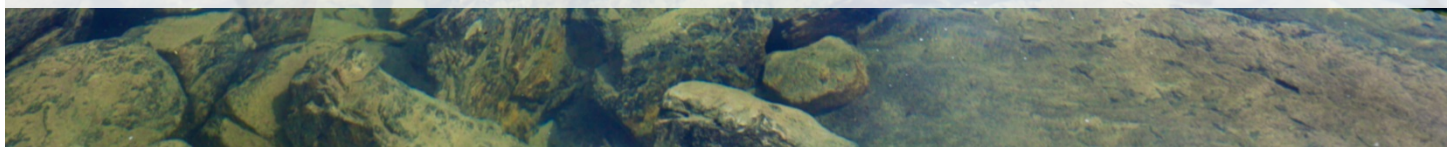




Red Mountain Underground Gold Project

Draft Environmental Assessment Report

September 2018



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Executive Summary

IDM Mining Ltd. (the proponent) proposes to construct, operate, and decommission an underground gold and silver mine located approximately 15 kilometres northeast of Stewart in northwestern British Columbia (B.C.). The Red Mountain Underground Gold Project (the Project) would include an underground mine, laydown areas, temporary waste rock storage area, temporary ore stockpiles, water management structures, tailings management facility, access and haul roads, and a powerline. The Project would have a year-round production rate of 1,000 tonnes per day or 365,000 tonnes per year over a mine life of six years. The Project is estimated to have an above ground disturbance footprint of 247 hectares.

The Canadian Environmental Assessment Agency (the Agency) is conducting an environmental assessment (EA) of the Project in accordance with the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The Project is subject to CEAA 2012 because it includes activities described in the *Regulations Designating Physical Activities*. Specifically, the Project would process up to 1,000 tonnes per day of gold ore, which exceeds the production capacity described in item 16(c) of the Schedule of the *Regulations Designating Physical Activities*.

The Project was also subject to an EA under B.C.'s *Environmental Assessment Act*, and subject to the EA requirements set out in Chapter 10 of the *Nisga'a Final Agreement*, a modern treaty between Canada, B.C., and the Nisga'a Nation. The federal and provincial governments coordinated activities and aligned Indigenous and public consultation to avoid duplication of effort.

The Draft EA Report summarizes the EA conducted by the Agency, including the information and analysis on the potential environmental effects of the Project considered by the Agency and the Agency's conclusion on whether the Project is likely to cause significant adverse environmental effects after taking into account the implementation of mitigation measures. The Agency prepared this report following a review of the proponent's Environmental Impact Statement (EIS) by the Agency, Fisheries and Oceans Canada, Environment and Climate Change Canada, Health Canada, Natural Resources Canada, Nisga'a Lisims Government (NLG), Tsetault/Skii km Lax Ha, Métis Nation B.C., and the public.

The EA focused on the following valued components as described in subsection 5(1) of CEAA 2012:

- Fish and fish habitat;
- Migratory birds;
- Current use of lands and resources for traditional purposes by Aboriginal peoples;
- Health and socio-economic conditions of Aboriginal peoples;
- Physical and cultural heritage and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance by Aboriginal peoples; and
- Transboundary effects – Greenhouse gas emissions.

The EA also considered the adverse effects of the Project on valued components as described in subsection 5(2) of CEAA 2012; and on wildlife species listed on Schedule 1 of the *Species at Risk Act* and their critical habitat. In addition, the EA considered environmental effects on the Nisga'a Nation and the effects of the Project on the existing and future economic, social and cultural well-being of Nisga'a citizens as set out in the *Nisga'a Final Agreement*

The Project's main environmental effects in relation to section 5 of CEAA 2012 include:

- Effects to fish and fish habitat from direct removal of habitat as a result of construction of the access and haul roads, changes to water chemistry, and changes to stream flows;
- Removal of habitat for migratory birds and terrestrial species at risk;
- Effects on Aboriginal peoples' health and socio economic conditions as a result of changes to air quality, surface water quality, and quality of traditional foods; and
- Effects on the use of lands and resources for hunting, fishing, gathering, and cultural practices by Aboriginal peoples.

The Agency has identified mitigation measures and follow-up program requirements for consideration by the Minister of Environment and Climate Change in establishing conditions as part of the Decision Statement under CEAA 2012. Conditions accepted by the Minister would become legally binding on the proponent if the Minister ultimately issues a Decision Statement indicating that the Project may proceed. Key mitigation measures to prevent or reduce adverse environmental effects include, but are not limited to:

- Collecting and treating effluent from the tailings management facility and contact water, as appropriate, prior to release into the environment;
- Identifying timing windows during which construction activities must be carried out to protect sensitive life stages for fish, migratory birds, species of importance to Indigenous groups, and listed species at risk;
- Providing access to the Bitter Creek valley to NLG, Tsetsault/Skii km Lax Ha, and Métis Nation B.C. through use of the access and haul roads, to the extent that access is safe; and
- Undertaking progressive reclamation of all areas disturbed by the Project

The Agency concludes that the Red Mountain Underground Gold Project is not likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures. In addition, the Agency concludes that the Project is not reasonably expected to have adverse environmental effects on Nisga'a Lands, Nisga'a Lands or Nisga'a interests as defined by paragraph 8(e) of the *Nisga'a Final Agreement*, and that the Project would result in both positive and negative effects on the existing and future economic, social and cultural well-being of Nisga'a citizens who may be affected by the Project as defined by paragraph 8(f) of the *Nisga'a Final Agreement*.

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List of Abbreviations and Acronyms

Abbreviation/Acronym	Definition
B.C.	British Columbia
CEAA 2012	<i>Canadian Environmental Assessment Act, 2012</i>
EA	environmental assessment
EIS	environmental impact statement
GHG	greenhouse gases
NLG	Nisga'a Lisims Government
the Agency	Canadian Environmental Assessment Agency
the Project	Red Mountain Underground Gold Project
the proponent	IDM Mining Ltd.
the Treaty	<i>Nisga'a Final Agreement</i>

1 Introduction

1.1 Purpose of the Environmental Assessment Report

IDM Mining Ltd. (the proponent) proposes to construct, operate, and decommission an underground gold and silver mine located approximately 15 kilometres northeast of Stewart in northwestern British Columbia (B.C.). The Red Mountain Underground Gold Project (the Project) would have a year-round production rate of 1,000 tonnes per day or 365,000 tonnes per year over a mine life of six years.

The Draft Environmental Assessment Report, prepared by the Canadian Environmental Assessment Agency (the Agency), is being made available for review and comment. Its purpose is to provide a summary of the information and analysis on the potential adverse environmental effects of the Project considered by the Agency in reaching it a conclusion on whether the Project is likely to cause significant adverse environmental effects, after taking into account the implementation of mitigation measures. The Draft Environmental Assessment Report also summarizes the Agency's assessment and conclusion regarding potential effects of the Project on Nisga'a Nation interests defined in the *Nisga'a Final Agreement*.

The Minister of Environment and Climate Change will consider the final Environmental Assessment Report in making a decision on whether the Project is likely to cause significant adverse environmental effects, following which the Minister will issue an Environmental Assessment Decision Statement, in accordance with the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The Minister will also issue a Project Recommendation under the *Nisga'a Final Agreement*.

1.2 Scope of Environmental Assessment

1.2.1 Environmental Assessment Requirements

Requirements of the Canadian Environmental Assessment Act, 2012

On September 28, 2015, based on the Project Description submitted by the proponent, the Agency initiated a screening of the designated project to determine if an environmental assessment (EA) was required under CEAA 2012. The Agency invited the public to provide comments on the designated Project and its potential environmental effects. The Project would process up to 1,000 tonnes per day of gold ore, which exceeds the production capacity described in item 16(c) of the Schedule of the *Regulations Designating Physical Activities*. On November 12, 2015, the Agency determined that an EA was required and commenced the EA on the same day.

Cooperative Environmental Assessment Requirements

The Project was also subject to an EA under B.C.'s *Environmental Assessment Act* (2002). The Agency and B.C.'s Environmental Assessment Office applied the principles of the *Canada-B.C. Agreement for Environmental Assessment Cooperation* (2004) to align Indigenous and public consultation, and avoid duplication of effort. This cooperative approach included a working group comprising federal and provincial officials, and Indigenous groups that informed the conduct of the EA.

Other Environmental Assessment Requirements

The Project is also subject to the EA requirements set out in Chapter 10 of the *Nisga'a Final Agreement*, a modern treaty between Canada, B.C., and the Nisga'a Nation. Canada considered whether the Project could reasonably be expected to have:

- Adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands or Nisga'a interests, as set out in Chapter 10, paragraph 8(e) of the Treaty; and
- Effects on the existing and future economic, social and cultural well-being of Nisga'a citizens who may be affected by the Project, as set out in Chapter 10, paragraph 8(f) of the Treaty.

1.2.2 Factors Considered in the Environmental Assessment

Pursuant to subsection 19(1) of CEAA 2012, the following factors were considered as part of the EA:

- The environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other physical activities that have been or will be carried out;
- The significance of the effects;
- Comments from the public;
- Mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
- The requirements of the follow-up program in respect of the Project;
- The purpose of the Project;
- Alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;
- Any change to the Project that may be caused by the environment; and
- Species listed under the *Species at Risk Act* or assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) that may be affected by the Project.

In undertaking the EA, in addition to considering public comments, the Agency considered comments from the Nisga'a Lisims Government (NLG), Indigenous groups, including Indigenous traditional knowledge.

1.2.3 Selection of Valued Components

Valued components are environmental and socio-economic features that may be affected by a project and that were identified to be of concern by the proponent, government agencies, Indigenous groups or the public. The proponent's valued components selection process considered the temporal and spatial scope of the Project and anticipated project-environment-human interactions. The valued components selected reflect existing knowledge about typical environmental effects of underground mining and potential environmental effects raised by the public, federal and provincial government agencies, NLG, and Indigenous groups.

In its analysis, the Agency focused on valued components pertaining to the prediction of environmental effects as defined in subsection 5(1) of CEAA 2012. The following decisions under federal jurisdiction may also be required for the Project:

- An authorization under section 35 of the *Fisheries Act* for serious harm to fish; and
- A permit under the *Explosives Act* for an explosives storage magazine and for explosives manufacture/mixing.

Changes to the environment that could result from these federal decisions were captured under the consideration of effects under subsection 5(1). As a result, a specific analysis of the environmental effects defined under subsection 5(2) of CEAA 2012 was not required.

The EA also considered the adverse effects of the Project on species listed under the *Species at Risk Act* and their critical habitats. Under subsection 79(2) of the *Species at Risk Act* where the Agency must identify the Project’s adverse effects on species listed on Schedule 1 of the *Species at Risk Act* and their critical habitats. If the Project proceeds, preventative measures must be taken in accordance with applicable recovery strategies and action plans to avoid or lessen those effects and to monitor them.

The valued components selected by the Agency to support the assessment of environmental effects under CEAA 2012 and the potential effects on species listed under Schedule 1 of the *Species At Risk Act* are outlined in Table 1.

Table 1 Valued Components Selected by the Agency

Valued Component	Rationale
Potential effects identified pursuant to subsection 5(1) of CEAA 2012	
Fish and fish habitat	Project infrastructure may be placed ovetop fish habitat and changes in water quality and stream flows may affect fish and result in the loss of fish habitat.
Migratory birds	Site clearing and changes in the noise and visual environment may disturb migratory birds resulting in mortality and changes in behaviour.
Current use of lands and resources for traditional purposes	Changes to the environment may restrict access or affect the availability and quality of resources for hunting, trapping, fishing, and gathering by local Indigenous peoples.
Physical and cultural heritage and historical, archaeological, paleontological or architectural sites or structures	Changes to the environment may directly disturb or prevent access or use to sites or structures of cultural importance to Indigenous peoples.
Health and socio-economic conditions of Indigenous peoples	Changes to the atmospheric, aquatic, and terrestrial environment may affect human health due to changes in water quality or country foods, or result in changes to socio-economic conditions.
Transboundary environment – greenhouse gas emissions	Emissions of greenhouse gases may contribute to atmospheric greenhouse gas levels and climate change.
Potential effects identified pursuant to subsection 79(2) of the <i>Species at Risk Act</i>	
Species at risk	Site clearing and changes in the noise and visual environment may result in disturbance to and loss of habitat used by wildlife species at risk.

1.2.4 Spatial and Temporal Boundaries

Spatial and temporal boundaries of an EA are established to define the area and timeframe within which a project may interact with the environment and cause environmental effects. The spatial and temporal

boundaries may vary among valued components depending on the nature of the project's interaction with the environment.

The proponent defined spatial boundaries as the geographic range over which the Project's potential environmental effects may occur. Local study areas were generally used to measure baseline environmental conditions and to assess effects on each valued component. Regional study areas were used to measure baseline conditions at a larger scale to assess the maximum predicted geographic extent of effects on each valued component and for the assessment for cumulative effects. Table 2 summarizes the valued components selected by the Agency and the applicable spatial boundaries (i.e. local study areas and regional study areas) identified by the proponent.

The proponent defined temporal boundaries based on the timing and duration of Project activities that could cause environmental effects. The purpose of the temporal boundaries is to identify when an effect may occur in relation to specific project phases and activities. In general, temporal boundaries for this assessment mirror the phases of the Project: construction (18 months), operation (6 years), decommissioning and closure (5 years), and post-closure (10 years).

Table 2 Spatial Boundaries for Valued Components as Described by the Proponent

Valued Component	Local Study Area	Regional Study Area
Fish and fish habitat	The local study area includes the Bitter Creek watershed up to Bromley Glacier.	The regional study area surrounds the local study area and includes portions of the Bear River watershed, from American Creek to Stewart and to the northern end of the Portland Canal.
Migratory birds	The local study area is a 15,877 hectare area extending from the mouth of Bitter Creek to the edge of the Bromley Glacier and Cambria Icefield.	The regional study area is a 205,350 hectare area extending from Meziadin Lake in the east to the Portland Canal in the west, Hastings arm in the south, and the upper end of the American Creek watershed to the north.
Current use of lands and resources for traditional purposes	The local study area is an approximately 50 kilometre buffer around the Project, and is adjusted (extended and reduced) to align with the northern extent of the Tsetsaut/Skii km Lax Ha's traditional territory boundary, and reduced to the Canada – United States border where the buffer extends into the United States.	Regional District of Kitimat-Stikine and is adjusted to align with the northern extent of the Tsetsaut/Skii km Lax Ha's traditional territory boundary.
Physical and cultural heritage and historical, archaeological, paleontological or architectural sites or structures	The local study area includes the Project infrastructure in combination with a with a 30 metre buffer around Project infrastructure.	Not applicable as the proponent did not identify any potential cumulative effects.
Health and socio-economic conditions of Indigenous peoples	The local study area is a 50 kilometre buffer around the Project and aligned to the Canada – United States border where the 50 kilometre buffer extended into the United States.	Not applicable as the regional study area is the Regional District of Kitimat-Stikine, which includes Terrace.
Transboundary environment – greenhouse gas emissions	Not applicable as the proponent did not select greenhouse gas emissions as a valued component.	Not applicable as the proponent did not select greenhouse gas emissions as a valued component.
Species at risk	The local study area is a 15,877 hectare area extending from the mouth of Bitter Creek to the edge of the Bromley Glacier and Cambria Icefield.	The regional study area is a 205,350 hectare area extending from Meziadin Lake in the east to the Portland Canal in the west, Hastings arm in the south, and the upper end of the American Creek watershed to the north.

1.2.5 Methods and Approach

The Agency reviewed various sources of information in conducting its analysis, including:

- The Environmental Impact Statement (EIS) submitted by the proponent;
- Additional information submitted by the proponent at the Agency's request during the review of the EIS;

- Advice from expert departments and agencies; and
- Comments received from NLG, Indigenous groups, and the public.

The Agency's conclusion on whether the Project is likely to cause significant adverse environmental effects are presented using the methodology prescribed in the Agency's *Operational Policy Statement on Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the Canadian Environmental Assessment Act, 2012* which includes the following criteria:

- Magnitude refers to the amount of change to baseline conditions or other standards, guidelines, or objectives;
- Geographic extent refers to the spatial area over which the environmental effect is predicted to occur;
- Timing describes whether the effect extends to sensitive periods (e.g. species breeding season, or Indigenous spiritual and cultural practices);
- Duration refers to the length of time that an effect would occur;
- Frequency describes how often the effect would occur within a given time period; and
- Reversibility is the degree to which a valued component would be able to return to its original state (prior to the environmental effect) over the life of the Project.

The significance of any residual effects (after mitigation measures are implemented) on the selected valued components were assessed using the criteria listed below. The ecological and social context is taken into account when considering these criteria in relation to a particular valued component.

The significance of each residual environmental effect was then determined based on pre-defined significance rating criteria (e.g. standards or thresholds) (Appendix A). Appendix B summarizes the residual effects assessment for all valued components in relation to anticipated activities over the life cycle of the Project. The analysis of the potential environmental effects of accidents and malfunctions is set out in Section 7.1.

The Agency's analysis and conclusion on the significance of environmental effects on valued components are presented in Section 6 (Predicted Effects on Valued Components).

The Agency considers effects to be "significant" where the residual effects after mitigation measures have been implemented would be high in magnitude, and long-term. The frequency of an impact is also considered when determining its significance on a valued component and, depending on the severity of the impact, can range from a single occurrence to continuous. The degree of the residual effect was determined after taking into account key mitigation measures considered necessary by the Agency (Appendix C) and the mitigation measures considered by the proponent (Appendix D).

2 Project Overview

2.1 Project Location

The Project would be located approximately 15 kilometres northeast of Stewart in northwestern B.C. (Figure 1). The Project is an underground gold and silver mine with two main areas of infrastructure: the mine site area (Figure 2) with portals located at the upper elevation of Red Mountain, and the Bromley Humps area (Figure 3) in the Bitter Creek valley where the process plant and tailings management facility would be located. A haul road would connect the mine site to Bromley Humps, and an access road would connect Bromley Humps to Highway 37A in Stewart.

The Project would be located on provincial Crown land within the Regional District of Kitimat-Stikine, and within the Nass Area and Nass Wildlife Area as set out in the *Nisga'a Final Agreement*. It is also located within an area where Tsetsaut/Skii km Lax Ha and Métis Nation B.C. assert Aboriginal rights.

2.2 Project Components

The Project consists of the following components at the mine site, Bromley Humps, and off site.

Mine site (17 hectare disturbance area)

Portals: The Project would include an upper portal, a lower portal, and a ventilation portal. The upper and lower portals would provide access to the tunnels of the underground mine. The upper portal would be an existing exploration portal located at 1,860 metres above sea level, and the lower portal would be located at 1,720 metres above sea level. A smaller ventilation portal would be located adjacent to the upper portal at 1,870 metres above sea level.

Laydown area: The mine site would have a laydown area for storage of materials and supplies (e.g. construction materials).

Waste rock storage area: A temporary waste rock storage area would be located at the existing historical waste rock storage area near the upper portal. The existing site has 90,000 tonnes of waste rock and an additional 52,000 tonnes of waste rock which may be temporarily stored at surface.

Temporary ore stockpiles: For the first 1.5 years of operation, the ore stockpile would be located outside the upper portal. For the remainder of mine operation, the ore stockpile would be located outside the lower portal. The stockpile at either location would contain ore for up to six days of production (up to 6,000 tonnes) at any one time. Ore from the temporary stockpiles would be transported to the run-of-mine stockpile located at Bromley Humps on a continuous basis.

Water management infrastructure: A piping system, sumps, and pumps would be located throughout the underground mine to collect groundwater inflows and discharge water to the Cambria icefield (for the first 1.5 years of operation) or portal collection pond (for the remainder of operation). If required, a secondary water treatment plant would be commissioned at the portal collection pond to treat water prior to discharge into the Goldslide Creek.

Quarries: Two talus quarries are located in the mine site area. Approximately 530,000 cubic metres of material would be extracted for use as mine backfill.

Explosives magazine: An explosives magazine would be located near the waste rock storage area and would be moved underground during the second year of production.

Ancillary infrastructure: Ancillary infrastructure would include site offices, two 20,000 litre fuel tanks, mine ventilation, underground utilities, cemented rock fill crushing and batch plant, electrical substation, transformers and electrical room, propane storage, heaters, communication tower, and maintenance shops for vehicles and machinery. Site offices and maintenance shops would be located at each of the upper and lower portals. The 20,000 litre fuel tanks would be located outside the lower portal. Existing infrastructure at the upper portal that will continue to be used for the Project include fuel tanks, helipad, and diesel generators.

Bromley Humps (57 hectare disturbance area)

Process plant: The process plant would have 1,000 tonnes per day capacity. Mineral processing during mine operation is described in Section 2.3 (Project Activities).

Run-of-mine stockpile: A stockpile with unprocessed ore (i.e. run-of-mine ore) and pad would be established at Bromley Humps to receive ore from the temporary stockpiles at the upper and lower portals.

Tailings management facility: The tailings management facility would comprise two rockfill embankments that would provide a total storage capacity of 1.5 million cubic metres (2.0 million tonnes) of tailings. At full build out, the north embankment would measure 275 metres wide with a maximum height of 60 metres (crest to toe) while the south embankment would measure 310 metres wide with a maximum height of 37 metres (crest to toe). The facility would be equipped with a water management system to collect seepage including a geomembrane liner, a basin underdrain located above the geomembrane liner, a foundation drain below the geomembrane liner, and seepage collection ponds located adjacent to each of the embankments. Seepage from the seepage collection ponds would be pumped into the tailings management facility.

Water treatment plant: Supernatant from the tailings pond would be pumped to the water treatment plant prior to discharge to Bitter Creek. The water treatment plant and effluent pond would be located near the process plant and would treat all supernatant water from the tailings management facility to meet prescribed limits in the *Metal and Diamond Mining Effluent Regulations* under the *Fisheries Act* prior to discharge.

Topsoil stockpile: A topsoil stockpile with a volume of 45,000 cubic metres would be established along the access road 0.5 kilometres north of the tailings management facility.

Laydown area: Bromley Humps would have a laydown area for storage of materials and supplies (e.g. construction materials).

Ancillary infrastructure: A 100,000 litre fuel tank, electrical substation, transformers and electrical room, fresh water intake and treated water discharge pipelines, communication tower, administrative buildings, locker room and change facilities, warehouse, assay lab, waste storage area, and hazardous waste storage area would be located near the process plant.

Off-site components (173 hectare disturbance area)

Access road: A 15 kilometre all-season access road would be constructed to connect Highway 37A near Stewart with Bromley Humps. The access road would follow the alignment of a decommissioned unnamed road, and cross 20 watercourses including Roosevelt Creek and Hartley Gulch. It would be single lane (approximately 5 metres wide), gravel, and include turnouts. The total right of way is expected to be 60 metres including the right of way for the powerline. A gate would be installed at the Highway 37A access point to limit access to the Project area.

Haul road: A 12 kilometre all-season haul road would be constructed to connect Bromley Humps to the upper portal and mine site. The haul road would follow Bitter Creek and cross 49 watercourses including Otter Creek and Rio Blanco Creek before making a number of steep switchbacks (up to 23 percent grade) as the road climbs towards the mine site. Similar to the access road, the haul road would be constructed as a single lane, gravel road with turnouts. The total right-of-way would be 70 metres where the powerline aligns with the road and 40 metres where the powerline deviates from the road alignment.

Powerline: A new powerline would connect the existing BC Hydro infrastructure near Stewart to Bromley Humps. The powerline would follow the access road up to Bromley Humps where a step-down transformer at the process plant would redirect power for local distribution. A powerline connecting Bromley Humps to the mine site would follow the haul road to another step-down transformer to distribute power locally.

Quarries and borrow areas: Four quarries and borrow areas would be located along the access and haul roads from Highway 37A to the mine site: Gabbro quarry, Roosevelt borrow, Harley Gulch borrow, and Highway 37A quarry. A total of 1.35 million cubic metres of aggregate material would be required for the construction of the access road and tailings management facility embankments.

2.3 Project Activities

Key activities and timelines associated with the construction, operation, decommissioning and closure, and post-closure of the Project are outlined below.

Construction (18 months)

Site preparation: Site preparation activities would include clearing, grubbing, stripping, stockpiling of topsoil, and grading for the access road, mine site, and Bromley Humps infrastructure.

Development of quarries and borrow areas: All four quarries and borrow areas would be established and 459,810 tonnes of material would be used during the construction phase.

Construction of infrastructure: The access road, powerline, haul road, and infrastructure at Bromley Humps and the mine site would be constructed.

Construction of the tailings management facility: An initial tailings management facility would be constructed to provide 12 months of tailings storage.

Underground mine development: There would be approximately 1,100 metres of underground development from the existing upper portal, and development of the lower portal during construction.

Operation (6 years)

Mining: Mine access would occur through the upper portal only for the first 1.5 years of production while the lower portal is being developed. Mining would be mainly by longhole stoping, however drift and fill mining would be employed where the mineralized zone is too shallow for longhole stoping. Mining would occur year-round.

Mine backfilling: Waste rock will be progressively backfilled into the voids left by extracted ore (i.e. underground stopes). Backfill would consist of cemented rockfill in primary stopes and unconsolidated waste rock in secondary stopes. A total of 772,000 tonnes of mined waste rock would be backfilled, in addition to the 90,000 tonnes of legacy waste rock which is currently stockpiled at surface, and 530,000 tonnes of talus rock sourced from the talus quarries near the mine site. No waste rock would remain at surface at the conclusion of operation.

Mine dewatering: Mine dewatering is required throughout the year. Dewatering of the upper portal and direct discharge to the Cambria icefield would continue until year 1.5 of operations (dewatering of the upper portal is currently being undertaken as part of ongoing exploratory activities). The upper and lower portals would connect after year 1.5 of operation and mine dewatering would continue at the lower portal. At the lower portal, mine water (an estimated 2,600 to 3,800 cubic metres per day) would be pumped from the underground to the portal collection pond prior to being discharged to Goldslide Creek.

Ore handling: Ore and any waste rock would be transported from the underground to the temporary stockpiles outside each of the portals via load-haul-dump machines. Stockpiled ore would then be transported via truck along the haul road to the run-of-mine stockpile at Bromley Humps.

Processing: The process plant would have a 1,000 tonnes per day capacity. Processing would include a crushing and grinding circuit, conventional carbon-in-leach recovery (i.e. extraction of gold and silver using a cyanide solution), carbon processing, electrowinning, and refining. The tailings would undergo cyanide destruction prior to being pumped to the tailings management facility. The end product of processing would be gold and silver doré bars.

Tailings management: Tailings from the process plant would be pumped in an overland pipeline and deposited into the tailings management facility. Supernatant water would be pumped from the tailings pond for use in the process plant. The tailings management facility would have a water surplus, and surplus supernatant (an estimated peak of 65,000 cubic metres per month) would be pumped to the water treatment plant for treatment prior to being discharged to Bitter Creek. The tailings management facility would be expanded four times during operation.

Fresh water withdrawals: Water would be required for dust suppression on roads, potable water, domestic freshwater, and processing. Reclaimed water from the tailings management facility would be used for processing, and fresh water would be sourced from Bitter Creek, Otter Creek, and Goldslide Creek.

Transportation of goods and personnel: An annual average of up to 7 vehicles per day would travel along the access road between Bromley Humps and Stewart.

Decommissioning and Closure (up to 5 years)

Removal of infrastructure: Mine infrastructure and buildings would be removed and materials would be salvaged and/or placed in the underground mine. Powerline poles would be removed or cut off at-grade and placed underground. Underground water pipelines would be drained, capped, and covered; and above-ground pipelines would be removed from the site.

Deactivation of the access and haul roads: Bridges and culverts would be removed, and the access and haul roads would be permanently deactivated. Future site access would only be possible via helicopter.

Drainage ditches: Water management infrastructure would be among the last components to be reclaimed. Natural drainage would be restored at most locations with the following exceptions. Drainage ditches to direct non-contact water around the tailings management facility would remain, as well as drainage ditches to direct runoff from the former process plant site and run-of-mine stockpile to the tailings management facility.

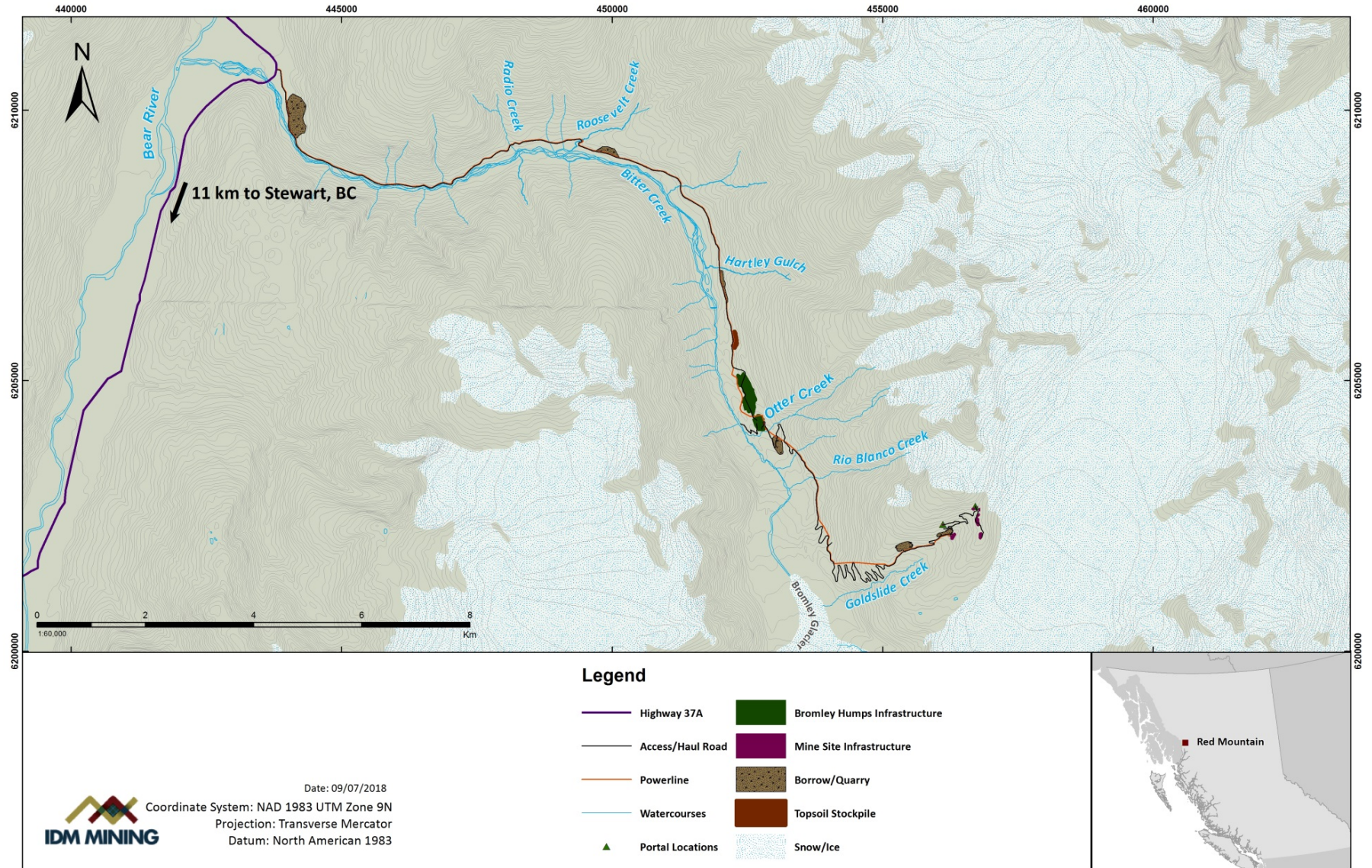
Flooding of the underground mine: All three portals would be sealed with hydrostatic plugs, and the underground would be allowed to flood. It would take an estimated 20 to 40 years for groundwater to reach baseline levels (a seasonal maximum of approximately 1,875 metres above sea level) in the underground works.

Reclamation of the tailings management facility: A geomembrane liner would be installed over the tailings management facility, and a rock and soil cover would be placed over the liner to direct water towards a permanent spillway. The seepage collection systems and water treatment plant would continue to operate until water is suitable for direct discharge to Bitter Creek.

