.	Operations	None
Changes to water table elevation in the local vicinity of the pits during reclamation and filling of pits to spill point levels.	Establishment of groundwater monitoring.	Collection and management of groundwater flow into the pits during Operations. Flooding of pits to spill point during Reclamation and Closure and revegetation of decommissioned areas.	• Reclamation and Closure • Post-Closure	Water table re-equilibrium, alteration of groundwater flow pattern (flow direction, hydraulic gradient).

Potential Effect	Mitigation Measure	Rationale	Applicable Phase(s)	Residual Effect
Groundwater Quality				
Changes in groundwater quality due to infiltration of non-contact surface water runoff to groundwater.	• Limit erosion and contain sediment through the application of standard industry practices. Conduct regular inspections to ensure control measures are effective and functioning properly. Divert clean runoff around mine disturbed areas, where possible. Capture clean surface water that cannot be diverted in sediment ponds prior to release. Limit the mine disturbance footprint through Project design and progressive reclamation. • Groundwater and surface water monitoring.	Erosion and sediment control measures (e.g., silt fencing) are standard industry practices and proven to be effective. Regular inspection of erosion and sediment control measures allows for timely repairs and adjustments as required. Minimizing the Project footprint minimizes potential erosion and sedimentation effects on surface water.	• Construction and Pre-Production • Operations • Reclamation and Closure	No
Changes in groundwater quality due to infiltration of mine contact water (i.e., surface water and mine site drainage) to groundwater.	• Limit the mine disturbance footprint through Project design and progressive reclamation. Control mine site drainage through the layered MRSF design and diversion ditches to sedimentation ponds. Ponds are equipped with impermeable liners. • Groundwater and surface water monitoring.	Minimizing the Project footprint, particularly area of exposed soils, minimizes potential wind erosion and dust generation. Liners will minimize interaction of pond water with groundwater and minimize effects of seepage/leakage of pond water to groundwater.	• Construction and Pre-Production • Operations • Reclamation and Closure	Seepage from the MRSF resulting in concentrations less than guidelines.

Potential Effect	Mitigation Measure	Rationale	Applicable Phase(s)	Residual Effect
Potential release of hydrocarbons to the environment.	Restricting the storage and transfer of fuel will be restricted to certain areas. Implementing procedures for handling and storing fueling and fuel transfer. Conducting regular site and vehicle inspections. Preventative maintenance for all vehicles and equipment on site.	Standard industry practices for handling, storing, and transferring fuel are proven to be effective at reducing the release of hydrocarbons to the receiving environment. Regular inspections of the site, vehicles, and equipment allows for timely repairs and adjustments as required.	• Construction and Pre-Production • Operations • Reclamation and Closure	No
Potential release of explosive residues (i.e., nitrogen forms) to the environment.	Following Provincial and Federal requirements for the storing and handling of explosives. Collection and disposal of decontamination water off site. Lining all blast holes to keep the ammonium nitrate fuel oil dry. Minimizing the use of emulsion bulk explosives. Optimizing the blast hole size and pattern design. Limiting the sleep time of a loaded pattern to one week. Training of employees to limit spillage of explosive agents on the blast pattern.	Standard industry practices are proven to be effective to reduce the potential for nitrogen loading from explosives use. However, some nitrogenous residues are likely to remain on mine rock after blasting that is placed in the mine rock storage facilities.	• Construction and Pre-Production • Operations	No

Potential Effect	Mitigation Measure	Rationale	Applicable Phase(s)	Residual Effect
Changes in groundwater quality from loading, hauling and disposal of mine rock and coal rejects.	• Divert clean runoff around mine disturbed areas, where possible. Capture clean surface water that cannot be diverted in sediment ponds prior to release. Conduct regular inspections to ensure control measures are effective and functioning properly. Engineered layering of the MRSF. • Saturated backfill of mine rock with high selenium levels in the East and North Pits. • Progressive reclamation of the mine rock storage facilities. Groundwater and surface water monitoring.	The mine rock placement outside of the pits will blend potentially acid generating (PAG) and non-PAG materials such that the resulting mixture performs as non-PAG. The reject layers will act as suboxic environments where oxygen, nitrate, and selenite will be reduced in a few years. The proposed design will be evaluated during the first few years of Operations to determine if successful by monitoring for evidence of decreasing oxygen levels and water chemistry indicators of nitrate and selenium removal such as stable isotopes. Selenium removal from contact waters has not been demonstrated directly, but selenium concentrations from saturated backfills are much lower than observed for conventional ex-pit mine rock at several operating mines. Progressive reclamation will limit exposure time of the mine rock storage facility.	• Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure	Seepage from MRSF resulting in concentrations less than guidelines.
Changes in groundwater quality from runoff of water during washing coal and stockpiling of coal.	Generally, handling of coal product is on controlled surfaces or indoors.	Coal processing, including hauling, run of mine sizing, stockpiling, and loading are conducted in designated areas on controlled surfaces or indoors to prevent infiltration of water to ground.	Operations	No

Potential Effect	Mitigation Measure	Rationale	Applicable Phase(s)	Residual Effect
Changes in groundwater quality due management and discharge of sediment pond water to West Alexander Creek via infiltration to groundwater.	• Diverting clean, non-contact water away from the sediment ponds, where possible. Appropriate sizing of sediment ponds and installation of impermeable liner to minimize seepage losses and convey runoff during storm events. • Treating water prior to discharge as required in order to meet effluent standards. Limit the mine disturbance footprint through Project design and progressive reclamation. • Groundwater and surface water monitoring and adaptive management.	Appropriately sized sediment ponds have proven to effectively settle particles. Minimizing the Project footprint reduces the amount of surface runoff from mine disturbed areas, reducing the burden on the sediment ponds. However, the potential for discharge of water containing elevated concentrations of TSS, selenium, nitrates, or other constituents exists should other upstream mitigation methods (e.g., mine rock management) not operate as intended. A liner can mitigate effects of leakage and seepage of pond water to groundwater. Pond water is expected to meet effluent standards and B.C. WQG Aquatic Life guidelines prior to discharge to West Alexander Creek.	• Operations • Reclamation and Closure • Post-Closure	Potentially elevated concentrations of various constituents in effluent released to West Alexander Creek with potential for interaction with groundwater. Concentrations in groundwater are not anticipated to be worse than those of surface water.

Environmental Protection Measures

NWP plans to use a different approach to ML/ARD management compared with what other coal mines in the area have used. Potential adverse effects on groundwater quality from metal leaching will be addressed through a layered mine rock design as a mitigation strategy for selenium leaching and nitrate contamination. Finer-grained reject layers that separate the approximately 40 m rock lifts will impede infiltration or ingress of water to the structure and promote the development of suboxic conditions. Oxygen, nitrate, and selenate will be reduced to water (H_2O), nitrogen gas (N_2), and selenite or elemental selenium, respectively. The impeding layers will also disrupt large-scale gas convection within the structure, restricting oxidation of mine rock. While oxidation will continue on the edges of the MRSF, modelling indicates it will be restricted internally. The aim of the layers is to mitigate any oxidation of pyrite, prevent the release of selenium, and reduce nitrate levels. Excess neutralizing potential will also lead to attenuation of elements such as cadmium, zinc, and copper through reactions with iron oxides in the rock.

Figure 33.4-19 provides a conceptual layout and configuration of monitoring that would be deployed around the pilot test dump and eventually the main MRSF. Multi-level monitoring wells will be designed with the ability to sample in situ gases (e.g., O_2, CO_2, and N_2), moisture conditions in the separating reject layers and the top cover, and water accumulation at the base of mine rock lifts. This will allow performance of the waste storage method to be assessed for:

- Degree and magnitude of O_2 ingress;
- Reject layer performance regarding O_2 and water exclusion;
- Suitability of proposed rock lift size (i.e., 40 m) to accomplish creation of suboxic zones;
- Time to create suboxic zone including lateral and vertical extent, as well as stability and sustainability; and
- Internal leachate generation (at downgradient exit points), amount, types of constituents, etc.

Prevention and Avoidance Measures

NWP will employ prevention and avoidance measures to deal with the risk of ML/ARD. These measures will include:

- Identification of rock with potentially acid generating (PAG) properties from rock with non-PAG properties;
- Monitoring of site water conditions for pH, metals concentrations, and O2 levels that may signal the development of, or potential for, ML/ARD;
- Use of non-PAG rock with sufficient neutralizing capacity to proactively address possible future effects from PAG rock stored in mine rock dumps;
- Limiting O2 and water ingress into mine rock dumps through the use of impeding covers; and
- Identification of major fault and fracture systems beneath PAG-containing mine rock areas that could facilitate movement of ML/ARD-affected water in the subsurface.

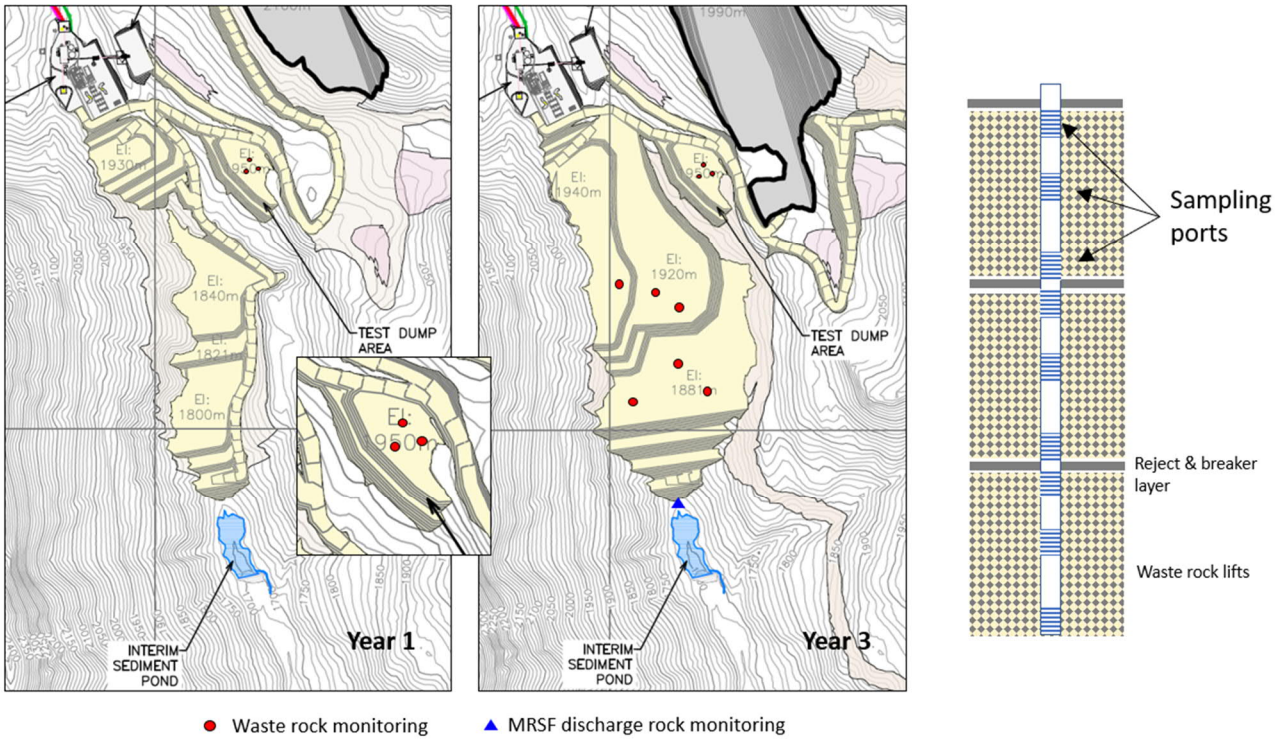


Figure 33.4-19: Conceptual Layout of Pilot-Scale Mine Rock Dump Monitoring (Year 1) and Full-Scale Monitoring of Initial Stages of MRSF (Year 3)

Mitigation Measures

Mitigation of seepage generated by the MRSF is not anticipated to be necessary based on initial calculations and laboratory work. However, if the structure does not perform as expected and groundwater mitigation is deemed appropriate, the West Alexander Creek valley represents an ideal location to effectively manage this. The valley is relatively narrow, and overburden is shallow and groundwater flows are low, on the order of 2 to 3 litres per second (L/s). Deeper flow in the bedrock is estimated to be a minor component of the overall groundwater flow. However, the presence of faults and fractures may create conditions suitable for more rapid movement, creating the need to identify these features in advance and monitor groundwater quality conditions accordingly.

Contingency Plans

Contingency plans for ML/ARD will be developed if or when the situation requires them. The current monitoring and mitigation systems in place should be sufficient to address this risk. If active groundwater recovery is required, it will be accomplished through purpose-built recovery systems, with the water reused in coal processing. Any excess water will be routed to lined sediment ponds and neutralized if necessary. However, based on initial static and kinetic testing of the rock formations, the production of ARD is not anticipated.

Selenium Management

Background

Selenium is a significant chemical of concern in surface waters associated with coal mines in southeastern British Columbia. Water quality guidelines have been developed and significant efforts have been devoted to understanding the impacts of this trace element and limit its release into sensitive aquatic ecosystems. Background concentrations of 1 or 2 µg/L are common in the region. However, depending on the situation, concentrations of this harmful element can be one to two orders of magnitude higher in discharges from large mine rock piles, with flux rates proportional to the size and design of these structures.

Elk Valley bedrock formations, when disturbed and exposed to oxygen and moisture, have the ability to release selenium and other trace elements at significant concentrations. Selenium values in some areas of the valley exceed both current guidelines for the protection of aquatic health and those currently proposed in the draft *Coal Mining Effluent Regulations* (ECCC, 2022). This has resulted in the need to develop site-specific guidelines and to consider mine designs that mitigate selenium release through either passive or active treatment.

Assessment work conducted by SRK (2021) found that selenium (as well as SO_4) loading from mine rock dumps spans a relatively narrow range throughout the Elk Valley despite differences in mine rock volumes. Sulphide oxidation rates are therefore considered similar throughout the region, with selenium release occurring regardless of the scale of the mine rock dumps constructed. Seasonal patterns of selenium concentrations show no detectable lag time between high flow events and high loading release, implying that the element is leaching from components of the mine rock dumps via a piston flow mechanism. Further study into the effects of scale on selenium mobilization (Kennedy et al., 2012) found that SO_4 and selenium release under field conditions is at least an order of magnitude lower than that detected in controlled laboratory studies.

The rock formations at NWP's development are the same as those shown to promote selenium mobilization in Teck's Elk Valley operations, prompting the need to proactively manage selenium mobilization risks. The source of this trace element has been linked to oxidation of iron sulphide in the Mist Mountain Formation (the coal-bearing interval). Subsequent release into infiltrating waters and/or runoff waters from waste management areas and discharge into local streams, creeks, and wetlands has been identified as an issue for other coal mines in the region. Seepage into local groundwater systems is another risk that warrants increased attention due to the presence of elusive fracture-and-fault pathways that can facilitate groundwater movements that may contradict conventional thinking. These subsurface pathway features can sometimes be difficulty to fully identify and map and therefore merit special attention.

Given this prior knowledge, NWP recognizes the risk of selenium mobilization and its effects on local water resources and is designing a mine plan that facilitates the detection, detention, and management of any selenium released from active and reclaimed mining and waste management areas.

Environmental Protection Measures

NWP is fortunate to have geologic conditions that will help address selenium movement into surface water and groundwater environments. The use of liners for sediments ponds will capture and contain

mine contact waters and help isolate this harmful trace element from underlying groundwater systems and local drainage features. The presence of low-permeability glaciolacustrine deposits on the base of the West Alexander Creek valley, where all of the water retention and waste management areas are to be established, provides an additional level of protection to the groundwater from selenium mobilization.

The design of the MRSF has considered this risk and will follow a bottom-up strategy of mine rock lifts, on the order of 40 m, separated by layers of finer-grained reject material and a breaker layer to limit infiltration of oxygen and moisture and reduce the risk of sulphide mineral weathering. The residual organics in this reject layer, in the form of coal fines, will capture downward migrating infiltration and create a barrier for oxygen ingress. This layer will also provide a substrate for microbes to further deplete any oxygen through biological reactions and create suboxic conditions conducive to the reduction of selenate to elemental selenium and the sequestering of this element in the MRSF.

NWP intends to monitor the initial pilot-scale rock dump beginning in Year 1 and continue until it is integrated into the main MRSF around Year 3. Monitoring wells will be placed to test the degree of oxygen and moisture ingress, efficacy of the impeding reject layers, changes in oxidation conditions, production of characteristic gases consistent with biological reactions (CO_2 and N_2), and any resulting implications for sulphide mineral weathering and selenium production. Monitoring will then commence at the larger MRSF once sufficient lifts are in place to again test the degree of oxygen and moisture (as well as groundwater) ingress and the resulting changes. All information generated by the monitoring program will be compared against modelled projections to assess the degree of alignment and/or determine if additional simulations and contingency design considerations are necessary.

Prevention and Avoidance Measures

To prevent and avoid the issues associated with selenium mobilization, it is important to understand the source and cause of the issue. NWP has completed an extensive geochemical assessment of the bedrock formations on-site and their potential to leach trace elements. Results from static and kinetic laboratory tests indicate the highest potential for selenium mobilization involves finer-grained rock layers, particularly those associated with the Mist Mountain Formation.

Teck's EVWQP, which was developed in cooperation with the Provincial and Federal governments, local Indigenous Communities, and public stakeholders, identifies solutions to stabilize and reverse increasing trends of selenium concentrations associated with their operations. Clean water diversions and covers on mine rock dumps that limit water infiltration are preferred management options in the EVWQP. Clean water diversions are considered "proven effective and available for use." Covers are a preferred water infiltration management option but waiting periods before mine rock piles are available can be problematic.

To reduce the potential release of selenium from coal mining operations in southeastern B.C., the Strategic Advisory Panel on Selenium Management identified several waste management approaches, including:

- Avoiding placement of waste in cross-valley fills;
- Using low-selenium rock in rock drains;
- Designing new dumps to limit oxygen and water infiltration (e.g., construction of clean water diversions and/or capping mine rock dumps);

- Reclaiming dumps earlier rather than later; and
- Placing mine rock dumps underwater in constructed impoundments.

Mine rock at the Project will be placed across the West Alexander Creek basin beginning at the head of the West Alexander Creek and progressing southward. This approach addresses concerns related to typical cross-valley fill placement by minimizing runoff and seepage flowing into the mine rock dump. Covering mine rock as soon as possible is also planned for the MRSF. This will take the form of finer-grained reject materials that are meant to impede infiltration of oxygen and water and the continued downward movement of water through the various mine rock lifts while promoting suboxic conditions to sequester any selenium that may be mobilized.

Another useful prevention-and-avoidance technique is mine rock segregation. That is, mine rock with low levels of selenium are separated from the rock mass to be used for rock drains, while mine rock with high levels of selenium is placed within controlled areas, such as in-pit dumps. The North Pit and East Pit will be suitable for placement of mine rock with high levels of selenium because the mine rock will be contained within excavated pits, and runoff and/or seepage will be monitored and controlled by the onsite water monitoring and management systems. Water accumulating at the base of the pits will saturate the lower portions of rock fill, effectively limiting sulphide mineral oxidation and release of this trace element. Mine rock dumps will be reclaimed progressively to limit exposure time after the rock has been placed to final grade and re-sloped.

Mitigation Measures

Selenium management at the Project incorporates mitigation practices that have been identified in the industry in response to the concerns in the Elk Valley and other coal mining regions. These mitigation practices include:

- Designing layered mine rock dumps that limit oxygen and water infiltration by establishing suboxic layers and limiting water infiltration through capping;
- Use of clean water diversions; and
- Rapid reclamation of MRSFs.

NWP plans to use available rock reject material for constructing of infiltration barriers. Additional practices might be implemented when the mine rock is more fully characterized. These measures may include the construction of rock drains using clean (non-ML/ARD) mine rock, and the targeted placement of mine rock that has a high potential for selenium leaching in sub-aqueous in-pit backfill dumps.

Gilron and McKenna (2021) explored the various types of mitigation and their technical readiness to assist the metallurgical coal industry in dealing with Se management. Figure 33.4-7 outlines the various prevention, avoidance, and mitigation measures including mining methods, source control, and site water management. It is clear that some approaches or technologies are more advanced and have more certainty compared to others.

Other parties are conducting research and pilot tests for some of these selenium management technologies, including in situ microbial reduction and passive biochemical reactors. In situ microbial reduction involves the placement of specific bacteria, fungi, and algae into mine rock environments to reduce selenium into immobile and non-toxic forms. Passive biochemical reactors involve passing

selenium-bearing water through large, excavated reactors filled with natural organic media. They include constructed wetlands for flow equalization and removal of organic by-products. Biochemical reactor pilot testing performed in Alberta has achieved selenium removal rates of greater than 90%.

NWP intends to deal with selenium management first through the segregation of site waters to ensure that non-contact waters are kept clean and diverted from areas where they could become affected by mine discharge. In turn, site waters that contact mine rock in open pits, stockpiles, or dedicated rock dumps will be collected and diverted to lined sediment ponds. The intent is to recycle the water collected in the Interim Sediment Pond for coal processing as the MRSF is being constructed. Eventually the Interim Sediment Pond will become covered by the MRSF and all waters from the structure will then be routed to the Main Sediment Pond.

The MRSF itself is being designed to address the risk of sulphide mineral oxidation and the release of selenium (as well as other harmful trace elements). Unlike traditional rock dumps created by end-dumping techniques, the MRSF will be a bottom-up construction consisting of lifts of mine rock (approximately 40 m thick) covered by a layer of finer-grained reject material (minimum 1 m lift) to impede the entry of oxygen and moisture and facilitate the creation of suboxic conditions for selenium species transformation and sequestration.

Contingency Plans

The MRSF is meant to operate as a dry structure. However, the accumulation of some water within the structure is possible over the course of time, particularly in the basal layers due to groundwater entry. The greatest risk of this occurring is along the west side, where the MRSF abuts the valley wall. The presence of permeable colluvium and scree deposits (associated with avalanche chutes) is a concern, as these represent pathways for easy movement of infiltrating snowmelt and precipitation. The degree to which this may occur, if at all, is currently unknown but is definitely a risk that needs attention. This may require the placement of permeability barriers along the side of the west valley wall, as well as the sides of the MRSF lifts (at least in the first few basal layers) to impede the entry of groundwater. Construction of a rock drain system along the west side and underneath the MRSF would also channel any drainage and associated leachate water to the lined Interim and Main Sediment Ponds.

In addition to the planned mine rock and water management designs, NWP is actively investigating other selenium management options as a contingency to the current management strategy. Increased investigation and adaptive design efforts will improve the reliability of the management systems being considered or that are in place to address selenium mobilization. Still, a risk is likely to remain for several years into the Operations phase and possibly into Reclamation and Closure.

The current mine plan incorporates a pilot rock dump with similar layered construction in the first few years of the mine life. This will allow important monitoring and evaluation of a similar, but smaller-scale, structure that will help identify challenges with the approach and any necessary design changes for the larger MRSF in advance of it being built.

Other alternative mitigation methods are being considered, depending on the outcome of the pilot rock dump test and initial years of monitoring at the larger MRSF and surrounding area. Placing mine rock in a different location onsite or progressively backfilling this rock into mined-out areas could reduce the risks

associated with selenium management. Another possibility involves strategically placed gravel bed reactors. All of these approaches have been shown to successfully abate selenium and nitrate levels in mine rock waste.

The mitigation and contingency methods described here have not been fully developed or assessed by NWP, and their effects on Project success cannot be quantified at this time. NWP will continue to address uncertainties through modelling, monitoring, and management efforts and apply adaptive management to respond rapidly to situations that deviate from current understanding and pose an unacceptable risk to the local environment. Further mitigation may be required as per adaptive management strategies outlined in Section 33.4.1.8. According to B.C.'s Technology Readiness Level (TRL) Assessment (TRA) Guidance issued in August 2022 (B.C. Ministry of Energy, Mines and Low Carbon Innovation and B.C. Ministry of Environment and Climate Change Strategy, 2022) and the Best Achievable Technology Assessment to Inform Waste Discharge Standards Handout (and B.C. Ministry of Environment and Climate Change Strategy, 2021), the TRA is part of Step 3 of the Best Achievable Technology (BAT) process. The BAT process (along with the now embedded TRA) is a requirement of Chapter 5 of the *Mines Act/Environmental Management Act* Joint Application Information Requirements (JAIR). Further details regarding the TRL assessment are provided in Chapter 11 (Appendix 11-E).

Cumulative Selenium Management

The EVWQP is designed to manage the cumulative effects of coal mining on water quality within the Elk Valley (Teck, 2014). The Project will adhere to the Water Quality Targets provided in the EVWQP to mitigate potential cumulative effects on water quality caused by the Project in the Elk River watershed. Best Achievable Control Technology contingency measures and adaptive management strategies will be included in the monitoring program, as described within this management plan. As described in Chapter 11, predicted changes in median monthly concentrations of selenium due to the Project are negligible during all Project phases at nodes in the Elk River and Lake Koocanusa.

NWP is committed to working with other proponents to establish a regional selenium monitoring program in Michel Creek, as water quality in this creek has been degraded by past and present mining operations and faces additional cumulative effects from two additional proposed developments, the Crown Mountain Coking Coal Project and the Michel Coal Project. This regional approach would include working with the provincial government and local Indigenous Communities to establish long-term water quality targets for Michel Creek, and collaborating with other proponents to ensure these targets are met through a combination of Project-specific (described above) and regional mitigation measures.

The results of the monitoring program will be used to evaluate the effectiveness of the proposed selenium mitigation measures and determine whether additional mitigation measures or adaptive management strategies are needed. A description of the steps to be taken in response to potential exceedances of selenium is provided in the Trigger Action and Response Plan in Section 33.4.1.8.8. Regional management practices as they relate to selenium releases and cumulative selenium loading may be integrated into and/or influence future iterations of the EVWQP.

Nitrate Management

Background

NWP intends to use ammonium nitrate fuel oil (ANFO) explosives to remove overburden rock layers and access the coal seams for extraction and processing. By their very nature, ANFO explosives are composed of nitrogen compounds that, when detonated, can generate nitrate in groundwater and surface waters. Among the factors that control the generation of nitrate prior to and after blasting are:

- Types of explosives used and water resistance levels, sleep times prior to detonation, quality of the explosives, and the quantities used;
- Conditions in the blast area, and the amount of water contacting explosives (including length of time);
- Hydrogeological conditions in the area affecting pathways for movement in the subsurface as well as the transport and fate of nitrate (i.e., pre-existing fault and fracture systems);
- Explosives management, including losses and spillage that may take place during handling and storage, filling of explosives loading equipment, loading of blast holes, and disposal of excess explosives; and
- Efficiency of the blasting operations and the amount of undetonated explosives left in the ground to leach into the groundwater.

Environmental Protection Measures

To address the risk of nitrate loading to the local surface water and groundwater, NWP will use a number of monitoring and management activities at the site. The current surface water and groundwater monitoring has identified the baseline for nitrate in the local area, and this information will be used to detect any deviations outside of the normal range documented. If, or when, anomalous detections of nitrate are made, the follow-up investigation process outlined in Section 33.4.1.8.8 will be used to determine the source and cause of the deviation and the most appropriate steps to mitigate the situation.

NWP will use leading KPIs to assess the effectiveness of management strategies. Lagging KPIs, such as nitrate concentrations in the local surface water and/or groundwater, measure impacts after they have already occurred. Leading KPIs serve as early warning indicators that risk to the receiving environment may be escalating. Examples of leading KPIs include:

- Powder factor (i.e., how much rock is broken and how much explosive is used to break it);
- Velocity of detonation (i.e., faster on competent unfractured rock);
- Number of dry and wet holes at time of blasting;
- Duration of sleep time;
- Spill reporting frequency; and
- Nitrogen concentrations in contact waters.

NWP will generate an annual report evaluating the results of the nitrate monitoring and management program and compare them against previous reports. This will include comparisons of leading and lagging KPIs with management performance metrics. Trends in water monitoring and discussion of nitrogen management successes, failures, and lessons learned will also be included. NWP will also ensure that an adequate feedback process will be in place to drive continuous improvement. Opportunities for research

and development initiatives will be assessed on an ongoing, or as-needed, basis to ensure that the best available practices and technologies are being employed at the site.

Prevention and Avoidance Measures

NWP will manage nitrate occurrences in the surface waters and groundwater of the site by deploying a number of measures to prevent and avoid releases where possible. This will include a thorough review of the following aspects:

- The type and quality of explosives being used;
- Existing protocols/procedures for handling, storage, and isolation from the environment;
- Blast simulations to assist with pattern design optimization;
- Blast-hole drilling and loading methods;
- The type of rock material being blasted (i.e., hard, soft, and pre-existing fractures);
- Overall goals and objectives for the blasting program; and
- Frequency of blasting and typical sleep time.

A conceptual site model will be used to support nitrate management activities such that sources, release rates and mechanisms, and effects pathways and receptors are fully understood and consistent with site knowledge. Where available, quantifiable data will be used to define the potential risk (i.e., extent, duration, magnitude, and direction of impacts). All surface-receiving aquatic environments, groundwater, aquifers, and drinking water sources will be identified, described, and monitored to ensure that nitrate loading is detected in a timely manner and mitigated as required. Special attention will be paid to pre-existing fault-and-fracture pathways that can act as conduits for nitrate movement.

Nitrate loading of surface waters and groundwater at the Project from blasting activities will be handled proactively by NWP. All efforts will be taken to:

- Avoid over-use of explosives, or over-loading of blast holes, by using only the amount of explosive needed for the particular type, and strength, of the rock being blasted (this will vary by rock type but is consistent with knowledge that NWP has regarding the site geology);
- Avoid unnecessary blast-hole drilling to ensure optimum spacing and minimal explosives use;
- Limit blasting to the North, East, and South Pits to eliminate nitrogen loading to other areas of the mine site; and
- Consider the use of non-nitrogen explosives as they become commercially available, if they do not create another issue for groundwater and surface water in the area.

NWP will also reduce nitrate impacts by:

- Loading blast-holes in a manner that keeps the explosives dry, if possible;
- Limiting the use of emulsion bulk explosives to avoid leakage into pre-existing fractures;
- Optimizing blast-hole size, pattern, and number for the rock type including consideration for pre-existing fractures;
- Limiting the sleep time of a loaded pattern to one week or less;
- Employing overburden ripping versus blasting where possible; and
- Ensuring employees are sufficiently trained to limit spillage of explosive agents on the blast pattern or any other parts of the site.

Additional aspects that NWP will investigate and/or employ during the blasting and mining process include:

- Explosive product selection (i.e., type of ANFO);
- Powder factor optimization;
- Proper explosive security and storage (preventing contact with water/moisture);
- Practices to prevent water contacting explosive in blast holes (i.e., blast hole liners, bench dewatering);
- Drill pattern and blast optimization (including minimal sleep time);
- Electronic systems testability to ensure firing control connectivity;
- Timely spill response and documentation;
- Incident identification, investigation, and management;
- Blast monitoring and dealing with misfires;
- Proper handling and disposal of waste explosives;
- Monitoring groundwater at sentinel locations where surface waters could be at risk; and
- Conduct periodic audits and inspections to ensure compliance with monitoring and management practices, and timely rectification of any non-conformances identified.

All the above will play important roles in managing and optimizing blasting operations and reducing the risk of nitrate loading to the local environment. However, surface water runoff control will be a critical aspect of the management process. The geography of the Project means waters affected by blasting and mining operation can be directed to lined sediment ponds for retention and treatment, if needed. NWP also has a good understanding of the local precipitation patterns, frequency of storm events, and the annual volume of water captured, stored, and released, and it expects that containment of these waters during extreme events can be maintained.

Mitigation Measures

In addition to the above prevention-and-avoidance measures, NWP will have in place surface water and groundwater monitoring to detect any departures from baseline nitrate concentrations. NWP will also build a layered MRSF to reduce nitrate loading to the local surface water and groundwater by creating conditions within that structure that facilitate its conversion to innocuous by-products.

Infiltration of water into the MRSF will be minimized where possible to reduce the risk of leachate formation. Additionally, the downward movement of any infiltrating water through the structure will be controlled by placing lower-permeability layers of reject material between the various mine rock lifts. Oxygen ingress into the MRSF will be minimized to facilitate the development of suboxic conditions conducive to the conversion of nitrogen to dinitrogen (N_2). Monitoring within the MRSF will be conducted to ensure that the appropriate conditions are being achieved. This will also allow for the measurement of any leachate generated and the creation of gases consistent with nitrate-conversion processes.

Despite the treatment that is anticipated to occur in the MRSF, any drainage from that structure will be directed to the Interim Sediment Pond during the early stages of development, and/or the Main Sediment Pond during later stages of development. This is one of the benefits of the geographical location in the West Alexander Creek valley and the constraining character of the west and east slopes. The sediment ponds are to be lined to avoid leakage of the stored water out of their bases and into the local groundwater environment. Routine monitoring of the groundwater near these ponds and evaluation of

the data will be used to ensure that containment is being maintained. Once in place, these mitigation measures will reduce any direct residual effect on groundwater quality from nitrate, and in turn protect surface water quality downstream of the mining development.

Contingency Plans

In the event a breach of containment occurs from either of the sediment ponds, nitrate-affected water may be released into the local groundwater. However, this will be detected by groundwater monitoring, giving NWP teams time to deploy sufficient contingency measures. Depending on the situation, this may include active groundwater recovery and return of that water to the sediment ponds. If warranted, passive or active treatment to reduce nitrate levels to acceptable concentrations will be considered.

The fact that the site is blanketed by a layer of low-permeability glaciolacustrine deposits reduces the risk to groundwater from nitrate impacts. If released, some of this nitrate-laden water may be treated naturally before it affects the underlying groundwater. But in the event that elevated nitrate concentrations are detected in the groundwater downstream of the Main Sediment Pond, NWP will have ample time to respond, given the relatively slow groundwater flow rates through low-permeability valley fill and underlying bedrock formations. A number of contingency measures are available to deal with nitrate-affected waters, and some are more conducive and/or acceptable than others. If needed, NWP will deploy one or more of the following contingency measures:

- Monitored natural attenuation if geochemical conditions are suitable to achieve in situ treatment;
- Active groundwater pumping to intercept nitrate-affected groundwater and return it to a lined pond for natural treatment;
- Installation of a permeable reactive barrier to intercept impacted groundwater and reduce nitrate to N_2 before it can interact any further with the local environment;
- Creation of a downgradient engineered above- and/or below-ground bioreactor treatment system to similarly convert nitrate to N_2 before it can migrate and discharge to downstream locations;
- Use of gravel bed reactors; and
- Collection of the nitrate-affected water via pumping and treatment at a dedicated facility prior to release back to the environment.

Calcite Management

Background

Calcification of streambeds due to the precipitation of carbonate minerals has posed a problem at Teck Coal's Elk Valley operations. The result of this calcification process is the cementation of the streambed materials to the point where aquatic habitat is adversely affected. This not only relates to spawning beds but also habitat for benthic invertebrates that serve as food for resident fish populations.

Carbonate deposits form as the result of contact between waters emerging from mine rock piles that are over-pressurized with carbon dioxide (CO_2). These waters also often contain elevated levels of dissolved calcium and bicarbonate ions that promote formation of the minerals when present in sufficient concentrations (MacGregor et al., 2012). This process results from the neutralization of acid produced from the oxidation of sulphide minerals by carbonate minerals like dolomite, $CaMg(CO_3)_2$. Calcite is precipitated when the dissolved CO_2 (present as carbonic acid, H_2CO_3) off-gases, which causes the pH of

the water to rise. This in turn promotes the precipitated of minerals such as calcite, through the following reaction:

$$\begin{array}{c} CO_2 \\ \uparrow \\ Ca^{2+} + HCO_3^- \rightarrow CaCO_3\,(solid) + H^+ \end{array}$$

SRK completed an assessment of calcification risks in a May 19, 2021, memorandum (SRK, 2021). Although the MRSF has been designed to mitigate selenium and nitrate leaching by incorporating layers of compacted plant reject between mine rock layers, this configuration will lead to reduced O_2 levels and facilitate the increase in CO_2. This, in turn, will increase the risk of dolomite weathering and eventually lead to the formation of calcite once the waters discharge from the structure.

Modelling results show that mineral saturation indices for calcite ($SI_{CALCITE}$) are normally above 0, indicating theoretical over-saturation with calcite. Peak $SI_{CALCITE}$ values were only slightly above 0.5, typically later in the year. Values were also found to fall below 0 during the spring freshet as a result of enhanced dilution by fresh runoff. Model analysis concluded that calcite deposits are not likely to be present under natural conditions in the West Alexander Creek and associated tributaries.

The proportion of the West Alexander Creek catchment covered by mine rock will be less than 10% in the first four years of mining. Localized calcite precipitation may be expected near the initial portions of the MRSF. As the mine rock dump grows, it will eventually occupy around 30% of the catchment. The SRK modelling projected that calcite deposits might progress downstream and eventually reach monitoring stations WA-1.

The main conclusions of the assessment were:

- If the layering system is not successful in reducing O2 entry, calcite deposits can be expected to form in West Alexander Creek down to its confluence with Alexander Creek. The deposits might extend into Alexander Creek but are not expected to extend far downstream to its confluence with Michel Creek.
- Calcite deposits are expected to increase in extent in West Alexander Creek as the mine footprint increases.
- Mine rock layering to be deployed at the MRSF is expected to reduce, but not eliminate, the potential for calcite precipitation.

Environmental Protection Measures

NWP will manage the risk posed by calcite formation to the downstream portions of West Alexander Creek and Alexander Creek by implementing an effective monitoring program that establishes baseline conditions for the streambed materials and monitors any changes that may occur as the MRSF is being constructed and operated. A number of reconnaissance, surveillance, and evaluation activities will be employed, such as:

- In-field assessment of the streambed materials in West Alexander Creek for the presence of carbonate mineral precipitated on rock surfaces;

- A calcite reporting structure that identifies locations where streambed calcification is occurring for follow-up assessment and identifies the number of cobbles or pebbles with calcite present, compared to the total number cobbles and pebbles assessed;
- Monitoring of water quality changes in surface water flowing within West Alexander Creek to determine any changes in pH conditions, concentrations of major ions (i.e., Ca, Mg), and hardness conditions;
- Monitoring of shallow groundwater for similar chemistry, including dissolved gases such as CO_2;
- Monitoring of conditions within the various locations and depths within the MRSF to gauge the presence and quality (physical, chemical, and biological) of any leachate waters that may form;
- Monitoring for the presence and composition of gases including O_2, CO_2, and N_2; and
- Continued calculation of $SI_{CALCITE}$ values and comparison SRK projections to assess alignment with anticipated trajectory for mineral formation.

Prevention and Avoidance

NWP will put in place measures to prevent and avoid issues related to streambed calcification through the operation of planned onsite water management systems. Ensuring that non-contact waters are segregated from contact water will help address the risk by diverting contact waters to lined sediment ponds in upstream portions of West Alexander Creek.

The highest risk of streambed calcification at the Crown Mountain development is related to the operation of the MRSF. A pilot-scale assessment of functionality is planned as part of the MRSF assessment process, to see what types of conditions could arise. This assessment will take place before construction of the larger MRSF, giving NWP the ability to see how such a structure will operate. The challenges with comparing smaller-scale pilots with larger-scale development-level structures, particularly over the short term (i.e., one to two years) are understood and appreciated, but the information provided will assess the efficacy of the water rock management approach so that comparisons can be made to modelled projections. The information provided will also identify any adaptive adjustments needed for monitoring and management.

