



GOLDER

REPORT

Identification of Potential Project-Interactions and Proposed Mitigation Measures

Environmental Assessment Initiation Package for Pine Point Project

Submitted to:

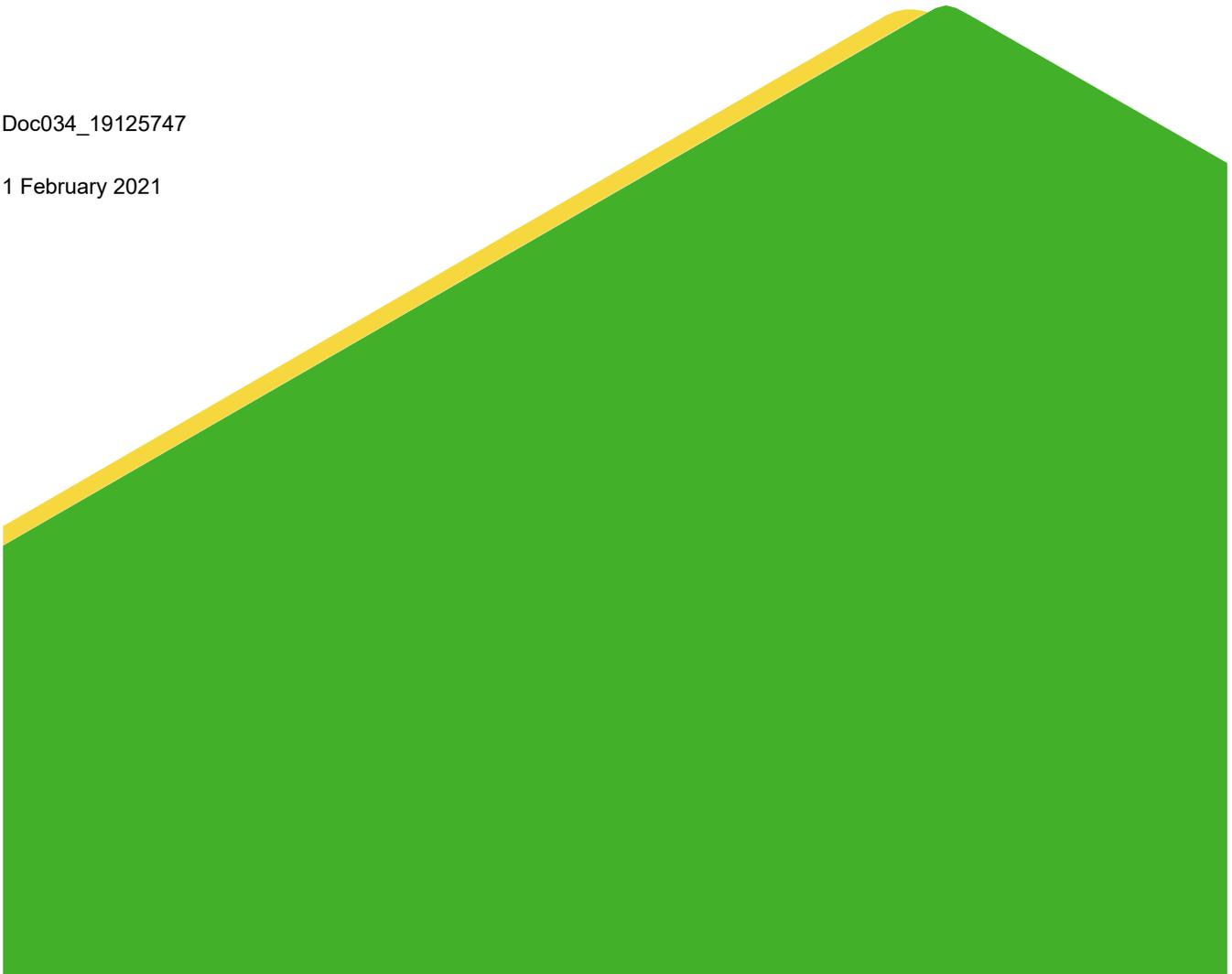
Pine Point Mining Ltd.

Submitted by:

Golder Associates Ltd.

Doc034_19125747

1 February 2021



Distribution List

One digital copy to Pine Point Mining Ltd.

One digital copy to Golder Associates Ltd.

One digital copy to Mackenzie Valley Environmental Impact Review Board

Table of Contents

1.0 INTRODUCTION	1
1.1 Overview	1
1.2 Organization.....	1
2.0 IDENTIFICATION OF PROJECT INTERACTIONS AND MITIGATIONS	2
2.1 Methods.....	2
2.2 Results	4
2.2.1.1 Biophysical Environment.....	4
2.2.1.2 Human Environment	31
2.2.1.3 Effects of Extreme Events.....	45
2.2.1.3.1 Effects of the Environment on the Project	45
2.2.1.3.2 Accidents and Malfunctions	45
3.0 IDENTIFICATION OF CUMULATIVE EFFECTS	45
4.0 REFERENCES	48

TABLES

Table 1: Potential Pathways for Effects to Air Quality.....	5
Table 2: Potential Pathways for Effects to Noise	6
Table 3: Potential Pathways for Effects to Climate	6
Table 4: Potential Pathways for Effects to Groundwater Quantity and Quality	7
Table 5: Potential Pathways for Effects to Surface Water Quantity.....	7
Table 6: Potential Pathways for Effects to Surface Water Quality.....	9
Table 7: Potential Pathways for Effects to Fish and Fish Habitat	12
Table 8: Potential Pathways for Effects to Terrain and Soils	16
Table 9: Potential Pathways for Effects to Vegetation	19
Table 10: Potential Pathways for Effects to Caribou.....	22
Table 11: Potential Pathways for Effects to Wildlife.....	26
Table 12: Potential Pathways for Effects to Heritage Resources	32
Table 13: Potential Pathways for Effects to Traditional Land and Resource Use	32

Table 14: Potential Pathways for Effects on Population Demographics.....35

Table 15: Potential Pathways for Effects on Economic Development and Government Revenues.....36

Table 16: Potential Pathways for Effects on Employment and Education37

Table 17: Potential Pathways for Effects on Health and Well-being.....39

Table 18: Potential Pathways for Effects on Housing, Services, and Infrastructure.....40

Table 19: Potential Pathways for Effects to Non-Traditional Land and Resource Use42

1.0 INTRODUCTION

1.1 Overview

This document provides a description of potential Project-environment interactions and proposed mitigation measures, as a component of the Environmental Assessment Initiation Package (EA Initiation Package) for the Pine Point Mining Limited (PPML) Pine Point Project (the Project), as outlined in the Mackenzie Valley Environmental Impact Review Board (MVEIRB) Draft Environmental Assessment Initiation Guidelines for Developers of Major Projects (EA Initiation Guidelines; MVEIRB 2018). The Project is located in the Northwest Territories (NWT) within the South Slave Mining District, approximately 175 kilometres (km) south of Yellowknife, on a brownfield site associated with historical mining activity by Cominco Ltd. The Project will consist of open-pit and underground mining for lead and zinc, and development of a process plant, storage and management facilities for processed mineralized material, and ancillary support facilities, including a camp for workers.

This document provides information related to how the proposed Project could interact with and affect components of the biophysical and human environments. A description of proposed mitigation measures that could be used to avoid or limit effects is also provided. As recommended in the EA Initiation Guidelines, this description includes consideration of how the Project could affect air, water, land, fish and wildlife, as well as surrounding communities and residents, socio-economic conditions such as employment, culture, way of life of Indigenous people, archaeological and cultural sites, harvesting, and traditional activities. Consideration of potential cumulative effects that could result from the proposed Project and from past, current, and reasonably foreseeable future developments and activities, as well as natural environmental vulnerabilities and events are also discussed.

Consistent with recommendations outlined in the EA Initiation Guidelines, information provided in this document was also used to consider and identify the key issues and interactions with intermediate and valued components that are proposed to be carried forward in the Developer's Assessment Report, as described in the Developer's Assessment Proposal (Volume 5). The Developer's Assessment Proposal also provides details related to the proposed assessment methods that will be used for the investigation of Project effects. The Project interactions and mitigations described below will be finalized in the Developer's Assessment Report based on additional Project details in the Project Description to be included in the Developer's Assessment Report and following feedback from communities and regulators on the EA Initiation Package.

1.2 Organization

This document has been prepared according to the recommendations outlined in Section 4.3 of the EA Initiation Guidelines:

- Section 2.0 provides a list and brief description of potential Project interactions with the environment. This description includes consideration of accidents and malfunctions and effects of the environment on the Project, including climate change, where appropriate. Instances where there is no pathway to an effect on an environmental component are also identified, where applicable.
- Section 2.0 also provides a list and brief description of recommended mitigation actions, procedures and policies (measures) that would be used to avoid, minimize, or restore (reclaim) the identified effects. In the Developer's Assessment Report, a description of how the mitigation measures were developed and would reliably and sufficiently mitigate the identified effects will be provided.
- Section 3.0 provides a description of how cumulative effects that could result from the proposed Project will be identified. This discussion considers the cumulative effects from past, current, and reasonably foreseeable future developments and activities, as well as natural environmental vulnerabilities and events such as climate change, forest fires, and flooding, which could interact with Project effects.

2.0 IDENTIFICATION OF PROJECT INTERACTIONS AND MITIGATIONS

2.1 Methods

A pathway analysis approach was used as the primary method for identifying potential Project interactions with components of the biophysical and human environments. Pathway analysis defines a comprehensive list of potential interactions between the Project and environment (i.e., effect pathways), identifies mitigation that could be used to eliminate and/or minimize potential adverse effects, and focuses further assessment on key or principal effects from the Project that remain after practicable mitigation has been applied. Each pathway is initially considered to have a linkage to potential effects on components of the biophysical and human environments. For an effect to occur, there must be a source (i.e., a Project component or activity that interacts with the biophysical or social environment) that results in a measurable change in the environment and a corresponding effect on at least one measurement indicator for a valued component or intermediate component



Potential pathways from Project components/activities to components of the biophysical and human environment were identified using the following information:

- review of the Project Description (current version in Volume 1) and scoping of potential effects by the environmental and engineering teams for the Project
- input from early public and community engagement and Indigenous Traditional Knowledge (currently described in Volume 2)
- information related to the existing environment (currently described in Volume 3)
- scientific knowledge
- previous experience with mining projects, including feedback from past regulatory applications for the Pine Point property

Potential adverse effects of the Project were then identified, and environmental design features and mitigation were applied to avoid or minimize effects to components of the biophysical and human environments. Avoidance and minimization are widely recognized as the most important for biodiversity conservation (BBOP 2015). Offsetting may also be considered for certain environmental disciplines where residual effects remain after applying reclamation/restoration actions. Policies, guidelines, and actions to enhance positive outcomes of the Project are also provided, where applicable. Finally, management and monitoring plans that will be developed and implemented for Project are identified, where applicable. These plans represent the primary mechanism for verifying effect predictions, identifying unanticipated effects, and providing the framework for implementation of adaptive management. Additional information related to management and monitoring plans is provided in Volume 6.

The environmental design features, mitigation measures, and regulatory standards and policies identified for the Project were defined based on accepted and proven best management practices that are generally well understood and that have been applied to similar types of projects. These measures also include consideration of feedback received from early engagement completed for the Project and are considered to be effective strategies for reducing adverse effects on components of the biophysical and human environments. Although these lists will need to be refined based on the Project Description and confirmation of Project effects, it is anticipated that mitigation will reliably and sufficiently avoid or reduce the identified effects, such that significant adverse environmental effects can be avoided.

The effectiveness of mitigation proposed for each pathway analysis was assessed to determine whether the mitigation would address the potential effect of the Project such that the pathway is eliminated or results in a negligible adverse effect to a component. Where minimization is proposed, for example by limiting an activity, it will be to the extent allowable by regulation and to the extent that is practical. Uncertainty in the effectiveness of mitigation was considered in the process of completing the pathway analysis. Where uncertainty is anticipated to be high, mitigation is not considered sufficient to remove a pathway or result in a negligible effect (i.e., the analysis applies a precautionary approach). Further discussion related to how uncertainty will be considered in the future Developer's Assessment Report is provided in the Developer's Assessment Proposal (Volume 5).

Each potential effect pathway was evaluated using proposed mitigation to predict whether the pathway had the potential to cause residual adverse effects. Using Indigenous Traditional Knowledge and scientific knowledge, logic, experience with similar developments, and an understanding of the effectiveness of mitigation (i.e., level of certainty that mitigation will work), each pathway was categorized as one of the following:

- No pathway – the analysis reveals that the pathway could be removed (i.e., effect is avoided) by mitigation or design so that the Project would result in no measurable environmental change relative to existing conditions or guideline values (e.g., air, soil, or water quality guidelines), and therefore, would have no residual effect on a biophysical or human environment component.
- Secondary – the pathway could result in a measurable minor environmental change relative to existing conditions or guideline values, but the change is sufficiently small that it would have a negligible residual effect on a biophysical or human environment component (e.g., an increase in an air quality parameter that is small compared to the range of existing values and is well within the air quality guideline for that parameter). Therefore, the pathway is not expected to contribute to effects of other existing, approved, or reasonably foreseeable projects to cause a significant effect.
- Primary – the pathway is likely to result in an environmental change relative to existing conditions or guideline values that could cause a greater than negligible effect on a biophysical or human environment component.

The potential effects pathways from each Project interaction, associated mitigation measures, and pathway categorization are described for each biophysical or human environment component in Section 2.2. The primary objective of pathway analysis is to complete a screening level assessment of potential adverse effects from the Project on valued and intermediate components. Predicted adverse effects on environmental components are characterized in terms of the definitions outlined above (i.e., no pathway, secondary, and primary). Positive or beneficial outcomes are also identified (e.g., employment and training opportunities, income levels) and typically classified as primary or no pathway. An assessment of positive effects and potential enhancement measures will be completed in the Developer's Assessment Report, where applicable.

The effects pathways and mitigations represent a current understanding of the potential Project-environment interactions based on the preliminary Project Description (Volume 1) and will be finalized in the Developer's Assessment Report. That is, the Project interactions will be updated, as required, based on further Project design details, as well as additional mitigation measures identified through discussions with the engineering and environmental teams for the Project. The Developer's Assessment Report will also provide a detailed analysis of Project effects according to the methods outlined in the Developer's Assessment Proposal (Volume 5).

2.2 Results

2.2.1.1 *Biophysical Environment*

Project components and activities, effects pathways, environmental design features and mitigation, and the categorization of effects pathways (no pathway, secondary, and primary) for the air quality, noise and climate; groundwater quantity and quality; surface water quantity; surface water quality; fish and fish habitat; terrain and soils; vegetation; caribou; and wildlife components are summarized in Tables 1 to 11.

Table 1: Potential Pathways for Effects to Air Quality

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to criteria air contaminant emissions include:</p> <ul style="list-style-type: none"> • Combustion of fossil fuels in mobile vehicles and heavy equipment for the following: <ul style="list-style-type: none"> ○ Land clearing, site preparation, and construction of facilities and infrastructure ○ Development and mining of open pits and underground mines ○ Handling and storage of waste rock and mineralized material ○ Process plant and processing ○ Site traffic ○ Transportation of personnel and materials to and from the site ○ Removal of infrastructure ○ Restoration and revegetation of facilities and infrastructure • Combustion of fossil fuels in stationary equipment (e.g., power generation) • Non-hazardous waste incineration 	<ul style="list-style-type: none"> • Emissions of criteria air contaminants from mobile and stationary combustion sources including nitrogen and sulphur oxides, particulates, and carbon monoxide can affect air quality. 	<ul style="list-style-type: none"> • Hydroelectric power will be used to supplement fossil fuel methods for power generation. • Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. • An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and adaptive management based on ambient air quality standards. • Procurement criteria will be developed to confirm stationary and mobile engines meet applicable performance standards, such as equipment that has the lowest practical and economically achievable nitrogen oxide emission rates. Ultra-low sulphur diesel (less than 15 parts per million sulphur) will be used in all equipment to reduce ambient concentrations of nitrogen dioxide. • Transportation of workers will be completed using large vehicles where possible to reduce the number of engines in use, thereby reducing vehicle combustion and fugitive emissions • Emissions control devices will be used and maintained on fossil-fuel based engines. • Equipment will be regularly maintained • Idling of vehicles and equipment will be limited to the extent practical. 	<p>Primary</p>
<p>Project components/activities that contribute to mercury, dioxins, and furans emissions include:</p> <ul style="list-style-type: none"> • Non-hazardous waste incineration 	<ul style="list-style-type: none"> • Emissions of mercury, dioxins, and furans may adversely affect air quality. 	<ul style="list-style-type: none"> • On-site incineration will be conducted using equipment and methods consistent with the federal guidance on batch waste incineration. As an alternative or supporting action, off-site disposal of some or all garbage is also being considered. • Canadian Council of Ministers of the Environment guidelines will be complied with. • Stack testing and adaptive management will be conducted if required. • Operator training and operational management will be implemented. 	<p>Primary</p>
<p>Project components/activities that contribute to dust emissions include:</p> <ul style="list-style-type: none"> • Land clearing, site preparation and construction of facilities and infrastructure • Development and mining of open pits and underground mines • Handling and storage of waste rock and mineralized material (includes conveyors) • Process plant and processing (includes crushers and conveyors) • Site traffic • Transportation of personnel and materials to and from the site • Removal of infrastructure • Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> • Emissions of fugitive dust can affect air quality. 	<ul style="list-style-type: none"> • An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for fugitive dust and adaptive management. • Water and/or dust suppressants will be applied to site roads as necessary. • Speed limits will be established and enforced on site roads to reduce dust production. • Crushers and conveyors will be covered. 	<p>Primary</p>
<p>Project activities that result in wind-borne concentrate along transportation route during operation:</p> <ul style="list-style-type: none"> • Hauling concentrate from Project to Hay River or Enterprise for rail transport 	<ul style="list-style-type: none"> • Wind-borne emissions of concentrate from haul trucks can affect air quality. 	<ul style="list-style-type: none"> • Concentrate will be covered during transportation to rail yards. 	<p>No pathway</p>
<p>Accidents and Malfunctions</p>	<ul style="list-style-type: none"> • Releases of criteria air contaminants from a wildfire started by Project activities can alter air quality and greenhouse gas emissions and affect climate. 	<ul style="list-style-type: none"> • A Wildfire Prevention and Preparedness Plan will be developed and implemented. • All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. • Firefighting training will be provided to on-site personnel (as deemed appropriate). • No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. • Safety management systems (e.g., hot work permits) will be in place. • Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented as required. 	<p>No pathway</p>