Post-closure (10 years)

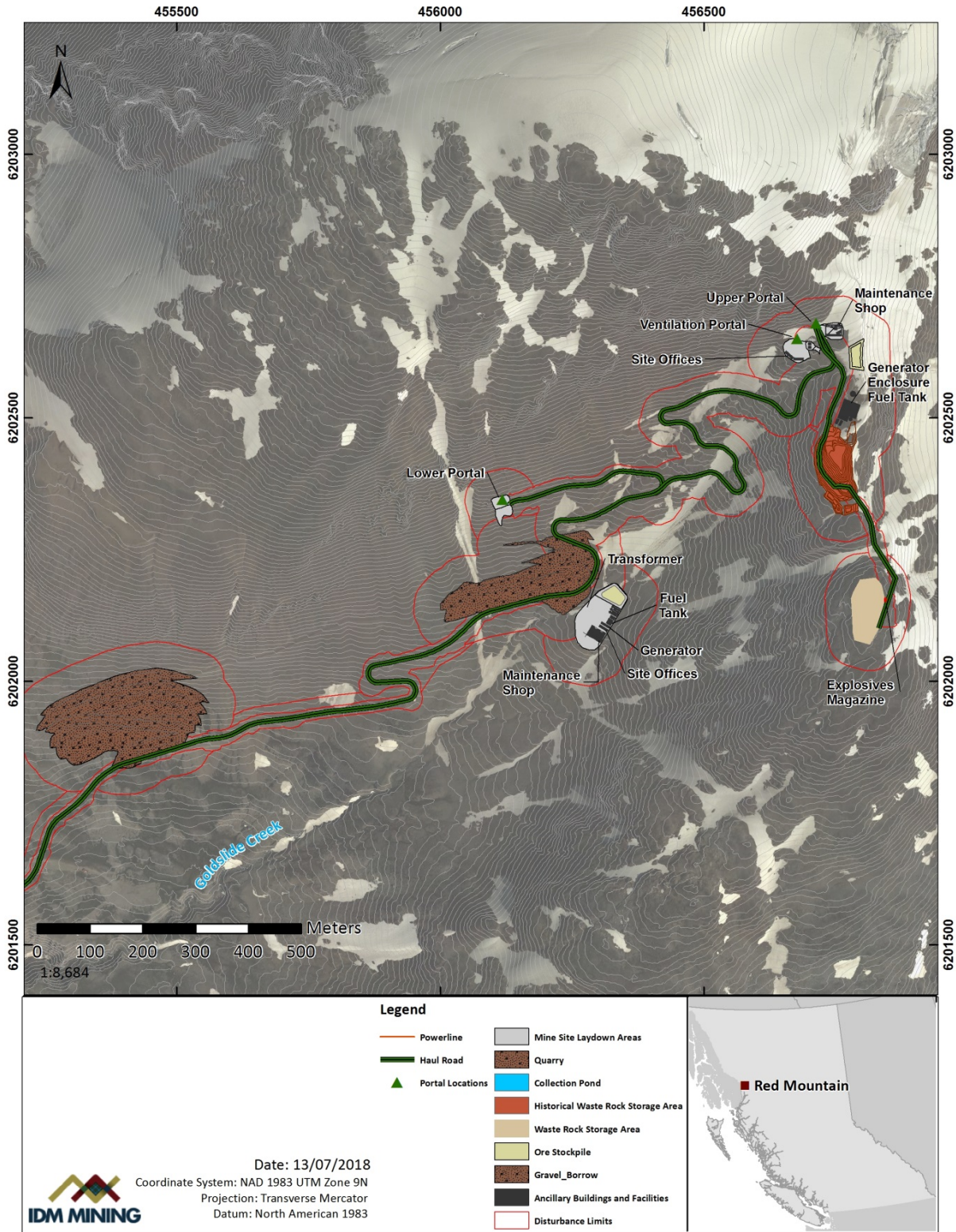
Monitoring: The post-closure monitoring program would include: monitoring the physical stability of the tailings management facility and hydrostatic plugs at the mine openings; biological monitoring of wildlife, aquatic effects, and terrestrial ecosystems; and chemical monitoring of seepage from the tailings management facility. Monitoring would continue until the proponent is satisfied that the site is physically and chemically stable and the specific monitoring requirements that would be established during the permitting process have been met.

Figure 1 Project Location



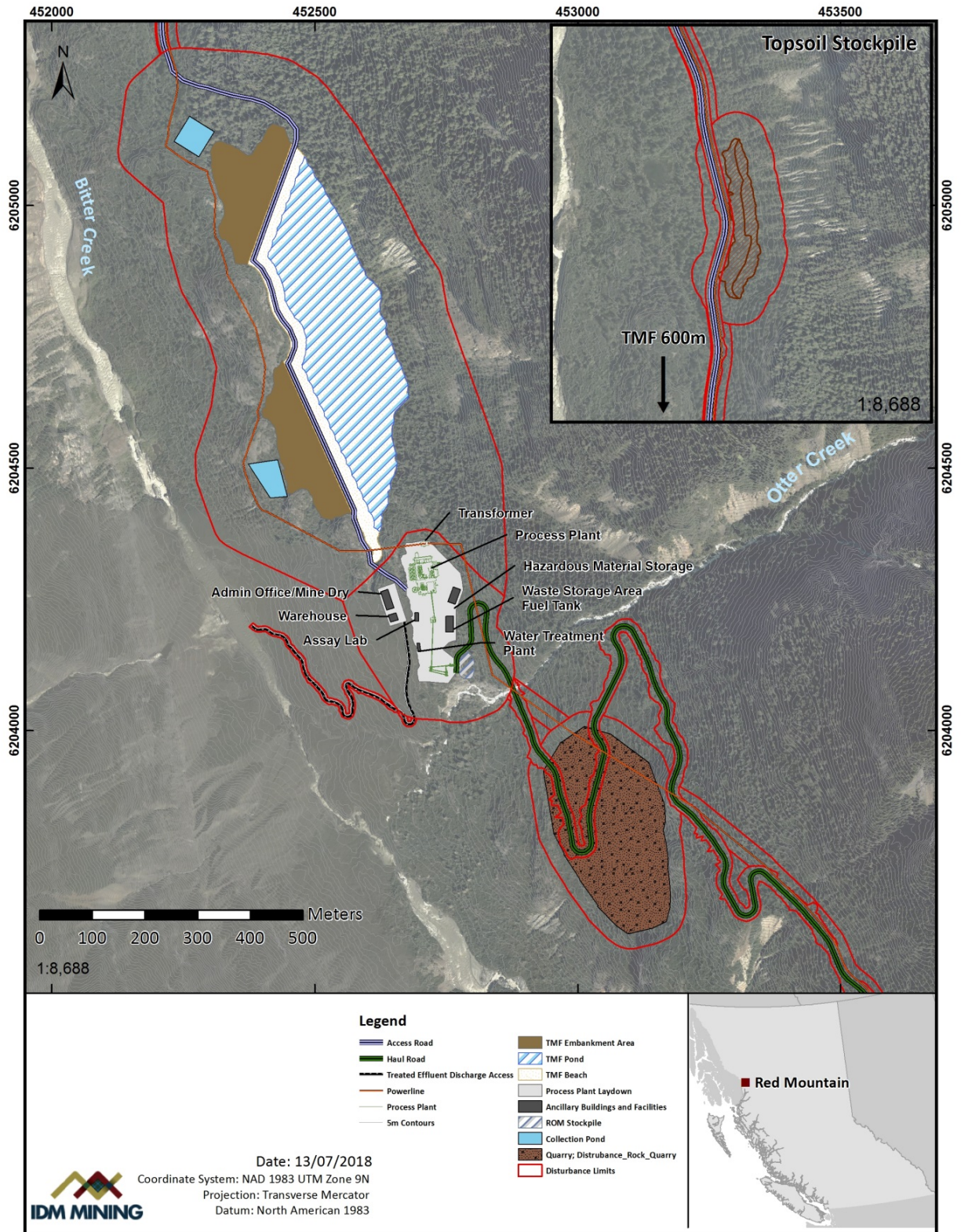
Source: IDM Mining Ltd.

Figure 2 Mine Site Infrastructure



Source: IDM Mining Ltd.

Figure 3 Bromley Humps Infrastructure



Source: IDM Mining Ltd.

3 Purpose of Project and Alternative Means

3.1 Purpose of Project

The purpose of the Project would be to mine, process, and deliver high-grade gold and silver doré from northwest B.C. to international markets. The proponent expects that the Project would contribute to economic development in the region by providing additional employment, business opportunities, skills training, and investments in services to the local town of Stewart.

3.2 Alternative Means of Carrying Out the Project

3.2.1 Proponent's Assessment of Environmental Effects

In the EIS the proponent identified alternative means of carrying out the Project that are economically and technically feasible. The proponent described general environmental effects associated with each alternative and the rationale for the selection of the preferred alternative. Alternatives were considered for the following key components and activities.

Mine Rate

The proponent identified and considered two technically and economically feasible options for the mining rate: mining at a rate of 1,000 tonnes per day year-round, and mining at a rate of 1,500 tonnes per day for eight months per year while operating the process plant year-round. The year-round mining operation would require snow clearing, have increased road maintenance requirements, and have safety concerns related to extreme winter weather conditions such as heavy snowfall events and avalanche hazards, which would likely result in occasional mine shutdowns. As for mining for only part of the year, the proponent noted that there are mechanical and operational challenges associated with closing and restarting an underground mining operation. The proponent also indicated the issue of losing employees to other employers during the four month closure. A year-round mining operation would have a smaller footprint because the run-of-mine stockpile (unprocessed ore stockpiled near the process plant at Bromley Humps) would be smaller, resulting in a lower volume of contact water runoff and potentially improved water quality. Based on these considerations, the proponent selected a year-round mining operation at 1,000 tonnes per day as the preferred option.

Access and Transportation

The proponent considered accessing the mine site either by road or helicopter. Helicopter access was not considered economically feasible for the transportation of large equipment, supplies, personnel, and ore. The proponent decided to rehabilitate an existing decommissioned resource road between Highway 37A and Bromley Humps.

The proponent also considered the construction and use of a tram or road as two options for the transportation of ore between Bromley Humps and the mine site. The proponent indicated that the tram would have good material movement capacity, the ability to operate in adverse weather

conditions, and provide a safe alternative to hauling using trucks. However, the proponent selected the road transportation option since vehicles would be used to transport personnel and equipment between Bromley Humps and the mine site anyway, and the cost of the tram would be higher than the road. Although the additional transport of ore along the haul road would generate more dust and greenhouse gases, the proponent committed to adhering to B.C. air quality guidelines, controlling dust and emissions by undertaking regular vehicle maintenance, and using water to suppress dust along the haul road.

Underground Mining Operations

The proponent considered three portal locations for primary and secondary access to the mine: (1) an upper portal at 1,890 metres above sea level, (2) a lower portal at 1,650 metres above sea level, and (3) a portal at Bromley Humps. The proponent rejected the portal at Bromley Humps option for economic and technical reasons as it would have required additional underground development which would delay the Project. The proponent decided to use the lower portal for primary access to the underground mine and subsequently refined its location to 1,720 meters above sea level in order to reduce the distance of underground works necessary to access the ore. The upper portal is an existing exploration portal that would be used as a temporary primary access while the lower portal is being constructed during construction and the first 18 months of operation. Thereafter, the upper portal would serve as a secondary access location to the lower portal.

The proponent considered both longhole stoping, and drift and fill as potential underground mining methods. The proponent selected longhole stoping as the primary mining method due to its lower cost. Where longhole stoping would be less effective at accessing shallow deposits, the proponent selected drift and fill as a secondary mining method.

Waste Rock Management

The proponent predicted that the Project would generate 719,000 tonnes of waste rock over the life of the mine, and that all waste rock would be potentially acid generating in post-closure after a lag time of approximately 20 years from the time of exposure to ambient environmental conditions. The proponent considered two technically and economically feasible options for waste rock management: storage on the surface, and placement of waste rock underground as backfill. The proponent indicated that storing the waste rock at the surface would increase potential seepage into the receiving environment that could have effects on aquatic species, increase the surface disturbance area that could require the clearing of habitat, cause strong concern from the local community, Nisga'a Lisims Government (NLG), and Indigenous groups, and expand reclamation requirements.

The other option of placement of waste rock underground would require short-term storage of a much smaller quantity of waste rock (52,000 tonnes) at the surface during the pre-production stage of operation. The waste rock would be stored underground and progressively backfilled for the remainder of mine operation. Based on the limited need to store waste work at surface, the proponent chose backfilling waste rock into the underground mine as the preferred option.

Mineral Processing Technology

The proponent considered three different mineral processing options to extract gold and silver: (1) whole ore leach, (2) flotation, re-grind and leaching of a concentrate, and (3) floatation to produce gold-silver concentrate for sale to an offsite smelter. The proponent stated that flotation, re-grind, and leaching of a concentrate would not be technically feasible due to poor recovery, and that producing and selling concentrate to an offsite smelter would be economically unfeasible because the concentrate would be considered low-grade concentrate with limited marketability. The proponent selected whole ore leach as the only technically and economically feasible option.

Tailings Management

The proponent assessed options for tailings management based on location, climate, topography, environment, tailings geochemistry, processing requirements, and mining throughput (the rate at which the ore would be processed). The proponent considered both underground disposal (backfill with potential mixing with waste rock), and surface disposal (in the tailings management facility) of tailings. Underground disposal would require temporary storage of tailings at the surface for two to three years as well as reprocessing and dewatering of the tailings before attaining a suitable material for backfill, which would delay mining operations. Surface disposal of tailings in the tailings management facility was therefore considered the only feasible option by the proponent.

Nine potential locations were identified for the tailings management facility. Three locations were rejected based on technical feasibility due to topographic, climatic and site conditions such as locations with high seismic activity and steep terrain. Five other options were rejected due to a large disturbance footprint, challenging topographical conditions, potential risk of hazards (avalanches and landslides) or proximity to a recreational area (Clements Lake). Placing the tailings management facility at the upper Bromley Humps was the preferred location given the favorable climate conditions at lower elevation, efficient storage of tailings with flatter topography, favourable topography for diversion of non-contact water, and availability of geotechnical and hydrogeological site investigations.

The proponent presented five options for tailings technology at the Bromley Humps tailings management facility location: (1) conventional slurry tailings, (2) thickened slurry tailings, (3) ultra-thickened (paste) tailings, (4) ultra-thickened cemented tailings, and (5) filtered tailings. All options were considered technically and economically feasible, except for the conventional slurry tailings. The proponent stated that producing thickened slurry tailings would be affected less by extreme climatic conditions, allow the reuse of water at the mill immediately adjacent to the tailings management facility, and result in limited acid rock drainage/metal leaching by maintaining saturation of the tailings mass. Based on these considerations, the proponent chose thickened slurry tailings as the preferred option.

Power Supply

The proponent considered five sources of power to support the mine operation: (1) diesel, (2) liquefied natural gas, (3) powerline, (4) wind, and (5) solar. Wind and solar power were not considered reliable

options due to their intermittent power supply and were determined to be technically infeasible. The proponent stated that a powerline which would follow the access road right-of-way and tie into the BC Hydro grid near Highway 37A was the most technically and economically feasible option with fewer environmental effects. Although this option would have a larger disturbance footprint compared to both the use of diesel and liquefied natural gas power, the powerline would eliminate the risk of fuel spills associated with the transportation and storage of diesel and liquefied natural gas that could affect water quality and aquatic species. Further, the transportation of diesel and liquefied natural gas would increase the release of greenhouse gas emissions.

3.2.2 Views Expressed

NLG expressed concerns about the proponent's plan to backfill the mine with talus rock in order to make up the shortfall in waste rock available for backfill. NLG suggested that the proponent consider paste backfill with tailings as a method of limiting contaminant release from talus waste rock.

The United States Environmental Protection Agency, Southeast Alaska Conservation Council, Rivers Without Borders, and Salmon Beyond Borders expressed concerns about the selection of thickened slurry tailings over filtered (dry stack) tailings, and indicated that the use of filtered tailings may reduce the consequence of a dam breach.

In response to comments from NLG, United States Environmental Protection Agency, Southeast Alaska Conservation Council, Rivers Without Borders, and Salmon Beyond Borders, the proponent noted that because all waste rock is potentially acid generating, the most appropriate management strategy would be to submerge waste rock in the flooded underground mine. As a result, the proponent stated that there is only enough space in the underground mine for partial disposal of tailings. The proponent updated its alternatives assessment to consider a combination of filtered tailings deposited on the ground surface (60 percent of tailings) and paste backfill of tailings into the underground mine (40 percent of tailings). The proponent agreed with the United States Environmental Protection Agency, Southeast Alaska Conservation Council, Rivers Without Borders, and Salmon Beyond Borders that filtered tailings would be less likely to mobilize in the event of a dam breach, and agreed with NLG that paste backfill with tailings would minimize metal leaching/acid rock drainage from the fraction of paste backfill tailings. However, even though metal leaching/acid rock drainage from the paste backfill would decrease, the proponent described that this would be offset by increased metal leaching from the portion of tailings stored on surface because filtered tailings would have increased exposure to oxygen. In addition, the proponent noted that filtered tailings would result in a larger Project footprint because filtered tailings would require an additional water management pond and a larger tailings management facility, and the paste backfill would require a 15 kilometre pipeline between the process plant at Bromley Humps and the mine site. The proponent also stated that there would be technical challenges in pumping paste tailings from the process plant at Bromley Humps to the mine site because the mine site is located at much higher elevation (1,000 metres), and the cold and wet climate in the Project area would make tailings placement and compaction challenging. As a result, the proponent considered the combination of filtered tailings and paste underground backfill to be no more desirable than thickened

tailings from an environmental perspective, and less desirable from a technical and economic perspective. As a result, the proponent decided to proceed with conventional thickened tailings.

NLG expressed concern, and requested that the proponent re-consider cemented tailings as a potential option. While the proponent initially rejected this option because it was not economically feasible, the proponent committed to continue to investigate this option with NLG. Should the proponent decide to make a change to tailings technology at a later time, the proponent would be required to notify the Agency of the change and the Agency would consider the implications for the EA.

The Agency did not receive any comments on the alternative means of carrying out the Project from federal authorities, Tsetsaut/Skii km Lax Ha, or Métis Nation B.C.

3.2.3 Agency Analysis and Conclusion

The proponent's alternatives assessment considered the technically and economically feasible alternatives and the environmental effects associated with the selected alternative means of carrying out the Project. Based on a review of the proponent's analysis, the Agency is satisfied that the proponent has sufficiently assessed alternative means of carrying out the Project for the purposes of assessing the environmental effects of the Project under CEAA 2012.

4 Consultation Activities and Advice Received

4.1 Crown Consultation with Indigenous Groups

4.1.1 Crown Consultation Led by the Agency

The federal government has a duty to consult Indigenous groups and, where appropriate, accommodate when its proposed conduct might adversely affect Aboriginal or treaty rights. Crown consultation with Indigenous groups is also undertaken more broadly as an important part of good governance, sound policy development and informed decision making.

In addition to the federal government's broader obligations, CEAA 2012 requires the EA to consider the effect of any change to the environment caused by the Project on Indigenous peoples' health and socio-economic conditions, physical and cultural heritage, current use of lands and resources for traditional purposes, and changes to any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance.

The Agency identified three Indigenous groups whose Aboriginal rights or title could be adversely impacted by the Project:

- Nisga'a Nation;
- Tsetsaut/Skii km Lax Ha; and
- Métis Nation B.C.

Funding through the Agency's Participant Funding Program was made available to support Indigenous groups' participation in the EA. The Nisga'a Nation as represented by the Nisga'a Lisims Government (NLG), Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. applied for and were allocated funding for a total of \$92,150 to participate in the EA and related consultation activities. Details of the funding allocation are available on the Agency's web site at <http://www.ceaa.gc.ca/050/evaluations/document/114555>.

The Agency integrated Crown consultation with steps of the EA process to the extent possible. Key steps included the review of the project description, development of the EIS Guidelines, review of the EIS, and opportunities to comment on drafts of the EA Report and potential conditions. The Agency also coordinated consultation activities with B.C.'s Environmental Assessment Office to the extent possible, including sharing correspondence, participating in joint meetings with Indigenous groups, and ensuring that Indigenous groups were provided with responses to their comments and issues raised throughout the process.

Crown consultation included the following components:

- Providing written notification about the Project and EA process;
- Corresponding through letters, phone calls, and emails;
- Offering meetings to explain the EA process and proposed consultation approach and to seek initial feedback from Indigenous groups;

- Providing opportunities to review and comment on key EA documents, e.g. EIS Guidelines, EIS, draft EA Report, and potential conditions; and
- Offering face-to-face discussions during key stages of the EA to discuss concerns regarding the Project and the consultation process.

The Agency determined the appropriate depth of consultation for each group based on the information available regarding Aboriginal or treaty rights and the potential for adverse impacts to those rights from the Project. The depth of consultation determined the type of consultation activities offered to Indigenous groups through individualized consultation work plans.

Potential changes to the environment that may affect Indigenous peoples are discussed in Sections 6.3 (Current Use of Lands and Resources for Traditional Purposes), 6.4 (Physical and Cultural Heritage and Historical, Archaeological, Paleontological or Architectural Sites or Structures) and 6.5 (Health and Socio-economic Conditions), and impacts on Aboriginal rights are discussed in Section 9 of the EA Report. Potential changes to Nisga'a Nation rights and interests are discussed in Section 8 of the EA Report. Appendix E contains a summary of concerns raised by Indigenous groups during the EA process up to the time of publication of the Draft EA Report, and includes both a proponent and Agency response. Subsequent comments from Indigenous groups will be included in the summary of comments in Appendix F of the final EA Report.

4.1.2 Consultation Activities Related to Treaty Rights

The Nisga'a Nation has an established treaty with Canada and B.C., the *Nisga'a Final Agreement*, which includes EA provisions that are discussed and assessed in Section 8 of this report. The Government of Canada worked collaboratively with NLG and the Government of B.C. as part of a tripartite government approach to: (1) ensure that the NLG was informed about the Project; (2) understand the potential impacts of the Project on Nisga'a Nation treaty rights under the *Nisga'a Final Agreement*, and (3) elicit NLG feedback on how the *Nisga'a Final Agreement* applies to different phases of the EA process. Information was shared with and received from NLG through working groups, technical meetings, bilateral and trilateral government meetings, correspondence, and through attending information sessions held by the proponent in Nisga'a villages. NLG submitted detailed comments about the Project and the EA in areas including access, fish and fish habitat, wildlife and migratory birds, human health and water quality.

In addition to the comment opportunities discussed above, the Agency provided NLG with the opportunity to comment on the proponent's EIS, draft versions of EA Report sections, including a list of key mitigation measures identified by the Agency to address potential Project effects, and the Agency's assessment of impacts on Nisga'a treaty rights and interests.

4.1.3 Consultation Activities Related to Aboriginal Rights

Tsetsaut/Skii km Lax Ha asserted that they are an independent group for the purposes of Crown consultation and not a "wilp", or house group, of the Gitksan Nation. The Agency consulted Tsetsaut/Skii km Lax Ha for the purposes of the EA, as the Agency had done in previous EAs. However, the Agency has

not taken a position on the independence of Tsetsaut/Skii km Lax Ha from the Gitksan Nation. Tsetsaut/Skii km Lax Ha advised the proponent in 2017 that there are approximately 35 members of the Tsetsaut/Skii km Lax Ha, many of whom live in Hazelton or New Hazelton, while some live in other locations in B.C. and the United States.

Métis Nation B.C. represents its chartered communities for consultation purposes. The closest Métis chartered communities to the Project are the Northwest B.C. Métis Association (based out of Terrace) and the Tri-River Métis Association (based out of Smithers).

From the outset of the EA, the Agency consulted both Tsetsaut/Skii km Lax Ha and Métis Nation B.C. at the low end of the *Haida* consultation spectrum. Both Indigenous groups provided feedback at various points in the EA, including comments on the Project Description and the EIS.

4.1.4 Indigenous Engagement Activities by the Proponent

The federal government bears a legal responsibility to consult and, where appropriate, accommodate when its proposed conduct might adversely affect Aboriginal or treaty rights. However, the efforts of the proponent can assist in the overall consultation process and inform not only the assessment of potential adverse impacts of the Project on Aboriginal and treaty rights, but also appropriate mitigation or accommodation measures that may be required to address the potential impacts. Information collected by the proponent during its engagement with Indigenous groups was considered in the Agency's determination of any potential adverse impacts of the Project on Aboriginal and treaty rights.

The proponent engaged with the Indigenous groups identified by the Agency and B.C.'s Environmental Assessment Office through meetings, phone calls, emails, and letters, and by providing responses to concerns identified during the review of the EIS. The proponent's engagement included discussion of the engagement process, potential effects to the current use of lands and resources for traditional purposes, the assessment of potential adverse impacts of the Project on Aboriginal or treaty rights, and proposed steps to avoid or mitigate those impacts.

The proponent began engaging with NLG in May 2014 and entered into a capacity funding agreement with them in May 2016. It shared information, and held community meetings, site tours, and meetings with NLG representatives. The proponent provided NLG with the opportunity to comment on the proponent's work plan outlining the necessary data to assess impacts set out under Chapter 10, paragraphs 8(e) and 8(f) of the *Nisga'a Final Agreement*, the proponent's draft 8(e) and 8(f) assessments and supporting documents, and has committed to continuing to engage NLG throughout the remainder of the EA and subsequent Project phases the development of the EA Report and potential conditions.

The proponent indicated in the EIS that it intends to continue broader discussions towards an impact benefits agreement. The Agency is aware that the proponent is continuing efforts to negotiate an agreement with NLG to address any potential residual impacts not addressed through the EA or permitting processes. Although the Agency is not involved in these confidential discussions, such agreements can be important in the context of accommodating impacts on Aboriginal or treaty rights.

The proponent discussed the proposed design of the Project and potential business opportunities with the Tsetsaut/Skii km Lax Ha, hosted a site visit of the Project in October 2016, offered an opportunity to comment on draft content regarding the Tsetsaut/Skii km Lax Ha in the EIS, incorporated their feedback into the final EIS, and made a commitment to ongoing engagement with them.

The proponent offered Métis Nation B.C. an opportunity to comment on draft content regarding Métis Nation B.C. in the EIS, incorporated their feedback into the final EIS, and indicated a commitment to ongoing engagement with them.

The proponent participated in an open house, organized jointly by the Agency and B.C.'s Environmental Assessment Office, in Stewart, B.C. and held open house meetings in the Nisga'a villages of Gingolx and Laxgaltsap during the public comment period on the EIS summary. The proponent has committed to continuing engagement with NLG, Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

4.2 Public Participation

4.2.1 Public Participation Led by the Agency

The Agency provided opportunities for the public to comment on:

- The Summary of the Project Description between September 28 and October 19, 2015;
- The draft EIS Guidelines between November 12, 2015 and January 11, 2016; and
- The summary of the proponent's EIS between November 14 and December 14, 2017.

Notices of these opportunities to participate were posted on the Canadian Environmental Assessment Registry website, and advertised through local media. The Agency offered support for public participation through its Participant Funding Program.

In addition, the public is now invited to comment on the Draft EA Report and the potential conditions. After taking into consideration the comments received from the public, the Agency will finalize and submit the final EA Report to the Minister of Environment and Climate Change.

Copies of the draft EIS Guidelines, entire EIS, EIS Summary, and Draft EA Report were made available at public viewing centres in Stewart and the Nisga'a Villages (i.e. Laxgalts'ap, Gitlaxt'aamiks, Gitwinksihlkw, and Gingolx) in B.C., and in Hyder, Alaska. The Agency coordinated consultation activities with B.C.'s Environmental Assessment Office to the extent possible. During the technical review of the EIS, the Agency and B.C.'s Environmental Assessment Office conducted an open house in Stewart, with participation from the proponent. This session provided opportunities for members of the public to speak with government representatives about the EA process, and to review the proponent's presentation of its EIS.

Groups that participated in the public consultation activities included:

- United States Environmental Protection Agency, Region 10;
- United States Department of the Interior, Office of Environmental Policy and Compliance;

- United States Department of Commerce, National Marine Fisheries Service;
- State of Alaska Department of Natural Resources;
- Rivers Without Borders, Southeast Alaska Conservation Council and Salmon Beyond Borders;
- Southeast Alaska Indigenous Transboundary Commission (a coalition of 15 federally-recognized tribes in southeast Alaska); and
- Individual members of the public.

The public expressed concerns about water quality, transboundary water quality, cumulative effects of mining in the region, employment, and effects of accidents and malfunctions. Some individuals also expressed general support for the Project.

4.2.2 Public Participation Activities Organized by the Proponent

The proponent engaged local residents from Stewart and consulted other potentially affected or interested stakeholders including local and regional governments, commercial land users, and overlapping tenure holders.

Public consultation and engagement activities by the proponent included sending introductory letters to key stakeholders, establishing a website and email address to exchange information about the Project, circulating newsletters, hosting in-person meetings, and participating in open houses hosted by the B.C. government.

4.3 Participation of Federal and Other Experts

Federal authorities in possession of specialist or expert information or knowledge with respect to the Project provided advice to the Agency on whether a CEAA 2012 EA was required. Federal authorities also participated in the review of the draft EIS Guidelines and the proponent's EIS, and provided input to the preparation of the Draft EA Report and potential conditions.

The following federal authorities provided input:

- Fisheries and Oceans Canada: input on fish and fish habitat that are part of, or support, a commercial, recreational or Aboriginal fishery, and provisions related to fish passage and flow.
- Environment and Climate Change Canada: input on air quality, effluent discharges related to mine waste management, geochemistry, water quality and quantity, non-aquatic species at risk, and migratory birds.
- Natural Resources Canada: input on groundwater quality and quantity, groundwater-surface water interactions, geochemistry, and geohazards.
- Health Canada: input on potential impacts on Indigenous peoples' health related to country foods, water quality, noise levels and air quality.

The Agency and B.C.'s Environmental Assessment Office worked closely on the review of technical information, shared key information received from the public, NLG, Tsetsaut/Skii km Lax Ha and Métis Nation B.C. and participated in joint meetings with NLG.

5 Geographical Setting

5.1 Biophysical Environment

The Project is situated in the Bitter Creek watershed within the Southern Boundary Ranges ecosection, and west of the Nass River basin in northwestern B.C. The Southern Boundary Ranges are characterized by often ice-capped rugged granitic and metamorphic-based mountains, and rugged wet mountains that contain frequent avalanche tracks and windy conditions. The regional climate is mostly cool and wet with snow packs and heavy precipitation of approximately 500 millimetres in the summer and up to 1,300 millimetres in the winter. Mean annual temperatures range between -6.4 degrees Celsius in winter to 6.9 degrees Celsius in the summer, with an annual average of negative 0.8 degrees Celsius.

The forested areas contain mid-slope mature forests and valley bottoms contain young forests with pioneer vegetation. The mouth of Bitter Creek is characterized by flat floodplain forests with deciduous stands and mixed forests on higher, less-active floodplains as it drains into Bear River. Most of the area is extensive alpine terrain sparsely vegetated with large expanses of ice all year round. Wetlands and floodplains are uncommon in the Project area, which is mostly dominated by alpine and parkland ecosystems. The Project is approximately 400 kilometres southwest of the Queen Charlotte Fault, which experiences frequent (almost daily) earthquakes of 4.0 magnitude or lower on the Richter scale.

The mine site is situated above the Bitter Creek valley at the top of Red Mountain cirque which drains into Goldslide Creek. Goldslide Creek is not glacially-influenced, flows into Bromley Glacier, and is a part of six tributaries to Bitter Creek, which include Rio Blanco Creek, Otter Creek and Roosevelt Creek. Bitter Creek and Otter Creek are glacially-influenced with flow peaks during the summer (highest in July). Bitter Creek is divided into six river reaches (Figure 4); the first four are fish bearing, while the junction between the fourth and fifth reach contains a permanent migration barrier for fish; reaches five and six are not fish bearing. Dolly Varden use the lower reaches of Bitter Creek and its tributaries (Hartley Gulch and Roosevelt Creek) for spawning, rearing and limited overwintering. The proponent indicated that Dolly Varden caught in the Bitter Creek and tributaries were small (seven to 20 centimetres long), which is consistent with Dolly Varden found in other small headwater streams.

Bitter Creek drains into Bear River and then flows into the Portland Canal which is a shared waterway between Canada and the United States. Bear River is a major watercourse in the region that flows south past the confluence with Bitter Creek and into the Portland Canal. Bear River provides habitat for all life-history stages of Dolly Varden, coho salmon, Chinook salmon, chum salmon, pink salmon, steelhead, rainbow trout, eulachon, and coastrange sculpin.