Implementation of the baseline assessment program, ongoing monitoring of the natural water systems across the site (both surface water and groundwater), in combination with assessment of conditions around the pilot-scale test dump and subsequent MRSF will provide the necessary early warning to allow changes to be made to the calcite management program to mitigate downstream effects before they become a problem beyond the footprint of the MRSF and the Main Sediment Pond.

Mitigation Measures

The current understanding from all the modelling that has been conducted to date is that streambed calcification is a distinct possibility that may need to be mitigated in advance. Early results from baseline assessments and monitoring and evaluation of the pilot-scale MRSF will provide the information necessary to fully understand the risk posed by the Project on the West Alexander Creek Valley and other receiving water bodies downstream of that confined valley. One of the greatest mitigating factors for this risk is the geographical layout of the valley itself and the confining of drainage waters by the flanking ridges. This provides conditions that facilitate easier management and control of waters that interact with the mine site by directing these waters to lined sediment ponds.

Contingency Plans

In the event that the risk of streambed calcification becomes unacceptable or unmanageable through the existing water management systems deployed, NWP will consider the use of other mitigating options to lower the risk profile during and after mine development. These may include:

- Development of natural cascading water features to promote the degassing of CO_2 and precipitation of calcite in sacrificial portions of the West Alexander Creek upstream of the Main Sediment Pond;
- Use of environmentally appropriate chelating agents in lined sediment ponds to sequester the hard cations that would otherwise participate in carbonate minerals precipitation reactions; and
- Deployment of active water treatment to remove hard cations and release treated water back into the watershed.

33.4.1.8.10 Program Optimization

The goal of any water monitoring program is to identify changes in conditions or VCs influenced by development activities in a timely manner and identify the necessary response. It is equally important to periodically evaluate the suitability of the monitoring and detection system, including individual stations where data is collected, to eliminate redundancy and unnecessary monitoring. The refinement process should evaluate the program and its related infrastructure based on purpose (including the intended potential contaminant sources and pathways being monitored) and risk—what is the expected timeline of a potential incident, and would the monitoring location indicate the presence of contamination before or after another monitoring location?

Conditions at an active mine will change with time as pits are created, materials are moved, and waste is managed. Periodic review is therefore necessary to ensure that the proper infrastructure is in place to identify changes to site water conditions as site conditions evolve. This process of program optimization is also amenable to vulnerability and risk-mapping, which can be used to identify areas with redundant monitoring, as well as those requiring additional monitoring.

Program audits are a necessary step to ensure that the activities are being performed in a proper manner. Periodic audits should also be carried out on data collection, QA/QC, database assimilation and analysis, and reporting aspects of the monitoring programs. Program audits should not be completed by the party executing the work, and require documentation of general observations, indication of tasks not being executed as required, areas for improvement, and corrective-action follow-up.

NWP will periodically review the monitoring programs to ensure that its goal and objectives are being met. Any changes will be documented and communicated to key regulatory agencies and stakeholders to ensure they align with the agreed-upon approach and comply with provincial and federal legislation.

This management plan and the practices described herein may be integrated into and/or influence future iterations of the EVWQP, in addition to industry BMPs for coal mine rock management.

33.4.1.8.11 Reporting Process

Reporting for NWP's monitoring programs will be done on an annual basis, or on a timeframe agreed to by regulators, the Ktunaxa Nation, and any other key stakeholders. Report sections for the various water

management aspects will outline the monitoring activities that occurred within the reporting cycle, the results obtained from field measurements and laboratory analyses, an evaluation and interpretation of those results, and any recommendations for changes to the program. This may include the need to enhance monitoring or analytical programs to understand changes that are detected, or adaptively manage a situation to ensure NWC, regulator, and stakeholder goals and objectives are being met.

The results of the monitoring programs are typically communicated through a hard-copy or digital report. NWP will continue the practice, but consideration will be given to the development of a fully digital, interactive platform that would provide timely communication of results to key stakeholders (spatial and temporal), automated data and information, and QA/QC updates and analysis, and trigger exceedance notifications, among other things.

33.4.1.8.12 Plan Revisions

This document has been compiled to provide a consistent approach to monitoring, data evaluation, and reporting. Program needs may change with time and more appropriate methods or approaches may be required. To ensure that the most up-to-date protocols are being employed, and that the process outlined is applicable to the intent of the monitoring programs and related approval conditions, this document will be reviewed from time to time to ensure alignment. This will occur on a least a 5-year cycle but may not necessarily result in any changes. If changes do occur, a formal authorization process will be used, with notification given to all necessary stakeholders.

The authorization process for any changes to this document will require sign-off from NWP management, key regulatory agencies, and any other relevant stakeholders (i.e., the Ktunaxa Nation) to ensure full agreement with the changes made. Version tracking with a brief summary of changes will be used to provide a history of document development and the authorization process. An example of the document tracking and sign-off is provided below:

Version	Description of Changes	NWP Approval	Regulator Approval	Date
1	Original document			
		[signature]	[signature]	
		[signature]	[signature]	

Upon authorization of this plan and any future changes, the most current version will supersede all previous versions. Copies of this document, and any changes in the future, will be made available to any monitoring personnel working with, or for, NWP to ensure familiarity and full compliance. Suggestions for changes to this document should be forwarded to the NWP Environmental Manager for consideration.

33.4.1.9 Soil Management Plan

33.4.1.9.1 Introduction

The Project has the potential to directly and indirectly impact soil quantity, soil quality, and terrain over the course of the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases. As such, the Soil Management Plan (SMP) provides the objectives, relevant regulatory

requirements, roles and responsibilities, mitigation measures, and monitoring requirements aimed at minimizing soil loss and effects to soil quality and productivity during soil salvage during site development, through to site restoration activities at the time of Reclamation and Closure.

Soil quantity, soil quality, and terrain have linkages to the ecosystem function and intermediate and receptor valued components (VCs) including groundwater quality, surface water quality, fish and fish habitat, wildlife and wildlife habitat, human and ecological health, vegetation, and landscape and ecosystems. Therefore, the Best Management Practices (BMPs), mitigation, and monitoring measures described herein are important for the overall success of the Project.

Throughout the life of the Project, soils within the Project footprint will be disturbed primarily during site development and soil salvage activities. Soils will be stripped and stockpiled for future replacement, and in the process, are more susceptible to soil loss effects resulting from handling and compaction, and erosion as sediment via intermittent drainage pathways.

The SMP is conceptual in nature and will be updated by NWP as part of mine permitting and prior to construction to include additional site-specific details. Further, NWP will strive to continually improve the SMP throughout the life of the Project, through the implementation of any new BMPs or advanced technologies that will further reduce the risk of potential effects of the Project on soil quantity, soil productivity, and terrain stability.

33.4.1.9.2 Scope and Objectives

Project activities that have potential effects on soil quantity, soil quality and terrain stability are presented in Chapter 8. The Soil Management Plan (SMP) is intended to provide a framework of the environmentally and operationally feasible measures for the protection of soil resources related to the identified potential effects as follows:

- Measures that will be employed to minimize the risk of soil loss during soil salvage, to preserve adequate volumes of suitable soil for use during site reclamation as specified by the Landform Design and Reclamation Plan (Section 33.4.1.6);
- Measures that will be employed to minimize alteration of soil quality and soil productivity (i.e., soil fertility, permeability, porosity, soil microbial function, etc.) through soil salvage and stockpile management;
- Protection of soils from metal substances from Project sources or activities that have the potential to adversely affect soil quality and its function;
- Mitigate erosion effects which may result in increased terrain instability;
- Manage potential geohazards in identified areas within the Project footprint;
- Monitoring requirements for soil quality, stockpile management, erosion-prone areas, and signs of slope instability; and
- Routine reporting and incident reporting requirements that will be implemented to identify and minimize potential degradation of soil quality and loss of soil, including and adaptive management strategies and remediation and countermeasures, as required.

NWP is committed to creating a post-mine environment that is ecologically diverse, biologically productive, and broadly mimics local natural ecosystems using advanced techniques in site restoration. Replacement of soils within previously disturbed portions of the Project footprint is a key component to

achieving the reclamation objectives of the post-mine environment. The overall aim of the SMP is to provide guidance on soil salvage procedures, towards preparing for and creating healthy, self-sustaining ecosystems at mine closure and beyond.

It is important to note that the SMP is supplemented by other Project-specific management plans, including the Erosion and Sediment Control Plan (ESCP) which is intended to provide a framework of the detailed erosion control measures that will be employed to minimize the risk of erosion or sediment transport and its release into the receiving environment. The ESCP will be reviewed in conjunction with the SMP, for the minimization of soil loss through erosion and sedimentation controls during storm events, by wind effects, and by mine site drainage, as well as soil loss through excavation and compaction during construction activities.

The SMP is also supplemented by emergency response processes outlined in the Mine Emergency Response Plan, which will be in place to control and remediate erosion or sediment loss events, or spill events with the potential to affect soil quality. Refer to the Mine Emergency Response Plan for the procedures by which a release will be reported, as well as the monitoring programs that will be implemented to identify and manage potential erosion and sediment issues before they occur.

The Ecological Restoration Plan (ERP) outlines efforts for biomass and soil salvage in the Construction and Pre-Production phase, soil and biomass storage through the Operations phase, and replacement of soils and biomass during both the Operations and Reclamation and Closure phases. Revegetation with native species will be guided by an interpretation of the post-mine environment by means of a post-mine terrestrial ecosystem map (TEM) that takes elevation, aspect, slope steepness, slope position, and proximity to surface water into account.

Alteration to soil quality associated with dust deposition and interaction with Metal Leaching and Acid Rock Drainage (ML/ARD) during Operations is addressed through the Air Quality and GHG Management Plan (AQGHGMP) and the Site Water Management Plan, respectively. Refer to these plans for avoidance measures, BMPs, and response actions related to the preservation of soil quality.

In addition, the SMP will be reviewed in conjunction with the available surficial geological mapping and Soil Map Units (SMU) mapping by Keefer Ecological Services (KES, 2020), Terrain Stability (TS) mapping, Soil Salvage Potential (SSP) and Soil Erosion Potential (SEP) mapping by BGC Engineering Inc. (BGC, 2019), and other available mapping related to major soil types, soil instability, and geohazard risk for the Project area.

33.4.1.9.3 Regulatory Framework

There are several federal and provincial legislative requirements applicable to the management of soil resources. These requirements and their primary components related to the management of soils are provided in Table 33.4-31.

Table 33.4-31: Federal and Provincial Regulatory Requirements for Soil Management

Legislation/Policy	Year	Applicable Regulations or Permits
Federal Legislation		
Soil Quality Guidelines for the Protection of Environmental and Human Health	2010, and updates as available	The Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines for the Protection of Environmental and Human Health provide guidelines for contaminants in soil. These Canada-wide guidelines suggest maximum limits for substances such as pesticides, metals, and hydrocarbons in soil, and apply to residential, agricultural, industrial, and other land uses.
Canadian Environmental Protection Act	1999	Provides pollution prevention measures for the protection of human and environmental health, while promoting sustainable development and use of resources in Canada.
Provincial Legislation		
Contaminated Sites Regulation	1996	The *Contaminated Sites Regulation* (B.C. Reg. 375/96) Schedule 3.1 under the *Environmental Management Act* (2003) lists soil quality standards for human health and environmental protection. These criteria are used to define if a specific site is contaminated, to determine liability for site remediation, and to assess the effectiveness of remediation and reclamation efforts.
Environmental Management Act	2003	The *Environmental Management Act* regulates industrial waste discharge, pollution, hazardous waste, and contaminated site remediation. This act provides the authority to introduce waste into the environment while protecting environmental and human health. The act enables permits, regulations, and codes of practice to authorize this discharge and details enforcement options including administrative penalties, orders, and fines to encourage compliance.
Soil Conservation Guidebook	2001	Forest Practices Code of B.C.
Forest Road Engineering Guidebook	2002	Provides guidance for the development of resource roads (British Columbia Ministry of Forests [MOF], 2002).
Forest Service Road Use Regulation	2004	The FRPA requires that road construction adheres to codes provided in the *Forest Service Road Use Regulation* (B.C. Reg. 70/2004), which focuses extensively on erosion prevention.
Health, Safety and Reclamation Code for Mines in British Columbia	2021	Provides a foundation for the protection of terrestrial landscapes and ecosystems through requirements that minimize environmental risks associated with mining activities, in addition to providing reclamation requirements for disturbed areas.
Mines Act	1996	Regulates the stability of stream, river, wetland, and seepage area crossings (Section 9) and requires that the stability of man-made structures (e.g., impoundments, dumps, slopes) are planned in advance, inspected, monitored, and maintained throughout the operations and at the time of project closure (Section 10). It also requires that all surficial soil materials

Legislation/Policy	Year	Applicable Regulations or Permits
		removed for mining purposes be salvaged for use in reclamation (Sections 6, 9, and 10).
Standards and Best Practices for Instream Works	2004	The Standards and Best Practices for Instream Works is a document that summarizes provincial standards and recommended best practices that should be included in an application for instream work. The document assists in developing plans to address fish and wildlife populations as well as habitat protection during instream work (British Columbia Ministry of Water, Land, and Air Protection, 2004).
Water Sustainability Act	2014	The Water Sustainability Act ensures fresh and clean water remains at a sustainable supply to meet the needs of the Province of British Columbia. This act addresses the management including diversion and use of water resources. The goal of the act is to protect, manage, and use water efficiently.

33.4.1.9.4 Roles and Responsibilities

An important factor in minimizing effects to soil and terrain is the implementation of appropriate site-specific and task-specific training to employees and contractors outlining specific measures relating to the work, and the importance of protecting soil and terrain to environmental and human health.

The key roles and responsibilities for the implementation and administration of the SMP are provided in Table 33.4-32.

Table 33.4-32: Roles and Responsibilities of the Soil Management Plan

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the SMP, including meeting commitments to implement environmental protection measures and monitoring programs. • Lead environmental inspections, audits, and on-site monitoring programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate response to and effective remediation of sediment releases, geohazards (i.e., landslides), spills, and other environmental incidents that may affect soil quantity or quality. • Lead environmental incident investigations. • Report to applicable regulatory agencies as required. • Update the SMP as required.
Project Construction Manager	• Implement and ensure compliance with the SMP during Project Construction and Pre-Production, clearing and grubbing, soil salvage, and soil stockpiling activities. • Ensure completion of environmental awareness training by all employees and contractors.
NWP Mine Manager	• Ensure completion of environmental awareness training by all employees and contractors .

Role	Responsibilities
	• Participate in environmental incident investigations. • Implement and ensure compliance with the SMP during soil replacement and site restoration during progressive reclamation to Project Closure.
Health and Safety Manager	• Oversee health and safety of personnel during the occurrence of an environmental incident. • Participate in environmental incident investigations. • Implement the Mine Emergency Response Plan, as required. • Complete health and safety investigations related to environmental incidents.
First Aid Personnel	• Apply first aid to personnel during environmental incidents, as required. • Mobilize emergency transportation of personnel during environmental incidents, as required.
Security Personnel	• Limit access to Project areas following an environmental incident or identified geohazard risk as required. • Contact local law enforcement authorities for assistance, as required.
All employees and contractors	• Complete environmental awareness training. • Compliance with the SMP.

33.4.1.9.5 Environmental Protection Measures

Mine development activities will require soil stripping, clearing, and grubbing, which will result in soil disturbance and terrain alteration in many portions of the Project footprint. The degree of soil loss associated with soil disturbance is subject to the characteristics of the soil and the conditions under which the soil salvage and handing work is undertaken, including the implementation of erosion control measures and BMPs.

The mitigation measures proposed for soil quantity and quality and terrain are based on available best management practices, provincial and federal guidance documents, mitigation measures conducted and accepted for similar projects, and professional judgment. The identification and selection of technically and economically feasible mitigation measures followed the mitigation hierarchy approach outlined by the provincial Environmental Mitigation Policy and related Environmental Mitigation Procedures (Ministry of Environment, 2014a and 2014b). Mitigation measures are considered under the following categories:

- Prevention and avoidance measures (i.e., Project design features);
- Mitigation measures and BMPs (i.e., measures that will reduce or minimize Project-related changes to soil quality and quantity and terrain effects); and
- Countermeasures and restoration;
- Monitoring program;
- Incident response; and
- Reporting requirements.

Prevention and Avoidance Measures

It is important to understand the potential effects of the Project on soil quantity, soil quality, and terrain stability in order to manage the risks associated with geohazards and mitigate the effects through good Project design. Prevention is the preferred manner of mitigating degradation of soil, soil loss, and erosion or a sediment release throughout all phases of the Project. The ESCP provides a range of environmental

protection measures that will be implemented to avoid or reduce the potential for the occurrence of erosion or a sediment release on the Project, and to appropriately respond to and mitigate erosion or a sediment release should they occur during any phase of the Project. Refer to the ESCP; implementation of the erosion avoidance measures provided in the ESCP during all potentially soil disturbing activities will contribute to the effective prevention of erosion or sediment releases (i.e., geohazards).

In addition to those outlined in the ESCP, the following avoidance measures will be implemented during construction:

- Construction design to minimize disturbance areas and infrastructure footprints to reduce need for disturbed area and sediment controls (i.e., consider reducing building size in erosion-prone areas to reduce risk of erosion of de-stabilized and/or exposed soils, and consider construction scheduling and phasing to ensure limited duration of exposed soils, and to avoid particularly wet and or windy seasons when erosion potential is higher);
- Minimize soil disturbance, clearing, and grubbing to the required areas within the Project footprint only; and
- Planning and management strategies during mine development and operation to undertake progressive restoration as soon as is reasonably possible.

The Project footprint is situated in steep mountainous terrain and landslides are often common processes on steep, rugged ground. The following preventative measures will be implemented to mitigate potential Project-related effects on terrain and geohazards:

- Identification of areas classified as Terrain Stability (TS) class IV and V and Soil Erosion Potential (SEP) class High (H) and Very High (VH) that are located within or upslope of Project infrastructure;
- Conduct additional terrain stability field assessments on areas classified as TS IV and V;
- Designation of appropriate locations where infrastructure and services will be constructed, and where mobile equipment will be refueled, lubricated, and serviced with appropriate containment measures;
- Develop detailed geotechnical plans, including assessment of probability of geohazard occurrence, magnitude, intensity, spatial probability, and vulnerability of elements at risk;
- Monitoring and reporting to determine effectiveness of mitigation; and
- Design adaptation to address stability issues.

Mitigation Measures and BMPs

Project design decisions will consider BMPs during site selection and construction of Project infrastructure, with the long-term goal of successful reclamation by creating healthy, self-sustaining ecosystems during mine closure. Where soil disturbance is required, mitigation measures to minimize soil loss, degradation of soil, and terrain instability will be implemented throughout all phases of the Project.

Soil Quality Mitigations

The Project has the potential to adversely affect soil quality through the accumulation of mine-generated dust associated with mining operations, including development of the pits through detonating explosives, loading, hauling and dumping of mine rock and coal, processing of coal, and coal reject disposal. Dust generated through these activities has the potential to increase concentrations of metals and other contaminants in soil following deposition, potentially resulting in soil contamination. In addition, soil

contact with ML/ARD, and potentially impacted soil with groundwater and surface water may also lead to increased metals concentrations in soil in the absence of mitigation measures.

Degradation of soil quality is primarily mitigated through soil salvage in areas prone to dust deposition and contact with ML/ARD and mine seepage. In addition, alteration of soil quality is mitigated through dust control measures to reduce the deposition of fine-textured particles where possible, and engineered drainage and sedimentation ponds to reduce the opportunity for interaction of soil with mine contact water and seepage water. Details of the avoidance and minimization measures pertaining to potentially dust-generating activities that have the potential to increase mobilization of naturally occurring metals are described in the AQGHGMP. Refer to the ESCP (Section 33.4.1.4) and SWMP (Section 33.4.1.8) for the specific BMPs related to management of mine site drainage for the preservation of soil quality.

Sampling of salvaged soil will be conducted in accordance with the methodology and sampling frequency provided in B.C. CSR Technical Guidance 1 and B.C. CSR Protocol 4 to determine natural concentrations of metals in soil and other constituents of interest (i.e., nitrate, nitrite, ammonia, phosphorous, sulphate etc.). Soil that is found to contain naturally elevated concentrations of constituents above the applicable CSQGs or CSR Schedule 3.1 standards will be identified, segregated, and handled in accordance with B.C. CSR technical guidance to prevent contamination and impact to the environment. Soils will be monitored for increased concentrations of constituents of interest resulting from dust deposition and/or MLARD contact over the course of the Project. If required, additional mitigation and remedial efforts will be undertaken.

Mitigations for Terrain Stability and Geohazards

Changes to terrain type and areas of increased slope resulting from clearing, grubbing, soil salvage, construction, and pit development within the Project footprint, as well as other activities that destabilize surficial materials on slopes, may affect terrain stability and increase the risk of geohazards (i.e., landslides). Refer to the ESCP for details of slope stabilization techniques and BMPs required for the prevention of sediment releases and slope instability.

In addition to those described in the ESCP, the following additional mitigation measures will be implemented:

- Monitoring of slopes and disturbed areas for signs of instability. If an elevated risk of geotechnical failure becomes apparent, proactive preventive measures will be taken to restore geotechnical stability, as required;
- Reduce spatial probability of impact (i.e., reduce the likelihood that a landslide will reach or impact an element at risk such as infrastructure or critical habitat);
- Reduce the temporal probability of impact (i.e., reduce the likelihood of workers being present in the zone subject to the hazard); and
- Reduce the vulnerability (i.e., reduce the degree of loss to a given element at risk within the area affected by the landslide hazard).

Soil Salvage

In areas of the Project footprint where clearing, grubbing, and soil stripping is required, and is operationally feasible and safe (i.e., sufficient depth and suitable slope and terrain), soils will be salvaged, handled, transported, and stored in a manner that does not result in excessive soil loss or reduction in

suitability and future productivity. Soil salvage activities will adhere to a soil salvage plan. Employees and contractors will be adequately trained and supervised to ensure compliance with the soil salvage plan, SMP, and ESCP. Soil salvage will be practiced everywhere where soil is disturbed, including areas outside of the main mine area, such as footings for conveyor and powerline towers, and the road leading to and clearing for the explosives storage facility. Salvaged soil in these smaller disturbance areas will be stored locally for replacement at closure.

Seasonality is key to successful soil salvage, both in terms of safety and productivity. Whenever possible, soils will be salvaged in relatively dry conditions to minimize the risk of compaction upon placement, but not so dry that losses are incurred through dust migration. Prior to soil salvage activities, there will be a resource identification process that uses the existing soil mapping, supplemented with field surveys, when and where needed. Soils will be stripped with a combination of excavators and dozers and windrowed to facilitate loading and hauling.

Prolonged exposure of bare soil to the elements will be avoided; whenever possible, soil salvage will occur immediately follow logging, vegetation clearing, and grubbing activities during Construction and Pre-Production. From soil sampling at the Project footprint, developed (and hence more productive) soil is found to a depth of about 60 cm. Parent materials are found below this depth. The upper approximately 60 cm of soil should be stripped and stored separately from the underlying salvaged soil. The parent soil material (>60 cm depth) should be stripped either to bedrock or where unconsolidated rock becomes dominant over < 2 mm particle size soil (coarse fragment content exceeds 50%). Soil salvage will include mineral and organic materials identified in the soil salvage plan. It is critical to salvage the productive organic upper soil separately from the underlying mineral parent material to maintain overall soil productivity.

Biomass salvage will occur concurrently with soil salvage activities during logging, clearing, and grubbing activities. Merchantable timber will be removed by conventional logging (or push-over harvest, to facilitate removal of root systems prior to soil salvage), under the Cutting Permit for the Project. If merchantable timber is conventionally harvested, then root systems will be extracted mechanically prior to soil salvage. All non-merchantable tree harvest will be accomplished by push felling. This will allow for more efficient and thorough soil salvage. Various treatments incorporating woody debris into the soil salvage through breaking up the wood or chipping to allow for efficient handling by equipment will be evaluated for implementation during the Project.

Soil Stockpiles

During the Operations phase, salvaged soil storage will occur temporarily in designated areas not being actively mined. Soil stockpiles will be constructed in lifts (layers) with a maximum of 3 horizontal:1 vertical (33%) slopes to a maximum height of 15 m to ensure stability and reduce the potential for slumping or failure. Soil stockpiles will be designed and constructed to meet the requirements for geotechnical stability, constructed in stable, level areas, and beyond the limits of active watercourses, wetlands, and their associated floodplains. Appropriate setbacks will be incorporated into stockpile design to direct placement of materials within approved areas.

The stockpile surfaces will be loosely constructed to produce surface roughness, protectively matted when required, and revegetated to limit erosion from wind, snow melt, and precipitation. When practical,

coarse mineral fragments larger than 25 cm diameter will be separated to improve the ecosystem function of the soil for future reclamation effort and enable effective contouring of the soil stockpile. Machine traffic in stockpile areas will be limited to the required activities only, such as stacking and shaping, to minimize soil loss through compaction.

Revegetation of soil stockpiles will enhance soil organic matter accumulation over time and will be done using species that do not have persistently viable seed, so that seed does not germinate after salvaged soil has been placed for ultimate revegetation. Stockpiles will be revegetated in the spring or fall, as soon as possible following their establishment, to achieve a stable vegetation cover in a timely manner. Natural revegetation is anticipated to supplement the initial revegetation measures. Further BMPs (refer to the ESCP) at the toe of the stockpiles (e.g., silt fencing, bale barriers) will be implemented to limit the loss of fines by erosion. Perimeter runoff diversion ditching will also be constructed around the stockpiles to capture erosion, slow runoff, and effectively direct drainage around the stockpiles from uphill sources.

Stockpiles will be constructed as soil salvage activities progress, with soil replacement occurring throughout the Operations phase through progressive reclamation and portions. As soil is removed from the stockpiles for replacement on site, stockpile slopes will be contoured to ensure ongoing stockpile stability, reduce erosion and to promote revegetation.

Information including stockpile identifiers will be posted using clear and permanent signage, and records for stockpile soil volumes, soil type, and quality will be maintained and retained. Stockpile areas will be monitored such that any erosion can be addressed as soon as practical; the stockpiles will also be monitored for vegetation establishment, control of invasive species, and sediment release.

Countermeasures and Restoration

Progressive reclamation objectives toward the restoration of the site and post-mine environment targets have the goal of creating a diverse post-mine landscape, which re-create biodiversity features and habitat linkages through the reclamation of post-mine landforms.

Progressive reclamation activities will begin to occur during the Operations phase, as mining progresses and the mine layout achieves final configuration and is subject to no further disturbance. The progressive restoration over the course of the Project allows for vegetation to establish as soon as possible in disturbed areas and for primary succession to re-establish the ecological processes found in the local undisturbed ecosystems. The progressive approach also allows for adaptive refinement of restoration treatments. Another priority in reclamation of the Project footprint is that soil will be salvaged wherever soil conditions are suitable both in terms of operational feasibility of salvage operation and soil properties to provide a good growing medium.

Through reclamation, all areas will receive replacement of salvaged soil to a minimum depth of 30 cm and woody debris and will be revegetated. In the event that insufficient volume of soil is available from soil salvage stockpiles to meet the reclamation objectives, imported soil will meet the soil quality objectives for the site based on land use and ecological function. During slope re-contouring and soil replacement, there will be emphasis placed on the creation of both micro- and meso-topography that will help facilitate diverse ecosystems. For example, rough and loose surface preparation (including the incorporation of

woody debris) provide effective ways to control erosion and create conditions that promote revegetation and a diversity of habitats, thereby improving the ecological resilience of a site.

Upon establishment of stable post-mining landforms, the created landforms will be covered with salvaged soil. On gently sloping (<25% slope) terrain, subsoil (parent material) will be laid down first and then a capping of upper soil horizons will be applied to a total depth of about 30 cm. On more steeply sloping terrain (>25% slope), upper and subsurface soils will be mixed before placing on the mine rock landform, again to a depth of approximately 30 cm. Dark-colored salvaged soil material will not be placed on warm-aspect, sloping ground to avoid creating temperature stress. Surfaces to be covered with salvaged soil will be roughened so that microtopography (approximately 50 to 100 cm relief) is produced across all sites. As well, these surfaced will be loosened by ripping if they are compact and may provide a barrier to root or water infiltration. Salvaged soil will be laid down in such a manner that ensures soil compaction does not occur.

Following soil replacement, re-contouring of surface features will be conducted (refer to the ESCP; i.e., undulating or troughs parallel to the slope) to reduce the amount of sheet and rill erosion by surface water runoff and reduce surface water flow velocity to allow for sediment to settle. When possible, re-contouring will be designed to reduce the length of the slope and decrease the angle of the slope, thereby reducing the likelihood of geohazards. Monitoring and maintenance of slope gradients and ramp stability will occur following re-contouring to prevent accelerated erosion of soils and surficial materials. The re-contouring of the post-mine TEM ecological treatment will be designed to effectively improve terrain within the Project footprint to further prevent geohazards within the Project footprint.

In areas of high erosion potential, mulching, hydromulching, and hydroseeding will be implemented as soon as possible to protect the soil surface from erosion, and if seed is included, aids in enhanced germination and revegetation to exposed soils. Prior to hydroseeding or seeding and where feasible, track walking slopes will be conducted to slow water runoff and reduce erosion and sedimentation. Revegetation should prioritize the use of fast growing vegetative species to provide faster stabilization and erosion control. Specific vegetative species selection will be selected based on slope, aspect, growth medium, and stabilization goals, using non-invasive, native seed mix. Soil replacement, slope stabilization, and revegetation should be conducted in accordance with the erosion control measures detailed in the ESCP, SWMP, Landform Design and Reclamation Plan, Ecological Restoration Plan, and the Vegetation and Ecosystems Management and Monitoring Plan.

As described in further detail above, soil will be monitored for soil quality, soil loss through erosion and signs of instability, and risk of geohazards throughout the life of the Project. Soil that is found to exceed the applicable soil quality guidelines or standards will be segregated, handled, and remediated in accordance with the Site Water Management Plan. Any sediment and erosion control issues will be addressed in accordance with the ESCP and ERP. If an elevated risk of geotechnical failure is identified through monitoring of slopes within or upslope of the Project footprint, proactive preventive measures will be taken to restore geotechnical stability, as required.

Monitoring Program

A monitoring program is a key component of the SMP, as it will be used to evaluate the effectiveness of preventative and mitigation measures throughout all phases of the Project. The monitoring program will

be implemented and managed by the NWP Environmental Manager; however, a range of Project personnel will be trained to participate in the program.

A soil and terrain monitoring program will be implemented and consider the following components:

- Planned areas of soil disturbance compared to actual disturbance area;
- Estimated rates of erosion and sedimentation;
- Evaluation of soil salvage, stockpiling, and replacement techniques to assess if measures are performing as intended and identify opportunities for improvement; and
- Evaluate the need for additional mitigation measures, remediation, or adaptive management strategies.

The measures outlined above are generally accepted, understood, and proven to effectively reduce adverse environmental effects related to soil and terrain. If monitoring indicates that the effectiveness of mitigation measures is lower than predicted, further mitigation may be required as per adaptive management strategies.

Incident Response

While prevention is the preferred manner to manage soil loss through erosion and geohazards, a response plan is required in the event of a sediment release, landslide, or spill event occurrence during any phase of the Project. A key to effective response is the timely implementation of controls and mitigation measures by following clearly established procedures. Documentation and notification requirements are provided in the following section. Refer to the ERP and ESCP for details of the response actions and notification process in the event of a significant erosion event or sediment release.

Reporting Requirements

Under the ESCP, the NWP Environmental Manager (or a responsible designated alternate) will be responsible for the reporting requirements relevant to soil management, erosion and sediment control, and terrain stability throughout all phases of the Project including Reclamation and Closure and Post-Closure. This reporting will be conducted in accordance with the requirements and conditions of the permits, approvals, and authorizations obtained for the Project, in addition to the ESCP.
Inspection reports detailing the findings of the monitoring program, or incident reports following a sediment release, landslide, or spill incident, will include the following:

- Observations and findings of the monitoring program including written descriptions, analytical results and photographs;
- Identification of non-compliances, issues and/or incidents;
- Effectiveness of employed mitigation measures; and
- Recommendations and corrective actions, including additional mitigation measures or adaptive management (if warranted).

Inspection and monitoring activities will be conducted and supervised by qualified and trained personnel, accordance with the guidance, and support of a qualified soil/geotechnical specialist, as needed. Reporting will include the notification of appropriate government agencies, stakeholders, landowners, and nearby communities, as required.

33.4.1.10 Spill Prevention, Control, and Countermeasures Plan

33.4.1.10.1 Introduction

Throughout the construction and operation phases of the Project, many activities will be undertaken that will involve the handling and storage of hazardous materials. This Spill Prevention, Control, and Countermeasures Plan (SPCCP) is intended to provide a framework of the measures that will be employed to minimize the risk of a spill or release occurrence, the emergency response processes that will be in place to control and remediate spills, the procedures by which spills will be reported, as well as the monitoring programs that will be implemented to identify and manage potential spills before they occur.

This SPCCP is a conceptual plan, which NWP will revise and include additional, site-specific details prior to construction. Further, NWP will strive to continually improve the SPCCP throughout the life of the Project, through the use of advanced technologies and implementation of management practices that will further reduce the risk or potential effects of spills on human health and the environment.

33.4.1.10.2 Scope and Objectives

This SPCCP involves the practices and procedures associated with prevention and management of spills, releases or discharges of hazardous materials or contaminants (e.g., fuels, lubricants, waste oils, coolant, etc.) to terrestrial and aquatic environments. The practices and procedures included in this plan are applicable to and will be implemented throughout the construction, operation and decommissioning phases of the Project. Further, this SPCCP is applicable to the Project footprint, transportation routes, and undeveloped areas in the vicinity of the Project.

The SPCCP was prepared to meet the following objectives:

- Provide a framework for the appropriate prevention, response and management of hazardous or dangerous materials spills to the environment;
- Define the regulatory requirements, roles and responsibilities and reporting requirements associated with spill prevention and management;
- Describe the environmental protection measures and management practices to be implemented to reduce the risk of potential impacts of spills on human health and the environment; and
- Outline the monitoring programs that will be implemented to assess the performance of the SPCCP and identify areas in which the plan can be improved through the use of adaptive management strategies.

33.4.1.10.3 Regulatory Requirements

There are several federal and provincial legislative requirements applicable to spill prevention and management planning. These requirements and their primary components related to spill prevention and management are provided in Table 33.4-33.

Table 33.4-33: Federal and Provincial Regulatory Requirements for Spill Prevention and Management

Regulation/Policy	Year	Applicable Regulations or Permits
Federal Legislation		
Canadian Environmental Protection Act	1999	The *Environmental Emergency Regulations* outline the environmental emergency planning requirements and reporting requirements for the Project.
Fisheries Act	1985; amended 2019	The *Fisheries Act* includes measures to protect fish and fish habitat that must be followed to prevent entry of deleterious substances in water, harmful alteration, disruption, or destruction (HADD), or the death of fish by means other than fishing, among other requirements.
Canada *Transportation of Dangerous Goods Act*	1992	Classification system by which substances are classified as dangerous good. Permits for the transportation of dangerous goods by railroad, or air.
Provincial Legislation		
Environmental Management Act	2003	*Spill Contingency Planning Regulation* *Spill Preparedness, Response and Recovery Regulation* *Spill Reporting Regulation*
Mines Act	1996a	Health, Safety and Reclamation Code for Mines (the Code; British Columbia [B.C.] Ministry of Energy and Mines, 2021).
Transportation of Dangerous Goods Act	1996b	*Transportation of Dangerous Goods Regulations*

33.4.1.10.4 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the SPCCP are provided in Table 33.4-34.

Table 33.4-34: Roles and Responsibilities of the Spill Prevention, Control, and Countermeasures Plan

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the SPCCP, including meeting commitments to implement environmental protection measures and monitoring programs. • Lead environmental inspections, audits and on-site monitoring programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate response to and effective remediation of environmental incidents, including spills. • Lead environmental incident investigations. • Report to applicable regulatory agencies as required. • Update the SPCCP as required.

Role	Responsibilities
Project Construction Manager	• Implement and ensure compliance with the SPCCP during Project Construction and Pre-Production. • Designate hazardous materials storage areas during Construction and Pre-Production. • Provide and deploy spill response materials and equipment at appropriate locations within the Project site during Construction and Pre-Production. • Ensure completion of environmental awareness training by all employees and contractors.
NWP Mine Manager	• Implement and ensure compliance with the SPCCP during Project Operations. • Designate hazardous materials storage areas during Operations. • Provide and deploy spill response materials and equipment at appropriate locations within the Project site during Operations. • Ensure completion of environmental awareness training by all employees and contractors. • Oversee personnel resourcing for spill response. • Participate in environmental incident investigations.
Health and Safety Manager	• Oversee health and safety of personnel during the occurrence of an environmental incident. • Participate in environmental incident investigations. • Implement the Mine Emergency Response Plan, as required. • Complete health and safety investigations related to environmental incidents.
First Aid Personnel	• Apply first aid to personnel during environmental incidents, as required. • Mobilize emergency transportation of personnel during environmental incidents, as required.
Security Personnel	• Limit access to Project areas following an environmental incident, as required. • Contact local law enforcement authorities for assistance, as required.
All employees and contractors	• Complete environmental awareness training. • Compliance with the SPCCP.

33.4.1.10.5 Environmental Protection Measures

This SPCCP provides a range of environmental protection measures that will be implemented to avoid or reduce the potential for the occurrence of spills on the Project, and to appropriately respond to and mitigate spills should they occur during any phase of the Project. These environmental protection measures will be further refined and detailed throughout the Project permitting process and will be updated with more site-specific information prior to the commencement of construction.

Spill Prevention

Prevention is the preferred manner of addressing spills throughout all phases of the Project. Implementation of the following measures will contribute to the effective prevention of spills:

- Incorporate industry standards and best management practices (BMPs) for spill prevention and containment during the design of Project facilities and infrastructure, which may include:
  - Installation of bermed storage areas around containers of hazardous materials or potential contaminants, which can exceed 110% of the maximum volume of the containers;

    - Installation of protective barriers around hazardous material containers where there is potential to be impacted by vehicles or powered mobile equipment; and
    - Use of double-walled containment for storage of fuels or other hazardous materials;
- Design the site layout so that hazardous material storage areas are placed in locations where the potential impacts of spills can be minimized, and to facilitate prompt and effective spill response;
- Deploy and maintain spill response kits in strategic locations within the Project area to facilitate prompt and effective spill response;
- Install spill response kits or materials on all vehicles and equipment on-site;
- Identify and maintain Safety Data Sheets for all hazardous materials and potential contaminants on-site, which contain specific information to mitigate effects to the environment in the event of a spill;
- Implement procedures for handling and storing hazardous materials, including fueling, fuel transfer and transportation of hazardous materials;
- Develop an evolving risk assessment program to identify vulnerabilities in processes and systems on-site that may result in a spill occurrence, and promptly implement controls or address deficiencies to mitigate the risks;
- Develop, implement and document regularly scheduled site inspections, which include fueling locations, shops, spill kits and material and waste storage areas;
- Certify all vehicles, equipment and operators for transportation of dangerous goods;
- Inspect vehicles and equipment regularly for leaks and document their condition;
- Develop, implement and document a preventative maintenance program for all vehicles and equipment on the Project;
- Provide environmental awareness training for all on-site personnel during onboarding, and communicate the conditions and requirements of the SPCCP regularly during meetings; and
- Strictly enforce proper housekeeping and compliance with the SPCCP by all on-site personnel.