Table 2: Potential Pathways for Effects to Noise

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to noise emissions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material (includes conveyors) Process plant and processing (includes crushers and conveyors) Site traffic Transportation of personnel and materials to and from the site Power generation Additional infrastructure (e.g., camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Noise emissions from Project activities and equipment will increase sound levels. 	<ul style="list-style-type: none"> A health and safety program will be implemented. Noisy equipment will be enclosed in buildings, where feasible. Internal combustion engines will be outfitted with well-maintained muffler systems. Power plant generator facilities will have louvers on ventilation openings and exhaust mufflers. Sound levels will be monitored, as per the noise management plan, and adaptive management applied if required. 	Primary
<p>Project components/activities that contribute to ground vibration and air blast overpressure during construction and operation:</p> <ul style="list-style-type: none"> Development and mining of open pits and underground mines 	<ul style="list-style-type: none"> Blasting will result in ground vibration and air blast overpressure. 	<ul style="list-style-type: none"> A Blast Management Plan will be developed and implemented. Blasting activities will be limited to the daytime periods, where possible. Blasting activities will follow a regular schedule, where possible, and site-wide notice will be given prior to each blast. A standard safety buffer around blasts will be cleared of staff and contractors, where applicable. 	Primary

Table 3: Potential Pathways for Effects to Climate

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to greenhouse gas emissions include:</p> <ul style="list-style-type: none"> Combustion of fossil fuels in mobile vehicles and heavy equipment for the following: <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development and mining of open pits and underground mines Process plant and processing Site traffic Transportation of personnel and materials to and from the site Removal of infrastructure Restoration and revegetation of facilities and infrastructure Combustion of fossil fuels in stationary equipment (e.g., power generation) Non-hazardous waste incineration 	<ul style="list-style-type: none"> Greenhouse gas emissions from land use change, refrigeration, and fossil fuel combustion can affect climate. 	<ul style="list-style-type: none"> Hydroelectric power will be used to supplement fossil fuel methods for power generation. Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. Emissions control devices will be used and maintained on fossil-fuel based engines. Equipment will be regularly maintained. Idling of vehicles and equipment will be limited to the extent practical. Procurement criteria will be developed to confirm stationary and mobile engines meet applicable performance standards. An energy management program will be developed for monitoring and adaptive management of thermal and electrical energy. Energy performance standards will be developed for infrastructure (e.g., insulation for buildings meet codes) and equipment. 	Primary
Accidents and Malfunctions	<ul style="list-style-type: none"> Releases of criteria air contaminants from a wildfire started by Project activities can alter air quality and greenhouse gas emissions and affect climate. 	<ul style="list-style-type: none"> A Wildfire Prevention and Preparedness Plan will be developed and implemented. All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. Firefighting training will be provided to on-site personnel (as deemed appropriate). No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. Safety management systems (e.g., hot work permits) will be in place. Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented as required. 	No pathway

Table 4: Potential Pathways for Effects to Groundwater Quantity and Quality

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that influence groundwater processes during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development and mining of open pits and underground mines Tailings disposal and management 	<ul style="list-style-type: none"> Development of open pits and underground mines can change groundwater flow patterns and distribution. 	<ul style="list-style-type: none"> The footprint of the open pits and underground mining areas will be designed to minimize the area required to access the mineable resource, to the extent practicable and safe. Groundwater inflows will be monitored to verify the groundwater model and predicted effects on the groundwater resources for adaptive management, if required. The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, as required. 	Primary
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and mining of open pits and underground mines Tailings disposal and management 	<ul style="list-style-type: none"> Development of open pits and underground mines can change groundwater quality. 	<ul style="list-style-type: none"> Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. Studies will be undertaken to evaluate the suitability of multiple locations as tailings disposal sites and to select locations that will avoid and minimize risk of potential environmental effects. Studies will be undertaken to evaluate the potential use of re-injection wells as an additional method to dispose of underground saline water that will infiltrate open pits and underground mines. Seepage from the pits will be managed, if necessary, as described in the Tailings and Waste Rock Management Plan. Groundwater monitoring around injection sites will be as described in the Tailings and Waste Rock Management Plan. The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. 	Secondary or Primary
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Handling and storage of waste rock Tailings disposal and management 	<ul style="list-style-type: none"> Seepage from waste rock deposition areas can cause changes in groundwater quality. 	<ul style="list-style-type: none"> Mineralized material and waste rock will be stored in a contained area. Waste rock will be disposed of onto constructed waste rock storage facilities, or where possible, into historical open pits. Potential acid generating material will be segregated from non-potential acid generating material. Seepage will be monitored and managed, if necessary, as described in the Tailings and Waste Rock Management Plan The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. The Closure and Reclamation Plan will be implemented. 	Secondary or No Pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> Chemical or hazardous materials spills on site and during transport offsite may enter groundwater and affect groundwater quality. 	<ul style="list-style-type: none"> The Spill Contingency Plan and Waste Management Plan will be implemented. Standard best management practices for general activities with regards to use, handling, and storage of deleterious substances will be followed. Hazardous waste will be stored in appropriate containers that will be located in a lined bermed containment pad, which will provide secondary containment of spills. No fuels, oils, or other hazardous substances will be stored within 150 m of groundwater springs or areas of upwelling, unless otherwise authorized. No equipment maintenance or refuelling will be conducted within 150 m of groundwater springs or areas of upwelling, unless otherwise authorized. The tailings transport pipeline will have drainage points and spill containment areas located along the route. Regular maintenance of vehicles and equipment will be conducted. Spill kits will be available at various locations throughout the site and will be maintained in good working order. Hazardous waste will be transported to a licensed hazardous waste receiving facility for disposal. Fuel and hazardous materials will be transported in approved containers in licensed vehicles. If a major spill occurs, the cleanup, treatment, and disposal of the contaminated waste and soil will be handled and disposed of using approved methods. Speed limits will be enforced. 	No Pathway

Table 5: Potential Pathways for Effects to Surface Water Quantity

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that may divert water from its natural course and result in changes to surface watersheds during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) 	<ul style="list-style-type: none"> Project construction and footprint may change local surface water quantity, routing, and timing. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. Clearing equipment will be used that minimizes surface disturbance, soil compaction and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. 	Secondary
	<ul style="list-style-type: none"> Project operation and footprint may alter site drainage and runoff and change local hydrology, which can affect drainage patterns and timing. 		Primary

Table 5: Potential Pathways for Effects to Surface Water Quantity

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that may divert water from its natural course and result in changes to surface watersheds during closure and reclamation:</p> <ul style="list-style-type: none"> Cessation of site water management activities, including mine water discharge Reconnection of closure drainages to the local surface water environment Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> During closure, residual ground disturbance, cessation of site water management activities, and reconnection of drainages to the surface water environment may cause changes to local hydrology, which can affect drainage patterns and timing. 	<ul style="list-style-type: none"> Where possible, work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Areas disturbed/alterd will be regraded to conform to the local topography to maintain drainage patterns. Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Where possible, a 30 metre (m) buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Primary</p>
<p>Project components/activities that alter watercourse hydraulics and geomorphology during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Installation of cross drainage structures 	<ul style="list-style-type: none"> Cross-drainage structures for site roads may alter watercourse hydraulics and geomorphology, which may affect local drainage and a risk of blocking flow. 	<ul style="list-style-type: none"> Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Cross-drainage structures will be designed to limit the area disturbed within waterbodies and watercourses and crossings will be located to avoid sensitive habitats, where possible. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Culverts will be regularly inspected and maintained to prevent blockages from forming and causing ponding or backwater effects, including snow removal at inlets and outlets prior to freshet. 	<p>No pathway</p>
<p>Project components/activities that may influence surface water flows and sedimentation during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Release of sediment during instream construction, ground disturbance, and altered surface flows may result in transport of suspended sediment and deposition downstream. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Where possible, work in sensitive areas will be avoided during the time-of-year when erosion is more likely (e.g., spring freshet). The steepness and length of slopes of disturbed areas and stockpiled soils will be limited. The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, including adaptive management, as required. Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Where possible, a 30 m buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>
<p>Project components/activities that influence hydrological processes and water balance during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Tailings disposal and management Mine water discharge Domestic wastewater discharge following treatment Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Physical changes to land cover and land surface can result in changes to local hydrological processes and water balance. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of future activity at that location. Roads will be designed to the minimum allowable possible width and will follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, as required. An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Water withdrawals will adhere to guidance from regulators such as Fisheries and Oceans Canada as to the allowable rate and timing of withdrawals from the point of supply. Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. Process water for start-up may be pumped from historical open pits if the water has suitable quality and quantity, or if not, from Great Slave Lake. The number of water intake and discharge locations will be limited to reduce effects to surface water quantity. The Closure and Reclamation Plan will be implemented. 	<p>Primary</p>
	<ul style="list-style-type: none"> Development of open pits and underground mines and associated surface and groundwater changes can result in local increases or decreases in surface water quantity, which may change surface water flow regimes. 		<p>Primary</p>
	<ul style="list-style-type: none"> Water supply requirements (potable and process) and water discharge for the Project may alter local hydrology and water balance. 		<p>Primary or Secondary</p>
<p>Accidents and Malfunctions</p>	<ul style="list-style-type: none"> Flow over emergency spillways of water containment structures during extreme flood events may alter local hydrology, drainage and/or stream characteristics. 	<ul style="list-style-type: none"> Overflow spillways and downstream conveyance structures will be designed to be stable and maintain function, and provide sufficient erosion protection during a design flood. Routine inspections will be completed and the storm water management system will be maintained. 	<p>No pathway</p>

Table 6: Potential Pathways for Effects to Surface Water Quality

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that may change surface water and sediment quality through alterations in site drainage and runoff during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) 	<ul style="list-style-type: none"> Altered site drainage and runoff during construction and operation may change local hydrology (subsurface water flows, drainage, lake and stream levels) and affect surface water and sediment quality in receiving and downstream aquatic environments. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. Clearing equipment will be used that minimizes surface disturbance, soil compaction, and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush), where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Where possible, work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Where possible, a 30 metre (m) buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>
<p>Project components/activities that may change surface water and sediment quality through alterations in site drainage and runoff during closure and reclamation:</p> <ul style="list-style-type: none"> Cessation of site water management activities, including mine water discharge Reconnection of closure drainages to the local surface water environment Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> During closure, residual ground disturbance, cessation of site water management activities, and reconnection of drainages to the surface water environment may cause changes to local hydrology, which can affect surface water and sediment quality in the receiving and downstream aquatic environments. 	<ul style="list-style-type: none"> Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Cross-drainage structures will be designed to limit the area disturbed within waterbodies and watercourses and crossings located to avoid sensitive habitats, where possible. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Culverts will be regularly inspected and maintained to prevent blockages from forming and causing ponding or backwater effects, including snow removal at inlets and outlets prior to freshet. 	<p>Secondary</p>
<p>Project components/activities that alter watercourse hydraulics and geomorphology during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Installation of cross-drainage structures 	<ul style="list-style-type: none"> Cross-drainage structures for site roads may alter watercourse hydraulics and geomorphology, which may affect local drainage and alter surface water and sediment quality. 	<ul style="list-style-type: none"> Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Cross-drainage structures will be designed to limit the area disturbed within waterbodies and watercourses and crossings located to avoid sensitive habitats, where possible. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Culverts will be regularly inspected and maintained to prevent blockages from forming and causing ponding or backwater effects, including snow removal at inlets and outlets prior to freshet. 	<p>No pathway</p>
<p>Project components/activities that may influence surface water flows and sedimentation during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Release of sediment during instream construction and ground disturbance and altered surface flows may cause a change in surface water and sediment quality in receiving and downstream aquatic environments. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Where possible, work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, including adaptive management, if required. Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Where possible, a 30 m buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>

Table 6: Potential Pathways for Effects to Surface Water Quality

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that may change surface water and sediment quality during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Tailings disposal and management Mine water discharge 	<ul style="list-style-type: none"> Direct discharge of mine water may cause physical erosion of lake or stream bottom sediments near the discharge location resulting in changes to surface water quality. Direct discharge of mine water, as well as surface runoff, groundwater inflow and seepage from the Project will cause changes to surface water quality in receiving and downstream aquatic environments. 	<ul style="list-style-type: none"> If required, the discharge of mine water to a receiving waterbody or watercourse will be directed through a properly designed diffuser, where appropriate, to minimize erosion effects from high velocity outflows. The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. Water that interacts with the site footprint, waste rock, and tailings management areas will be captured and managed. If required, the mine water discharge will meet all regulatory guidelines including Effluent Quality Criteria defined in a future Type A Water Licence and the Canadian Metal and Diamond Mining Effluent Regulations – Schedule 4 limits. If water is to be discharged during operations, the location of the mine water discharge will be selected that will minimize effects to water quality and fish habitat. Studies will be undertaken to evaluate the potential use of re-injection wells as an additional method to dispose of underground saline water that will infiltrate open pits and underground mines. Depending on the location, the pumped mine water discharge to a receiving water body (river or lake system), if required, may be directed through a properly designed diffuser system to rapidly attenuate the discharge, as appropriate Discharge water will be regularly sampled and monitored, enabling adaptive management actions if necessary. An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Mineralized material and waste rock will be stored in contained areas. Waste rock will be disposed of onto constructed waste rock storage facilities, or where possible, into historical open pits. Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. A Blast Management Plan will be developed and implemented. 	<p>Secondary</p> <p>Primary</p>
<p>Project components/activities that may change surface water and sediment quality through treated domestic effluent release during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Domestic wastewater discharge following treatment 	<ul style="list-style-type: none"> Discharge of treated domestic wastewater and sewage may cause a change in surface water quality in receiving and downstream aquatic environments. 	<ul style="list-style-type: none"> Treated domestic effluent will be discharged to the septic field or may be discharged to a waterbody if it meets effluent criteria. The Water Management Plan and Waste Management Plan will be implemented. 	<p>No pathway or Secondary</p>
<p>Project components/activities that influence hydrological processes and water balance during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Tailings disposal and management Mine water discharge Domestic wastewater discharge following treatment Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Alterations in land cover and development of open pits and underground mines and associated surface and groundwater changes can result in local increases or decreases in surface water quantity, which may change surface water quality in receiving and downstream aquatic environments. Water supply requirements (potable and process) and water discharge for the Project may alter local hydrology and water balance and change surface water quality in receiving and downstream aquatic environments. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, which includes adaptive management, if required. Water withdrawals will adhere to guidance from regulators such as Fisheries and Oceans Canada as to the allowable rate and timing of withdrawals from the point of supply. Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. Process water for start-up may be pumped from historical open pits if the water has suitable quality and quantity, or if not, from Great Slave Lake. The number of water intake and discharge locations will be limited to reduce effects to surface water quantity. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p> <p>Secondary</p>

Table 6: Potential Pathways for Effects to Surface Water Quality

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to emissions and deposition of fugitive dust during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material (includes conveyors) Process plant and processing (includes crushers and conveyors) Site traffic Transportation of personnel and materials to and from the site Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition of fugitive dust emissions (e.g., metals) may change surface water quality in the local aquatic receiving environment. 	<ul style="list-style-type: none"> An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for fugitive dust and adaptive management. An AEMP will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Water and/or dust suppressants will be applied to site roads as necessary. Speed limits will be established and enforced on site roads to reduce dust production. Crushers and conveyors will be covered. Concentrate will be covered during transportation to rail yards. 	<p>Secondary</p>
<p>Project components/activities that contribute to criteria air contaminant emissions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material (includes conveyors) Process plant and processing Site traffic Transportation of personnel and materials to and from the site Power generation Non-hazardous waste incineration Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition suspended solids in criteria air contaminant emissions (e.g., sulphur and nitrogen oxides) may change surface water quality in the local aquatic receiving environment. 	<ul style="list-style-type: none"> Hydroelectric power will be used to supplement fossil fuel methods for power generation. Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and adaptive management based on ambient air quality standards. An Aquatics Effects Monitoring Program (AEMP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Procurement criteria will be developed to ensure stationary and mobile engines meet applicable performance standards, such as equipment that has the lowest practical and economically achievable nitrogen oxide emission rates. Ultra-low sulphur diesel (less than 15 parts per million sulphur) will be used in all equipment to reduce ambient concentrations of nitrogen dioxide. Transportation of workers will be completed using large vehicles where possible to reduce the number of engines in use, thereby reducing vehicle combustion and fugitive emissions Emissions control devices will be used and maintained on fossil-fuel based engines. Regular maintenance of equipment will be conducted. Idling of vehicles will be limited to the extent practical. 	<p>Secondary</p>
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and mining of open pits and underground mines Tailings disposal and management 	<ul style="list-style-type: none"> Changes in groundwater quality from open pits, underground mines and tailings can affect surface water and sediment quality. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. Studies will be undertaken to evaluate the suitability of multiple locations as tailings disposal sites and to select locations that will avoid and minimize risk of potential environmental effects. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Handling and storage of waste rock and mineralized material 	<ul style="list-style-type: none"> Seepage from waste rock deposition areas can cause changes in groundwater quality and surface water and sediment quality. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. Waste rock will be deposited into historical mined open pits or onto constructed stockpile pads adjacent to deposits being mined. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>
<p>Accidents and Malfunctions</p>	<ul style="list-style-type: none"> Chemical or hazardous materials spills on site and during transport offsite may adversely affect surface water quality in the local aquatic receiving environment. 	<ul style="list-style-type: none"> The Spill Contingency Plan and Waste Management Plan will be implemented. Standard best management practices for general activities with regards to use, handling, and storage of deleterious substances will be followed. Hazardous waste will be stored in appropriate containers that will be located in a lined bermed containment pad, which will provide secondary containment of spills. No fuels, oils, or other hazardous substances will be stored within 150 m of waterbodies. No equipment maintenance or refuelling will be conducted within 150 m of waterbodies. The tailings transport pipeline will have drainage points and spill containment areas located along the route. Regular maintenance of vehicles and equipment will be conducted. Spill kits will be available at various locations throughout the site and will be maintained in good working order. Hazardous waste will be transported to a licensed hazardous waste receiving facility for disposal. Fuel and hazardous materials will be transported in approved containers in licensed vehicles. If a major spill occurs, the cleanup, treatment, and disposal of the contaminated waste and soil will be handled and disposed using approved methods. Speed limits will be enforced. 	<p>No pathway</p>
<p>Accidents and Malfunctions</p>	<ul style="list-style-type: none"> Flow over emergency spillways of water containment structures during extreme flood events may adversely affect surface water quality. 	<ul style="list-style-type: none"> Overflow spillways and downstream conveyance structures will be designed to be stable and maintain function, and provide sufficient erosion protection during a design flood. Routine inspections and maintenance of storm water management system will be conducted. 	<p>No pathway</p>