The Project is located entirely within the Nass Wildlife Area, which is a 16,101 square kilometre area set out in the *Nisga'a Final Agreement*. The Nisga'a Nation has treaty rights to manage and harvest designated wildlife species (mountain goat, grizzly bear, and moose), migratory birds, and fish species. The region also provides habitat for a wide variety of furbearers, bats, birds and amphibians. Eleven terrestrial species within the Project area are designated by the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC) as either special concern, endangered or threatened. Of these species,

three bat species, five bird species and one amphibian species are listed under the *Species at Risk Act*. The Project is located within 30 kilometres of a provincial Wildlife Habitat Area established for the protection of grizzly bear, and three provincial Ungulate Winter Ranges for the protection of mountain goat or moose. No plant species listed under the *Species at Risk Act* or by *Committee on the Status of Endangered Wildlife in Canada* were found in the Project area.

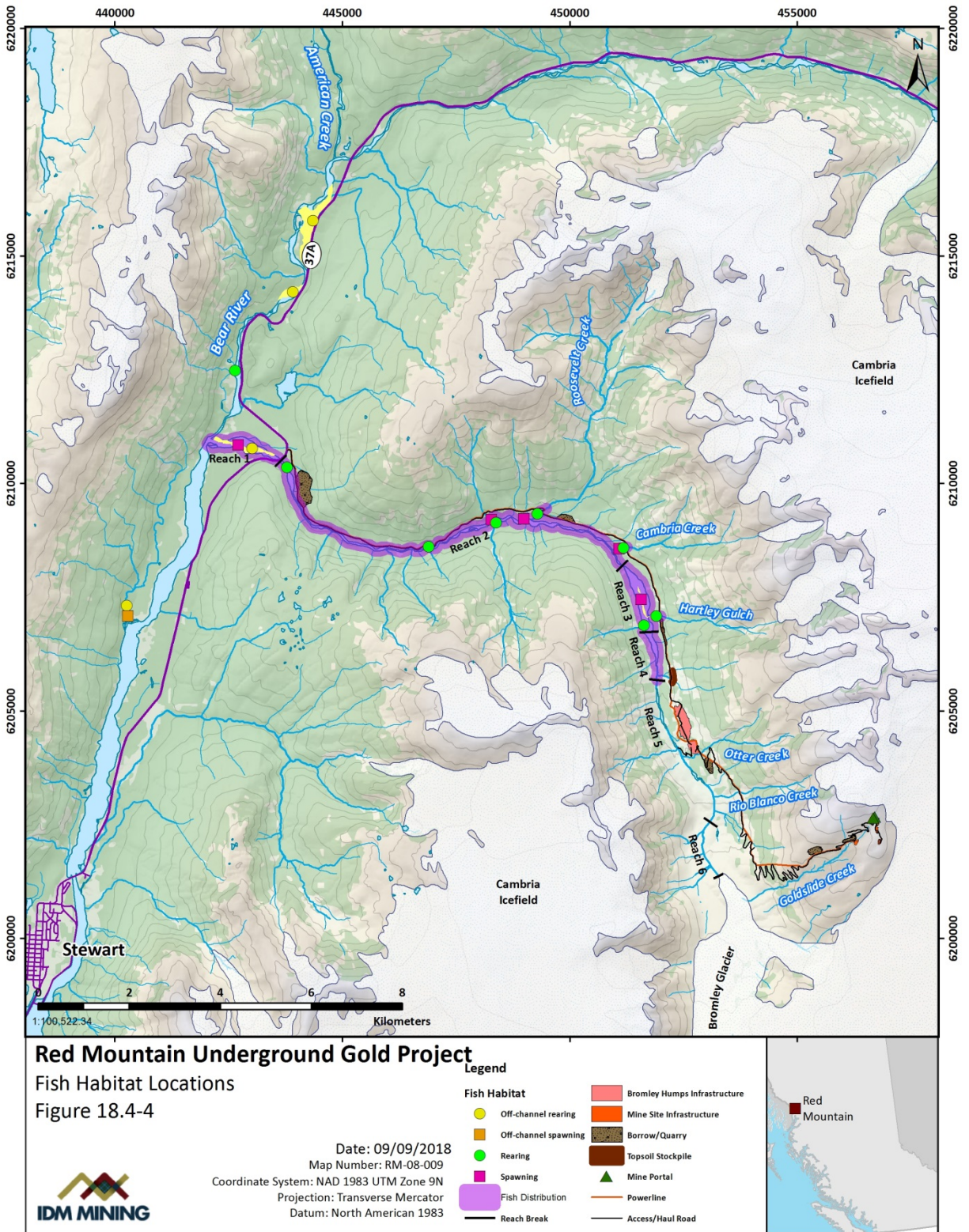
5.2 Human Environment

The Project is situated in the Regional District of Kitimat-Stikine that provides services to approximately 37,000 residents, including residents of the District of Stewart and the City of Terrace. The closest city centre is the City of Terrace at the junction of Highways 16 and 37. Terrace provides an integrated transportation network that supports natural resource development, including forestry, fisheries and mining. The nearest communities are the town of Stewart (15 kilometres from the Project), town of Hyder in Alaska (17 kilometres), year-round residences at Meziadin junction (65 kilometres), and seasonal residences at Bell II (153 kilometres). Hyder maintains close ties with Stewart to manage the local tourist economy. Bell II offers a wilderness destination that attracts seasonal tourists for steelhead fishing in the fall and heli-skiing in the winter.

The Project is located approximately 100 kilometres northwest of the four Nisga'a villages: Gitlaxt'aamiks, Gitwinksihlkw, Laxgalts'ap, and Gingolx. The Nisga'a Nation has approximately 6,000 members, almost 2,050 of whom reside in one of the four Nisga'a villages. Land and resource use by the Nisga'a Nation and other Indigenous peoples is discussed in Sections 6.3 (Current Use of Lands and Resources for Traditional Purposes), 8 (Nisga'a Nation Effects Assessment), and 9 (Impacts on Potential or Established Aboriginal Rights) of this report.

Existing infrastructure in the vicinity of the Project includes the Long Lake Hydroelectric Project, Forest Kerr Project, and Volcano Creek Hydroelectricity Project and McLymont Creek Hydroelectric Project in the Iskut River watershed. Since 1984, five mines that used to provide employment for the region have closed their operations. Forestry remains a prominent activity in the area.

Figure 4 Fish Habitat Locations



Source: IDM Mining Ltd

6 Predicted Effects on Valued Components

6.1 Fish and Fish Habitat

The Project has the potential to affect fish and fish habitat as a result of road construction, discharges or runoff from the mine site, tailings management facility, mine site, Bromley Humps, and access and haul road and operation.

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects to fish and fish habitat.

6.1.1 Proponent's Assessment of Environmental Effects

Predicted Effects

The proponent stated that potential effects to fish and fish habitat may result from habitat loss, increased fishing pressure, changes in aquatic resources, changes in surface water quality, changes in sediment quality, changes in stream flows, and blasting.

Habitat Loss

The proponent characterized habitat loss in terms of the removal of instream and riparian habitat. The proponent stated that there would be no fish habitat loss under the infrastructure at the mine site or at Bromley Humps because there are no fish bearing watercourses in these areas. Habitat loss is predicted in relation to the construction of the access road, where infilling is required along a 174 metre section of the Bitter Creek channel and clearing and grubbing of riparian habitat in some areas.

The access road follows the north bank of Bitter Creek for 15 kilometers from Highway 37A to Bromley Humps (Figure 1). The access road crosses 64 unnamed tributaries to Bitter Creek and five named tributaries: Lim Creek, Radio Creek, Roosevelt Creek, Cambria Creek, and Hartley Gulch. Of these tributaries only two, Roosevelt Creek and Hartley Gulch, are fish bearing at the road crossing. The proponent indicated that the primary area of impact on Bitter Creek would be between road stations 2+074 metres to 5+145 metres, where road infilling would be required with the largest proportion of infilling between road stations 4+550 metres to 4+840 metres. The total instream habitat loss would be approximately 10,500 square metres. The proponent characterized fish habitat use of this area as limited to migration and juvenile rearing in the slow-moving areas along the stream margins and in the side channel.

The proponent indicated that riparian habitat loss would be expected to occur from earthworks, armouring, cut/fill slopes, and road surfacing. Earthworks within the length of the access and haul roads would account for 23,078 square metres of riparian habitat loss, while 3,932 square metres of riparian habitat would be cleared for the road right-of-way, which totals approximately 27,000 square metres of riparian habitat loss in fish-bearing streams. The proponent estimated that approximately 1,500 square metres of the 27,000 square metre estimate would be associated with the construction of the two clearspan bridges over the fish bearing streams (Roosevelt Creek and Hartley Gulch). Potential effects

from riparian habitat loss include reduced instream cover, lower inputs of nutrients and food for fish into the stream, and decreased capacity for stream temperature regulation.

Increased Fishing Pressure

The proponent described a potential for increased pressure on recreational fisheries from Project employees and contractors as well as increased public accessibility to the fish bearing reaches of Bitter Creek as a result of construction of the access road. The proponent indicated that an increase in fishing pressure would be highly unlikely, however, due to the recreational fishing ban imposed by Fisheries and Oceans Canada and B.C.'s Ministry for Forests, Lands and Natural Resource Operations and Rural Development for Bear River and its tributaries, including Bitter Creek.

The proponent noted that, although it is unknown whether there are current Aboriginal fisheries in Bear River or Bitter Creek, Nisga'a citizens and other Indigenous peoples may, in the future, exercise their treaty or Indigenous right to fish. In particular, this may apply to eulachon in the lower reaches of Bear River.

Changes in Aquatic Resources

Aquatic resources, comprising periphyton (aquatic plants) and benthic invertebrates are primary and secondary producers that form the basis of the aquatic food web. Primary producers are typically plants that convert light and nutrients into energy, while secondary producers are organisms that consume primary producers and convert the energy into their growth. Benthic invertebrates provide food to some species of fish, and the success of benthic invertebrate populations is often based on diverse and abundant periphyton communities.

The proponent identified that potential effects to aquatic resources through habitat loss, changes in water quality, sediment quality and stream flows could decrease the abundance of these organisms or shift the community composition. This could ultimately lead to effects to fish food availability or preference. Aquatic resources may also accumulate metals, which, when fed on by fish, can result in bioaccumulation up the food chain.

The proponent indicated that effects to aquatic resources resulting from changes in water quality, sediment quality, and stream flows would be primarily limited to Goldslide Creek. Goldslide Creek is non-fish bearing and flows to Bromley Glacier before entering Bitter Creek. The proponent considered benthic drift to Bitter Creek unlikely, but stated that if it were to occur, only a minor proportion of food and nutrients would enter Bitter Creek. Goldslide Creek contributes between one and two percent of the total flow in Bitter Creek.

Changes in Surface Water Quality

The proponent described predicted changes in surface water quality from dewatering of the underground mine (including metal leaching/acid rock drainage), and the discharge from the tailings management facility (including residual cyanide from the gold recovery process and metal leaching/acid rock drainage), blasting, runoff, and aerial deposition into adjacent waterbodies. Several components of water quality could be altered including metal concentrations, nutrient loads, pH, total suspended

solids, and water hardness. The proponent indicated that effects of changes to surface water quality on fish could, in general, result in sub-lethal or lethal effects depending on the nature, predicted concentration, and timing of the release of the contaminant, and the resilience of the fish to water quality changes.

The proponent modeled water quality at station BC06, which is located just upstream of fish-bearing reaches of Bitter Creek, and BR06 which is located in Bear River just downstream of the confluence of Bitter Creek and Bear River. At BC06 in Bitter Creek, the proponent predicted that antimony, cadmium, chromium, copper, mercury, and selenium would exceed baseline and Canadian Council of Ministers of the Environment's *Water Quality Guidelines* or B.C.'s *Water Quality Guidelines for Aquatic Life* for portions of the year during operations; and that cadmium, chromium, cobalt, selenium, silver and zinc would exceed these guidelines in post-closure. Cyanide was not predicted to exceed the Canadian Council of Ministers of the Environment's *Water Quality Guidelines* or B.C.'s *Water Quality Guidelines for Aquatic Life* limit of 0.005 milligram per litre for any phase of the Project. At BR06 in Bear River, the proponent predicted that aluminum, chromium, and mercury would exceed baseline and Canadian Council of Ministers of the Environment's *Water Quality Guidelines* or B.C.'s *Water Quality Guidelines for Aquatic Life* for portions of the year during operations; and that cadmium, chromium, selenium, silver and zinc would exceed guidelines in post-closure.

Changes in Sediment Quality

The proponent described that potential sources of changes in sediment quality would include: discharge from the mine site and tailings management facility; runoff of non-contact water from the mine site and Bromley Humps; runoff of contact and non-contact water along the access road; aerial deposition of dust from blasting, ore management, and traffic and equipment use; acid deposition from the burning of fossil fuels; and blasting vibration and shockwaves. Changes in sediment quality can be chemical, such as increased metal concentrations, or physical, such as changes in particle size distributions, resulting in sub-lethal or lethal effects. Chemical effects can result in increased mortality, cellular damage, decreased metabolism, and decreased reproductive capacity and success as well as changes to food availability and community composition. Physical effects can result in direct mortality through smothering and changes in particle size distribution which can result in altered benthic invertebrate community abundance and composition.

The proponent estimated changes to sediment quality based on model predictions for surface water quality. If the magnitude of change is assumed to be the same, cadmium, selenium, silver, and zinc are expected to exceed sediment quality guidelines in Bitter Creek. However, the proponent indicated that the actual change in sediment concentrations would likely be less than the change in water concentrations due to the mechanisms by which changes in water concentrations would cause a change in sediment chemistry. However, the proponent conservatively assessed effects from changes in sediment quality to fish and fish habitat based on the predicted guideline exceedances of cadmium, selenium, silver, and zinc.

Changes in Stream Flows

Changes in stream flows can arise as either an increase or a decrease in flow. The proponent stated that decreases in stream flow would result from the dewatering of the underground mine, construction of surface water management facilities, and use of water for mine-related activities such as dust suppression and providing freshwater for the process plant. The proponent predicted flow increases as a result of direct discharge from the portal collection pond to Goldslide Creek.

The proponent stated that Goldslide Creek would be subject to the highest potential changes in streamflow due to its proximity to the mine site and the portal collection pond discharges. Although Goldslide Creek passes through the Bromley Glacier before entering Bitter Creek, the proponent predicted that the increased flow in Goldslide Creek would add volume to the downstream, fish bearing reaches of Bitter Creek (Table 3). During construction, the proponent characterized the flow changes in the upper fish bearing reaches of Bitter Creek to be negligible because the average reduction in flow was predicted to be 0.25 percent compared to baseline, while the worst case is a decrease in flow of one percent. During operation, the highest average change in streamflow occurs during dry conditions with an average annual increase of less than six percent and a worst case increase of 22 percent. In post-closure, the worst case is an increase of less than six percent from baseline flows. The changes further downstream, close to the mouth of Bitter Creek, are much less than predicted for the upper reaches.

Changes in flow can potentially affect the physical habitat of fish, including changes in stream velocity, water depth, and substrate composition, and can decrease the quality of habitat available for fish. Sudden increases in flow can have direct effects to fish by flushing eggs or fry downstream, altering fry emergence timing, or causing fish to avoid certain areas typically used for foraging or refuge. Increased winter flows have the potential to improve the availability of overwintering habitat for juvenile fish through the creation of deeper areas that do not freeze to the stream bottom.

Table 3 Predicted Changes to Streamflow in Bitter Creek

Streamflow scenario	Upper Fish Bearing Reach (BC06)		Creek Mouth (BC02)	
	Average Base Case (%)	Worst Case (%)	Average Base Case (%)	Worst Case (%)
Construction				
Dry conditions	-0.25	-1.00	-0.16	-0.66
Annual flow	-0.22	-1.00	-0.17	-0.70
Wet conditions	-0.17	-1.00	-0.16	-0.67
Operation				
Dry conditions	5.82	22.00	3.84	14.00
Annual flow	1.25	5.30	0.61	3.50
Wet conditions	2.40	8.00	1.49	5.00
Post-closure				
Dry conditions	2.47	5.9	1.64	3.90
Annual flow	1.81	3.90	1.22	2.60
Wet conditions	1.23	2.3	0.81	1.50

Blasting

Blasting would be required for the construction of the access road, tailings management facility and portals, as well as for underground mining during operation. The proponent stated that potential effects to fish and fish habitat from blasting include physical effects to fish tissues and organs through vibration and shockwaves, damage to incubating fish eggs from mechanical shock, increased sedimentation smothering eggs and larvae or altering fish prey community composition, changes in fish behaviour, and increased concentrations of ammonia and other blasting by-product concentrations in the water which may be toxic to fish and other aquatic biota. The proponent indicated that direct effects to fish and fish habitat related to blasting would occur in Bitter Creek at various locations along the access road during construction as a result of vibration and shockwaves. The proponent described these effects as being limited to the construction phase and at a limited number of locations along the access road. The proponent also described the potential for indirect effects through blasting residues leaching from blasted materials or runoff from blasting areas entering the aquatic environment. The proponent considered the effects from blasting residues in the assessment of effects to surface water quality.

Proposed Mitigation Measures, Monitoring and Follow-Up

The proponent would implement an Aquatic Effects Management and Response Plan, applicable to all potential effects to fish and fish habitat, which outlines management and response strategies relating to aquatic effects through all phases of the Project. The Aquatic Effects Management and Response Plan would include sampling sites for monitoring potential Project effects as well as reference sites.

Monitoring protocols for surface water quality, sediment quality, aquatic biota, fish populations, and fish tissue would also be included. The Aquatic Effects Management and Response Plan would also

describe sampling for *Metal and Diamond Mining Effluent Regulations* requirements such as effluent characterization, acute toxicity testing, site characterization studies (including surface hydrology), and sublethal toxicity testing.

Habitat Loss

The proponent would minimize habitat loss by locating mine components away from fish bearing waters. Habitat loss would be confined to the construction of the access road and would be minimized by following the existing road alignment and by minimizing the number of new stream crossings required. Where the access road crosses fish-bearing streams, the proponent would install clearspan bridge structures to avoid unnecessary effects to fish-bearing streams.

The proponent developed a Conceptual Fisheries Offsetting Plan which described several preliminary options to offset the habitat losses assessed based on Project activities. Approximately 10,500 square metres of instream fish habitats would be offset through activities such as salmon spawning habitat enhancement, restoration of fish habitat and passage areas, implementation of a beaver management program, and side channel habitat development. As part of the *Fisheries Act* authorization process and in consultation with Fisheries and Oceans Canada, the proponent may also offset the 27,000 square metres of riparian habitat loss. In the Conceptual Fisheries Offsetting Plan, the proponent provides the estimated area for habitat gain from each of the proposed offsetting projects. The proponent would provide a detailed fisheries offsetting plan to Fisheries and Oceans Canada as part of the proponent's application for a *Fisheries Act* authorization which would include the selected offsetting measure(s) and habitat accounting to ensure that the habitat losses are appropriately offset.

Increased Fishing Pressure

To address the potential increase in fishing pressure from Project personnel on-site and from non-Project personnel who could use the increased access to Bitter Creek and its tributaries, the proponent committed to implementing a no fishing policy and to control access to the access road. The proponent would restrict access with a locked gate to prohibit unauthorized entry (vehicles and foot entry) to the Project area, with the exception of individuals with existing rights to access the Bitter Creek valley including Indigenous people, guide outfitters, and trapline holders.

Changes in Aquatic Resources

Mitigation measures for potential changes to aquatic resources are similar to those for habitat loss, changes in surface water quality, changes in sediment quality, changes in streamflow, and blasting. Refer to the subsections above and below for a description of the mitigation measures associated with changes in aquatic resources.

Changes in Surface Water Quality

The proponent would minimize the release of cyanide into the environment by including a cyanide destruction circuit as part of the process plant. The circuit would use sodium metabisulphite, air, and copper sulphate for the destruction of cyanide prior to the discharge of tailings into the tailings management facility.

Tailings are expected to be potentially acid generating and are predicted to become acid generating during the post-closure phase. To reduce the potential for tailings to go acid during operation, the proponent would submerge tailings under a water cover in the tailings management facility and manage tailings deposition such that new tailings would be placed on top of old tailings on the exposed tailings beach.

In order to manage metal leaching/acid rock drainage, the proponent committed to backfilling all waste rock into the underground, and installing a hydraulic bulkhead at the lower portal to allow the mine to flood, thereby limiting oxidation which leads to acidic conditions. The proponent would also add lime to talus prior to placement as backfill in the underground to ensure that the talus remain neutral for the duration of the flooding period.

To mitigate for potential changes to fish and fish habitat from changes in surface water quality during operation, the proponent would sequester most mine and site contact water prior to discharge to the aquatic environment. Mine site runoff and contact water from dewatering activities would be directed to the portal collection pond for settling and removal of suspended solids. Site runoff from the Bromley Humps area would be collected and directed away from nearby watercourses to the tailings management facility; tailings management facility supernatant and most contact water would be treated to meet the *Metal and Diamond Mining Effluent Regulations* requirements prior to discharge to Bitter Creek. The tailings management facility would be fully lined to minimize groundwater seepage losses to Bitter Creek and fish habitat and seepage collection ponds would be in place to capture seepage and pump it back to the tailings management facility. The proponent indicated that it would not sequester the following sources of contact water, providing that its water quality predictions are correct and that water quality meets the requirements for direct discharge: contact water from dewatering activities during construction and the first one and a half years of operation (i.e. until the portal collection pond is commissioned), and contact water from the temporary waste rock storage areas. The proponent estimated that 20% of the seepage from the tailings management facility would be unrecoverable and diffuse.

Changes in Sediment Quality

The proponent would implement best management practices to mitigate the effects associated with changes in sediment quality from sedimentation and erosion as described in the Site Water Management Plan and Erosion and Sediment Control Plan. The mitigation measures described for changes in surface water quality are also applicable to sediment quality.

In-stream construction activities associated with the access road would take place between the reduced work window of June 1 and August 31 when the potential effects of instream works in Bitter Creek on Dolly Varden would be reduced. The proponent would install clear span bridges across Roosevelt Creek, and Hartley Gulch to minimize potential effects to fish bearing waters and eliminate the need for instream construction.

Changes in Stream Flows

To mitigate potential changes in stream flows, the proponent would install site water management infrastructure to divert non-contact water away from the tailings management facility and other Project infrastructure to maintain water quality and natural drainage networks. The proponent indicated that water needs for the process plant would be sourced from reclaim water from the tailings management facility to reduce the amount of water required from local natural surface waters. The proponent would limit creek water withdrawals to no more than ten percent of natural stream flows. The proponent would match the discharge from the tailings management facility to the hydrograph of the receiving environment. During operation, the proponent would monitor stream flows to determine whether additional mitigation needs to be implemented as mining continues. At closure, the tailings management facility would be fully lined with a geomembrane liner and soil to reduce infiltration and restore flows to the environment.

Blasting

To mitigate the effects of blasting on fish and fish habitat, the proponent stated that the destruction of fish, or any harmful effects to fish habitat when using explosives in or around water frequented by fish would be prevented or avoided. The proponent would also consider the guidance provided in Fisheries and Oceans Canada's *Guidelines for the Use of Explosives In or Near Canadian Waters*¹. The proponent indicated that no ammonium nitrate-fuel oil mixtures would be used in or near water to avoid the production of toxic by-products.

Blasting during operation would be restricted to the mine site thereby avoiding effects related to shockwaves on any fish-bearing waters. Transport of blasting residues to nearby watercourses would be mitigated through the capture and diversion of runoff into ponds at the mine site or Bromley Humps prior to discharge to the receiving environment.

Predicted Residual Effects

Taking into account the implementation of mitigation measures, the proponent did not predict residual effects to fish and fish habitat from increased fishing pressure, changes in aquatic resources, changes in sediment quality, or blasting.

The proponent predicted residual effects resulting from habitat loss in Bitter Creek where infilling for the access road would be required within the stream channel. Approximately 10,500 square metres of instream habitat would be lost, along with 27,000 square metres of riparian habitat adjacent to fish bearing streams. The proponent noted that some of the disturbed riparian habitat would be re-vegetated after construction and that following closure and reclamation, riparian vegetation would revert to near baseline conditions. The proponent predicted these residual effects to be of low magnitude because of the limited habitat loss, discrete geographic extent, short-term duration, one time frequency, and partially reversible over the long-term. Taking into account the implementation of

¹ Wright, D.G. and Hopky, G.E. (1998). Fisheries and Oceans Canada's *Guidelines for the Use of Explosives In or Near Canadian Waters*. Available from: <http://publications.gc.ca/site/fra/9.557379/publication.html>

mitigation measures, the proponent concluded that the effects of the Project to habitat loss would be not significant.

The proponent predicted residual effects to fish resulting from changes in surface water quality. Aluminum, antimony, cadmium, chromium, copper, mercury, selenium, silver, and zinc are predicted to exceed federal and/or provincial water quality guidelines. The proponent characterized the residual effects as low in magnitude, local geographic extent, permanent duration, sporadic frequency, and reversible in the long-term. Taking into account the implementation of mitigation measures as well as the interpretation that the predicted water quality guideline exceedances would be localized and would not have far-reaching effects on the regional productivity or diversity of fish, the proponent concluded that the effects of the Project from surface water quality to fish and fish habitat would be not significant.

The proponent also predicted residual effects to changes in streamflow in Bitter Creek as a result of mine discharge into Goldslide Creek. The maximum predicted increase in flow from baseline occurs in the low flow winter period and increases are predicted to be as high as 22 percent and 14 percent (dry conditions) above baseline at Bitter Creek BC06 and BC02, respectively. Changes in flows during the spring freshet, from May to September, are predicted to be negligible. Winter in the local study area is a low flow period under natural conditions. Winter is when Dolly Varden egg incubation occurs and the proponent indicated that increases in flows could affect incubating eggs and fry emergence timing. The proponent also stated that increased winter flows could improve the availability of overwintering habitat for juvenile Dolly Varden through the creation of deeper areas that do not freeze to bottom. The proponent characterized the residual effects to be of low magnitude, local geographic extent, short-term duration, regular frequency, and reversible after operations. Taking into account the implementation of mitigation measures, the proponent concluded that the effects of the Project to fish and fish habitat from changes in stream flows would be not significant.

6.1.2 Views Expressed

Fisheries and Oceans Canada expressed concerns about how predicted maximum changes to streamflow would affect the quantity and quality of fish habitat. In response, the proponent provided the percent change to streamflow for a one in 10 year dry scenario (low-flow scenario) and for one in 20 year wet scenario (high-flow scenario). The proponent predicted a maximum of an eight percent increase in flow at BC06 compared to baseline during the wet year scenario, and a maximum of a 22 percent increase in flow at BC06 compared to baseline in the dry year scenario. Fisheries and Oceans Canada noted that the proponent's response was adequate.

Natural Resources Canada provided comments on the proponent's groundwater model, and requested additional information about the sensitivity of the groundwater model to different hydrogeological parameters including hydraulic conductivity, recharge, and precipitation scenarios. Changes to the groundwater model would affect surface water flows and, in turn, may result in effects to fish and fish habitat. The proponent provided the requested information and Natural Resources Canada indicated that the proponent's response was adequate.

Natural Resources Canada also commented on the proponent's geochemical characterization and the potential for metal leaching/acid rock drainage. Changes to metal leaching/acid rock drainage assumptions would affect surface water quality and, in turn, may result in effects to fish and fish habitat. Natural Resources Canada noted that the proponent used field tests to evaluate the time to onset of acidic drainage, and noted that freezing in field tests may have resulted in an underestimation of the time to onset of acidic drainage. Further, Natural Resources Canada questioned whether existing samples used for the analysis were geologically and spatially representative. Natural Resources Canada recommended that the proponent undertake additional humidity cell testing using geologically and spatially representative samples in order to improve confidence in the geochemical information used in the water quality predictions.

United States government departments (United States Department of Interior, United States Environmental Protection Agency, and United States Department of Commerce – National Oceanic and Atmospheric Administration) expressed general concerns about effects of the Project on downstream aquatic resources and Alaskan fisheries. The Agency notes that effects to downstream fisheries are not anticipated, but has considered the potential environment effects associated with catastrophic failure of the tailings management facility as part of the assessment of effects of accidents and malfunctions (Section 7.1).

The Nisga'a Lisims Government (NLG) expressed concerns about exceedances of water quality guidelines for metals and about selenium bioaccumulation in Bitter Creek. The proponent and NLG agreed to continue discussions about water quality as part of development of site-specific environmental benchmarks during the permitting phase.

The Agency did not receive any comments on fish and fish habitat from Tsetsaut/Skii km Lax Ha, Métis Nation B.C., or from the public.

Regulatory Comments

Environment and Climate Change Canada provided comments about seepage from the tailings management facility, discharge from the portal collection pond, and compliance of the Project with the *Metal and Diamond Mining Effluent Regulations*. The Agency's assessment of effects to fish and fish habitat under CEAA 2012 focuses on surface water quality in fish-bearing reaches of Bitter Creek, while Environment and Climate Change Canada comments focused on surface water quality in waters that are upstream of fish-bearing waters.

Environment and Climate Change Canada explained that the *Metal and Diamond Mining Effluent Regulations* would apply to the entire mine because the total effluent from the Project as a whole would exceed the prescribed threshold of 50 cubic metres per day. As a result, Environment and Climate Change Canada noted that the unrecoverable and diffuse seepage from the tailings management facility would be subject to the *Metal and Diamond Mining Effluent Regulations*. The proponent's predictions showed that zinc may exceed the *Metal and Diamond Mining Effluent Regulations* limits during the post-closure phase. The proponent committed to installing one or more groundwater monitoring wells downgradient of the tailings management facility in order to monitor groundwater throughout the mine

life and refine predictions and implement additional mitigation, if required. Environment and Climate Change Canada questioned the feasibility of installing additional mitigation should it be required, because of the short distance between the tailings management facility (less than 50 metres) and Bitter Creek, and the steep and rugged nature of the terrain. However, Environment and Climate Change Canada reiterated the requirements of the *Metal and Diamond Mining Effluent Regulations*, and confirmed that this could be addressed during the regulatory phase and would not affect the conclusion of the environmental assessment on effects to fish and fish habitat.

Environment and Climate Change Canada also expressed concerns about the feasibility of contingency options in the event that water quality in the portal collection pond does not meet requirements for discharge under the *Metal and Diamond Mining Effluent Regulations*. Environment and Climate Change Canada noted that the proponent's upper case scenario indicated that there may be exceedances, and that the portal collection pond may not have sufficient capacity to hold water while a secondary treatment plant is commissioned. In response to similar questions from other members of the working group, the proponent confirmed that the portal collection pond only has a capacity for approximately two days of mine dewatering activities but noted that there is a 10 month filling period for the portal collection pond, during which there would be no discharges, which provides enough time to verify the water quality predictions and commission a water treatment plant, if required. In addition, should there be a sudden deterioration of water quality that was not anticipated, the proponent committed to re-directing water underground and shifting mining activities to other areas that do not require dewatering in order to limit flows to the portal collection pond.

6.1.3 Agency Analysis and Conclusion

Analysis of the Effects

The Agency agrees with the proponent's view that there would be no adverse residual effects to fish and fish habitat from increased fishing pressure, changes in aquatic resources, changes in sediment quality, and effects of blasting after the implementation of the best management practices and mitigation measures proposed by the proponent.

The Agency is of the view that there would be residual effects to fish and fish habitat as a result of habitat loss, changes in surface water quality, and changes in stream flows.

Habitat Loss

The Project would result in the loss of approximately 10,500 square metres of instream habitat, along with 27,000 square metres of riparian habitat adjacent to fish bearing streams. The proponent has developed a *Conceptual Fisheries Offsetting Plan* which identifies potential offsetting locations and the approximate area of instream habitat that would be offset, and indicated that it would also consider offsetting riparian habitat losses following conversation with Fisheries and Oceans Canada as part of the permitting process. The detailed offsetting plan would be prepared as part of the application for an authorization under the *Fisheries Act*. Fish habitat loss associated with the Project is limited to Bitter Creek as a result of access road construction. The fish habitat at the road construction locations in Bitter Creek is commonly found through the Bitter Creek watershed and fish use is likely limited to migration

and juvenile rearing. The Agency therefore characterizes the effect of habitat loss to fish and fish habitat as being low in magnitude and landscape in geographic extent as the effect takes place in the local study area. The timing of the effect is general because the proponent would conduct instream works during the time when risk to fish would be reduced. The frequency is once as the effect will be limited to the one-time loss of fish habitat during construction, and the duration is short-term, as it is limited to construction. The effect is reversible because fish habitat losses would be offset with habitat of similar function and attributes to the habitat lost.