Spill Response

While spill prevention is the preferred manner to address spills in the SPCCP, a Spill Response and Countermeasures Plan is required in the event that a spill occurs during any phase of the Project. A key to effective spill response is the timely implementation of controls and mitigation measures by following clearly established procedures.

The following actions will be taken in the event of a spill, in order of priority:

- Immediately identify and control dangers to human life and health, and secure the site to ensure the safety of all personnel and members of the public;
- Determine the spill material and source of the spill;
- Notify the NWP Environmental Manager, Health and Safety Manager and/or other appropriate Project personnel;
- If safe to do so, stop or control the flow or release of hazardous materials;
- If safe to do so, construct barriers to isolate the spill and control its spread using materials from a spill response kit, earth, snow, or any other suitable nearby material;
- If the spill area continues present unsafe conditions due to the nature of the spilled material, the location of the spill, or the presence of hazards near the spill area (e.g., ignition sources), initiate the procedures included in the Mine Emergency Response Plan (see Section 33.4.2.2); and

- Notify appropriate government agencies, stakeholders, landowners and nearby communities, as required.

Countermeasures

Once the appropriate responsible personnel have been notified and the spill material has been contained, the extent and severity of the spill be assessed, and the environmental receptors affected or potentially affected by the spill will be identified, such as aquatic environments. If the extent of the spill cannot be addressed by trained on-site personnel, external contractors with expertise in spill response will be contacted to effectively address the spill. The conditions of the spill will be documented and photographed for inclusion in a spill report (see Section 33.4.1.10.6), and a spill clean-up plan will be developed.

Countermeasure procedures will be initiated based on the spill clean-up plan. Clean-up measures will vary depending on the location and extent of the spill; however, typical measures may include:

- Install robust containment berms using soil, sandbags and/or synthetic barriers to maintain isolation of the spill materials during clean-up;
- Excavate a sump near the spill area, if possible, line the sump with an impermeable geomembrane, and divert the spill material into the sump;
- Collect the spilled material using a vacuum truck;
- Excavate contaminated soil, snow, and solid material form the spill area using heavy equipment (i.e., excavator, dozer, loader) and hand tools;
- Use sorbent pads, booms or granular sorbent material to absorb hydrocarbon spills, as appropriate; and
- Transport the recovered spill material, contaminated soil, oily pads or other wastes to an appropriate disposal facility.

Once the clean-up activities have been completed, any spill kit materials used during the spill response will be replenished. All spill response activities will be documented by the NWP Environmental Manager or a responsible delegate, for inclusion in the spill report.

33.4.1.10.6 Reporting Requirements

The NWP Environmental Manager (or a responsible designated alternate) will prepare a spill report and conduct an incident investigation to identify a root cause of the spill. The findings of the investigation will be used to improve spill prevention procedures, and the SPCCP will be updated accordingly.

The spill will be reported to the appropriate regulatory authorities, as required, based on the guidance provided in the British Columbia (B.C.) *Spill Reporting Regulation* (B.C. Reg. 187/2017) of the B.C. *Environmental Management Act* (2003). The Regulation states that a spill is reportable (i.e., must be reported to the B.C. Provincial Emergency Program at 1-800-663-3456) if:

- The spill enters, or is likely to enter, a body of water; or
- The quantity of a spilled material equals or exceeds the quantity listed for that material in the Schedule included with the B.C. *Spill Reporting Regulation*.

A reportable spill will be reported within 24 hours of its occurrence to the B.C. Provincial Emergency Program by the NWP Environmental Manager, Mine Manager, Construction Manager, or a responsible designated alternate. The spill report will include, to the extent practicable, the following information:

- The contact information for
  - The individual making the report;
  - The responsible person in relation to the spill; and
  - The owner of the spilled material;
- The date and time of the spill occurrence;
- The location of the spill site;
- A description of the spill location and surrounding area;
- A description of the spill source;
- The type and estimated volume of material spilled;
- A description of the circumstances, cause and adverse effects of the spill;
- Details of the spill response actions and countermeasures taken to address the hazard caused by the spill;
- The names of government agencies at the spill site; and
- The names of other persons or government agencies that have been advised about the spill.

Records of all documented spills on the Project will be maintained by the Environmental Manager, including the spill incident, all spill response actions and countermeasures, investigation findings, subsequent remediation, and monitoring programs. This information will be used to facilitate improvements to the SPCCP through adaptive management practices.

33.4.1.10.7 Monitoring Program

A monitoring program is a key component of the SPCCP, as it is used to evaluate the effectiveness of spill prevention strategies throughout all phases of the Project. The monitoring program will be implemented and managed by the Environmental Manager; however, a range of Project personnel will be trained to participate in the program. The monitoring program may include the following procedures:

- An inventory of all hazardous or dangerous materials stored on-site will be maintained, and their use on-site will be monitored;
- All hazardous materials storage areas will be regularly inspected to document compliance with appropriate storage, signage and housekeeping procedures;
- Storage containers and barriers (e.g., fuel tanks, drums and berms) will be regularly monitored for signs of leakage, corrosion, apparent staining or instability;
- Vehicles and equipment will be regularly inspected by operators to ensure proper working condition, cleanliness and adequate supply of spill prevention material;
- Secondary containment equipment (e.g., spill trays) will be kept free of water, snow or debris;
- Barriers and signage will be placed on or around tanks or piping where there is potential to be impacted by vehicles or equipment;
- Spill kits will be regularly inventoried and replenished as required; and
- Emergency response equipment (e.g., pumps, hoses, skimmers) will be maintained and tested for operation on a regular basis.

The monitoring program will be refined and supplemented with additional site-specific detail prior to commencement of construction, as the permitting process progresses. The monitoring program and related mitigation measures are not expected to pose a risk to the environment and as such, no additional intervention measures are presented at this time as it relates the program. Details on the approach to interventions and strategies to protect the environment is provided in Section 33.2.4 as it relates to the adaptive management framework.

33.4.1.11 Vegetation and Ecosystems Management and Monitoring Plan

33.4.1.11.1 Scope and Objectives

The purpose of the Vegetation and Ecosystems Management and Monitoring Plan (VEMMP) is to provide realistic and feasible strategies and measures for the management of vegetation and ecosystems over the course of the Project. Implementation of the VEMMP aims to achieve the following performance objectives:

- Avoidance and minimization of the effects of the Project on rare ecosystems and rare plants or their habitat through implementation of appropriate management strategies;
- Minimize the loss and alternation of ecosystem extent, abundance, and function through implementation of applicable federal and provincial legislation, Best Management Practices (BMPs), and Project-specific mitigation;
- Restoration of ecosystems and ecosystem integrity impacted by Project activities;
- Prevention of invasive plant introduction and establishment of new infestations;
- Reduction of the spread of invasive plants through ecology-based management of Project activities; and
- Management of invasive plants that are present at the site according to ecosystem-based management, including consideration of successional processes such as, disturbance type, extent and intensity, dispersal mechanisms, site history, competition, and germination.

33.4.1.11.2 Regulatory Requirements and Applicable Guidelines

Federal and provincial regulatory requirements applicable to the management of vegetation and ecosystems are outlined in Table 33.4-35.

Table 33.4-35: Federal and Provincial Regulatory Requirements for Vegetation and Ecosystems Management

Legislation/Policy	Year	Description
Federal Legislations or Policies		
Species at Risk Act	2002	Protects listed plant species (including whitebark pine and limber pine) in Canada from decline or disappearance. Aids in the recovery of species that are extirpated, threatened, or endangered, resulting from anthropogenic activities, and to manage species of special concern.
Migratory Birds Convention Act	1994	Prohibitions under the *Migratory Birds Convention Act* (MBCA) provide legislative protection to migratory birds listed under its Schedule 1 and their nests.

Legislation/Policy	Year	Description
Canadian Environmental Assessment Act	2012	Provides the legal basis for the federal environmental assessment process. As of August 28, 2019, the *Canadian Environmental Assessment Act* (CEA Act; 2012) has been repealed and replaced by the *Impact Assessment Act* (2019); however, this Project remains under the 2012 legislation.
Fisheries Act	1985, amended 2019	Framework for the management of fisheries resources and conservation of fish, including prohibiting the death of fish by any means other than fishing, the harmful alteration, disruption, and destruction (HADD) of fish habitat, and the release of deleterious substances, among other requirements. May have implications for wetlands that support protected fish species or riparian habitat along watercourses.
Federal Policy on Wetland Conservation	1991	Federal policy document that outlines the coordinated federal approach to wetland conservation with the goal to "promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future". It strives to achieve a goal of "no net loss of wetland functions" on federal land and waters.
Provincial Legislation or Policies		
Forest and Range Practices Act	2002	Outlines how all forest and range practices and resource-based activities are to be conducted on Crown land in British Columbia (B.C.), while ensuring the protection of plants, wildlife, and ecosystems.
Environmental Management Act	2003	Regulates industrial and municipal waste discharge, hazardous waste, pollution, and contaminated sites remediation. The *Environmental Management Act* (EMA) enables the use of permits, regulations, and codes of practice to authorize discharges to the environment.
Environmental Assessment Act	2002; 2018	Provides a framework for the process of reviewing major projects and assessing their potential environmental impacts. As of December 16, 2019, the 2002 Act has been repealed and replaced by the *Environmental Assessment Act* (2018). On May 3, 2023, the Project was transitioned to the EAA (2018) through a Transition Order under Section 78(7) of the 2018 Act.
Mines Act	1996	In combination with the accompanying Health, Safety and Reclamation Code for Mines, this Act provides a foundation for the protection of the land and watercourses by minimizing the environmental risks associated with mining activities, in addition to providing reclamation requirements for disturbed areas.
Land Act	1996	The primary legislation through which the government conveys land to the public for community, industrial, and business use. The Act allows the granting of land and the issuance of Crown land tenure in the form of leases, licenses, permits and rights-of-way. Sustainable management of Crown land and natural resources is guided in part by the *Land Act* and associated Land Use Objectives Regulation, in

Legislation/Policy	Year	Description
		addition to land use plans, which work to protect species at risk and their habitats within certain regions.
Invasive Plants Regulation	2004	Identifies species of invasive plants in B.C.
Weed Control Act and *Weed Control Regulation*	1996; 1985	Sets out requirements for land occupiers to control noxious weed species and provides the province legislation to plan, implement, and enforce a weed control program. The regulation outlines plant species designated as noxious weeds in B.C.
Seeds Act	1985	Regulates seed sold, imported, and exported in Canada and their associated grade, also requires that seed in Canada is free of prohibited noxious weeds and ensures that standards of purity are met.
Riparian Areas Protection Act and the Riparian Areas Protection Regulation	1997; 2019	Provides legislation and regulatory requirements to protect riparian areas during residential, commercial, and industrial development.

Guidelines and relevant BMPs will be implemented for the management of vegetation and ecosystems will be incorporated, as applicable over the course of the Project. Relevant guidelines and BMPs to be implemented include but are not limited to:

- An Invasive Alien Species Strategy for Canada (Government of Canada, 2004);
- Canadian Biodiversity Strategy (Ministry of Supply and Services Canada, 1995);
- The Federal Policy on Wetland Conservation: Implementation Guide for Federal Land Managers (Lynch-Stewart et al., 1996);
- B.C. Water Quality Guidelines (British Columbia Ministry of Environment and Climate Change Strategy, 2019);
- Wetland Ways: Interim Guidance for Wetland Protection and Conservation in British Columbia (Cox and Cullington, 2009);
- Forest Practices Code Riparian Management Area Guidebook (Province of British Columbia, 2021);
- Invasive Species Strategy for British Columbia (Invasive Species Council of British Columbia [ISCBC], 2021);
- Standards and Best Practices for Instream Works (British Columbia Ministry of Water, Land and Air Protection Ecosystem Standards and Planning Biodiversity Branch [B.C. MWLAP], 2004);
- Best Practices for Managing Invasive Plants Along Roadsides: A Pocket Guide for British Columbia's Maintenance Contractors (ISCBC and B.C. Ministry of Transportation and Infrastructure, 2019);
- Procedures for Mitigation Impacts on Environmental Values (Environmental Mitigation Procedures; B.C. Ministry of Environment, 2014b); and the
- Handbook for Pesticide Applicators and Dispensers (B.C. MWLAP, 2005);
- Field Guide to Noxious Weeds and Other Selected Invasive Plants of British Columbia (ISCBC and Inter-Ministry Invasive Species Working Group [IMISWG], 2019); and
- Invasive Species Strategic Plan (IMISWG, 2014a).

33.4.1.11.3 Roles and Responsibilities

The key roles and responsibilities for the implementation and administration of the VEMMP are provided in Table 33.4-36.

Table 33.4-36: Roles and Responsibilities of the Vegetation and Ecosystems Management and Monitoring Plan

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the VEMMP, including meeting commitments to implement environmental protection measures and monitoring programs. • Lead environmental inspections, audits, and on-site monitoring and follow-up programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate response to and effective remediation of environmental incidents. • Lead environmental incident investigations. • Report to applicable regulatory agencies, as required. • Update the VEMMP, as required. • Maintain records of communication with employees and contractors related to invasive plant species occurrences and related control methods.
Project Construction Manager	• Implement and ensure compliance with the VEMMP during Project Construction and Pre-Production. • Designate soil and biomass storage areas during Construction and Pre-Production. • Ensure completion of environmental awareness training by all employees and contractors.
NWP Mine Manager	• Implement and ensure compliance with the VEMMP during Project Operations. • Designate soil and biomass storage areas during Operations. • Ensure completion of environmental awareness training by all employees and contractors. • Oversee personnel resourcing for mine reclamation and closure activities. • Participate in environmental incident investigations. • Maintain records of invasive plant species occurrences and related control measures.
Health and Safety Manager	• Oversee health and safety of personnel mine reclamation and closure activities. • Participate in environmental incident investigations. • Implement the Mine Emergency Response Plan, as required. • Complete health and safety investigations related to environmental incidents.
First Aid Personnel	• Apply first aid to personnel during mine reclamation and closure activities, as required. • Mobilize emergency transportation of personnel during environmental incidents, as required.
Security Personnel	• Limit access to Project reclamation and closure areas and activities, as required. • Contact local law enforcement authorities for assistance, as required.
All Employees and Contractors	• Complete environmental awareness training and implement values outlined in training. • Implement and comply with the VEMMP

33.4.1.11.4 Environmental Protection Measures

The VEMMP provides a range of environmental protection measures that will be implemented to avoid or minimize losses of or alterations to the abundance, distribution, and function of listed plant communities, species, and ecosystems. Where losses and/or alterations cannot be avoided, this plan also includes measures by which the abundance, distribution, and function of vegetation communities, species, and ecosystems can be appropriately restored. These environmental protection measures will be further refined and detailed throughout the Project permitting process and will be updated with more site-specific information prior to the commencement of construction.

Mitigation through Project Design

Design mitigation incorporated into the Project and to be implemented over the course of the Project include:

- Optimization of the Project footprint to use existing access roads and areas of disturbance where feasible, to minimize the extent of vegetation clearing and encroachment into ecosystems to that which is required for the Project;
- Restriction of all vehicles and machinery travel to designated roadways and road surfaces throughout the life of the Project;
- Completion of pre-construction surveys to delineate “no-work” zones to establish buffers and setbacks around sensitive vegetation areas to avoid disturbance to ecosystems and potentially sensitive plant species that were identified as VCs (i.e., avalanche chutes, grasslands, riparian habitat, old growth and mature forests, wetlands, and listed plants and plan communities), where feasible;
- Pre-construction surveys will be conducted to document the presence and delineate buffers around documented listed plant species or plant communities, including wetlands. “No-work” zones will be established as necessary;
- Establishment of appropriate setback and buffer distances from surface water (e.g., watercourses and wetlands) and riparian habitat;
- Minimization of landscape disturbance and the implement revegetation through progressive reclamation to reduce erosion potential, invasive plant introduction and spread, and support successional processes; and
- Development of the Ecological Restoration Plan (Section 33.4.1.3) to restore and reclaim ecosystems impacted as part of the Project to create a post-mine environment that is ecologically diverse, biologically productive, and broadly mimics local natural ecosystems, including a vegetation mosaic of coniferous forest, open alpine tundra, rock outcrops, shrub and graminoid dominated brushland, talus slopes, wetlands, and riparian areas.

Implementation of Best Management Practices and Project-Specific Mitigation

Environmental protection measures will be implemented over the course of the Project to avoid and minimize adverse effects to vegetation and ecosystems. The measures follow industry best practices, legislative requirements, and industry standards and will include appropriate practices in biomass and soil salvage, invasive plant species management, dust management, restoration, and training of Project personnel.

General Measures

- Access roads leading up from Grave Creek Road to the mine site will be closed to vehicle access during the Construction and Pre-Production, Operation, and Reclamation and Closure phases;
- Qualified environmental personnel will be on-site during the Construction and Pre-Production, Operation, and Reclamation and Closure phases to identify areas of listed plant species, communities, sensitive ecosystems, and will implement appropriate procedures to avoid or minimize potential adverse effects to these areas; and
- Disturbance and encroachment into natural vegetation will be minimized, to the extent feasible, by clearing and grubbing only what is required for Construction and Pre-Production activities and progressive development of pits and MRSFs.

Soil and Biomass Salvage

- Biomass will be salvaged using conventional logging (for merchantable timber), or push-felling, and woody debris will be incorporated into the salvaged organic soils;
- Soils will be salvaged and stockpiled for future reclamation following industry BMPs, in appropriate locations to reduce the potential for soil degradation and erosion;
- Compaction of soils will be minimized as per the Soil Management Plan (Section 33.4.1.9);
- The Erosion and Sediment Control Plan (see Section 33.4.1.4) will be implemented to reduce indirect impacts to adjacent vegetated areas; and
- Vegetated ground cover, including roots, will be retained where possible to prevent soil erosion and maintain soil temperatures.

Listed Plant Species and Community Management

- Appropriate exclusion zones will be established around known listed plant species, communities and ecosystems, to avoid or minimize effects related to vegetation clearing, soil disturbance, fugitive dust, and invasive plant species introduction;
- Exclusion zones will apply to the use of chemical treatments and biological agents for invasive species management;
- Exclusion zones will be delineated using exclusion fencing (or equivalent) and signage to clearly demarcate the areas for avoidance, and will remain in place throughout the course of the Project;
- Listed plant species and communities within or in the vicinity of the Project footprint will be regularly monitored as part of the monitoring program (see Section 33.4.1.11.5); and
- Implement dust management strategies to prevent accumulation of fugitive dust in the areas of the listed plant species and communities.

Invasive Plant Species Management

- An Early Detection and Rapid Response (EDRR) system will be established in accordance with the Government of B.C. guidance (e.g., IMISWG, 2014b);
- Pre-construction surveys will be conducted to document the presence and extent of invasive plant species within the Project footprint and existing transportation corridors that will be used by the Project during the Construction and Pre-Production and Operations phases. Where possible, “no work” zones will be established around known populations of invasive plants to reduce the potential to introduce or spread these species beyond their existing areas of infestation;

- All equipment will arrive to the Project clean and free of soil and vegetative debris that may contain seed and/or propagules of invasive plant species;
- Field inventories will be completed to confirm the current extent of invasive plant infestations and annual monitoring to assess effectiveness of treatments;
- invasive plant populations will be identified and demarcated within and adjacent to sensitive plant populations and ecological communities prior construction or on-site activities;
- Setbacks and barriers will be established to prevention of further spread of known invasive plant infestations;
- Vehicle and machinery traffic will be restricted to designated access roads;
- Control activities will be undertaken to eliminate or reduce the extent of invasive plant infestations, including removal of existing plant populations through mechanical and chemical treatments or the use of biocontrol agents, if applicable;
- Progressive reclamation will be implemented to minimize bare soil;
- Vehicles and machinery will be decontaminated before leaving work areas, where required; and
- Disturbed areas and areas where invasive plants are removed will be monitored to evaluate effectiveness of mitigation and control measures.

Dust Management

- Earthmoving activities will be limited during windy or unfavorable conditions;
- Clearing and grubbing activities will be completed using an area-by-area approach, and as efficiently as possible, to avoid drying of exposed soils;
- Project infrastructure will be sited outside of high wind or wind channelling areas where feasible;
- Enforcement of low-speed limits for vehicle traffic;
- Truck loads will be covered prior to leaving the facility to reduce the release of fugitive dust;
- Height limit for debris/waste or gravel stockpiles;
- Soil stockpiles will be revegetated with appropriate plant species as soon as possible;
- Water will be applied to active areas within the Project footprint during dry conditions, including conveyors, stockpiles, ramps and haul roads within the pit area;
- Water lubrication will be used for blast hole drilling;
- blasting, particularly in exposed areas near or above the pit rim, will be undertaken on calm days or calm periods of the day, or use of delay blasting techniques;
- Blasting mats will be used to suppress dust emissions; and
- Access roads will be constructed with the goal of keeping dust levels as low as reasonably achievable, which may include the use of coarser aggregate material on haul roads and/or pavement of high traffic areas.

Personnel Training and Education

Appropriate training and education will be provided for employees and contractors on the VEMMP and how to minimize effects to listed plant populations and communities and intact ecological communities. Training will focus on the following aspects:

- Identification and flagging of current locations of known rare and sensitive plant species, communities, and ecosystems within the Project footprint and surrounding areas;
- Identification and flagging of known invasive plant infestations within the Project footprint and surrounding areas;

- Education on rare and invasive plant species identification through use of education materials (e.g., visual aids);
- Requirements on reporting listed plants and plant communities as well as invasive plants; and
- General roles and responsibilities under the VEMMP.

Training will be provided to all new staff each year, with refresher training offered on a regular basis. Training schedules will be flexible to allow for changes in site personnel throughout the year, if and when applicable. While not all site personnel will be involved directly in the implementation of the VEMMP, all site personnel will be aware that the plan exists and the appropriate person to contact in the event that they observe a potential invasive plant species, or rare plant species occurrence during the course of their regular Project activities. NWP will provide all site employees or contractors with updated maps indicating areas of concern with respect to vegetation management (e.g., invasive plant species, rare plant species, communities and ecosystems).

Restoration

Restoration of the Project footprint will be completed in accordance with the Ecological Restoration Plan (Section 33.4.1.3). Progressive reclamation will be initiated in the Operations phase as stable landforms are created. It is planned that opportunities for progressive reclamation will occur in Years 6, 8, 10, 11 and 15 of the Operations phase, and will continue into the Reclamation and Closure and Post-Closure phases. Progressive restoration over the course of the Project allows for vegetation to establish as soon as possible in disturbed areas, and for primary succession to re-establish the ecological processes found in the local undisturbed ecosystems.

Approximately 790 hectares (ha) of area disturbed within the Project footprint will be restored with the objective of creating self-sustaining ecosystems. Ecosystem types to be created through implementation of the Ecological Restoration Plan (Section 33.4.1.3) include:

- High elevation forests;
- Grasslands;
- Whitebark pine dominated forests;
- Low elevation forests;
- Sparsely vegetated talus;
- Riparian habitat; and
- Wetland ecosystems.

Plant species prescribed for restoration will reflect those found in similar local natural ecosystems and those present within the Project footprint or local area prior to disturbance, with the consideration of successional processes. A wide variety of plant species will be established in during Reclamation and Closure to provide enhanced resilience to disturbance and climate change induced stress (e.g., herbivory, disease, insects). Additional plant species may be used in restoration if they are deemed appropriate, are feasible to propagate, and will provide additional benefits to site restoration.

The following environmental protection measures will be implemented during Project restoration activities:

- Implementation of the Ecological Restoration Plan (Section 33.4.1.3), through which abiotic conditions (e.g., surface contours, drainage pathways) and early successional trajectories of

vegetation communities and ecosystems (e.g., wetlands and whitebark pine forests) will be established. Measures that will be implemented under this plan specific to vegetation and ecosystem management include:

  - Surfaces covered with salvaged soil will be roughened to create microtopography (approximately 50 to 100 cm relief) across restored areas;
  - Surfaces will be loosened by ripping if they are compact and may provide a barrier to root or water infiltration;
  - Salvaged soil will be laid down in such a manner that ensures soil compaction does not occur;
  - Small diameter salvaged biomass will be incorporated into salvaged soil prior to its placement, with larger amounts being incorporated into the organic-matter-poor subsoil and locations where plants tolerant of higher carbon/nitrogen (C/N) ratios (e.g., black huckleberry) are to be established in vegetation restoration;
  - Larger diameter coarse woody debris (CWD) and tree root wads will be placed on the ground surface in locations where it will function as erosion control, to provide favorable microsites for establishment of vegetation, and provide wildlife habitat, this is especially relevant to areas subject to high winds;
  - Greater amounts of CWD will be placed in ecosystems with greater productivity (e.g., cool aspect, lower elevations); and
  - Coarse woody debris will be placed in shallow open water wetlands and wetland margins to create habitat diversity and areas of refuge;
- Implement a whitebark pine salvage, propagation and restoration strategies, including restoration of critical habitat for whitebark pine where feasible, and compensation are areas of lost critical habitat where restoration is not deemed to be feasible (see Ecological Restoration Plan, Section 33.4.1.3, for more details);
- Seeding of agronomic grasses and legumes will be avoided in favour of native species to enhance biodiversity of vegetation communities in reclaimed portions of the Project footprint;
- Surface contouring and erosion control measures will be implemented within reclaimed site to stabilize the soil and promote establishment of native vegetation species, thereby limiting the spread of invasive and agronomic species; and
- Invasive species management procedures will continue to be followed throughout the Reclamation and Closure and Post-Closure phases.

33.4.1.11.5 Follow-up Strategy

Monitoring Program

A monitoring program will be developed and implemented to demonstrate environmental compliance, to verify the effectiveness of mitigation measures where there is uncertainty, to verify environmental effects predictions, and to identify unanticipated Project-related effects so that new mitigation can be developed. Where environmental effects exceed that predicted under the effects assessment, or mitigation measures prove to be ineffective, alternative strategies will be developed to adaptively manage the Project's effects on the landscapes and ecosystems VCs. In addition to the findings from the monitoring program, adaptive management strategies will also consider guidance and recommendations provided by regulatory agencies, changes in applicable regulations or legislation, shared traditional or local knowledge, technological advancements, and findings from new scientific studies. Consultation with key stakeholders,

Indigenous Communities, and regulatory agencies will be conducted, as applicable, when improving or developing new mitigation strategies for inclusion in the VEMMP.

The monitoring program will be implemented and completed by on-site environmental personnel. The NWP Environmental Manager will evaluate the effectiveness of the mitigation measures based on the findings of the monitoring program and determine if adaptive management strategies should be implemented to improve the VEMMP, as required. The monitoring program will be refined and supplemented with additional site-specific detail prior to commencement of construction, as the permitting process progresses. Changes to the environmental management activities and monitoring program will be communicated to Project personnel, and appropriate training and education will be provided to workers, where applicable. Financial resources associated with the monitoring program will be provided in the future as part of the permitting process and cannot be provided at this time as the extent of monitoring programs will be dictated to a large degree by specific certificate and permitting conditions developed in collaboration with Indigenous groups and regulatory agencies.

The monitoring program and related mitigation measures are not expected to pose a risk to the environment and as such, no additional intervention measures are presented at this time as it relates the program. Details on the approach to interventions and strategies to protect the environment is provided in Section 33.2.4 as it relates to the adaptive management framework.

A summary of the proposed follow-up and monitoring measures that will comprise the monitoring program is provided below in Table 33.4-37.

Table 33.4-37: Follow-up Monitoring Measures and Timing/Duration by Valued Component

Valued Component	Follow-up and Monitoring Measure	Timing (Phase)	Timing (Years)
Landscapes and Ecosystems Valued Components			
Avalanche Chutes	Extent of the VC area overlapping with Project footprint activities, including the extent of rare and sensitive ecosystems.	Construction and Pre-Production and Operations phases	Prior to disturbance only
	Extent of the VC area overlapping with occurrences of weeds and invasive, non-native species as well as the area of implemented control/treatment measures.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
	Extent of the VC area overlapping with spills or releases of deleterious substances including sediment-laden water.	Only required where overlapping with reportable spills or releases	Years 1, 3 and 5 following spill/release event
	Plant species composition as well as the rate of deposition (i.e., mass/year/hectare), particle size analysis and contaminant analysis for dustfall at regular intervals up to 100 m from the edge of clearing from the Project.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance

Valued Component	Follow-up and Monitoring Measure	Timing (Phase)	Timing (Years)
	Delineation of the extent of post-slide avalanche fields (adjacent/contiguous with the Project footprint) following avalanche control or operational blasting events.	Construction and Pre-Production and Operations phases	Following avalanche control or operational blasting events only
Grasslands	Extent of the VC area overlapping with Project footprint activities, including the extent of rare and sensitive ecosystems (e.g., Gg12 ecological community).	Construction and Pre-Production and Operations phases	Prior to disturbance only
	Extent of the VC area overlapping with occurrences of weeds and invasive, non-native species as well as the area of implemented control/treatment measures.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
	Extent of the VC area overlapping with spills or releases of deleterious substances including sediment-laden water.	Only required where overlapping with reportable spills or releases	Years 1, 3 and 5 following spill/release event
	Plant species composition as well as the rate of deposition (i.e., mass/year/hectare), particle size analysis and contaminant analysis for dustfall at regular intervals up to 100 m from the edge of clearing from the Project.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
Riparian Habitat	Extent of the VC area overlapping with Project footprint activities, including the extent of rare and sensitive ecosystems.	Construction and Pre-Production and Operations phases	Prior to disturbance only
	Extent of the VC area overlapping with occurrences of weeds and invasive, non-native species as well as the area of implemented control/treatment measures.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
	Extent of the VC area overlapping with spills or releases of deleterious substances including sediment-laden water.	Only required where overlapping with reportable spills or releases	Years 1, 3 and 5 following spill/release event
	Plant species composition as well as the rate of deposition (i.e., mass/year/hectare), particle size analysis and contaminant analysis for dustfall at regular intervals up to 100 m from the edge of clearing from the Project.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
	Species composition (quantified annually), water quality (monthly), and surface water/groundwater elevation in representative riparian habitats located immediately downstream of the Project in West Alexander Creek, at the confluence of West Alexander Creek	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance

Valued Component	Follow-up and Monitoring Measure	Timing (Phase)	Timing (Years)
	and Alexander Creek, as well as the confluence of Alexander Creek with Michel Creek.		
Old Growth and Mature Forest	Extent of the VC area overlapping with Project footprint activities, including the extent of rare and sensitive ecosystems.	Construction and Pre-Production and Operations phases	Prior to disturbance only
	Extent of the VC area overlapping with occurrences of weeds and invasive, non-native species as well as the area of implemented control/treatment measures.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
	Extent of the VC area overlapping with spills or releases of deleterious substances including sediment-laden water.	Only required where overlapping with reportable spills or releases	Years 1, 3 and 5 following spill/release event
	Plant species composition as well as the rate of deposition (i.e., mass/year/hectare), particle size analysis and contaminant analysis for dustfall at regular intervals up to 100 m from the edge of clearing from the Project.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
Wetlands	Extent of the VC area overlapping with, and adjacent to, Project footprint activities, including the extent of rare and sensitive ecosystems.	Construction and Pre-Production and Operations phases	Prior to disturbance only
	Extent of the VC area overlapping with occurrences of weeds and invasive, non-native species as well as the area of implemented control/treatment measures.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
	Extent of the VC area overlapping with spills or releases of deleterious substances including sediment-laden water.	Only required where overlapping with reportable spills or releases	Years 1, 3 and 5 following spill/release event
	Plant species composition as well as the rate of deposition (i.e., mass/year/hectare), particle size analysis and contaminant analysis for dustfall at regular intervals up to 100 metres (m) from the edge of clearing from the Project.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
	Evaluation of wetland ecosystem function of wetlands adjacent to the Project footprint.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance

Valued Component	Follow-up and Monitoring Measure	Timing (Phase)	Timing (Years)
Vegetation Valued Components			
Listed and Sensitive Plant Communities and Species	Areal extent of known listed plant communities and species overlapping with Project footprint activities.	Construction and Pre-Production and Operations phases	Prior to disturbance only
	Areal extent of known listed plant communities and species overlapping with occurrences of weeds and invasive, non-native species as well as the area of implemented control/treatment measures.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
	Areal extent of known listed plant communities and species overlapping with spills or releases of deleterious substances including sediment-laden water.	Only required where overlapping with reportable spills or releases	Years 1, 3 and 5 following spill/release event
	Plant species composition as well as the rate of deposition (i.e., mass/year/hectare), particle size analysis and contaminant analysis for dustfall at regular intervals up to 100 m from the edge of clearing from the Project in known areas of listed plant communities and species.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
Whitebark Pine	Extent of known whitebark pine populations and critical habitat overlapping with Project footprint activities.	Construction and Pre-Production and Operations phases	Prior to disturbance only
	Extent of known whitebark pine populations and critical habitat overlapping with occurrences of weeds and invasive, non-native species as well as the area of implemented control/treatment measures.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance
	Extent of known whitebark pine populations and critical habitat overlapping with spills or releases of deleterious substances including sediment-laden water.	Only required where overlapping with reportable spills or releases	Years 1, 3 and 5 following spill/release event
	Plant species composition as well as the rate of deposition (i.e., mass/year/hectare), particle size analysis and contaminant analysis for dustfall at regular intervals up to 100 m from the edge of clearing from the Project in known whitebark pine populations and critical habitat.	Construction and Pre-Production and Operations phases	Prior to disturbance, and Years 1, 3 and 5 following initial disturbance

Over the course of the Project, NWP will use an Environmental Management System (EMS) based on key components of International Organization for Standardization (ISO) 14001 (see Chapter 33, Section 33.2 for more information). The EMS will provide the structure and procedures for implementing environmental management plans, ensuring compliance with regulations and permit requirements, and continuously improving environmental protection measures and environmental performance. The EMS,

the accompanying Environmental Policy (Appendix 1-F), and the NWP Employee Code of Conduct (Appendix 1-B) form the basis through which NWP will require contractors and sub-contractors to comply with environmental management programs, adhere to regulatory permitting requirements, and achieve auditing programs. Through the EMS, NWP will monitor the Project's performance against established objectives and standards and will correct environmental management strategies where necessary by implementing contingency measures and corrective actions.

33.4.1.11.6 Reporting Requirements

The NWP Environmental Manager (or a responsible designated alternate) will be responsible for the reporting requirements relevant to vegetation and ecosystem management throughout all phases of the Project. Compliance reporting will be subject to *Mines Act* (1996) permit conditions. The information gathered during monitoring and follow-up programs will be summarized with information from other management plans in an annual summary report. The annual summary report will be distributed to the appropriate entities, which may include key stakeholders, Indigenous Communities, and regulatory agencies. Annual reporting (see Section 33.4.1.11.5) is anticipated to include the following information:

- Records of inventory, treatment, monitoring, and restoration activities;
- Quality assurance/quality control (QA/QC) protocols (e.g., data validation) implemented;
- Evaluation of the effectiveness of the environmental protection measure employed in achieving the stated objective(s) where appropriate; and
- Education and training for workers completed.

On-site auditing will be implemented as part of the monitoring program prior to commencement of construction to assess compliance to permit conditions and for QA/QC. Results of the audits will be included in the reporting system, including a record of the dates the audits took place, what was checked/reviewed, corrective actions carried out, and personnel involved.

33.4.1.12 Waste Management Plan

Throughout the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project, activities will be undertaken that will result in the generation, storage, and transportation of waste. This Waste Management Plan focuses on the management of various waste streams to reduce the potential for adverse effects of waste associated with the Project on human health and the environment. In particular, the Waste Management Plan details mitigation measures and best management practices (BMPs) for waste management within the Project area as well as details for monitoring waste management and disposal over the course of the Project.

This Waste Management Plan is a conceptual plan, which NWP will revise and include additional, site-specific details prior to construction. Further, NWP will strive to continually improve the Waste Management Plan throughout the life of the Project, through the use of advanced technologies and implementation of management practices that will further reduced the risk or potential effects of waste on human health and the environment.

33.4.1.12.1 Overview of Waste Streams

The following waste streams will be generated by the Project:

- Domestic waste, including:

    - Food waste;
    - General non-recyclable refuse/garbage; and
    - Recyclable materials (e.g., bottles, cans, plastics, paper, etc.);
- Non-hazardous industrial waste, including:
    - Building and construction waste materials;
    - Scrap metal and wood;
    - Waste concrete;
    - Plastic packaging;
    - Light fixtures and bulbs;
    - Tires;
    - Wiring materials; and
    - Scrap vehicle and equipment parts;
- Hazardous waste, including:
    - Waste petroleum hydrocarbon products (e.g., fuels, oils) and materials (e.g., filters, rags and sorbent products);
    - Batteries;
    - Solvents;
    - Aerosols;
    - Glycols and other coolant products;
    - Sharps (e.g., syringes, razors);
    - Other hazardous chemicals (e.g., reagents, acids, paint, etc.); and
    - Biohazard waste (i.e., first aid room waste); and
- Sewage.

33.4.1.12.2 Scope and Objectives

This Waste Management Plan includes practices and procedures associated with reduction, management and disposal of waste throughout the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project. Further, this plan is applicable to Project activities within the Project footprint, transportation routes associated with the Project, and undeveloped areas in the vicinity of the Project.

The Waste Management Plan was prepared to meet the following objectives:

- Provide a framework for the responsible management of waste generated by the Project;
- Define the regulatory requirements, roles and responsibilities, and reporting requirements associated with management of waste generated by the Project;
- Describe waste management practices and procedures to be implemented to reduce and appropriately manage waste generated by the Project; and
- Outline the monitoring programs that will be implemented to assess the performance of the Waste Management Plan and identify areas in which the plan can be improved through the application of adaptive management strategies.

33.4.1.12.3 Regulatory Requirements

There are several federal and provincial legislative requirements applicable to the Waste Management Plan. These requirements and their primary components related to waste management are provided in Table 33.4-38.

Table 33.4-38: Federal and Provincial Regulatory Requirements for Waste Management

Regulation/Policy	Year	Applicable Regulations or Permits
Federal Legislation		
Canada Transportation Act	1996	The *Canada Transportation Act* is legislation for the national transportation system including rail, aviation, and marine.
Canadian Environmental Protection Act	1999	The *Canadian Environmental Protection Act* promotes sustainable development through preventative measures of pollution including details of programs related to air, water, and hazardous waste pollutants in the interest of protecting the environment and human health. Governs the export and import of hazardous waste and provides details on how to manage this hazardous waste.
Fisheries Act	1985	The *Fisheries Act* details and prohibits releases of deleterious materials into fish habitat.
Hazardous Product Act	1985	The *Hazardous Product Act* details that hazardous product supplier are required to provide a product label and safety data sheet for hazardous materials.
Controlled Products Regulations	2017	The Controlled Products Regulations detail regulations of controlled products through safety data sheets.
Hazardous Products Regulations	2015	The Hazardous Products Regulations detail the hazards of hazardous materials under three categories including physical hazards, health hazards and environmental hazards.
Provincial Legislation		
Hazardous Waste Legislation Guide	2016	The *Hazardous Waste Legislation Guide* details how to follow the laws in the province of British Columbia (B.C.) for managing hazardous waste including programs used for managing hazardous waste (British Columbia Ministry of Environment, 2016a)
Public Health Act	2008	The *Public Health Act* deals with emerging health issues including environmental health hazards that are not covered off by other acts. This includes the ability to regulate operations, activities or conditions that pose a health hazard.
Environmental Management Act	2003	The *Environmental Management Act* regulates industrial waste discharge, pollution, hazardous waste and contaminated site remediation. This act provides the authority to introduce waste into the environment while protecting environmental and human health. The act enables permits, regulations, and codes of practice to authorize this discharge and details enforcement options including administrative penalties, orders, and fines to encourage compliance.
Hazardous Waste Regulation	1988	The Hazardous Waste Regulation describes the proper handling and disposal of hazardous wastes in B.C.
Mines Act	1996	The *Mines Act* protects both employees and the general public to minimize health and safety and environmental risks associated with mining related activities.