Table 6: Potential Pathways for Effects to Surface Water Quality

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
Accidents and Malfunctions	<ul style="list-style-type: none"> A wildfire started by Project activities may adversely affect surface water quality. 	<ul style="list-style-type: none"> A Wildfire Prevention and Preparedness Plan will be developed and implemented. All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. Firefighting training will be provided to on-site personnel (as deemed appropriate). No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. Safety management systems (e.g., hot work permits) will be implemented. Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented. 	No pathway

Table 7: Potential Pathways for Effects to Fish and Fish Habitat

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that may divert water from its natural course and result in changes to surface watersheds during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) 	<ul style="list-style-type: none"> Changes to local hydrology from surface disturbances during construction may alter fish habitat quantity and quality and affect habitat connectivity and fish distribution. Altered site drainage and runoff from facilities during operation may change local hydrology and affect fish habitat quantity and quality (e.g., Twin Creek and Paulette Creek). 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. Clearing equipment will be used that minimizes surface disturbance, soil compaction and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Where possible, work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Where possible, a 30 metre (m) buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	No pathway
<p>Project components/activities that may divert water from its natural course and result in changes to surface watersheds during closure and reclamation:</p> <ul style="list-style-type: none"> Cessation of site water management activities, including mine water discharge Reconnection of closure drainages to the local surface water environment Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Residual ground disturbance at closure, cessation of site water management activities, and reconnection of closure drainages to the local surface water environment may cause permanent changes to local hydrology, which can affect fish habitat quantity and quality. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. Clearing equipment will be used that minimizes surface disturbance, soil compaction and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Where possible, work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Where possible, a 30 m buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	Secondary or Primary
<p>Project components/activities that may change surface water and sediment quality through alterations in site drainage and runoff during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) 	<ul style="list-style-type: none"> Altered site drainage and runoff during construction and operation may change local hydrology and surface water and sediment quality and alter fish habitat quality affect the survival and reproduction of fish. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. Clearing equipment will be used that minimizes surface disturbance, soil compaction and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Where possible, work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Where possible, a 30 m buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	Secondary
<p>Project components/activities that may change surface water and sediment quality through alterations in site drainage and runoff during closure and reclamation:</p> <ul style="list-style-type: none"> Cessation of site water management activities, including mine water discharge Reconnection of closure drainages to the local surface water environment Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Residual ground disturbance at closure, cessation of site water management activities, and reconnection of closure drainages to the local surface water environment may cause changes to water quality, which alter affect fish habitat quality and affect the survival and reproduction of fish. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. Clearing equipment will be used that minimizes surface disturbance, soil compaction and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Where possible, work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Where possible, a 30 m buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	Secondary
<p>Project components/activities that contribute to emissions and deposition of fugitive dust during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material (includes conveyors) Process plant and processing (includes crushers and conveyors) Site traffic Transportation of personnel and materials to and from the site Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition of fugitive dust emissions (e.g., metals) may change surface water quality, which can alter fish habitat quality and affect the survival and reproduction of fish. 	<ul style="list-style-type: none"> An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for fugitive dust and adaptive management. An Aquatic Effects Monitoring Program (AEMP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Water and/or dust suppressants will be applied to site roads as necessary. Speed limits will be established and enforced on site roads to reduce dust production. Crushers and conveyors will be covered. Concentrate will be covered during transportation to rail yards. 	Secondary

Table 7: Potential Pathways for Effects to Fish and Fish Habitat

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to criteria air contaminant emissions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from the site Power generation Non-hazardous waste incineration Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition suspended solids in criteria air contaminant emissions (e.g., sulphur and nitrogen oxides) may change surface water quality, which can alter fish habitat quality and affect the survival and reproduction of fish. 	<ul style="list-style-type: none"> Hydroelectric power will be used to supplement fossil fuel methods for power generation. Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and adaptive management based on ambient air quality standards. An Aquatic Effects Monitoring Program (AEMP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Procurement criteria will be developed to ensure stationary and mobile engines meet applicable performance standards, such as equipment that has the lowest practical and economically achievable nitrogen oxide emission rates. Ultra-low sulphur diesel (less than 15 parts per million sulphur) will be used in all equipment to reduce ambient concentrations of nitrogen dioxide. Transportation of workers will be completed using large vehicles where possible to reduce the number of engines in use, thereby reducing vehicle combustion and fugitive emissions Emissions control devices will be used and maintained on fossil-fuel based engines. Regular maintenance of equipment will be conducted. Idling of vehicles will be limited to the extent practical. 	<p>Secondary</p>
<p>Project components/activities that result in a direct loss of fish habitat during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Installation of cross drainage structures, diffuser for mine water discharge, and water intakes 	<ul style="list-style-type: none"> Project footprint will result in a direct loss or alteration of fish habitat, which may affect habitat quantity, quality, and connectivity and fish distribution. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical infrastructure will be built on previously disturbed sites. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. Removal of riparian vegetation will be minimized If necessary, a fisheries offsetting plan will be developed in consultation with Fisheries and Oceans Canada (DFO) and with engagement of local Indigenous communities. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Primary or Secondary</p>
<p>Project components/activities that alter watercourse hydraulics and geomorphology during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Installation of cross-drainage structures 	<ul style="list-style-type: none"> Water crossing structures for site roads may alter watercourse hydraulics and geomorphology, which may affect fish habitat quantity and quality and alter habitat connectivity and fish passage and distribution. 	<ul style="list-style-type: none"> Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Culverts will be sized to convey flows under design conditions. Crossing structures will be designed to limit the area disturbed within waterbodies and watercourses and locate crossings to avoid sensitive fish habitats where possible. Culverts will be designed to allow for fish passage, where appropriate. An assessment of water flow conditions and fish presence will be completed prior to construction to establish a culvert design that will allow for passage of fish. Water crossings structures will be constructed and installed in a manner that protects the banks from erosion and maintains the flows in the water body and follows permits or authorizations issued for the Project from the appropriate regulatory agencies and DFO's <i>Measures to Protect Fish and Fish Habitat</i> (DFO 2019). Culverts will be regularly inspected and maintained to prevent blockages from forming and causing ponding or backwater effects, including snow removal at inlets and outlets prior to freshet. Where culverts are installed at fish bearing water bodies, debris removal activities will follow DFO's guidance (i.e., gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment, and fish stranding can be avoided). 	<p>Secondary</p>

Table 7: Potential Pathways for Effects to Fish and Fish Habitat

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that may influence surface water flows and sedimentation during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Release of sediment during instream construction and from ground disturbance and altered surface flow may alter fish habitat quality. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical; infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Where possible, work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, including adaptive management, if required. DFO's <i>Measures to Protect Fish and Fish Habitat</i> (DFO 2019) will be considered. Areas disturbed/altered will be regraded to conform to the local topography to maintain drainage patterns. Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Where possible, a 30 m buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. Where possible, instream construction in areas of potential spawning habitat will take place outside the spawning period for fish VCs. Construction activities will be scheduled to avoid work during DFO's <i>Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat</i> (DFO 2013). Restricted activity periods for fish VCs are as follows: <ul style="list-style-type: none"> Great Slave Lake, Buffalo River, and Paulette Creek fish communities: <ul style="list-style-type: none"> April 1 to July 15 for spring spawning species [e.g., Northern Pike (<i>Esox lucius</i>) and Walleye (<i>Sander vitreus</i>)] September 15 to June 30 for fall spawning species [e.g., Lake Whitefish (<i>Coregonus clupeaformis</i>)] Twin Creek fish community: <ul style="list-style-type: none"> April 1 to July 15 for spring spawning species (e.g., Northern Pike and Walleye) No fall spawning species are likely to be present in Twin Creek 	<p>Secondary</p>
<p>Project components/activities that may change surface water and sediment quality during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Tailings disposal and management Mine water discharge 	<ul style="list-style-type: none"> Direct discharge of mine water, as well as surface runoff, groundwater inflow and seepage from the Project will cause changes to downstream surface water quality, which can alter fish habitat quality and affect the survival and reproduction of fish. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. Water that interacts with the site footprint, waste rock, and tailings management areas will be captured and managed. If water is to be discharged during operations, the location of the mine water discharge will be selected that will minimize effects to water quality and fish habitat. Studies will be undertaken to evaluate the potential use of re-injection wells as an additional method to dispose of underground saline water that will infiltrate open pits and underground mines. If required, the mine water discharge will meet all regulatory guidelines including Effluent Quality Criteria defined in a future Type A Water Licence and the Canadian Metal and Diamond Mining Effluent Regulations – Schedule 4 limits. Depending on the location, the pumped mine water discharge to a receiving water body (river or lake system) may be directed through a properly designed diffuser system to rapidly attenuate the discharge, as appropriate Discharge water will be regularly sampled and monitored, enabling adaptive management actions if necessary. An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Mineralized material and waste rock will be stored in a contained area. Waste rock will be disposed of onto constructed waste rock storage facilities, or where possible, into historical open pits. Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. A Blast Management Plan will be developed and implemented. 	<p>Secondary or Primary</p>

Table 7: Potential Pathways for Effects to Fish and Fish Habitat

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that influence hydrological processes and water balance during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Tailings disposal and management Mine water discharge Domestic wastewater discharge following treatment Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Alterations in land cover and development of open pits and underground mines and associated surface and groundwater changes can result in local increases or decreases in surface water quantity, which may change surface water quality and affect fish habitat quantity and quality. Water supply requirements (potable and process) and water discharge for the Project may alter local hydrology and water balance and change surface water quality, which can affect fish habitat quantity and quality. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, which includes adaptive management, if required. Water withdrawals will adhere to guidance from regulators such as DFO as to the allowable rate and timing of withdrawals from the point of supply. Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. Process water for start-up may be pumped from historical open pits if the water has suitable quality and quantity, or if not, from Great Slave Lake. The number of water intake and discharge locations will be limited to reduce effects to surface water quantity. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>
<p>Project components/activities that may change surface water and sediment quality through treated domestic effluent release during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Domestic wastewater discharge following treatment 	<ul style="list-style-type: none"> Discharge of treated domestic wastewater and sewage may cause a change in surface water quality, which can alter fish habitat quality and affect the survival and reproduction of fish. 	<ul style="list-style-type: none"> Treated domestic effluent will be discharged to the septic field or may be discharged to a waterbody if it meets effluent criteria. The Water Management Plan and Waste Management Plan will be implemented. 	<p>No pathway or Secondary</p>
<p>Project activities that directly alter fish habitat during operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Diffuser for modifying flow of mine water discharge Removal of diffuser 	<ul style="list-style-type: none"> The area of turbulence around the diffuser may affect fish habitat quantity and quality and fish distribution. 	<ul style="list-style-type: none"> If required, the pumped mine water discharge will be directed through a properly designed diffuser to minimize effects from changes in velocity. The diffuser will be located to avoid sensitive fish habitat (e.g., shoals, spawning areas). Direct discharge flow rates will be developed and maintained to address erosion concerns. The diffuser discharge ports will be located above the lakebed to minimize erosion. 	<p>No pathway</p>
<p>Project activities that may result in risk of injury/mortality to fish during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Installation of cross drainage structures, diffuser for mine water discharge, and water intakes Development and mining of open pits and underground mines Removal of infrastructure 	<ul style="list-style-type: none"> The use of explosives near fish-bearing water may cause injury or mortality to fish. Impingement and entrainment of fish in intake pumps during operation may cause injury or mortality to fish. Instream construction activities may alter fish habitat quality and affect the survival of fish. 	<ul style="list-style-type: none"> Blasting operations will follow DFO's <i>Measures to Protect Fish Habitat and Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters</i> (Wright and Hopky 1998) for setback distances from fish bearing waterbodies. Blasting will occur on land during the open pit and underground mine development, where no water or fish are present. Blasting will not occur in a water body. The water intake(s) will be screened to prevent entrainment or impingement of fish. Pump intake screens will be designed in accordance with DFO's <i>Freshwater Intake End-of-Pipe Fish Screen Guideline</i> (DFO 1995) and the interim code of practice (DFO 2020). The water intake(s) will be located in areas and depths of water away from high quality fish habitat. Where possible, instream construction in areas of potential spawning habitat will take place outside the spawning period for fish VCs. Construction activities will be scheduled to avoid work during DFO's <i>Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat</i> (DFO 2013). Water crossing structures and water intakes will be constructed and installed in a manner that protects the banks from erosion and maintains the flows in the water body and follows permits or authorizations issued for the Project from the appropriate regulatory agencies and DFO's <i>Measures to Protect Fish and Fish Habitat</i>. Instream construction will be completed in isolation of flowing water (i.e., use of isolation methods for the installation of instream developments where surface water exists at the time of construction). For isolations/diversions, 100% downstream flow will be maintained. Pump intakes should not disturb the bed. Water diversion hoses will be screened as per DFO's <i>Freshwater Intake End-of-Pipe Fish Screen Guidelines</i> (DFO 2015) and the interim code of practice (DFO 2020). A qualified aquatics professional will be retained to complete or oversee the fish rescue from within the exclusion area(s). Salvaged fish will be relocated from work isolation areas to adjacent sections of tributaries, outside the work location. Fish handling time will be kept to a minimum, and appropriate, non-lethal sampling methods will be used during the fish rescue (e.g., backpack electrofishing, minnow trapping). 	<p>No pathway</p>
<p>Project components/activities that create changes in access during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Construction of Project roads and access trails Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Changes to public access to fishing areas and increased density of people (i.e., Project staff and contractors) in the area could affect fish abundance. 	<ul style="list-style-type: none"> Existing roads and trails will be used where possible. To reduce risks to public health and safety, access will be restricted by installing gates and fencing on private roads. A "No hunting and fishing" policy will be implemented on the Project site that applies to staff and contractors. 	<p>No pathway</p>
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and mining of open pits and underground mines Tailings disposal and management 	<ul style="list-style-type: none"> Changes in groundwater quality from open pits, underground mines and tailings can affect surface water and sediment quality, which can alter fish habitat quality and affect the survival and reproduction of fish. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. Studies will be undertaken to evaluate the suitability of multiple locations as tailings disposal sites and to select locations that will avoid and minimize risk of potential environmental effects. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>

Table 7: Potential Pathways for Effects to Fish and Fish Habitat

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Handling and storage of waste rock and mineralized material 	<ul style="list-style-type: none"> Seepage from waste rock deposition areas can cause changes in groundwater quality and surface water and sediment quality, which can alter fish habitat quality and affect the survival and reproduction of fish. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. Waste rock will be deposited into historical mined open pits or onto constructed stockpile pads adjacent to deposits being mined. The Closure and Reclamation Plan will be implemented. 	Secondary
Accidents and Malfunctions	<ul style="list-style-type: none"> Chemical or hazardous materials spills on site and during transport offsite can alter fish habitat quantity and quality and affect the survival and reproduction of fish. 	<ul style="list-style-type: none"> The Spill Contingency Plan and Waste Management Plan will be implemented and will consider DFO's <i>Measures to Protect Fish Habitat</i> Standard best management practices for general activities with regards to use, handling, and storage of deleterious substances will be followed. Hazardous waste will be stored in appropriate containers that will be located in a lined bermed containment pad, which will provide secondary containment of spills. No fuels, oils, or other hazardous substances will be stored within 150 m of waterbodies. No equipment maintenance or refuelling will be conducted within 150 m of waterbodies. The tailings transport pipeline will have drainage points and spill containment areas located along the route. Regular maintenance of vehicles and equipment will be conducted. Spill kits will be available at various locations throughout the site and will be maintained in good working order. Hazardous waste will be transported to a licensed hazardous waste receiving facility for disposal. Fuel and hazardous materials will be transported in approved containers in licensed vehicles. If a major spill occurs, the cleanup, treatment, and disposal of the contaminated waste and soil will be handled and disposed of using approved methods. Speed limits will be enforced. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> Flow over emergency spillways of water containment structures during extreme flood events may adversely alter surface water quality and affect fish habitat quantity and quality and the survival and reproduction of fish. 	<ul style="list-style-type: none"> Overflow spillways and downstream conveyance structures will be designed to be stable and maintain function, and provide sufficient erosion protection during a design flood. Routine inspections and maintenance of storm water management system will be conducted. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> A wildfire started by Project activities may adversely alter surface water quality and affect fish habitat quantity and quality and the survival and reproduction of fish. 	<ul style="list-style-type: none"> A Wildfire Prevention and Preparedness Plan will be developed and implemented. All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. Firefighting training will be provided to on-site personnel (as deemed appropriate). No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. Safety management systems (e.g., hot work permits) will be implemented. Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented. 	No pathway

Table 8: Potential Pathways for Effects to Terrain and Soils

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that alter soil conditions or final terrain (topography) conditions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Alteration of soil and terrain conditions (e.g., quantity, quality, and distribution) may adversely affect soil productivity and the types of ecosystems that can be reclaimed on the landscape. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Clearing equipment will be used that minimizes surface disturbance, soil compaction, and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	Primary