Changes in Surface Water Quality

The Agency finds that the proponent's commitment to include cyanide destruction as part of the process plant and cyanide monitoring to ensure compliance with the *Metal and Diamond Mining Regulations* would be sufficient to manage any potential effects to fish and fish habitat from the use of cyanide.

In response to Natural Resources Canada's comment with respect to metal leaching/acid rock drainage and the associated uncertainty in the proponent's water quality predictions, the Agency is recommending a potential condition that, if accepted by the Minister of Environment and Climate Change, would require the proponent to undertake additional geological and chemical characterization and update the water quality model prior to construction.

The Agency agrees with the proponent that the Project would likely affect water quality in fish-bearing waters sporadically during operation and post-closure, as discharges from the mine are expected, including from dewatering of the underground mine, effluent discharges from the tailings management facility, and contact water runoff. This would result in reduced water quality in the mainstem of Bitter Creek. The highest quality spawning and rearing habitats for Dolly Varden in Bitter Creek occur within side channels and at tributary inflows. Under baseline conditions, these Dolly Varden are exposed to elevated background metal concentrations and therefore have demonstrated a high natural resilience to stresses from changes in water quality. In addition, the proponent would be required to comply with the *Metal and Diamond Mining Effluent Regulations* and, for parameters not under those regulations, subsection 36(3) of the *Fisheries Act* which are administered by Environment and Climate Change Canada.

The Agency characterizes the effect on fish and fish habitat as a result of changes in surface water quality as low in magnitude. Even though concentrations of several metals (cadmium, selenium, silver, and zinc), are predicted to exceed guideline thresholds in the receiving environment, the habitat affected is not considered limited or essential habitat. The effects are expected to be landscape geographic extent, sporadic in frequency, long term in duration, sensitive, and irreversible. The timing of the effect is considered sensitive because guideline exceedances can occur over months which overlap with essential life processes, such as spawning, for the Dolly Varden population in Bitter Creek. The Agency does not consider the effects of changes in surface water quality to fish and fish habitat to be reversible because the effects, based on the surface water quality assessment, are not reversible in the long term.

Changes in Stream Flows

There is a high degree of natural variability in the stream flows in fish-bearing reaches of Bitter Creek and the changes to Bitter Creek flows from Project discharges would be within the range of Bitter Creek's natural flow variability. The magnitude of the effect to fish and fish habitat from changes to stream flows would be low because it would be measurable but likely within range of natural variation experienced by fish in the local study area. The effect would be sensitive because the maximum predicted flow changes occur outside but immediately following the spawning season for Dolly Varden, medium-term in duration, and irreversible.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, advice from expert federal authorities, and comments received from NLG in identifying the following key mitigation measures to be implemented with respect to fish and fish habitat:

- Conduct in-water construction activities during the timing windows for carrying out work in fish habitat defined for the Skeena region by B.C. for Dolly Varden in the *Terms and Conditions for changes in and about a stream specified by Ministry of Forests, Lands, Natural Resources Operations, and Rural Development Habitat Officers, Skeena Region* (April 2018), unless otherwise allowed by relevant authorities. If the proponent is allowed by relevant authorities to conduct in-water construction activities outside of these timing windows, it would develop and implement additional mitigation measures for in-water construction activities other than the application of timing windows to protect fish during sensitive life stages. The proponent would submit these measures to the Agency prior to implementation.
- Implement, during all phases of the Project, measures to control erosion and sedimentation, including along the access and haul roads, to avoid the deposit of deleterious substances in water frequented by fish.
- Restore riparian buffer strips disturbed by Project construction activities to their baseline width and capacity as soon as possible as the construction work is completed. The proponent would use plant species native to the area when restoring the riparian zone.
- The proponent shall comply with the *Metal and Diamond Mining Effluent Regulations* and subsection 36(3) of the *Fisheries Act*. In doing so, the proponent would:
 - Collect supernatant and seepage from the tailings management facility and treat all collected supernatant and seepage that would not meet the requirements of the *Metal and Diamond Mining Effluent Regulations* and subsection 36(3) of the *Fisheries Act* prior to any discharge, including discharge into Bitter Creek, during operation and decommissioning and until such time that the water is suitable for direct discharge to the environment. When treating supernatant and seepage, the proponent would take into account the water quality thresholds in the Canadian Council of Ministers of the Environment's *Water Quality Guidelines for the Protection of Aquatic Life* and in B.C.'s *Water Quality Guidelines for the Protection of Aquatic Life*; and
 - Collect and treat contact water that would not meet the requirements of the *Metal and Diamond Mining Effluent Regulations* and subsection 36(3) of the *Fisheries Act*, prior to any discharge, including discharge into Goldslide Creek, during all phases of the Project and until such time that water is suitable for direct discharge into the environment. When treating contact water, the proponent would take into account the water quality thresholds in the

Canadian Council of Ministers of the Environment's *Water Quality Guidelines for the Protection of Aquatic Life* and in B.C.'s *Water Quality Guidelines for the Protection of Aquatic Life*.

- Place all acid-generating and potentially acid generating tailings into the tailings management facility and submerge tailings under a water cover during operation.
- Maintain the flow rates downstream of the tailings management facility discharge location in Bitter Creek within the range of naturally occurring low-flow and peak-flow rates for the applicable months of the year as identified in table 5-7 and table 5-8 of Appendix 12-A of the EIS by controlling volume and timing of discharges to Bitter Creek.
- Complete, prior to construction and in consultation with relevant authorities, a geological and geochemical characterization of the geologic material in the Project area. The proponent would subsequently update the water quality model conducted for the EA to predict adverse effects on water quality during all phases of the Project, based on information from the completed geological and geochemical characterization. As part of the geological and geochemical characterization, the proponent would:
 - Describe the geology and the distribution and nature of reactive geologic material in the Project area;
 - Conduct humidity cell studies to predict the time to onset of neutralizing potential depletion and acidic drainage for waste rock using samples that are geologically and spatially representative of the Project area, taking into account the *Mine Environment Neutral Drainage Program's Prediction Manual for Drainage Chemistry from Sulphidic Geological Materials (2009)*;
 - Conduct field tests to measure rate of geochemical change (neutralizing potential depletion and acid generation) for tailings for periods of time that would be determined in consultation with relevant authorities;
 - Determine the impact of freezing on the rate of sulphide oxidation and the depletion of neutralizing potential in the crib field test pads and legacy waste rock pile using total inorganic carbon - neutralizing potential calculations;
 - Predict drainage chemistry from cemented backfill and associated adverse effects on water quality in the mine pool; and
 - Conduct long-term trickle leach columns based on long-term strength of acidic drainage.
- Develop, prior to construction and to the satisfaction of Fisheries and Oceans Canada and in consultation with NLG, any offsetting plan(s) related to any residual serious harm to fish associated with the carrying out of the Project. The proponent would submit any approved offsetting plan(s) to the Agency prior to implementation.
- If any fish habitat offsetting measure(s) proposed in any offsetting plan(s) may cause adverse environmental effects not considered in the EA, develop and implement, following consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities, measures to mitigate those effects. The proponent would submit these measures to the Agency prior to implementation.

Need for and Requirements of Follow-up

After considering the follow-up program proposed by the proponent, expert advice from federal authorities, and comments received by NLG and the public, the Agency has identified the following requirements for a follow-up program:

- Develop and implement, prior to construction and in consultation with NLG and relevant authorities, a follow-up program to verify the accuracy of the EA as it pertains to fish and fish habitat including any update to the predicted adverse effects to water quality as described above, and to determine the effectiveness of mitigation measures. The proponent would implement the follow-up program, including the monitoring requirements of the *Metal and Diamond Mining Effluent Regulations*, during all phases of the Project. As part of implementation of the follow-up program, the proponent would:
 - Monitor water quality in Bitter Creek, Goldslide Creek and Bear River year round; and
 - Develop, in consultation NLG and relevant authorities, and implement modified or additional mitigation measures if monitoring results show any exceedances of water quality objectives and benchmarks identified by British Columbia for the Project to protect aquatic life.

Conclusion

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects to fish and fish habitat.

6.2 Migratory Birds

The Agency focused its assessment on effects of changes to habitat availability (habitat loss, habitat alteration and sensory disturbance), and mortality risk (direct mortality, mortality from chemical hazards and attractants) for migratory birds, as defined in the *Migratory Birds Convention Act, 1994*.

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects to migratory birds.

6.2.1 Proponent's Assessment of Environmental Effects

Predicted Effects

The proponent assessed changes to habitat availability and mortality risk for migratory birds, including specific species at risk such as black swift, common nighthawk, marbled murrelet, and olive-sided flycatcher. MacGillivray's warbler, a common species in the Project area that is listed as a priority species by Environment and Climate Change Canada in the bird conservation region where the Project is located (Bird Conservation Region 5), was chosen as a focal species for the assessment. The proponent also assessed changes to habitat availability using habitat guilds based on nesting habitat associations, including: alpine, old/mature forest, riparian/early successional, and other species. Mortality risk was assessed for migratory birds as a whole rather than in a species-specific manner.

Changes to Habitat Availability

According to the proponent, direct loss of migratory bird habitat would occur as a result of vegetation clearing and ground disturbance, while indirect habitat loss would occur as a result of sensory disturbance. Clearing of trees and other vegetation near Project infrastructure would remove suitable nesting and resident species habitat, create wind exposure, increase predation, and lead to other edge effects. Human presence and sensory disturbance such as light and noise during construction and

operation would also decrease the suitability of habitats adjacent to the Project area as bird species tend to avoid noisy and human-occupied areas, although the response can vary by species and their resiliency. MacGillivray's warbler is more resilient to stress, whereas black swift and common nighthawk are more sensitive to changes in their environment. Migratory birds, particularly black swift, may be affected by airborne pollutants and climate change events, such as droughts, storms, flooding and extreme temperature.

The proponent predicted that a total of 1,045 hectares of suitable habitat would be lost directly as a result of clearing for Project infrastructure or indirectly as a result of sensory disturbance: 155 hectares of alpine habitat, 312 hectares of old or mature forest habitat, 394 hectares of riparian habitat, and 184 hectares of shrub early successional habitat (Table 4). Specifically, the proponent predicted the loss or alteration of 55 hectares of habitat for black swift, 34 hectares for common nighthawk, 95 hectares for marbled murrelet, 150 hectares for olive-sided flycatcher, and 171 hectares for MacGillivray's warbler (Table 4). Approximately one hectare of marbled murrelet habitat was mapped as potential critical habitat, however, the proponent verified it in the field and indicated that it would not be considered critical habitat.

Table 4 Changes to Migratory Bird Habitat Availability in the Local Study Area and Regional Study Area

Habitat guild or species	Local study area			Regional study area		
	Total suitable habitat (hectares)	Suitable habitat lost or altered (hectares)	Percentage of suitable habitat lost or altered (%)	Total suitable habitat (hectares)	Suitable habitat lost or altered (hectares)	Percentage of suitable habitat lost or altered (%)
Habitat guilds						
Alpine	6,204	155	2	34,653	155	<1
Old/mature forest	3,301	312	9	34,249	312	<1
Riparian	2,797	394	14	12,146	394	<1
Shrub/early successional	1,446	184	13	49,889	184	2
Specific species						
Black swift	263	55	21	2,084	55	3
Common nighthawk	99	34	35	4,823	34	<1
Marbled murrelet	162	95	59	2,971	95	3
Olive-sided flycatcher	809	150	19	32,743	150	<1
MacGillivray's warbler	2,258	171	8	23,805	171	<1

Mortality Risk

Collisions with vehicles or Project infrastructure represent the greatest risk of mortality to birds, particularly for common nighthawk because they nest on gravel roads and could collide with vehicles, and for marbled murrelet because they fly at or above forest canopies and could collide with powerlines.

Effects from Chemical Hazards and Attractants

The proponent considered the potential for chemical hazards to affect the health of migratory birds. Exposure to chemical hazards may be direct as a result of direct contact with chemical hazards through direct uptake of water, dust, soil or sediment, or indirect as a result of ingestion of contaminated food.

The proponent also considered the potential for Project features to act as attractants to migratory birds, including odours from garbage and food waste, grey water, sewage, and lighting. Project infrastructure, ponds or roadside pools may also provide refuge or shelter for migratory birds in the form of perching, nesting, stop-over, foraging or roosting sites, exposing them to potential entrapment, behavioral changes or human-wildlife conflicts.

Proposed Mitigation Measures, Monitoring and Follow-Up

The proponent prepared a Wildlife Management Plan that presented mitigation measures to minimize the adverse effects to wildlife species, including migratory birds. As part of this plan, the proponent committed to measures to mitigate effects to habitat availability including scheduling vegetation clearing and construction activities outside sensitive bird breeding periods where possible, and establishing a buffer zone of at least 30 meters around active nests to prevent their destruction or disruption. If vegetation clearing and construction activities must proceed during sensitive bird breeding periods, the proponent committed to conducting pre-clearing surveys to identify nests to be avoided and developing site specific procedures to protect nests. At closure, the proponent committed to revegetating and reclaiming the Project area to remove barriers, facilitate wildlife movement, and restore habitat suitability to pre-disturbance conditions.

To mitigate mortality risk, the proponent committed to employing deterrents (e.g. air horns, noise makers, fencing) to discourage migratory birds from entering Project infrastructure (including on-site settling sumps, ponds, and the tailings management facility) for refuge, shelter, nesting, and roosting, and potentially becoming entrapped.

The proponent would also consider the Avian Power Line Interaction Committee's guidance, *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (October 2012), which identifies mitigation measures to reduce mortality risk, in the final design of the powerline.

The proponent committed to intercepting, routing, and treating contact water to on-site settling sumps, ponds, and the tailings management facility prior to discharging to the environment where the chemical hazards could lead to mortality of migratory birds. Hazardous materials (e.g. used batteries, petroleum product containers, grey water, sewage, contaminated soil or snow) would be managed according to the *Transportation of Dangerous Goods Act*. Fuel would be stored on-site in double walled tanks to prevent potential spills.

Predicted Residual Effects

The proponent predicted that there would be residual effects to migratory birds from changes to habitat availability. The proponent characterized this predicted residual effect as low in magnitude considering the access to thousands of hectares of suitable habitat in the regional study area, and occurring at the landscape level given that it would be limited to the local study area. While this effect would be continuous and occur over the long-term, the proponent indicated that the effect would be reversible after Project closure and reclamation activities. Consequently, the proponent concluded that the effects of the Project to habitat availability of migratory birds would be not significant.

The proponent predicted increased mortality risk for common nighthawk and marbled murrelet. The proponent noted that the loss of a few individuals within the regional population of the common nighthawk and marbled murrelet would be offset by natural recruitment through reproduction and migration. The proponent noted the low density populations of common nighthawk in the local study area and their conservative assessment of the species considering uncertainty in the population size in

the Project area. The proponent concluded that the effects of the Project to migratory birds due to mortality risk would be not significant.

The proponent did not predict any residual effects from chemical hazards and attractants.

6.2.2 Views Expressed

Environment and Climate Change Canada recommended that the proponent consider baseline data collected during non-breeding seasons in addition to breeding seasons to understand and accurately assess year-round migratory bird use of the Project area and their seasonal movements. In response, the proponent provided survey data collected as part of other projects and initiatives in the area for non-breeding seasons.

Environment and Climate Change Canada expressed concern about the location of baseline surveys for common nighthawk and black swift, and questioned whether the selected locations in lower quality habitats were appropriate for detecting the species. The proponent provided maps showing the overlap of nesting habitat with Project infrastructure and survey locations. The proponent also indicated that the locations of detections are not necessarily linked to habitat quality. Black swift spend most of their time in flight and leave nesting sites at dawn and return at dusk. Common nighthawk are more likely to be detected while in flight because they return calls while in flight but not while in nests.

The Agency did not receive any comments on migratory birds from Nisga'a Lisims Government (NLG), Tsetsaut/Skii km Lax Ha, Métis Nation B.C., or the public.

6.2.3 Agency Analysis and Conclusion

Analysis of the Effects

The Agency agrees with the proponent that there would be residual effects to migratory birds due to changes in habitat availability, and increased mortality risk for common nighthawk and marbled murrelet.

The Agency agrees with the proponent that the majority of species considered under the habitat guild assessment as well as the MacGillivray's warbler, have a high resiliency to change and may still occupy areas altered by Project-related vegetation clearing and sensory disturbances. Migratory bird species at risk, namely black swift, common nighthawk, marbeled murrelet, and olive-sided flycatcher, are less resilient to change. In particular, black swift are sensitive because they have high nest fidelity and specific nest attributes while the common nighthawk are sensitive because they have a low clutch size (low number of eggs per brood) and a short breeding season. However, the amount of habitat that would be removed by the Project is small compared to the habitat available in the regional study area (three percent and less than one percent of habitat lost relative to the regional study area for black swift and common nighthawk, respectively).

The Agency agrees with the proponent that changes to habitat availability should be assessed using the regional area given large ranges for birds. The Agency finds that the magnitude of changes to habitat

availability is moderate given that up to 59 percent of suitable habitat would be removed in the local study area for one species (marbled murrelet), and up to 3 percent of habitat would be lost in the regional study area. The geographic extent of the effect would occur at the landscape level because the residual effect would be limited to the local study area. Since the Project would be under construction for 18 months and operate for six years, these Project activities would overlap with the several breeding seasons. As a result, the Agency considers the timing of the residual effect to be sensitive. The effect would occur once for land clearing and be continuous for sensory disturbance, be long-term in duration, and occur during construction, operation, and into closure. The effect would be reversible once Project infrastructure is removed and vegetation has been re-established; however, re-establishment may not occur for some species until post-closure (e.g. old-growth forest for marbled murrelet).

While birds fly high and above powerlines, their vision does not always permit them to clearly see powerlines so the Agency expects that the Project would result in increased mortality risk for common nighthawk and marbled murrelet. As there is a relatively small area of overlap between bird habitat and the access road and powerlines, the residual effect would be low in magnitude. The effect would be limited to the local study area and occur sporadically due to occasional collisions. The timing of the effect would be sensitive because it would occur throughout the year, including breeding season, and long-term. The effect would be reversible immediately upon removal of Project infrastructure during the closure phase. The Agency agrees with the proponent that the loss of a few individuals within a regional population would be offset by natural recruitment through reproduction and migration.

The Agency agrees with the proponent that measures including use of deterrents (e.g. air horns, noise makers, fencing), and managing hazardous materials, contact water and fuel would be sufficient to address effects to migratory birds from exposure to chemical hazards and attractants. The Agency is of the view that there would be no residual effects to migratory birds from exposure to chemical hazards and attractants.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent and advice from expert federal authorities in identifying the following key mitigation measures to be implemented by the proponent with respect to migratory birds:

- Carry out the Project in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the proponent would develop, prior to construction and in consultation with relevant authorities, a migratory birds management plan that takes into account Environment and Climate Change Canada's *Avoidance Guidelines*, and the risk of incidental take. The migratory birds management plan would also include measures the proponent would implement if migratory birds or their nests are found. The proponent would implement the migratory birds management plan during all phases of the Project. The proponent's actions when implementing the migratory birds management plan would be in compliance with the *Migratory Birds Convention Act, 1994*, the *Migratory Birds Regulations*, and with the *Species at Risk Act*.
- As part of development and implementation of the migratory birds management plan, the proponent would develop and implement mitigation measures related to sensitive periods and

locations for migratory birds, including mitigation measures that would consider critical habitat identified for black swift, common nighthawk, marbled murrelet, olive-sided flycatcher in recovery strategies under the *Species at Risk Act* and suitable habitat identified by the proponent in figures 16.7-21, 16.7-22, 16.7-23 and 16.7-24 of the EIS.

- Control lighting required for all phases of the Project, including direction, timing and intensity, to avoid adverse effects on migratory birds and on listed species at risk, while meeting health and safety requirements.
- Deter migratory birds from using on-site settling sumps, ponds, tailings management facility, and other water management structures containing contact water.
- Undertake, in consultation with NLG and relevant authorities, progressive reclamation of all areas disturbed by the Project. The proponent would identify, in consultation with NLG and relevant authorities, plant species native to the area of the Project for revegetation as part of progressive reclamation, including species suitable to create habitats for migratory birds, listed species at risk, and species of interest to Indigenous peoples.

Need for and Requirements of Follow-up

After considering the follow-up program proposed by the proponent, and expert advice from federal authorities, the Agency has identified the following requirements for a follow-up program:

- Develop, prior to construction and in consultation with NLG, a follow-up program to verify the accuracy of the EA and determine the effectiveness of mitigation measures to avoid harm to migratory birds, their eggs and nests, including mitigation measures described above. The proponent would implement the follow-up program during all phases of the Project. As part of the implementation of the follow-up program:
 - Monitor use of on-site settling sumps, ponds, the tailings management facility, and other water management structures containing contact water; and
 - Monitor migratory bird collisions with vehicles and Project infrastructure.
- Develop, prior to construction and in consultation with NLG and relevant authorities, a follow-up program to assess the effectiveness of the progressive reclamation activities, including the establishment of plant species native to the Project area and suitable to create habitat for migratory birds, listed species at risk, and species of interest to Indigenous people.

Conclusion

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects to migratory birds.

6.3 Current Use of Lands and Resources for Traditional Purposes

The Agency assessed effects of changes to the environment on the current use of lands and resources for traditional purposes by Indigenous peoples, including fishing, hunting, trapping, plant gathering, and use of habitations, trails, or cultural and spiritual sites.

This section assesses the effects of the Project on Tsetsaut/Skii km Lax Ha and Métis Nation B.C. Section 8.0 describes the Agency's assessment of Project-related effects on the Nisga'a Nation in the context of

paragraph 8(e) and 8(f) of Chapter 10 of the *Nisga'a Final Agreement*. The Nisga'a Lisims Government (NLG) indicated to the Agency that the current use of lands and resources for traditional purposes section of CEAA 2012 does not apply to Nisga'a Nation; therefore, the Agency did not include Nisga'a Nation in this assessment.

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects to the current use of lands and resources for traditional purposes by Aboriginal peoples.

6.3.1 Proponent's Assessment of Environmental Effects

Predicted Effects

The proponent assessed Project-related environmental changes to fish, wildlife, vegetation and ecosystems that could result in changes to the ability of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. to harvest fish, wildlife, birds or plants for traditional purposes. The proponent also assessed changes to access to the Bitter Creek valley and changes to air quality, visual quality, and noise that could result in avoidance or other impacts to the cultural value of the Bitter Creek valley, including a reduced quality of experience while practicing traditional activities.

Access and Cultural Value

The proponent noted that consultation activities and a review of secondary information indicated a low level of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. use of the Bitter Creek valley due to the steep and rugged terrain which make access challenging. A road used for exploration activities at the location of the Project would have been the primary access into the Bitter Creek valley until it was decommissioned in the 1990s.

Construction of the access and haul roads for the Project has the potential to increase harvesting pressure on migratory birds, wildlife, fish, and plants. However, the proponent has committed to limiting access to the Bitter Creek valley during construction, operation, and decommissioning by installing a manned, locked gate on the access road near the Clements Lake turn off. The manned, locked gate would be required for safety reasons and would prohibit public access to the Bitter Creek valley, thereby reducing increased harvesting pressure, but it would also limit the ability of Indigenous peoples to access the area. The proponent would develop, in consultation with Tsetsaut/Skii km Lax Ha, Métis Nation B.C. and other appropriate parties, an access management plan to allow some use of the Bitter Creek valley.

The proponent considered the potential for effects to air quality, visual quality, and noise to change Tsetsaut/Skii km Lax Ha or Métis Nation B.C. use of the Bitter Creek valley. The proponent determined that air contaminant concentrations are predicted to be below ambient air quality objectives within 500 metres of Project infrastructure and within 50 metres of the access road. The proponent stated that changes to air quality effects were unlikely to affect the cultural value of the area for Tsetsaut/Skii km Lax Ha or Métis Nation B.C. because of their limited use of the Bitter Creek valley. Similarly, the proponent did not identify any changes to visual quality that would affect the cultural value of the area.

The proponent predicted that noise levels generated by the processing plant and the mine portals would not exceed the nighttime noise criteria threshold of 45 A-weighted decibels beyond 950 metres from the noise sources during construction and 1.2 kilometres during operations. Noise levels near the outer spatial extent of the local study area were predicted to be at or below 35 A-weighted decibels, which is equivalent to the assumed background noise level. Noise levels from surface blasting would only take place during the construction phase and would meet Environment and Climate Change Canada's *Environmental Code of Practice for Metal Mines* criteria threshold of 128 decibels outside the immediate blast areas. The proponent predicted that noise would not affect the cultural value of the Bitter Creek valley for Tsetsaut/Skii km Lax Ha or Métis Nation B.C. considering their limited use and the limited extent of noise effects.

Fishing

The proponent stated that consultation activities and the review of secondary information did not identify evidence of current fishing use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha or Métis Nation B.C. Section 6.1 of this report describes the predicted effects of the Project on fish and fish habitat. The proponent stated that potential effects to fish and fish habitat would occur as a result of habitat loss, increased fishing pressure, blasting, and changes in aquatic resources, water quality, sediment quality and stream flows. These effects may impact the ability of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens to harvest fish for traditional purposes.

The Project would affect Dolly Varden, the only consumable fish species found in the Project area. Dolly Varden use the lower reaches of Bitter Creek and its tributaries (Hartley Gulch, Cambria Creek, and Roosevelt) for spawning, rearing and limited overwintering. The proponent indicated that Dolly Varden caught in the Bitter Creek and tributaries were small (seven to twenty centimetres long), which is consistent with Dolly Varden found in other small headwater streams. The proponent indicated that changes in surface water quality (i.e. elevated levels of antimony, cadmium, chromium, cobalt, copper, mercury and selenium, silver and zinc) may affect the quantity and quality of Dolly Varden and would be limited to the local study area, continuous, permanent, and reversible in the long term. Bitter Creek flows into Bear River which supports a number of fish species, but residual effects to fish are expected to be limited to Bitter Creek and are not expected to extend into Bear River.

Increased fishing pressure from recreational fishers using the Project access and haul roads may reduce Dolly Varden availability. Project-related noise, increased human presence, dust and change to the visual landscape may lead to a lower quality fishing experience and possible avoidance of the area. These effects would be confined to the Bitter Creek valley, but persist through all phases of the Project. Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens' access to Bitter Creek valley is expected to be limited during all phases of the Project due to the manned, locked gate.

Hunting and Trapping

The proponent stated that consultation activities and the review of secondary information did not identify evidence of current hunting or trapping activities in the Bitter Creek valley by Tsetsaut/Skii km Lax Ha. Métis Nation B.C. indicated members of their chartered communities hunt and trap in the area and provided a map identifying a trapping site and a mountain goat hunting site within the local study

area. The proponent indicated that consultation efforts and the review of secondary information did not identify further information about the historic or current use of these sites. The proponent concluded Bitter Creek valley has low traditional use value for hunting and trapping for Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

The proponent assessed changes to habitat availability (habitat loss, habitat alteration, and sensory disturbance), changes to habitat distribution (disruption of movement), mortality risk (direct and indirect) and effects from chemical hazards and attractants for all species. These effects may impact the ability of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. to harvest wildlife for traditional purposes. The proponent anticipates that the Project may result in a reduction of the availability of wildlife (including mountain goat, moose, grizzly bear, other furbearers, and migratory birds) as a result of loss or alteration of wildlife habitat, and increased mortality risk from collisions with Project-related traffic and increased access by recreational hunters resulting from increased public access to the Bitter Creek valley. Section 7.3 of this report assesses in greater detail the potential effects of the Project on species at risk (i.e. grizzly bear and wolverine). Section 7.1 describes the potential effects on wildlife and migratory birds as a result of accidents and malfunctions that may occur as a result of the Project and which could negatively impact the ability of Indigenous peoples to hunt and trap wildlife.

The proponent noted that Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens may be excluded from the Bitter Creek valley during the life of the Project for health and safety reasons. These access restrictions may disrupt hunting and trapping within the Bitter Creek valley. In addition to a reduction in wildlife and access to the Bitter Creek valley, changes to the Indigenous experience of hunting and trapping may result from increased public access to, and presence in, the Bitter Creek valley. Project-related noise, dust and change to the visual landscape will be confined to the Bitter Creek valley but will persist through all phases of the Project. These changes may also lead to a lower quality hunting and trapping experience and possible avoidance of the area.

Plant Gathering

The proponent stated that consultation activities and the review of secondary information did not identify evidence of current use of the Bitter Creek valley for plant gathering by Tsetsaut/Skii km Lax Ha or Métis Nation B.C. Effects to vegetation and ecosystems may impact the ability of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens to harvest plants for traditional purposes.

The proponent indicated that surface disturbance, dust, and the potential spread of invasive plant species would result in the loss and alteration of ecosystem and vegetation abundance, distribution and/or function. The proponent stated that effects cannot be fully mitigated and thus loss and/or alteration of alpine and parkland ecosystems, old and mature forested ecosystems, B.C. Conservation Data Centre listed floodplain and wetland ecosystems, and rare plants and lichens are predicted. Construction of the access road into the Bitter Creek valley may increase plant gathering activities by Project employees and contractors and the public, resulting in a reduction in resource availability.

The proponent noted that Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens may be excluded from areas surrounding Project infrastructure for health and safety reasons, and prevented from accessing

the Bitter Creek valley by way of a gate that would be installed near the entrance to the access road. These access restrictions may disrupt plant harvesting opportunities within the Bitter Creek valley.

In addition to changes to plant availability, changes to the Indigenous experience of plant gathering may result from increased Project employee and contractor and public access to, and presence in, the Bitter Creek valley. The Project would result in increased noise and dust, and change the visual landscape, effects that may lead to a lower quality plant gathering experience and possible avoidance of the area by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens.

Habitation, Trails, and Cultural and Spiritual Sites

The proponent stated that consultation activities and the review of secondary information did not identify evidence of Tsetsaut/Skii km Lax Ha habitation, trails, or cultural and spiritual sites in the Bitter Creek valley. The proponent noted that Métis Nation B.C. identified one tent site, but did not provide further information about the historic or current use of the site or about access or travel routes in the area.

The proponent indicated that there would be no effects to current use of lands for habitation, trails, or cultural and spiritual sites in the Bitter Creek valley. As a result, the proponent did not propose any mitigation measures and did not identify any residual effects.

Proposed Mitigation Measures, Monitoring and Follow-Up

Access and Cultural Value

The proponent proposed the installation of a locked, manned gate along the access road near the junction of Highway 37A. The proponent would develop, in consultation with Tsetsaut/Skii km Lax Ha and Métis Nation B.C. and other appropriate parties, an access management plan to limit public access to the Project area, to mitigate the effects of road use on the environment, and to ensure appropriate access for Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens. The proponent will prohibit fishing, hunting and trapping by employees and contractors. Mine personnel would be housed in accommodations in Stewart and would be transported to the Project site by bus. Project road use would be restricted only to persons required for construction, operation, and maintenance.

The proponent did not anticipate effects to the cultural value of the Bitter Creek valley for Tsetsaut/Skii km Lax Ha or Métis Nation B.C. and therefore proposed no mitigation measures.

Fishing

The proponent would be required to implement the measures identified in Section 6.1 of this report to avoid or mitigate effects on fish and fish habitat and in turn, on the fishing rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. As noted in the previous section, the proponent proposed to develop, in consultation with Tsetsaut/Skii km Lax Ha and Métis Nation B.C. and other appropriate parties, an Access Management Plan to limit access to the Project area and to ensure appropriate access for Indigenous peoples to exercise their rights, including fishing, in the Bitter Creek valley. The proponent also committed to enforcing a no-fishing policy for Project employees and contractors in the Bitter Creek valley. Loss of fish habitat would be offset as part of the proponent's fisheries offsetting plan.

Hunting and Trapping

For effects to habitat availability, the proponent committed to avoid undertaking vegetation clearing and construction activities during sensitive periods where possible. The proponent committed to establishing non-disturbance buffers, where possible, around all important wildlife features. For instance, the proponent committed to minimizing helicopter use and avalanche control within one to two kilometres of high suitability grizzly bear denning habitat and known den sites and to performing ground-based surveys prior to blasting from November to July and stop blasting if mountain goat are observed within 1,000 metres of the blast area. Active avalanche control would be implemented to mitigate snow avalanche disturbance and mortality risks to mountain goat.