Regulation/Policy	Year	Applicable Regulations or Permits
Health, Safety and Reclamation Code for Mines in British Columbia	2017	The Health, Safety and Reclamation Code for Mines in British Columbia details the potential health and safety issues attributed to waste handling and storage to human health and the environment. Provides details on how to handle, store, and manage these waste materials on site (British Columbia Ministry of Energy and Mines, 2021).
Transportation Of Dangerous Goods Act	1996	The *Transportation of Dangerous Goods Act* establishes safety requirements when handling or transporting dangerous goods by road, rail, air, or water.
Transportation of Dangerous Goods Regulation	1985	The Transportation of Dangerous Goods Regulation applies to transporting and handling dangerous goods within the Province of British Columbia on all Provincial highways and railways.
Water Sustainability Act	2014	The *Water Sustainability Act* allows the Province to control groundwater and surface water throughout the province to protect stream and aquatic health.
Wildlife Act	1996	The *Wildlife Act* states that a facility needs to be operated in accordance with the *Environmental Management Act* so as to not attract wildlife.
Workplace Hazardous Materials Information System (WHMIS)	2015	WHMIS provides information on hazardous materials and products so that workers are trained to protect themselves (Government of British Columbia, 2015).

33.4.1.12.4 Roles and Responsibilities

The key roles and responsibilities of the implementation and management of the Waste Management Plan are provided in
Table 33.4-39.

Table 33.4-39: Roles and Responsibilities of the Waste Management Plan

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the Waste Management Plan, including meeting commitments to implement environmental protection measures and monitoring programs. • Lead environmental inspections, audits and on-site monitoring programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate response to and effective remediation of environmental incidents. • Lead environmental incident investigations. • Report to applicable regulatory agencies, as required. • Update the Waste Management Plan, as required.
Project Construction Manager	• Implement and ensure compliance with the Waste Management Plan during Project Construction and Pre-Production. • Designate waste storage areas during the Construction and Pre-Production phase of the Project.

Role	Responsibilities
	• Provide and deploy waste response materials and equipment at appropriate locations within the Project site during Construction and Pre-Production. • Ensure completion of environmental awareness training by all employees and contractors.
NWP Mine Manager	• Implement and ensure compliance with the Waste Management Plan during Project Operations. • Designate waste storage areas during the Operations phase. • Provide and deploy waste response materials and equipment at appropriate locations within the Project site during operation. • Ensure completion of environmental awareness training by all employees and contractors.
All employees and contractors	• Complete environmental awareness training. • Compliance with the Waste Management Plan.

33.4.1.12.5 Waste Management Practices and Procedures

The Waste Management Plan is based on a hierarchical framework that will be implemented to reduce, reuse, recycle, and recover wastes generated by the Project where feasible, while the remaining waste will be collected, stored, and disposed of in a responsible manner. The practices and procedures that will be implemented as components of this framework are outlined in the following sections.

Waste Reduction, Reuse, Recycling, and Recovery

Reduction

Reduction of generated waste is the primary objective of managing waste throughout all phases of the Project. Implementation of the following measures will contribute to waste reduction:

- Materials will be purchased in bulk containers to reduce the amount of waste packaging;
- Chemicals and lubricants will be ordered in bulk and reusable containers;
- Non-disposable items will be preferred to disposable items;
- Material consumption will be planned out during Project design and evaluated at regular intervals to reduce waste;
- Regular inventory of materials on-site and conservative procurement of materials will be implemented to maximize the use of materials prior to product expiration; and
- Training personnel on responsible use of materials and waste reduction during onboarding.

Reuse

Materials will be used to their maximum extent and, where practical and possible, reused to reduce waste on site. Examples of potentially reusable materials include the following:

- Waste oils, glycols, and solvents that can be reused for secondary purposes;
- Scrap metal, wood, and other leftover materials that can be repurposed; and
- Chemical containers that may be returned to the supplier to be refilled.

Recycling

A recycling program will be implemented during all phases of the Project, to recycle materials when products cannot be reduced or reused. All recyclable products will be organized and sorted on-site to minimize improper recycling and disposal of products. Examples of materials used or generated on-site that will be targeted for recycling include:

- Scrap metal that cannot be reused;
- Paper and cardboard products;
- Used oil and filters;
- Used batteries;
- Used vehicle or equipment parts;
- Plastic, metal, and glass containers; and
- Printer and copier cartridges.

Recovery

Where possible, recovery of materials will be implemented when the above three options are not viable. Recovery involves the extraction of usable material or energy as a by-product of used products or materials. Opportunities for waste recovery will be identified prior to the Construction and Pre-Production phase and will be continuously explored throughout the life of the Project.

33.4.1.12.6 Waste Collection, Storage, and Disposal

While waste reduction, reuse, recycling, and recovery are the preferred manners to address waste in the Waste Management Plan, appropriate collection, storage, and disposal procedures will be implemented for the remaining or residual waste materials generated by the Project.

Waste Collection and Storage

Two waste storage areas will be established in designated locations within the Project footprint where waste will be collected and temporarily stored prior to disposal: one storage area for non-hazardous waste, and on storage area for hazardous waste. The following mitigation procedures will be implemented to properly collect and store waste:

- Waste will be sorted and separated by waste stream (i.e., domestic waste, non-hazardous industrial waste, and hazardous waste);
- Within these designated waste collection areas, waste that can be reused, recycled or recovered will be stored separately from disposable waste;
- The waste collection areas will be clearly marked and monitored throughout all phases of the Project;
- All workers will be trained on proper waste storage including prohibited and permitted materials;
- All waste storage areas are temporary, and all waste will be removed from site as soon as possible and transported to approved recycling facilities, disposal facilities, or landfills;
- Waste materials will be stored in appropriate containers to avoid attracting wildlife species, pests and protect from inclement weather;
- Waste storage areas will have fire prevention systems installed in close proximity;
- Spill kits will be placed at waste storage areas. These spill kit wills be equipped with materials to appropriately clean and mitigate and potential spills or released materials;
- All waste containers will be regularly maintained and inspected;

- Solid waste will be collected in bins and liquid waste will be collected in drums or other approved containers;
- Hazardous waste will be packed, labelled, and stored at a secure location that will be clearly marked and signed with the appropriate signs, in accordance with applicable provincial and federal legislation;
- The hazardous waste storage area will be established in a location to reasonable avoid and minimize potential adverse environmental and human health risks (i.e., store away from wetlands or surface water); and
- The hazardous waste storage area will be established within a bermed area, with predetermined maximum volume storage limits. This allows for the hazardous wastes storage area to contain spills (i.e., see Section 33.4.1.10 for the Spill Prevention, Control, and Countermeasures Plan).

Sewage and Grey Water Treatment

Sewage and grey water generated by the Project will flow via gravity to a sewage treatment plant located adjacent to the office and mine dry buildings. The sewage treatment plant will handle all sewage from these buildings. Treated solids will be removed by a qualified contractor and disposed off-site at an approved local disposal facility. Treated effluent will be directed to a disposal field located adjacent to the mine office building. The sewage treatment plant will be designed, constructed, and operated in accordance with the *Environmental Management Act* (2003).

Waste Transportation and Disposal

Waste that has been separated and temporarily stored in the waste storage areas will be transported off-site and taken to appropriate facilities for disposal and recycling, depending on the waste stream. The following procedures will be implemented for proper transportation and disposal of waste:

- Hazardous waste materials will be handled and transported in accordance with all applicable transportation of dangerous goods regulations;
- Transportation of waste materials will be conducted with task appropriate equipment and by personnel and/or contractors who have been certified in transport of that material. Those who are transporting hazardous waste material will be trained in the Transport of Dangerous Goods regulations (B.C. Reg. 203/85);
- Waste materials will be removed from the Project and taken approved facilities for recycling or disposal; and
- All workers who handle or transport hazardous waste material will have WHMIS training.

33.4.1.12.7 Reporting Requirements

The NWP Environmental Manager (or a responsible designated alternate) will be responsible for the reporting requirements relevant to waste management throughout all phases of the Project. This reporting will be conducted in accordance with the requirements and conditions of all permits, approvals, and authorizations obtained for the Project with relevance to waste management, including annual permit and license reporting, and corporate reporting. Additional reporting will be conducted as part of the waste monitoring program. The monitoring program will be developed prior to construction and implemented, including routine inspections, compliance checks, and quality assurance and quality control. All monitoring events will be reported on and submitted to the appropriate personnel. See Section 33.4.1.12.8 for further details on the waste monitoring program.

Records of all documents related to the Waste Management Plan will be maintained by the Environmental Manager, including incident reports, actions, countermeasures, investigation findings, training records, complaint records, monitoring program results, and annual waste reports. This information will be used to facilitate improvements to the Waste Management Plan through adaptive management practises.

33.4.1.12.8 Monitoring Program

A monitoring program is a key component of the Waste Management Plan, as it is used to evaluate the effectiveness of the waste management strategies throughout all phases of the Project. The monitoring program will be implemented and managed by the Environmental Manager; however, a range of Project personnel will be trained to participate in the program. The monitoring program may include the following procedures:

- Assess and review the use of strategies to reduce, reuse, recycle, and recover waste over disposal; and
- Develop and implement a comprehensive checklist to conduct regular assessments of waste management practices and procedures based on these principles. The checklist may include variables such as:
  - Volume of recycled/reused/recovered/repurposed waste;
  - Quantity and materials removed from site to waste facilities;
  - Characteristics of waste removed from site to be disposed of at landfills (i.e., weight and location);
  - Analysis of surface water runoff samples compared to upstream and downstream water quality;
  - Analysis of treated sewage effluent material from the sewage treatment plant;
  - Regular visual inspections of the waste storage areas to ensure proper waste sorting, separation, and storage of waste; and
  - Regular reviews of waste collection procedures including training, equipment, records, and employee awareness.

The monitoring program will be refined and supplemented with additional site-specific details prior to commencement of the construction and Pre-Production phase, as the permitting process progresses.

33.4.1.13 Wildlife Management and Monitoring Plan

33.4.1.13.1 Introduction

Throughout the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project, many activities will be undertaken that will involve the potential for impacts to wildlife and wildlife habitat; measures to avoid and minimize effects will be required. The Wildlife Management and Monitoring Plan (WMMP) is intended to provide:

- A framework for the measures that will be implemented to avoid, minimize or control the effects to wildlife from the Project;
- The processes that will be in place to track and address wildlife and wildlife incidents.
- Reporting procedures; and,
- The program that will be implemented to monitor the effectiveness of mitigation measures to compare against predictions made in the Project effects assessment.

The Wildlife Management and Monitoring Plan is a conceptual plan, which NWP will revise to include additional site-specific details prior to construction. Further, NWP will strive to continually improve the WMMP throughout the life of the Project, through adaptive management in consideration of results of monitoring, incident investigations, traditional and local knowledge, improved methods, regulatory changes, or other Project-related changes.

The Project Ecological Restoration Plan (ERP) is interrelated with wildlife mitigation and management as it describes the strategies for post-mine terrain creation and revegetation leading to the goal of creating biologically rich and ecologically productive post-mine ecosystems. Measures described in the Vegetation and Ecosystems Management and Monitoring Plan are also closely linked to wildlife management. Specifically, measures to avoid and minimize loss and disturbance to natural vegetation and the monitoring of the footprint extent within naturally vegetated areas are applicable to avoidance and minimization of wildlife habitat loss.

Other management plans that are relevant to wildlife mitigation and management include:

- Vegetation and Ecosystems Management and Monitoring Plan;
- Vegetation Management Plan;
- Air Quality and Dust Control Management Plan;
- Erosion and Sediment Control Plan;
- Soil Management Plan;
- Noise Management Plan;
- Waste Management Plan;
- Spill Prevention, Control, and Countermeasures Plan;
- Site Water Management Plan;
- Access Management Plan;
- Traffic Control Plan; and
- Ecological Restoration Plan.

These other plans are referenced in this plan wherever they are relevant to wildlife and wildlife habitat.

33.4.1.13.2 Scope and Objectives

The WMMP was prepared to meet the following objectives:

- Consolidate NWP's commitments and strategies to mitigate potential effects to wildlife and wildlife habitat;
- Provide Project personnel with procedures and practices to protect people and wildlife and to guide responses to given human-wildlife situations;
- Outline NWP's approach to monitoring the effectiveness of implemented mitigations;
- Outline NWP's approach to monitoring wildlife and wildlife habitat effects; and
- Summarize NWP's reporting and consultative approaches to transmit and share results.

33.4.1.13.3 Regulatory Requirements

Applicable provincial and federal legislation related to the protection of wildlife and wildlife habitat is summarized in Table 33.4-40. Relevant guidelines, including standards and best management practices, are summarized in Table 33.4-41.

Table 33.4-40: Regulatory Considerations Relevant to Wildlife and Wildlife Habitat VCs

Legislation Name	Regulatory Agency	Description
Federal		
Species at Risk Act (2002)	Environment and Climate Change Canada	The *Species at Risk Act* protects wildlife species listed as extirpated, endangered, or threatened from being killed, harmed, harassed, or captured; and the residences of these at-risk wildlife species on federal land and within federally designated Critical Habitat.
Migratory Birds Convention Act (1994)	Environment and Climate Change Canada	The *Migratory Birds Convention Act* protects various species of migratory birds, including gamebirds, insectivorous birds, and non-gamebirds. This Act prohibits the disturbance, destruction, or removal of a nest or related shelter or eff of a migratory bird, as well as the possession of a live migratory bird, carcass, nest, or egg.
Provincial		
Forest and Range Practices Act (2002)	Ministry of Forests, Lands, Natural Resource Operations and Rural Development	Outlines how all forest and range practices and resource-based activities are to be conducted on Crown land in B.C., while ensuring the protection of plants, wildlife, and ecosystems.
Wildlife Act (1996)	Ministry of Forests, Lands, Natural Resource Operations and Rural Development	The *Wildlife Act* protects all native and some non-native wildlife species found in B.C. from direct harm or harassment, except as allowed by regulation (e.g., hunting or trapping). Wildlife Management Areas (WMAs) are mapped areas that are necessary to meet the habitat requirements of an Identified Wildlife element. WMAs are an area of land designated under Sec. 42 of the Act for the benefit of regionally and internationally significant fish and wildlife species or their habitats.
Environmental Management Act (2003)	Ministry of Environment and Climate Change Strategy	Regulates industrial and municipal waste discharge, hazardous waste, pollution, and contaminated sites remediation. The *Environmental Management Act* (EMA) enables the use of permits, regulations, and codes of practice to authorize discharges to the environment, to ensure protection of the environment, which includes wildlife.

Table 33.4-41: Guidelines and Guidance Documents Relevant to Wildlife and Wildlife Habitat Valued Components (VCs)

Guideline	Year	Agency/Organization	Description
Federal			
Guidelines to Reduce Risk to Migratory Birds	2019	Environment and Climate Change Canada (ECCC)	Provides information on the risks that development activities may pose to migratory birds and guidance to mitigate such risks (ECCC, 2019).

Guideline	Year	Agency/Organization	Description
Bird Conservation Strategy for Bird Conservation Region 10 Pacific and Yukon Region: Northern Rockies	2013	Environment Canada	The primary aims of this Strategy is to present Environment Canada's priorities with respect to migratory bird conservation in this region, and to provide a comprehensive overview of the conservation needs of bird populations to practitioners who may then undertake activities that promote bird conservation in Canada and internationally (Environment Canada, 2013).
Provincial			
Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development	2014	Ministry of Forests, Lands, and Natural Resource Operations	Outlines the planning and site development phases of building with environmental objectives and the aim of balancing urbanization with the protection of the environment (British Columbia Ministry of Forests, Lands, and Natural Resource Operations [FLNRO], 2014).
Environmental Best Management Practices for Urban and Rural Land Development: Special Wildlife and Species at Risk	2004	Ministry of Water, Land and Air Protection (now the Ministry of Environment and Climate Change Strategy)	Outlines best management practices for protecting special wildlife and species at risk before, during, and after development (Polster and Cullington, 2004).
A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (B.C.) (Interim Guidance)	2014	Ministry of Forests, Lands and Natural Resource Operations, North Area	Provides guidance for considering and mitigating threats to wildlife and wildlife habitat from industrial development in the North Area (Peace, Omineca and Skeena regions), British Columbia. While this document is intended to apply only to the North Area, the guidance can be applied or adapted for use for many species in the Kootenay Region (FLNRO, 2014a).
British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture	2019	Ministry of Environment and Climate Change Strategy	Ambient water quality guidelines are used to protect water values, including wildlife and their habitats, and provide the basis for evaluation of ambient water quality and environmental impact assessments to inform resource management decisions (British Columbia Ministry of Environment and Climate Change Strategy [ENV], 2019a).
Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in B.C.	2009	Government of B.C.	Guidelines for the protection and management of wetlands before, during, and after development (Cox and Cullington, 2009).
Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia	2013	B.C. Ministry of Forests, Lands, and Natural Resource Operations	Outlines current laws, guidelines, and recommendations pertaining to raptors (FLNRO, 2013)

Guideline	Year	Agency/Organization	Description
Guidelines for Amphibian and Reptile Conservation in Urban and Rural Development in British Columbia	2014	B.C. Ministry of Forests, Lands, and Natural Resource Operations	Outlines legislation protecting amphibians, as well as general guidelines for conservation (FLNRO, 2014b).
Best Management Practices for Amphibian and Reptile Salvages in British Columbia	2016	B.C. Ministry of Forests, Lands, and Natural Resource Operations	Outlines catch and release procedures, permitting and current regulations (FLNRO, 2016).
Best Management Practices for Bats in British Columbia	2016	Ministry of Environment	Provides information about potential impacts development has on bats and their habitat and guidelines on how to minimize impacts (B.C. MOE, 2016b).
Wildlife Habitat Features Field Guide (Kootenay Boundary Region)	2019	B.C. Ministry of Environment and Climate Change Strategy, Ecosystems Branch	Intended specifically for Kootenay Boundary Region Forest and range practitioners, this Field Guide assists in identifying wildlife habitat features and provides guidance on management practices (ENV, 2019b).
Cumulative Effects Framework, Elk Valley Cumulative Effects Management Framework (EV-CEMF)		Government of B.C., Elk Valley Cumulative Effects Management Framework Working Group	As part of the Provincial Cumulative Effects Framework, EV-CEMF aims to assess the historic, current, and potential future conditions of selected valued components and to support natural resource management decisions within the region (). The purpose of EV-CEMF is to develop an approach to understand cumulative effects on the environment from various industries and natural events in the Elk Valley. Grizzly Bear and Bighorn Sheep are EV-CEMF valued components (EV-CEMF Working Group, 2018).
Recovery Strategy for the Olive-sided Flycatcher (*Contopus cooperi*) *in Canada*	2016	Environment Canada	The short-term population objective for Olive-sided Flycatcher in Canada is to halt the national decline by 2025, while ensuring the population does not decrease more than 10% over this time. The long-term (after 2025) population objective is to ensure a positive 10-year population trend. The distribution objective is to maintain the current extent of occurrence in Canada. Broad strategies and approaches to achieve these objectives are outlined in this recovery strategy (Environment Canada, 2016a).
Recovery Strategy for the Common Nighthawk (Chordeiles minor) *in Canada*	2016	Environment Canada	The short-term population objective for the Common Nighthawk in Canada is to halt the national decline by 2025, while ensuring the population does not decrease more than 10% over this time. The long-term (after 2025) population objective is to ensure a positive 10-year population trend. The distribution objective is to maintain the current extent of occurrence in Canada. Broad strategies to be taken to address the threats to the survival and recovery of Common Nighthawk are presented (Environment Canada, 2016b).

33.4.1.13.4 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the WMMP are provided in Table 33.4-42.

Table 33.4-42: Responsibilities for the Wildlife Management and Monitoring Plan

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the WMMP, including meeting commitments to implement the reclamation research and monitoring programs. • Lead environmental inspections, audits and on-site monitoring programs. • Implement the revegetation plan and keep it a living document that evolves with results from the research and monitoring programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate response to and effective remediation of environmental incidents, including spills. • Report to applicable regulatory agencies as required. • Update the WMMP as required.
Project Construction Manager	• Implement and ensure compliance with the WMMP during Project Construction and Pre-Production, particularly in regard to soil and biomass salvaging. • Designate soil and biomass storage areas during Construction and Pre-Production. • Ensure completion of environmental awareness training by all employees and contractors.
NWP Mine Manager	• Implement and ensure compliance with the WMMP during Project Operations • Designate soil and biomass storage areas during Operations. • Ensure completion of environmental awareness training by all employees and contractors. • Oversee personnel resourcing for mine closure related activities. • Participate in environmental incident investigations.
Health and Safety Manager	• Oversee health and safety of personnel mine reclamation and closure activities. • Participate in environmental incident investigations. • Implement the Mine Emergency Response Plan, as required. • Complete health and safety investigations related to environmental incidents.
First Aid Personnel	• Apply first aid to personnel during mine reclamation and closure activities, as required. • Mobilize emergency transportation of personnel during environmental incidents, as required.
Security Personnel	• Limit access to Project areas mine reclamation and closure activities, as required. • Contact local law enforcement authorities for assistance, as required.
All employees and contractors	• Complete environmental awareness training. • Compliance with the WMMP.

33.4.1.13.5 Wildlife Valued Components and Species at Risk

Potential interactions between the Project and wildlife valued components (VCs) were identified within the Application/EIS. Sixteen wildlife species or groups were identified as receptor VCs for the Project. (Table 33.4-43). The selection of the wildlife VCs was based on cultural value to Indigenous Communities, important to subsistence and recreational hunters, conservation status, and indicator value of ecosystem health. The WMMP is focused on the wildlife VCs and other wildlife species at risk. The mitigation measures, however, are generally applicable to other species in the same species group.

Table 33.4-43: Wildlife Valued Components and Other Species at Risk Known to Occur Within or Near the Project Footprint

Wildlife VCs and Other Species at Risk	B.C. Status [1]	COSEWIC [2]	SARA [3]
Ungulates			
Moose (*Alces alces*)	Yellow	-	-
Elk (*Cervus elaphus*)	Yellow	-	-
Bighorn sheep (*Ovis canadensis*)	Yellow	-	-
Mountain goat (*Oreamnos americanus*)	Blue	-	-
Carnivores			
Grizzly bear (*Ursus arctos*)	Yellow	Special Concern	Schedule 1 – Special Concern
Wolverine (*Gulo gulo*)	Yellow	Special Concern	Schedule 1 – Special Concern
American badger (*Taxidea taxus*)	Red	Endangered	Schedule 1 – Endangered
American marten (*Martes americana*)	Yellow	-	-
Canada lynx (*Lynx canadensis*)	Yellow	-	-
Bats			
Little brown myotis (*Myotis lucifugus*)	Yellow	Endangered	Schedule 1 – Endangered
Northern myotis (*Myotis septentrionalis*)	Blue	Endangered	Schedule 1 – Endangered
Eastern red bat (*Lasiurus borealis*)	Yellow	-	-
Birds			
Migratory Birds, represented by:			
Olive-sided Flycatcher (*Contopus cooperi*)	Blue	Special Concern	Schedule 1 – Threatened
Barn Swallow (*Hirundo rustica*)	Blue	Threatened	Schedule 1 – Threatened
Woodpeckers (family Picidae)	-	-	-
Northern Goshawk (*Accipiter gentilis atricapillus*)	Blue	-	-
Other Bird Species at Risk:			

Wildlife VCs and Other Species at Risk	B.C. Status [1]	COSEWIC [2]	SARA [3]
Common Nighthawk (*Chordeiles minor*) [4]	Yellow	Special Concern	Schedule 1 – Threatened
Evening Grosbeak (*Coccothraustes vespertinus*) [4]	Yellow	Special Concern	Schedule 1 – Special Concern
Amphibians			
Western toad (*Anaxyrus boreas*)	Yellow	Special Concern	Schedule 1 – Special Concern
Insects			
Gillette's checkerspot (*Euphydryas gilletti*)	Blue	-	-

[1] B.C. list: Y=yellow (least risk of being lost), B= Blue (special concern), R= Red (risk of being lost (extirpated, endangered or threatened)
[2] Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designations E – Endangered; T – Threatened; SC – Special Concern; C – Candidate; NAR – Not At Risk.
[4] SARA Federal Species at Risk Act Schedule number (1-3). 1= Schedule 1, official list of wildlife species at risk.
[4] Not selected as a VC but included because of its COSEWIC/SARA conservation status.

33.4.1.13.6 General Measures

Project Activities During Sensitive Wildlife Periods

Wildlife and their nests, dens, staging, overwintering, and feeding areas should be avoided during sensitive periods (Table 33.4-44). The goals of managing Project activities during wildlife sensitive periods are as follows:

- Minimize loss of high-quality habitat and disruption to movement;
- Avoid and/or reduce human-caused disturbance in areas that contain known wallows, particularly during the ungulate breeding season and the hot summer months for grizzly bears;
- Maintain known and potential mineral licks in a natural state and ensure ungulates have access to them during the season when they are most used;
- Avoid activities within known and mapped ungulate winter ranges and calving/lambing areas;
- No destruction or disruption of any active den during any phase of the Project;
- No destruction or disruption of bat hibernacula or maternity roosts during any phase of the Project;
- No destruction or disruption of active raptor nests during any phase of the Project. Inactive raptor nests or nests found outside of the breeding season will also be maintained or relocated, as determined by a Qualified Professional and in consultation with appropriate regulators;
- No destruction or disruption of any other active bird nest during site clearing; and
- Avoid amphibian mortality to the greatest extent possible, especially during the breeding and post-breeding period.

Where avoidance of sensitive periods is not possible, pre-construction clearing surveys will be conducted (e.g., to identify nests or dens that must be avoided) (further detail provided in Section 33.4.1.13.7). When Project-activities occur during sensitive periods, setback distances will be established (as described in Table 33.4-44) and will be considered the minimum distance from which Project activities could occur, unless determined otherwise by a Qualified Environmental Professional and in consultation with regulatory agencies.

Table 33.4-44: Wildlife Sensitive Periods, Guidelines, and Recommended Minimum Target Buffer Distances for Wildlife VCs and Other Sensitive Wildlife Habitats

Species or Group	Sensitive Period	Sensitive Habitat	Guidelines and Buffers	Applicable Guidance
Moose	January 1-May 14	High quality winter range	Avoid activities within 500 metres (m) of mapped high quality winter range (low elevation riparian areas, wetlands, and shrubby areas). During this cautionary period, if disturbance is unavoidable, a mitigation and monitoring plan will be developed by a Qualified Professional.	Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development. A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia [1]
	May 15-July 15	Spring calving areas	Avoid activities within 500 m of known calving areas during this critical risk period.	
Elk	January 1-May 14	High quality winter range	Avoid activities within 500 m of mapped high quality winter range (low elevation south-facing grass dominated ecosystems, deciduous forest cover, herbaceous and shrub dominated ecosystems). During this cautionary period, if disturbance is unavoidable, a mitigation and monitoring plan will be developed by a Qualified Professional.	Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia [1]
	May 15-July 15	Spring calving areas	Avoid activities within 500 m of known calving areas.	
Bighorn Sheep	January 15–July 15 (birthing period)	Escape terrain, lambing habitats, mineral licks and mapped winter ranges	500 m no-disturbance buffer around all sensitive bighorn sheep habitats.	A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia [1]

Species or Group	Sensitive Period	Sensitive Habitat	Guidelines and Buffers	Applicable Guidance
Mountain Goat	January 15–July 15 (birthing period)	Winter range, kidding and early rearing, mineral lick use areas, escape terrain and connecting trails	500 m no-disturbance buffer around all sensitive mountain goat habitats.	A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia [1]
Grizzly Bear (includes Black Bear)	November 1–March 31 (denning period)	Dens	No disturbance buffer up to 500 m from active dens, depending on topography and site conditions, as determined by Qualified Professional.	Wildlife Habitat Features Field Guide (Kootenay Boundary Region)
Wolverine	February 1–June 29	Maternal and natal den sites	Avoid activities within 500 m of wolverine Maternal and natal den sites during the sensitive period.	A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia [1]
American Badger (includes other small carnivores)	April 15-August 15	Burrows	Avoid disturbance within 250 m buffer of active burrow.	Wildlife Habitat Features Field Guide (Kootenay Boundary Region)
American Marten and Canada Lynx (applicable to other furbearers)	March 1-September 20	Dens	Avoid activities within 60 m of an active marten den and 500 m of an active Canada lynx den.	A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia [1]
Migratory Breeding Birds (including species at risk)	April 13 to August 19	Active Nests	Species specific buffers will be selected using guidance from General Nesting Periods of Migratory Birds in Canada by a professional biologist with avian expertise (e.g., 10–50 m or more for most nests of songbirds and other small birds; 10–25 m up to 50 m or more for swallow colonies; 10–30 m up to 50 m or more for most waterfowl nests).	Wildlife Habitat Features Field Guide (Kootenay Boundary Region)

Species or Group	Sensitive Period	Sensitive Habitat	Guidelines and Buffers	Applicable Guidance
Raptors	Match to September, depending on the species	Active Nests	Species specific buffers will be selected using guidance from Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia by a professional biologist with avian expertise (e.g., a minimum buffer of 200–500 m from nesting raptors (dependent on species ability to co-exist with anthropogenic activities) with an additional breeding season quiet buffer of 100 m or more depending on the species.	Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (2013) Wildlife Habitat Features Field Guide (Kootenay Boundary Region)
Amphibians (including Western Toad)	May to August	Known breeding areas	Restrict activities at known breeding areas with minimum of 30 m buffer. Known post-breeding migratory corridors will have a 100 m buffer during migration.	Guidelines for Amphibian and Reptile Conservation During Urban and Rural Development in British Columbia - 2014
Bats (including Little Brown Myotis, Northern Myotis and Eastern Red Bat)	May 30 to September 1 October to April	Maternal roosting sites Hibernacula	100 m buffer around roost sites and hibernacula.	Best Management Practices for Bats in British Columbia Wildlife Habitat Features Field Guide (Kootenay Boundary Region)
Gillette's Checkerspot	Year-round	Occupied sites	50 m buffer around occupied sites, or as determined by a Qualified Environmental Professional. There are no least-risk periods since eggs, larvae or adults are present at all times of the year.	-

[1] While this document is intended to apply only to the North Area, the guidance can be applied or adapted for use for many species in the Kootenay Region, where other regional guidance is not available.

During the Construction and Pre-Production phase and where required during the Operation Phase, a Qualified Environmental Professional will be on site to identify sensitive wildlife features and implement appropriate procedures to minimize potential adverse effects to these areas.

Vegetation Clearing and Site Preparation

The following mitigation measures will be implemented to minimize wildlife habitat loss and degradation:

- Minimize disturbance and encroachment into natural vegetation, to the extent feasible, by clearing and grubbing only what is required for Construction and Pre-Production activities and progressive development of pits and MRSFs;
- Clear vegetation only in the year in which the area will be required for construction or operation to minimize the extent of cleared vegetation, to the extent possible;
- Sequence the development of pits and MRSF areas to limit total disturbance during any one period and maximize progressive reclamation opportunities;
- Clearing, grubbing and construction activities will be conducted in such a manner that if animals are present, there is escape;
- Progressively reclaim areas, as described in the Ecological Restoration Plan, as soon as possible to restore habitat for wildlife use;
- Implement the Erosion and Sediment Control Plan to reduce the potential for sedimentation of riparian, wetland, and aquatic habitat used by wildlife; and
- Implement the Air Quality and Greenhouse Gas Management Plan to reduce deposition of dust of vegetation that can affect plant vigour.

Roads and Traffic

Management of vehicle traffic and access contributes to minimization of direct mortality during all project phases. Traffic related measures are documented in the Traffic Control Plan and include:

- Speed limits will be clearly marked and signed on all Project access roads. Lower speed limits will be set where monitoring and wildlife observation records indicate a high-risk area for animal-vehicle collisions (e.g., at identified wildlife crossings);
- Additional road signs will be posted for wildlife crossings, speed limit changes, advisory corner speeds, areas with limited visibility, and other potential road hazards;
- Wildlife will be given the right-of-way on all Project roads;
- Wildlife sightings and incidents will be reported to the site supervisor as soon as possible;
- Project traffic will be minimized to the greatest extent practicable;
- Site workers will travel on crews buses to limit road traffic;
- Where possible, roads will be designed with clear lines of sight to increase the ability of drivers to see wildlife or other hazards;
- Vegetation along Project roadsides will be mowed/brushed as necessary to ensure visibility of wildlife and reduce the risk of wildlife-vehicle collisions; and
- Prior to winter avalanche control along the access road, avalanche control areas will be visually searched for wildlife prior to avalanche control activities; avalanche control activities will not be conducted when ungulates are present in potential slide areas.

Sensory Disturbance

Sensory disturbance to wildlife will occur from Project-related noise (equipment and blasting), light, dust, and human presence. Measures to mitigate the impact of sensory disturbance on wildlife are documented in the Noise and Vibration Management Plan and include relevant measures such as:

- Limit construction activities, especially those with high noise impact, to daytime hours;
- Appropriately time construction activities to minimize cumulative noise levels;
- Select equipment for construction activities that is appropriate for the task;
- Ensure that construction equipment at a minimum, is fitted with standard noise-damping devices such as mufflers or enclosures, where possible;
- Discourage unnecessary idling of construction equipment;
- Inform employees of noise impacts and potential mitigation/control measures through appropriate training;
- Install and maintain noise mitigation measures, where possible, on and around Project infrastructure; and
- Prior to blasting at pits, the blast area will be searched for the presence and wildlife and cleared from the area if necessary.

Directed/focused lighting will be used where possible rather than broad area lighting to minimize sensory disturbance. Light in non-essential areas will only be used, when necessary, without compromising worker safety.

Implementation of the Air Quality and Greenhouse Gas Management Plan will minimize dust around wildlife in off-site areas.

Attractants, Waste and Water Management, and Chemical Hazards

To avoid and minimize attractants that could lead to increased human-wildlife conflict, the following measures will be implemented:

- Following construction and upgrades of Project access roads, disturbed areas will be revegetated with a seed mixture that is less attractive to foraging wildlife;
- If a carcass is found along access roads, it will be reported and removed to discourage scavenging wildlife along access roads;
- To minimize attraction to roads from de-icing materials, use of salt (sodium chloride) will be minimized where possible, the road will be maintained such that concentrations of salt in pools are minimized and alternatives to salt for de-icing will be explored;
- Implementation of the measures in Waste Management Plan that includes:
    - General waste will be separated at the source and will be handled, stored, and transported off-site for disposal at an approved facility; and
    - Wildlife-proof containers will be used for temporary on-site storage of waste.

Additional measures to mitigate the impact of attractants on birds will include:

- If contaminants are present in the sediment ponds, exclusion and deterrence measures will be used to deter birds from using the waterbodies; and
    - Exclusion and deterrence measures will be used on buildings if birds are found to be nesting on or in buildings.

The Spill Prevention, Control, and Countermeasures Plan contributes to eliminating or minimizing exposure of wildlife to spills. Petroleum products and chemicals will be stored in holding tanks or closed facilities that exclude wildlife. Grey water and sewage will be contained in a closed system of holding tanks that will be pumped out as required.

Site Access Management

Access roads leading up from Grave Creek Road to the mine site will be closed to public vehicle access during Construction and Pre-Production, Operations, and Reclamation and Closure.

Employee Education

Effective staff training is an important mitigation strategy to avoid adverse effects to wildlife and wildlife habitat. Regular training of, and reminders to, personnel and contractors will be carried out throughout the Project that are appropriate to their tasks and responsibilities. All workers (and all visitors to a lesser extent) will participate in a detailed site orientation, either immediately prior to and/or when arriving to site, that will include general wildlife education and a more specific discussion regarding the WMMP, how to avoid or limit human-wildlife encounters, and rules pertaining to traffic management and wildlife attractants. Detailed on-site training records will be maintained by the Environmental Manager.

On-site education and awareness training will include:

- Relevant acts and regulations pertaining to protection of wildlife;
- Responsibilities of all site personnel and contractors for environmental protection;
- Responsibilities of all site personnel and contractors to follow wildlife-related mitigation and practices and other management plans, reporting procedures of wildlife observations and wildlife incidents reporting;
- Identification of Species at Risk potentially in the area, potential use of anthropogenic structures and habitats, and reporting procedures;
- Bear awareness training and response;
- Procedures regarding waste and wildlife attractant management and the possible implications of food conditioning and unsecured wildlife attractants; and
- Accidental spill and emergency response, including rapid deployment and containment approaches, as outlined in the Spill Contingency and Mine Emergency Response Plan.

33.4.1.13.7 Species-Specific Wildlife Protection Measures

Dens of Grizzly Bear, American Badger, and Other Carnivores

In advance of all clearing, surveys for dens in high potential denning habitat for grizzly bear and American badger will be conducted. If an active den of any carnivore is found, an appropriate no-disturbance buffer will be established, and protective management strategies developed.

Birds

The Project area contains a wide variety of habitats that provide breeding habitat for many bird species including raptors, waterbirds, waterfowl, shorebirds, and upland birds, including several species at risk. Beneficial management practices to reduce risk to migratory birds will be developed. In addition to the

Project design and general mitigation measures identified above, Beneficial management practices will include the following:

- The majority of vegetation clearing during Construction and Pre-Production and Operations will occur outside of the general nesting period for most migratory birds in the region (April 13 to August 19);
- For raptors that may nest earlier in the season (as early as March 15), pre-disturbance stick-nest surveys will be conducted by a Qualified Environmental Professional if clearing is to occur in this period. If an active nest is found, an appropriate no-disturbance buffer will be established;
- If limited vegetation clearing during the general nesting period for most migratory birds in the region (April 13 to August 19) is unavoidable, the following protocol will be followed:
    - Breeding bird point counts will first be conducted to determine the potential presence of breeding birds;
    - If the area to be cleared is limited in size and habitat complexity is low (e.g., open habitats with few trees), nest searches will be conducted; and
    - If an active nest is found during a nest search or at any other time, a specific no-disturbance buffer appropriate for the species will be established and maintained until the young have fledged.

Bats

Pre-clearing bat roost and hibernaculum surveys will be conducted in areas considered to have high potential for roosting or hibernation. If an active roost site is identified, the tree will not be felled and a suitable buffer zone will be maintained during the maternal roosting period, or FLNRORD (or the appropriate governing agency) will be contacted for guidance. No bat hibernaculum or any caves that may support hibernating bats were identified during the baseline surveys. If a cave-based bat hibernaculum is found during pre-clearing surveys, FLNRORD, or the applicable provincial government agency will be notified and mitigation enacted, as directed.