Table 8: Potential Pathways for Effects to Terrain and Soils

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that may contribute to slope instability during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Activities may affect terrain through an increase in potential slope instability and/or failures. 	<ul style="list-style-type: none"> The Water Management Plan will be implemented. The Erosion and Sediment Control Plan will be implemented. Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. 	<p>No pathway</p>
<p>Project components/activities that contribute to the Project footprint and may alter soils during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Site clearing, contouring and excavation can cause admixing, compaction, and increase erosion potential, which may change the quantity, quality, and distribution of soil. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. The Erosion and Sediment Control Plan will be implemented. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. Clearing equipment will be used that minimizes surface disturbance, soil compaction, and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Work in sensitive areas will be avoided during the time-of-year when erosion is more likely (e.g., spring freshet). Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. 	<p>Secondary</p>
	<ul style="list-style-type: none"> Soil transport and stockpiling can increase erosion potential and change soil quality. 	<ul style="list-style-type: none"> The Erosion and Sediment Control Plan will be implemented. If soils are prone to wind erosion, areas will be tackified, covered, seeded, and/or water will be applied during periods of high erosion potential (e.g., summer and fall). Organics and upper soil material will be salvaged to the extent practical for future use in reclamation. Soil salvage stockpiles will be constructed in such a way as to reduce changes to quality, erosion, and loss (e.g., slumping). 	<p>No pathway</p>
<p>Project components/activities that may contribute to permafrost degradation during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Soil disturbance can alter soil temperature and lead to changes in permafrost depth or prevalence. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. Clearing equipment will be used that minimizes surface disturbance, soil compaction and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes, and brush) where feasible. 	<p>No pathway or Secondary</p>
<p>Project components/activities that contribute to deposition of fugitive dust emissions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material (includes conveyors) Process plant and processing (includes crushers and conveyors) Site traffic Transportation of personnel and materials to and from the site Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition of fugitive dust emissions (e.g., metals) may change soil chemistry and adversely affect soil quality. 	<ul style="list-style-type: none"> An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for fugitive dust and adaptive management. Water and/or dust suppressants will be applied to site roads as necessary. Speed limits will be established and enforced on site roads to reduce dust production. Crushers and conveyors will be covered. Concentrate will be covered during transportation to rail yards. 	<p>Secondary</p>
<p>Project components/activities that contribute to criteria air contaminant emissions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from the site Power generation Non-hazardous waste incineration Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition of suspended solids in criteria air contaminant emissions (e.g., potential acid inputs) may change soil chemistry and adversely affect soil quality. 	<ul style="list-style-type: none"> Hydroelectric power will be used to supplement fossil fuel methods for power generation. Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and adaptive management based on ambient air quality standards. Procurement criteria will be developed to ensure stationary and mobile engines meet applicable performance standards, such as equipment that has the lowest practical and economically achievable nitrogen oxide emission rates. Ultra-low sulphur diesel (less than 15 parts per million sulphur) will be used in all equipment to reduce ambient concentrations of nitrogen dioxide. Transportation of workers will be completed using large vehicles where possible to reduce the number of engines in use, thereby reducing vehicle combustion and fugitive emissions. Emissions control devices will be used and maintained on fossil-fuel based engines. Equipment will be regularly maintained. Idling of vehicles will be limited to the extent practical. 	<p>Secondary</p>

Table 8: Potential Pathways for Effects to Terrain and Soils

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that potentially increase soil erosion through changes in surface water runoff and drainage areas during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Mine water discharge Water withdrawals for potable and process water use Domestic wastewater discharge following treatment Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Changes in site surface water runoff can increase soil erosion and affect soil quality and distribution. Changes in surface water levels, flows and drainage areas can increase soil erosion and sedimentation along waterbodies and watercourses and affect soil quality and distribution. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, and includes that applies adaptive management, if required. Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. Process water for start-up may be pumped from historical open pits if the water has suitable quality and quantity, or if not, from Great Slave Lake. Areas disturbed/alterd will be regraded to conform to the local topography to maintain drainage patterns. Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Where possible, a 30 metre buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>
<p>Project components/activities that contribute to changes in site surface water quality and affect soil chemistry and quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Handling and storage of waste rock and mineralized material Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Changes in surface water quality from contact with Project facilities and additional infrastructure may alter soil chemistry and affect soil quality. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented and includes adaptive management, if required. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and mining of open pits and underground mines Tailings disposal and management 	<ul style="list-style-type: none"> Changes in groundwater quality from open pits, underground mines, and tailings can affect soil quality. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented that include adaptive management, if required. Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. Studies will be undertaken to evaluate the suitability of multiple locations as tailings disposal sites and to select locations that will avoid and minimize risk of potential environmental effects. The Closure and Reclamation Plan will be implemented. 	<p>No pathway</p>
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Handling and storage of waste rock and mineralized material 	<ul style="list-style-type: none"> Seepage from waste rock deposition areas can cause changes in groundwater quality and soil quality. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented that include adaptive management, if required. Waste rock will be deposited into historical mined open or onto constructed stockpile pads adjacent to deposits being mined. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>

Table 8: Potential Pathways for Effects to Terrain and Soils

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
Accidents and Malfunctions	<ul style="list-style-type: none"> Chemical or hazardous materials spills on site and during transport offsite may adversely affect soil quality. 	<ul style="list-style-type: none"> The Spill Contingency Plan and Waste Management Plan will be implemented. Standard best management practices for general activities with regards to use, handling, and storage of deleterious substances will be followed. Hazardous waste will be stored in appropriate containers that will be located in a lined bermed containment pad, which will provide secondary containment of spills. No fuels, oils, or other hazardous substances will be stored within 150 m of waterbodies. No equipment maintenance or refuelling will be conducted within 150 m of waterbodies. The tailings transport pipeline will have drainage points and spill containment areas located along the route. Vehicles and equipment will be regularly maintained. Spill kits will be available at various locations throughout the site and will be maintained in good working order. Hazardous waste will be transported to a licensed hazardous waste receiving facility for disposal. Fuel and hazardous materials will be transported in approved containers in licensed vehicles. If a major spill occurs, the cleanup, treatment, and disposal of the contaminated waste and soil will be handled and disposed of using approved methods. Speed limits will be enforced. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> A wildfire started by Project activities may adversely affect soil quality and distribution. 	<ul style="list-style-type: none"> A Wildfire Prevention and Preparedness Plan will be developed and implemented. All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. Firefighting training will be provided to on-site personnel (as deemed appropriate). No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. Safety management systems (e.g., hot work permits) will be implemented. Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> Failure of storm water management features (culverts, roadside ditches) following a severe rainfall event can influence surface water levels, flows and drainage areas, which can affect soil quality and distribution. 	<ul style="list-style-type: none"> Storm water features will be designed to carry/contain a suitable return rainfall event as well as provide sufficient erosion protection during those events. Routine inspections and maintenance of storm water management system will be conducted. 	No pathway

Table 9: Potential Pathways for Effects to Vegetation

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to the Project footprint during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Direct loss, alteration, and fragmentation of upland, wetland, and riparian ecosystems from the Project footprint. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. Construction of the Project will be planned to avoid environmentally sensitive areas (e.g., listed plants and wetlands) to the extent practical. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Clearing equipment will be used that minimizes surface disturbance, soil compaction, and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	Primary
<p>Project components/activities that alter soil conditions or final terrain (topography) conditions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Alteration of final terrain and soil conditions, and/or plant species composition could change the types of ecosystems that can be reclaimed on the landscape, and adversely affect vegetation ecosystem availability, distribution, and condition. 	<ul style="list-style-type: none"> The Closure and Reclamation Plan will be implemented. 	Primary

Table 9: Potential Pathways for Effects to Vegetation

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to deposition of fugitive dust emissions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material (includes conveyors) Process plant and processing (includes crushers and conveyors) Site traffic Transportation of personnel and materials to and from the site Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition of fugitive dust emissions (e.g., metals) may adversely change soil quality and/or cover plants and affect the availability, distribution and condition of vegetation ecosystems. 	<ul style="list-style-type: none"> An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for fugitive dust and adaptive management. Water and/or dust suppressants will be applied to site roads as necessary. Speed limits will be established and enforced on site roads to reduce dust production. Crushers and conveyors will be covered. Concentrate will be covered during transportation to rail yards. 	<p>Secondary</p>
<p>Project components/activities that contribute to criteria air contaminant emissions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from the site Power generation Non-hazardous waste incineration Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition of suspended solids in criteria air contaminant emissions (e.g., potential acid inputs) may change soil chemistry and affect the availability, distribution and condition of vegetation ecosystems. 	<ul style="list-style-type: none"> Hydroelectric power will be used to supplement fossil fuel methods for power generation. Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and adaptive management based on ambient air quality standards. Procurement criteria will be developed to ensure stationary and mobile engines meet applicable performance standards, such as equipment that has the lowest practical and economically achievable nitrogen oxide emission rates. Ultra-low sulphur diesel (less than 15 parts per million sulphur) will be used in all equipment to reduce ambient concentrations of nitrogen dioxide. Transportation of workers will be completed using large vehicles where possible to reduce the number of engines in use, thereby reducing vehicle combustion and fugitive emissions. Emissions control devices will be used and maintained on fossil-fuel based engines. Equipment will be regularly maintained. Idling of vehicles will be limited to the extent practical. 	<p>Secondary</p>
<p>Project components/activities that contribute to the introduction of designated weed species during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Site roads Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Introduction of invasive or non-native plant species can affect the condition of upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> Certified seed will be used for reclamation activities, per the Closure and Reclamation Plan. Reclamation objectives for areas disturbed by the Project will reflect the local native vegetation communities. New equipment brought to Project will be cleaned to reduce the potential for introduction or spread of invasive and non-native species, according to established practices. If non-native invasive species are identified, a response plan will be established. 	<p>Secondary</p>
<p>Project components/activities that potentially alter surface water levels, flows and drainage areas during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Mine water discharge Water withdrawals for potable and process water use Domestic wastewater discharge following treatment Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Changes in site surface water runoff can affect soils and the availability, distribution, and condition of upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, and includes that applies adaptive management, if required. 	<p>No pathway or Secondary</p>
	<ul style="list-style-type: none"> Changes in surface water levels, flows and drainage areas can increase soil erosion and sedimentation along waterbodies and watercourses and affect the availability, distribution, and condition of upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. Process water for start-up may be pumped from historical open pits if the water has suitable quality and quantity, or if not, from Great Slave Lake. Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Where possible, a 30 metre buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>No pathway or Secondary</p>
	<ul style="list-style-type: none"> Changes in surface water levels and flows can alter waterbodies and watercourses and affect the availability, distribution, and condition of upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. Process water for start-up may be pumped from historical open pits if the water has suitable quality and quantity, or if not, from Great Slave Lake. Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. Culverts will be sized to convey flows under design conditions. Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. Where possible, a 30 metre buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>No pathway or Secondary</p>

Table 9: Potential Pathways for Effects to Vegetation

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to changes in site surface water quality and affect soil chemistry and vegetation during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Handling and storage of waste rock and mineralized material Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Changes in surface water quality from contact with surface facilities and additional infrastructure could adversely affect soil chemistry and the condition of upland, wetland and riparian ecosystems. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented and includes adaptive management, if required. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>No pathway or Secondary</p>
<p>Project components/activities that may change surface water and sediment quality during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Tailings disposal and management Mine water discharge 	<ul style="list-style-type: none"> Direct discharge of mine water, as well as surface runoff, groundwater inflow and seepage from the Project will cause changes to surface water quality, which can adversely affect the condition of upland, wetland, riparian ecosystems. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. The road alignment will minimize stream crossings and alterations to existing drainage patterns. The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. Water that interacts with the site footprint, waste rock, and tailings management areas will be captured and managed. Studies will be undertaken to evaluate the potential use of re-injection wells as an additional method to dispose of underground saline water that will infiltrate open pits and underground mines. If required, the mine water discharge will meet all regulatory guidelines including Effluent Quality Criteria defined in a future Type A Water Licence and the Canadian Metal and Diamond Mining Effluent Regulations – Schedule 4 limits. Depending on the location, the pumped mine water discharge to a receiving water body (river or lake system) may be directed through a properly designed diffuser system to rapidly attenuate the discharge, as appropriate Discharge water will be regularly sampled and monitored, enabling adaptive management actions if necessary. An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Mineralized material and waste rock will be stored in a contained area. Waste rock will be disposed of onto constructed waste rock storage facilities, or where possible, into historical open pits. Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. A Blast Management Plan will be developed and implemented. 	<p>No pathway or Secondary</p>
<p>Project components/activities that may change surface water and sediment quality through treated domestic effluent release during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Domestic wastewater discharge following treatment 	<ul style="list-style-type: none"> Discharge of treated domestic wastewater and sewage may cause a change in surface water quality, which can affect the condition of upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> Treated domestic effluent will be discharged to the septic field or may be discharged to a waterbody if it meets effluent criteria. The Water Management Plan and Waste Management Plan will be implemented. 	<p>No pathway</p>
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and mining of open pits and underground mines Tailings disposal and management 	<ul style="list-style-type: none"> Changes in groundwater quality from open pits, underground mines, and tailings can alter soil chemistry and affect the condition of upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented that include adaptive management, if required. Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. Studies will be undertaken to evaluate the suitability of multiple locations as tailings disposal sites and to select locations that will avoid and minimize risk of potential environmental effects. The Closure and Reclamation Plan will be implemented. 	<p>No pathway</p>
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Handling and storage of waste rock and mineralized material 	<ul style="list-style-type: none"> Seepage from waste rock deposition areas can cause changes in groundwater quality and soil chemistry, which can affect the condition of upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented that include adaptive management, if required. Waste rock will be deposited into historical mined open or onto constructed stockpile pads adjacent to deposits being mined. The Closure and Reclamation Plan will be implemented. 	<p>No pathway</p>

Table 9: Potential Pathways for Effects to Vegetation

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
Accidents and Malfunctions	<ul style="list-style-type: none"> Chemical or hazardous materials spills on site and during transport offsite may adversely affect upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> The Spill Contingency Plan and Waste Management Plan will be implemented. Standard best management practices for general activities with regards to use, handling, and storage of deleterious substances will be followed. Hazardous waste will be stored in appropriate containers that will be located in a lined bermed containment pad, which will provide secondary containment of spills. No fuels, oils, or other hazardous substances will be stored within 150 m of waterbodies. No equipment maintenance or refuelling will be conducted within 150 m of waterbodies. The tailings transport pipeline will have drainage points and spill containment areas located along the route. Vehicles and equipment will be regularly maintained. Spill kits will be available at various locations throughout the site and will be maintained in good working order. Hazardous waste will be transported to a licensed hazardous waste receiving facility for disposal. Fuel and hazardous materials will be transported in approved containers in licensed vehicles. If a major spill occurs, the cleanup, treatment, and disposal of the contaminated waste and soil will be handled and disposed of using approved methods. Speed limits will be enforced. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> A wildfire started by Project activities may adversely affect upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> A Wildfire Prevention and Preparedness Plan will be developed and implemented. All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. Firefighting training will be provided to on-site personnel (as deemed appropriate). No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. Safety management systems (e.g., hot work permits) will be implemented. Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> Failure of storm water management features (culverts, roadside ditches) following a severe rainfall event can influence surface water levels, flows and drainage areas, which can affect upland, wetland, and riparian ecosystems. 	<ul style="list-style-type: none"> Storm water features will be designed to carry/contain a suitable return rainfall event as well as provide sufficient erosion protection during those events. Routine inspections and maintenance of storm water management system will be conducted. 	No pathway

Table 10: Potential Pathways for Effects to Caribou

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to the Project footprint during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Direct removal/alteration and fragmentation of vegetation ecosystems (i.e., caribou habitat) can affect caribou abundance and distribution. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. Construction of the Project will be planned to avoid environmentally sensitive areas (e.g., wetlands) to the extent practical. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Clearing equipment will be used that minimizes surface disturbance, soil compaction, and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	Primary
<p>Project components/activities that alter soil conditions or final terrain (topography) conditions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Alteration of final terrain and soil conditions, and/or plant species composition could change the types of ecosystems that can be reclaimed on the landscape, and adversely affect caribou habitat availability and distribution, and survival and reproduction. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. Construction of the Project will be planned to avoid environmentally sensitive areas (e.g., wetlands) to the extent practical. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Clearing equipment will be used that minimizes surface disturbance, soil compaction, and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	Primary

Table 10: Potential Pathways for Effects to Caribou

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to sensory disturbance (e.g., presence of people, lights, sounds, smells, and vibrations) during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Power generation Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Sensory disturbance can alter caribou movement and behaviour and adversely affect functional habitat availability and caribou abundance and distribution. 	<ul style="list-style-type: none"> The Wildlife Protection Plan will be implemented. Construction will be planned to occur outside of sensitive and breeding windows for caribou (e.g., calving and post-calving periods) A no harassing, feeding, or approaching wildlife policy will be implemented through the Wildlife Protection Plan. Noisy equipment will be enclosed in buildings, where feasible. Internal combustion engines will be outfitted with well-maintained muffler systems. Power plant generator facilities will have louvers on ventilation openings and exhaust mufflers. Sound levels will be monitored, as per the noise management plan, and adaptive management applied if required. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Primary</p>
<p>Project components/activities that contribute to the introduction of designated weed species during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Site roads Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Introduction of invasive or non-native plant species can affect caribou habitat availability and distribution. 	<ul style="list-style-type: none"> Certified seed will be used for reclamation activities, per the Closure and Reclamation Plan. Reclamation objectives for areas disturbed by the Project will reflect the local native vegetation communities. New equipment brought to Project will be cleaned to reduce the potential for introduction or spread of invasive and non-native species, according to established practices. If non-native invasive species are identified, a response plan will be established. 	<p>Secondary</p>
<p>Project components/activities that change access for predators during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and improvement of site roads Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Increased access for predators (e.g., wolf and black bear) and prey may increase predation risk and decrease caribou survival and reproduction. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Existing roads and trails will be used where possible. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Primary</p>
<p>Project components/activities that change public access for during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and improvement of site roads Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Changes in public access to hunting/trapping areas and increased density of people (i.e., Project staff and contractors) in the area may increase harvesting of caribou and affect abundance. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Existing roads and trails will be used where possible. To reduce risks to public health and safety, access will be restricted by installing gates and fencing on private roads. A “no hunting and fishing” policy will be implemented on the Project site that applies to staff and contractors. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Primary or Secondary</p>
<p>Project components/activities that contribute to deposition of criteria air contaminant and fugitive dust emissions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material (includes conveyors) Process plant and processing (includes crushers and conveyors) Site traffic Transportation of personnel and materials to and from the site Power generation Non-hazardous waste incineration Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition of suspended solids in criteria air contaminant emissions (e.g., potential acid inputs) and fugitive dust containing metals may change soil and vegetation and affect caribou habitat availability and distribution. 	<ul style="list-style-type: none"> Hydroelectric power will be used to supplement fossil fuel methods for power generation. Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and fugitive dust and adaptive management based on ambient air quality standards. Procurement criteria will be developed to ensure stationary and mobile engines meet applicable performance standards, such as equipment that has the lowest practical and economically achievable nitrogen oxide emission rates. Ultra-low sulphur diesel (less than 15 parts per million sulphur) will be used in all equipment to reduce ambient concentrations of nitrogen dioxide. Transportation of workers will be completed using large vehicles where possible to reduce the number of engines in use, thereby reducing vehicle combustion and fugitive emissions. Emissions control devices will be used and maintained on fossil-fuel based engines. Equipment will be regularly maintained. Idling of vehicles will be limited to the extent practical. Water and/or dust suppressants will be applied to site roads as necessary. Speed limits will be established and enforced on site roads to reduce dust production. Crushers and conveyors will be covered. Concentrate will be covered during transportation to rail yards. 	<p>Secondary</p>