For effects on habitat distribution and mortality risk from vehicle collisions with wildlife, the proponent proposed to manage snow bank height along Project roads, establish periodic breaks and escape routes in snowbanks to minimize physical barriers for wildlife movement, improve road conditions through vegetation management and wildlife signage to increase wildlife visibility and wildlife right-of-way, and minimize Project traffic to reduce noise. To reduce mortality risk from vehicle collisions with wildlife, the proponent would apply a 50 kilometres per hour speed limit along the access and haul roads, a no-hunting policy for Project employees and guests, access restrictions into the Bitter Creek valley, and a road-wildlife reporting program. The proponent also committed to permanently deactivating the full length of the access and haul roads following the operation of the mine.

To mitigate the effects of chemical hazards and to attractants, the proponent committed to implementing a no-littering or intentional attraction policy, installing bear-proof waste receptacles, maintaining Project roads to avoid de-icing or dust suppression, especially in winter as salt attracts mountain goat, and designing the Project to limit new access to alpine areas within known mountain goat ranges. Additional measures applicable to wildlife and migratory birds are described in Sections 6.2 (Migratory Birds), 7.3 (Species at Risk), and 8.1.3 (Nisga'a Nation Effects Assessment – Wildlife).

Plant Gathering

The proponent proposed to mitigate potential effects on plant gathering opportunities and practices by minimizing site clearing, protecting soil quality and quantity, and applying dust suppression measures. The proponent would mitigate potential effects on ecosystems and vegetation by conducting pre-construction rare plant surveys to identify rare plant and lichen habitat, and invasive plant species, avoiding the use of herbicide sprays within 200 metres of rare plants and lichen populations, and ensuring that a qualified environmental monitor is on site during clearing activities in known rare plant habitat. The proponent proposed pre-construction invasive plant surveys within the Project footprint and removal of existing invasive plant populations to prevent spread.

Predicted Residual Effects

Fishing

Taking into account the implementation of mitigation measures, the proponent predicted that there would be residual effects to fishing. The proponent characterized the predicted residual effects as low in magnitude considering the minimal use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis

Nation B.C. and the effects would be limited to the local study area. The effects would be continuous, long-term, and reversible. Consequently, the proponent concluded that the Project is not likely to cause significant residual effects to fishing, hunting and trapping, and plant gathering for Tsetsaut/Skii km Lax Ha or Métis Nation B.C.

Hunting and Trapping

Taking into account the implementation of mitigation measures, the proponent predicted that there would be residual effects to hunting and trapping. The proponent characterized the predicted residual effects as low in magnitude considering the minimal use of the Bitter Creek valley Tsetsaut/Skii km Lax Ha and Métis Nation B.C. and the effects would be limited to the local study area. The effects would be continuous, long term and reversible. Consequently, the proponent concluded that the Project is not likely to cause significant residual effects to hunting and trapping for Tsetsaut/Skii km Lax Ha or Métis Nation B.C.

Plant Gathering

Taking into account the implementation of mitigation measures, the proponent predicted that there would be residual effects to plant gathering. The proponent characterized the predicted residual effects as low in magnitude considering the minimal use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. and the effects would be limited to the local study area. The effects would be continuous, long-term, and reversible. Consequently, the proponent concluded that the Project is not likely to cause significant residual effects to plant gathering for Tsetsaut/Skii km Lax Ha or Métis Nation B.C.

6.3.2 Views Expressed

Métis Nation B.C. identified three sites in the Project area: one trapping, one overnight, and one mountain goat harvesting. However, they did not provide additional information on the specific location of these sites or the historic or current use of these sites. Métis Nation B.C. advised the Agency that Métis citizens in Terrace, Prince Rupert, Smithers, and Stewart harvest country foods for sustenance purposes and hunt, fish, trap, and gather in the area of the Project. They are also concerned about the spread of invasive plant species. Métis Nation B.C. did not comment on the Wildlife Management Plan or other mitigation measures outlined by the proponent in the EIS.

During the Agency's public comment period on the Project Description, Tsetsaut/Skii km Lax Ha advised the Agency that they are a hunting, trapping, fishing, and resource harvesting community, whose traditional territory is dotted with highly valued historical, cultural, and berry/plant/mushroom harvesting sites. They consume blueberries, cranberries, dandelions and fiddleheads and gather other plants including willow, devil's club, and yarrow. They trade soapberries for herring eggs and seaweed. They fish salmonid species, eulachon, and lake trout, hunt moose and bear, and trap beaver, martin, and wolverine. Tsetsaut/Skii km Lax Ha indicated they have a tenure system that allows for exclusive resource use, territorial management and decision-making under the guidance of the hereditary chief. Managing resources in their territory is critically linked to continued existence, wealth, and status in the feasting system. They expressed concerns about effects to country foods for sustenance purposes, and

effects on furbearers, including an increase in predator wolf populations. Tsetsaut/Skii km Lax Ha did not provide information about their current use of the Bitter Creek valley and did not provide subsequent comments during the comment period on the EIS Summary.

The Agency did not receive any comments on the current use of lands and resources for traditional purposes from federal authorities or the public.

6.3.3 Agency Analysis and Conclusion

Analysis of the Effects

The Agency considered the proponent's EIS as well as comments provided by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. during the EA to evaluate the potential effects of changes to the environment caused by the Project on the current use of lands and resources for traditional purposes by Indigenous peoples. This section is informed by the assessment of effects to biophysical valued components including air quality, noise, water quality, hydrology, vegetation, wildlife, and fish. The Agency's assessment of effects to fish and fish habitat, migratory birds, and species at risk is presented in Sections 6.1, 6.2, and 7.3, respectively.

The Agency agrees with the proponent that there is little evidence of current use in the Bitter Creek valley by Tsetsaut/Skii km Lax Ha or Métis Nation B.C. The Agency acknowledges that Métis Nation B.C. identified three use sites in the Project area: a location each for trapping, overnight, and mountain goat harvest. However, there is no information about the current or historic use of those sites.

Access and Cultural Value

The Agency agrees with the proponent that increased presence in the Bitter Creek valley by Project employees and contractors and the public, combined with restricted access by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens for safety reasons, may lead to changes to the use of the lands and resources by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. The Agency considers the proponent's proposed engagement with Tsetsaut/Skii km Lax Ha and Métis Nation B.C. on the development and implementation of an Access Management Plan and its no hunting, fishing or trapping policy for employees and contractors to be appropriate to mitigate the potential effects of changes to access on Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

The Agency finds that the magnitude of change in access is low given the minimal use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. The effects are expected to be continuous, reversible after reclamation, occurring at the landscape level, and long-term in duration.

The Agency agrees with the proponent that the Project is not anticipated to cause effects to the cultural value of the Bitter Creek valley for Tsetsaut/Skii km Lax Ha or Métis Nation B.C. and therefore no mitigation measures are required.

Fishing

The Agency agrees with the proponent that there would be a residual effect to fishing due to changes in access, a reduction in the availability of Dolly Varden, and changes to the quality of the fishing experience.

The Project is not expected to result in residual effects to fish or fish habitat outside of the Bitter Creek valley and therefore, no impacts to Tsetsaut/Skii km Lax Ha or Métis Nation B.C. fishing opportunities or practices are expected in Bear River.

The Agency finds that the magnitude of change to fishing is low given the minimal use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. The effects are expected to be continuous, irreversible, occurring at the landscape level, and lasting into the far future.

The Agency agrees with the proponent that with the minimal use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. and the implementation of mitigation measures, the Project is not expected to result in significant residual effects on fishing by Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

Hunting and Trapping

The Agency agrees with the proponent that there would be residual effects to hunting and trapping due to changes in access, in the availability of wildlife including mountain goat, moose, grizzly bear, other furbearers, and migratory birds, and wildlife habitat, and in the quality of experience.

The Agency is of the view that the magnitude of change to hunting and trapping would be low given the minimal use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. The effects are expected to be landscape level, continuous for the life of the Project, long term, and reversible.

The Agency agrees with the proponent's assessment that after implementation of mitigation measures, there will be an adverse, but not significant residual effect on hunting and trapping by the Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

Plant Gathering

The Agency agrees with the proponent that there would be a residual effect to plant gathering and harvesting due to the loss and alteration of ecosystem and vegetation abundance, distribution and/or function.

The Agency is of the view that the changes to plant gathering would be low in magnitude given the minimal use of the Project area by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. These effects are expected to occur at the landscape level, be continuous into the far future, and irreversible.

The Agency agrees with the proponent that with the minimal use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. and the implementation of mitigation measures, the Project is not expected to result in significant residual effects on plant gathering by the Tsetsaut/Skii km Lax Ha or Métis Nation B.C.

Habitation, Trails, and Cultural and Spiritual Sites

The Agency agrees with the proponent that there is little evidence of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. use of habitation, trails, or cultural and spiritual sites in the Bitter Creek valley. The Agency agrees that adverse effects are not anticipated and therefore no mitigation measures are required.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent and comments from Indigenous groups in identifying the following key mitigation measures as necessary to ensure no significant adverse effects to current use of lands and resources for traditional purposes:

- Provide access to the Bitter Creek valley, during all phases of the Project, to members of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. through use of the access and haul roads to Tsetsaut/Skii km Lax Ha and Métis Nation B.C. for practicing traditional activities, to the extent that such access is safe. The proponent would consult with Tsetsaut/Skii km Lax Ha and Métis Nation B.C. prior to construction to identify the manner by which this access will be provided. The proponent would notify Tsetsaut/Skii km Lax Ha and Métis Nation B.C. in a timely manner if access to the Bitter Creek valley through use of the access or haul road must be prohibited temporarily for safety reasons.
- Prohibit public access to the access and haul roads during all phases of the Project.
- Prohibit employees and contractors associated with the Project from fishing and hunting in the Bitter Creek valley during all phases of the Project, unless the proponent provides access to an employee or contractor in accordance with the above.
- Identify, prior to construction and in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities, time periods during which construction activities may not be carried out to protect wildlife during sensitive life states including for mountain goat, grizzly bear, moose, hoary marmot, marten and wolverine. In doing so, the proponent would:
 - Apply B.C.'s *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia* when identifying these time periods;
 - Notify, prior to construction, the Agency of these time periods and of the areas within which each of these time periods would apply;
 - Conduct construction activities during these time periods, unless not technically feasible.
- If construction during time periods referred to above is not technically feasible, the proponent would develop and implement additional mitigation measures, in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities, to protect mountain goat, grizzly bear, moose, hoary marmot, marten and wolverine during construction. In doing so, the proponent would:
 - Develop and implement additional mitigation measures, including species-specific non-disturbance setback distances around habitat features used by each species for critical life functions to protect wildlife during sensitive life stages. The proponent would apply B.C.'s *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia* when developing the setback distances.
 - Notify the Agency of the additional mitigation measures referred to above prior to implementation, including the setback distance identified for each species, the habitat feature(s)

and construction activity(ies) applicable to each setback distance and the period(s) of time during which each setback distance will be applied.

- Avoid helicopter overflights and blasting disturbance within two kilometres of grizzly bear identified potential denning habitat and known denning sites, unless required for safety reasons.
 - If overflight or blasting is required for safety reasons within two kilometres of known denning sites or identified denning habitat during critical periods for denning grizzly bear (October 1 to the end of winter conditions), the proponent would keep a line-of-sight distance of 500 metres from known denning sites and identified potential denning habitat.
- Avoid helicopter overflights within two kilometres or with less than a 500 metre absolute altitude from the mountain goat ungulate winter range, unless required safety reasons.
- Avoid surface blasting for avalanche control purposes, if the proponent observes mountain goat within one kilometre of the blast area, unless required for safety reasons.
- Manage, during all phases of the Project, snow bank height along the access and haul roads to create and maintain escape pathways at periodic distances to allow ungulates to exit the plowed roads in winter.
- Install and maintain, during all phases of the Project, wildlife crossing signs along the access and haul roads.
- Avoid use of salt for de-icing or traction control on the access and haul roads during all phases of the Project, unless all other methods used for de-icing or traction control purposes do not meet safety requirements.
- Manage vegetation height and composition along the access and haul roads to increase sight lines for drivers and visibility of wildlife.
- Reclaim the access and haul roads at the end of decommissioning, unless otherwise required by NLG or relevant authorities.
- Implement measures identified in Section 6.1 (Fish and Fish Habitat), 6.2 (Migratory Birds), 6.4 (Physical and Cultural Heritage), and 6.5 (Health and Socio-economic Conditions), to mitigate effects on water quality, fish and fish habitat, migratory birds, and heritage.

Need for and Requirements of Follow-up

After considering the follow-up program proposed by the proponent, expert advice from federal authorities, and comments received by NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and the public, the Agency has identified the following requirements for a follow-up program:

- Develop, prior to operation and in consultation with NLG, Tsetsaut/Skii km Lax Ha and Métis Nation B.C., a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as they pertain to mountain goat. As part of the implementation of the follow-up program, the Proponent would conduct mountain goat population surveys once every three years starting during the first year of operation. The Proponent would develop the methodology for the surveys in consultation with NLG, Tsetsaut/Skii km Lax Ha and Métis Nation B.C. prior to the implementation of the follow-up program.
- Implement the follow-up programs identified in Sections 6.1 (Fish and Fish Habitat) and 6.2 (Migratory Birds).

Conclusion

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects to the current use of lands and resources for traditional purposes by Aboriginal peoples.

6.4 Physical and Cultural Heritage, and Historical, Archaeological, Paleontological or Architectural Sites or Structures

The Agency assessed potential Project effects on physical and cultural heritage and historical, archaeological, paleontological or architectural sites or structures. Archaeological and heritage resources on provincial Crown land are subject to the requirements of B.C.'s *Heritage Conservation Act*.

Chapter 17 of the *Nisga'a Final Agreement* includes provisions relating to Nisga'a Nation heritage sites, artifacts and human remains on Nisga'a Lands or on Category A Lands. As the Project is outside of Nisga'a Lands and Category A Lands, these provisions do not apply. Potential adverse environmental effects of the Project on residents of Nisga'a Lands, Nisga'a Lands, and Nisga'a interests as defined in the Treaty are assessed in Section 8.

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to result in residual adverse environmental effects to physical and cultural heritage, or historical, archaeological, paleontological or architectural sites or structures.

6.4.1 Proponent's Assessment of Environmental Effects

Predicted Effects

The proponent focused its assessment on the potential effects to known or undiscovered cultural and heritage resources that may occur through changes to access, changes to value or importance, changes to abundance, changes to distribution, or the loss, alteration, or degradation of physical objects, structures, or sites. The proponent completed an Archaeological Overview Assessment and a field reconnaissance and did not identify any archaeological, historical, paleontological, architectural, cultural or heritage resources in the Project area such as burial sites or culturally modified trees.

However, undiscovered resources may still exist and could be affected by potential disturbances from Project activities and potential changes to access to cultural and heritage resources. The proponent concluded that there is a low potential to find previously undiscovered archaeological, historical, architectural, and paleontological resources in the Project area due to its remote and alpine location. In addition, the geology of the surrounding area is primarily volcanic and intrusive rock that has been strongly altered and deformed which would have destroyed any paleontological resources.

Proposed Mitigation Measures, Monitoring and Follow-Up

The proponent proposed to mitigate potential effects to undiscovered archaeological, paleontological, cultural, and heritage resources by implementing a Chance Find Procedure during construction,

operation, and closure and reclamation of the Project. The Chance Find Procedure would describe actions to be followed should previously undiscovered archaeological, paleontological, heritage, and cultural resources be identified, including stopping work in the immediate vicinity of the potential resource, marking the resource with flagging tape, and documenting the resource. The proponent would also contact the Nisga'a Lisims Government (NLG) and B.C.'s Archaeology Branch for advice on further actions to manage the discovered resource. Project activities would cease until the site has been assessed and mitigation measures have been implemented to the satisfaction of the NLG and B.C.'s Archaeology Branch.

The proponent also indicated that potential effects from any changes to access to cultural and heritage resources, if found, would be mitigated through the implementation of an Access Management Plan, which would be developed in consultation with NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C.

Predicted Residual Effects

Taking into account the implementation of mitigation measures, the proponent did not predict any residual adverse effects to cultural and heritage resources.

6.4.2 Views Expressed

The Agency did not receive any comments on the effects assessment for physical and cultural heritage or historical, archaeological, paleontological or architectural sites or structures from federal authorities, NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., or the public.

6.4.3 Agency Analysis and Conclusion

Analysis of the Effects

The Agency accepts the proponent's assertion that there are no known cultural and historical sites that may be impacted by the Project, and that the application of a Chance Find Procedure would mitigate potential effects to previously undiscovered sites.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponent in identifying the following key mitigation measures to be implemented with respect to physical and cultural heritage, or historical, archaeological, paleontological or architectural sites or structures:

- Develop, prior to construction and in consultation with NLG and relevant authorities, a chance find protocol for any previously undiscovered structures, sites, or things of historical, archaeological, paleontological, or architectural significance or physical or cultural heritage resources discovered within the Project area. As part of the chance find protocol, the proponent would:
 - Immediately halt work at the location of the discovery;
 - Delineate an area of at least 30 metres around the discovery as a no-work zone. The no-work zone requirement shall not apply to action(s) required to be undertaken to protect the integrity of the discovery;

- Inform the Agency and NLG within 24 hours of the discovery, and allow NLG to monitor archaeological works; and
- Consult with NLG and relevant authorities, on the manner by which to comply with all applicable legislative or legal requirements and associated regulations and protocols respecting the discovery, recording, transferring and safekeeping of previously unidentified structures, sites or things of historical, archaeological, paleontological or architectural significance.

Need for and Requirements of Follow-up

The Agency does not consider it necessary to require the proponent to develop and implement a follow-up program to verify the accuracy of predictions and/or determine the effectiveness of measures to mitigate adverse effects to physical and cultural heritage, and effects on historical, archaeological, paleontological or architectural sites or structures.

Conclusion

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to result in residual adverse effects to physical and cultural heritage, or historical, archaeological, paleontological or architectural sites or structures.

6.5 Health and Socio-economic Conditions

The Agency focused its assessment on effects to the health of Indigenous peoples caused by changes in air quality, quality of traditional foods, surface water quality, and noise; and effects to socio-economic conditions of Indigenous peoples caused by reduced access to, and availability and quality of, traditional foods.

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on the health and socio-economic conditions of Aboriginal peoples.

6.5.1 Proponent's Assessment of Environmental Effects

Predicted Effects

The proponent conducted a human health risk assessment to quantify the human health risks associated with exposure to contaminants caused by air emissions and discharges through inhalation, dermal contact, and ingestion of contaminants in air, soil, surface water, and land and aquatic-based traditional foods. Traditional foods are those foods obtained from hunting, fishing, and gathering.

As part of the human health risk assessment, the proponent estimated non-cancer risks associated with the Project by calculating a hazard quotient for each contaminant of potential concern via the following exposure pathways: soil (incidental ingestion, inhalation of particulate, and dermal contact), surface water (dermal contact), and traditional foods ingestion. A hazard quotient is calculated by comparing the predicted dose of a contaminant of potential concern for a given exposure pathway against a recognized toxicological reference value. Health Canada guidelines indicate a hazard quotient greater

than 0.2 could result in adverse effects on human health. A hazard quotient less than 0.2 indicates that exposure to site-related contaminants are not expected to exceed health-based standards, guidelines, or objectives. In addition to the calculation of non-cancer risks, the proponent calculated the incremental lifetime cancer risk associated with exposure to carcinogenic contaminants of potential concern. An incremental lifetime cancer risk of zero means there is no probability of a cancer event occurring while any other value is associated with an increase in cancer risk. An incremental lifetime cancer risk of 1×10^{-5} (1 in 100,000 people) is considered acceptable by Health Canada for site-specific exposure to Project-related carcinogens.

In addition, the proponent assessed the potential effects of the Project on socio-economic conditions of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. Potential effects on the existing and future economic and social well-being of Nisga'a citizens are assessed in Section 8 pursuant to requirements under the *Nisga'a Final Agreement*.

Changes in Air Quality

The proponent assessed the Project's effects on air quality during year one of the construction phase and year three of the operation phase as these phases are considered to be the worst-case scenarios for air emissions. The proponent stated that Project activities would generate fugitive dust, exhaust emissions from mine equipment, and air emissions from the process plant which may cause potential respiratory effects.

The proponent stated that volatile organic compounds, diesel vapours, and ore processing reagents releases would be negligible. The proponent also estimated concentrations of diesel particulate matter that may be released through Project activities. The maximum estimate short-term and chronic diesel particulate matter concentrations of 3.5 micrograms per cubic metre (24 hour) and 1.4 micrograms per cubic metre (annual) did not exceed the non-cancer chronic critical effect value of 10 micrograms per cubic meter and 5 micrograms per cubic meter, respectively, which are noted in Health Canada's *Human Health Risk Assessment for Diesel Exhaust*² and therefore, the proponent stated that risks from Project diesel particulate matter would be negligible. The proponent stated that it did not assess the carcinogenic risk associated with diesel particulate matter because a toxicity value was not available in the literature.

The proponent's assessment compared the Project's potential effects on air quality relative to the B.C. Ambient Air Quality Objectives (which include the Interim Provincial Air Quality Objectives), National Ambient Air Quality Objectives, and the 2015 Canadian Ambient Air Quality Standards. As shown in Table 5, nitrogen dioxide, sulphur dioxide, carbon monoxide, particulate matter (PM_{2.5} and PM₁₀) and dust deposition (measured in milligrams per square decimeter per day (mg/dm²/day)) are expected to increase as a result of Project-related air emissions in the local study area. All increased concentrations of these potential contaminants are predicted to remain below air quality objectives and therefore, the

² Health Canada (2016). Human Health Risk Assessment for Diesel Exhaust. Available from: http://publications.gc.ca/collections/collection_2016/sc-hc/H129-60-2016-eng.pdf

proponent stated that there would be no health risks associated with the Project as a result of changes in air quality.

Table 5 Parameter Predictions in the Local Study Area

Parameter	Averaging Period	Concentrations ($\mu\text{g}/\text{m}^3$) or Dust Deposition Rate ($\text{mg}/\text{dm}^2/\text{day}$)			
		Air Quality Objective ¹	Background	Maximum Project Contribution	Predicted Concentration
Nitrogen dioxide	1 hour	188	21	166	187
	Annual	60	50	42	47
Sulphur dioxide	1 hour	196	4.0	74	78
	Annual	13	2.0	4.5	6.5
Carbon monoxide	1 hour	14,300	100	505	605
	8 hour	5,500	100	371	471
PM _{2.5}	24 hour	25	1.3	17.3	18.6
	Annual	8	1.3	3.1	4.4
PM ₁₀	24 hour	50	3.4	39.3	42.7
Total suspended particulate	24 hour	120	10	81.3	91.3
	Annual	60	10	14.6	24.6
Total dustfall	Annual	1.7	0.56	0.42	0.98
Wet deposition	Annual	1.7	0.56	0.054	0.61
Dry deposition	Annual	1.7	0.56	0.39	0.95

¹ The air quality objective is the most stringent of the B.C. Ambient Air Quality Objectives, National Ambient Air Quality Objectives, and Canadian Ambient Air Quality Standards.

Reduced Quality of Traditional Foods

The proponent assessed whether Project-related contaminants likely to be present in the aquatic or terrestrial environment at elevated levels have the potential to affect human health via the consumption of traditional foods in the local study area or regional study area. Emissions of airborne pollutants (e.g. particulate matter and combustion by-products) and fugitive dust generated from Project activities have the potential to affect traditional foods. This may occur through uptake from air deposition, soil or water (e.g. vegetation); exposure of wildlife to contaminants in air, water, soil, and vegetation or prey; and subsequent human consumption of local wildlife.

The EIS stated that several estimates of non-cancer contaminants of potential concern (cadmium, cobalt, iron, lead, manganese, nickel, selenium, thallium, zinc) in the soil, surface water and traditional foods had hazard quotients that exceeded the Health Canada acceptable hazard quotient threshold of 0.2 in the baseline condition and predicted future conditions. The proponent used a conservative

approach that assumed that individuals' daily consumption would consist of traditional foods with the highest concentrations of contaminants of potential concern in fish, plants, moose, grouse or rabbit and the calculations did not take into account the variety of traditional foods that people might eat. Based on this approach, the proponent identified seven contaminants of potential concern that would have detectably higher concentrations in the predicted future condition than the baseline condition: arsenic, cobalt, iron, lead, mercury, manganese, and strontium. The proponent stated that the predicted concentrations of these contaminants are likely to be overestimated and are not anticipated to result in an increase in adverse human health effects.

As a result of dialogue with Nisga'a Lisims Government (NLG) and Health Canada, the proponent further evaluated the non-cancer risks associated with the Project on the most sensitive receptor (toddler), using the most conservative exposure scenario (year round resident) through a country food basket approach, which considered that the receptor's daily consumption consisted of a variety of food types. Based on the results of the re-evaluation, the risks associated with Project-related exposure to cobalt, lead and manganese risks would increase by less than a hazard quotient of 0.1. However, the proponent's opinion was that the higher bioconcentration factors used were very conservative, therefore the risk would be lower than estimated. Risks associated for all other contaminants of potential concern would increase by less than a hazard quotient of 0.05 which would indicate that risks from exposures to these contaminants via ingestion of traditional foods would be negligible.

The proponent also assessed the risk of cancer from contaminants of potential concern in traditional foods. Out of cadmium, chromium, nickel and arsenic, only arsenic exceeded the Health Canada incremental lifetime cancer risk threshold of 1×10^{-5} in the baseline condition. However, baseline and predicted arsenic fish tissue concentrations were estimated to be equal, and thus no Project-related risk associated with exposure to arsenic via consumption of fish tissue was identified.

Decreased Surface Water Quality

While there are no drinking water wells in the local study area and therefore no groundwater use, the proponent assessed human health effects through changes in contaminants to surface water in the instance that Indigenous peoples may consume water in the local study area. Contaminants of potential concern in surface water were assessed and the only potential increase in health risk was from increases to arsenic in Bitter Creek. However, baseline (0.00845 milligram per litre) and maximum predicted (0.00979 milligram per litre) arsenic concentrations in surface water were less than the Health Canada drinking water guideline of 0.01 milligram per litre. The proponent stated that the assessment used conservative assumptions that likely overestimated the Project-related risk and as a result, the Project is not likely to result in measureable changes to human health as a result of arsenic exposure.

Increased Noise

The proponent conducted a separate noise effects assessment from the human health effects assessment. The proponent stated that Project activities may introduce noise to the surrounding environment, potentially creating adverse noise affecting Indigenous peoples residing in or spending time in the area. The proponent predicted that noise levels generated by the processing plant and the mine portals would not exceed 45 A-weighted decibels, the nighttime noise criteria threshold, beyond

950 metres from the noise sources during construction and 1.2 kilometres during operations. Other indicators of noise effects on human health recommended by Health Canada, including sleep disturbance, compliance, and annoyance, were not considered because of the lack of permanent residential dwellings in the Project area. Noise levels near the outer spatial extent of the local study area were predicted to be at or below 35 A-weighted decibels, which is equivalent to the assumed background noise level. Noise levels from surface blasting would only take place during the construction phase and would meet Environment and Climate Change Canada's *Environmental Code of Practice for Metal Mines* criteria threshold of 128 decibels outside the immediate blast areas.

Socio-economic Conditions

The proponent stated that the Project could have potential effects on the socio-economic conditions of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. as a result of changes to access of navigable waters; commercial fishing, hunting, trapping, and gathering activities; commercial outfitting operations; and recreational use. The proponent stated that the Project is not anticipated to have any effect on navigable waters and forestry and logging operations, and that there are no known commercial fishing, hunting, and gathering operations in the Project area. Tsetsaut/Skii km Lax Ha hold commercial traplines north of Meziadin Lake, which are located outside of the area where potential effects to wildlife are anticipated. The proponent concluded that the Project would not have any effects on the socio-economic conditions of Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

Proposed Mitigation Measures, Monitoring and Follow-Up

The proponent did not propose specific mitigation measures for human health effects. However, since air quality and surface water quality are the major exposure pathways, measures proposed for air quality and surface water quality would also mitigate risk to human health.

The proponent committed to reducing the direct release of emissions and controlling fugitive dust from mining and related activities. Specific mitigation measures include water sprays to suppress dust generated by equipment in the crushing facility, access and haul roads, and construction areas; using emission control measures on point source and crusher transfer point emissions; and designing tailings disposal methods to reduce the size of the tailings beach (the coarse particles within the tailings that tends to accumulate near the discharge point) and therefore reduce dust sources and generation. The proponent prepared a conceptual Air Quality and Dust Management Plan that would be updated in advance of construction and implemented during all phases of the Project.

Specific mitigation measures for effects to surface water quality would include sequestering most mine and site contact water prior to discharge to the aquatic environment, directing mine site runoff and contact water to portal collection pond or the tailings management facility, fully lining the tailings management facility to minimize seepage losses, installing seepage collection ponds, backfilling all waste rock into the underground, and installing a hydraulic bulkhead at the lower portal to manage metal leaching/acid rock drainage. The proponent will also develop and implement a Cyanide Management Plan.

To mitigate noise effects from the Project, the proponent proposed mitigation measures primarily related to controlling noise at the source and controlling the noise pathway. Underground mining would reduce noise emitted by the Project for excavating and hauling waste rock. Impulse events, such as blasting, would be limited to certain times of the day. The proponent would design and implement a Noise Abatement Plan that outlines additional measures to mitigate potential Project effects related to noise.

Since no effects from changes to the environment are anticipated on the socio-economic conditions of Tsetsaut/Skii km Lax Ha and Métis Nation B.C., no mitigation measures were proposed.

Predicted Residual Effects

The proponent assessed the effects of the Project on noise, air quality and human health. For noise and air quality, the proponent concluded that there would be residual effects, but that these effects would not result in a residual effect to human health.

The proponent completed a human health risk assessment for a number of potential receptors and applied conservative assumptions (e.g. receptors exclusively consumed the traditional food associated with the highest risk).

The proponent concluded that with the implementation of the mitigation measures, residual effects on Indigenous human health from changes to air quality or traditional foods are not expected.

6.5.2 Views Expressed

Health Canada and NLG conducted a review of the human health risk assessment. Based on the findings of this review, the proponent made a number of changes to the methodology of the human health risk assessment including selecting more conservative and applicable criteria for identifying contaminants of potential concern, adjusting the proportion of inorganic arsenic from one percent to a more conservative 10 percent of total arsenic, and providing a less conservative assessment using a country food basket approach, which considered that individuals' daily consumption would include a variety of food types.

Health Canada and NLG had concern with the uncertainty in the human health risk assessment and the proponent's overall health effects assessment. They identified the need for a follow-up program, should the Project proceed, in order to confirm the human health effects once the Project is in operation. The uncertainty in the risk assessment was driven by the limited baseline sampling, and the fact that bioconcentration factors were calculated using samples that were not co-located (i.e. water and fish tissue samples taken from the same location). In addition, Health Canada and NLG had the following concerns with the assessment.

Arsenic Relative Absorption Factors

Health Canada and NLG noted that the proponent's assessment assumed oral relative absorption factors of 0.29 and 0.5 for inorganic arsenic for plants and fish, respectively, and pointed to Health Canada's

guidance which indicates that a relative absorption factor of 1.0 should be used. In response, the proponent noted that changing the relative absorption factor of 0.5 to 1.0 would not change the health risk associated with the Project specifically, because the relative absorption factor is applied in the same way to both the baseline and predicted risk scenario. However, Health Canada indicated that this interpretation was incorrect because the calculation of dose would be different. Health Canada noted that sufficient supporting rationale was not provided including justification showing how the selected values of 0.29 and 0.5 were applicable to this specific Project and site. The Agency considered this advice as part of its characterization and assessment of residual effects and is recommending a potential condition that, if accepted by the Minister of Environment and Climate Change, would require the proponent to use a relative absorption factor of 1.0 for any future updates to the human health risk assessment, for all contaminants of concern, to support the understanding of risks to any receptors that hunt, trap, fish, gather food or live in the Bitter Creek valley.