For blasting activities in the vicinity of roosting or hibernating sites (in the event that any are identified), procedures described in B.C. Ministry of Environment (2016) will be followed, specifically:

- Either ensure sound concussion of less than 150 decibels and that shock wave is less than 15 pound-force per square inch (p.s.i.) and the peak particle velocity is less than 15 millimetres/second (mm/s); or
- Maintain a setback of 2 kilometres from occupied significant roost sites (if any are determined). Blasting may occur during periods when bats are not occupying a roost (if any are identified); however, ensure that the roost habitat is not degraded.

Decontamination protocols to minimize the introduction and transmission of white-nose syndrome will be followed in all cases where bats are present likely present (e.g., caves); signs of white-nose syndrome symptoms on bats will be immediately reported to the B.C. Ministry of Environment and B.C. Wildlife Health Program.

Amphibians

Where avoidance of sensitive time periods (breeding and post-breeding) is not possible, pre-disturbance surveys will be conducted for amphibian presence. If amphibians are observed, working areas will be outside the established buffer zone and, where required, temporary fencing may be used to prevent

access to critical habitats. An amphibian salvage program will be implemented if wetlands will be lost during the breeding season.

Gillette's Checkerspot

Gillette's checkerspot was not observed within the footprint during baseline surveys; however, since suitable habitat exists, there is still potential for presence. To verify predictions and as a mitigation measure, pre-disturbance surveys for Gillette's checkerspot will be completed in high-quality habitats within the Project footprint. Locations of high-quality Gillette's checkerspot habitat will be identified based on and informed by the baseline surveys, the habitat suitability mapping, and terrestrial ecosystem mapping. High-quality habitats within disturbance footprints will then be surveyed during the prime flight window for the species and during weather conditions suitable for adult butterfly activity. If Gillette's checkerspot are identified within the Project footprint, a management strategy will be developed by a Qualified Environmental Professional and in consultation with regulatory agencies.

33.4.1.13.8 Monitoring

Monitoring will be used to demonstrate environmental compliance, to verify the effectiveness of mitigation measures where there is uncertainty, to verify environmental effects predictions, and to identify unanticipated Project-related effects so that new mitigation can be developed. Where environmental effects exceed that predicted under the effects assessment, or mitigation measures prove to be ineffective, alternative strategies will be developed to adaptively manage the Project's effects on wildlife. Financial resources associated with the monitoring program will be provided in the future as part of the permitting process and cannot be provided at this time as the extent of monitoring programs will be dictated to a large degree by specific certificate and permitting conditions developed in collaboration with Indigenous groups and regulatory agencies. The wildlife monitoring program and related mitigation measures are not expected to pose a risk to the environment and as such, no additional intervention measures are presented at this time as it relates the program. Details on the approach to interventions and strategies to protect the environment is provided in Section 33.2.4 as it relates to the adaptive management framework.

The pre-disturbance surveys for specific species or groups described previously are mitigation measures, though the results of those surveys will be used to evaluate the effectiveness of mitigation and to verify predictions.

A wildlife effects monitoring program will be developed that will include at least the following components:

- Monitoring of footprint and habitat losses/gains, coordinated with similar monitoring described in the Vegetation and Ecosystems Management and Monitoring Plan, to track and compare the planned footprint with actual footprint and to track ecological restoration;
- Recording and reporting on bird surveys (including raptor nest monitoring) conducted prior to vegetation clearing, including observations of bird nest sites, correspondence with regulatory agencies, and any monitoring or additional mitigation undertaken;
- During the amphibian breeding period, inspection of ponds and wetland areas prior to construction or disturbance activities for observations of amphibian congregations and breeding sites and recording and documenting any inspections, observations, and additional mitigations undertaken;

- Regular inspection of construction fences or flagged no-disturbance buffers around identified important wildlife habitat or features;
- Regular inspection of waste disposal facilities for non-compliance and potential wildlife attractants or wildlife occurrence;
- Recording and reporting on wildlife mortality, incidents, accidents, or near misses, documenting any correspondence with regulatory agencies, and documenting any additional mitigations undertaken;
- Recording and monitoring of use of Project infrastructure by wildlife;
- Developing a wildlife observation reporting procedure and form and maintaining an on-site log of wildlife observations;
- Developing and implementing efforts of employee education and environmental awareness, including bear interactions; and
- Monitoring of species occurrence at the local level by Project personnel documenting incidental observations of wildlife (i.e., wildlife sighting and incidents).

Two additional studies will be included in the wildlife effects monitoring program. The conveyor will be elevated to at least 2.4 m above ground at intervals of two per 1,000 m to create underpasses to allow animal passage beneath the conveyor. Use of the conveyor underpasses and habitats adjacent to the conveyor will be dependent on their sensitivity to the physical presence of the conveyor and the noise that is generated. To verify the effectiveness of the underpasses to allow animal passage and to verify the predicted effects on wildlife, a program will be developed to monitor ungulate and carnivore use of underpasses and areas immediately adjacent, using remote wildlife cameras.

A north-south corridor that connects the Erickson Ridge to Sheep Mountain through Grave's Creek Canyon is known to occur. Measures to mitigate the effects of increased traffic volume along Grave Creek Road on the frequency of crossing by wildlife will be implemented; however, there is uncertainty on their effectiveness. To verify the effectiveness of mitigation measures and verify the effects predictions made in the Application/EIS, a program will be developed to monitor ungulate and carnivore movement across Grave Creek Road at Grave Creek Canyon and in areas immediately adjacent (for comparison) using remote wildlife cameras, similar to the program for the overland conveyor.

A summary of the wildlife monitoring program is provided in Table 33.4-45.

Table 33.4-45: Summary of Wildlife Monitoring

Monitoring Component	Follow-up and Monitoring Measure	Timing (Phase)	Timing (Years)
Footprint Monitoring	Monitoring of footprint and habitat losses/gains, coordinated with similar monitoring described in the Vegetation and Ecosystems Management and Monitoring Plan, to track and compare the planned footprint with actual footprint and to track ecological restoration.	Construction and Pre-Production and Operations phases	Prior to disturbance in Years -2 to 15

Monitoring Component	Follow-up and Monitoring Measure	Timing (Phase)	Timing (Years)
Birds	Recording and reporting on bird surveys (including raptor nest monitoring) conducted prior to vegetation clearing, including observations of bird nest sites, correspondence with regulatory agencies, and any monitoring or additional mitigation undertaken.	Construction and Pre-Production and Operations	Prior to disturbance in Years -2 to 15
Amphibians	During the amphibian breeding period, inspection of ponds and wetland areas prior to construction or disturbance activities for observations of amphibian congregations and breeding sites and recording and documenting any inspections, observations, and additional mitigations undertaken.	Construction and Pre-Production Operations	Prior to disturbance in Years -2 to 15
Boundary and buffer inspections	Regular inspection of construction fences or flagged no-disturbance buffers around identified important wildlife habitat or features.	Construction and Pre-Production Operations	Years -2 to 15
Waste disposal inspections	Regular inspection of waste disposal facilities for non-compliance and potential wildlife attractants or wildlife occurrence.	Construction and Pre-Production, Operations, Reclamation and Closure	Years -2 to 20
Wildlife mitigation and monitoring program reporting	Recording and reporting on wildlife mortality, incidents, accidents, or near misses, documenting any correspondence with regulatory agencies, and documenting any additional mitigations undertaken.	Construction and Pre-Production, Operations, Reclamation and Closure	Years -2 to 20
	Developing and implementing efforts of employee education and environmental awareness, including bear interactions.	Construction and Pre-Production, Operations, Reclamation and Closure	Years -2 to 20
	Recording and monitoring of use of Project infrastructure by wildlife.	Construction and Pre-Production, Operations, Reclamation and Closure	Years -2 to 20
Wildlife use reporting	Developing a wildlife observation reporting procedure and form and maintaining an on-site log of wildlife observations.	Construction and Pre-Production, Operations, Reclamation and Closure	Years -2 to 20
	Monitoring of species occurrence at the local level by Project personnel documenting incidental observations of wildlife (i.e., wildlife sighting and incidents).	Construction and Pre-Production, Operations, Reclamation and Closure	Years -2 to 20

Monitoring Component	Follow-up and Monitoring Measure	Timing (Phase)	Timing (Years)
Conveyor follow-up monitoring	To verify the effectiveness of the underpasses to allow animal passage and to verify the predicted effects on wildlife, a program will be developed to monitor ungulate and carnivore use of underpasses and areas immediately adjacent, using remote wildlife cameras.	Construction and Pre-Production, Operations	Year -1 to Year 5. Annual interim reporting of results and final reporting after Year 5.
Road crossing follow-up monitoring	To verify the effectiveness of mitigation measures and verify the effects predictions, a program will be developed to monitor ungulate and carnivore movement across Grave Creek Road at Grave Creek Canyon and in areas immediately adjacent (for comparison) using remote wildlife cameras.	Construction and Pre-Production, Operations	Year -1 to Year 5. Annual interim reporting of results and final reporting after Year 5.

Over the course of the Project, NWP will use an Environmental Management System (EMS) based on key components of International Organization for Standardization (ISO) 14001 (see Chapter 33, Section 33.2 for more information). The EMS will provide the structure and procedures for implementing environmental management plans, ensuring compliance with regulations and permit requirements, and continuously improving environmental protection measures and environmental performance. The EMS, the accompanying Environmental Policy (Appendix 1-F), and the NWP Employee Code of Conduct (Appendix 1-B) form the basis through which NWP will require contractors and sub-contractors to comply with environmental management programs, adhere to regulatory permitting requirements, and achieve auditing programs. Through the EMS, NWP will monitor the Project's performance against established objectives and standards and will correct environmental management strategies where necessary by implementing contingency measures and corrective actions.

33.4.1.13.9 Reporting Requirements

NWP will report annually on the findings of the wildlife monitoring. Annual reporting will include, but not be limited to:

- Summarize wildlife mitigation measures implemented;
- Describe any investigations of Project-related wildlife mortality, the results of the investigations, and any corrective actions taken; and
- Summarize any consultation with regulators, Project-related working groups, Indigenous groups, or stakeholders regarding on-site wildlife issues.

Every three years, or as appropriate based on data collection, NWP will review the results of the annual monitoring and develop a detailed report that includes a retrospective analysis and assessment of trends in monitoring results.

33.4.2 Health and Safety

33.4.2.1 Access Management Plan

33.4.2.1.1 Introduction

The Access Management Plan (AMP) was created to manage mine traffic, Mine site, mine road maintenance, road safety and management of the environment along the transportation route and on access roadways.

This AMP is a conceptual plan, which NWP will revise and include additional site-specific details prior to construction. Further, NWP will strive to continually improve the AMP throughout the life of the Project, through the use of advanced technologies and implementation of management practices that will further reduce the risk or potential effects of a health and safety incident on human health and the environment.

33.4.2.1.2 Scope and Objectives

The AMP will provide administrative, policy plans and commitments for the transportation routes with clearly defined procedures for road users to follow. Each of the plans and procedures created will apply to all phases of the Project. The objective of the AMP is to ensure the access road is maintained, and used in a manner that is safe to road users; potential adverse effects on the environment are tracked, recorded and mitigated; and to ensure that all existing transportation route roads are used in a safe manner. The AMP will describe the plan and procedures as guidelines for the management of construction and maintenance activities.

The AMP was prepared to meet the following objectives:

- Provide a framework for the responsible management of the Access Management Plan to all Project personnel;
- Define the regulatory requirements, roles and responsibilities, and reporting requirements associated with access management;
- Describe the management practises to be implemented to reduce risk of the health and safety of Project personnel; and
- Outline the monitoring program that will be implemented to assess the performance of the AMP and identify areas in the plan that can be improved through the use of adaptive management strategies.

33.4.2.1.3 Regulatory Requirements

There are several provincial legislative requirements applicable to the AMP. These requirements and their primary components related to health and safety management are provided in Table 33.4-45.

Table 33.4-45: Provincial Regulatory Requirements for Access Management

Regulation/Policy	Year	Applicable Regulations or Permits
Provincial Legislation		
Mines Act	1996	The *Mines Act* protects both employees and the general public to minimize health and safety and environmental risks associated with mining related activities (Government of British Columbia, 1996a).

Regulation/Policy	Year	Applicable Regulations or Permits
Mineral Tenure Act	1996	The *Mineral Tenure Act* includes that the definition of "mineral" means an ore of metal, or a natural substance and indicates that it specifically excludes types of deposits e.g., coal, petroleum, natural gas, marl, earth, soil, peat, sand, gravel. (R.S.B.C. 1996, c. 292, s.1)
Forest Act (1996c)	1996	The *Forest Act* instructs on the disposition of Timber and forms of rights to Crown Timber Rights to Crown timber. (Government of British Columbia, 1996c)
Transportation Act (2004)	2004	The *Transportation Act* purpose is to enter into arrangements or agreements, including, without limitation, exchange of information, or for the payment of sharing the cost of transportation. (Government of British Columbia, 2004, bill 47)
Motor Vehicle Act	1996	The *Motor Vehicle Act* protects the general public to minimize motor vehicle impacts and institutes standards for motor vehicle operations and that of the operator. (Government of British Columbia, 1996, c 318)
Forest and Range Practices Act (FRPA)	2002	The *FRPA* governs forest and range activities on public lands in B.C., during and including forest planning, road building, timber harvesting, reforestation. (Government of British of Columbia, 2002a)
Fisheries Act and Fish-Stream Crossing Guidebook	1985	The *Fisheries Act* and Fish-Stream Crossing Guidebook is for the proper management and control of fisheries, and the conservation and protection of fish and fish habitat. (Government of British Columbia, 19985, c. F-14)
Wildlife Act	1996	The *Wildlife Act* provides protection and conservation of wild animals with defined controls for hunting, trapping, possession of wildlife and wildlife parts. ((Government of British Columbia, RSBC 1996)
Species at Risk Act	2002	The *Species at Risk Act* is the protection of Species identified at risk and recognition or protecting species at risk. (Government of Canada S.S. 2002, c. 29)

33.4.2.1.4 Roles and Responsibilities

The key roles and responsibilities for implementation and management of the Access Management Plan are provided in Table 33.4-46.

Table 33.4-46: Roles and Responsibilities of the Access Management Plan

Role	Responsibilities
NWP Mine Manager	• Overall implementation and review of the Health and Safety Management Plan (HSMP), including meeting commitments to implement health and safety management and monitoring programs. • Assume overall responsibility for the health and safety of Project personnel. • Establish a Joint Occupational Health and Safety Committee. • Serve as a management member of the Joint Occupational Health and Safety Committee. • Review inspections, audits and on-site monitoring programs. • Ensure appropriate response to health and safety incidents and complaints.

Role	Responsibilities
	• Ensure completion of health and safety awareness training by all employees and contractors. • Oversee personnel resourcing for health and safety response. • Report to applicable regulatory agencies, as required. • Update the HSMP, as required.
Project Construction Manager	• Implement and ensure compliance with the HSMP during Project Construction and Pre-Production. • Provide and deploy health and safety mitigation measures within the Project site during Construction and Pre-Production. • Ensure completion of health and safety awareness training by all employees and contractors. • Serve as a management member of the Joint Occupational Health and Safety Committee.
Environmental Manager	• Oversee environmental of personnel during the occurrence of a health and safety/environmental incident. • Lead environmental incident investigations. • Implement environmental awareness training for all employees and contractors. • Implement the Mine Emergency Response Plan, as required. • Ensure health and safety/environmental resources are made available to all Project personnel. • Track and keep records of all environmental information for the Project, including inspection, incident, and investigation reports. • Serve as a management member of the Joint Occupational Health and Safety Committee.
Security Personnel	• Limit road access following a health and safety/environmental incident, as required. • Contact local law enforcement authorities for assistance, as required.
All employees and contractors	• Complete Road Access awareness training. • Compliance with the AMP.

33.4.2.1.5 Health and Safety Management Practices and Procedures

The AMP provides a range of practices and procedures that will be implemented to avoid or minimize the potential risk to the health and safety of workers on the Project, and to appropriately respond to and mitigate health and safety incidents should they occur during any phase of the Project. These practices and procedures will be further refined and detailed throughout the Project permitting process and will be updated with more site-specific information prior to the commencement of constriction.

Prior to the start of construction, the AMP will describe the following performance practices and how they will be achieved.

- Follow laws and regulations related to traffic and highway/road use;
- Implement reasonable mitigations to avoid and minimize risk to the environment; and
- Implement reasonable mitigations to avoid and minimize risk to the safety of Project personnel and the public.

Mine Access

All equipment, materials, supplies and personnel will be transported to the Project using Highway 3 and 43. The majority of personnel working on the Project will be housed in Sparwood, Elkford, Fernie and Crowsnest Pass with transportation via buses to the Project.

The access road is the sole land-based entry and exit corridor to the Project. It consists of a shared existing roadway with Teck, other industry, rural residents and visitors; and portions will be upgraded from forestry standards to allow for safe use as part of the clean coal haul.
Project-related traffic will be significantly less during the Pre-Production phase of the Project and will be at its peak during Construction and Operations phases of the Project. Traffic will then be less during the Reclamation and Closure phase and Post-Closure phase. Types of vehicles expected during all phases of the Project are that of legal freight load, oversize freight loads, fuel trucks, passenger buses and passenger cars; and on portions of the route clean coal highway trucks. Only authorized vehicles will be allowed access to proceed through the gated entrance to the Project.

Traffic Management Procedures

Traffic management procedures will be developed prior to the start of construction as part of the AMP. It describes the administration, policy and commitments along all transportation routes involved with the Project and is intended to be used primarily with management and access road contractors. The procedures outlined will instruct on how to perform traffic management during construction and operational phases of the Project. The procedures will include:

- Information on existing bridge load ratings and limiting dimensions;
- Road safety information, monitoring, and compliance;
- Speed limit monitoring and enforcement;
- Spill response planning and implementation; and
- Road sharing information for portions of the access road where the public and mine traffic will interact, including safety signage and information for the public.

Vehicle Operation and Safety Procedures

Vehicle Operation and Safety Procedures (VOSP) will be developed prior to the commencement of construction to ensure the safe movement of all mine-related traffic along the transportation routes based primarily for road users. The VOSP plan includes:

- Detailed procedures outlining proper etiquette, how to drive each road segment safely;
- Description of activities within the corridor;
- Identification of key personnel and contact information, such as security and traffic control personnel;
- Road use information and any road use contracts if in place;
- Road map, radio frequency information and signage map;
- Spill reporting and procedures; and
- Safety and courtesy for those portions of the access road where the public and mine traffic will interact.

User Safety

The AMP will describe how the access road will be constructed, operated and maintained with mitigation of potential safety concerns. In order to minimize the risk of collisions, roadside vegetation will be cleared initially through the Construction and Pre-Production phase, and then periodically throughout the life of the project as part of the road maintenance program. Speed limit signage will be posted as per the appropriate geometry (i.e., curves, grades) of the various sections of the access road.

Environmental Protection Measures

The AMP will describe how the Access Road will be constructed, operated and maintained with mitigation of potential adverse environmental effects. Relevant Project Management plans such as the ERP, ESCP, Wildlife Management and Monitoring Plan, and Fish and Fish Habitat Management Plan will be incorporated into the AMP. Such topics of discussion include surface and groundwater quality, aquatic habitat, wildlife, and air quality.

Blasting Near Fish-Bearing Waters

Blasting is expected to occur near fish-bearing waters which includes noise, vibration, and possible blasting residue that could enter the watercourse and have adverse effects on fish and the aquatic environment without use of special care. In order to reduce any hazardous effect to fish and/or fish habitat, all blasting operations near fish-bearing water will follow the requirements established in the DFO "Guidelines for Use of Explosives In or Near Canadian Fisheries Waters" (Wright and Hopky 1998):

- Blast mats must be used to prevent fly-rock from entering the watercourse;
- No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change greater than 100 kilopascals in the swim bladder of a fish; and
- No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 millimetres (mm) per second in a spawning bed during the period of egg incubation.

Placement of Riprap

The following BMPs are recommended to minimize the effects to fish habitat in any crossing locations or areas of fill that require riprap placement:

- Clearly mark vegetation clearing limits prior to the commencement of clearing activities while limiting clearing to the footprint of the crossing or toe of slope;
- Ensure that riprap placed below the high-water mark is clean and free of fines that could generate sediment loading;
- Ensure riprap is a mixture of size classes, rather than a uniform size class; this creates interstitial spaces that can provide habitat to small-bodied and juvenile fish;
- Pull back cleared vegetation away from the water rather than pushing towards the water;
- Re-contour banks prior to placing riprap making sure to pull all material away from the water; and
- Time works to ideally occur during periods of low water to minimize in-water works whenever possible. Procedures may be modified if work is completed outside of the low water period.

Fording Equipment

When there is a requirement for fording equipment to construct crossings or perform other required work, the following BMP's will be followed in order to reduce the risk to aquatic environment (B.C. MFLNRO 2012).

- Conduct crossings at slow speed, with a steady pace to prevent bogging;
- Do not stop while crossing the channel;
- Do not allow equipment to work from within the wetted channel;
- Do not allow matting or other protective materials to excessively constrict flow, or block fish passage;
- Material is to be pulled back from the water to construct ramps to facilitate equipment crossings;
- Remove matting immediately after crossing; and
- Stream banks are to be protected with matting the in the event that rutting, or damage could occur to the stream bank (e.g., swamp mats, rubber tire mats, logs, etc.).

33.4.2.1.6 Reporting Requirements

NWP's reporting will be conducted as per future permits, authorizations and approvals that are relevant for the use and maintenance of the access road. It will be delivered to the Mine Manager and/or authorized delegates. The development of auditing of this program will be implemented prior to the start of construction in relation to applicable compliance checks and QA/QC. Audit findings and reports will be included in NWP's reporting system, including records of the dates the audit took place, what was checked/reviewed in the audit process, personnel involved, and the corrective actions carried out.

The Environmental manager will be responsible for the implementation of the AMP and is to inform, report to the Mine Manager. All employees, contractors and contractor employees are responsible for complying with the intent of this plan and its procedures laid out.

Components of the AMP may need modification based on site experience or changes in legislation or best practices. The plan shall be audited and reviewed for effectiveness and to identify components needing correction, adjustment or upgrading. All formal evaluations of the plan will be documented, deficiencies noted and tracked with correct follow up. Addressing deficiencies will be assigned to ensure accountability with deadlines for addressing the required changes and training for those involved.

33.4.2.1.7 Operations and Maintenance Monitoring Program

The access road is a key component of the Project infrastructure and will be subject to a comprehensive and ongoing maintenance program to ensure the integrity of the road and protection of the environment. This program includes regular inspections of road surfaces, bridges, culverts and dangerous tree/snags that have the potential for risk. Maintenance will be done as needed and will include grading, applications of granular material for traction control in winter conditions, snow ploughing, dust control, roadside vegetation management and ditch and culvert cleaning. Appropriate signage will be placed on each roadway to establish speed limits and warn of road-use hazards. Breaks in snowbanks will provide escape routes to wildlife with right away given by drivers.

Emergency and hazardous spill response plans will be developed for the access road for the Construction and Pre-Production, Operations, and Reclamation and Closure phases of the Project.

A snow management strategy will be essential to maintaining the safety of personnel and wildlife, open access and allowing planned earthwork to progress on either side of the shut-down period to allot for the high levels of snowfall in the winter.

A gate will be installed at the main access to the Project site and personnel will control vehicle access to the Project to those with authorization. Frequently used gate personnel with authorization from NWP may be provided with a key, with infrequent users to be provided with a temporary key.

Adjustments to the plan may change during the mine's Construction and Pre-Production, Operations, and Reclamation and Closure activities. The plans best practices include anticipation of the likely risks and preparedness of unusual circumstances.

33.4.2.2 Mine Emergency Response Plan

33.4.2.2.1 Introduction

The Mine Emergency Response Plan (MERP) has been prepared to provide on-site personnel and contractors with a framework of emergency response measures that will be employed in the event of an emergency situation during the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project. These measures will be implemented to avoid and/or mitigate adverse effects of emergency situations on human health and safety, the environment, and Project property/equipment.

The MERP is a conceptual plan, which NWP will continue to develop and include additional, site-specific details as Project application and permitting process progresses. Further, NWP will strive to continually improve the MERP throughout the life of the Project, through the use of advanced technologies and implementation of management practises that will further reduce the likelihood risk of potential effects of emergencies on human health, the environment, and Project property/equipment.

33.4.2.2.2 Scope and Objective

The MERP was prepared to meet the following objectives:

- Provide a framework for the appropriate prevention, response and management of emergency incidents;
- Define the regulatory requirements, roles and responsibilities and reporting requirements associated with emergency response;
- Describe the environmental protection measures and management practises to be implemented to reduce the risk of potential impacts of emergency incident in human health and the environment; and
- Outline the monitoring programs that will be implemented to assess the performance of the Mine Emergency Response Plan and identify areas in which the plan can be improved through the use of adaptive management strategies.

The emergency response procedures included in this MERP are applicable to and will be implemented throughout the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project phases of the Project. Further, this MERP is applicable to the Project footprint, transportation routes associated with the Project, and undeveloped areas in the vicinity of the Project.

Once fully developed, the MERP will meet the requirements of a Mine Emergency Response Plan, as described in Section 3.7.1 of the Health, Safety and Reclamation Code for Mines in British Columbia (B.C.; B.C. Ministry of Energy and Mines [MEM], 2021), and will include the following information:

- An outline of the response procedures essential to the effective and timely management of an emergency event associated with the Project;
- The elements of a Mine Emergency Response Plan, as outlined in the Mine Emergency Response Plan Guidelines for the Mining Industry (B.C. Ministry of Energy, Mines, and Petroleum Resources, 2017);
- Emergency preparedness and response plans specific to tailings storage facilities; and
- The potentially affected local and Indigenous Communities in the identification of potential hazards, emergency communications, and response measures.

The MERP will build upon the Mine Emergency Response Plan that was used as part of the Project exploration.

33.4.2.2.3 Regulatory Requirements

There are several federal and provincial legislative requirements applicable to this ERP. These requirements and their primary components related to this plan are provided in Table 33.4-47.

Table 33.4-47: Federal and Provincial Regulatory Requirements for Mine Emergency Response Plan

Regulation/Policy	Year	Applicable Regulations or Permits
Federal Legislation		
Canadian Environmental Protection Act	1999	The *Canadian Environmental Protection Act* promotes sustainable development through preventative measures of pollution including details of programs related to air, water, and hazardous waste pollutants in the interest of protecting the environment and human health. Governs the requirements for environmental emergency plans.
Environmental Emergency Regulations	2003	The *Environmental Emergency Regulations* describe substances and the concentrations and quantities they are likely to explode at or are hazardous to humans when inhaled. This regulation details when an emergency response plan is required in regards to the substances listed and reporting requirements in the event of an emergency. The Environmental Emergency Regulations are enforced under the *Canadian Environmental Protection Act*.
Fisheries Act	1985	The *Fisheries Act* protects all fish and fish habitat through protection of oceans and water bodies. This act provides permitting and code of practice to allow for responsible development around fish and fish habitat. The act restores protection against activities such as harmful alteration, disruption, or destruction of fish habitat while protecting biodiversity and addressing urgent threats to conservation and fisheries.
Transportation of Dangerous Goods Act	1992	The *Transportation of Dangerous Goods Act* promotes safe handling and safety requirements when transporting dangerous goods.

Regulation/Policy	Year	Applicable Regulations or Permits
Department of Health Act	1996	The *Department of Health Act* promotes and protects the health and well-being of people including those in modes of transportation (i.e., rail, ship, air).
Provincial Legislation		
Forest and Range Practices Act	2002	The *Forest and Range Practices Act* addresses all forest and range practices including resource-based activities that are conducted on Crown lands in the Province of British Columbia. Through this Act, high levels of protection are provided to the environment. The act provides a streamlined planning process for all development. Forest and range licensees' are subject to the act during all stages of the Project.
Mines Act	1996	The *Mines Act* protects both employees and the general public to minimize health and safety and environmental risks associated with mining related activities.
Health, Safety and Reclamation Code for Mines in British Columbia	2008	The Health, Safety and Reclamation Code for Mines in British Columbia details the potential health and safety issues attributed to waste handling and storage to human health and the environment. Provides details on how to handle, store, and manage these waste materials on site (B.C. MEM, 2021).
Environmental Management Act	2003	The *Environmental Management Act* regulates industrial waste discharge, pollution, hazardous waste and contaminated site remediation. This act provides the authority to introduce waste into the environment while protecting environmental and human health. The act enables permits, regulations, and codes of practice to authorize this discharge and details enforcement options including administrative penalties, orders, and fines to encourage compliance.
Spill Reporting Regulation	1990	The *Spill Reporting Regulation* details reportable levels for specific substance spills including substance class spills and reportable amounts under the *Environmental Management Act*.
Contaminated Sites Regulation	1996	The *Contaminated Sites Regulation* is enforced under the *Environmental Management Act*. This regulation defines how to profile a site, register a site, determine if a site is contaminated and if so the remediation standards and liability of the site. The regulation provides details on remediation plan approvals and certificates for completion of remediation.
Spill Cost Recovery Regulation	1998	The *Spill Cost Recovery Regulation* is enforced under the *Environmental Management Act*. This regulation details how to determine the reasonable cost of a spill.
Wildlife Act	1996	The *Wildlife Act* states that a facility needs to be operated in accordance with the *Environmental Management Act* so as to not attract wildlife.
Water Sustainability Act	2014	The *Water Sustainability Act* ensures fresh and clean water remains at a sustainable supply to meet the needs of the Province of British Columbia. This act addresses the management including diversion and use of water resources. The goal of the act is to protect, manage and use water efficiently.

Regulation/Policy	Year	Applicable Regulations or Permits
Public Health Act	2008	The *Public Health Act* deals with emerging health issues including environmental health hazards that are not covered off by other acts. This includes the ability to regulate operations, activities or conditions that pose a health hazard.
Fire Services Act	1996	The *Fire Services Act* provides details on fire investigation, prevention, and suppression.
British Columbia Fire Code Regulations	2013	The British Columbia *Fire Code Regulations* are enforced under the *Fire Service Act*. Under this regulation inspections of buildings and facilities is required to ensure compliance with the British Columbia Fire Code.
Motor Vehicle Act	1996	The *Motor Vehicle Act* details registrations, licenses, and insurance needed to operate a motorized vehicle in the Province of British Columbia. It establishes rules of the road traffic control device standards, commercial vehicle weight scales and vehicle safety standards, inspection and enforcement.
Transportation Of Dangerous Goods Act	1996	The *Transportation of Dangerous Goods Act* establishes safety requirements when handling or transporting dangerous goods by road, rail, air, or water.
Transportation of Dangerous Goods Regulations	2001	The *Transportation of Dangerous Goods Regulations* provide classifications of dangerous goods, required documentation, training requirements, and responsibilities required to possess these goods, emergency response planning, and reporting requirements. These regulations are enforced under the *Transportation of Dangerous Goods Act*.
Workplace Hazardous Materials Information System (WHMIS)	2015	WHMIS provides information on hazardous materials and products so that workers are trained to protect themselves (Government of British Columbia, 2015).

33.4.2.2.4 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the MERP are provided in Table 33.4-48.

Table 33.4-48: Roles and Responsibilities of the Mine Emergency Response Plan

Role	Responsibilities
Project Construction Manager	• Implement and ensure compliance with the MERP during Project Construction and Pre-Production. • Ensure completion of emergency response training by all employees and contractors.
NWP Mine Manager	• Implement and ensure compliance with the ERP during Project Operations. • Ensure completion of emergency response training by all employees and contractors. • Oversee personnel resourcing for the MERP. • Participate in investigations following emergency events.

Role	Responsibilities
Health and Safety Manager	• Oversee health and safety of personnel during the occurrence of an emergency event. • Participate in investigations following emergency events. • Implement procedures of the MERP, as required. • Complete health and safety investigations related to emergency events.
NWP Environmental Manager	• Participate in the implementation and review of the MERP, specifically with regard to environmental emergency events. • Ensure alignment of MERP procedures with those outlined in the Spill Prevention, Control, and Countermeasures Plan (SPCCP). • Lead environmental inspections, audits and on-site monitoring programs. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate response to and effective remediation of environmental emergency events. • Lead environmental incident investigations. • Report to applicable regulatory agencies, as required. • Update the MERP, as required.
First Aid Personnel	• Apply first aid to personnel during emergency events, as required. • Mobilize emergency transportation of personnel during emergency events, as required.
Security Personnel	• Limit access to Project areas following an emergency event, as required. • Contact local law enforcement authorities for assistance, as required.
All employees and contractors	• Complete emergency response training during onboarding. • Compliance with the MERP.

33.4.2.2.5 Relevant Project Activities

Throughout all phases of the Project there is potential for the occurrence of accidents, malfunctions, and unplanned events, which may require the initiation of the ERP. These events include, but are not limited to:

- Spills, discharge or leaks of hazardous materials in both terrestrial and aquatic environments (See Section 33.4.1.10 - Spill Prevention, Control, and Countermeasures Plan [SPCCP]);
- Stockpile discharges or failure including ore, mine rock, or contaminated soils;
- Containment structure leaks or failures such as the tailings ponds;
- Sediment releases into waterbodies and/or watercourses (see Section 33.4.1.4 for the Erosion and Sediment Control Plan for response measures pertaining to sediment releases);
- Equipment malfunctions and accidents;
- Fires;
- Explosions; and
- Construction and operational hazards such as fly rock and debris from blasting, or mine failure.

33.4.2.2.6 Emergency Response Procedures

The MERP provides a range of control measures that will be implemented to prevent or reduce the potential for the occurrence of an emergency on the Project, and to appropriately respond to and mitigate

the emergency should it occur during any phase of the Project. These measures will be further refined and detailed throughout the Project permitting process and will be updated with more site-specific information prior to the commencement of construction.

Emergency Prevention

While the MERP outlines the processes and procedures to respond to an emergency on the Project, NWP's primary goal is to prevent an emergency situation from occurring during all phases of the Project. Implementation of the following measures will contribute to the effective prevention of emergencies:

- Site conditions will continually change throughout the life of the Project; as such, all areas of the Project footprint will be inspected at regular intervals to identify potential risks and implement control measures to prevent emergencies from occurring; and
- Once fully developed, the MERP will be continually updated using adaptive management strategies to incorporate the findings of site inspections, identified risks, changes to conditions on the Project, and advancement of new technologies.

Emergency Response

NWP is committed to establishing a health and safety focused culture on the Project throughout all phases. A key component to this culture is an effective MERP that meets the requirements as outlined in the Health, Safety and Reclamation Code for Mines in British Columbia (B.C. MEM, 2021), with clearly defined roles and responsibilities and well-established lines of communication. Staff will be trained for their specific roles in emergency response or mine rescue processes, including the incident command structure.

NWP will establish and Incident Command System (ICS) to manage emergencies and unplanned events. The ICS will define a clear chain of command, with the Mine Manager or designated staff member as Incident Commander to lead the emergency response processes in the event of an emergency situation.

The following actions will be taken in the event of an emergency, in order of priority:

- All Project activities unrelated to the emergency will cease and the site will be secured to allow for effective and timely response to the emergency;
- Internal communications and notifications will occur, and the ICS response will be initiated;
- Emergency response plan procedures will be coordinated by the Incident Commander, and trained emergency response team members will be deployed to attend to the emergency.
- External communications and notifications will be given to authorities, stakeholders, Aboriginal Groups, and local communities, as needed.

Once the appropriate emergency response personnel have been notified and the emergency has been responded to, the extent and severity of the incident will be assessed, the human and environmental receptors affected or potentially affected by the incident will be identified. If the incident cannot be addressed by on-site personnel, external contractors with expertise in emergency response will be contacted to address the incident. The emergency response incident will be investigated, documented and photographed for inclusion in an incident report.

Action Plans

Action plans will be developed by NWP and incorporated into the MERP, which will be implemented as required in the event of an emergency situation. These Action Plans may include:

- Site Evacuation Plan with a map showing escape routes;
- Emergency Notification Plan;
- ICS Initiation Plan; and
- Emergency Check-in/Check-out Plan.

Training Program

An emergency response training program will be developed for the Project, which will provide training for the following staff:

- Members of the Emergency Response Team;
- Members of the Mine Rescue Team;
- Members in the ICS command structure; and
- All on-site staff will undergo training in general emergency response processes during onboarding.

NWP will keep all training programs up to date with industry standards and will develop regular practice drills to evaluate staff performance in the emergency response processes, and identify areas for improvement.

33.4.2.2.7 Reporting Requirements

Following an emergency situation, the NWP Mine Manager (or a responsible designated alternate) will prepare an incident report appropriate to the situation and conduct an investigation to identify the root cause of the incident. The findings of the investigation will be used to improve the MERP, which will be updated regularly throughout the life of the Project.

The emergency incident report will include, but is not limited to, the following information:

- The contact information for the person completing the report and details of all individuals involved (i.e., site shift);
- The date and time of the incident;
- The location of the incident;
- A description of the incident location and surrounding area;
- A description of the nature of the incident;
- A description of the circumstances, cause and adverse effects of the incident;
- Details of actions and countermeasures taken to address the incident;
- Follow up investigation measures; and
- The names of other persons or government agencies that have been advised about the incident.

All reporting will be conducted and completed as per permits, approvals, and authorizations obtained for the mine based on annual permits and license reporting, corporate reporting, and potential additional reporting requirements based on the results of the emergency response monitoring program.

Records of all documents related to the MERP will be maintained by NWP's Health and Safety Manager, including incident reports, actions, countermeasures, investigation findings, training records, compliance

records, and annual emergency response reports. This information will be used to facilitate improvements to the Mine Emergency Response Plan through adaptive management practises.

33.4.2.3 Health and Safety Management Plan

33.4.2.3.1 Introduction

The Health and Safety Management Plan (HSMP) has been prepared to provide on-site personnel and contractors with a framework of the practices and procedures that will be employed to minimize the risk of adverse effects to the health and safety of Project personnel, during all phases of the Project.

This HSMP is a conceptual plan, which NWP will revise and include additional site-specific details prior to construction. Further, NWP will strive to continually improve the HSMP throughout the life of the Project, through the use of advanced technologies and implementation of management practices that will further reduce the risk or potential effects of a health and safety incident on human health and the environment.

33.4.2.3.2 Scope and Objectives

The HSMP includes practices and procedures that will be developed and implemented to avoid and minimize potential adverse effects on the health and safety of workers on the Project. These practices and procedures are applicable to and will be implemented throughout the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project. Further, this HSMP is applicable to the Project footprint, transportation routes associated with the Project, and undeveloped areas in the vicinity of the Project.

The HSMP was prepared to meet the following objectives:

- Provide a framework for the responsible management of the health and safety of Project personnel;
- Define the regulatory requirements, roles and responsibilities, and reporting requirements associated with health and safety management;
- Describe the management practises to be implemented to reduce risk to the health and safety of Project personnel; and
- Outline the monitoring program that will be implemented to assess the performance of the HSMP and identify areas in the plan that can be improved through the use of adaptive management strategies.

33.4.2.3.3 Regulatory Requirements

There are several provincial legislative requirements applicable to the HSMP. These requirements and their primary components related to health and safety management are provided in Table 33.4-49.

Table 33.4-49: Provincial Regulatory Requirements for Health and Safety Management

Regulation/Policy	Year	Applicable Regulations or Permits
Provincial Legislation		
Mines Act	1996	The *Mines Act* protects both employees and the general public to minimize health and safety and environmental risks associated with mining related activities.