Table 10: Potential Pathways for Effects to Caribou

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that potentially alter surface water levels, flows and drainage areas during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> • Land clearing, site preparation and construction of facilities and infrastructure • Development and mining of open pits and underground mines • Handling and storage of waste rock and mineralized material • Mine water discharge • Water withdrawals for potable and process water use • Domestic wastewater discharge following treatment • Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) • Removal of infrastructure • Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> • Changes in surface water levels, flows and drainage areas can affect soils and vegetation, and caribou habitat availability and distribution. 	<ul style="list-style-type: none"> • The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. • Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. • Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. • The road alignment will minimize stream crossings and alterations to existing drainage patterns. • Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). • Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. • The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, and including the application of adaptive management, if required. • Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. • Process water for start-up may be pumped from historical open pits if the water has suitable quality and quantity, or if not, from Great Slave Lake. • Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. • Culverts will be sized to convey flows under design conditions. • Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. • Where possible, a 30 metre buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. • Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. • The Closure and Reclamation Plan will be implemented. 	<p>No pathway or Secondary</p>
<p>Project components/activities that contribute to changes in site surface water quality and affect soil chemistry and vegetation during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> • Land clearing, site preparation and construction of facilities and infrastructure • Handling and storage of waste rock and mineralized material • Process plant and processing • Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) • Removal of infrastructure • Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> • Changes in surface water quality from contact with surface facilities and additional infrastructure could affect soil chemistry and vegetation, and caribou habitat availability and distribution. 	<ul style="list-style-type: none"> • The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented and includes adaptive management, if required. • Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. • The Closure and Reclamation Plan will be implemented. 	<p>No pathway or Secondary</p>
<p>Project components/activities that may change surface water and sediment quality during construction and operation:</p> <ul style="list-style-type: none"> • Land clearing, site preparation and construction of facilities and infrastructure • Development and mining of open pits and underground mines • Handling and storage of waste rock and mineralized material • Process plant and processing • Tailings disposal and management • Mine water discharge 	<ul style="list-style-type: none"> • Direct discharge of mine water, as well as surface runoff, groundwater inflow and seepage from the Project will cause changes to surface water quality, which can adversely affect vegetation and caribou habitat availability and distribution. 	<ul style="list-style-type: none"> • The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. • Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. • Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. • The road alignment will minimize stream crossings and alterations to existing drainage patterns. • The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. • Water that interacts with the site footprint, waste rock, and tailings management areas will be captured and managed. • Studies will be undertaken to evaluate the potential use of re-injection wells as an additional method to dispose of underground saline water that will infiltrate open pits and underground mines. • If required, the mine water discharge will meet all regulatory guidelines including Effluent Quality Criteria defined in a future Type A Water Licence and the Canadian Metal and Diamond Mining Effluent Regulations – Schedule 4 limits. • Depending on the location, the pumped mine water discharge to a receiving water body (river or lake system) may be directed through a properly designed diffuser system to rapidly attenuate the discharge, as appropriate • Discharge water will be regularly sampled and monitored, enabling adaptive management actions if necessary. • An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. • Mineralized material and waste rock will be stored in a contained area. Waste rock will be disposed of onto constructed waste rock storage facilities, or where possible, into historical open pits. • Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. • A Blast Management Plan will be developed and implemented. 	<p>No pathway</p>

Table 10: Potential Pathways for Effects to Caribou

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that may change surface water and sediment quality through treated domestic effluent release during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Domestic wastewater discharge following treatment 	<ul style="list-style-type: none"> Discharge of treated domestic wastewater and sewage may cause a change in surface water quality, which can affect vegetation and caribou habitat availability and distribution. 	<ul style="list-style-type: none"> Treated domestic effluent will be discharged to the septic field or may be discharged to a waterbody if it meets effluent criteria. The Water Management Plan and Waste Management Plan will be implemented. 	No pathway
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and mining of open pits and underground mines Tailings disposal and management 	<ul style="list-style-type: none"> Changes in groundwater quality from open pits, underground mines, and tailings can alter soil chemistry and affect vegetation and caribou habitat availability and distribution. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented that include adaptive management, if required. Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. Studies will be undertaken to evaluate the suitability of multiple locations as tailings disposal sites and to select locations that will avoid and minimize risk of potential environmental effects. The Closure and Reclamation Plan will be implemented. 	No pathway
<p>Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Handling and storage of waste rock and mineralized material 	<ul style="list-style-type: none"> Seepage from waste rock deposition areas can cause changes in groundwater quality and soil chemistry, which can affect vegetation and caribou habitat availability and distribution. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented that include adaptive management, if required. Waste rock will be deposited into historical mined open or onto constructed stockpile pads adjacent to deposits being mined. The Closure and Reclamation Plan will be implemented. 	No pathway
<p>Project activities that use explosives during construction and operation:</p> <ul style="list-style-type: none"> Development and mining of open pits and underground mines 	<ul style="list-style-type: none"> Blasting and associated fly rock may result in injury or mortality to caribou. 	<ul style="list-style-type: none"> A Blast Management Plan will be developed and implemented. Blasting activities will be limited to the daytime periods, where possible. Blasting activities will follow a regular schedule, where possible, and site-wide notice will be given prior to each blast. A survey of the blast area will be completed prior to the blast and caribou will be deterred from areas of risk. 	No pathway
<p>Project activities that contribute to risk of vehicle-wildlife collisions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Handling and storage of waste rock and mineralized material Site traffic Transportation of personnel and materials to and from the site Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Collisions with vehicles and equipment on site, and vehicles travelling to and from site may cause injury or mortality to individual animals. 	<ul style="list-style-type: none"> The Wildlife Protection Plan will be implemented. Speed limits and signage will be established on all roads to limit risk of vehicle-animal collisions. Caribou will be provided with the right of way. When caribou are observed on or adjacent to the road, drivers will stop and report/communicate and allow animals to move away before continuing to drive. Any collisions with caribou along any road will be reported. 	Secondary
<p>Project components/activities that contribute to the attraction of wildlife to the Project during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Attraction of wildlife to the Project (e.g., food waste, sewage, petroleum-based products, salt, explosive powder) may increase human-wildlife interactions and alter predator-prey relationships, or result in direct removal/mortality of problem wildlife resulting in an affect to wildlife abundance. 	<ul style="list-style-type: none"> The Wildlife Protection Plan will be implemented. Littering and feeding of wildlife will be prohibited. The Waste Management Plan will be implemented Domestic (e.g., food) waste will be incinerated regularly. Industrial (e.g., used oil and lubricants) waste will be collected and incinerated and/or transported off site for recycling or disposal at a licensed disposal facility. Wastes will be stored in wildlife proof containers. Work sites will be maintained and materials (e.g., cables, wires, fencing) will be properly stored so as not to entangle caribou or other wildlife. 	No pathway
<p>Accidents and Malfunction</p>	<ul style="list-style-type: none"> Chemical or hazardous materials spills on site or during transport offsite can affect soil, vegetation, and caribou habitat availability and survival and reproduction of individual animals. 	<ul style="list-style-type: none"> The Spill Contingency Plan and Waste Management Plan will be implemented. Standard best management practices for general activities with regards to use, handling, and storage of deleterious substances will be followed. Hazardous waste will be stored in appropriate containers that will be located in a lined bermed containment pad, which will provide secondary containment of spills. No fuels, oils, or other hazardous substances will be stored within 150 m of waterbodies. No equipment maintenance or refuelling will be conducted within 150 m of waterbodies. The tailings transport pipeline will have drainage points and spill containment areas located along the route. Vehicles and equipment will be regularly maintained. Spill kits will be available at various locations throughout the site and will be maintained in good working order. Hazardous waste will be transported to a licensed hazardous waste receiving facility for disposal. Fuel and hazardous materials will be transported in approved containers in licensed vehicles. If a major spill occurs, the cleanup, treatment, and disposal of the contaminated waste and soil will be handled and disposed of using approved methods. Speed limits will be enforced. 	No pathway

Table 10: Potential Pathways for Effects to Caribou

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
Accidents and Malfunctions	<ul style="list-style-type: none"> A wildfire started by Project activities may result in loss of caribou and caribou habitat. 	<ul style="list-style-type: none"> A Wildfire Prevention and Preparedness Plan will be developed and implemented. All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. Firefighting training will be provided to on-site personnel (as deemed appropriate). No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. Safety management systems (e.g., hot work permits) will be implemented. Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> Failure of storm water management features (culverts, roadside ditches) following a severe rainfall event can influence surface water levels, flows and drainage areas, which can affect caribou habitat availability and distribution. 	<ul style="list-style-type: none"> Storm water features will be designed to carry/contain a suitable return rainfall event as well as provide sufficient erosion protection during those events. Routine inspections and maintenance of storm water management system will be conducted. 	No pathway

Table 11: Potential Pathways for Effects to Wildlife

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to the Project footprint during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Direct removal/alteration and fragmentation of vegetation ecosystems (i.e., wildlife habitat) can affect wildlife abundance and distribution. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. Construction of the Project will be planned to avoid environmentally sensitive areas (e.g., wildlife trees and wetlands) to the extent practical. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Clearing equipment will be used that minimizes surface disturbance, soil compaction, and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	Primary
<p>Project components/activities that alter soil conditions or final terrain (topography) conditions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Alteration of final terrain and soil conditions, and/or plant species composition could change the types of ecosystems that can be reclaimed on the landscape, and adversely affect wildlife habitat availability and distribution, and survival and reproduction. 	<ul style="list-style-type: none"> Soil disturbance will be focused within previously disturbed areas to avoid overwintering habitat for hibernating amphibians or other wildlife with low motility. Where possible, soil disturbance will be completed outside of the overwintering period for northern leopard frogs (November through March). Clearing of mature forest and hollow wildlife trees (i.e., dead or decaying trees, standing or fallen) will be avoided from March 11 to July 31 to avoid destruction of active American marten natal and maternal dens (Ellis 1999; Environment Canada 2013c; Strickland and Douglas 1987). Vegetation clearing will be outside of general nesting periods for migratory birds (May 5 to August 10; ECCC 2018). If vegetation clearing is required to occur during the nesting period for migratory birds, activities will be managed to comply with the <i>Species at Risk Act</i> and the <i>Migratory Birds Convention Act</i>. 	Primary
<p>Project activities that contribute to risk of wildlife injury/mortality during construction:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure 	<ul style="list-style-type: none"> Vegetation removal and soil alterations during site preparation and construction may result in injury or mortality to individual animals with low motility (e.g., denning marten, overwintering amphibians) and destruction of nests, eggs, and individuals of migratory birds (incidental take). 	<ul style="list-style-type: none"> Soil disturbance will be focused within previously disturbed areas to avoid overwintering habitat for hibernating amphibians or other wildlife with low motility. Where possible, soil disturbance will be completed outside of the overwintering period for northern leopard frogs (November through March). Clearing of mature forest and hollow wildlife trees (i.e., dead or decaying trees, standing or fallen) will be avoided from March 11 to July 31 to avoid destruction of active American marten natal and maternal dens (Ellis 1999; Environment Canada 2013c; Strickland and Douglas 1987). Vegetation clearing will be outside of general nesting periods for migratory birds (May 5 to August 10; ECCC 2018). If vegetation clearing is required to occur during the nesting period for migratory birds, activities will be managed to comply with the <i>Species at Risk Act</i> and the <i>Migratory Birds Convention Act</i>. 	Secondary

Table 11: Potential Pathways for Effects to Wildlife

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to sensory disturbance (e.g., presence of people, lights, sounds, smells, and vibrations) during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Power generation Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Sensory disturbance can alter wildlife movement and behaviour and adversely affect wildlife habitat availability and animal abundance and distribution. 	<ul style="list-style-type: none"> The Wildlife Protection Plan will be implemented. Construction activities will be planned to occur outside of sensitive and breeding windows for wildlife (e.g., migratory bird nesting period, black bear and marten denning periods). If sensitive periods cannot be avoided, pre-clearance surveys and buffers (setbacks) would be applied, as required (e.g., ECCO 2018). A no harassing, feeding, or approaching wildlife policy will be implemented through the Wildlife Protection Plan. Noisy equipment will be enclosed in buildings, where feasible. Internal combustion engines will be outfitted with well-maintained muffler systems. Power plant generator facilities will have louvers on ventilation openings and exhaust mufflers. Sound levels will be monitored, as per the noise management plan, and adaptive management applied if required. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Primary</p>
<p>Project components/activities that contribute to the introduction of designated weed species during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Site roads Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Introduction of invasive or non-native plant species can affect wildlife habitat availability and distribution. 	<ul style="list-style-type: none"> Certified seed will be used for reclamation activities, per the Closure and Reclamation Plan. Reclamation objectives for areas disturbed by the Project will reflect the local native vegetation communities. New equipment brought to Project will be cleaned to reduce the potential for introduction or spread of invasive and non-native species, according to established practices. If non-native invasive species are identified, a response plan will be established. 	<p>Secondary</p>
<p>Project components/activities that change access for predators during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and improvement of site roads Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Increased access for predators (e.g., wolf and black bear) and prey may increase predation risk and decrease survival and reproduction for ungulates (e.g., bison, moose). 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Existing roads and trails will be used where possible. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>
<p>Project components/activities that change public access during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Development and improvement of site roads Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Changes in public access to hunting/trapping areas and increased density of people (i.e., Project staff and contractors) in the area may alter ungulate and carnivore survival and reproduction and affect abundance. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Existing roads and trails will be used where possible. To reduce the risk to public health and safety, access will be restricted by installing gates and fencing on private roads. A “no hunting and fishing” policy will be implemented on the Project site that applies to staff and contractors. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. 	<p>Secondary</p>
<p>Project components/activities that contribute to deposition of criteria air contaminant and fugitive dust emissions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development and mining of open pits and underground mines Handling and storage of waste rock and mineralized material (includes conveyors) Process plant and processing (includes crushers and conveyors) Site traffic Transportation of personnel and materials to and from the site Power generation Non-hazardous waste incineration Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Deposition of suspended solids in criteria air contaminant emissions (e.g., potential acid inputs) and fugitive dust containing metals may change soil and vegetation and affect wildlife habitat availability and distribution. 	<ul style="list-style-type: none"> Hydroelectric power will be used to supplement fossil fuel methods for power generation. Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and fugitive dust and adaptive management based on ambient air quality standards. Procurement criteria will be developed to ensure stationary and mobile engines meet applicable performance standards, such as equipment that has the lowest practical and economically achievable nitrogen oxide emission rates. Ultra-low sulphur diesel (less than 15 parts per million sulphur) will be used in all equipment to reduce ambient concentrations of nitrogen dioxide. Transportation of workers will be completed using large vehicles where possible to reduce the number of engines in use, thereby reducing vehicle combustion and fugitive emissions. Emissions control devices will be used and maintained on fossil-fuel based engines. Equipment will be regularly maintained. Idling of vehicles will be limited to the extent practical. Water and/or dust suppressants will be applied to site roads as necessary. Speed limits will be established and enforced on site roads to reduce dust production. Crushers and conveyors will be covered. Concentrate will be covered during transportation to rail yards. 	<p>Secondary</p>

Table 11: Potential Pathways for Effects to Wildlife

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that potentially alter surface water levels, flows and drainage areas during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> • Land clearing, site preparation, and construction of facilities and infrastructure • Development and mining of open pits and underground mines • Handling and storage of waste rock and mineralized material • Mine water discharge • Water withdrawals for potable and process water use • Domestic wastewater discharge following treatment • Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) • Removal of infrastructure • Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> • Changes in surface water levels, flows and drainage areas can affect soils and vegetation, and wildlife habitat availability and distribution. 	<ul style="list-style-type: none"> • The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. • Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. • Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. • The road alignment will minimize stream crossings and alterations to existing drainage patterns. • Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). • Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. • The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, and includes that applies adaptive management, if required. • Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. • Process water for start-up may be pumped from historical open pits if the water has suitable quality and quantity, or if not, from Great Slave Lake. • Areas disturbed/altered will be regraded to conform to the local topography to maintain drainage patterns. • Routine inspection and maintenance of containment and conveyance structures (i.e., roadside ditches and culverts) will be conducted to limit the risk of road wash-out or sediment release to the environment. • Culverts will be sized to convey flows under design conditions. • Water crossing structures will be constructed and installed in a manner that protects the banks from erosion and maintains surface water flows. • Where possible, a 30 metre (m) buffer will be established between Project components/infrastructure and permanent waterbodies and watercourses. • Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. • The Closure and Reclamation Plan will be implemented. 	<p>No pathway or Secondary</p>
<p>Project components/activities that contribute to changes in site surface water quality and affect soil chemistry and vegetation during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> • Land clearing, site preparation and construction of facilities and infrastructure • Handling and storage of waste rock and mineralized material • Process plant and processing • Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) • Removal of infrastructure • Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> • Changes in surface water quality from contact with surface facilities and additional infrastructure could affect soil chemistry and vegetation, and wildlife habitat availability and distribution. 	<ul style="list-style-type: none"> • The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented and includes adaptive management, if required. • Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. • The Closure and Reclamation Plan will be implemented. 	<p>No pathway or Secondary</p>
<p>Project components/activities that may change surface water and sediment quality during construction and operation:</p> <ul style="list-style-type: none"> • Land clearing, site preparation, and construction of facilities and infrastructure • Development and mining of open pits and underground mines • Handling and storage of waste rock and mineralized material • Process plant and processing • Tailings disposal and management • Mine water discharge 	<ul style="list-style-type: none"> • Direct discharge of mine water, as well as surface runoff, groundwater inflow and seepage from the Project will cause changes to surface water quality, which can adversely affect vegetation and wildlife habitat availability and distribution. 	<ul style="list-style-type: none"> • The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. • Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. • Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. • The road alignment will minimize stream crossings and alterations to existing drainage patterns. • The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented, including adaptive management, if required. • Water that interacts with the site footprint, waste rock, and tailings management areas will be captured and managed. • Studies will be undertaken to evaluate the potential use of re-injection wells as an additional method to dispose of underground saline water that will infiltrate open pits and underground mines. • The mine water discharge will meet all regulatory guidelines including Effluent Quality Criteria defined in a future Type A Water Licence and the Canadian Metal and Diamond Mining Effluent Regulations – Schedule 4 limits. • Depending on the location, the mine water discharge to a receiving water body (river or lake system) may be directed through a properly designed diffuser system to rapidly attenuate the discharge, as appropriate • Discharge water will be regularly sampled and monitored, enabling adaptive management actions if necessary. • An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. • Mineralized material and waste rock will be stored in a contained area. Waste rock will be disposed of onto constructed waste rock storage facilities, or where possible, into historical open pits. • Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. • A Blast Management Plan will be developed and implemented. 	<p>No pathway</p>