Background Risks

NLG noted that there are several contaminants of potential concern with hazard quotients that exceeded the acceptable risk threshold of 0.2 under both baseline and predicted future conditions. Given that the risk to receptors would be a combination of exposures to background levels of contaminants of potential concern and Project-related contributions, NLG requested that risks be assessed after considering total risk (i.e. background risk in addition to Project-related risks). Health Canada also noted during several stages of the review process that evaluation of overall risk (background exposure plus incremental risks) will help determine how the future conditions would impact human health. The proponent responded that their approach to determining significance of the Project was to assess the risks associated with the Project rather than the total risks. The Agency considered the background risk associated with existing levels of contaminants in the environment as part of its characterization and assessment of residual effects.

Non-threshold Contaminants

Health Canada and NLG noted that PM_{2.5} and nitrogen dioxide are recognised as non-threshold contaminants, meaning that health effects can be expected at any level of exposure including below the air quality objectives. In addition, Health Canada and NLG noted that the maximum predicted concentration of nitrogen dioxide was 187 micrograms per cubic metre, which is just one microgram per cubic metre below the current provincial and federal air quality objectives, and would exceed the 2020 Canadian Ambient Air Quality Standard of 113 micrograms per cubic metre. Further, Environment and Climate Change Canada noted that air quality predictions may be underestimated by as much as 50 percent. As a result, Health Canada and NLG encouraged the proponent to recognize the health effects from exposure to these non-threshold air contaminants as residual effects. The proponent indicated that the assessment was conservative and that the predicted maximum value would be unlikely to occur where people are located. The Agency took into account Health Canada and NLG's recommendation to consider non-threshold contaminants in its assessment of human health effects. The proponent committed to developing and implementing a detailed Air Quality and Dust Management Plan, which would include monitoring of nitrogen dioxide and particulate matter.

The Agency did not receive any comments in relation to effects to human health from Tsetsaut/Skii km Lax Ha, Métis Nation B.C., or the public.

6.5.3 Agency Analysis and Conclusion

Analysis of the Effects

Changes in Air Quality

The Agency disagrees with the proponent's assessment that there would be no human health effects as a result of diminished air quality. As pointed out by Health Canada and NLG, increases in air emissions are predicted, and these predictions are below but approaching provincial and federal air quality objectives and standards and several contaminants identified do not have recognized thresholds, meaning that adverse effects can occur at any level of exposure. Therefore, the Agency predicts that the magnitude of residual effects from decreasing air quality would be low to moderate, and landscape extent. Since air emissions would be released throughout construction and operation, residual effects are expected to be continuous and medium-term in duration, but reversible because air quality would return to baseline levels during post-closure.

Given that air quality predictions are approaching provincial and federal air quality objectives and standards and may have adverse effects to human health, the Agency has identified the need for a follow-up program to verify the accuracy of the air quality predictions for the purpose of understanding effects to human health and adaptive management.

Reduced Quality of Traditional Foods

Bioaccumulation of contaminants in the tissues of traditional foods from soil and water contamination may occur, but concentration levels of contaminants in the soil and water are predicted to be below provincial and federal guidelines. The Agency acknowledges that the proponent's assessment was conducted using conservative assumptions and that health risks may be overestimated, but disagrees with the proponent's assessment that there would be no residual effects to health. The Agency understands that there is uncertainty as to the actual health risk from the decreasing quality of traditional foods. To address the uncertainty, the Agency has identified the need for a follow-up program to verify the results of the effects assessment, and, if results show contaminant concentrations above those predicted, the proponent should re-assess contaminant levels in traditional foods to determine the health risks to human consumers of such foods. Taking into account the uncertainty in the human health risk, the Agency considers the adverse residual effects to human health from contaminants in traditional foods to be low in magnitude and occurring at the landscape level. These effects are anticipated to be long-term in duration, continuous in frequency, and reversible at the end of post-closure.

Diminished Surface Water Quality

There is a potential for water quality changes to occur in Bitter Creek as a result of the release of contaminants from Project activities. While it is unlikely for individuals to drink unfiltered water directly from Bitter Creek, Nisga'a citizens can exercise their treaty rights and interests to use the Project area

and Tsetsaut/Skii km Lax Ha and Métis Nation British assert Aboriginal rights in and around the area. As a result, there may be a human health risk associated with increased concentrations of arsenic in Bitter Creek as a result of Project activities. The maximum predicted concentration of arsenic is approaching Health Canada's maximum acceptable concentration of 0.010 micrograms per litre, and therefore the Agency has identified the need to monitor water quality. The Agency is of the view that the magnitude of the residual effects resulting from contaminated surface water quality would be low landscape extent. Since contaminants of potential concern are expected to be released into Bitter Creek throughout the Project life, these effects are expected to be long-term in duration, continuous in frequency, and reversible at the end of post-closure.

Given that concentrations of arsenic in Bitter Creek are approaching Health Canada's drinking water guidelines, the Agency has identified the need for a follow-up program to verify the accuracy of the surface water quality predictions for the purpose of understanding effects to human health.

Increased Noise

Increases in noise levels can reduce the quality of experience of practicing traditional activities, including harvesting traditional foods. The Agency acknowledges that the Project is in a remote and quiet area such that increases in noise levels would have detectable effects. However, with the implementation of mitigation measures, noise levels are not anticipated to exceed the *Environmental Code of Practice for Metal Mines* criteria. As such, the Agency concludes that the residual effects of increased noise on human health would be low magnitude, long-term in duration, landscape in extent, continuous in frequency, and reversible after Project closure and reclamation.

Socio-economic Conditions

The Agency is of the view that since there are no known Tsetsaut/Skii km Lax Ha and Métis Nation B.C. commercial hunting, trapping, fishing, or gathering or outfitting stations and little evidence of current use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C, the Project is not likely to have adverse effects on the socio-economic conditions of Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, advice from federal authorities, and comments received from NLG in identifying the following key mitigation measures to be implemented with respect to human health:

- Mitigate, during all phases of the Project, emissions of fugitive dust and particulate matter, including through point source emission control measures and improvement and treatment of unpaved road surfaces.
- Establish a speed limit of no more than 50 kilometres per hour on the access and haul roads and require employees and contractors associated with the Project to abide by those limits.
- Ensure, during all phases of the Project, that noise generated by the Project does not exceed the background noise level of 35 A-weighted decibels during all phases of the Project at the boundary of the local study area identified by the proponent in figure 8.3-1 of the EIS.

Need for and Requirements of Follow-up

After considering the follow-up program proposed by the proponent, expert advice from federal authorities, and comments received by NLG, the Agency has identified the following requirements for a follow-up program.

- Develop, prior to construction and in consultation with NLG and relevant authorities, a follow-up program to verify the accuracy of the EA as it pertains to adverse environmental effects on health of Indigenous people caused by changes in concentrations of contaminants of potential concern in air, water, soil, vegetation, and fish. As part of the development of the follow-up program, the proponent would identify the species of plants and fish exposed to these contaminants that the proponent must monitor. The proponent would implement the follow-up program during all phases of the Project. As part of implementation of the follow-up program, the proponent would:
 - Conduct baseline sampling, prior to construction, for contaminants of potential concern in soil, water, plant tissue, and fish tissue. In doing so, the proponent would co-locate soil sampling from the root zone with plant tissue sampling and would co-locate water sampling with fish sampling in order to establish site-specific bioconcentration factors;
 - Monitor air concentrations of nitrogen dioxide, ozone, sulfur dioxide, particulate matter (PM_{2.5} and PM₁₀), and metals in dustfall at the nearest open air location to where maximum concentrations are predicted to occur as identified by the proponent in Appendix D of Appendix 7-A of the EIS;
 - Monitor contaminants of potential concern in soil, water, vegetation and fish. In doing so, the proponent would co-locate soil sampling from the root zone with plant tissue sampling and would co-locate water sampling with fish sampling; and
 - If the sampling and monitoring results indicate that concentrations of contaminants of potential concern exceed those predicted in the EIS, the proponent would update the human health risk assessment using the site-specific bioconcentration factors, and sampling and monitoring results. In doing so, the proponent would assume that 100 percent of all contaminants of potential concern from country foods are absorbed.
- Develop, prior to construction and in consultation with NLG and relevant authorities, and implement, during all phases of the Project, a plan to communicate the results of the follow-up program to NLG and relevant authorities. The communication plan would include procedures to communicate any update to the human health risk assessment and potential associated health risks in plain language, and the modified or additional mitigation measures implemented.

Conclusion

Taking into account the implementation of mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on the health and socio-economic conditions of Aboriginal peoples.

6.6 Transboundary Environment – Greenhouse Gas Emissions

Greenhouse gases (GHGs) are atmospheric gases that absorb and re-emit infrared radiation resulting in the warming of the lower levels of the atmosphere. These gases disperse at the global scale and were

assessed under CEAA 2012 as changes to the environment that cross provincial or international boundaries.

GHGs include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), ozone (O₃), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). GHG emissions estimates are usually reported in units of tonnes of CO₂ equivalent³ (CO₂e) per year.

The Agency focused its assessment on direct GHG emissions from the Project, and their relative contribution to provincial and national emissions levels. See Section 7.2 (Effects of the Environment on the Project) for an analysis of the potential effects of climate change on the Project, and Section 6.5 (Health and Socio-Economic Conditions) for an analysis of the potential effects of air emissions on human health.

The Agency concludes that the Project is not likely to cause significant adverse environmental effects as a result of GHG emissions.

6.6.1 Proponent's Assessment of Environmental Effects

Predicted Effects

To characterize the relative contribution of Project GHG emissions, the proponent compared them to B.C. emission estimates from industry, B.C. province-wide emission estimates and national emission estimates.

The proponent predicted direct GHG emissions would be produced mainly as a result of fuel combustion from vehicles and equipment during construction and operation of the Project. The proponent predicted GHG emissions during construction to total approximately 12,168 tonnes CO₂e per year, and during operation to total approximately 4,937 tonnes CO₂e per year (Table 6). The proponent estimated that GHG emissions resulting from construction would be approximately 0.02 percent and 0.0017 percent of the annual GHG emissions in B.C. and Canada, respectively, based on 2015 emissions levels (Table 7). The proponent estimated that the GHG emissions resulting from operation would be approximately 0.0081 percent and 0.0007 percent of the annual GHG emissions in B.C. and Canada, respectively, based on 2015 emissions levels (Table 7).³

³ GHG emissions are calculated by multiplying the emission rate of each substance by its global warming potential relative to CO₂

Table 6 GHG Emissions Summary

Emission source	Construction (tonnes CO ₂ e per year)	Operation (tonnes CO ₂ e per year)
Non-road equipment	12,093	4,475
On-road vehicles	29	419
On-road freight vehicles	46	43
Totals	12,168	4,937

Table 7 Comparison of the Project's GHG Emissions with B.C. Industrial Emissions, Province-wide Emissions and National Emissions

Scenario	Construction (12,168 tonnes CO ₂ e per year)	Operation (4,397 tonnes CO ₂ e per year)
Project GHG emissions as a percentage of industrial emissions in B.C.	0.063%	0.03%
Project GHG emissions as a percentage of B.C. province-wide emissions	0.020%	0.0081%
Project GHG emissions as a percentage of national emissions	0.0017%	0.0007%

Proposed Mitigation Measures, Monitoring and Follow-Up

The proponent identified the following mitigation measures to reduce GHG emissions from Project activities:

- Reduce the number of Project-related vehicles on roads by providing buses to transport workers to the mine site, the amount of time vehicles operate, and distance travelled by minimizing the length of road;
- Ensure all equipment and vehicles are properly maintained and turned off when not in use; and
- Train all on-site equipment operators in ways to reduce generation of emissions and to optimize emission controls.

The proponent stated that considering the relatively short operational life of the mine, and the use of BC Hydro electrical grid power for many of the energy-intensive mining processes including the process plant, tailings management facility and ancillary buildings and offices, the Project would result in a limited release of GHG emissions in comparison to more energy-intensive mines that may rely on diesel power generation for some or all of their energy requirements.

Predicted Residual Effects

The proponent stated that after the implementation of mitigation measures, the Project's GHG emissions would not result in residual effects.

6.6.2 Views Expressed

Following a review from Environment and Climate Change Canada, the proponent identified minor errors in their estimate of air emissions from on-road vehicles during construction. However, as on-road vehicles make up less than one percent of total CO₂e emissions, the Agency is of the view that an updated estimate of air emissions from on-road vehicles would not change the conclusion of the effects assessment.

The Agency did not receive any comments on GHG emissions from the Nisga'a Lisims Government (NLG), Tsetsaut/Skii km Lax Ha, Métis Nation B.C., or the public.

The Agency received comments from United States government departments and non-government organizations about transboundary water quality and cumulative effects to transboundary interests. These concerns are discussed in Sections 6.1 (Fish and Fish Habitat) and 7.4.2 (Cumulative Environmental Effects – Fish and Fish Habitat).

6.6.3 Agency Analysis and Conclusion

Analysis of the Effects

The Agency notes that since the Project would primarily use electric power, the main source of direct GHG emissions would occur as a result of fuel combustion from vehicles and equipment during construction and operation of the Project. Direct emissions of GHGs are estimated to be approximately 12,168 tonnes CO₂e per year during construction and 4,937 tonnes CO₂e per year during operation. The Agency did not consider indirect GHG emissions, such as the loss of carbon sinks from vegetation clearing. Given the small disturbance footprint (247 hectares) and limited loss of vegetation (the proponent estimated that the Project would result in the loss of 9 hectares of alpine ecosystem, 33.3 hectares of parkland, 25.7 hectares of old growth/mature forest, 15.9 hectares of floodplain, and 0.3 hectares of wetland), the Agency considers indirect GHG emissions to be small compared to other mining projects.

The Agency considers the level of direct GHG emissions from the Project to be low in magnitude, particularly considering the electrification of major Project components. The Project would contribute 0.0081 percent to provincial emissions and 0.0007 percent to national emissions during operations. The GHG emissions occurring during operations would be continuous, global in geographic extent, far future in duration, and irreversible due to the persistence of GHGs in the atmosphere.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, advice from expert federal authorities, and comments received from Nisga'a Lisims Government, other Indigenous groups and the public and did not identify any key mitigation measures as necessary in relation to GHG emissions.

Need for and Requirements of Follow-up

The Project will be subject to provincial and federal GHG emission reporting and regulatory requirements through the *Pan-Canadian Framework on Clean Growth and Climate Change*. Specifically, facilities that emit over 10,000 tonnes of CO₂e per year are required to report their GHG emissions annually to the federal and provincial governments under the *Canadian Environmental Protection Act, 1999* and B.C.'s *Greenhouse Gas Industrial Reporting and Control Act*, respectively. The Agency does not consider it necessary to require the proponent to develop and implement a follow-up program to monitor the Project's climate change effects.

Conclusion

The Agency concludes that the Project is not likely to cause significant adverse environmental effects as a result of GHG emissions.

7 Other Effects Considered

7.1 Effects of Accidents and Malfunctions

Pursuant to subsection 19(1) of CEAA 2012, the Agency must take into account the environmental effects of accidents and malfunctions that may occur in connection with the Project. The Agency conducted an analysis and concluded that, taking into account the implementation of mitigation measures, the Project is not likely to cause significant adverse environmental effects due to accidents and malfunctions.

7.1.1 Proponent's Assessment of Environmental Effects

Predicted Effects

Accidents and malfunctions have the potential to occur during all phases of the Project. The proponent evaluated each potential accident and malfunction scenario according to likelihood, or probability of the event occurring, and consequence, and assigned an associated risk ranking for the potential event. The results of this analysis are summarized in Table 8.

The proponent identified 15 potential accidents and malfunctions with eight considered to be of moderate risk, and seven of low risk. The accidents and malfunctions of moderate risk include a tailings dam breach, accidental discharge of sediment and metals from the tailings management facility or waste rock stockpile, hazardous materials release to land, hazardous materials release to water, explosive accident, waste rock stockpile slope failure, failure of underground mine stability, and helicopter or vehicle accidents. The proponent did not identify any high or extreme risk accidents or malfunctions.

The assessment that follows focuses on accidents and malfunctions with the greatest risk to the environment, including the valued components identified in Section 6 of this report. Information on the seven identified low-risk accidents and malfunctions can be found in Chapter 23 of the EIS.

Table 8 Proponent’s Risk Summary of Potential Accidents and Malfunctions

Accident or Malfunction	Potential Environmental Effects	Consequence ¹	Likelihood ²	Risk ³
Tailings dam breach	Changes to soil quantity and quality, terrain stability, hydrology, and surface water quality and quantity which can affect vegetation, wildlife and wildlife habitat, aquatic resources, fish and fish habitat, human health, and treaty rights and current use of lands and resources for traditional purposes	Critical	Rare	Moderate
Accidental discharge of sediment and metals from tailings management facility and waste rock stockpile	Increased total suspended solids and metal contaminants downstream resulting in changes to surface water quality and sediment quality which can affect aquatic resources, fish and fish habitat, human health, and treaty rights and current use of lands and resources for traditional purposes	Moderate	Unlikely	Moderate
Hazardous materials release to land	Changes to soil quality which can affect vegetation, and treaty rights and current use of lands and resources for traditional purposes	Minor	Likely	Moderate
Hazardous materials release to water	Changes to surface water and sediment quality which can affect aquatic resources, fish and fish habitat, and treaty rights and current use of lands and resources for traditional purposes	Moderate	Possible	Moderate
Explosive accident (accidental detonation of explosives, fly rock from blasting)	Changes to air quality and effects to human health	Major to critical	Rare	Low to moderate
Waste rock stockpile slope failure	Effects to human health (injury)	Moderate	Unlikely	Moderate
Failure of underground mine stability	Effects on terrain stability and human health (injury or fatality)	Major to critical	Rare	Low to moderate
Helicopter or vehicle accidents	Effects to human health (injury or fatality)	Major to critical	Unlikely	Moderate
Large spill resulting from vehicle accident	Changes to soil quality, surface water quality and quantity which can affect vegetation, wildlife and wildlife habitat, aquatic resources, fish and fish habitat, human health, and treaty	Major	Rare	Low

Accident or Malfunction	Potential Environmental Effects	Consequence ¹	Likelihood ²	Risk ³
	rights and current use of lands and resources for traditional purposes.			
Vehicle-wildlife collisions	Direct mortality for wildlife and effects to human health (injury)	Minor	Unlikely	Low
Inability to manage water inflow into underground mine works	Decreased air and water quality in the underground environment affecting human health	Minor	Unlikely	Low
Failure of waste water treatment plant	Increased total suspended solids and metal contaminants downstream resulting in changes to surface water quality and sediment quality which can affect aquatic resources, fish and fish habitat, human health, and treaty rights and current use of lands and resources for traditional purposes	Minor	Unlikely	Low
Fire	Effects to human health (injury) and temporary changes to air quality	Minor to major	Unlikely	Low
Failure of power supply	Potential effects to human health in the underground environment	Major	Rare	Low
Weather-related stranding of personnel	Effects to human health (injury)	Moderate	Rare	Low

¹Consequence is categorized into five different categories: Critical – Long-term, widespread, significant environmental effects; Major – relatively widespread, long-term, serious environmental effects; Moderate – Moderate short-term, widespread effects, some impairment on ecosystem; Minor - minor short-term damage to small areas; and Insignificant – limited damage to minimal area of low significance.

²Likelihood is categorized into five categories: Almost certain (90 to 100 percent chance of occurring); Likely (55 to 90 percent chance of occurring); Possible (30 to 55 percent chance of occurring); Unlikely (5 to 30 percent chance of occurring); and rare (less than five percent chance of occurring).

³Risk is derived from the product of likelihood and consequences.

Tailings Dam Breach and Accidental Discharge of Sediment and Metals from the Tailings Management Facility or Waste Rock Stockpile

The proponent stated that a tailings dam breach would be the worst-case scenario of an accidental discharge of sediment or metals from tailings and waste rock. The proponent indicated that the tailings dam is rated as a “very high” consequence classification according the Canadian Dam Association’s *Dam Safety Guidelines*. Failure of the tailings dam would result in increased total suspended solids and metals in Bitter Creek and downstream environments.

Release of tailings and increased scouring from release of tailings would lead to effects on surface water and sediment quality, vegetation, fish and fish habitat, and human health. The proponent predicted that a breach could lead to multiple exceedances of surface water quality guidelines for the protection of aquatic life and could potentially destroy western toad habitat along Bitter Creek. The proponent

predicted the effects of a dam breach would be significant for fish and fish habitat, western toad, human health, Nisga'a Nation right to harvest Nass salmon, steelhead, eulachon and non-salmon fish such as Dolly Varden, and the current use of lands and resources by Métis Nation B.C. and Tsetsaut/Skii km Lax Ha. The proponent also predicted non-significant but moderate effects to the Nisga'a Nation allocation of Nass salmon, steelhead, and eulachon, right to harvest wildlife and migratory birds. The proponent indicated that the likelihood of a tailings dam breach would be rare.

Hazardous Materials Release to Land and Water

The proponent stated that vehicle accidents, containment leaks or ruptures, or poor storage and handling could result in a minor fuel spill or hazardous materials release to land or water. The proponent stated that the consequence is higher for a spill or release to water than it is to land because aquatic systems tend to be more sensitive to the effects of spills and releases than terrestrial systems. However, the likelihood of a spill or release to water was predicted to be lower than a potential spill to land because of Project design criteria and multiple management plans that would be designed to minimize potential for adverse effects to water quality. The most likely locations for a spill would be to terrestrial or aquatic environments adjacent to the 26 kilometres of access and haul roads connecting the mine to Highway 37A.

Hazardous materials release to water could result in elevated concentrations of hydrocarbons above applicable guidelines affecting vegetation and fish and fish habitat through the alteration of soil and water quality, or direct physical damage to plants and fish through contact or ingestion of contaminants. In addition, fish behaviour can change after exposure to sublethal concentrations of spilled contaminants in response to the physiological changes caused by the toxins. The proponent anticipates that effects of hazardous materials release on biophysical valued components would be of high magnitude, short to long term in duration, and reversible. Based on these considerations, the proponent predicted that the effects of hazardous materials release to fish and fish habitat, wildlife and wildlife habitat, human health, Nisga'a Nation right to harvest, and the current use of lands and resources by Métis Nation B.C. and Tsetsaut/Skii km Lax Ha would be not significant.

Explosive Accident

The proponent stated that based on historical trends, the likelihood for an explosive accident or potential accidents resulting from the use of explosives, including injury to personnel from fly rock during blasting activities would be rare. A worse-case scenario would involve detonation of a fully stocked explosives magazine, which the proponent indicated would likely be caused by human error and have major to critical consequences.

In the event of an explosion, there would be short-term air quality effects from fire and smoke which would be reversible. The proponent predicted that in the worst-case scenario, detonation of an explosives magazine could largely affect human health and safety, including fatality and injury. The magnitude of a potential explosion on human health is predicted to be high, long-term and partially reversible to permanent depending on the consequence. The proponent therefore, predicted that the potential effects of an explosive accident to human health would be significant, but that the event

would be unlikely to occur. The proponent does not anticipate any other biophysical or socio-economic effects to occur as a result of an explosive accident.

Failure of Waste Rock Dumps or Stockpiles

The proponent stated that current Project design standards incorporate the potential for stockpile failure at maximum capacity and; therefore, did not identify any environmental effects from a failure of waste rock stockpiles. While the worst-case scenario involves failure of the waste rock pile at the peak storage capacity of 76,000 tonnes, this is unlikely based on the conservative design standards, the geological stability of the Project area, the implementation of best management practices for waste rock pile construction, and proactive monitoring of pile stability. Although the proponent predicted that human injury may occur as a result of a waste rock pile slump or failure, effects to human health were considered not significant and are unlikely to occur.

Failure of Underground Mine Stability

The proponent indicated that failure of underground mine stability would be very rare because of design safety factors and continuous inspection. The worst-case scenario would result in one or more injuries or fatalities. The proponent committed to developing and implementing a detailed Emergency Response Plan to address mine collapse incidents. The magnitude of the potential effect on human health is considered high due to the possibility of injury or fatality. The proponent concluded that the effects to human health as a result of the failure of underground mine stability would be significant, but that these events would be rare in occurrence.

Vehicle Accidents

The proponent anticipated that Project-related traffic would increase the overall vehicle collision rate along Highway 37A by 0.5 percent during operations. The worst case vehicular accident would be one involving a bus transporting personnel during a shift change with a full passenger load. The proponent stated that preventative measures such as strict adherence to speed limits, communication protocols, driver codes of conduct, and maintenance of access and haul roads would lower the risk of the worst-case scenario vehicle accident.

The proponent indicated that helicopters would be used for Project-related activities, which presents a potential risk of helicopter accidents. The proponent proposed to implement a helicopter maintenance program that follows federal requirements and manage helicopter use based on weather conditions to lower the risk of helicopter accidents. The magnitude of a potential effect on human health is considered to be high due to the possibility of human injury or fatality. Based on these considerations, the proponent predicted that the potential effects of vehicular accidents to human health would be significant but unlikely to occur. The proponent does not anticipate any other biophysical or socio-economic effects from potential helicopter accidents.

Proposed Mitigation Measures, Monitoring and Follow-up

The proponent proposed a number of measures focused on reducing the likelihood of accidents and malfunctions. The proponent identified the following measures to reduce the likelihood of the accident or malfunction scenarios discussed above:

- Design and build the dam in accordance with the Canadian Dam Association’s *Dam Safety Guidelines* for a “very high” consequence classification dam;
- Regular monitoring to maximize probability of detecting geotechnical failures;
- Implement the Erosion and Sediment Control Plan, Site Water Management Plan, and Tailings Management Plan;
- Minimize the use and generation of hazardous materials;
- Develop a Cyanide Management Plan, and follow the principles and practices of the International Cyanide Management Institute’s *International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold*, which outlines best practices for the purchase, handling, and storage design of cyanide, as well as spill and emergency response procedures;
- Design facilities to incorporate best management practices for spill containment such as double walled containment of fuels and hazardous materials, protective barriers around dangerous or hazardous products, and bermed storage areas for material containers;
- Provide training to all workers handling dangerous goods;
- Construct bulk chemical storage sites with concrete or lined floors and walls capable of containing appropriate volume as stipulated by regulations;
- Store all fuels away from ignition sources and environmentally sensitive areas with consideration of site drainage and surface flows and pathways to the nearest waterbody;
- Using blast mats to minimize spread of fly rock;
- Restricting access to explosive storage and use areas to authorized and trained personnel; and
- Controlling explosive spillage when filling blast holes.

Should a hazardous spill occur, spill containment will be implemented using booms and temporary diversions for small waterways and rapid recovery of materials. Once contained, the proponent would immediately implement appropriate site remediation activities, contributing to a reversible potential effect.

In the event of a major accident or malfunction such as a dam failure or explosive accident, the proponent would implement an Emergency Response Plan, which would include procedures for notification of appropriate authorities, reporting, and roles and responsibilities; and accessing emergency transportation. The proponent prepared a conceptual Emergency Response Plan as part of the EA and committed to developing a detailed plan prior to Project construction.

Predicted Residual Effects

The proponent noted that the implementation and adaptation of the Project design, mitigation, and response procedures, in conjunction with the application of industry best management practices over the life of the Project would minimize the potential for accidents and malfunctions to occur. Further, the proponent stated that the accidents and malfunctions with the potential to cause significant adverse environmental effect would be unlikely to occur.

7.1.2 Views Expressed

The Nisga'a Lisims Government (NLG), United States Environmental Protection Agency, and Southeast Alaska Conservation Council, Rivers Without Borders, and Salmon Beyond Borders expressed concern regarding the proponent's assessment of the best available technology for tailings management. The NLG and the United States Environmental Protection Agency requested the proponent reconsider dry stack tailings and/or paste backfill of tailings as a means of reducing the consequence of failure of the tailings management facility. The proponent provided further environmental, technical, social and economic information for both options, but ultimately concluded that the selection of thickened slurry tailings remained the most appropriate option after considering all environmental, technical, social and economic information.

NLG also expressed concern regarding the potential effects of avalanches leading to a potential catastrophic failure of the tailings management facility. See Section 8 for comments provided by NLG.

The United States Environmental Protection Agency also requested that the proponent develop an Emergency Response Plan that includes communication protocols to notify all downstream stakeholders, including those in the United States, in the event of a tailings dam break. The proponent provided a conceptual Emergency Response Plan as part of the EA and committed to developing a detailed Emergency Response Plan as part of the permitting process.

Métis Nation B.C. expressed concern about the reporting framework for a spill, accident, or malfunction. The proponent's assessment of accidents and malfunctions, including potential effects of an accident or malfunction on the health and socio-economic conditions, physical and cultural heritage and the current use of lands and resources of the Métis Nation B.C., is presented in Chapter 23 of the Environmental Impact Statement. The proponent proposed mitigation measures to address the risks of any accidents and malfunctions, including the establishment of an on-site Emergency Response Team, a Risk Management and Emergency Response Plan, and a Spill Contingency Plan. A component of the Risk Management and Emergency Response Plan involves pre-planned notifications that will occur internally and externally to the Project, depending on the nature and extent of the emergency. The proponent committed to develop, prior to construction, a procedure to engage with and notify authorities, stakeholders, Indigenous groups, and communities in the event of an emergency.

7.1.3 Agency Analysis and Conclusion

The Agency is satisfied with the characterization of accidents and malfunctions undertaken by the proponent. The Agency understands that the proponent would take reasonable measures to avoid or prevent potential accidents and malfunctions, and that contingency and response plans that would be implemented should an accident or malfunction occur. The Agency is of the view that most accidents and malfunctions are unlikely to occur.

The Agency considered the mitigation measures proposed by the proponent and advice from NLG and the public in identifying the following key mitigation measures to be implemented to mitigate the potential environmental effects from accidents and malfunctions:

- Take all reasonable measures to prevent accidents and malfunctions that may result in adverse environmental effects.
- Prior to construction, consult with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities on measures to be implemented to prevent accidents and malfunctions.
- Develop an accident and malfunction response plan prior to construction and in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities. The accident and malfunction plan would include:
 - The types of accidents and malfunctions that may cause adverse environmental effects; and
 - The measures to be implemented in response to each type of accident and malfunction to mitigate any adverse environmental effects caused by the accident or malfunction.
- In the event of an accident and malfunction with the potential to cause adverse environmental effects, the proponent would immediately implement measures appropriate to the accident and malfunction response, and would:
 - Notify, as soon as possible, NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities of the accident or malfunction, and notify the Agency in writing no later than 24 hours following the accident or malfunction. For the notification to NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and the Agency, the proponent would specify:
 - The date the accident or malfunction occurred;
 - A summary description of the accident or malfunction; and
 - A list of any substances potentially released into the environment as a result of the accident or malfunction.
 - Immediately implement measures to mitigate any adverse environmental effects.
 - Submit a written report to the Agency no later than 30 days after the day on which the accident or malfunction occurred. The written report would include:
 - A detailed description of the accident or malfunction and its adverse effects;
 - A description of the measures that were taken to mitigate the adverse environmental effects caused by the accident or malfunction;
 - Any views from NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities received with respect to the accident and malfunction, its adverse environmental effects and the measures taken by the proponent to mitigate these environmental effects;
 - A description of any residual adverse effects and any modified or additional measures required by the proponent to mitigate residual adverse environmental effects; and
 - Details concerning the implementation of the accident and malfunction response plan referred to above.
 - Submit a written report to the Agency no later than 90 days after the day on which the accident or malfunction took place, that includes a description of the changes made to avoid a subsequent occurrence and the modified or additional measure(s) implemented by the proponent to mitigate and monitor residual effects and to carry out any required progressive reclamation. The report would also include all additional views from NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities received by the proponent.

- Develop a communication plan, in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C. The proponent would develop the communication plan prior to construction and would implement and keep it up to date during all phases of the Project. The plan would include:
 - The types of accidents and malfunctions requiring the proponent to notify each of NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C.;
 - The manner by which NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. would be notified of an accident and malfunction and any opportunities for NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. to assist in the response to the accident or malfunction; and
 - The contact information of representatives of the proponent that NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. may contact and the representative of each of NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C. to which the proponent provides notification.

The Agency concludes that although accidents and malfunctions such as a tailings dam breach could result in significant adverse effects environmental effects, these accidents and malfunctions are unlikely to occur. The Agency concludes that the Project is not likely to cause significant adverse environmental effects as a result of accidents and malfunctions, taking into account the likelihood of occurrence and the implementation of mitigation measures identified by the Agency.