Regulation/Policy	Year	Applicable Regulations or Permits
Health, Safety, and Reclamation Code for Mines in British Columbia	2017	The Health, Safety and Reclamation Code for Mines in British Columbia protects both employees and the general public to minimize health and safety risks associated with mining related activities. (British Columbia Ministry of Energy and Mines, 2021).
Public Health Act	2008	The *Public Health Act* deals with emerging health issues including environmental health hazards that are not covered off by other acts. This includes the ability to regulate operations, activities or conditions that pose a hazard to human health.
Workers Compensation Act	1996	The *Workers Compensation Act* protects workers in regards to workers' compensation, occupational health and safety, and employers' assessment premiums and may be applied in the case of employee accident. This Act details compensation, scale of compensation, accidents and accident fund assessments and procedures.
Occupational Health and Safety Regulation	1997	The *Occupational Health and Safety Regulation* is enforced under the *Workers Compensation Act* and details general site hazard requirements and industry and activity specific requirements for a number of tasks such as traffic control, personal protective equipment (PPE), mobile equipment, etc.
Guidelines for Workers Compensation Act	2017	The *Guidelines for Workers Compensation Act* is a handbook that details occupational health and safety guidelines including general duties of employers, workers and others, tasks and roles of the joint committee and worker representatives, worker protection and prohibited actions, accident reporting and investigation and enforcement (WorkSafe B.C., 2020).
Workplace Hazardous Materials Information System (WHMIS)	2015	WHMIS provides information on hazardous materials and products so that workers are trained to protect themselves (Government of British Columbia, 2015).

33.4.2.3.4 Roles and Responsibilities

The key roles and responsibilities for implementation and management of the HSMP are provided in Table 33.4-50.

Table 33.4-50: Roles and Responsibilities of the Health and Safety Management Plan

Role	Responsibilities
NWP Mine Manager	• Overall implementation and review of the HSMP, including meeting commitments to implement health and safety management and monitoring programs. • Assume overall responsibility for the health and safety of Project personnel. • Establish a Joint Occupational Health and Safety Committee. • Serve as a management member of the Joint Occupational Health and Safety Committee. • Review inspections, audits and on-site monitoring programs. • Ensure appropriate response to health and safety incidents and complaints.

Role	Responsibilities
	• Ensure completion of health and safety awareness training by all employees and contractors. • Oversee personnel resourcing for health and safety response. • Report to applicable regulatory agencies, as required. • Update the HSMP, as required.
Project Construction Manager	• Implement and ensure compliance with the HSMP during Project Construction and Pre-Production. • Provide and deploy health and safety mitigation measures within the Project site during Construction and Pre-Production. • Ensure completion of health and safety awareness training by all employees and contractors. • Serve as a management member of the Joint Occupational Health and Safety Committee.
Health and Safety Manager	• Oversee health and safety of personnel during the occurrence of a health and safety incident. • Lead health and safety incident investigations. • Implement health and safety awareness training for all employees and contractors. • Implement the Mine Emergency Response Plan, as required. • Ensure health and safety resources are made available to all Project personnel. • Track and keep records of all health and safety information for the Project, including inspection, incident, and investigation reports. • Serve as a management member of the Joint Occupational Health and Safety Committee.
Joint occupational Health and Safety Committee	• Comprise a team of management and worker representatives on the Project. • Conduct regular health and safety inspections of the workplace on the Project to identify potential health and safety risks and areas of non-compliance with occupational health and safety standards and regulations. • Conduct investigations to follow up on health and safety incidents and near-misses. • Track health and safety training records of all Project personnel. • Communicate health and safety information to all Project personnel or other members of the Joint Occupational Health and Safety Committee.
First Aid Personnel	• Apply first aid to personnel during health and safety incidents, as required. • Mobilize emergency transportation of personnel during health and safety incidents, as required.
Security Personnel	• Limit access to Project areas following a health and safety incident, as required. • Contact local law enforcement authorities for assistance, as required.
All employees and contractors	• Complete health and safety awareness training. • Compliance with the HSMP.

33.4.2.3.5 Health and Safety Management Practices and Procedures

The HSMP provides a range of practices and procedures that will be implemented to avoid or minimize the potential risk to the health and safety of workers on the Project, and to appropriately respond to and mitigate health and safety incidents should they occur during any phase of the Project. These practices and procedures will be further refined and detailed throughout the Project permitting process and will be updated with more site-specific information prior to the commencement of Construction and Pre-Production.

Prevention of Health and Safety Hazards

Prevention is the preferred manner of managing health and safety throughout all phases of the Project. NWP will follow the hierarchy of controls to prevent and minimize risk to health and safety on the Project. This hierarchy includes the following controls, in order of priority:

- Elimination: physically removing a health and safety hazard from the work site;
- Substitution: replacing a hazardous process or material in the work site with a less hazardous alternative;
- Engineering controls: implementing controls to isolate employees from health and safety hazards in the work site;
- Administrative controls: implementing controls to change the way people work, administered through training programs, to reduce health and safety hazards in the work site; and
- Personal protective equipment (PPE): implemented as a last line of defence to protect the worker where a health and safety hazard exists after the above controls have been implemented.

Personnel Training Programs

All Project personnel will be educated to know their basic rights as workers:

- The right to know: workers have the right to know of any potential health and safety hazards present at the work site that may have long term affects to their health and safety;
- The right to participate: workers have the right and responsibility to participate in creating a safe work place, by participating in training and health and safety planning; and
- The right to refuse: workers have the right to refuse work they consider to be unsafe without any repercussions.

All Project personnel will receive training in general workplace health and safety practices, such as basic emergency response, fire-fighting procedures, WHMIS and Job Safety Analysis (JSA) reporting. Additionally, personnel will receive appropriate and relevant health and safety training specific to their work tasks, such as the following:

- Fall protection training;
- Lock out procedures;
- Confined space entry training; and
- Specific equipment training.

General Health and Safety Programs and Procedures

The following health and safety programs and procedures will be developed and implemented on site:

- Pre-employment screening programs to ensure that employees are fit-for-duty;
- Drug and alcohol screening and testing;

- Substance abuse and re-hiring program;
- Acceptable and expected behaviours within the community;
- Anti-discrimination and workplace diversity program;
- Anti-bullying and harassment program;
- Illness and disability management program;
- Fatigue management;
- Sick days and mental health; and
- Mental wellness awareness program.

Implementation of the following measures will contribute to the effective prevention of health and safety incidents:

- All workers will report to work fit for duty. A security check-in procedure will be established at site. This procedure will be used to monitor the entrance and exit of individuals on site in order to account for people in the event of an emergency;
- Daily health and safety meetings will occur and documented at the start of each shift. This meeting will include the planning of all shift activities, the identification of any hazards or potentially hazardous substances and/or work and mitigation measures to be implemented. At this time, tasks will be delegated to workers who are competent and trained to complete the task. Safety meetings will discuss past meeting concerns, findings from the workplace inspections and reported near misses and incidents;
- Management will attend contractor safety meetings at regular intervals to reinforce the commitment to safety;
- In addition to the daily safety meeting, additional health and safety and project logistical meetings will be held at agreed upon intervals such as weekly and monthly meetings;
- A job safety analysis (JSA) assessment will be implemented, the job safety analysis procedure will allow for the separation of work into specific tasks, identification of hazards associated with these tasks, and methods to eliminate or mitigate these hazards;
- All workers will be trained to be familiar with the incident response and reporting procedure;
- All workers will be trained and familiar with the Mine Emergency Response Plan, including knowing their roles and responsibilities if implemented;
- All workers will receive training that is specific to their tasks. Qualified personnel will provide this training and all training records will be kept up to date on site. Safety specific training may include but is not limited to fall protection, confined space, lock out procedures, cyanide management, respirators, equipment specific training, ground disturbance, etc.;
- All workers will know and ensure that they have access to first-aid kits and fire extinguishers throughout the work site and in all work vehicles;
- Workers will be familiar with characteristics of their work site including site access, location of coworkers, vehicles, tools, safety equipment and communication devices, and location of the designated muster point;
- All workers will ensure that they have reviewed JSA procedures for the tasks that they will complete. These JSA procedures will be readily accessible as reference materials when conducting the task;
- All standard operation procedures, safe work practises, JSA procedures, and material safety data sheets will be stored in a known location, updated at regular intervals and be easily accessible to all workers;

- Workers will be limited to a maximum of 50 hours a week and no more than 16 hours of work within a 24 hour period. Exceptions to these rules apply when an emergency is occurring and continues, or property is in danger;
- Working under the influence or possessing illegal substances or alcohol will be prohibited on the Project;
- All improper conduct will be prohibited including horseplay, scuffling, fighting, and/or practical jokes that may present safety hazards;
- Workers should avoid wearing loose fitting clothes including clothing that contains hoods, jewelry, and loose long hair;
- Workers will properly wear all PPE and additional job specific PPE when required. This may include but is not limited to hard hats, safety glasses, steel-toed boots, high visibility vest, face masks, respirators, hearing protection, fire-resistant coveralls, etc.;
- Workers are prohibited from drinking, eating, and using tobacco products in the work area, designated eating, drinking, and smoking areas will be established on site;
- All workers will have access to proper PPE and safety equipment. Employees will be trained on the proper use, maintenance and inspection of this equipment; and
- All mine activities will be carried out in close communication with local emergency services including volunteer fire departments, the RCMP, nearby hospitals and ambulance departments.

A health and safety monitoring program will be established and implemented to ensure prevention measures are being properly implemented and are affective at minimizing potential health and safety incidents. See Section 33.4.2.3.7 for further details on the health and safety monitoring program.

33.4.2.3.6 Reporting Requirements

The NWP Health and Safety Manager (or a responsible delegated alternate) will undertake the reporting requirements and conduct an incident investigation to identify a root cause in the event of a health and safety incident. Findings of the investigation will be used to improve the health and safety management procedures and the HSMP will be updated accordingly.

All reporting will be conducted and completed as per permits, approvals, and authorizations obtained for health and safety and annual permits and licence reporting, corporate reporting, and potential additional reporting requirements based on the results from the health and safety monitoring program. The monitoring program will be developed prior to construction and implemented, including routine monitoring, compliance checks, and quality assurance and quality control. All monitoring events will be reported on and submitted to the appropriate personnel. See Section 33.4.2.3.7 for further details on the health and safety monitoring program.

Records of all documented health and safety incidents for the Project will be maintained by the Health and Safety Manager, including the health and safety incident report, all health and safety incident response actions and countermeasures, investigation findings, and monitoring program results and documents. This information will be used to facilitate improvements to the HSMP through adaptive management practises. Records and report collected and maintained on site will include:

- Near miss reports;
- Incident reports;
- Daily safety meeting records;

- Weekly and monthly safety meeting records;
- Training records;
- Corrective and preventative action plans;
- Hazard identification forms;
- Incident investigations reports; and
- Health and safety inspection forms.

33.4.2.3.7 Monitoring Program

A health and safety monitoring program is a key component of the HSMP, as it is used to evaluate the effectiveness of the health and safety procedures and manage strategies throughout all phases of the Project. The health and safety monitoring program is expected to evaluate changes in health and safety and the health and safety culture on site during all phases of the project, to ensure that regulatory compliance measures are met, and allow for the development of adaptive management strategies through continued improvement of mitigation measures. The monitoring program will be established prior to construction and implemented and managed by the NWP Health and Safety Manager; however, a range of project personnel will be trained to participate in the program.

The monitoring program may include the following:

- Regular inspections of the work site by shift supervisors, the Joint Occupational Health and Safety Committee and individual workers will be regularly completed. A worksite inspection checklist will be developed prior to construction and worksite inspections will be formally documented, corrective actions identified, communicated with the site supervisor and individual workers. Corrective action dates will be set, and regular worksite inspections will identify overdue actions that will be reported to higher levels of management until the corrective action is implemented; and
- Worker health will be monitored throughout the Project. This may include a medical surveillance program that workers can choose to participate in where they can attend a doctor of their choice to undergo the examination and/or testing.

The monitoring program will be refined and supplemented with additional site-specific details prior to commencement of construction, as the permitting process progresses.

33.4.2.4 Traffic Control Plan

33.4.2.4.1 Introduction

Throughout the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases of the Project, many activities will be undertaken that will involve increased traffic on both public and private roads. This Traffic Control Plan (TCP) is intended to provide a framework of the measures that will be employed to manage access, traffic, and maintenance of transportation routes used for all Project components.

This TCP is a conceptual plan, which NWP will revise to incorporate additional, site-specific details prior to commencement of the construction phase. Further, NWP will strive to continually improve the TCP throughout the life of the Project, through the use of advanced technologies and implementation of

management practises that will further reduce the risk of potential effects of Project-related traffic on the biophysical and socio-economic environments.

33.4.2.4.2 Scope and Objectives

This TCP was prepared to meet the following objectives:

- Define the regulatory requirements, roles and responsibilities, and reporting requirements associated with traffic management;
- Provide a framework for the appropriate controls and management of traffic to avoid adverse effects to workers and the public;
- Describe the environmental protection measures and management practices to be implemented to reduce the risk of potential adverse effects of traffic on the environment; and
- Outline the reporting procedures and monitoring programs that will be implemented to assess the performance of the TCP and identify areas in which the plan can be improved through the use of adaptive management strategies.

The TCP is intended to be implemented in conjunction with other management plans prepared for the Project, including the following:

- Air Quality and Dust Control Management Plan;
- Erosion and Sediment Control Plan;
- Spill Prevention, Control, and Countermeasures Plan;
- Wildlife Management Plan;
- Site Water Management Plan;
- Community Relations and Communications Plan;
- Mine Emergency Response Plan; and
- Health and Safety Management Plan.

33.4.2.4.3 Regulatory Requirements

There are several federal and provincial legislative requirements applicable to traffic control planning and management. These requirements and their primary components related to the traffic control planning and management are provided in in Table 33.4-51.

Table 33.4-51: Federal and Provincial Regulatory Requirements for Traffic Control Planning and Management

Regulation/Policy	Year	Applicable Regulations or Permits
Federal Legislation		
Transportation Act	1996	The *Transportation Act* is legislation for the national transportation system including rail, aviation, and marine.
Species at Risk Act	2002	The *Species at Risk Act* protects wildlife species from extinction by providing protection for listed wildlife species and their critical habitat on Federal lands.
Radiocommunication Act	1985	Under the *Radiocommunication Act*, licenses must be obtained for any project communication needs, including kilometer calling on haul roads. This act governs and regulates that use of radio communication equipment.

Regulation/Policy	Year	Applicable Regulations or Permits
Transportation of Dangerous Goods Act	1992	The *Transportation of Dangerous Goods Act* promotes safe handling and safety requirements when transporting dangerous goods.
Fisheries Act	1985, amended 2019	The *Fisheries Act* protects all fish and fish habitat through protection of oceans and water bodies. This act provides permitting and code of practice to allow for responsible development around fish and fish habitat. The act restores protection against activities such as harmful alteration, disruption, or destruction of fish habitat while protecting biodiversity and addressing urgent threats to conservation and fisheries.
Provincial Legislation		
Motor Vehicle Act	1996	The *Motor Vehicle Act* details registrations, licenses, and insurance needed to operate a motorized vehicle in the Province of British Columbia (B.C.). It establishes rules of the road traffic control device standards, commercial vehicle weight scales and vehicle safety standards, inspection and.
Commercial Transport Act	1996	The *Commercial Transport Act* details vehicle configurations, safety standards, and license requirements for commercial vehicles.
Commercial Transport Procedures Manual	2012	The Commercial Transport Procedures Manual details licensing, insurance and permit guidelines for various vehicles in the Province of British Columbia.
Mines Act	1996	The *Mines Act* protects both employees and the general public to minimize health and safety and environmental risks associated with mining related activities.
Transportation Act	2004	The *Transportation Act* related to transportation including planning, design, holding, construction, use, operation, alterations, maintenance, repair, rehabilitation and closing of provincial highways.
Transportation of Dangerous Goods Act	1996	The *Transportation of Dangerous Goods Act* details safety regulations and a framework for transporting dangerous goods by truck in the Province of British Columbia.
Forest and Range Practices Act	2002	The *Forest and Range Practices Act* addresses all forest and range practices including resource-based activities that are conducted on Crown lands in the Province of British Columbia. Through this act, high levels of protection are provided to the environment. The Act provides a streamlined planning process for all development. Forest and range licensees' are subject to the act during all stages of the Project.
Forest Practices Code of British Columbia Act	1996	The *Forest Practices Code of British Columbia Act* describes mandatory forest practices, enforcement provisions and administrative arrangements.
Provincial Forest Use Regulation	1995	The *Provincial Forest Use Regulation* permits use of Crown land in provincial forest under the *Land Act* and *Wildlife Act* including special use permits.

Regulation/Policy	Year	Applicable Regulations or Permits
Mining Right of Way Act	1996	The *Mining Right of Way Act* allows for the use of existing access roads on Crown or private lands to access mineral titles when these roads have been constructed under the *Mining Right of Way Act* or another existing Act.
Water Protection Act	2014	The *Water Protection Act* confirms the Province's ownership of surface and groundwater, defines limits for bulk water removal, and prohibits large-scale diversions of water between major provincial watersheds and/or to locations outside the province.
B.C. Water Sustainability Act	2006	The *Water Sustainability Act* enforces the protection of stream and aquatic environment health and considers the potential effects on surface water and groundwater in land use decisions.
Fish-stream Crossing Guidebook	2012	The Fish-stream Crossing Guidebook is a reference tool developed as part of the Forest Practices Code to address poor culvert installation. The guidebook provides technical advice on how to remediate and improve fish passage at culverts as well as proper design, implementation and long-term performance of fish-stream crossings, how to obtain permits, best management practices and applicable provincial and federal legislation.
Wildlife Act	1996	The *Wildlife Act* states that a facility needs to be operated in accordance with the *Environmental Management Act* so as to not attract wildlife.

33.4.2.4.4 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the TCP are provided in Table 33.4-52.

Table 33.4-52: Roles and Responsibilities of the Traffic Control Plan

Role	Responsibilities
NWP Environmental Manager	• Overall implementation and review of the TCP, including meeting commitments to implement environmental protection measures and monitoring programs. • Lead environmental inspections, audits and on-site monitoring programs related to traffic control. • Implement environmental awareness training for all employees and contractors. • Ensure appropriate response to traffic incidents and roadwork to mitigate environmental risk. • Lead environmental incident investigations. • Report to applicable regulatory agencies, as required. • Update the TCP as required.

Role	Responsibilities
Project Construction Manager	• Implement and ensure compliance with the TCP during Project Construction and Pre-Production. • Provide and deploy traffic control and road maintenance materials and equipment at appropriate locations within the Project site during Construction and Pre-Production. • Ensure completion of environmental awareness training by all employees and contractors.
NWP Mine Manager	• Implement and ensure compliance with the TCP during Project Operations. • Provide and deploy traffic control and road maintenance materials and equipment at appropriate locations within the Project site during Operations. • Ensure completion of environmental awareness training by all employees and contractors. • Oversee personnel resourcing for traffic control and road maintenance. • Participate in environmental incident investigations.
Health and Safety Manager	• Oversee health and safety of personnel during the occurrence of an incident related to Project traffic. • Participate in incident investigations. • Implement the Mine Emergency Response Plan, as required. • Complete health and safety investigations related to incidents involving Project traffic.
Security Personnel	• Track authorized and unauthorized traffic and access to Project areas. • Contact local law enforcement authorities for assistance, as required.
All employees and contractors	• Complete environmental awareness training. • Compliance with the TCP.

33.4.2.4.5 Project Access

The Project site will be accessed from the Elk Valley Highway (Highway 43) via Line Creek Mine Road, Valley Road, and Grave Creek Road for all phases. These roads will require upgrading and expansion from their current configurations during construction and pre-operation, to handle both coal haulage and vehicles traveling to the site. A new access road will be constructed off the Valley Road to access the rail loadout during construction and operation.

During construction and operation, vehicles such as pick-up trucks, crew buses, fuel delivery trucks, equipment transport trucks, and clean coal haul trucks will be traveling on the access roads.

33.4.2.4.6 Access Road Design and Construction

The Project access roads will be designed and constructed in accordance with the regulations under the *Forest and Range Practices Act* (2002) and the *Health, Safety, and Reclamation Code for Mines in British Columbia* (B.C. Ministry of Energy and Mines, 2021) under the *Mines Act* (1996). Any required road use agreements will be secured by NWP prior to construction.

Access roads will be designed and constructed in accordance with industry standards, and with consideration of the following:

- Roads will be properly constructed to manage the equipment and vehicles intended for their use;

- Existing roads networks will be used for Project access where possible, and will be upgraded as required to accommodate mine site traffic during construction and operation;
- Roads will be designed to include appropriately spaced pullouts where feasible;
- Road design and construction will incorporate standard water management features, such as:
  - Appropriate road crowning and grading;
  - Roadside drainage ditches installed with check dams, cross-ditches, and waterbars, as required; and
  - Appropriately sized granular material and rip-rap, to ensure stability of the access roads and drainage ditches; and
- Appropriate regulatory authorization and permits will be obtained for any proposed upgrades to or construction of water crossings, and work will be completed in accordance with these authorizations and permits; and
- Access roads entering the Project site will be secured with gates attended by security personnel to restrict unauthorized access.

33.4.2.4.7 Road Maintenance

A year-round road maintenance program will be developed and implemented throughout the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases, to maintain road conditions to a suitable standard. This program will include, but will not be limited to the following:

- Snow removal and application of sand, gravel, or non-palatable salts during snowy or icy conditions;
- Application of dust suppressants or water to reduce fugitive dust emissions from roads during dry conditions;
- Vegetation clearing and management to allow appropriate sightlines for road users;
- Regular inspections, particularly following precipitation events, to identify areas requiring repairs; and
- Deactivation and reclamation of access roads during Project closure, or as otherwise required.

Vehicle Operation by Authorized Users

All Project personnel and contractors will undergo safety and environmental training during onboarding. This training will include guidance on vehicle and equipment operation within the Project site and along transportation routes used for the Project.

Vehicle and equipment operators will comply with the following requirements during all phases of the Project:

- All vehicles and equipment will remain on established roads and designated travel routes;
- Speed limits will be clearly marked and signed on all Project access roads. These speeds will take into consideration road conditions, potential weather, and wildlife crossings;
- Additional road signs will be posted for wildlife crossings, speed limit changes, advisory corner speeds, areas with limited visibility, and other potential road hazards;
- Wildlife will be given the right of way on all Project roads; wildlife sightings and incidents will be reported to the site supervisor as soon as possible (see Section 33.4.1.13.6);

- Vehicles and equipment used for the Project will be equipped two-way radios and the operator will be trained on site specific radio use;
- Traffic associated with the Project will be minimized where possible. Multiple passenger transportation options will be provided for personnel to reduce the amount of traffic on Project roads during peak traffic times;
- Vehicle and equipment loads will be optimized to minimize traffic;
- All personnel operating vehicles and equipment will have the proper licenses and training. These records will be regularly updated and maintained at the Project site;
- Vehicle operators will be responsible for determining the suitability of roads prior to use. Project personnel will monitor weather and highway conditions, and plan activities accordingly;
- All vehicles and equipment will maintain a regular inspection and maintenance schedule to ensure proper working condition, cleanliness, and appropriate registration is place;
- Maintenance logs will be maintained for all on-site vehicles and equipment;
- All vehicles and equipment will be equipped with spill response materials and firefighting equipment while on-site;
- Vehicle and equipment idling will be reduced to the extent feasible;
- Vehicle and equipment operators will adhere to company and provincial requirements regarding mobile phone and radio use;
- All vehicles and equipment will meet or exceed Transport Canada requirements;
- A zero-tolerance drug and alcohol policy will be implemented for all workers and contractors operating vehicles in relation to the Project;
- A journey management plan, departure, and check-in schedule and procedure will be developed for all vehicles arriving and departing the Project site;
- During peak traffic periods such as construction, the TCP will be communicated to the public detailing driving routes, peak traffic periods, and potential road shutdowns; and
- Traffic plans will be communicated to provincial and local governments.

A TCP "fact sheet" will be developed and dispersed to vehicle operators prior to using Project access roads. This fact sheet will include road use details such as:

- Road rules to be followed on all roads, including details on radio calling;
- A road map detailing road types, radio frequencies, road signage, and current road closures and decommissioned roads; and
- Key personnel and contact information for traffic control and security personnel.

33.4.2.4.8 Traffic Monitoring Program

A monitoring program is a key component of the TCP, as it will be used to evaluate the effectiveness of the traffic control strategies throughout all phases of the Project. The traffic monitoring program will be implemented and managed by the Environmental Manager; however, a range of Project personnel will be trained to participate in the program. The monitoring program may include the following procedures:

- Recording and tracking road, vehicle, and traffic-related safety and environmental incidents;
- Tracking unauthorized use of Project access roads;
- Regular inspection of security gates, road signs, and road conditions, including culverts and bridges;

- Enforcement of posted road speed limits and compliance with the TCP requirements by Project personnel and contractors;
- Regular inspection of vehicles and equipment for maintenance and debris; and
- Tracking vehicle and equipment inspection records.

The monitoring program will be refined and supplemented with additional site-specific details prior to commencement of construction, as the permitting process progresses.

33.4.2.4.9 Reporting Requirements

Reporting will be conducted and completed in accordance with permits, approvals and authorizations obtained for the Project, relevant to traffic. Additionally, the findings from the traffic monitoring program will be reported internally on an annual basis and made available to regulatory agencies upon request. All reports from the monitoring program will be recorded regularly by Project personnel throughout all phases of the Project and submitted to the appropriate personnel for documentation and filing.

Records of all documents related to the TCP will be maintained by the Environmental Manager or other appropriate designated staff, including inspection and maintenance records, incident reports, wildlife observations, and studies related to road-use. This information will be used to facilitate improvements to the TCP through adaptive management practises throughout the duration of the Project.

33.4.3 Communication and Reporting

33.4.3.1 Community Relations and Communications Plan

33.4.3.1.1 Introduction

The Community Relations and Communications Plan (CRCP) will provide guidance for efforts to share information with and receive feedback from members of the public, relevant clubs and community organizations, and municipal governments. Communication with Indigenous nations is the subject of the Indigenous Engagement and Reporting Plan.

The CRCP will compliment engagement with members of the public, relevant clubs and community organizations, and municipal governments that is required by regulatory processes such as obtaining new permits/approvals or amending existing permits/approvals. Some engagement specific to reporting processes may fall under the Compliance Reporting Plan (CRP).

NWP values transparency and believes in open honest dialog. All parties need to be brave, consistent, and respectful to help build trust. NWP is convinced that we can only be successful through partnership with local communities. This CRCP will help.

This CRCP is a conceptual plan, which NWP will continuously revise based on direct feedback from members of the public, relevant clubs and community organizations, and municipal governments. Further, NWP will strive to address feedback from regulators and government agencies. NWP will assess and as appropriate incorporating emerging communication technologies and trends to ensure more effective two way communication.

33.4.3.1.2 Scope and Objectives

The CRCP involves the practises and procedures associated with management of community engagement and communication. The practises and procedures included in this plan are applicable to and will be implemented throughout the Construction and Pre-Production, Operations, Reclamation and Closure and Post-Closure phases of the Project.

The CRCP will meet the following objectives:

- Map of key stakeholders and stakeholder groups;
- Communication tools, strategies, and schedule to share information with each group;
- Tools to obtain feedback;
- Tools to track feedback, how the feedback is considered, outcomes, and how that is communicated back to the group that shared the feedback;
- Triggers to identify when feedback should be shared with regulators, government agencies, or other authorities;
- Triggers when a specific activity requires a stand-alone communication plan; and
- Tools to assess the communication success and to adjust the CRCP for continuous improvement.

33.4.3.1.3 Regulatory Requirements

The CRCP does not specifically apply to communication required by permits/approvals/ or legislation. Communication for those purposes is addressed through other mechanisms including the CRP. The CRCP will honor relevant privacy laws and communication laws.

33.4.3.1.4 Other Requirements

NWP anticipates that CRCP requirements may arise based on local communities. NWP anticipates that a community advisory committee may be an approval condition for the Project. If so, the committee and its requirements would be incorporated into the CRCP.

33.4.3.1.5 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the CRCP are provided in Table 33.4-53.

Table 33.4-53: Roles and Responsibilities of the CEP

Role	Responsibilities
NWP Mine Manager	• Overall accountability for development, implementation, and review of CRCP.
Manager Engagement	• Overall responsibility for development, implementation, and review of CRCP. • Ensure managers, all employees, and contractors understand their responsibilities under the CRCP. • Ensure integration of CRCP with other management plans. • Oversee development and implementation of activity specific Communication plans. • Delegate CRCP duties to employees as needed. • Report specific feedback to regulators, government agencies, or other authorities as required by permits/approvals or legislation/regulation.

Role	Responsibilities
Operations/Construction Managers	• Ensure all employees, and contractors understand their responsibilities under the CRCP. • Support Manager Engagement with activity specific communication or feedback response. • Report feedback from public, relevant clubs and community organizations, and municipal governments to the Manager Engagement.
All employees and contractors	• Adhere to the CRCP. • Report feedback from public, relevant clubs and community organizations, and municipal governments to the Manager Engagement.

33.4.3.1.6 Community Relations and Communication Plan Development

The CRCP will be developed prior to the start of Construction and Pre-Production. Development will start upon obtaining approval for the Project under the B.C. *Environmental Assessment Act*, *2018* and the *Canadian Environmental Assessment Act, 2012*.

The CRCP will mirror structural concepts from ISO 9001 and ISO 14001. The CRCP will include:

- Updated stakeholder mapping that builds on work completed as part of the environmental assessment. Stakeholder mapping will include, where appropriate, specific approach for some stakeholders.
- Tools to share information including:
  - NWP's website;
  - Project newsletters;
  - Project reporting (as per CRP);
  - Radio, Television, Social Media;
  - Signage;
  - Online surveys;
  - Open houses;
  - Presentations to meetings held by other groups;
  - Specific committees;
- Tools to tie Community Relations and Communication into other Management Plans and work processes;
- Strategies to identify key information to share, how to share it, and when to share it;
- Tools to receive feedback including:
  - Online surveys;
  - Open houses;
  - Presentations to meetings held by other groups;
  - Specific committees;
  - Publicly-available contact telephone number and email;
- Tracking, actioning, and closure process for feedback;
- Reporting (in conjunction with CRP); and
- Process for internal review of CRP focusing on continuous improvement.

33.4.3.1.7 Community Relations and Communication Plan Implementation

The CRCP will be implemented prior to the start of Project Construction and Pre-Production, building upon the existing work being conducted through the environmental assessment process and continuing throughout the life of the Project. Key CRCP activities that will build on existing processes include:

- Stakeholder mapping;
- NWP's website updated regularly with Project milestones and other items in this list;
- Project Newsletters released quarterly. The newsletters are distributed to a subscription list, posted to the website, and shared with social media;
- Radio and print media advertisements for key engagement opportunities including open houses;
- Semi-annual online surveys and special surveys for key subjects shared by Social Media, direct email to key stakeholders, and posted to the website. Survey findings published to the website and noted in the newsletter;
- Presentations to meetings held by outdoor groups and others;
- Quarterly updates to municipal councils including Elkford, Sparwood, Fernie, Crowsnest Pass, and the Regional District of East Kootenay;
- Publicly available contact telephone number and email;
- Tracking, actioning, and closure process for feedback; and
- Reporting through the environmental assessment process.

NWP is committed to the sharing of data through a variety of different means to allow accessibility and transparency of information for the general population. Mechanisms to share data include:

- Directly sharing data with interested groups/individuals;
- Facilitating Frequent meetings, as needed, with interested groups/individuals;
- Meeting regularly with CEMF and other regional organizations and sharing relevant data gathered throughout the Project;
- Sharing data with Elk River Monitoring Alliance (and their data portal);
- Publishing data to the B.C. data portals, as necessary; and
- Posting data to the NWP website.

33.4.3.1.8 Community Relations and Communications Plan Review

The CRCP will be reviewed as described within the CRCP following the schedule within the CRCP. The review will have an internal and external component. Different parts of the CRCP might have a different review cycle. For example, if a flaw is identified that could lead to a key stakeholder not receiving information or being able to provide feedback could require an immediate review and update to the CRCP.

The review will focus on questions such as:

- Is the stakeholder map up to date?
- Are stakeholders receiving information that they find valuable and easy to interpret?
- Are stakeholder able to provide feedback?
- Are stakeholders learning about feedback, how it's been considered, and any relevant changes related to the feedback?
- Are regulatory requirements related to specific feedback being met?
- Are there new communication tools or techniques that could be used to improve sharing information or gaining feedback?

33.4.3.2 Compliance Reporting Plan

33.4.3.2.1 Introduction

The Compliance Reporting Plan (CRP) will ensure that permit/approval requirements are understood, adhered to, tracked, and reported on as appropriate. The CRP will incorporate the many permits/approvals received from numerous Federal and Provincial regulators and agencies. The CRP will also account for changes as the permits/approvals are amended.

This CRP is a conceptual plan, which NWP will continuously revise as new permits/approvals are received and or permits/approvals are amended. Further, NWP will strive to continually improve the CRP throughout the life of the Project based on collaborative efforts with regulators, government agencies, the public, and Indigenous nations.

33.4.3.2.2 Scope and Objectives

The CRP is intended to provide a framework for:

- Reviewing all Project permits/approvals including amendments;
- Tracking all permits/approvals operational and reporting requirements;
- Tracking actions to meet permit/approval requirements;
- Developing reporting mechanisms, including where practicable, combining reports for multiple reports/approvals to simplify regulatory oversight and review; and
- Tracking non-compliances and related measures to come into compliance.

This CRP intends to capture all operational, emergency, and monitoring requirements in Project permits and approvals as they may be amended from time to time. These requirements may include:

- Reporting or notification that must be completed prior to starting some activities (e.g., submitting a notice of work, final designs, etc.);
- Actions that must be completed prior to starting some activities (e.g., completing bird nest sweeps, badger den sweeps, etc.);
- Design or operational requirements (e.g., location for fueling, avoidance of habitat trees, noise or dust control measures, geotechnical safety, etc.);
- Post action reporting (e.g., submission of as built drawings, reporting on bird nest sweeps, reporting on mitigation efforts, etc.);
- Operational environmental monitoring (e.g., regular water quality sampling, stack testing, etc.);
- Emergency reporting (e.g., spill reporting, community (and Indigenous nation) notification, final reporting on cause, cleanup, and avoidance of future events, etc.);
- Emergency monitoring (e.g., water or air quality monitoring related to a spill or other environmental emergency, etc.); and
- Scheduled reporting (e.g., annual reporting against operational environmental monitoring, annual reporting against specific permit/approval requirements, etc.).

The CRP's objective is to ensure that permit/approval requirements are understood, adhered to, tracked, and reported on as appropriate. The CRP only applies to major Project permits that relate to Project design and environmental considerations under the legislation listed in Section 33.4.3.2.3. All other permits or approvals for construction or operation management will be managed through other mechanisms.

33.4.3.2.3 Regulatory Requirements

The Project will require permits, approvals, and authorizations under federal and provincial legislation. The key legislation and related Project requirements are listed in Table 33.4-54.

Table 33.4-54: Federal and Provincial Legislation with Permits/Approvals relevant to the Compliance Reporting Plan

Legislation	Agency	Applicable Permit or Approval
Federal Legislation		
Canadian Environmental Assessment Act	Impact Assessment Agency of Canada	The Project is seeking an approval under CEA Act, 2012. The Project is under this Act because the assessment process started before the *Impact Assessment Act* (2019) came into force.
Fisheries Act	Fisheries and Oceans Canada	The Project will require permits and/or authorizations for impacts to fish and fish habitat.
Explosives Act	Natural Resources Canada	The Project will require permits and/or authorizations for explosives storage and use.
Coal Mining Effluent Regulations	Environment and Climate Change Canada	Once the *Coal Mining Effluent Regulations* are finalized and in force, the Project may require permits and/or authorizations for effluent release and management.
Provincial Legislation		
Environmental Assessment Act	British Columbia (B.C.) Environmental Assessment Office	The Project is seeking an approval under the *Environmental Assessment Act* (2018).
Mines Act	B.C. Ministry of Energy Mines and Low Carbon Innovation	The Project will require a permit for the major infrastructure and operations of the Project.
Coal Act	B.C. Ministry of Energy Mines and Low Carbon Innovation	The Project will need to convert our coal licenses to coal leases within the Project footprint to allow for production of coal.
Environmental Management Act	B.C. Ministry of Environment and Climate Change Strategy	The Project will need a permit for effluent discharge.
Environmental Management Act	B.C. Ministry of Environment and Climate Change Strategy	The Project will need a permit that interacts with the Area Based Management Plan currently managed through Teck's permit 107517.
Environmental Management Act	B.C. Ministry of Environment and Climate Change Strategy	The Project will need a permit for solid waste management.

Legislation	Agency	Applicable Permit or Approval
Environmental Management Act	B.C. Ministry of Environment and Climate Change Strategy	The Project will need a permit for air emissions.
Water Sustainability Act	B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development	The Project will need a permit or permits for withdrawal of water from the environment.
Heritage Conservation Act	B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development	The Project will need a permit or permits for ground disturbance.
Public Health Act	B.C. Ministry of Health	The Project will need a permit for sewage disposal.
Forest and Range Practices Act	B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development	The Project will need a permit or permits for tree removal and road building.
Wildlife Act	B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development	The Project will need a permit for vehicle use in Motor Vehicle Closed Areas and various activities related to wildlife management that might be required.

33.4.3.2.4 Other Requirements

NWP anticipates that CPR requirements may arise based on input, agreements, or requirements from Indigenous nations, including the Ktunaxa Nation, local communities, and/or regional stewardship initiatives.

NWP is actively engaging with:

- Ktunaxa Nation;
- Shuswap Indian Band;
- Stoney Nakoda Nation;
- Blood Tribe (Kainai Nation);
- Piikani Nation;
- Siksika Nation;
- Tsuut'ina Nation;
- Métis Nation Alberta, Region 3;
- Métis Nation British Columbia; and
- Elk Valley Métis Nation.

NWP anticipates entering into agreements with some or all these Indigenous nations. These agreements might include CRP related conditions. NWP understands that regulators and government agencies might also accept condition suggestions from these Indigenous nations. The CRP will also account for these requirements.

NWP anticipates that a community advisory committee may be an approval condition for the Project. If so, this approach would be used to incorporate feedback from the local communities into the CRP.

NWP anticipates participation in regional stewardship initiatives such as the Elk Valley Cumulative Effects Framework. The CRP will, where appropriate, encompass collaboration with regional stewardship initiatives.

33.4.3.2.5 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the CRP are provided in Table 33.4-55.

Table 33.4-55: Roles and Responsibilities of the CRP

Role	Responsibilities
NWP Mine Manager	• Overall accountability for development, implementation, and review of CRP. • Overall accountability for all Project compliance. • Overall accountability for all Project reporting. • Support the Environmental Manager develop plans to address potential or actual non-compliances including all related reporting related to Project wide activities or events.
Environmental Manager	• Overall responsibility for development, implementation, and review of CRP. • Ensure all new or amended permits/approvals incorporated into the CRP. • Ensure managers, all employees, and contractors understand their responsibilities for Project compliance related to specific Project activities. • Ensure managers understand their responsibilities for Project reporting related to specific Project activities. • Responsibility for Project wide environmental monitoring and reporting. • Overall accountability for inspections, audits, and reviews of compliance and reporting. • Support inspections, audits, and reviews where appropriate. • Engage with regulators, government agencies, the public, and Indigenous nations about the CRP, compliance, and reporting. • In coordination with the Mine Manager develop plans to address potential or actual non-compliances including all related reporting related to Project wide activities or events. • Support managers develop plans to address potential or actual non-compliances including all related reporting related to specific Project activities under their control.
Operations/Construction Managers	• Manage compliance related to specific Project activities under their control. • Ensure all employees, and contractors understand their responsibilities for Project compliance related to specific Project activities under their control. • Manage reporting related to specific Project activities under their control.