Table 11: Potential Pathways for Effects to Wildlife

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
Project components/activities that may change surface water and sediment quality through treated domestic effluent release during construction, operation, and closure and reclamation: <ul style="list-style-type: none"> Domestic wastewater discharge following treatment 	<ul style="list-style-type: none"> Discharge of treated domestic wastewater and sewage may cause a change in surface water quality, which can affect vegetation and wildlife habitat availability and distribution. 	<ul style="list-style-type: none"> Treated domestic effluent will be discharged to the septic field or may be discharged to a waterbody if it meets effluent criteria. The Water Management Plan and Waste Management Plan will be implemented. 	No pathway
Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation: <ul style="list-style-type: none"> Development and mining of open pits and underground mines Tailings disposal and management 	<ul style="list-style-type: none"> Changes in groundwater quality from open pits, underground mines, and tailings can alter soil chemistry and affect vegetation and wildlife habitat availability and distribution. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented that include adaptive management, if required. Tailings generated from the process plant will be pumped to and stored in the tailings disposal areas, which will be designed to minimize potential environmental effects by using pre-existing open pits. Studies will be undertaken to evaluate the suitability of multiple locations as tailings disposal sites and to select locations that will avoid and minimize risk of potential environmental effects. The Closure and Reclamation Plan will be implemented. 	No pathway
Project components/activities that potentially change groundwater quality during construction, operation, and closure and reclamation: <ul style="list-style-type: none"> Handling and storage of waste rock and mineralized material 	<ul style="list-style-type: none"> Seepage from waste rock deposition areas can cause changes in groundwater quality and soil chemistry, which can affect vegetation and wildlife habitat availability and distribution. 	<ul style="list-style-type: none"> The Water Management Plan and Tailings and Waste Rock Management Plan will be implemented that include adaptive management, if required. Waste rock will be deposited into historical mined open or onto constructed stockpile pads adjacent to deposits being mined. The Closure and Reclamation Plan will be implemented. 	No pathway
Project activities that use explosives during construction and operation: <ul style="list-style-type: none"> Development and mining of open pits and underground mines 	<ul style="list-style-type: none"> Blasting and associated fly rock may result in injury or mortality to wildlife. 	<ul style="list-style-type: none"> A Blast Management Plan will be developed and implemented. Blasting activities will be limited to the daytime periods, where possible. Blasting activities will follow a regular schedule, where possible, and site-wide notice will be given prior to each blast. Wildlife will be deterred from areas of risk. Blasting operations will follow DFO's <i>Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters</i> (Wright and Hopky 1998) for setback distances from fish bearing waterbodies, which is likely to reduce the risk to waterbirds. 	No pathway
Project activities that contribute to risk of vehicle-wildlife collisions during construction, operation, and closure and reclamation: <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Handling and storage of waste rock and mineralized material Site traffic Transportation of personnel and materials to and from the site Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Collisions with vehicles and equipment on site, and vehicles travelling to and from site may cause injury or mortality to individual animals. 	<ul style="list-style-type: none"> The Wildlife Protection Plan will be implemented. Speed limits and signage will be established on all roads to limit risk of vehicle-animal collisions. Wildlife will be provided with the right of way. When wildlife is observed on or adjacent to the road, drivers will stop and report/communicate and allow animals to move away before continuing to drive. Any collisions with wildlife along any road will be reported. 	Secondary
Project components/activities that contribute to the attraction of wildlife to the Project during construction, operation, and closure and reclamation: <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Process plant and processing Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Attraction of wildlife to the Project (e.g., food waste, sewage, petroleum-based products, salt, explosive powder) may increase human-wildlife interactions and alter predator-prey relationships, or result in direct removal/mortality of problem wildlife resulting in an affect to wildlife abundance. 	<ul style="list-style-type: none"> The Wildlife Protection Plan will be implemented. Littering and feeding of wildlife will be prohibited. The Waste Management Plan will be implemented Domestic (e.g., food) waste will be incinerated regularly. Industrial (e.g., used oil and lubricants) waste will be collected and incinerated and/or transported off site for recycling or disposal at a licensed disposal facility. Wastes will be stored in wildlife proof containers. Work sites will be maintained and materials (e.g., cables, wires, fencing) will be properly stored so as not to entangle caribou or other wildlife. 	Secondary
Project components that contribute to risk of injury/mortality to birds during construction, operation, and closure and reclamation: <ul style="list-style-type: none"> Above ground power distribution lines 	<ul style="list-style-type: none"> Electrocution or collisions with powerlines may cause injury or mortality to birds. 	<ul style="list-style-type: none"> Markers will be installed to enhance the visibility of lines in key movement corridors and staging areas. 	Secondary
Project components/activities that provide nesting habitat for raptors: <ul style="list-style-type: none"> Development and mining of open pits and underground mines 	<ul style="list-style-type: none"> Raptors nesting in open pits can result in injury or mortality to individual birds. 	<ul style="list-style-type: none"> The Wildlife Protection Plan will be implemented. Pit walls will be surveyed regularly during the nesting period and birds will be deterred from nesting in pits. If a nest is established in a pit, a restricted area of activity will be applied and the nest monitored to determine success. 	Secondary

Table 11: Potential Pathways for Effects to Wildlife

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
Accidents and Malfunction	<ul style="list-style-type: none"> Chemical or hazardous materials spills on site or during transport offsite can affect soil, vegetation, and wildlife habitat availability and survival and reproduction of individual animals. 	<ul style="list-style-type: none"> The Spill Contingency Plan and Waste Management Plan will be implemented. Standard best management practices for general activities with regards to use, handling, and storage of deleterious substances will be followed. Hazardous waste will be stored in appropriate containers that will be located in a lined bermed containment pad, which will provide secondary containment of spills. No fuels, oils, or other hazardous substances will be stored within 150 m of waterbodies. No equipment maintenance or refuelling will be conducted within 150 m of waterbodies. The tailings transport pipeline will have drainage points and spill containment areas located along the route. Vehicles and equipment will be regularly maintained. Spill kits will be available at various locations throughout the site and will be maintained in good working order. Hazardous waste will be transported to a licensed hazardous waste receiving facility for disposal. Fuel and hazardous materials will be transported in approved containers in licensed vehicles. If a major spill occurs, the cleanup, treatment, and disposal of the contaminated waste and soil will be handled and disposed of using approved methods. Speed limits will be enforced. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> A wildfire started by Project activities may result in loss of wildlife and wildlife habitat. 	<ul style="list-style-type: none"> A Wildfire Prevention and Preparedness Plan will be developed and implemented. All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. Firefighting training will be provided to on-site personnel (as deemed appropriate). No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. Safety management systems (e.g., hot work permits) will be implemented. Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> Failure of storm water management features (culverts, roadside ditches) following a severe rainfall event can influence surface water levels, flows and drainage areas, which can affect wildlife habitat availability and distribution. 	<ul style="list-style-type: none"> Storm water features will be designed to carry/contain a suitable return rainfall event as well as provide sufficient erosion protection during those events. Routine inspections and maintenance of storm water management system will be conducted. 	No pathway

2.2.1.2 Human Environment

Project components and activities, effects pathways, environmental design features and mitigation, and the categorization of effects pathways (no pathway, secondary, and primary) for the heritage resources; traditional land and resource use; socio-economics; and non- traditional land and resource use components are summarized in Tables 12 to 19.

Table 12: Potential Pathways for Effects to Heritage Resources

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to the Project footprint and final landscape conditions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Direct loss or alteration to heritage resources from the Project footprint and landscape alterations. 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. Construction of the Project will be planned to avoid heritage sensitive areas (e.g., archaeological sites) to the extent practical. Archaeological Impact Assessments will be conducted in any remaining heritage sensitive areas in advance of Project developments in order to identify potential sites. If heritage resources cannot be avoided, they will be mitigated through systematic data recovery (e.g., detailed site/feature mapping, collection of artifacts, shovel testing, archaeological excavation); effects to sites will be offset by the recovery and preservation of scientific data that may not otherwise have been gathered. Awareness training and a manual for recognizing heritage resources will be provided to all staff and contractors. A heritage resources management plan will be developed and implemented and will include chance find protocols for sites inadvertently discovered during construction. 	<p>Secondary</p>

Table 13: Potential Pathways for Effects to Traditional Land and Resource Use

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to the Project footprint and final landscape conditions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Water withdrawals for potable and process water use Process plant Tailings disposal and management Installation of cross drainage structures and diffuser for mine water discharge Mine water discharge Site traffic Transportation of personnel and materials to and from site Power generation Non-hazardous waste incineration Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Cessation of site water management activities, including mine water discharge Reconnection of closure drainages to the local surface water environment Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Project footprint could result in direct loss or disturbance of traditional use areas, including hunting and trapping, fishing, plant harvesting and culturally important sites and areas (e.g., habitation, spiritual sites, or trails). 	<ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. 	<p>Primary</p>
	<ul style="list-style-type: none"> Residual landscape disturbance from Project facilities and activities can permanently alter the landscape and change traditional land and resources use in the area. 	<ul style="list-style-type: none"> Construction of the Project will be planned to avoid environmentally sensitive areas (e.g., listed plants and wetlands) to the extent practical. Clearing equipment will be used that minimizes surface disturbance, soil compaction, and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. 	<p>Primary</p>
	<ul style="list-style-type: none"> Project can change intangible values, including sense of place within the cultural landscape, and reduce the ability to transfer knowledge to future generations. 	<ul style="list-style-type: none"> Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and fugitive dust and adaptive management based on ambient air quality standards The Waste Management Plan will be implemented. The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, and includes that applies adaptive management, if required. An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. The Wildlife Protection Plan will be implemented. The Closure and Reclamation Plan will be implemented. Ongoing engagement will occur with Indigenous communities on the implementation of appropriate mitigation actions and policies and their effectiveness. Involvement of potentially affected Indigenous communities in monitoring programs and regular communication of the results of monitoring programs. 	<p>Primary</p>

Table 13: Potential Pathways for Effects to Traditional Land and Resource Use

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that alter surface water quantity and quality and contribute to the Project footprint, air and dust emissions and deposition, sensory disturbance (e.g., noise, lights, vibrations), and presence of workforce during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Water withdrawals for potable and process water use Process plant and processing Tailings disposal and management Installation of cross drainage structures and diffuser for mine water discharge Mine water discharge Site traffic Transportation of personnel and materials to and from site Power generation Non-hazardous waste incineration Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Cessation of site water management activities, including mine water discharge Reconnection of closure drainages to the local surface water environment Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Project footprint and activities may lead to changes in the water quality, and the availability of water for drinking. 	<ul style="list-style-type: none"> Mitigations that avoid and limit effects to water quantity (Table 5) and quality (Table 6), fish (Table 7), vegetation (Table 9), and wildlife (Table 11) will be implemented; examples include: <ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical, and where possible and practical, infrastructure will be built on previously disturbed sites. 	Secondary or Primary
	<ul style="list-style-type: none"> Project footprint and activities may lead to changes in the abundance and distribution of fish, and the availability of fish for traditional fishing. 	<ul style="list-style-type: none"> Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Existing roads and trails will be used where possible. 	Secondary or Primary ¹
	<ul style="list-style-type: none"> Project footprint and activities may lead to changes in the abundance and distribution of vegetation ecosystems, and the availability of plants for traditional harvesting. 	<ul style="list-style-type: none"> The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, and includes that applies adaptive management, if required. Water that interacts with the site footprint, waste rock, and tailings management areas will be captured and managed. Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. Studies will be undertaken to evaluate the suitability of multiple locations as tailings disposal sites and to select locations that will avoid and minimize risk of potential environmental effects. 	Secondary or Primary
	<ul style="list-style-type: none"> Project footprint and activities may lead to changes in the abundance and distribution of wildlife, and the availability of wildlife for traditional hunting and trapping. 	<ul style="list-style-type: none"> An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Water crossing structures and water intakes will be constructed and installed in a manner that protects the banks from erosion and maintains the flows in the water body and follows permits or authorizations issued for the Project from the appropriate regulatory agencies and DFO's <i>Measures to Protect Fish and Fish Habitat</i>. The water intake(s) will be screened to prevent entrainment or impingement of fish. The pumped mine water discharge will be directed through a properly designed diffuser to minimize effects from changes in velocity. The diffuser will be located to avoid sensitive fish habitat (e.g., shoals, spawning areas). Blasting operations will follow DFO's <i>Measures to Protect Fish and Fish Habitat and Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters</i> (Wright and Hopky 1998) for setback distances from fish bearing water bodies. The Wildlife Protection Plan will be implemented. Speed limits and signage will be established on all roads to limit risk of vehicle-animal collisions. Wildlife will be provided with the right of way. Procedures to reduce noise, dust, and light levels will be implemented, such as: <ul style="list-style-type: none"> Noisy equipment will be enclosed in buildings, where feasible. Internal combustion engines will be outfitted with well-maintained muffler systems. Hydroelectric power will be used to supplement fossil fuel methods for power generation. Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and fugitive dust and adaptive management based on ambient air quality standards. Water and/or dust suppressants will be applied to site roads as necessary. Crushers and conveyors will be covered. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. Ongoing engagement will occur with Indigenous communities on the implementation of appropriate mitigation actions and policies and their effectiveness. 	Primary (caribou) Secondary or Primary (all other wildlife)

¹ The effects pathway related to changes in the availability of traditional resources for traditional hunting and trapping, fishing, and plant gathering will be secondary or primary depending on the results of the residual effects analysis for wildlife, fish and fish habitat, and vegetation, respectively.

Table 13: Potential Pathways for Effects to Traditional Land and Resource Use

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to sensory disturbance (e.g., presence of people, dust, lights, smells, sounds, and vibrations) during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> • Land clearing, site preparation and construction of facilities and infrastructure • Development of open pits and underground mines • Handling and storage of waste rock and mineralized material • Process plant and processing • Site traffic • Transportation of personnel and materials to and from site • Power generation • Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) • Removal of infrastructure • Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> • Sensory disturbances can affect the experience of Indigenous land users. 	<ul style="list-style-type: none"> • An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and fugitive dust and adaptive management based on ambient air quality standards. • Procurement criteria will be developed to ensure stationary and mobile engines meet applicable performance standards, such as equipment that has the lowest practical and economically achievable nitrogen oxide emission rates. • Ultra-low sulphur diesel (less than 15 parts per million sulphur) will be used in all equipment to reduce ambient concentrations of nitrogen dioxide. • Transportation of workers will be completed using large vehicles where possible to reduce the number of engines in use, thereby reducing vehicle combustion and fugitive emissions. • Emissions control devices will be used and maintained on fossil-fuel based engines. • Equipment will be regularly maintained. • Idling of vehicles will be limited to the extent practical. • Water and/or dust suppressants will be applied to site roads as necessary. • Speed limits will be established and enforced on site roads to reduce dust production. • Crushers and conveyors will be covered. • Noisy equipment will be enclosed in buildings, where feasible. • Internal combustion engines will be outfitted with well-maintained muffler systems. • Power plant generator facilities will have louvers on ventilation openings and exhaust mufflers. • Sound levels will be monitored, as per the noise management plan, and adaptive management applied if required. • Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. • The Closure and Reclamation Plan will be implemented. 	<p>Primary</p>
<p>Project activities that change public access during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> • Development and improvement of site roads • Removal of infrastructure • Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> • Increased public access and human population from Project employment can lead to increased hunting and fishing and competition for resources. • Increased public access and human population from Project employment can lead to disturbance of culturally important sites and areas (e.g., habitation, spiritual sites, or trails). 	<ul style="list-style-type: none"> • Existing roads and trails will be used where possible. • An access management plan will be developed and implemented in consultation with Indigenous communities. • Signage or fencing will be installed at known cultural sites to prohibit public access. • To reduce risks to public health and safety, access will be restricted by installing gates and fencing on private roads. • A “no hunting and fishing” policy will be implemented on the Project site that applies to staff and contractors. • Project employees and contractors will participate in cultural awareness training. • Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. • The Closure and Reclamation Plan will be implemented. • Ongoing engagement will occur with Indigenous communities on the implementation of appropriate mitigation actions and policies and their effectiveness. 	<p>Secondary</p>
<p>Project activities that change public access during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> • Access restrictions on site roads and trails 	<ul style="list-style-type: none"> • Access restrictions can affect the ability of Indigenous land users to access traditional use areas and to participate in traditional activities in the vicinity of the Project. 	<ul style="list-style-type: none"> • An access management plan will be developed and implemented in consultation with Indigenous communities. 	<p>Secondary</p>
<p>Project components/activities that may influence traditional activities and cultural values during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> • Land clearing, site preparation and construction of facilities and infrastructure • Development of open pits and underground mines • Handling and storage of waste rock and mineralized material • Process plant and processing • Transportation of personnel and materials to and from site • Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) • Removal of infrastructure • Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> • Involvement in Project activities by Indigenous people and associated changes in social and economic factors can affect participation in traditional activities and cultural values and practices. 	<ul style="list-style-type: none"> • The Socio-economic Management Plan will be developed and implemented. • Workplace policies will be implemented to provide an effective working environment for Indigenous people. • Project employees and contractors will participate in cultural awareness training. 	<p>Primary</p>

Table 13: Potential Pathways for Effects to Traditional Land and Resource Use

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
Accidents and Malfunctions	<ul style="list-style-type: none"> Chemical or hazardous materials spills on site or during transport offsite can affect actual or perceive changes in water, fish, plants, and wildlife, which could affect participation in traditional activities and the consumption of traditional foods. 	<ul style="list-style-type: none"> The Spill Contingency Plan and Waste Management Plan will be implemented. Standard best management practices for general activities with regards to use, handling, and storage of deleterious substances will be followed. Hazardous waste will be stored in appropriate containers that will be located in a lined bermed containment pad, which will provide secondary containment of spills. No fuels, oils, or other hazardous substances will be stored within 150 m of waterbodies. No equipment maintenance or refuelling will be conducted within 150 m of waterbodies. The tailings transport pipeline will have drainage points and spill containment areas located along the route. Vehicles and equipment will be regularly maintained. Spill kits will be available at various locations throughout the site and will be maintained in good working order. Hazardous waste will be transported to a licensed hazardous waste receiving facility for disposal. Fuel and hazardous materials will be transported in approved containers in licensed vehicles. If a major spill occurs, the cleanup, treatment, and disposal of the contaminated waste and soil will be handled and disposed of using approved methods. Speed limits will be enforced. Ongoing consultation and communication of the results of monitoring plans and programs will occur with Indigenous communities. Ongoing consultation with Indigenous communities will occur on the implementation of appropriate mitigation measures and their effectiveness. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> A wildfire started by Project activities may result in loss of traditional land use. 	<ul style="list-style-type: none"> A Wildfire Prevention and Preparedness Plan will be developed and implemented. All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. Firefighting training will be provided to on-site personnel (as deemed appropriate). No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. Safety management systems (e.g., hot work permits) will be implemented. Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented. 	No pathway
Accidents and Malfunctions	<ul style="list-style-type: none"> Failure of storm water management features (culverts, roadside ditches) following a severe rainfall event can influence surface water levels, flows and drainage areas, which can affect ecological services (e.g., water quality, fish, wildlife) and traditional land and resource use. 	<ul style="list-style-type: none"> Storm water features will be designed to carry/contain a suitable return rainfall event as well as provide sufficient erosion protection during those events. Routine inspections and maintenance of storm water management system will be conducted. 	No pathway