7.2 Effects of the Environment on the Project

Potential effects of the environment on the Project include heavy precipitation, high surface water flows, extreme air temperatures, snow avalanches, seismic activity, wildfires, and climate change. The Agency is satisfied that the proponent has adequately considered the potential effects of the environment on the Project and designed the Project to account for these natural hazards.

7.2.1 Proponent's Assessment of Environmental Effects

Heavy Precipitation

The proponent reported that the mean annual precipitation at the mine site is 1,847 millimetres, and estimated the precipitation for a 1 in 200 year wet year at 2,500 millimetres.

The proponent noted that the Project is located in an area that receives frequent and intense rainfall, and a high level of snowfall. Heavy precipitation may lead to erosion, increased groundwater seepage and surface runoff into the underground workings, flooding, and debris flows on steep slopes. Heavy snowfall could also increase snow loading which may, in turn, increase the risk of avalanches.

To address the potential effects of heavy precipitation on the Project, the proponent committed to designing most Project infrastructure, including diversion ditches and portal collection pond, to withstand a 1 in 200 year 24 hour rain event and designing the tailings management facility to withstand a 1 in 50 year wet month in combination with a 1 in 200 year 24 hour rain event in accordance with the Canadian Dam Association *Dam Safety Guidelines*. The proponent also committed to installing silt fencing and berms where necessary along ditches to reduce sediment transport into culverts in accordance with the Erosion and Sediment Control Plan, clearing debris from ditches and culverts, and

conducting ongoing maintenance, including clearing roads and building roofs after heavy snowfalls. In the event of a heavy precipitation event contributing to an emergency scenario, the proponent would initiate the Emergency Response Plan which includes notification of personnel and evacuation actions, if appropriate.

High Surface Water Flows

Creeks in the Project area are mostly glacially influenced. The major creek in the Project area is Bitter Creek which funnels into a relatively narrow outflow before flowing into Bear River. Soils in the area are generally thin and have limited ability to retain water so the area is sensitive to high surface water flows. The proponent noted that peak flows in the Project area generally occur from rapid snowmelt or heavy rains occurring from May to July. The greatest risk of high surface water flows is from flooding, including flooding as a result of chunks of ice blocking surface water flow (ice jams). Flooding typically occurs as a result of rapid snowmelt during freshet conditions and rain falling on melting snow during freshet conditions.

Floods can lead to erosion and sedimentation, mass wasting, and can potentially damage roads, bridges, culverts, which could halt construction and operations. In an extreme scenario, flooding could washout drainage structures and potentially lead to overtopping and failure of the tailings management facility. The proponent described the potential failure of the tailings management facility as a low likelihood event with significant irreversible effects on Project infrastructure, potential serious injury to personnel, and could force closure of the mine. Refer to Section 7.1 (Accidents and Malfunctions) for a discussion of potential failure of the tailings management facility.

Measures to mitigate the effects of high surface water flows would be the same as measures to address heavy precipitation (see above section).

Air Temperature

The proponent reported that the monthly temperatures in the Project area, range from -6.4 degrees Celsius in December and January to 6.9 degrees Celsius in August, and that there are records of air temperatures as cold as -20.7 degrees Celsius and as warm as 15.8 degrees Celsius.

The proponent noted that extreme cold temperatures are highly likely to occur over the life of the Project. Extreme cold temperatures would likely increase heating requirements and power demand of the Project, affect worker health (e.g., increase risk of frostbite and hypothermia) and susceptibility to accidents, and augment the potential for freezing pipelines.

Extreme warm temperatures would increase air conditioning requirements and increase power demand, affect worker health (e.g., increase risk of heat exhaustion, dehydration, and heat stroke), increase the risk of equipment malfunction, and increase risk of wildfires. Sustained warm air temperatures may result in precipitation falling as rain rather than snow, and advance melting of snow pack resulting in an increase in runoff in the late winter or early spring.

To address the effects of extreme air temperatures on the Project, the proponent committed to selecting equipment suitable for the range of air temperatures, installing air heating at the entrance to the portal(s) to provide a safe working environment for workers, implementing worker health and safety policies, and conducting maintenance including snow clearing, and road and ditch repair. The proponent also noted that pump failure could result in pipeline contents freezing. To mitigate the risk of a pipeline contents freezing, the proponent committed to installing valves, where appropriate, on pipes to allow the pipe to drain if they are unable to be drained by gravity.

Wind

Average wind speeds in the Project area range from 2.3 to 6.1 metres per second, predominantly from east and southeast. The proponent indicated winds could damage infrastructure by dislodging roofing or mobilizing debris, damage powerlines resulting in the loss of power, or down trees. The proponent committed to designing surface infrastructure to withstand wind, managing vegetation including hazard trees near roads, and applying vegetation setbacks from infrastructure. In the event of wind downing powerlines, non-essential equipment and machinery would be shut down and back-up generators would be used.

Landslides

The proponent mapped the local study area using 1:20,000 mapping to identify moderate and high magnitude natural hazards and 1:5000 mapping for the Project footprint to identify low hazard events. Landslides include rapid mass movement events including rock falls, debris flows, and slides, and slow mass movement events. Numerous small rock falls (at six locations) and small to moderate debris flows (at five locations) were recorded along the access and haul roads as part of the mapping exercise. Debris flows carry materials from drainage channels and streams that are carried a longer distance than rock falls. Small mass movements (i.e. a slow movement of bedrock) were also recorded near the proposed tailings management facility and at one location along the access road. Mass movements can cause damage to transportation corridors, infrastructure and cause human injury.

The proponent would mitigate potential effects of landslides by limiting the construction in high risk locations.

Snow Avalanches

Snow avalanches are common along the steep slopes of the Bitter Creek valley. The proponent noted that avalanches are common along the access road corridor in particular, and may also affect the tailings management facility and mine site. Avalanches have the potential to damage infrastructure, and lead to the obstruction of the access or haul road. To address the effects of avalanches, the proponent designed the Project to limit infrastructure in high risk areas, and committed to monitoring snow-pack, conducting controlled blasting, and offering avalanche training to staff as part of the Avalanche Management Plan.

Seismic Activity

The Project is located approximately 400 kilometres from the Queen Charlotte Fault, where there are frequent (almost daily) earthquakes of 4.0 magnitude or lower on the Richter scale with five moderate earthquakes of approximately 7.0 magnitude since 1920. The proponent noted that earthquakes could damage Project infrastructure, lead to a shutdown of operations, and cause serious injury to personnel.

The proponent committed to designing Project infrastructure to withstand the Maximum Design Earthquake for the Project area (the earthquake expected to produce the highest degree of shaking) and designing the tailings management facility in accordance with the Canadian Dam Association's *Dam Safety Guidelines*. In the event of an earthquake contributing to an emergency scenario, the proponent would initiate the Emergency Response Plan, which includes notification of personnel and evacuation, if appropriate.

The proponent stated that subsidence may occur as a result of underground mining. Subsidence occurs when the removal of material beneath the surface influences the state of the surrounding ground, which moves toward and into the empty volume left by the excavated material. As the volume of material removed increases, the amount of deformation and displacement of the ground around it also increases. Subsidence movement can occur vertically and laterally and is always greater in areal extent than the underground workings, but less in vertical extent than the height of the seam being mined. To mitigate the potential effects of subsidence on operations, the proponent stated that it would leave mining near surface to the end of the mine life to minimize effects of subsidence on Project operations. The proponent committed to tightly backfilling the area close to surface to achieve long term stability.

Fluvial Hazards

Bitter Creek presents a hazard to the access road via erosion and flood events. The proponent noted channel change and erosion along the alignment of the decommissioned access road due to washing out of the north bank and from flood events below the Cambria Creek crossing. Fluvial hazards may damage the road, vehicles, cause injury to drivers and disrupt access to the mine. The proponent designed the access road to avoid most high risk areas, and committed to designing the road to withstand 1 in 100-year peak surface water flows. In some locations, the proponent committed to installing increased armouring in order for the access road to withstand 1 in 100 year peak flows.

Wildfires

The proponent noted that the risk of wildfires is low, given the ecosystem type, the amount of annual precipitation in the Project area, and the snowed cover terrain that remains well into the growing season. In addition, there have been no records of forest fires in the immediate vicinity of the Project, although seven wildfire events have been recorded near Meziadin Junction (50 kilometers east of the Project) since 1999.

The proponent stated that fires could damage or destroy infrastructure, increase the risk to human safety, or adversely affect human health as a result of smoke inhalation. To address these effects, the proponent committed to providing basic fire suppression and safety training to mine-site personnel,

using appropriate fire protection and fire-fighting equipment, implementing a hazard-tree inspection program along the powerline to reduce the risk of trees falling on the powerline, managing vegetation in and around infrastructure, and managing the handling and storage of flammable materials in accordance with the Hazardous Materials Management Plan.

Climate Change

The proponent predicted the climate in the Project area to be warm with increasing levels of precipitation (by the year 2100, total precipitation is expected to increase 10 percent above current levels). The proponent noted that the assessment of potential effects of extreme weather events, as described above, would account for the potential effects of climate change. For example, the frequency and magnitude of high precipitation events is expected to increase, which would be accounted for in the assessment of effects of heavy precipitation. Similarly, warming air temperatures may increase the frequency of freeze-thaw cycles, which is accounted for in the assessment of effects of air temperature. The proponent stated that the proposed measures to mitigate the other effects of the environment on the Project are adequate to address additional risks brought forth by climate change.

7.2.2 Views Expressed

Natural Resources Canada commented that the proponent conducted a good analysis of the potential effects terrain hazards and no additional information was needed on sediment thickness, sediment type and soil types.

Natural Resources Canada also commented that the proponent adequately described the potential seismic hazards, its potential effects, and proposed mitigation measures. However, Natural Resources Canada requested clarification on whether there was any evidence of recent faulting near the proposed location of the tailings management facility. The proponent stated that the geotechnical site investigations revealed signs of faults coming to surface and recognized the potential for these faults to come to surface. The proponent stated that the design of the tailing management facility accounted for these faults and confirmed that there have been no active faults in the Project area within the last 10,000 years.

Natural Resources Canada requested additional information about the potential effects of a volcanic eruption, although it recognized that the probability of a volcanic eruption is low. In response, the proponent identified five dormant and one extinct volcano (Iskut-Unuk River Cones, Tseax Cone, Hoodoo Mountain, Spectrum Range, Crown Lagoon, and Edziza) between 100 and 200 kilometres of the Project, but indicated that these volcanos would not present a risk to the mine.

The Nisga'a Lisims Government expressed concerns regarding the potential effects of avalanches leading to a potential catastrophic failure of the tailings management facility. The Agency's discussion on this issue is described in Section 7.1 (Effects of Accidents and Malfunctions). Indigenous groups and the public did not have any comments on the effects of the environment on the Project.

7.2.3 Agency Analysis and Conclusion

The Agency is of the view that the proponent has adequately considered the potential effects of the environment on the Project and designed the Project to account for the effects of the environment on the Project. The Agency is of the view that the following design measures and mitigation measures proposed by the proponent would avoid or reduce potential effects:

- Design and construct diversion ditches and portal collection pond to withstand a 1 in 200 year 24 hour rain event;
- Design and construct the tailings management facility to withstand a 1 in 50 year wet month in combination with a 1 in 200 year 24 hour rain event in accordance with the Canadian Dam Association Dam Safety Guidelines;
- Design and construct the Project to withstand a Maximum Design Earthquake in accordance with the Canadian Dam Association Dam Safety Guidelines;
- Design and construct the access and haul roads to withstand 1 in 100-year peak surface water flows;
- Limit construction in areas with high risk of landslides or snow avalanches;
- Conduct controlled blasting as a way of managing snow avalanches;
- Removing hazard trees;
- Using silt fencing and berms where necessary to reduce sediment transport;
- Clearing debris from ditches and culverts, as necessary; and
- Conducting maintenance after heavy snowfalls, including clearing roads and building roofs.

The Agency is satisfied that the proponent has adequately considered the effects of the environment on the Project and that the proposed mitigation measures and follow-up activities are appropriate to account for the potential effects of the environment on the Project.

7.3 Effects to Species at Risk

The Agency focused its assessment on species listed on Schedule 1 of the *Species at Risk Act* and on species listed by the *Committee on the Status of Endangered Wildlife in Canada*.

The Project's effects on migratory bird species at risk are discussed in Section 7.2 (Migratory Birds). Only terrestrial species at risk were identified as potentially affected by the Project; no fish, aquatic species, or plants were identified. Potential effects on species of importance to the Nisga'a Lisims Government (NLG) are described in Section 8.

Under subsection 79(2) of the *Species at Risk Act*, the Agency is required to identify the Project's adverse effects on species listed on Schedule 1 of the *Species at Risk Act*, including effects to the critical habitat of these species. The Agency is also required to ensure measures are taken to avoid or lessen adverse effects on species at risk listed on Schedule 1, and that appropriate monitoring and follow-up programs are considered if a project is carried out. The measures must be consistent with applicable recovery strategies and action plans.

The Agency is of the view that, taking into account the mitigation measures, the effects on species at risk or their habitat would be reduced and/or avoided.

7.3.1 Proponent's Assessment of Environmental Effects

Predicted Effects

The proponent assessed changes to habitat availability (habitat loss, habitat alteration, and sensory disturbance), changes to habitat distribution (disruption of movement), mortality risk (direct and indirect) and effects from chemical hazards and attractants. The proponent assessed effects to the following species at risk that could be affected by the Project: grizzly bear, wolverine, Keen's myotis, little brown myotis, northern myotis, northern goshawk (*laingi* subspecies), western screech owl (both *kennicotti* and *macfarlanei* subspecies), and western toad. All species are listed on Schedule 1 of the *Species at Risk Act*, except for Keen's myotis which is listed on Schedule 3 of the *Species at Risk Act*.

Changes to Habitat Availability

The proponent described potential effects from changes to habitat availability that could occur through vegetation clearing, ground disturbance, and behavioral responses to light, noise, dust, and human presence. Most species would be affected to some degree by habitat loss and alteration through removal of suitable breeding and foraging habitat, including roosts for bats (Keen's myotis, little brown myotis, northern myotis), old growth forest for wolverines, wetlands and riparian areas for western toad, or trees and snags with cavities for raptors (northern goshawk and western screech owl). These habitats also provide breeding and foraging areas for prey and predator species, which could be affected by the Project and change predator-prey dynamics. For instance, wolverines are highly dependent on their prey, including hoary marmots and grouse which occur in the Project area. Northern goshawk is also sensitive to loss of their prey as well as large-scale habitat changes and fragmentation. The proponent acknowledged the potential increase in occurrence of predator species, such as an increase in barred owls that prey on western screech owls. Raptors in particular are sensitive to habitat alteration because they exhibit high nest site fidelity (return to nest sites year after year), and have low reproductive rates. For example, northern goshawks have a low clutch size and only one young per season. Habitat alteration could also result from changes to water quality and quantity from road run-off or changes to drainage patterns, which could affect western toad.

Human presence and sensory disturbance such as light and noise during construction and operation may also decrease the suitability of habitats adjacent to the Project area. Bird species in particular tend to avoid noisy and human-occupied areas, although the response can vary by species and their natural resiliency. Bats can also be attracted and disturbed by lights from Project infrastructure as well as noise from construction and operation which could distract them during foraging activities.

The proponent predicted that less than three percent of suitable habitat for all species at risk would be lost or altered in the regional study area (Table 9). Within the local study area, the greatest change would occur to the suitable nesting habitats (30 percent) and foraging habitats (16 percent) of northern goshawk, fall feeding habitat of grizzly bear (nine percent), and growing living habitat of bats (nine percent) (Table 9).

Table 9 Changes to Species at Risk Habitat Availability in the Local Study Area and Regional Study Area

Life requisites	Local study area			Regional study area		
	Total suitable habitat (hectares)	Suitable habitat lost or altered (hectares)	Percentage of suitable habitat loss or altered (%)	Total suitable habitat (hectares)	Suitable habitat lost or altered (hectares)	Percentage of suitable habitat loss or altered (%)
Grizzly bear						
Early spring feeding	1,237	51	4	13,858	51	<1
Late spring feeding	2,072	42	2	9,722	42	<1
Summer feeding	5,115	204	4	41,428	204	<1
Fall feeding	1,885	172	9	27,532	172	<1
Winter denning	757	8	1	6,496	8	<1
Wolverine						
Growing living	8,457	465	5	59,311	465	<1
Winter denning	1,157	49	4	10,906	49	<1
Bats						
Growing living	2,893	248	9	N/A	N/A	N/A
Northern goshawk						
Nesting	743	221	30	6,692	221	3
Foraging	2,574	399	16	16,743	399	2
Western screech-owl						
Nesting	71	3	4	4,127	3	<1
Western toad						
Breeding	94	<1	<1	N/A	N/A	N/A

N/A means that habitat availability was not assessed because of the smaller home range of the specific species.

Changes to Habitat Distribution

According to the proponent, physical and sensory changes may disrupt habitat connectivity and present a barrier to movement for grizzly bear and western toad. Physical barriers include Project infrastructure such as roads, powerlines and facilities that could disrupt wildlife movement on land and between water bodies. Noises from road traffic, blasting or construction, as well as visual disturbances from infrastructure lighting or generation of dust during construction also pose a sensory barrier. The proponent noted that bats and raptors can avoid disruptions to movement and habitat edge effects by flying over these physical barriers on the ground, while wolverine are not likely to be affected given the low traffic volume along the access and haul roads within the local study area during construction and operation. The proponent noted that western toad are particularly vulnerable to habitat fragmentation

by roads as the species aggregates at breeding sites and moves between habitats in large groups, making the population vulnerable to road traffic.

Mortality Risk

The proponent stated that the Project may increase mortality risk for species at risk as a result of collisions with vehicles, electrocutions from powerlines, increased predation, loss of prey, and interactions with humans. The proponent described that the access road could facilitate human access to the area and increase hunting pressure, especially for grizzly bear. Direct mortality of grizzly bears may result from conflicts between humans and bears and from habitat displacement. Vegetation clearing could remove important habitat features for wildlife that could lead to their increased vulnerability and potential mortality. Bats could be susceptible to mortality or injury (and therefore increased predation risk) as a result of collisions with artificial lighting structures while feeding on insects and other prey attracted by lights.

Effects from Chemical Hazards and Attractants

The proponent considered the potential for chemical hazards to affect the health of wildlife. Exposure to chemical hazards may be direct as a result of direct contact with chemical hazards, or indirect as a result of ingestion of contaminated food or water sources.

Other attractants that could lead to additional exposure to risks include odours, food waste, road-kill carcasses, salt from dust suppression and de-icing, and grey water from ponds/roadside pools. Project infrastructure may also provide refuge or shelter for small mammals or perching, nesting, or roosting sites for bats and birds, exposing them to potential entrapment.

Proposed Mitigation Measures, Monitoring and Follow-Up

The proponent identified a suite of measures to mitigate effects to species at risk as part of the Wildlife Management Plan and related plans, including the Hazardous Materials Management Plan, Access Management Plan, and Site Water Management Plan.

Changes to Habitat Availability

The proponent incorporated a number of measures into the Project design, including designing the access and haul roads to minimize distance traveled, and committed to progressively reclaiming the site to minimize erosion potential and introduction of invasive plants while initiating successional ecological processes. The proponent also committed to minimizing sensory disturbance to wildlife, particularly bats, by adhering to standard noise dampening measures and criteria in Environment and Climate Change Canada's *Environmental Code of Practice for Metal Mines* (2009).

Changes to Habitat Distribution

The proponent noted that density of roads was too low to affect most species, however it proposed mitigation measures to address this potential effect and identified changes to habitat distribution as a potential effect to western toad only. The proponent committed to conducting inspections of wetland areas along the access and haul roads in advance of any ground disturbing activities and to installing drift fences and culverts along these roads to facilitate toad migration crossings. The proponent stated

that it would manage snow bank height to reduce sensory barriers while creating escape pathways for wildlife.

Mortality Risk

To manage hunting pressure, the proponent committed to taking measures to limit public access (including hunters) into the Bitter Creek valley by installing a gate on the access road near the intersection with Highway 37A. The proponent also committed to implementing a policy prohibiting recreational hunting for all employees and contractors.

The proponent committed to scheduling vegetation clearing and construction activities to avoid sensitive periods for wildlife, where possible. These sensitive periods include October through spring for grizzly bear winter denning, February 1 to June 29 for wolverines, May 15 to September 30 for bat maternity roost sites, October 1 to May 31 for bat hibernaculum sites, and January 26 to September 6 for raptors. Where it is not possible, the proponent committed to conducting pre-clearing surveys to identify active sites and developing site and species-specific protection measures such as buffer zones. For example, the proponent committed to establishing, where possible, buffer zones around wolverine denning habitats (500 metres), grizzly bear dens (a minimum of 60 metres), bat habitat features (300 metres), wetlands for western toad (minimum 30 metres), and raptor nests (200 to 500 metres).

In order to reduce the risk of wildlife and vehicle collisions, the proponent committed to reducing traffic volume, imposing a speed limit of 50 kilometres per hour, managing snow bank height to exclude wildlife while creating escape ways, installing signage indicating important wildlife crossing areas, and giving wildlife the right of way along the access and haul roads (yielding to wildlife present on roads, stopping vehicles, and allowing wildlife to pass).

Effects from Chemical Hazards and Attractants

The proponent committed to intercepting and routing contact water to on-site settling sumps, ponds, and the tailings management facility, and treating it prior to discharging to the environment where the chemical hazards could lead to mortality of species at risk. Hazardous materials (e.g. used batteries, petroleum product containers, grey water, sewage, contaminated soil or snow) would be managed according to the *Transportation of Dangerous Goods Act*. The proponent also stated that fuel would be stored on-site in double walled tanks to prevent potential spills.

The proponent committed to employing deterrents (e.g. air horns, noise makers, wire barricades) to discourage wildlife from entering Project infrastructure (including on-site settling sumps, ponds, and the tailings management facility) for refuge, shelter, nesting, and roosting, and potentially becoming entrapped. The proponent stated that it would install bear-proof receptacles for all waste collection sites to prevent bears from accessing facility wastes, contaminated areas, and other attractants.

To mitigate the potential effects from wildlife attraction to light, the proponent stated that it would establish timed and focused lighting designed to deter insects and their predators (bats). The proponent also committed to installing tight mesh around mine portals to reduce the chances of bats gaining access to mine portals and underground workings.

Predicted Residual Effects

Changes to Habitat Availability

The proponent identified changes to habitat availability as a predicted residual effect for grizzly bear, wolverine, bats, northern goshawk, and western screech owl. The proponent noted that although the Project area does not contain any highly suitable breeding habitat for western toad, the Project footprint does minimally overlap with a small section of moderately suitable habitat along the access road. For grizzly bear, wolverine, and western screech owl, the proponent stated that habitat loss, alteration and sensory disturbance would be a low magnitude residual effect of continuous frequency and long-term duration that would be reversible through successful reclamation of the Project area. A larger portion of habitat would be affected by the Project for both bats and northern goshawk, and as a result, the proponent considered the residual effect to be moderate in magnitude. The potential effect to bats (i.e. sensory disturbances from lighting and noise from mine-related activities) would be limited to only the Project footprint considering the proponent stated that no hibernacula were documented to date in the local study area. Northern goshawk would also be moderately affected by the Project as the species is sensitive to large-scale habitat changes and fragmentation. The proponent concluded that the residual effects of the Project on species at risk due to changes to habitat availability would not be significant.

Changes to Habitat Distribution

The proponent concluded that changes to habitat distribution would not result in a residual effect for species at risk after the implementation of mitigation measures that would reduce barriers to movement and alter movement such as roads. The density of roads in the Project's local study area (0.04 kilometres per kilometres squared) and traffic levels (253 vehicles per day along Highway 37A) do not exceed thresholds set by B.C.'s Ministry of Transportation and Infrastructure (2017)⁴ that establish barriers for all species considered in the effects assessment in B.C. (roads greater than 2 kilometres squared with 300 to 500 vehicles per day).

Mortality Risk

The proponent identified mortality risk as a predicted residual effect only for grizzly bears. The proponent considered the vulnerability of grizzly bear to hunting pressure, habitat displacement, and contact with humans and vehicles, and determined the residual effects to be of a low magnitude, sporadic in occurrence, limited to the local study area, long-term in duration, and reversible once the population stabilizes through reproduction and migration. The proponent predicted that the proposed mitigation measures (i.e. imposing restrictions on vehicle speeds, traffic, light, noise, access, and human-wildlife interactions) would minimize species at risk mortality, including the risk to grizzly bear.

Effects from Chemical Hazards and Attractants

The proponent did not predict any residual effects from chemical hazards and attractants.

⁴ British Columbia Ministry of Transportation and Infrastructure (BC MOTI). 2017. Traffic Data Program. Available from <http://www.th.gov.bc.ca/trafficData/index.html>.

7.3.2 Views Expressed

As described in the EIS, the proponent focused on baseline surveys conducted during breeding seasons to support the effects assessment for species at risk. Environment and Climate Change Canada requested baseline information collected during non-breeding seasons in order to understand year-round use of the Project area and seasonal movements of bats, western toad, western screech owl, and northern goshawk. The proponent responded to the request by providing survey data collected for other projects in the area as well as academic monitoring data.

Environment and Climate Change Canada also indicated that there was uncertainty in western screech owl use of the Project area and requested that the proponent conduct additional species-specific surveys for western screech owl in the event that clearing activities overlap with the species' nesting period. The proponent committed to completing the pre-clearing surveys, following established B.C. Resources Information Standards Committee (RISC) survey standards, and in consultation with Environment and Climate Change Canada, to identify species-specific protection measures such as appropriate non-disturbance setbacks, if nests or evidence of nests are found.

During the public comment period on the Project Description, Tsetsaut/Skii km Lax Ha expressed a general concern about the effects of mineral exploration in their territory on furbearers harvested by the group, including wolverine. Métis Nation B.C. expressed an interest in reviewing the Wildlife Management Plan, but did not provide any comments on the effects assessment, Wildlife Management Plan, or mitigation measures pertaining to species at risk.

NLG provided comments on the Nisga'a grizzly bear allocation and expressed concerns about the effects of helicopters and blasting noise on denning grizzly bear. Refer to Section 8 for comments provided by NLG.

The public did not raise any concerns regarding species at risk.

7.3.3 Agency Analysis and Conclusion

For the Agency's analysis on species at risk not included on Schedule 1 of the *Species at Risk Act* but of importance to the treaty rights of the Nisga'a Nation as set out in *Nisga'a Final Agreement*, such as grizzly bear and wolverine, refer to Section 8 (Nisga'a Nation Effects Assessment) of this report.

Analysis of the Effects

Changes to Habitat Availability

The Agency considers the revegetation and reclamation of the Project area, noise dampening measures, and light control to be appropriate measures to mitigate changes to species at risk habitat availability. The Agency recommends adhering to standard noise dampening measures and criteria in Environment and Climate Change Canada's *Environmental Code of Practice for Metal Mines* (2009). The control of operational lighting, including direction, timing, intensity, and glare to avoid sensory disturbance is considered appropriate to prevent wildlife attraction to Project infrastructure.

Changes to Habitat Distribution

The Agency agrees with the proponent that mitigation measures including escape pathways on roads (i.e. drift fences and culverts), would be appropriate to manage changes to habitat distribution for all species.

Mortality Risk

The Agency agrees with the mitigation measures proposed by the proponent to prevent mortality risk of species at risk by initiating and conducting project-related activities outside sensitive periods for wildlife and away from sensitive habitats, and designing Project infrastructure and roads to exclude wildlife from the Project area. The Agency recommends that the proponent schedule vegetation clearing and construction activities outside sensitive breeding periods, where possible, and establish species-specific buffers around breeding bird areas, hibernacula, maternity roosts, and wetlands. The Agency supports the inspection of wetlands and ponds prior to any ground disturbing activities during the amphibian breeding season, following applicable provincial and federal guidance such as Environment and Climate Change Canada's *Wetland Ecological Functions Assessment: An Overview of Approaches*⁵ and the implementation of adaptive mitigation and management measures. The Agency also recommends that the proponent conduct pre-clearing, species-specific surveys for western screech owl in the Project area if clearing activities overlap with the nesting period in order to establish non-disturbance setbacks of approximately 200 to 500 metres around nests or suspected nests. Designing the Project infrastructure to minimize or avoid effects to species at risk is appropriate, including measures to exclude wildlife from attractants, minimize bird strikes and electrocutions, and improve road conditions that would increase wildlife visibility, establish wildlife escape routes, and minimize collisions. The Agency recommends the installation of tight mesh to reduce the risk of bats gaining access to underground workings, and drift fences or culverts, using the best available information on culvert construction for wildlife, to facilitate western toad crossing the access or haul roads without harm.

Effects from Chemical Hazards and Attractants

The Agency agrees with the proponent that measures including use of deterrents (e.g. air horns, noise makers, wire barricades), installation of bear-proof receptacles, and management of lighting would be sufficient to address effects to species at risk from exposure to chemical hazards and attractants.

Key Mitigation Measures to Avoid or Lessen Adverse Effects

The Agency considered the mitigation measures proposed by the proponent, advice from expert federal authorities, and comments received from NLG in identifying the following key mitigation measures to be implemented with respect to species at risk:

- Identify, prior to construction and in consultation with relevant authorities, time periods during which construction may not be carried out to protect western screech owl, northern goshawk, little

⁵ Hanson, A., Swanson, L., Ewing, D., Grabas, G., Meyer, S., Ross, L., Watmough, M., and Kirkby, J. (2008). *Wetland Ecological Functions Assessment: An Overview of Approaches*. Available from: http://publications.gc.ca/collections/collection_2010/ec/CW69-5-497-eng.pdf

brown myotis, northern myotis, and western toad during sensitive life stages. In doing so, the proponent would:

- Apply B.C.'s *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia* when identifying these time periods;
 - Notify the Agency, prior to construction, of these time periods and of the areas within which each of these time periods would apply; and
 - Conduct construction during these time periods, unless not technically feasible.
- If construction during time periods referred to above is not technically feasible, the proponent would conduct pre-clearing surveys and develop and implement additional mitigation measures to protect western screech owl, northern goshawk, little brown myotis, northern myotis, and western toad during construction. In doing so, the proponent would:
 - Develop, in consultation with relevant authorities, and implement species-specific non-disturbance setback distances around habitat features used by each species for critical life functions and identified through pre-clearing surveys. The proponent would apply B.C.'s *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia* when identifying these setback distances; and
 - Notify the Agency of the additional mitigation measures prior to implementation, including the setback distance identified for each species, the habitat feature(s) and construction activity(ies) applicable to each setback distance, and the period(s) of time during which each setback distance would be applied.
 - Construct and maintain, during all phases of the Project, wildlife tunnels and fencing along the access and haul roads to allow passage of western toad beneath the roads as close as possible to existing migration corridors, taking into account B.C.'s *Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia*.

Need for and Requirements of Follow-up

After considering the follow-up program proposed by the proponent, expert advice from federal authorities, the Agency has identified the following requirements for a follow-up program:

- Develop, prior to construction and in consultation with relevant authorities, a follow-up program to verify the accuracy of the EA and determine the effectiveness of mitigation measures to avoid harm to listed species at risk, including mitigation measures identified above. The proponent would implement the follow-up program during all phases the Project. As part of implementation of the follow-up program, the proponent would:
 - Monitor the use of habitat features, including nests, hibernacula and roosts, by western screech owl, northern goshawk, little brown myotis, and northern myotis;
 - Monitor western usage of the wildlife tunnels; and
 - Monitor ventilation shafts, portal entrance, tailings management facility, and open waterbodies for use by listed species at risk.

Conclusion

The Agency is of the view that, taking into account the key mitigation measures and follow-up program requirements, the effects on species at risk or their habitat would be reduced and/or avoided.

7.4 Cumulative Environmental Effects

This section describes the assessment of cumulative environmental effects that are likely to result from the Project in combination with other physical activities that have been or will be carried out. The assessment of cumulative effects takes into consideration the Agency’s Operational Policy Statement, *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*.

Taking into account the implementation of the proposed mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse cumulative environmental effects.

7.4.1 Approach and Scope

The proponent considered past, present, and reasonably foreseeable future projects or activities in the evaluation of cumulative effects (Table 10). The proponent’s assessment considered three temporal boundaries, at the time it submitted its EIS, to capture projects or activities for which the environmental effects overlap with the Project: past (active and inactive projects from 1988 to 2014), present (2014 to 2017), and reasonably foreseeable future (2018 to 2029, the end of the Project’s post-closure) projects or activities.