Role	Responsibilities
	• In coordination with the Environmental Manager develop plans to address potential or actual non-compliances including all related reporting related to specific Project activities under their control.
All employees and contractors	• Complete work in compliance with permits/approvals related to their specific Project activities. • Report potential or actual non-compliance or emergency situations in accordance with the CRP.

33.4.3.2.6 Compliance Reporting Plan Development

The CRP will be developed prior to the start of construction. Development will start upon obtaining approval for the Project under the B.C. *Environmental Assessment Act* and the *Canadian Environmental Assessment Act, 2012*.

The CRP will mirror structural concepts from ISO 9001 and ISO 14001. The CRP will include:

- Process for incorporating all compliance and reporting requirements from all new or amended permits/approvals/authorizations into the CRP;
- Tools to distribute information about compliance and reporting requirements to Managers, employees, and contractors. Key tools might include:
  - Site and new hire orientation training materials;
  - Site inspection forms;
  - Safe Job Procedures;
  - Work permits; and
  - Position descriptions and related performance review metrics;
- Tools to tie compliance and reporting requirements into other Management Plans and work processes;
- Implementation schedule:
  - Start implementation prior to construction start;
  - Assess phased implementation tied to specific Project activities or milestones; and
  - Define implementation triggers that require actions to occur prior to specific activities;
- Monitoring schedule/triggers;
- Reporting schedule/triggers including opportunities for combined reports;
- Process for internal review of CRP focusing on continuous improvement;
- Review schedule/triggers;
- Process to update CRP and cascade changes through all CRP related tools and processes;
- Process to:
  - share information about the CRP with regulators, government agencies, the public, and Indigenous nations;
  - Obtain feedback on CRP improvement; and
  - Share progress on CRP improvement and how feedback was considered.

33.4.3.2.7 Compliance Reporting Plan Implementation

The CRP will be implemented prior to the start of Project Construction and Pre-Production, following the implementation schedule within the CRP. Responsibilities will be cascaded to the appropriate Managers

or employees so that the planning, oversight, and execution of activities align with compliance and reporting requirements within permits/approvals.

Delivery of site and new hire orientation training materials related to the CRP to all Managers, employees, and contractors. Execution of CRP related tools such as site inspection forms, Safe Job Procedures, and Work permits. Incorporating CRP related items including position descriptions and related performance review metrics into HR systems.

Complete environmental monitoring, as required by CRP.

Complete all reporting, as required by CRP.

33.4.3.2.8 Compliance Reporting Plan Review

The review of the CRP will have an internal and external component. Different parts of the CRP might have a different review cycle. For example, if a flaw is identified that could lead to an immanent permit/approval non-compliance or harm to the environment or people, a trigger mechanism could require an immediate review and update to the CRP.

The review will focus on questions such as:

- Are there any permit/approval requirements not captured within the CRP?
- Are all permit/approval requirements for a particular activity communicated to the Manager, employees, and contractors conducting the work?
- Is monitoring and reporting meeting requirements?
- Is monitoring and reporting providing information that can be used to improve the Project and work processes?
- Is monitoring and reporting useful and meaningful for regulators, government, public, and Indigenous nations?
- Are there any permit/approval requirements that need to be amended to account for changing conditions, new information, or input from regulators, government, public, and Indigenous nations?

The Project will require additional permits/approvals and amendments to permits/approvals through the life of the Project. Reviews will need to both ensure that new information is incorporated into the CRP and that superseded information is removed.

33.4.3.3 Indigenous Engagement and Reporting Plan

33.4.3.3.1 Introduction

The Indigenous Engagement and Reporting Plan (IERP) will provide guidance for efforts to share information with, receive feedback from, and collaborate with Indigenous nations. Communication with the public, relevant clubs and community organizations, and municipal governments is the subject of the Community Relations and Communications Plan.

The IERP will compliment engagement with Indigenous nations that is required by regulatory processes such as obtaining new permits/approvals or amending existing permits/approvals. Some engagement specific to reporting processes may fall under the Compliance Reporting Plan.

NWP values transparency and believes in open honest dialog. All parties need to be brave, consistent, and respectful to help build trust. NWP is convinced that we can only be successful through partnership with Indigenous nations. This IERP will help.

This IERP is a conceptual plan, which NWP will continuously revise based on direct feedback from the Indigenous nations. Further, NWP will strive to address feedback from regulators and government agencies. NWP will assess and as appropriate incorporating emerging communication technologies and trends to ensure more effective two way communication.

33.4.3.3.2 Scope and Objectives

The IERP involves the practises and procedures associated with management of Indigenous engagement and communication. The practises and procedures included in this plan are applicable to and will be implemented throughout the Construction and Pre-Production, Operations, and Reclamation and Closure phases of the Project.

The IERP was prepared to meet the following objectives:

- Map of key Indigenous Nations;
- Communication tools, strategies, and schedule to share information with each group;
- Tools to obtain feedback;
- Tools to track feedback, how the feedback is considered, outcomes, and how that is communicated back to the group that shared the feedback;
- Triggers to identify when feedback should be shared with regulators, government agencies, or other authorities;
- Triggers when a specific activity requires a stand-alone communication plan;
- Tools, strategies, schedules, and tracking for collaboration efforts with Indigenous nations;
- Tools to assess the success the IERP and to adjust it for continuous improvement; and
- Reporting that might be required other than reporting under the CRP.

33.4.3.3.3 Regulatory Requirements

The IERP does not specifically apply to communication required by permits/approvals/ or legislation. Communication for those purposes is addressed through other mechanisms including the CRP. The IERP will honour:

- Relevant privacy laws and communication laws;
- The United Nations Declaration on the Rights of Indigenous Peoples; and
- The B.C. *Declaration on the Rights of Indigenous Peoples Act.*

33.4.3.3.4 Other Requirements

NWP anticipates that IERP requirements may arise based on input, agreements, or requirements from Indigenous nations, including the Ktunaxa Nation. NWP is actively engaging with:

- Ktunaxa Nation;

- Shuswap Indian Band;
- Stoney Nakoda Nation;
- Blood Tribe (Kainai Nation);
- Piikani Nation;
- Siksika Nation;
- Tsuut'ina Nation;
- Métis Nation Alberta, Region 3;
- Métis Nation British Columbia; and
- Elk Valley Métis Nation.

NWP anticipates entering into agreements with some or all these Indigenous Nations. The engagement and reporting requirements of these agreements will need to be addressed within the IERP.

The IERP will align with the NWP Indigenous Policy.

33.4.3.3.5 Roles and Responsibilities

The key roles and responsibilities for the implementation and management of the IERP are provided in Table 33.4-56.

Table 33.4-56: Roles and Responsibilities of the IERP

Role	Responsibilities
NWP Mine Manager	• Overall accountability for development, implementation, and review of IERP.
Manager Engagement	• Overall responsibility for development, implementation, and review of IERP. • Ensure managers, all employees, and contractors understand their responsibilities under the IERP. • Ensure integration of IERP with other management plans, company policies, procurement plans, etc. • Oversee development and implementation of activity specific Communication plans. • Delegate IERP duties to employees as needed. • Report specific feedback to regulators, government agencies, or other authorities as required by permits/approvals or legislation/regulation.
Operations/Construction Managers	• Ensure all employees, and contractors understand their responsibilities under the IERP. • Support Manager Engagement with activity specific communication or feedback response. • Report feedback from public, relevant clubs and community organizations, and municipal governments to the Manager Engagement.
All employees and contractors	• Adhere to the IERP. • Report feedback from public, relevant clubs and community organizations, and municipal governments to the Manager Engagement.

33.4.3.3.6 Indigenous Engagement and Reporting Plan Development

The IERP will be developed prior to the start of construction. Development will start upon obtaining approval for the Project under the B.C. *Environmental Assessment Act, 2018* and the *Canadian Environmental Assessment Act, 2012*.

The IERP will mirror structural concepts from ISO 9001 and ISO 14001. The IERP will include:

- Updated stakeholder mapping that builds on work completed as part of the Environmental Assessment. Stakeholder mapping will include, where appropriate, specific approach for some stakeholders;
- Tools to share information including:
  - NWP's website;
  - Project newsletters;
  - Project reporting (as per CRP);
  - Radio, Television, Social Media;
  - Signage;
  - Online surveys;
  - Open houses;
  - Presentations to Indigenous representatives and/or communities; and
  - Participation in Indigenous community events;
- Tools to tie IERP into other Management Plans and work processes;
- Strategies to identify key information to share, how to share it, and when to share it;
- Tools to receive feedback including:
  - Online surveys;
  - Open houses;
  - Presentations to Indigenous representatives and/or communities; and
  - Publicly available contact telephone number and email;
- Tracking, actioning, and closure process for feedback;
- Reporting (in conjunction with CRP); and
- Process for internal review of CRP focusing on continuous improvement.

33.4.3.3.7 Framework for Tracking and Responding to Indigenous Feedback

NWP is committed to responding to Indigenous feedback on environmental monitoring and on the phases of the Project through Indigenous Communities of interest in the East Kootenay region. Through tracking of Indigenous feedback using technology-based systems and responding to Indigenous peoples with clear communications and public sessions, NWP will monitor results of Indigenous feedback through electronic means and respond with open and closed Indigenous community engagement forums using electronic means.

How we are incorporating Indigenous feedback, responses and tracking guidelines:

- Annual review of Indigenous feedback and company response through the Indigenous engagement system; tracking the outcomes for management to monitor;
- Monthly reporting to mine management on Indigenous feedback;
- Collection and monitoring of Indigenous responses through electronic means;

- Responding to Indigenous feedback quickly and with open communication through electronic means and various tools for communicating; and
- Continuous monitoring of the program to assess the effects both on and off-site.

We will use incorporating Indigenous feedback, responding and tracking to help monitor and assess the quality and effectiveness of our management program, ensuring the programs objectives are being met.

33.4.3.3.8 Indigenous Engagement

The IERP provides ongoing engagement and communication with local residents in the communities in which we operate and are of interest. The goal is to keep open communication and engagement with members of the community by informing on our operations through the life cycles of the Project. Relaying the management and mitigation of work that is undertaken in order to minimize the effects of mining on Indigenous Communities.

How we will engage Indigenous peoples, groups and organizations:

- Annual written review and updates to Indigenous Community representatives in communities of interest in the East Kootenay and communities of Crowsnest Pass;
- Information sharing with Indigenous Communities identified with NWP through annual evaluations of distribution groups, ensuring Indigenous Peoples, groups or organizations that are affected receive updates;
- Monitoring of distribution groups to ensure information is received;
- Clear, plain language reporting summarizing air quality, noise and vibration monitoring results and highlighting significant results with explained actions taken in response from previous updates;
- Documentation of reporting and tracking of findings will be distributed to key Indigenous community locations, groups and organizations and posted through electronic means;
- Details on updates and how to access annual reports will be clearly communicated with Indigenous Communities of interest;
- Continuous invitations to Indigenous Communities to submit questions, concerns, and feedback through our Community & Aboriginal Engagement System with details on how to do so;
- Annual evaluation on Community and Indigenous Engagement System with consideration to additional or alternative distribution methods;
- Monitoring results are summarized annually by NWP with copies of results distributed to local key Indigenous representatives and key Indigenous groups;
- Communication on signage implementation or signage change at Unauthorized Entry Areas will be provided to Indigenous Communities through engagement with outdoor recreational organizations and through publication or maps in Indigenous Communities. This is also including map distribution in the B.C. Hunting and Trapping Regulations Synopsis;
- Local Indigenous user-group engagement to collect feedback on Unauthorized Entry Areas expansions as Project develops;
- Social consideration in conceptual closure plan with included components such as:
    - Indicators to verify goals are being attained;
    - Economic, social, cultural goals and land use;
    - Addressing requirements for communicating the monitored results with guidance on how the results will be intended to use in order to direct iterative management; and

    - Monitoring methods, descriptions and identification of responsible parties;
- Effective monitoring program development and implementation requires communication and cooperation from Indigenous groups, local government, communities of interest and NWP through a Communications Monitoring Committee and includes:
    - Communicating and reporting monitoring results;
    - Monitoring the data; and
    - Oversee design and implementation of the monitoring program; and
- NWP will collect feedback from Indigenous Communities through the Community and Aboriginal Engagement System, dedicated phone line; dedicated email address and public feedback boxes in each community of interest in the East Kootenay's and Crowsnest Pass. All gathered feedback, if not anonymous, will receive written response from NWP. All non-anonymous and anonymous responses will be tracked and recorded for record keeping and reporting purposes.

Response to feedback from Indigenous Communities through one of the mechanism tools listed, helps NWP track, report and use clearly communicated responses to maintain strong relationships with the public. The coordinator of Community Engagement and Feedback will investigate the cause and effect with proper operation(s) personnel to review and correct (if needed) the effectiveness of current mitigation and management procedures and respond to the community member if contact details are provided.

Monitoring of trends in feedback will be used to gauge the effectiveness of mitigation and the further need for Indigenous community updates on the work.

All feedback is recorded and tracked in the Community and Aboriginal Engagement System, with information collected, treated confidentially and only shared with the Coordinator of Community and Aboriginal Engagement and Feedback and the Manager of Community and Aboriginal Engagement.

The IERP will be reviewed annually to include other Indigenous Communities of interest as appropriate to ensure proper engagement methods are current and used effectively.

33.4.3.3.9 Engagement of Indigenous Communities of Interest Representatives

NWP is strongly committed to developing relationships with elected representatives of Indigenous Communities in East Kootenay and Crowsnest Pass communities for the duration of the Project. Monitored results are summarized annually by NWP, with copies of the results shared with Indigenous elected representatives in communities of interest.

Annual update meetings will be held on mutually agreed upon dates each year to provide Indigenous elected representatives and staff with the following:

- Provide information and updates, offer the opportunity for feedback and answering questions;
- Review of annual reporting with summarization on air quality, noise and vibration monitoring results since previous update given. Highlight of significant results with explaining the action taken in response to the significant results;
- Feedback summary and actions taken in response by NWP;
- Open communication on feedback and how Indigenous peoples can submit that information; and
- Provide updates on NWP activity as deemed important by NWP or as requested.

Additional information on the commitment to ongoing Indigenous community engagement of interest will be included in additional meetings or information sharing by electronic means as requested or on a required basis.

33.4.3.4 Indigenous Impact Management Plan

Impact on Indigenous Communities' rights and related interests may occur where the Project has a residual effects and residual cumulative effect on traditional activities such as water use (Ktunaxa Nation), fishing, hunting and trapping, harvesting and gathering, or on physical activities associated with traditional use such as travel and navigation, ceremonial and sacred sites, and physical and cultural heritage areas and any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance, and social, health, and economic conditions.

Project activities and components during the Construction and Pre-Production, Operations, Reclamation and Closure, and the Post-Closure phases have the potential to interact with Indigenous Communities' rights and interests. In the assessment of potential impacts on Indigenous Communities' rights and interests, determining the severity of potential impacts has considered historic and current (including future) use of lands and resources for traditional purposes, and social, health, and economic conditions. As noted in Chapters 23 to 31, traditional land and resource use is defined as current use that may not be reflective of desired current use, as such, current use as defined in each respective chapter is reflective of current use of lands and resources for traditional purposes as well as the potential future use as desired by the identified Indigenous Communities. The potential future use of the Project footprint, the ATRI/KNRI LSA, and the ATRI/KNRI RSA with the Project in place for the exercise of Indigenous Communities' rights and interests is in consideration of the certain past, present, and reasonably foreseeable future projects and activities within the ATRI/KNRI RSA that could potentially impact these rights and interests.

Mitigation measures discussed in the assessment and related VC assessment chapters will reduce or eliminate effects on resources which are relied upon in order to exercise Aboriginal and/or Treaty rights and related interests for current (and future) use and reduce or eliminate effects on conditions that may prohibit or deter the exercise of Aboriginal and/or Treaty rights and interests. Residual cumulative effects are not anticipated to alter the long-term persistence and viability of fish, wildlife, and vegetation species of interest within the ATRI/KNRI RSA which are relied upon to exercise Aboriginal and/or Treaty rights and related interests. The potential for residual cumulative effects of the Project in combination with reasonably foreseeable future projects and activities on physical and cultural heritage and to any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance are restricted to those located within the footprint of the Project and of other potential projects developed within the ATRI/KNRI RSA.

Mitigation measures identified for the potential impacts on the Indigenous Communities' rights and interests are based on both the publicly available information and preliminary consultation activities summarized in Chapters 4 and 23 to 31. It should be noted that as previously identified, Indigenous Communities' rights and interests are defined as those outlined in the correspondence from the Impact Assessment Agency of Canada to the Indigenous Communities (IAAC, 2015a-d; 2020 a-c; 2021 a-c; 2022a), indicating the Agency's preliminary understanding of the nature and extent of the Indigenous Communities' rights and interests as described in Chapters 23 to 31. Continued consultation and engagement with the identified Indigenous Communities to further identify and adapt mitigation

measures to address impacts on their rights and related interests within the Project footprint and the ATRI/KNRI LSA are expected to refine this process throughout the Project lifecycle. Ktunaxa Nation provided information regarding the evaluation of options to reduce impacts on the Grave Prairie Cultural Landscape during conformity review, but no Indigenous Community (including Ktunaxa Nation) provided any input into the impact management measures identified in the Indigenous Impact Management Plan. It is to be noted that the effectiveness of these measures has not been confirmed by the identified Indigenous Communities to date.

Mitigation measures to avoid, minimize, or otherwise address potential effects of the Project on Indigenous Communities' rights and interests linked to other VCs are anticipated to be more for some activities than for others, and as a result the comprehensiveness of the Indigenous Impact Management Plan and the monitoring programs for the specific elements of the environment (e.g., plants, wetlands, groundwater) reflect the nature of the potential interaction with the environment, the anticipated magnitude or extent of the environmental effects, the expected effectiveness of mitigation, the level of certainty in the environmental effects predictions, and the resulting potential for impact on Indigenous Communities' rights and interests. As the potential for, and consequences of, adverse environmental effects increases; so does the comprehensiveness of the Indigenous Impact Management Plan in order to meet the requirements and objectives of each mitigation measure and/or monitoring program.

Based on the evaluation of the environmental effects of the Project, as determined through Project-related residual effects and residual cumulative effects anticipated for the associated VCs (e.g., Wildlife and Wildlife Habitat VCs) and anticipated effects to non-VC groups (i.e., broad ecosystem types), and after implementation of proposed mitigation measures as well as additional information (certain intermediate and receptor VCs) included in the assessment, the potential severity of adverse impacts on the identified Indigenous Communities' rights and interests are anticipated to occur as they relate to:

- Change to use of water for traditional purposes (Water Sector for Ktunaxa Nation);
- Change to current use of lands and resources for traditional purposes: Fishing (listed under the Lands and Resources Sector for Ktunaxa Nation);
- Change to use of lands and resources for traditional purposes: Hunting and trapping (listed under the Lands and Resources Sector for Ktunaxa Nation);
- Change to use of lands and resources for traditional purposes: Harvesting and gathering (listed under the Lands and Resources Sector for Ktunaxa Nation);
- Change to physical and cultural heritage and change to a structure, site, or item that is of historical, archaeological, paleontological, or architectural significance (listed under the Traditional Knowledge and Language Sector for Ktunaxa Nation) ; and
- Change to social, health (listed under Social and Health Sector for Ktunaxa Nation), and economic conditions (listed under Economic Investment Sector for Ktunaxa Nation).

NWP is committed to an ongoing dialogue with the identified Indigenous Communities, including commitments to the following:

- Best management practices and procedures related to each VC of interest including the design of mitigation measures as outlined in the Application/EIS.
- Follow-up, monitoring and offsetting and compensation programs related to anticipated residual effects of select VCs.

- Implementation of the engagement agreement between NWP and the Identified Indigenous Communities.
- Confirmation and implementation of the Indigenous Impact Management Plan that outlines mitigation measures to avoid, minimize, reduce, and/or offset potential direct and indirect impacts of the Project and utilizes adaptive management approaches for follow-up strategies and monitoring programs.
- Consideration of collaborative strategies for addressing cumulative effects where applicable, with the Identified Indigenous Communities, other proponents, and regulatory agencies.
- Follow the spirit and intent of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and its guiding principles.
- Support the recognition of Indigenous stewardship and governance in the Elk Valley.
- Recognize and respect the deep personal, community, and cultural attachment of the Identified Indigenous Communities to the land and resources where NWP does business.
- Incorporate NWP's understanding of Indigenous interests, values, knowledge, and ways of knowing into NWP decision making where possible. To this end, NWP is committed to the Canadian Council for Aboriginal Business' Progressive Aboriginal Relations program[2].

In addition to the mitigation measures outlined in the specific VC chapters, the following preliminary mitigation measures are proposed to reduce the potential impact on identified Indigenous Communities' rights and interests:

- Engaging with the identified Indigenous Communities to refine the Indigenous Impact Management Plan specific to the rights-based activities and other interests (e.g., cultural activities, hunting, trapping, fishing, gathering, and cultural heritage) exercised by the identified Indigenous Communities within the Project footprint.
- The Indigenous Impact Management Plan will further describe cross-cultural awareness training, which will be developed in collaboration where practicable, with the identified Indigenous Communities. This training is expected to build awareness and reduce potential adverse interactions with the identified Indigenous Communities and will include cultural awareness education and training for staff and on-the-ground personnel during the applicable phases of the Project.
- Supporting possible opportunities to augment VC-specific monitoring programs to include responses to concerns raised by the identified Indigenous Communities utilizing adaptive management approaches for follow-up strategies.
- Participation in the Elk Valley Cumulative Effects Management Framework as co-led by the KNC.
- Encouraging the participation of the identified Indigenous Communities to the applicable Project Advisory, Environmental Stewardship, and in the Environmental Monitoring Committee to review, shape, and steer monitoring activities and to guide future priorities.
- Encouraging the participation of the identified Indigenous Communities in the Reclamation Planning Committee to review how traditional knowledge has been incorporated, including Indigenous traditional use and cultural expression as part of the Project closure goals.
- Supporting access to the Project site and provide applicable available resources for the Indigenous-Guardians Program to develop and lead monitoring programs related to the Project.

[2] Based on the CCAB's PAR program, NWP continues to improve their Indigenous relationships and to working across cultures and are committed to prosperity in Indigenous Communities.

- Incorporating feedback from the identified Indigenous Communities in the development of an Access Management and Monitoring Program which would address any concerns raised regarding access to areas that might be temporarily restricted due to safety concerns (e.g., in the Project footprint during construction and operations) by creating alternatives to guarantee access to key land use areas. NWP will establish No Unauthorized Entry (NUE) areas in order to ensure worker and public safety within and near the Project.
- Supporting the establishment of conservation lands that may be privately held by NWP, an Indigenous Community, or a recognized conservation organization.
- Supporting Indigenous work related to land and resource use planning objectives in proximity to the Project and following the EAC, NWP will support Indigenous work related to land and resource use planning objectives for consideration during the relevant Project phases.
- Providing access to requested reports and identify feedback opportunities where applicable including the various mitigation and monitoring plans as well as those related to the Indigenous Impact Management Plan.

As outlined in Chapters 23 to 31, the degree of severity of the adverse impact on Indigenous Communities' rights and related interests are expected to vary from low to moderate to moderate to high. For each potential impact, the specific mitigation measures identified that relate to Indigenous Communities' rights and interests are listed in their respective chapters.

33.4.3.4.1 Use of Water for Traditional Purposes

The mitigation measures identified for the change to the use of water for traditional purposes are as identified in Chapter 10, Section 10.5.3 and Chapter 11, Section 11.5.3 including the Erosion and Sediment Control Management Plan (Section 33.4.1.4), Air Quality and Greenhouse Gas Management Plan (Section 33.4.1.1), and the Site Water Management Plan (Section 33.4.1.8).

Key mitigation measures for water use include, where practicable:

- Implementing the Erosion and Sediment Control Management Plan (Section 33.4.1.4) to reduce the potential for erosion and the transportation of material in surface runoff to the West Alexander Creek, Alexander Creek, Grave Creek, and Elk River drainages.
- Reducing the potential for dust to settle in the West Alexander Creek, Alexander Creek, Grave Creek, and Elk River drainages through the implementation of the Air Quality and Greenhouse Gas Management Plan (Section 33.4.1.1).
- Earth moving activities throughout the life of mine scheduled to ensure limited durations of exposed soils.
- Sediment loading in runoff reduced by the application of standard industry practices to intercept sediment before it reaches the receiving environment.
- Regular inspections to ensure drainage, erosion, sediment control, air quality, and dust control measures are effective and functioning properly, and allow for timely repairs and adjustments as required.
- Limiting the mine disturbance footprint and avoiding affecting additional drainages beyond West Alexander and Grave Creeks and further to the north of the Grave Creek-West Alexander Creek drainage divide through the Site Water Management Plan (Section 33.4.1.8). Runoff will be directed to small catchment sumps prior to release or managed with localized erosion mitigations for small, isolated areas of disturbance.

- For surface water that cannot be diverted, capturing it in sediment ponds prior to release into the West Alexander Creek drainage.
- Progressive reclamation and re-vegetation throughout the mine life to minimize erosion potential and reduce the Project footprint, minimizing the potential for runoff effects to surface water.
- Surface water quality monitoring and adaptive management through the Fish and Fish Habitat Management Plan and permit conditions will be used to validate the efficiency of the proposed mitigation measures.
- NWP will support Ktunaxa Nation's stewardship initiatives where identified and applicable to review existing Project Specific programs and plans related to water stewardship and, if required, jointly develop a program to encourage a culture of water stewardship by employees within the Project work environment.
- Where not addressed through other processes, NWP and Ktunaxa Nation will jointly determine a funding and prioritization mechanism for supporting continued aquatic research studies specific to the Project where applicable and required.
- Consideration of Ktunaxa Nation requests through existing committees for monitoring studies related to water quality.
- Continued consultation and engagement with Ktunaxa Nation to identify and adapt mitigation measures to address impacts on use of the use of water resources for traditional purposes within the Project footprint and the KNRI LSA.

33.4.3.4.2 Use of Lands and Resources for Traditional Purposes: Fishing

The mitigation measures identified for the change to use of lands and resources for traditional fishing purposes are as identified in Chapter 12, Section 12.5.3 including the Fish and Fish Habitat Management Plan and the Ecological Restoration Plan. The operational practices and procedures that are prescribed in the Site Water Management Plan in (Section 33.4.1.8) including selenium, nitrate, and calcite management, and the Noise and Vibration Management Plan (Section 33.4.1.7), the Vegetation and Ecosystems Management and Monitoring Plan (Section 33.4.1.11) and the Aquatic Effects Management Program described in Section 33.4.1.5 will be the primary means by which the Project will address adverse effects to fish and fish habitat.

Key mitigation measures for fishing also include, where practicable:

- Limiting erosion and contain sediment through the application of standard industry practices (Erosion and Sediment Control Plan, Section 33.4.1.8).
- Conducting regular inspections to ensure control measures are effective and functioning properly.
- Diverting clean runoff around mine disturbed areas.
- Capturing clean surface water that cannot be diverted in sediment ponds prior to release.
- Limiting the mine disturbance footprint through Project design and progressive reclamation.
- Prohibiting or limiting non-Indigenous access to fishing areas to assure compliance with fishing restrictions.
- Respecting traditional fisheries timing windows and seasonal rounds where practicable.
- As there is potential for access within the Project footprint, NWP is committed to creating permanent access where practicable during the Post-Closure phase for future traditional activities including fishing.

- Developing NUE areas in collaboration with Indigenous Communities, regulators, and key stakeholders based on safety, logistical, and administrative considerations to restrict public access to fishing areas within the Project footprint.
- Educating the Project workforce about fish and fish habitats and implementing an angling policy for NWP non-Indigenous employees and contractors where practicable.
- NWP will coordinate with local conservation enforcement for Alexander and West Alexander Creeks should increases in non-Indigenous recreational fishing be observed by NWP employees.
- Progressive reclamation to occur such that riparian habitats are reclaimed as quickly as possible to minimize the magnitude of Project impacts at the temporal scale with collaboration where practicable with Indigenous Communities.
- Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on use of lands (and waters) and resources for traditional fishing purposes within the Project footprint and the ATRI/KNRI LSA.

33.4.3.4.3 Use of Lands and Resources for Traditional Purposes: Hunting and Trapping

The mitigation measures identified for the change to use of lands and resources for traditional hunting and trapping purposes are as identified in Chapter 15 (e.g., ungulates, Chapter 15, Section 15.4.3.3) including the Wildlife Management and Monitoring Plan and the Ecological Restoration Plan. Many of the measures to mitigate impacts to wildlife VCs are part of protocols described in this chapter including the Air Quality and Greenhouse Gas Management Plan (Section 33.4.1.1), the Noise and Vibration Management Plan (Section 33.4.1.7), the Vegetation and Ecosystems Management and Monitoring Plan (Section 33.4.1.11), the Spill Prevention, Control, and Countermeasures Plan (Section 33.4.1.10), the Waste Management Plan (Section 33.4.1.12), and the Traffic Control Plan (Section 33.4.2.4) which includes access management.

Key mitigation measures for hunting and trapping also include, where practicable:

- Minimizing disturbance and encroachment into natural vegetation, to the extent feasible, by clearing and grubbing only what is required for Construction and Pre-Production activities and progressive development of pits and Mine Rock Storage Facility.
- Clearing vegetation only in the year in which the area will be required for Construction or Operation activities to minimize the extent of cleared vegetation, to the extent possible.
- Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximizing progressive reclamation opportunities during Operations where practicable.
- Implementation of the Erosion and Sediment Control Plan (Section 33.4.1.4) to reduce the potential for sedimentation of riparian, wetland, and aquatic habitat used by wildlife VCs.
- Minimizing sensory disturbances and disruption by limiting construction activities, especially those with high noise impact, to daytime hours and appropriately timing construction activities to minimize cumulative noise levels.
- Installing and maintaining noise and light mitigation measures, where practicable, on and around Project infrastructure to minimize sensory disturbances.
- A wildlife education program will be developed to raise awareness of requirements and commitments to avoid wildlife and protect wildlife and wildlife habitat including educating employees on noise impacts and potential mitigation/control measures through appropriate training.

- Management of vehicle traffic (including limiting road traffic and access and the Traffic Control Plan) contributes to minimization of sensory disturbance and direct mortality along roads and reducing the barrier effect of roads or filters to movement.
- Wildlife will be given the right-of-way on all Project roads and gaps will be created in snowbanks to allow for unimpeded wildlife passage across roads at regular intervals.
- Preventing wildlife entrapment through implementation of wildlife protection protocols including during avalanche control activities.
- Minimizing the potential for exposure to chemical hazards and attractants through the use of holding tanks or closed facilities that exclude wildlife.
- As there is potential for access within the Project footprint, NWP is committed to creating permanent access where practicable during the Post-Closure phase for future traditional activities including hunting and trapping.
- Developing NUE areas in collaboration with Indigenous Communities, regulators, and key stakeholders based on safety, logistical, and administrative considerations to restrict public access to traditional hunting and trapping use areas within the Project footprint.
- Respecting traditional hunting and trapping timing windows and seasonal rounds where practicable.
- Progressive reclamation and revegetation throughout the mine life to reduce the Project footprint as quickly as possible to minimize the magnitude of Project impacts at the temporal scale with collaboration where practicable with Indigenous Communities.
- Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on use of lands and resources for traditional purposes within the Project footprint and the ATRI/KNRI LSA.

33.4.3.4.4 Use of Lands and Resources for Traditional Purposes: Harvesting and Gathering

The mitigation measures identified for the change to use of lands and resources for traditional harvesting and gathering purposes are as identified in Chapter 13 (e.g., riparian habitat, Section 13.6.5.2) and Chapter 14 (e.g., whitebark pine, Section 14.5.5.2.1) including the Vegetation and Ecosystems Management and Monitoring Plan and the Ecological Restoration Plan. Many of the measures to mitigate impacts to plants and vegetation VCs are part of protocols described in this chapter including the Wildlife Management and Monitoring Plan (Section 33.4.1.13), Air Quality and Greenhouse Gas Management Plan (Section 33.4.1.1), the Soil Management Plan (Section 33.4.1.9), Spill Prevention, Control, and Countermeasures Plan (Section 33.4.1.10), and the Waste Management Plan (Section 33.4.1.12).

Key mitigation measures for harvesting and gathering also include, where practicable:

- Minimizing disturbance and encroachment into natural vegetation, to the extent feasible, by clearing and grubbing only what is required for Construction and Pre-Production activities and progressive development of pits and Mine Rock Storage Facility.
- Clearing vegetation only in the year in which the area will be required for Construction or Operation activities to minimize the extent of cleared vegetation, to the extent possible.
- Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximizing progressive reclamation opportunities during Operations where practicable.
- Implementation of the Erosion and Sediment Control Plan (Section 33.4.1.4) to reduce the potential for sedimentation of riparian, wetland, and aquatic habitats and ecosystems.

- Implement the Vegetation and Ecosystems Management and Monitoring Plan (Section 33.4.1.11), to limit the effects that invasive plants may have on natural vegetation.
- Develop and implement whitebark pine salvage, propagation, and restoration as outlined briefly in Chapter 14, Section 14.5.5.2.1.
- Revegetation with Indigenous species to limit the effects that invasive plants may have on natural vegetation.
- As there is potential for access within the Project footprint, NWP is committed to creating permanent access where practicable during the Post-Closure phase for future traditional activities including harvesting and gathering.
- Developing NUE areas in collaboration with Indigenous Communities, regulators, and key stakeholders based on safety, logistical, and administrative considerations to restrict public access to traditional harvesting and gathering use areas within the Project footprint.
- Respecting traditional harvesting and gathering timing windows and seasonal rounds where practicable.
- Identifying opportunities for harvesting and gathering prior to construction for the identified Indigenous Communities community members within the Project footprint and the reestablishment of plant harvesting activities in the reclamation phase.
- Consideration of support for possible mapping of all high priority cultural use areas in the proximity to the Project by Indigenous Communities including support for research and development of approaches for restoring Landscape and Ecosystem VCs.
- Progressive reclamation and revegetation throughout the mine life to reduce the Project footprint as quickly as possible to minimize the magnitude of Project impacts at the temporal scale with collaboration where practicable with Indigenous Communities. As part of Project Reclamation and Closure activities, the Project footprint will be reclaimed to similar ecosystem types to the local area, and which previously existed before disturbance.
- Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on use of lands and resources for traditional purposes within the Project footprint and the ATRI/KNRI LSA.

33.4.3.4.5 Physical and Cultural Heritage, and Change to any Structure, Site, or Thing that is of Historical, Archaeological, Paleontological, or Architectural Significance

The mitigation measures identified for the change to physical and cultural heritage, and structures, sites, or things of historical, archaeological, paleontological, or architectural significance are related to reporting on the implementation of management and monitoring plans associated with the identification of appropriate mitigation for pre-contact archaeological sites based on collaboration with the identified Indigenous Communities. An Archaeology Management Plan (Chapter 33, Section 33.4.1.2) was developed for the Project and describes protocols that will be followed where the Project footprint encroaches upon the recorded boundaries of pre-contact archaeological sites (pre-dating A.D. 1846) that are protected under the *Heritage Conservation Act*, in addition to best management practices for archaeological potential zones and Chance Finds. Mitigation measures for direct impacts to archaeological resources will include, but not be limited to, the application for a provincial Section 12.4 Alteration Permit, to be held concurrently with a Section 12.2 Heritage Inspection Permit. A Heritage Resources response procedure will be put in place as per the Section 12.4 Alteration Permit and will be followed in the event that a Heritage Resource is discovered during Project-related activities. This will include:

- Monitoring by a qualified archaeologist throughout the duration of mechanical activity within defined site boundaries.
- Salvage inspection (≤20% sample screening) of mechanically excavated sediment extracted from and immediately adjacent to recorded archaeological sites.
- Short-term or long-term halt(s) of mechanical activity should significance archaeological resources be exposed.
- Salvage inspection (100% screening) should any of topsoil/sediment that originates from within an archaeological site be required to be removed from the locality of the site area.

Key mitigation measures for physical and cultural heritage also include, where practicable:

- Continued support of site visits from representatives of the identified Indigenous Communities.
- Providing opportunities for ceremonies on the land prior to construction of Project infrastructure.
- Seeking identified Indigenous Communities consent where applicable on any cultural heritage site or resource that may be impacted by a proposed development/land alteration.
- Protection of all cultural heritage sites and resources and managed in a way that is respectful of Indigenous stewardship, cultural values, and traditional teachings.
- NWP will support the development of a Traditional and Cultural Protection Plan to include cultural programs on site where applicable; and events and activities in communities where resource capacity may be supported by NWP.
- NWP with guidance from the identified Indigenous Communities will support the following:
  - Recording the nature and extent of any identified trail corridors and associated passes in proximity of the Project footprint including areas potentially disturbed by Project-related infrastructure, and
  - The rehabilitation of trails, marking of trail sections interrupted by disturbance within the Project footprint, and any additional archival information available regarding them.
- Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on physical and cultural heritage, and structures, sites, or things of historical, archaeological, paleontological, or architectural significance within the Project footprint and the ATRI/KNRI LSA.

Impacts on physical and cultural heritage related to the Grave Prairie Cultural Landscape may be addressed through:

- Continued collaboration with the Ktunaxa Nation and other identified Indigenous Communities to consult on alternative means of access to the Rail Loadout including utilization of the proposed road access that may be situated in the previously disturbed footprint of a current road which may require further assessment.
- Providing opportunities for ceremonies on the land prior to construction of Project infrastructure.
- Evaluating all options to reduce impacts of the rail loadout on the Grave Prairie Cultural Landscape including the adequate consideration to avoidance impact through alternative means that may include:
  - Longer truck haul to a less sensitive load out location,
  - The extension of rail to the Alexander Valley section of the facility, and
  - Agreements with existing operators to share already existing rail load out infrastructure if possible.

- As the Grave Prairie Cultural Landscape includes a "Culturally Sensitive Area" which requires rigorous in-depth assessments prior to contemplating additional development, NWP will continue to work with the Ktunaxa Nation to address related concerns.

33.4.3.4.6 Social, Health, and Economic Conditions

The mitigation measures identified for the change to social, health, and economic conditions are as identified in Chapters 17 (Section 17.5.5) and 18 (Section 18.5.4), including the Health and Safety Management Plan. As noted in Chapter 22, Section 22.5.3, a wide array of design mitigation measures are having been recommended in relation to surface water and air, and considered in the assessment of impact on soil, plant/animal tissue (i.e., food) and sediment quality. As such, mitigation measures applicable to the surface water and air quality VCs are applicable, as well as the following in relation to social and health conditions as described in this chpater including the Air Quality and Greenhouse Gas Management Plan (Section 33.4.1.1), the Noise and Vibration Management Plan (Section 33.4.1.7), the Vegetation and Ecosystems Management and Monitoring Plan (Section 33.4.1.11), the Spill Prevention, Control, and Countermeasures Plan (Section 33.4.1.10), the Waste Management Plan (Section 33.4.1.12), and the Traffic Control Plan (Section 33.4.2.4) which includes access management.