Table 14: Potential Pathways for Effects on Population Demographics

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
Project components/activities that contribute to employment and contracting during construction and operation: <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> The Project could induce in-migration to the NWT from southern communities. 	<ul style="list-style-type: none"> Local labour in local study area (LSA) communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through Impact Benefit Agreements (IBAs) or other agreements. A worker accommodation camp will be maintained as travelling from the site after a shift is a safety concern. 	No pathway
	<ul style="list-style-type: none"> The Project could induce out-migration from small LSA communities to Yellowknife. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Hiring priorities will be communicated to LSA communities. 	Primary
	<ul style="list-style-type: none"> The Project could induce migration from small LSA communities to Hay River or Fort Resolution. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Hiring priorities will be communicated to LSA communities. 	Primary
	<ul style="list-style-type: none"> The Project could induce out-migration from the NWT to southern communities if travel allowances or pickup points are provided for southern employees. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. 	Primary
	<ul style="list-style-type: none"> Uptake of northern labour from other mines as they close during Project operations could offset outmigration of skilled northern labour seeking mining employment. 	<ul style="list-style-type: none"> Other Northern labour will be included as a second priority for hiring after local labour from LSA communities. Yellowknife will be maintained as a pick-up point community to provide a transportation hub for other Northern workers coming from the North Slave Region. Communication will occur with other mining operators in the NWT to understand their closure schedules, and opportunities for workforce transition to the Project where possible and following prioritization of local labour from LSA communities. 	Primary

Table 14: Potential Pathways for Effects on Population Demographics

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
-------------------------------	-----------------	--	--------------------

Table 15: Potential Pathways for Effects on Economic Development and Government Revenues

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
Project components/activities that contribute to the Project expenditures during construction and operation: <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) 	<ul style="list-style-type: none"> Capital expenditures would add to the economic activity in the NWT, including investment. 	<ul style="list-style-type: none"> Strategies that increase capacity of local businesses will be used to supply the Project with goods and services. 	Primary
Project components/activities that contribute to spending on goods and services during construction and operation: <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project activities will contribute to territorial economic activity and Gross Domestic Product (GDP). 	<ul style="list-style-type: none"> None required. 	Primary
Project components/activities that contribute to employment and contracting during construction and operation: <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project-induced in-migration to the NWT from southern communities could increase consumer prices and result in inflation of consumer goods. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Other Northern labour will be included as a second priority for hiring after local labour from LSA communities. Yellowknife will be maintained as a pick-up point community to provide a transportation hub for other Northern workers coming from the North Slave Region. Communication will occur with other mining operators in the NWT to understand their closure schedules, and opportunities for workforce transition to the Project where possible and following prioritization of local labour from LSA communities. 	No pathway
	<ul style="list-style-type: none"> Project activities will influence forthcoming economic shocks associated with other mine closures in the NWT. 	<ul style="list-style-type: none"> Other Northern labour will be included as a second priority for hiring after local labour from LSA communities. Yellowknife will be maintained as a pick-up point community to provide a transportation hub for other Northern workers coming from the North Slave Region. Communication will occur with other mining operators in the NWT to understand their closure schedules, and opportunities for workforce transition to the Project where possible and following prioritization of local labour from LSA communities. 	Primary
Project activities that result in community investment: <ul style="list-style-type: none"> Implementation of community investment strategy Development of Impact Benefit Agreements 	<ul style="list-style-type: none"> Project activities will yield Impact Benefit Agreements (IBA) with some local communities, and community investment securing local benefits. 	<ul style="list-style-type: none"> None required. 	Primary
Project components/activities that contribute to territorial and federal revenues during construction and operation: <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services. 	<ul style="list-style-type: none"> Project activities will generate income taxes, corporate taxes, property taxes and other government revenues. 	<ul style="list-style-type: none"> None required. 	Primary

Table 14: Potential Pathways for Effects on Population Demographics

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
<p>Project activities during closure and reclamation:</p> <ul style="list-style-type: none"> Removal of infrastructure Restoration and revegetation of facilities and infrastructure Cessation of Impact Benefit Agreements 	<ul style="list-style-type: none"> Project closure and reclamation will bring an end to many of the positive economic effects associated with employment, incomes, taxes, and economic contributions to the territory. At the same time, adverse social effects are unlikely to dissipate with closure, and out-migration is a possibility. 	<ul style="list-style-type: none"> A conceptual socio-economic closure framework will be developed in early stages of the Project, with action plans and meetings with stakeholders delivered annually, in order to facilitate social transition. Economic development planning will be supported that emphasizes diversification. Local businesses will be worked with to expand their capacity to serve broader industries during construction and operations. Liaison will occur with communities, governments, workers and contractors regarding retrenchment opportunities and economic transition planning. Benefit recipients (e.g., IBAs, community investment) and contractors will be worked with to encourage the investment of community contributions and capital in sustainable initiatives that better life in communities. 	Primary

Table 16: Potential Pathways for Effects on Employment and Education

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
<p>Project components/activities that contribute to employment and contracting during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Workforce requirements will generate direct local employment opportunities and associated incomes. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Other Northern labour will be included as a second priority for hiring after local labour from LSA communities. Yellowknife will be maintained as a pick-up point community to provide a transportation hub for other Northern workers coming from the North Slave Region. Communication will occur with other mining operators in the NWT to understand their closure schedules, and opportunities for workforce transition to the Project where possible and following prioritization of local labour from LSA communities. 	Primary
<p>Project components/activities that contribute to employment and contracting during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Procurement and hiring for the Project will result in indirect and induced employment in supplier industries and from worker spending. 	<ul style="list-style-type: none"> None required. 	Primary
<p>Project components/activities that contribute to employment and contracting during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project employment opportunities will generate incomes, contributing to the overall labour income in communities and the NWT. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Other Northern labour will be included as a second priority for hiring after local labour from LSA communities. Yellowknife will be maintained as a pick-up point community to provide a transportation hub for other Northern workers coming from the North Slave Region. Communication will occur with other mining operators in the NWT to understand their closure schedules, and opportunities for workforce transition to the Project where possible and following prioritization of local labour from LSA communities. 	Primary
<p>Project components/activities that contribute to employment and contracting during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Procurement of materials, goods and services will affect local and regional business revenues. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Procurement strategies will be maintained that create accessible opportunities for smaller local businesses (e.g., breaking up construction bids into smaller opportunities, maintain a list of local businesses and capacity). The local business community will be worked with to identify ways to expand their capacity to meet the needs of the Project. 	Primary

Table 16: Potential Pathways for Effects on Employment and Education

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
<p>Project components/activities that contribute to demand for a trained workforce during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project employment educational requirements could increase training and education uptake amongst the prospective workforce. 	<ul style="list-style-type: none"> Training opportunities will be provided. Local education authorities will be worked with to communicate the need for education in the pursuit of mining employment. Efforts will be supported to upgrade education. Career information will be provided. Priority hiring and contracting for Northerners and Northern Indigenous candidates will be maintained. 	<p>Primary</p>
<p>Project components/activities that could result in training opportunities during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project training will continue to build capacity in the labour force, thereby strengthening the NWT population's ability to participate in the labour force. 	<ul style="list-style-type: none"> Training opportunities will be provided. Local education authorities will be worked with to communicate the need for education in the pursuit of mining employment and positions needed by mining companies. Efforts to upgrade education will be supported. Career information will be provided. Priority hiring and contracting for Northerners and Northern Indigenous candidates will be maintained. 	<p>Primary</p>
<p>Project components/activities that contribute to employment and associated in-migration during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> In-migration of families to Yellowknife, Hay River, and Fort Resolution could lead to increased number of children of school-age, leading to higher enrolment and larger class sizes. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Hiring priorities will be communicated to LSA communities. 	<p>Primary</p>
<p>Project components/activities that contribute to employment and associated in-migration during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Teacher retention could be affected if substantial in-migration increases the cost of living in communities. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Hiring priorities will be communicated to LSA communities. 	<p>Primary</p>
<p>Project activities during closure and reclamation:</p> <ul style="list-style-type: none"> Removal of infrastructure Restoration and revegetation of facilities and infrastructure Cessation of Impact Benefit Agreements 	<ul style="list-style-type: none"> Project closure and reclamation will bring an end to associated employment and incomes. 	<ul style="list-style-type: none"> A conceptual socio-economic closure framework will be developed in early stages of the Project, with action plans and meetings with stakeholders delivered annually to facilitate social transition. Economic development planning will be supported that emphasizes diversification. Local businesses will be worked with to expand their capacity to serve broader industries during construction and operations. Liaison will occur with communities, governments, workers, and contractors regarding retrenchment opportunities and economic transition planning. Benefit recipients (e.g., IBAs, community investment) and contractors will be worked with to encourage the investment of community contributions and capital in sustainable initiatives that better life in communities. 	<p>Primary</p>

Table 17: Potential Pathways for Effects on Health and Well-being

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
<p>Project components/activities that contribute to employment and associated health and safety training during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project health and safety training (e.g., defensive driving, first aid) will improve safety awareness, prevent injuries and provide skills for treatment of minor injuries. 	<ul style="list-style-type: none"> None required. 	Primary
<p>Project components/activities that contribute to employment and associated access to healthcare and counselling services during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project medical and counselling services could improve access to healthcare services and improve health seeking behaviors of employees and their families. 	<ul style="list-style-type: none"> None required. 	Primary
<p>Project components/activities that contribute to employment and contracting during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Preferential hiring of Indigenous candidates and women will build capacity in these groups, and provide employment, thereby potentially reducing their vulnerability to poverty. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Recruitment strategies will be developed that target these groups and put in place communication strategies to communicate opportunities specifically to women and Indigenous candidates. 	Primary
<p>Project components/activities that contribute to employment and contracting, and associated increased incomes during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Employment income will contribute to income disparity between employee families and families not benefiting from employment, and between communities. 	<ul style="list-style-type: none"> Additional discussion with communities is required to develop effective and appropriate mitigation. 	Primary
	<ul style="list-style-type: none"> The Project may contribute to social maladies similar to those evident in monitoring data in other mining-affected regions, including a linkage between mining and increased use of drugs and alcohol in communities, and concerns associated with interaction between work camps and nearby communities. 	<ul style="list-style-type: none"> Zero tolerance policies will be in place regarding the use of drugs and alcohol while on shift or in transit. A worker code of conduct will be developed and enforced. Access to an Employee and Family Assistance Program (EFAP) will be provided. Additional discussion with communities is required to develop effective and appropriate mitigation. 	Primary
	<ul style="list-style-type: none"> The Project may indirectly contribute to social ills such as family violence and crime associated with increased use of drugs and alcohol made increasingly accessible through incomes and growth in illegal markets 	<ul style="list-style-type: none"> Additional discussion with communities is required to develop effective and appropriate mitigation. 	Primary
<p>Project components/activities that require rotational employment during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> The requirement for construction and operations workers to stay in camps while on rotation can influence family conflict as workers are removed from the home for extend periods of time. 	<ul style="list-style-type: none"> The Project will use several different rotations to meet operational needs. Engagement with communities will continue to determine effective and proactive management of social impacts. 	Primary
	<ul style="list-style-type: none"> The requirement for construction and operations workers to stay in camps while on rotation reduces time for volunteering and participation in other community activities. 	<ul style="list-style-type: none"> The Project will use several different rotations to meet operational needs. Engagement with communities will continue to determine effective and proactive management of social impacts. 	Primary

Table 17: Potential Pathways for Effects on Health and Well-being

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
Project components/activities that require specialized labour from outside the NWT during construction and operation: <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> The use of both local and out-of-area personnel during construction could result in workplace or cross-cultural conflict, and concerns regarding public health risks (e.g., COVID-19) 	<ul style="list-style-type: none"> Cultural awareness training will be provided and an environment of respect will be cultivated. Workplace policies regarding worker codes of conduct and harassment will be maintained. Elder counselling opportunities for Indigenous staff will be maintained. 	Primary
Project components/activities that contribute to employment and contracting during construction and operation: <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Employment incomes can increase access to equipment and materials required to participate in traditional and recreational activities. 	<ul style="list-style-type: none"> None required. 	Primary
	<ul style="list-style-type: none"> Employment incomes can increase access to nutritious foods, and can be used to support the nutritional needs of families. 	<ul style="list-style-type: none"> None required. 	Primary

Table 18: Potential Pathways for Effects on Housing, Services, and Infrastructure

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
Project components/activities that contribute to employment and contracting during construction and operation: <ul style="list-style-type: none"> Land clearing, site preparation, and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project-induced in-migration to Yellowknife, Hay River and Fort Resolution could increase demand for housing at a level that could push beyond current stock and drive up prices. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Hiring priorities will be communicated to LSA communities. 	Primary
	<ul style="list-style-type: none"> Project workforce housing requirements could increase demand on the rental housing market in Yellowknife, Hay River and Fort Resolution. 	<ul style="list-style-type: none"> Workers, including those from outside the NWT, will be housed in full-service construction and operations camps. 	No pathway
	<ul style="list-style-type: none"> The Project's out-of-area workforce could increase demand for health, social, and protective services. 	<ul style="list-style-type: none"> A first responder medical station will be provided at the accommodation camp facilities to meet workers' medical needs while at site, to limit the demand for governmental health facilities for work related injuries. Pre-employment medical exams will be conducted in hometown. First aid training will be provided. Driver training will be provided and a driver code of conduct will be enforced, to control speeds and encourage considerate driving. Zero tolerance policies will be in place regarding the use of drugs and alcohol while on shift or in transit. A worker code of conduct will be developed and enforced. Access to an Employee and Family Assistance Program (EFAP) will be provided such that private fee for service organizations are used and the public or non-profit sector does not see an increase in demand. 	No pathway
	<ul style="list-style-type: none"> Project-induced in-migration to Yellowknife, Hay River and Fort Resolution may increase demand on health, social, and protective services. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Hiring strategies to LSA communities will be communicated to dispel the idea that they must be in the closest communities to secure employment. A first responder medical station will be provided at the accommodation camp facilities to meet workers' medical needs while at site, to limit the demand for governmental health facilities for work related injuries. First aid training will be provided. Driver training will be provided and a driver code of conduct will be enforced, to control speeds and encourage considerate driving. Zero tolerance policies will be in place regarding the use of drugs and alcohol while on shift or in transit. A worker code of conduct will be developed and enforced. Access to an Employee and Family Assistance Program (EFAP) will be provided. 	Primary

Table 18: Potential Pathways for Effects on Housing, Services, and Infrastructure

Project Components/Activities	Effects Pathway	Proposed Environmental Design Features, Mitigation, and Benefit Enhancement Measures for Discussion and Elaboration with Communities	Pathway Assessment
Transportation of personnel and materials to and from site during construction and operations	<ul style="list-style-type: none"> The transportation of materials, goods, and the workforce during construction and operations will result in increased traffic and access restrictions on roads used to access the Project-related roads and staging areas. 	<ul style="list-style-type: none"> Liaison will occur with other industrial road users (e.g., NWT Power) and GNWT Transportation regarding transportation schedules on Highway 6 and associated access roads. 	Primary
	<ul style="list-style-type: none"> Increased Project traffic on roads shared with other users introduces greater risk of collisions. 	<ul style="list-style-type: none"> Driver training will be provided and a driver code of conduct will be enforced, to control speeds and encourage considerate driving. Liaison will occur with other industrial road users (e.g., NWT Power) and GNWT Transportation regarding transportation schedules on Highway 6 and associated access roads. 	Primary
	<ul style="list-style-type: none"> The Project's use of air and water transportation for materials, goods, and out-of-area workers during construction and operations will place additional demand on air and shipping transportation services. 	<ul style="list-style-type: none"> Liaison will occur with air and shipping service providers to ensure capacity is available to move goods, equipment, and personnel. Service agreements will be established with providers in advance, and make them aware of shipping and air transportation requirements. 	No pathway
<p>Project components/activities that require power during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project construction and operations will generate demand for power and place pressure on the power supply system. 	<ul style="list-style-type: none"> Arrangements will be made with NWT Power to provide services to some extent in a manner that does not jeopardize the electricity security for other users. Diesel generators will be used as required to offset surplus and emergency demand for electricity extra to that provided by the NWT Power grid. 	No pathway
<p>Project components/activities that generate waste during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> The Project will generate solid waste requiring disposal, thereby potentially affecting capacity of waste management services infrastructure. 	<ul style="list-style-type: none"> The Waste Management Plan will be implemented. Waste management agreements will be established with service providers capable of handling solid and hazardous waste. Inert waste may be disposed in an onsite landfill. Organic waste from the camp may be incinerated on site. 	No pathway
<p>Project components/activities that contribute to employment and contracting during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project-induced in-migration to Yellowknife, Hay River and Fort Resolution could increase demand for waste management infrastructure beyond capacity. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Hiring priorities will be communicated to LSA communities. 	No pathway
<p>Project activities that contribute to use of potable water during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project will increase demand for potable water and wastewater treatment and disposal. 	<ul style="list-style-type: none"> Water will be drawn from an appropriate potable source. Wastewater management agreements will be established with service providers capable of effectively collecting, transporting, and treating wastewater. 	No pathway
<p>Project components/activities that contribute to employment and contracting during construction and operation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Food, housekeeping, maintenance, and environmental monitoring services 	<ul style="list-style-type: none"> Project-induced in-migration to Yellowknife, Hay River and Fort Resolution could increase demand for water and wastewater treatment and disposal infrastructure. 	<ul style="list-style-type: none"> Local labour in LSA communities will be prioritized for employment and local businesses for contracting opportunities. Communities will be prioritized for hiring through IBAs or other agreements. Hiring priorities will be communicated to LSA communities. 	Primary

Table 19: Potential Pathways for Effects to Non-Traditional Land and Resource Use