Key mitigation measures for change to social, health, and economic conditions also include, where practicable:

- With respect to the use of lands and resources for traditional purposes (including fishing, hunting and trapping, harvesting and gathering, physical and cultural heritage, and social, health and economic conditions) NWP with guidance from the identified Indigenous Communities, will include a process to monitor during the relevant phases of the Project:
  - Potential Project contaminants to water, country foods, and medicines, including identifying areas or species of particular risk where practicable.
  - The development and implementation of mitigation strategies and measures to address contaminants related to water, country foods, and medicines and their impact on Indigenous community members and Indigenous culture.
  - A culturally appropriate communication strategy to inform Indigenous community members regarding the relative safety or risks of water, country foods, and medicine consumption in proximity of the Project based on scientific and Traditional Knowledge.
  - A joint process for the incorporation of Traditional Knowledge and the participation of Indigenous community representatives in monitoring activities relate to water, country foods, and medicines within and downstream (Alexander Creek) of the Project.
- Avoidance strategies to reduce exposure by Indigenous harvesters active near the Project footprint during Operations, such as site fencing to preclude access and signage.
- Implementation of the Health and Safety Management Plan (Section 33.4.2.3) to mitigate possible social issues that could emerge as a result of the changes to the environment due to the Project.
- Incorporating diversity and inclusivity and GBA+ in all areas of the company such that acceptable and expected behaviours are integrated in the company and are reflected at the community level;
- Implementation of social safety measures and preventative plans to reduce incidents and developing incident support programs.
- Collaborating with local Indigenous organizations on diversity and inclusivity initiatives and events.

- Providing preferential employment provisions including where applicable training programs that encourage the Indigenous community members to have the training, skills, and qualifications to apply for jobs that become available.
- Developing a well-being management plan with Indigenous partners to address ways to reduce the potential effects of shift work for new Indigenous employees and to promote the safety and security of Indigenous women, girls, and 2SLGBTQIAA+ people in the workplace.
- Defining goals for a certain percentage of the workforce to be comprised of Indigenous employees while prioritizing Indigenous women where applicable and requirements that all contractors and subcontractors agree to the preferential hiring process.
- Providing flexible and individually tailored shift work hours for Indigenous employees new to shift work and possibly wage based employment, as well as those Indigenous employees needing time off for traditional hunting, fishing, trapping, and/or gathering activities.
- Designation of an Indigenous Project Liaison to assist Indigenous employees and to address workplace concerns, the availability of different types of cultural leaves for Indigenous employees where applicable.
- Distribution of relevant materials where applicable in local languages and on-site interpretation where needed for Indigenous employees, and employment assistance programs that offer culturally relevant support for Indigenous employees where applicable.
- Where practicable, contracting and sub-contracting related to the Project will be given to qualified businesses that are owned at least in part by Indigenous Community members and requirements that all businesses contracts employ Indigenous employees.
- NWP will work with the identified Indigenous Communities to create economic benefits for the community that might include initiatives related to:
  - Capacity building;
  - Direct and indirect employment;
  - Education and training; and
  - Procurement and business relationships.
- NWP will support activities related to monitoring and address potential beneficial and adverse economic and social effects related to increased participation of Indigenous community members in the NWP work force including providing support to related Indigenous Communities to conduct community-based surveys to monitor baseline trends and track positive and negative changes in socio-economic conditions.
- Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on social, health, and economic conditions within the Project footprint and the ATRI/KNRI LSA.

Communication of the results of the follow-up strategies and/or monitoring programs to the Indigenous Communities is an essential component of the Indigenous Impact Management Plan to be implemented by NWP. Not only does this maintain communication with all parties and keep them informed of the Project activities and their associated environmental effects, but it also offers the opportunity to incorporate input from Indigenous Communities into the design of the Indigenous Impact Management Plan and related monitoring programs and any consequential adaptive management, where applicable.

Using an adaptive management plan, the follow-up strategies and the monitoring programs will be periodically evaluated for effectiveness and the appropriateness of their elements, and the parameters

being measured and reported. This evaluation will be done in consultation with the appropriate regulatory agencies and the results of these strategies and programs will be analyzed. If any elements of the follow-up strategies and the monitoring programs warrant adjustment to meet the aim and intent, then in consultation with regulatory agencies, the strategies and the programs may be adjusted. It is anticipated that as a condition of the approval of the Project, the results of the follow-up strategies, and the monitoring programs or measures being conducted will be reported to the appropriate regulatory agencies, both federal and provincial.

33.4.3.4.7 Summary of Indigenous Impact Management Plan Commitments

The Indigenous Impact Management Plan Commitments related to Indigenous Communities' rights and related interests are summarized in Table 33.4-57.

Table 33.4-57: Summary of Indigenous Impact Management Plan for the identified Indigenous Communities

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
Potential Change to all Rights/Interests	• Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure	NWP is committed to an ongoing dialogue with the identified Indigenous Communities, including commitments to the following: • Best management practices and procedures related to each VC of interest including the design of mitigation measures as outlined in the Application/EIS. • Follow-up, monitoring and offsetting and compensation programs related to anticipated residual effects of select VCs. • Implementation of the engagement agreement between NWP and the identified Indigenous Communities. • Confirmation and implementation of the Indigenous Impact Management Plan that outlines mitigation measures to avoid, minimize, reduce, and/or offset potential direct and indirect impacts of the Project and utilizes adaptive management approaches for follow-up strategies and monitoring programs. • Consideration of collaborative strategies for addressing cumulative effects where applicable, with the identified Indigenous Communities, other proponents, and regulatory agencies. • Follow the spirit and intent of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and its guiding principles. • Support the recognition of Indigenous stewardship and governance in the Elk Valley. • Recognize and respect the deep personal, community, and cultural attachment of the identified Indigenous Communities to the land and resources where NWP does business. • Incorporate NWP's understanding of Indigenous interests, values, knowledge, and ways of knowing into NWP decision making where practicable. In addition to the mitigations outlined in the specific VC chapters, the following mitigation measures are proposed to reduce the potential impact on the identified Indigenous Communities' rights and interests: • Engaging with the identified Indigenous Communities to refine the Indigenous Impact Management Plan specific to the rights-based activities and other interests (e.g., cultural activities, hunting, trapping, fishing, gathering, and cultural heritage) exercised by the identified Indigenous Communities within the Project footprint. • The Indigenous Impact Management Plan will further describe cross-cultural awareness training, which will be developed in collaboration where practicable, with the identified Indigenous Communities. This training is expected to build awareness and reduce potential adverse

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
		interactions with the identified Indigenous Communities and will include cultural awareness education and training for staff and on-the-ground personnel during the applicable phases of the Project. • Supporting possible opportunities to augment VC-specific monitoring programs to include responses to concerns raised by the identified Indigenous Communities utilizing adaptive management approaches for follow-up strategies. • Participation in the Elk Valley Cumulative Effects Management Framework as co-led by the KNC. • Encouraging the participation of the identified Indigenous Communities to the applicable Project Advisory, Environmental Stewardship, and in the Environmental Monitoring Committee to review, shape, and steer monitoring activities and to guide future priorities. • Encouraging the participation of the identified Indigenous Communities in the Reclamation Planning Committee to review how traditional knowledge has been incorporated, including Indigenous traditional use and cultural expression as part of the Project closure goals. • Supporting access to the Project site and provide applicable available resources for the Indigenous-Guardians Program to develop and lead monitoring programs related to the Project. • Incorporating feedback from the identified Indigenous Communities in the development of an Access Management and Monitoring Program which would address any concerns raised regarding access to areas that might be temporarily restricted due to safety concerns (e.g., in the Project footprint during construction and operations) by creating alternatives to guarantee access to key land use areas. NWP will establish No Unauthorized Entry (NUE) areas in order to ensure worker and public safety within and near the Project. • Supporting the establishment of conservation lands that may be privately held by NWP, an Indigenous Community, or a recognized conservation organization. • Supporting Indigenous work related to land and resource use planning objectives in proximity to the Project and following the EAC, NWP will support Indigenous work related to land and resource use planning objectives for consideration during the relevant Project phases. • Providing access to requested reports and identify feedback opportunities where applicable including the various mitigation and monitoring plans as well as those related to the Indigenous Impact Management Plan.

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
Potential Change to Use of Lands and Resources for Traditional Purposes: Water Use (Ktunaxa Nation)	• Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure	The mitigation measures identified for the change to the use of water for traditional purposes are as identified in Chapter 10, Section 10.5.3 and Chapter 11, Section 11.5.3. Key mitigation measures for water use include, where practicable: • Implementing the Erosion and Sediment Control Management Plan (Section 33.4.1.4) to reduce the potential for erosion and the transportation of material in surface runoff to the West Alexander Creek, Alexander Creek, Grave Creek, and Elk River drainages. • Reducing the potential for dust to settle in the West Alexander Creek, Alexander Creek, Grave Creek, and Elk River drainages through the implementation of the Air Quality and Greenhouse Gas Management Plan (Section 33.4.1.1). • Earth moving activities throughout the life of mine scheduled to ensure limited durations of exposed soils. • Sediment loading in runoff reduced by the application of standard industry practices to intercept sediment before it reaches the receiving environment. • Regular inspections to ensure drainage, erosion, sediment control, air quality, and dust control measures are effective and functioning properly, and allow for timely repairs and adjustments as required. • Limiting the mine disturbance footprint and avoiding affecting additional drainages beyond West Alexander and Grave Creeks and further to the north of the Grave Creek-West Alexander Creek drainage divide through the Site Water Management Plan (Section 33.4.1.8). Runoff will be directed to small catchment sumps prior to release or managed with localized erosion mitigations for small, isolated areas of disturbance. • For surface water that cannot be diverted, capturing it in sediment ponds prior to release into the West Alexander Creek drainage. • Progressive reclamation and re-vegetation throughout the mine life to minimize erosion potential and reduce the Project footprint, minimizing the potential for runoff effects to surface water. • Surface water quality monitoring and adaptive management through the Fish and Fish Habitat Management Plan and permit conditions will be used to validate the efficiency of the proposed mitigation measures. • NWP will support Ktunaxa Nation's stewardship initiatives where identified and applicable to review existing Project Specific programs and plans related to water stewardship and, if required, jointly develop a program to encourage a culture of water stewardship by employees within the Project work environment.

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
		• Where not addressed through other processes, NWP and Ktunaxa Nation will jointly determine a funding and prioritization mechanism for supporting continued aquatic research studies specific to the Project where applicable and required. • Consideration of Ktunaxa Nation requests through existing committees for monitoring studies related to water quality. • Continued consultation and engagement with Ktunaxa Nation to identify and adapt mitigation measures to address impacts on use of the use of water resources for traditional purposes within the Project footprint and the KNRI LSA.
Potential Change to Use of Lands and Resources for Traditional Purposes: Fishing	• Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure	The mitigation measures identified for the change to use of lands and resources for traditional fishing purposes are as identified in Chapter 12, Section 12.5.3. Key mitigation measures for fishing also include, where practicable: • Limiting erosion and contain sediment through the application of standard industry practices (Erosion and Sediment Control Plan, Section 33.4.1.8). • Conducting regular inspections to ensure control measures are effective and functioning properly. • Diverting clean runoff around mine disturbed areas. • Capturing clean surface water that cannot be diverted in sediment ponds prior to release. • Limiting the mine disturbance footprint through Project design and progressive reclamation. • Prohibiting or limiting non-Indigenous access to fishing areas to assure compliance with fishing restrictions. • Respecting traditional fisheries timing windows and seasonal rounds where practicable. • As there is potential for access within the Project footprint, NWP is committed to creating permanent access where practicable during the Post-Closure phase for future traditional activities including fishing. • Developing NUE areas in collaboration with Indigenous Communities, regulators, and key stakeholders based on safety, logistical, and administrative considerations to restrict public access to fishing areas within the Project footprint. • Educating the Project workforce about fish and fish habitats and implementing an angling policy for NWP non-Indigenous employees and contractors where practicable. • NWP will coordinate with local conservation enforcement for Alexander and West Alexander Creeks should increases in non-Indigenous recreational fishing be observed by NWP employees.

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
		• Progressive reclamation to occur such that riparian habitats are reclaimed as quickly as possible to minimize the magnitude of Project impacts at the temporal scale with collaboration where practicable with Indigenous Communities. • Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on use of lands (and waters) and resources for traditional fishing purposes within the Project footprint and the ATRI/KNRI LSA.
Potential Change to Use of Lands and Resources for Traditional Purposes: Hunting and Trapping	• Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure	The mitigation measures identified for the change to use of lands and resources for traditional hunting and trapping purposes are as identified in Chapter 15 (e.g., ungulates, Chapter 15, Section 15.4.3.3). Key mitigation measures for hunting and trapping also include, where practicable: • Minimizing disturbance and encroachment into natural vegetation, to the extent feasible, by clearing and grubbing only what is required for Construction and Pre-Production activities and progressive development of pits and Mine Rock Storage Facility. • Clearing vegetation only in the year in which the area will be required for Construction or Operation activities to minimize the extent of cleared vegetation, to the extent possible. • Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximizing progressive reclamation opportunities during Operations where practicable. • Implementation of the Erosion and Sediment Control Plan (Section 33.4.1.4) to reduce the potential for sedimentation of riparian, wetland, and aquatic habitat used by wildlife VCs. • Minimizing sensory disturbances and disruption by limiting construction activities, especially those with high noise impact, to daytime hours and appropriately timing construction activities to minimize cumulative noise levels. • Installing and maintaining noise and light mitigation measures, where practicable, on and around Project infrastructure to minimize sensory disturbances. • A wildlife education program will be developed to raise awareness of requirements and commitments to avoid wildlife and protect wildlife and wildlife habitat including educating employees on noise impacts and potential mitigation/control measures through appropriate training. • Management of vehicle traffic (including limiting road traffic and access and the Traffic Control Plan) contributes to minimization of sensory disturbance and direct mortality along roads and reducing the barrier effect of roads or filters to movement. • Wildlife will be given the right-of-way on all Project roads and gaps will be created in snowbanks to allow for unimpeded wildlife passage across roads at regular intervals.

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
		• Preventing wildlife entrapment through implementation of wildlife protection protocols including during avalanche control activities. • Minimizing the potential for exposure to chemical hazards and attractants through the use of holding tanks or closed facilities that exclude wildlife. • As there is potential for access within the Project footprint, NWP is committed to creating permanent access where practicable during the Post-Closure phase for future traditional activities including hunting and trapping. • Developing NUE areas in collaboration with Indigenous Communities, regulators, and key stakeholders based on safety, logistical, and administrative considerations to restrict public access to traditional hunting and trapping use areas within the Project footprint. • Respecting traditional hunting and trapping timing windows and seasonal rounds where practicable. • Progressive reclamation and revegetation throughout the mine life to reduce the Project footprint as quickly as possible to minimize the magnitude of Project impacts at the temporal scale with collaboration where practicable with Indigenous Communities. • Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on use of lands and resources for traditional purposes within the Project footprint and the ATRI/KNRI LSA.
Potential Change to Use of Lands and Resources for Traditional Purposes: Harvesting and Gathering	• Construction and Pre-Production • Operations • Reclamation and Closure • Post-Closure	The mitigation measures identified for the change to use of lands and resources for traditional harvesting and gathering purposes are as identified in Chapter 13 (e.g., riparian habitat, Section 13.6.5.2) and Chapter 14 (e.g., whitebark pine, Section 14.5.5.2.1). Key mitigation measures for harvesting and gathering also include, where practicable: • Minimizing disturbance and encroachment into natural vegetation, to the extent feasible, by clearing and grubbing only what is required for Construction and Pre-Production activities and progressive development of pits and Mine Rock Storage Facility. • Clearing vegetation only in the year in which the area will be required for Construction or Operation activities to minimize the extent of cleared vegetation, to the extent possible. • Sequencing the development of pits and Mine Rock Storage Facility areas to limit total disturbance during any one period and maximizing progressive reclamation opportunities during Operations where practicable. • Implementation of the Erosion and Sediment Control Plan (Section 33.4.1.4) to reduce the potential for sedimentation of riparian, wetland, and aquatic habitats and ecosystems.

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
		• Implement the Vegetation and Ecosystems Management and Monitoring Plan (Section 33.4.1.11), to limit the effects that invasive plants may have on natural vegetation. • Develop and implement whitebark pine salvage, propagation, and restoration as outlined briefly in Chapter 14, Section 14.5.5.2.1. • Revegetation with Indigenous species to limit the effects that invasive plants may have on natural vegetation. • As there is potential for access within the Project footprint, NWP is committed to creating permanent access where practicable during the Post-Closure phase for future traditional activities including harvesting and gathering. • Developing NUE areas in collaboration with Indigenous Communities, regulators, and key stakeholders based on safety, logistical, and administrative considerations to restrict public access to traditional harvesting and gathering use areas within the Project footprint. • Respecting traditional harvesting and gathering timing windows and seasonal rounds where practicable. • Identifying opportunities for harvesting and gathering prior to construction for the identified Indigenous Communities community members within the Project footprint and the reestablishment of plant harvesting activities in the reclamation phase. • Consideration of support for possible mapping of all high priority cultural use areas in the proximity to the Project by Indigenous Communities including support for research and development of approaches for restoring Landscape and Ecosystem VCs. • Progressive reclamation and revegetation throughout the mine life to reduce the Project footprint as quickly as possible to minimize the magnitude of Project impacts at the temporal scale with collaboration where practicable with Indigenous Communities. As part of Project Reclamation and Closure activities, the Project footprint will be reclaimed to similar ecosystem types to the local area, and which previously existed before disturbance. • Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on use of lands and resources for traditional purposes within the Project footprint and the ATRI/KNRI LSA.

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
Potential Change to Physical and Cultural Heritage and Change to any Structure, Site, or Thing that is of Historical, Archaeological, Paleontological, or Architectural Significance	• Construction and Pre-Production • Operations	An Archaeology Management Plan (Chapter 33, Section 33.4.1.2) was developed for the Project and describes protocols that will be followed where the Project footprint encroaches upon the recorded boundaries of pre-contact archaeological sites (pre-dating A.D. 1846) that are protected under the *Heritage Conservation Act*, in addition to best management practices for archaeological potential zones and Chance Finds. Key mitigation measures for physical and cultural heritage also include, where practicable: • Continued support of site visits from representatives of the identified Indigenous Communities. • Providing opportunities for ceremonies on the land prior to construction of Project infrastructure. • Seeking identified Indigenous Communities consent where applicable on any cultural heritage site or resource that may be impacted by a proposed development/land alteration. • Protection of all cultural heritage sites and resources and managed in a way that is respectful of Indigenous stewardship, cultural values, and traditional teachings. • NWP will support the development of a Traditional and Cultural Protection Plan to include cultural programs on site where applicable; and events and activities in communities where resource capacity may be supported by NWP. • NWP with guidance from the identified Indigenous Communities will support the following: o Recording the nature and extent of any identified trail corridors and associated passes in proximity of the Project footprint including areas potentially disturbed by Project-related infrastructure, and o The rehabilitation of trails, marking of trail sections interrupted by disturbance within the Project footprint, and any additional archival information available regarding them. • Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on physical and cultural heritage, and structures, sites, or things of historical, archaeological, paleontological, or architectural significance within the Project footprint and the ATRI/KNRI LSA. Impacts on physical and cultural heritage related to the Grave Prairie Cultural Landscape may be addressed through: • Continued collaboration with the Ktunaxa Nation and other identified Indigenous Communities to consult on alternative means of access to the Rail Loadout including utilization of the proposed road access that may be situated in the previously disturbed footprint of a current road which may require further assessment. • Providing opportunities for ceremonies on the land prior to construction of Project infrastructure.

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
		• Evaluating all options to reduce impacts of the rail loadout on the Grave Prairie Cultural Landscape including the adequate consideration to avoidance impact through alternative means that may include: o Longer truck haul to a less sensitive load out location, o The extension of rail to the Alexander Valley section of the facility, and o Agreements with existing operators to share already existing rail load out infrastructure if possible. • As the Grave Prairie Cultural Landscape includes a "Culturally Sensitive Area" which requires rigorous in-depth assessments prior to contemplating additional development, NWP will continue to work with the Ktunaxa Nation to address related concerns.
Potential Change to Social, Health, and Economic Conditions	• Construction and Pre-Production • Operations • Reclamation and Closure	The mitigation measures identified for the change to social, health, and economic conditions are as identified in Chapters 17 (Section 17.5.5) and 18 (Section 18.5.4). Key mitigation measures for change to social, health, and economic conditions also include, where practicable: • With respect to the use of lands and resources for traditional purposes (including fishing, hunting and trapping, harvesting and gathering, physical and cultural heritage, and social, health and economic conditions) NWP with guidance from the identified Indigenous Communities, will include a process to monitor during the relevant phases of the Project: o Potential Project contaminants to water, country foods, and medicines, including identifying areas or species of particular risk where practicable. o The development and implementation of mitigation strategies and measures to address contaminants related to water, country foods, and medicines and their impact on Indigenous community members and Indigenous culture. o A culturally appropriate communication strategy to inform Indigenous community members regarding the relative safety or risks of water, country foods, and medicine consumption in proximity of the Project based on scientific and Traditional Knowledge. o A joint process for the incorporation of Traditional Knowledge and the participation of Indigenous community representatives in monitoring activities relate to water, country foods, and medicines within and downstream (Alexander Creek) of the Project. • Avoidance strategies to reduce exposure by Indigenous harvesters active near the Project footprint during Operations, such as site fencing to preclude access and signage. • Implementation of the Health and Safety Management Plan (Section 33.4.2.3) to mitigate possible social issues that could emerge as a result of the changes to the environment due to the Project.

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
		• Incorporating diversity and inclusivity and GBA+ in all areas of the company such that acceptable and expected behaviours are integrated in the company and are reflected at the community level; • Implementation of social safety measures and preventative plans to reduce incidents and developing incident support programs. • Collaborating with local Indigenous organizations on diversity and inclusivity initiatives and events. • Providing preferential employment provisions including where applicable training programs that encourage the Indigenous community members to have the training, skills, and qualifications to apply for jobs that become available. • Developing a well-being management plan with Indigenous partners to address ways to reduce the potential effects of shift work for new Indigenous employees and to promote the safety and security of Indigenous women, girls, and 2SLGBTQIAA+ people in the workplace. • Defining goals for a certain percentage of the workforce to be comprised of Indigenous employees while prioritizing Indigenous women where applicable and requirements that all contractors and subcontractors agree to the preferential hiring process. • Providing flexible and individually tailored shift work hours for Indigenous employees new to shift work and possibly wage based employment, as well as those Indigenous employees needing time off for traditional hunting, fishing, trapping, and/or gathering activities. • Designation of an Indigenous Project Liaison to assist Indigenous employees and to address workplace concerns, the availability of different types of cultural leaves for Indigenous employees where applicable. • Distribution of relevant materials where applicable in local languages and on-site interpretation where needed for Indigenous employees, and employment assistance programs that offer culturally relevant support for Indigenous employees where applicable. • Where practicable, contracting and sub-contracting related to the Project will be given to qualified businesses that are owned at least in part by Indigenous Community members and requirements that all businesses contract employ Indigenous employees. • NWP will work with the identified Indigenous Communities to create economic benefits for the community that might include initiatives related to: o Capacity building; o Direct and indirect employment; o Education and training; and

Impact on Rights and Interests	Applicable Project Phase(s)	Key Commitments/Mitigation Measures
		○ Procurement and business relationships. • NWP will support activities related to monitoring and address potential beneficial and adverse economic and social effects related to increased participation of Indigenous community members in the NWP work force including providing support to related Indigenous Communities to conduct community-based surveys to monitor baseline trends and track positive and negative changes in socio-economic conditions. • Continued consultation and engagement with the identified Indigenous Communities to identify and adapt mitigation measures to address impacts on social, health, and economic conditions within the Project footprint and the ATRI/KNRI LSA.

33.5 References

Bianchin, M., Martin, A., and Adams, J. (2013). *In-situ immobilization of selenium within the saturated zones of backfilled pits at coal-mine operations.* BC Mine Reclamation Symposium.

British Columbia Ministry of Energy and Mines. (2021). *Health, safety and reclamation code for mines in British Columbia*. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/health-and-safety/code-review/health_safety_and_reclamation_code_2017_rev.pdf

British Columbia Ministry of Energy and Mines. (2017a). *Health, safety and reclamation code for mines in British Columbia*. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/health-and-safety/code-review/health_safety_and_reclamation_code_2017_rev.pdf

British Columbia Ministry of Energy and Mines. (2017). *Mine emergency response plan guidelines for the mining industry.* https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/health-and-safety/code-review/merp_guideline_2017_revision_final.pdf

BC Ministry of Environment. (1979). *Pollution control objectives for the mining, smelting, and related industries of British Columbia.* Pollution Control Board. Victoria B.C. http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=6321

British Columbia Ministry of Environment. (2014a). *Procedures for mitigation impacts on environmental values (Environmental mitigation procedures)* [Version 1.0]. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/environmental-mitigation-policy/em_procedures_may27_2014.pdf

British Columbia Ministry of Environment (2014b). *Environmental Mitigation Procedures. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/environmental-mitigation-policy/em_procedures_may27_2014.pdf*

British Columbia Ministry of Environment. (2016a). *Hazardous waste legislation guide.*

British Columbia Ministry of Environment. (2016b). *Best management practices for bats in British Columbia.* http://a100.gov.bc.ca/pub/eirs/viewDocumentDetail.do?fromStatic=true&repository=BDP&documentId=12460

British Columbia Ministry of Environment and Climate Change Canada. (2019b). *Wildlife habitat features field guide (Kootenay Boundary region).*

British Columbia Ministry of Environment and Climate Change Canada. (2021). *Climate change*. https://www2.gov.bc.ca/gov/content/environment/climate-change

British Columbia Ministry of Environment and Climate Change Strategy. (2019). British Columbia *Approved water quality guidelines: Aquatic life, wildlife and agriculture.* British Columbia Ministry of Environment & Climate Change Strategy, Water Protection and Sustainability Branch.

British Columbia Ministry of Environment and Climate Change Strategy. (2019a). *Approved water quality guidelines: Aquatic life, wildlife and agriculture.* British Columbia Ministry of Environment & Climate Change Strategy, Water Protection and Sustainability Branch.

British Columbia Ministry of Forests, Lands, Natural Resource Operations, and Rural Development. (1999). *Found human remains policy*. Archaeology Branch. https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/archaeology/bulletins-policies#Archaeology%20Bulletins

British Columbia Ministry of Forests, Lands, and Natural Resource Operations and Department of Oceans and Fisheries Canada. (2012). *Fish-Stream Crossing Guidebook.* https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/resource-roads/fish-stream_crossing_web.pdf

British Columbia Ministry of Forests, Lands, and Natural Resource Operations. (2013). *Guidelines for raptor conservation during urban and rural Land development in British Columbia (2013): A companion document to Develop with Care 2012*. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/raptor_conservation_guidelines_2013.pdf

British Columbia Ministry of Forests, Lands, and Natural Resource Operations. (2014a). *A compendium of wildlife guidelines for industrial development projects in the North Area, British Columbia (Interim guidance).*

British Columbia Ministry of Forests, Lands, and Natural Resource Operations (2014b). *Develop with care 2014: Environmental guidelines for urban and rural land development in British Columbia*. https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care

British Columbia Ministry of Forests, Lands, and Natural Resource Operations. (2014c). *Guidelines for Amphibian and Reptile Conservation in Urban and Rural Development in British Columbia*. https://www.env.gov.bc.ca/wld/documents/bmp/HerptileBMP_complete.pdf

British Columbia Ministry of Forests, Lands and Natural Resource Operations. (2016). *Best management practices for amphibian and reptile salvages in British Columbia [Version 1.0].* http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10351

British Columbia Ministry of Water, Land, and Air Protection. (2004). S*tandards and best practices for instream works*. https://www.env.gov.B.C..ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

British Columbia Ministry of Water, Land, and Air Protection. (2005). *Handbook for pesticide applicators and dispensers* (R.W. Adams Ed.). Government of British Columbia.

Canadian Dam Association. (2019). *CDA technical bulletin: Application of dam safety guidelines to mining dams*. https://cda.ca/news/view/cda-guidance-documents-online-for-members

Canadian Environmental Assessment Agency. (2015). *Guidelines for the preparation of an environmental impact statement pursuant to the Canadian Environmental Assessment Act, 2012*. Crown Mountain Coking Coal Project, NWP Coal Canada Ltd.

Canadian Council of Ministers for the Environment. (2014). *Canadian water quality guidelines for the protection of aquatic life.* https://ccme.ca/en/resources/water-aquatic-life

Claridge, F., Funk, W., and Martin, L. (2012). *The evolution of coal mine waste management practices in Western Canada*. 13th International Symposium on Environmental Issues and Waste Management in Energy and Mineral Production, New Dehli, India.

Contaminated Sites Regulation (1996), B.C. Reg. 375/96. https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/375_96_01

Cox, R.K. and Cullington, J. (2009). *Wetland ways: Interim guidelines for wetland protection and conservation in British Columbia.* Wetland Stewardship Partnership. https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-planning-strategies/wetlands-in-bc

Elk Valley Cumulative Effects Management Framework Working Group. (2018). *Elk Valley cumulative effects assessment and management report*. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/cumulative-effects/final_elk_valley_ceam_12122018.pdf

Environmental Assessment Office (2018a). *Application information requirements – Crown Mountain Coking Coal Project*. Proposed by NWP Coal Canada Ltd, April 26, 2018.

Environment Canada. (2009). *National inventory report 1990-2007: Greenhouse gas sources and sinks in Canada*. United Nations Framework Convention.

Environment Canada. (2013). *Bird conservation strategy for bird conservation region 10 Pacific and Yukon region: Northern Rockies abridged version.* https://canada.ca/content/dam/eccc/migration/main/mbc-com/b0e2c86b-57e6-419a-b3e9-e1cd1808adfe/bcr-10-pyr-final-abridged-feb2013.pdf

Environment Canada. (2016a). *Recovery strategy for the olive-sided flycatcher (Contopus cooperi) in Canada.* Species at Risk Act Recovery Strategy Series. https://www.sararegistry.gc.ca/virtual_sara/files/plans/rs_olive-sided%20flycatcher_e_final.pdf

Environment Canada. (2016b). *Recovery strategy for the common nighthawk (Chordeiles minor) in Canada.* Species at Risk Act Recovery Strategy Series. https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_common%20nighthawk_e_final.pdf

Environment and Climate Change Canada. (2019). *Guidelines to reduce risk to migratory birds.* https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/reduce-risk-migratory-birds.html

Environment and Climate Change Canada. (2022). *Proposed Approach for Coal Mining Effluent Regulations.* https://www.canada.ca/content/dam/eccc/documents/pdf/managing-pollution/sources-industry/cmer-remc/CMER-Discussion-Document.pdf

British Columbia Ministry of Environment. (2015). *Technical guidance 7 Environmental Management Act: Assessing the design, size, and operation of sediment ponds used in mining. Version 1.0.* https://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/mining-smelt-energy/assessing_design_size_and_operation_of_sediment_ponds.pdf

Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment. (2003). *Incorporating climate change considerations in environmental assessment: General guidance for practitioners*. https://www.canada.ca/content/dam/iaac-acei/documents/policy-guidance/incorporating-climate-change-considerations-environmental-assessment-general-guidance-practitioners/incorporating-climate-change-considerations-environmental-assessment.pdf

Gibbons, R.D. (1994). Statistical methods for groundwater monitoring.

Gilbert, R.O. (1987). *Statistical methods for environmental pollution monitoring*. Van Nostrand Reinhold, New York.

Gilron. G., and McKenna. G. (2021). *Selenium management for Alberta coal mines: state of practice review.* Borealis Environmental Consulting and McKenna Geotechnical Inc.

Government of Canada. (2004). *An invasive alien species strategy for Canada.* https://publications.gc.ca/collections/collection_2014/ec/CW66-394-2004-eng.pdf

Government of British Columbia. (2015). Workplace Hazardous Materials Information System (WHMIS) 2015. https://www2.gov.bc.ca/gov/content/careers-myhr/all-employees/safety-health-well-being/workplace/planning/whmis-2015

Government of British Columbia. (2019). *Reference guide for forest development stocking standards.* https://www2.gov.B.C..ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/stocking-standards

Health Canada. (2020). *Guidelines for Canadian drinking water quality summary table.* https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf

Inter-Ministry Invasive Species Working Group. (2014a). *Invasive species strategic plan.* Province of British Columbia. https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/invasive-species/imiswg/prov_is_strategy.pdf

Inter-Ministry Invasive Species Working Group. (2014b). *Invasive species early detection and rapid response plan for British Columbia.* Province of British Columbia. https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/invasive-species/guidance-resources/final_imiswg_bc_is_edrr_plan_nov_2014.pdf

International Network for Acid Protection. (2017). *Global cover system design – technical guidance document*.

Invasive Species Council of British Columbia. (2021). *Invasive species strategy for British Columbia: 2018-2022.* https://bcinvasives.ca/wp-content/uploads/2021/01/Invasive_Species_Strategy_for_BC-2018-180117-WEB.pdf

Invasive Species Council of British Columbia and British Columbia Ministry of Transportation and Infrastructure. (2019). *Best practices for managing invasive plants on roadsides: A pocket guide for British Columbia's maintenance contractors.* https://bcinvasives.ca/wp-content/uploads/2021/01/Weeds_Roads_BMP_Guide-2019-web.pdf

Invasive Species Council of British Columbia and Inter-Ministry Invasive Species Working Group. (2019). *Field guide to noxious weeds and other selected invasive plants of British Columbia* [Tenth Edition]. Province of British Columbia. https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/invasive-species/publications/field_guide_to_noxious_weeds_10th_edition_32619.pdf

Kendall, M.G. (1975). *Rank Correlation Methods 4th ed*. Charles Griffin, London.

Kennedy, C., Day, S., MacGregor, D. and Pumphrey, J. (2012). *Selenium leaching from coal waste rock in the Elk Valley, B.C*. International Conference on Acid Rock Drainage, Ottawa, Canada.

Kennedy, C., Day, S., Mackie, D., and Pesonen, N. (2015). *Biogeochemical selenium sequestration in unsaturated coal reject piles*. ICARD International Conference on Acid Rock Drainage.

Kirk, L.B., Hwang, C., Ertuna, C., Kennedy, C., and Peyton, B. (2017). *Column tests of selenium biomineralization in support of saturated rockfill design.* Mine Water and the Circular Economy, Lappeenranta, Finland.

Khatri, N., and Tyagi, S. (2015). Influences of natural and anthropogenic factors on surface and groundwater quality in rural and urban areas. *Frontiers in Life Science, 8(*1), 23-39. 10.1080/21553769.2014.933716

Ktunaxa Nation Council. (2020a). *Ktunaxa Nation Council guidelines for archaeological assessment and engagement in Ktunaxa territory.*

Ktunaxa Nation Council. (2020b). *DRAFT KNC standards for determining significance in EAs in the Elk Valley version 1.1.*

Knoben, W.J.M., Freer, J.E., and Woods, R.A. (2019). Technical Note: Inherent benchmark or not? Comparing Nash-Sutcliffe to Kling-Gupta efficiency score. *Hydrology and Earth System Science*. https://doi.org/10.5194/hess-2019-327

Landform Design Institute. (2021). *Mining with the end in mind: Landform design for sustainable mining.*

Locke, A., and A. Paul. (2011). *A desk-top method for establishing environmental flows in Alberta rivers and streams.* Alberta Environment and Alberta Sustainable Resource Development. http://www.environment.gov.ab.ca/info/library/8371.pdf.

Lloyd, J. W., and Heathcote, J.A. (1985). *Natural inorganic hydrochemistry in relation to groundwater*. Clarendon Press, Oxford.

Lynch-Stewart, P., Neice, P., Rubec, C., and Kessel-Taylor, I. (1996). *The federal policy on wetland conservation – Implementation guide for federal land managers.* Canadian Wildlife Service, Environment Canada.

MacGregor, D., Day, S., and Lopez, G. (2012). *Investigations of calcite deposits in streams downstream of coal waste rock dumps, British Columbia and Alberta, Canada.* International Conference on Acid Rock Drainage, Ottawa, Canada.

MacKillop, D.J., Ehman, A.J., Iverson, K.E., and McKenzie, E.B. (2018). *A field guide to site classification and identification for southeast British Columbia: East Kootenay*.

Mann, H.B. (1945). Nonparametric tests against trend. *Econometrica, 13*, 245-259.

Ministry of Supply and Services Canada. (1995). *Canadian biodiversity strategy – Canada's response to the convention on biological diversity.* https://m.espacepourlavie.ca/sites/espacepourlavie.ca/files/canadian-biodiversity-strategy.pdf

Peck, R.B. (1969). Advantages and limitation of the observational method in applied soil mechanics. *Geotechnique, 19*(2), 171-187.

Polster, D., and Cullington, J. (2004). *Environmental best management practices for urban and rural land development: Special wildlife and species at risk.* British Columbia Ministry of Water, Land, and Air Protection. https://www.env.gov.bc.ca/wld/documents/bmp/urban_ebmp/urban_ebmp.html

Pomeroy, J.W., Stewart, R.E., and Whitfield, P.H. (2015). The 2013 flood event in the South *Saskatchewan and Elk River Basins: Causes, assessment and damages. Canadian* Water Resources, *41,* 105-177.

Province of British Columbia. (2021). *Forest practices code riparian management area guidebook.* https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-

resources/silviculture/silvicultural-systems/silviculture-guidebooks/riparian-management-area-guidebook

Robinson, M. D., and MacDonald, R. J. (2014). *Teck Coal Limited 2013 calcite monitoring program – Elk Valley Operations summary report*. Lotic Environmental Ltd.

Sen P.K. (1968a). On a class of aligned rank order tests in two-way layouts. *The Annals of Mathematical Statistics, 39*, 1115-1124.

Sen P.K. (1968b). Estimates of the regression coefficient based on Kendall's tau. *American Statistical Association, 63*, 1379-1389.

Shuswap Indian Band. (2019). *Chance find procedures for archaeological assessment and engagement.*

SRK. (2021). *Geochemical baseline Crown Mountain Project*.

Stantec. (2020). *Crown Mountain bankable feasibility study.* Prepared for NWP Coal Canada Ltd.

Tamasi, I. (2021). *Archaeological impact assessment of the Crown Mountain coking coal project – Final report* (I. Tamasi, N. Sherwin, and D. Heinrichs Eds.). British Columbia Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, Archaeology Branch.

Tamasi, I. and Sherwin, N. (2021). *Archaeological impact assessment of the Crown Mountain coking coal project: Phase I – Rail loadout facility.* British Columbia Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, Archaeology Branch.

Teck Resources Limited. (2014). *Elk Valley water quality plan*. https://www.teck.com/media/2015-Water-elk_valley_water_quality_plan_T3.2.3.2.pdf

Theil, H. (1950). A rank-invariant method of linear and polynomial regression analysis*. Proceedings of the Royal Netherlands Academy of Sciences, 53,* 1397-1412.

United States Geological Survey. (2020). *Statistical methods in water resources - Chapter 3 of Section A, Statistical Analysis, Book 4: Hydrologic Analysis and Interpretation (editor: J.F. Reilly, Director), version 1.1.*

WorkSafe B.C. (2020). *Guidelines for the workers compensation act*. https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-guidelines/guidelines-for-workers-compensation-act

Wright, D.G., and Hopky, G.E. (1998). Guidelines for the use of explosives in or near Canadian fisheries waters. *Canadian Technical Report of Fisheries and Aquatic Sciences.*