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to the Project footprint and final landscape conditions during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> • Land clearing, site preparation and construction of facilities and infrastructure • Development of open pits and underground mines • Handling and storage of waste rock and mineralized material • Water withdrawals for potable and process water use • Process plant • Tailings disposal and management • Installation of cross drainage structures and diffuser for mine water discharge • Mine water discharge • Site traffic • Transportation of personnel and materials to and from site • Power generation • Non-hazardous waste incineration • Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) • Cessation of site water management activities, including mine water discharge • Reconnection of closure drainages to the local surface water environment • Removal of infrastructure • Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> • Presence of Project infrastructure will restrict access and reduce area available for non-traditional land and resource users. • Residual landscape disturbance from Project facilities and activities can permanently alter the landscape and change non-traditional land and resource use in the area. 	<ul style="list-style-type: none"> • The Project disturbance footprint will be limited to the extent practical. Where possible and practical, infrastructure will be built on previously disturbed sites. • Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. • Roads will be designed to the minimum allowable possible width and follow best practices for design speeds and expected vehicle traffic. • A pipe bench will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to the extent practical to minimize the Project footprint. • Construction of the Project will be planned to avoid environmentally sensitive areas (e.g., listed plants and wetlands) to the extent practical. • Clearing equipment will be used that minimizes surface disturbance, soil compaction, and topsoil loss (e.g., equipment with low ground pressure tracks or tires, blade shoes and brush) where feasible. • Steepness and length of slopes of disturbed areas and stockpiled soils will be limited. • Work will be avoided in sensitive areas during the time-of-year when erosion is more likely (e.g., spring freshet). • Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. • An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and fugitive dust and adaptive management based on ambient air quality standards • The Waste Management Plan will be implemented. • The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, and includes that applies adaptive management, if required. • An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. • The Wildlife Protection Plan will be implemented. • The Closure and Reclamation Plan will be implemented. • Engagement will occur with guides, outfitters, lodges, and other land and resource users. 	<p>Primary</p> <p>Primary</p>

Table 19: Potential Pathways for Effects to Non-Traditional Land and Resource Use

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that alter surface water quantity and quality and contribute to the Project footprint, air and dust emissions and deposition, sensory disturbance (e.g., noise, lights, vibrations), and presence of workforce during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Water withdrawals for potable and process water use Process plant and processing Tailings disposal and management Installation of cross drainage structures and diffuser for mine water discharge Mine water discharge Site traffic Transportation of personnel and materials to and from site Power generation Non-hazardous waste incineration Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Cessation of site water management activities, including mine water discharge Reconnection of closure drainages to the local surface water environment Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Project footprint and activities may lead to changes in the abundance and distribution of fish, vegetation ecosystems, and wildlife and the availability or suitability of resources for outfitted and recreational hunting and angling, camping, or lodge experiences. 	<ul style="list-style-type: none"> Mitigations that avoid and limit effects to water quantity (Table 5) and quality (Table 6), fish (Table 7), vegetation (Table 9), and wildlife (Table 11); examples include: <ul style="list-style-type: none"> The Project disturbance footprint will be limited to the extent practical. Where possible and practical, infrastructure will be built on previously disturbed sites. Areas of vegetation clearing and soil disturbance will be limited to the immediate area of the future activity at that location. The road alignment will minimize stream crossings and alterations to existing drainage patterns. Existing roads and trails will be used where possible. The Water Management Plan, Tailings and Waste Rock Management Plan, and Erosion and Sediment Control Plan will be implemented, and includes that applies adaptive management, if required. Water that interacts with the site footprint, waste rock, and tailings management areas will be captured and managed. Process water will be recirculated and water from tailings disposal areas will be recovered for recycling. Studies will be undertaken to evaluate the suitability of multiple locations as tailings disposal sites and to select locations that will avoid and minimize risk of potential environmental effects. An Aquatic Effects Monitoring Program (AEMP) and Surveillance Network Program (SNP) will be developed and implemented to monitor effects of the mine on the aquatic receiving environment. Adaptive management actions as per an aquatic response framework within the AEMP will be enabled if necessary. Water crossing structures and water intakes will be constructed and installed in a manner that protects the banks from erosion and maintains the flows in the water body and follows permits or authorizations issued for the Project from the appropriate regulatory agencies and DFO's <i>Measures to Protect Fish and Fish Habitat</i>. The water intake(s) will be screened to prevent entrainment or impingement of fish. The pumped mine water discharge will be directed through a properly designed diffuser to minimize effects from changes in velocity. The diffuser will be located to avoid sensitive fish habitat (e.g., shoals, spawning areas). Blasting operations will follow DFO's <i>Measures to Protect Fish and Fish Habitat and Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters</i> (Wright and Hopky 1998) for setback distances from fish bearing water bodies. The Wildlife Protection Plan will be implemented. Speed limits and signage will be established on all roads to limit risk of vehicle-animal collisions. Wildlife will be provided with the right of way. Procedures to reduce noise, dust, and light levels will be implemented such as: <ul style="list-style-type: none"> Noisy equipment will be enclosed in buildings, where feasible. Internal combustion engines will be outfitted with well-maintained muffler systems. Hydroelectric power will be used to supplement fossil fuel methods for power generation. Secondary (or backup) power generation will be mainly compressed natural gas (CNG) to minimize use of diesel. An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and fugitive dust and adaptive management based on ambient air quality standards. Water and/or dust suppressants will be applied to site roads as necessary. Crushers and conveyors will be covered. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. Engagement will occur with guides, outfitters, lodges, and other land and resource users. 	<p>Secondary or Primary²</p>

² The effects pathway related to changes in the availability or suitability of resources for outfitted and recreational hunting and angling, camping, or lodge experiences are expected to be secondary, but may be primary depending on the results of the residual effects analysis for wildlife, fish and fish habitat, and vegetation.

Table 19: Potential Pathways for Effects to Non-Traditional Land and Resource Use

Project Components/Activities	Effects Pathway	Environmental Design Features and Mitigation Measures	Pathway Assessment
<p>Project components/activities that contribute to sensory disturbance (e.g., presence of people, dust, lights, smells, sounds, and vibrations) during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Land clearing, site preparation and construction of facilities and infrastructure Development of open pits and underground mines Handling and storage of waste rock and mineralized material Process plant and processing Site traffic Transportation of personnel and materials to and from site Power generation Additional infrastructure (e.g., roads, camp, maintenance shop, and offices) Removal of infrastructure Restoration and revegetation of facilities and infrastructure 	<ul style="list-style-type: none"> Sensory disturbances can influence outfitted and recreational hunting and angling, camping, or lodge experiences in the vicinity of the Project. 	<ul style="list-style-type: none"> An Air Quality Effects Mitigation and Monitoring Plan will be developed and implemented that includes ambient air monitoring for criteria air contaminants and fugitive dust and adaptive management based on ambient air quality standards. Procurement criteria will be developed to ensure stationary and mobile engines meet applicable performance standards, such as equipment that has the lowest practical and economically achievable nitrogen oxide emission rates. Ultra-low sulphur diesel (<15 ppm sulphur) will be used in all equipment to reduce ambient concentrations of nitrogen dioxide. Transportation of workers will be completed using large vehicles where possible to reduce the number of engines in use, thereby reducing vehicle combustion and fugitive emissions. Emissions control devices will be used and maintained on fossil-fuel based engines. Equipment will be regularly maintained. Idling of vehicles will be limited to the extent practical. Water and/or dust suppressants will be applied to site roads as necessary. Speed limits will be established and enforced on site roads to reduce dust production. Crushers and conveyors will be covered. Noisy equipment will be enclosed in buildings, where feasible. Internal combustion engines will be outfitted with well-maintained muffler systems. Power plant generator facilities will have louvers on ventilation openings and exhaust mufflers. Sound levels will be monitored, as per the noise management plan, and adaptive management applied if required. Progressive reclamation and revegetation will be implemented for areas disturbed by the Project that are no longer required. The Closure and Reclamation Plan will be implemented. Engagement will occur with guides, outfitters, lodges, and other land and resource users. 	<p>Primary</p>
<p>Project activities that change public access during construction, operation, and closure and reclamation:</p> <ul style="list-style-type: none"> Access restrictions on site roads and trails 	<ul style="list-style-type: none"> Access restrictions can affect the ability of people to participate in outfitted and recreational hunting and angling or camping in the vicinity of the Project. 	<ul style="list-style-type: none"> An access management plan will be developed and implemented in consultation with guides, outfitters, lodges, and other land and resource users. Engagement will occur with guides, outfitters, lodges, and other land and resource users. 	<p>Secondary</p>
<p>Accidents and Malfunctions</p>	<ul style="list-style-type: none"> Chemical or hazardous materials spills on site or during transport offsite can influence water, fish, and wildlife, which could affect availability or suitability of resources for outfitted and recreational hunting and fishing. 	<ul style="list-style-type: none"> The Spill Contingency Plan and Waste Management Plan will be implemented. Standard best management practices for general activities with regards to use, handling, and storage of deleterious substances will be followed. Hazardous waste will be stored in appropriate containers that will be located in a lined bermed containment pad, which will provide secondary containment of spills. No fuels, oils, or other hazardous substances will be stored within 150 m of waterbodies. No equipment maintenance or refuelling will be conducted within 150 m of waterbodies. The tailings transport pipeline will have drainage points and spill containment areas located along the route. Vehicles and equipment will be regularly maintained. Spill kits will be available at various locations throughout the site and will be maintained in good working order. Hazardous waste will be transported to a licensed hazardous waste receiving facility for disposal. Fuel and hazardous materials will be transported in approved containers in licensed vehicles. If a major spill occurs, the cleanup, treatment, and disposal of the contaminated waste and soil will be handled and disposed of using approved methods. Speed limits will be enforced. 	<p>No pathway</p>
<p>Accidents and Malfunctions</p>	<ul style="list-style-type: none"> A wildfire started by Project activities may result in loss of non-traditional land and resource use. 	<ul style="list-style-type: none"> A Wildfire Prevention and Preparedness Plan will be developed and implemented. All heavy equipment and fuelling sites will be equipped with approved and fully charged fire extinguishers. Firefighting training will be provided to on-site personnel (as deemed appropriate). No smoking will be allowed at equipment fuelling stations or outside of designated areas at all times. Safety management systems (e.g., hot work permits) will be implemented. Firebreaks and vegetation management (e.g., removal of understory fuel loads) will be implemented. 	<p>No pathway</p>
<p>Accidents and Malfunctions</p>	<ul style="list-style-type: none"> Failure of storm water management features (culverts, roadside ditches) following a severe rainfall event can influence surface water levels, flows and drainage areas, which can affect ecological services (e.g., water quality, fish, wildlife) and non-traditional land and resource use. 	<ul style="list-style-type: none"> Storm water features will be designed to carry/contain a suitable return rainfall event as well as provide sufficient erosion protection during those events. Routine inspections and maintenance of storm water management system will be conducted. 	<p>No pathway</p>

2.2.1.3 Effects of Extreme Events

2.2.1.3.1 Effects of the Environment on the Project

The EA Initiation Guidelines indicate that the description of potential Project interactions with the environment provided in the EA Initiation Package should include consideration of effects of the environment on the Project. Natural environment vulnerabilities and events that may interact with components of the biophysical and human environments include potential effects from climate change, extreme precipitation events, seasonal flooding and spring thaw patterns, changes in permafrost, natural fires, ice jams, and seismic events. Further details related to how effects from these potential sources will be assessed in the Developer's Assessment Report are provided in the Developer's Assessment Proposal (Volume 5).

2.2.1.3.2 Accidents and Malfunctions

The EA Initiation Guidelines indicate that the description of potential Project interactions with the environment provided in the EA Initiation Package should include consideration of potential accidents and malfunctions. Accidents and malfunctions are unplanned events caused by industrial or natural hazards, such as structural or operation failures. Accidents and malfunctions that could conceivably occur as a result of mining activity include small to large fuel spills, slope failures, failure of turbidity control systems, pipeline leaks or ruptures, erosion of roads connecting to water management components, and failure of pumps or overflow of sumps. Further details related to how effects from these potential sources will be assessed in the Developer's Assessment Report are provided in the Developer's Assessment Proposal (Volume 5). Accidents and malfunctions that may occur as part of normal Project operations (e.g., small scale spills) are identified in the tables in Sections 2.2.1.1 and 2.2.1.2.

3.0 IDENTIFICATION OF CUMULATIVE EFFECTS

Cumulative effects are those effects that result from a combination of a project with other past, present, and reasonably foreseeable future developments (MVEIRB 2004). Cumulative effects represent the sum of all natural and human induced influences on the physical, biological, social, cultural, and economic components of the environment through time and across space. Changes may be human-related, such as increasing mineral development and some changes may be associated with natural phenomena such as fire, insect outbreaks, floods, and climate change. It is the goal of cumulative effects assessment to predict the relative contribution of human-related influences on valued and intermediate components in context of natural factors.

Cumulative effects will be assessed in the Developers Assessment Report following the environmental assessment methods defined in the Developer's Assessment Proposal (Volume 5). Cumulative effects will be identified and evaluated in the context of the spatial and temporal boundaries defined for each biophysical or human environment component (Section 4.1.3.1 and 4.1.3.2 of Volume 5). The concept of assessment cases (Section 4.1.3.3 of Volume 5) will be applied to the associated component-specific environmental assessment boundaries to estimate the incremental and cumulative effects from the Project and other developments. Assessment cases will include a Base Case (existing environment), an Application Case, and a Reasonably Foreseeable Development (RFD) Case.

Each of the assessment cases included in the Developer's Assessment Report considers the potential for cumulative effects within the temporal and spatial boundaries of the assessment. The Base Case (i.e., the existing environment) includes consideration of cumulative effects from all previous, existing, and approved developments, activities, and natural disturbances that have occurred within the spatial and temporal boundaries of the assessment. For example, the brownfield nature of the historical Pine Point Mine will be considered on components of the biophysical or human environments in the Base Case. The Application Case will provide predictions of the cumulative effects of the developments in the Base Case combined with the effects from the Project, in isolation from potential future land-use activities or natural disturbances.

The RFD Case will consider the Application Case plus the cumulative effects from all previous, existing, approved, and future projects and activities. A summary of projects currently recommended to be considered in the RFD Case, and a list of criteria used for their selection, is provided in the Developer's Assessment Proposal (Volume 5). The list of projects will be finalized once the regional study areas (see Section 4.1.3 of Volume 5) defined for individual biophysical and human environment components are confirmed. Finalizing the regional study areas is important, as this is the spatial scale that is considered when evaluating cumulative effects from the Project and other previous, existing, and reasonably foreseeable developments.

The evaluation of cumulative effects in the RFD Case will focus on Project-interactions that have the potential to overlap spatially and temporally with similar types of effects from other existing, approved, or reasonably foreseeable developments. Only effect pathways that are predicted to result in a greater than negligible residual effect on a biophysical or human environment component (i.e., primary pathways) will be considered in the RFD Case. Cumulative effects are considered for secondary pathways; however, these pathways are predicted to result in a negligible residual effect on an environmental component and have no measurable contribution to effects from other existing, approved, or reasonably foreseeable projects to cause a significant effect. Natural environmental vulnerabilities and events, such as climate change, forest fires, and flooding may be also be considered in the RFD Case for individual components, where relevant.

Not all components or effect pathways will require an analysis of cumulative effects in the RFD Case. Confirmation of the regional study areas that will be used for each component is required to determine whether an RFD Case assessment may be needed. In addition, more detailed Project design information and the results of environmental modelling (e.g., groundwater, air quality surface water quantity, water quality) are needed to confirm whether Project activities will result in greater than negligible effects on environmental components, and thus, whether cumulative effects from other existing, approved, or reasonably foreseeable developments are possible.

Due to the considerations noted above, it is not possible at the current stage of planning for the Project to specifically identify the expected cumulative effects of the Project and other existing, approved, or reasonably foreseeable developments. However, in general, cumulative effects are more likely to occur in components that are more widely distributed, or that travel over large areas, and that consequently, could be influenced by a number of developments (e.g., caribou and socio-economics). In these instances, the analysis of cumulative effects can be necessary and important. For example, job creation associated with the Project and other existing, approved, or reasonably foreseeable developments has the potential result in a cumulative effect on employment conditions in the communities affected by the Project. For other components, there is little or no potential for cumulative effects in the RFD Case because there is little or no overlap with other projects (e.g., terrain and soils, heritage resources). For example, ground disturbance affecting soils and archeological sites would be limited to the footprint area of each project and there is no to little potential for multiple projects to result in cumulative effects.

Identification and analysis of cumulative effects will occur during the preparation of the Developer's Assessment Report. The approach will be based on the environmental assessment approach (e.g., spatial and temporal boundaries; list of reasonably foreseeable developments) described in the Developer's Assessment Proposal, while taking into account relevant feedback on the EA Initiation Package. This process will also consider findings from ongoing engagement, Indigenous Traditional Knowledge data collection, results from environmental modelling, and the updated Project Description.

Signature Page



Leah James, MSc
Aquatic Biologist



Kristine Mason, MSc
Principal, Fisheries Biologist



John Virgl, PhD
Principal, Senior Ecologist

LJ/KM/JV/vm/rd

4.0 REFERENCES

- BBOP (Business and Biodiversity Offset Programme) 2015. Mitigation Hierarchy. Accessed November 2018. Available at http://bbop.forest-trends.org/pages/mitigation_hierarchy
- DFO (Fisheries and Oceans Canada). 1995. Freshwater Intake End-of-Pipe Fish Screen Guideline. March 1995.
- DFO. 2013. Northwest Territories Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat. Available at <https://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/nwt-eng.html>
- DFO. 2019. Measures to Protect Fish and Fish Habitat. Available at: <https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html>
- DFO. 2020. Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater. Available at <https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html>
- ECCC (Environment and Climate Change Canada). 2018. General nesting periods of migratory birds in Canada. Accessed June 2019. Available at <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#toc0>.
- Ellis E. 1999. *Martes americana* (On-line), Animal Diversity Web. Accessed 8 May 2020. Available at https://animaldiversity.org/accounts/Martes_american/
- Environment Canada. 2013. Recovery strategy for the American marten (*Martes americana atrata*), Newfoundland population, in Canada. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa, 51 p.
- MVEIRB (Mackenzie Valley Environmental Impact Review Board). 2004. Mackenzie Valley Environmental Impact Review Board. Environmental Impact Assessment Guidelines.
- MVEIRB. 2018. Draft Environmental Assessment Initiation Guidelines for Developers of Major Projects. 48 p.
- Strickland MA, Douglas CW. 1987. Marten. In: B Malloch (ed) Wild Furbearer Management and Conservation in North America. Ontario Trappers Association, Ontario Ministry of Natural Resources, Toronto, Ontario, Canada, pp 531-546
- Wright DG, Hopky GE. 1998. Guidelines for the use of explosives in or near Canadian fisheries waters. Canadian technical report of fisheries and aquatic sciences 2107. DFO, Winnipeg, MB, Canada.



golder.com