Table 10 Past, Present and Future Projects or Activities Identified by the Proponent

Project	Current Status	Location
Stewart Bulk Terminals	Operating	Stewart
Stewart World Port	Operating	Stewart
Highway 37A	Operating	Stewart
Long Lake Hydroelectric Project	Operating	25 kilometres east of Stewart
Bitter Creek Hydro Project	Proposed	Bitter Creek valley, 15 kilometres northeast of Stewart
Commercial recreation	Ongoing	Regional
Forestry	Ongoing	Regional
Guide outfitting	Ongoing	Regional
Hunting	Ongoing	Regional
Mineral exploration	Ongoing	Regional
Parks and protected areas	Ongoing	Regional
Transportation	Ongoing	Regional
Trapping	Ongoing	Regional

The Agency focused its cumulative effects assessment on five valued components: fish and fish habitat, migratory birds, health and socio-economic conditions, and current use of lands and resources for traditional purposes. The Agency selected these valued components for the cumulative effects

assessment because the Agency identified residual effects for these valued components in Section 6 of this report (Predicted Effects to Valued Components).

7.4.2 Fish and Fish Habitat

Proponent's Assessment of Environmental Effects

The proponent considered whether the Project may interact with other projects or activities leading to cumulative effects to fish and fish habitat from the loss of fish habitat, changes in surface water quality and changes in stream flows.

The proponent indicated that the Project would not interact with other projects or activities leading to cumulative effects to fish and fish habitat. In particular, the proponent noted that the Bitter Creek Hydro Project, a 30 megawatt run-of-river hydroelectric facility that is proposed to be located within the local study area, would be located upstream of the fish bearing reaches of Bitter Creek and therefore would not result in changes to Bitter Creek streamflow or loss of fish habitat. The Bitter Creek Hydro Project would have an intake on Bitter Creek approximately two kilometers upstream of the tailings management facility, a penstock that runs parallel to Bitter Creek and the Bromley Humps infrastructure, and outflow located on Bitter Creek next to the tailings management facility located at Bromley Humps.

Views Expressed

The Agency received a joint letter from the Southeast Alaska Conservation Council, Rivers Without Borders, and Salmon Beyond Borders and a separate letter from the Southeast Alaska Indigenous Transboundary Commission expressing concerns about the cumulative effects of mining projects in B.C. and the downstream effects on Alaskan interests. The organizations expressed their concerns over cumulative effects of the Project to fish moving up and down the Portland Canal to Alaska rivers, as well as concerns over gaps in the proponent's analysis of contaminants of potential concern from discharges. The Agency recognizes that these concerns include but also go beyond the scope of the Project. As part of the EIS, the proponent assessed the potential for cumulative effects to water quality, in addition to how changes to contaminants of potential concern would affect fish and fish habitat. The proponent's assessment indicates that cumulative effects to surface water would not extend beyond the border between Canada and the United States of America.

Environment and Climate Change Canada requested more information about the Bitter Creek Hydro Project including the amount of flow reduction in the diversion reach, location of flow reduction, and expected loss of dilution in Bitter Creek. The proponent responded that the Bitter Creek Hydro Project intake and outflow would occur upstream of fish-bearing reaches of Bitter Creek and therefore would have no effect on fish and fish habitat. In addition, the proponent noted that the Bitter Creek Hydro Project is in the early planning stages and that the requested details are not currently available.

The Agency did not receive any comments in relation to cumulative effects of the Project to fish and fish habitat from the Nisga'a Lisims Government (NLG), Tsetsaut/Skii km Lax Ha, or Métis Nation B.C.

Agency Analysis and Conclusion

The Agency agrees with the proponent that the Project is not likely to interact with other projects, including the Bitter Creek Hydro Project, or activities in the regional study area leading to cumulative effects to fish and fish habitat. The proposed water intake and discharge locations for the Bitter Creek Hydro Project are located upstream of fish bearing reaches of Bitter Creek which means that there would be no direct loss of fish habitat in the diversion reach (the section of Bitter Creek downstream of the water intake and upstream of the discharge point). In addition, the Agency assumes that, as a run-of-river facility, there will be limited, if any, water storage in the form of a reservoir or pool which means that streamflow in downstream fish-bearing reaches would remain unchanged. Further, the Agency understands that the winter period is a sensitive time for fish and fish habitat due to low flow, but that the hydroelectric facility would not operate during the winter. The Agency concludes that the Project is not likely to cause cumulative effects to fish and fish habitat.

The Agency acknowledges the concerns of Alaskan non-government organizations and the Southeast Alaska Indigenous Transboundary Commission about the potential cumulative effects of mining projects in B.C. on Alaskan interests including fish. The Agency agrees with the proponent that cumulative effects to surface water quality would be limited to the Project footprint (cumulative effects would be limited to the diversion reach associated with the Bitter Creek Hydro Project because of the loss of dilution). In addition, the Agency agrees with the proponent that residual effects to surface water quality extend to the confluence of Bitter Creek to Bear River, which is approximately 15 kilometres upstream of the Portland Canal and B.C./Alaska border.

7.4.3 Migratory Birds

Proponent's Assessment of Environmental Effects

The proponent identified that the cumulative effects of the Project to migratory birds, including migratory bird species at risk, from changes to habitat availability and changes to mortality risk.

The proponent predicted that the Project-related residual effects on migratory birds in combination with activities related to Highway 37A, Stewart Bulk Terminals, Stewart World Port, Long Lake Hydroelectric Project, forestry, mineral exploration, and the Bitter Creek Hydro Project would result in a minor loss or alteration of habitat and sensory disturbance. Vegetation clearing and ground disturbance from all projects or activities would increase predation and lead to edge effects such as increased wind exposure. Noise and light would also disturb migratory birds. The proponent noted that less than 5 percent of suitable habitat would be lost or altered for most species in the regional study area, with the exception of marbled murrelet for which 13 percent of suitable habitat would be affected (Table 11).

Table 11 Cumulative Effects to Habitat Availability for Migratory Birds

Habitat Type	Habitat Loss from Past, Present, and Future Projects or Activities (hectares)	Habitat Loss from the Project (hectares)	Total Habitat Loss (hectares)	Total Habitat in Regional Study Area (hectares)	Cumulative Loss of Habitat in the Regional Study Area (%)
Habitat Guilds					
Alpine	33	154	188	34,653	<1
Old/mature forest	982	212	1,193	34,249	3
Riparian	500	119	619	12,146	5
Shrub/early successional	1,141	256	1,405	49,889	3
Specific Species					
Black swift	27	51	78	2,084	4
Common nighthawk	228	8	233	4,823	5
Marbled murrelet	329	57	382	2,971	13
Olive-sided flycatcher	566	88	653	32,743	2
MacGillivray's warbler	280	149	428	23,805	2

The proponent characterized the cumulative effect to migratory birds as a result of changes to habitat availability as low in magnitude, occurring at the regional level, long-term in duration, continuous, and reversible after Project closure and reclamation, except for the marbled murrelet. The proponent concluded that the magnitude for marbled murrelet would be moderate, as the loss or alteration of its habitat would be higher than the other bird species (13 percent) because the proponent assigned a larger sensory disturbance zone to account for its sensitivity to indirect effects from habitat alteration, such as wind exposure from edge effects and predation. The remaining criteria would be the same.

The proponent also identified cumulative effects to common nighthawk and marbled murrelet as a result of increased mortality risk caused by collisions with vehicles from present projects (i.e. Highway 37A, Long Lake Hydroelectric Project, forestry, mineral exploration) and future projects (i.e. Bitter Creek Hydro Project), as well as collisions with infrastructure such as powerlines, vegetation clearing and ground disturbance of all projects. The proponent concluded that the magnitude would be low for common nighthawk, low to moderate for marbled murrelet due to its lower resiliency to change, occurring at the regional level, long-term in duration, sporadic in frequency, and reversible after Project closure and reclamation activities.

The proponent did not propose any mitigation measures specific to cumulative effects to migratory birds, but stated that the measures to mitigate direct effects of the Project (described in Section 6.2) would also apply to cumulative effects, including scheduling Project activities outside sensitive periods, where possible, establishing no-work buffer zones around key habitat features, and employing deterrents to discourage migratory birds from using Project infrastructure and potentially becoming entrapped.

The proponent concluded that Project is not likely to cause significant cumulative effects to migratory birds.

Views Expressed

The Agency did not receive any comments in relation to the cumulative effects of the Project to migratory birds from federal authorities, NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., or the public.

Agency Analysis and Conclusion

The Agency agrees with the proponent that there would be cumulative effects to migratory birds as a result of changes to habitat availability. The Agency finds the proponent's assessment of changes to habitat availability to be conservative, given that the proponent modeled a range of suitable habitat that may be important biologically for migratory birds and not just highly valued habitat. In addition, the Agency agrees with the proponent that there would be a cumulative increase in mortality risk for common nighthawk and marbled murrelet primarily as a result of collisions with vehicles, powerlines, but also as a result of ground disturbance and vegetation clearing from other projects or activities. The Agency finds that no additional mitigation is necessary as mitigation measures identified to mitigate the effects of the Project to migratory birds would also apply to cumulative effects.

The Agency concludes that the Project is not likely to cause significant adverse cumulative effects to migratory birds taking into account the implementation of mitigation measures.

7.4.4 Aboriginal Peoples - Health and Socio-Economic Conditions

Proponent's Assessment of Environmental Effects

The proponent did not identify any residual effects to the health and socio-economic conditions of Indigenous peoples and, as a result, did not conduct a cumulative effects assessment.

Views Expressed

The Agency did not receive any comments in relation to effects of the Project to cumulative effects to health and socio-economic conditions from federal authorities, NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., or the public.

Agency Analysis and Conclusion

As noted in Section 6.5, the Agency disagrees with the proponent's conclusion that the Project would not result in residual effects to the health and socio-economic conditions of Indigenous peoples. The Agency is of the view that the Project is likely to result in adverse residual effects (i.e. changes in air quality, increased noise, reduction in quality of traditional foods, and diminished surface water quality) that could act in combination with the environmental effects from the proposed Bitter Creek Hydro Project. The Agency agrees with the proponent's assessment that there may be minor interactions between the two projects with regard to the cumulative effects to noise levels and air emissions, but disagrees with the proponent that these would not have a resulting effect on human health.

The proponent stated that cumulative effects on air quality would occur if air contaminants and fugitive dust from the Project and the Bitter Creek Hydro Project disperse into the same location. The proponent stated that air emissions from the Bitter Creek Hydro Project are anticipated to primarily occur during construction activities and are not expected to materially increase air emissions in combination with air emissions from the Project. The proponent did not propose any mitigation measures specific to cumulative effects to air quality, but stated that measures to mitigate direct effects of the Project would also apply to cumulative effects, including controlling fugitive dust at the source by employing point source emission controls within the process plant and employing water sprays along the access and haul roads. The proponent stated that the residual cumulative effects to air quality would be low in magnitude, local in geographic extent, occur intermittently during any overlapping project activities, and would be reversible following Project decommissioning and successful reclamation. The proponent concluded that the cumulative effects of the Project on air quality would be not significant.

As explained by Health Canada and NLG in Section 6.5 (Health and Socio-economic Conditions), particulate matter and nitrogen dioxide are non-threshold contaminants and, therefore, any minor increase in these air contaminants would have resulting effects to human health. The Agency is of the view that the cumulative effects to human health from changes to air quality would be minor, as they would be limited to the construction phase of the Bitter Creek Hydro Project and are not expected to materially increase air emissions in combination with air emissions from the Project.

With regards to noise effects, the proponent stated that cumulative effects could occur if noise levels from the Bitter Creek Hydro Project match or exceed the noise levels from the Project at a particular receptor. The proponent did not propose any mitigation measures specific to cumulative noise effects, and stated that measures to mitigate direct effects of the Project would also apply to cumulative effects. The proponent indicated that residual cumulative noise effects would be moderate in magnitude, occur within the local study area and throughout the duration of overlapping project activities, and be reversible following Project decommissioning and reclamation. The proponent concluded that the cumulative effects of the Project on noise levels would be not significant.

The Agency is of the view that the cumulative increase in noise would be limited to the construction phase of the Bitter Creek Hydro Project. The Agency finds the mitigation measures for the direct effects of the Project to be reasonable, and agrees with the proponent that additional measures to mitigate cumulative noise effects specifically are not required.

The Agency agrees with the proponent that there would be no potential cumulative effects to human health as a result of changes to the quality of traditional foods and surface water quality. The Bitter Creek Hydro Project would not discharge effluent or other waste into the environment which may result in any measurable changes to the quality of traditional foods or surface water quality.

The Agency concludes that the Project is not likely to cause significant adverse cumulative environmental effects to the health and socio-economic conditions of Aboriginal peoples taking into account the implementation of mitigation measures.

7.4.5 Current Use of Lands and Resources for Traditional Purposes

Proponent's Assessment of Environmental Effects

The proponent identified cumulative effects to the current use of lands and resources by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. as they relate to mountain goat, moose, grizzly bear, other furbearers, and migratory birds and the groups' ability to harvest wildlife for traditional purposes. The proponent anticipates that the Project in combination with other projects may result in a reduction of the wildlife availability due to the loss or alteration of wildlife habitat, and increased wildlife mortality risk from vehicle collisions and recreational hunters with greater public access to the Bitter Creek valley.

The proponent did not identify cumulative effects to the access and current use of fish and plant resources by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. The proponent stated that the Project along with other projects, including the Bitter Creek Hydro Project, or activities in the regional study area is not likely to result in cumulative effects to fish and fish habitat. The proponent identified cumulative effects to plant resources, including loss and alteration of ecosystem abundance, distribution and/or function, but did not anticipate any cumulative effects to the current use of plant resources because of the minimal use of Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

The proponent concluded that the cumulative effects of the Project to the current use of lands and resources for traditional purposes by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. would be low in magnitude, confined to the Bitter Creek valley, and occur for the life of the Project. The proponent concluded that the Project is not likely to cause significant cumulative effects to the current use of lands and resources for traditional purposes by Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

Views Expressed

Tsetsaut/Skii km Lax Ha expressed a general concern about the cumulative effects of mineral exploration on furbearers. The Agency did not receive any comments in relation to cumulative effects to the current use of lands and resources for traditional purposes by Indigenous peoples from federal authorities, Métis Nation B.C., or the public.

Agency Analysis and Conclusion

The Agency is of the view that cumulative effects on the current use of lands and resources for traditional purposes by Tsetsaut/Skii km Lax Ha and Métis Nation B.C have the potential to occur. The

Agency agrees with the proponent's assessment of potential cumulative effects on the current use of wildlife resources by Tsetsaut/Skii km Lax Ha and Métis Nation B.C., based on the proponent's proposed mitigation measures for direct effects of the Project, but disagrees with the proponent's conclusion that cumulative effects to fishing and plant gathering activities are not anticipated.

As described in Section 6.3 (Current Use of Lands and Resources for Traditional Purposes), the Agency is of the view that the Project would result in residual effects to access to the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. and considered it as a potential cumulative effect. The Agency considered that both Tsetsaut/Skii km Lax Ha and Métis Nation B.C. may be excluded from the Bitter Creek valley during the life of the Project and the Bitter Creek Hydro Project for health and safety reasons. These access restrictions may disrupt fishing, hunting and trapping, and plant gathering within the Bitter Creek valley.

In addition to the cumulative effects on wildlife and plant resources, and access to the Bitter Creek valley, the Agency also acknowledges that adverse changes to the Indigenous experience of fishing, hunting and trapping, and plant gathering may occur because of increased public access to, and presence in, the Bitter Creek valley. A cumulative increase in noise and dust, and incremental changes to the visual landscape have the potential to lead to a lower quality experience and possible avoidance of the area by Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

The Agency concludes that the Project is not likely to cause significant adverse cumulative environmental effects to the current use of lands and resources for traditional purposes by Aboriginal peoples taking into account the implementation of mitigation measures.

8 Nisga'a Nation Effects Assessment

The Nisga'a Nation, Canada and B.C. have a treaty, the *Nisga'a Final Agreement*. The Treaty defines Nisga'a Nation rights and interests and the geographic areas in which they apply, including: (1) Nisga'a Lands containing the four Nisga'a villages; (2) the 27,000 square kilometre Nass Area; and (3) within the Nass Area, the 16,101 square kilometre Nass Wildlife Area (Figure 5). The Project would be located on provincial Crown land within the Regional District of Kitimat-Stikine, within the Nass Wildlife Area and the Nass Area, and is 66 km northwest of the boundary of Nisga'a Lands. The Nisga'a Nation is represented by the Nisga'a Lisims Government (NLG) which is comprised of at least three officers elected by the Nisga'a Nation, the elected members of the four Nisga'a Village Governments, and representatives of the Prince Rupert/Port Edward, Terrace, and Vancouver Urban Locals.

The Project is subject to the EA requirements described in Chapter 10 of the Treaty because it is located in the Nass Wildlife Area and Nass Area and could reasonably be expected to have adverse environmental effects on Nisga'a interests set out in the Chapter 10, paragraph 6 of the Treaty.

To meet Canada's obligations under the Treaty, the Agency assessed:

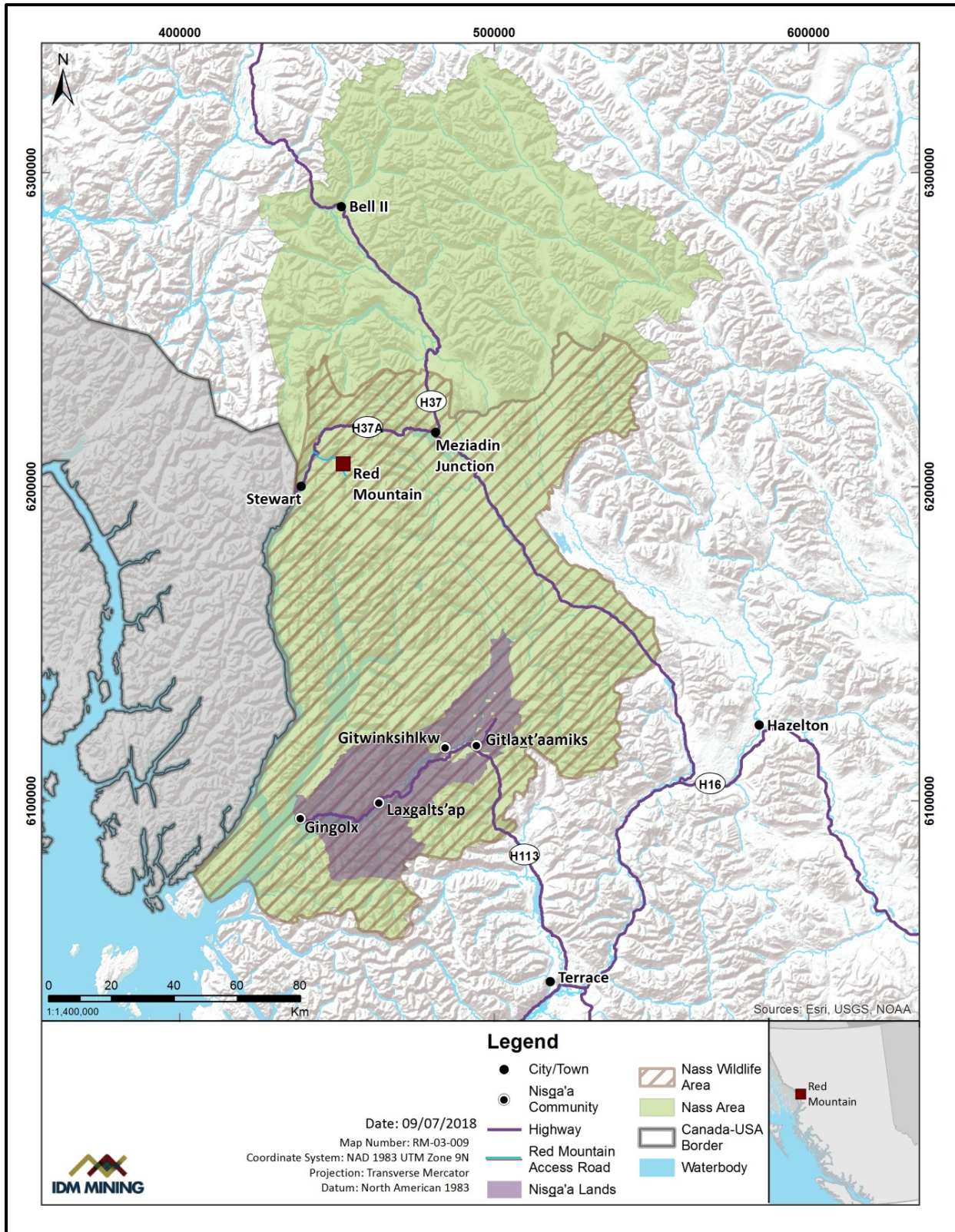
- 1) whether the Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests set out in the Treaty, as required under paragraph 8(e) of Chapter 10 (referred to as the 8(e) effects); and
- 2) the effects of the Project on the existing and future economic, social, and cultural well-being of Nisga'a citizens under paragraph 8(f) of Chapter 10 (referred to as the 8(f) effects).

Paragraph 8(e) effects were examined using the environmental effects information and analyses generated through the EA in consultation with representatives from federal authorities, B.C. provincial ministries, and NLG. Paragraph 8(f) effects were assessed using the proponent's information on economic, social and cultural impacts to Nisga'a Nation, based on the *Nisga'a Economic, Social and Cultural Impact Assessment Guidelines* dated November 2010, as well as issues raised by NLG through the EA.

The following sections describe the outcomes of the assessment of 8(e) and 8(f) effects examined during the EA and the Agency's conclusion on these potential effects in the context of Nisga'a Nation interests defined in the Treaty. Taking into account the mitigation measures and analyses described in this report, the Agency concludes that the Project is not reasonably expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands or Nisga'a interests as set out in the Treaty. The Agency concludes that the Project would result in both positive and negative effects on the existing and future economic, social and cultural well-being of Nisga'a citizens who may be affected by the Project.

In addition to the EA decision statement, the Minister of Environment and Climate Change will issue a *Nisga'a Final Agreement* Project Recommendation, based on the 8(e) and 8(f) assessment, as to whether the Project should proceed. Any subsequent permitting or approval decisions by responsible authorities must take both the EA decisions and *Nisga'a Final Agreement* Project Recommendation into account.

Figure 5 Map of the Project, Nisga'a Lands, Nass Wildlife Area and Nass Area



Source: IDM Mining Ltd.

8.1 Assessment of Paragraph 8(e) Effects

The Agency's assessment of Chapter 10, paragraph 8(e) effects as described by the Treaty focused on potential adverse environmental effects of the Project on Nisga'a Nation interests in the Nass Wildlife Area and Nass Area, specifically those related to access, fisheries, wildlife and migratory birds, guide outfitting, and cultural artifacts and heritage.

8.1.1 Access

The Project lies within the Nass Wildlife Area and Nass Area. The steep and rugged terrain with weather conditions typical of the northern coastal mountains, including significant snow accumulation, typically of more than 2 metres, makes access to the Bitter Creek valley challenging. A road used for exploration activities at the location of the Project would have been the primary access into the Bitter Creek valley until it was decommissioned in the 1990s.

Potential Effects of the Project

The construction of the access and haul roads has the potential to increase harvesting pressure on migratory birds, wildlife, and fish, which may negatively affect Nisga'a rights and interests. Nisga'a citizens' access to the Bitter Creek valley is expected to be limited during construction, operation, decommissioning and closure, and post closure due to safety considerations and Project disturbance.

Measures to Prevent or Mitigate Effects

The proponent proposed the installation of a locked, manned gate along the access road near the junction of Highway 37A. The proponent would develop, in consultation with NLG and other appropriate parties, an access management plan to limit public access to the Bitter Creek valley, to mitigate the effects of road use on the environment, and to ensure appropriate access for Nisga'a citizens to exercise their treaty rights and interests in the Bitter Creek valley. Mine personnel would be housed in accommodations in Stewart and would be transported to the Project site by bus. Project road use would be restricted only to persons required for construction, operation, and maintenance.

Views Expressed by Nisga'a Lisims Government

NLG expressed concern that increased access to the Bitter Creek valley may lead to recreational pressure on wildlife, fish and plant resources which may impact Nisga'a treaty rights and interests. They requested that the access and haul roads be deactivated and rehabilitated with scarification and revegetation as part of the Project closure, unless there is another use for the roads. The proponent committed to establishing a locked, manned gate near the junction of Highway 37A to deter unauthorized entry to the Project. The proponent also committed to develop, in consultation with NLG and other appropriate parties, an access management plan to limit access to the Project area, mitigate the effects of road use on the environment, and ensure appropriate access for Nisga'a citizens to exercise their rights and interests in the Project area. It is expected that most personnel would be housed in accommodation in Stewart and transported to the Project by bus which would limit vehicle

traffic. Project road use will be restricted only to persons required for Project construction, operation, and maintenance.

The proponent will prohibit employees and contractors from fishing or hunting in the Project area and committed to permanently deactivating the full length of the access road upchain of Clements Lake.

Agency Conclusion on Residual Effects

The Agency has identified the following mitigation measures to address effects on Nisga'a treaty rights and interests pertaining to access. The Agency is continuing to consult with NLG on whether the Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests.

- Prohibit public access to the access and haul roads during all phases of the Project.
- Provide access to the Bitter Creek valley through use of the access and haul roads, during all phases of the Project, to Nisga'a citizens to exercise rights under the *Nisga'a Final Agreement*, to the extent that such access is safe. The proponent would consult with NLG prior to construction to identify the manner by which the proponent would provide this access. The proponent would notify NLG in a timely manner if the proponent must prohibit access temporarily for safety reasons.
- Prohibit employees and contractors associated with the Project from fishing and hunting in the Bitter Creek valley during all phases of the Project, unless the proponent provides access to an employee or contractor in accordance with the above.

8.1.2 Fisheries

Potential Effects of the Project

Chapter 8 of the Treaty sets out the Nisga'a Nation's treaty right to fish as well as their fisheries allocation entitlements and angling guide licenses. Nisga'a citizens have the right to harvest fish and aquatic plants for domestic use (i.e. food, social and ceremonial), and to barter or trade fish and aquatic plants harvested within the Nass Area, subject to conservation and laws for public health and safety. Nisga'a citizens harvest salmon, steelhead and eulachon within the Nass Area as well as non-salmonid species of fish, aquatic plants and marine mammals.

The proponent stated that potential effects to fish and fish habitat would occur as a result of habitat loss, increased fishing pressure, changes in aquatic resources, water quality, sediment quality and stream flows, and blasting. The Project would affect Dolly Varden, the only consumable fish species found in the Project area. Dolly Varden use the lower reaches of Bitter Creek and its tributaries (Hartley Gulch, Cambria Creek, and Roosevelt) for spawning, rearing and limited overwintering. The proponent indicated that Dolly Varden caught in the Bitter Creek and tributaries were small (seven to 20 centimetres long), which is consistent with Dolly Varden found in other small headwater streams.

The proponent indicated that changes in surface water quality (i.e. elevated levels of antimony, cadmium, chromium, cobalt, copper, mercury and selenium, silver and zinc) may affect the quantity and quality of Dolly Varden and would be limited to the local study area, continuous, permanent, and

reversible in the long term. Bitter Creek flows into Bear River which supports a number of fish species, but since residual effects to fish are expected to be limited to Bitter Creek, no impacts to fish or fish habitat are expected in Bear River and the Project is not anticipated to result in adverse effects to Nisga'a Nation treaty interests related to Nass salmon or steelhead, eulachon, aquatic plants or marine mammals.

Increased fishing pressure from recreational fishers using the Project access and haul roads may reduce Dolly Varden availability. The proponent noted that, although it is unknown whether there are current Aboriginal fisheries in Bear River or Bitter Creek, Nisga'a citizens may, in the future, exercise their treaty right to fish. In particular to eulachon in the lower reaches of Bear River. Project-related noise, increased human presence, dust and change to the visual landscape may lead to a lower quality fishing experience and possible avoidance of the area. These effects would be confined to the Bitter Creek valley, but persist through all phases of the Project. Nisga'a citizens' access to the Bitter Creek valley is expected to be limited during all phases of the Project.

Measures to Prevent or Mitigate Effects

The proponent proposed to develop, in consultation with NLG and other appropriate parties, an Access Management Plan to limit access to the Project area and to ensure appropriate access for Nisga'a citizens to exercise their rights in the Bitter Creek valley. The proponent also committed to enforce a no-fishing policy for Project employees and contractors in the Bitter Creek valley.

Direct loss of fish habitat and Dolly Varden is expected to be limited to the local study area and any loss of habitat would be offset as part of the proponent's fisheries offsetting plan.

Views Expressed by Nisga'a Lisims Government

NLG requested additional information about the site-specific habitat and fish use that would be lost as a result of the construction of the access road. The proponent responded that the main Bitter Creek channel is deep run habitat with some shallow and slow-moving areas at the channel edge and side channel. The side channel contains riffle/run habitat. The area is used for Dolly Varden migration, with some juvenile rearing in the slower moving areas of the channel edges and side channel.

NLG expressed concerns about water quality. First, NLG expressed concern with the modeling of dissolved metals, instead of total metals, for bioaccumulative substances. In response, the proponent provided an updated surface water quality effects assessment using total metals and also used total metals in the revised human health risk assessment.

NLG also expressed concerns about exceedances of water quality guidelines for metals, and about the effects of increased contaminants of potential concern in aquatic resources and fish, particularly from selenium. NLG noted that baseline selenium levels in water, periphyton, and benthic invertebrates are already high. In response, the proponent noted that fish tissue selenium is a better indicator of aquatic ecological risk than selenium in benthic invertebrate tissue because of the limited volume of benthic invertebrate tissue that was collected as part of the baseline sampling program. The proponent agreed to conduct additional baseline benthic invertebrate tissue sampling in support of the Aquatic Effects

Monitoring Program, in consultation with NLG, in advance of Project construction. The proponent and NLG agreed to continue discussions about water quality as part of development of site-specific limits such as science-based environmental benchmarks during the permitting phase. In addition, the proponent agreed to develop and implement a Selenium Management Plan, if it is determined to be required following additional baseline sampling and modeling work.

Agency Conclusion on Residual Effects

The Agency has identified the following mitigation measures to address effects on Nisga'a treaty rights and interests pertaining to fisheries. The Agency is continuing to consult with NLG on whether the Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests.

- Prohibit employees and contractors associated with the Project from fishing in the Bitter Creek valley during all phases of the Project, unless the proponent provides access to an employee or contractor in accordance with the mitigation measure listed under Section 8.1.1 pertaining to access of a Nisga'a citizen.
- Conduct in-water construction activities during the timing windows for carrying out work in fish habitat defined for the Skeena region by B.C. for Dolly Varden in the *Terms and Conditions for changes in and about a stream specified by Ministry of Forests, Lands, Natural Resources Operations, and Rural Development Habitat Officers, Skeena Region* (April 2018), unless otherwise allowed by relevant authorities. If the proponent is allowed by relevant authorities to conduct in-water construction activities outside of these timing windows, the proponent would develop and implement additional mitigation measures for in-water construction activities other than the application of timing windows to protect fish during sensitive life stages. The proponent would submit these measures to the Agency and NLG prior to implementation.
- Implement, during all phases of the Project, measures to control erosion and sedimentation, including along the access and haul roads, to avoid the deposit of deleterious substances in water frequented by fish.
- Restore riparian buffer strips disturbed by Project construction activities to their baseline width and capacity as soon as possible as the construction work is completed. The proponent would use plant species native to the area when restoring the riparian zone.
- The proponent shall comply with the *Metal and Diamond Mining Effluent Regulations* and subsection 36(3) of the *Fisheries Act* regarding the deposit of effluent in water frequented by fish from the Project. In doing so, the proponent would:
 - Collect supernatant and seepage from the tailings management facility and treat all collected supernatant and seepage that would not meet the requirements of the *Metal and Diamond Mining Effluent Regulations* and subsection 36(3) of the *Fisheries Act* prior to any discharge, including discharge into Bitter Creek, during operation and decommissioning and until such time that water is suitable for direct discharge into the environment. When treating supernatant and seepage, the Proponent would take into account the water quality thresholds in the Canadian Council of Ministers of the Environment's *Water Quality Guidelines for the Protection of Aquatic Life* and in B.C.'s *Water Quality Guidelines for the Protection of Aquatic Life*; and
 - Collect and treat contact water that would not meet the requirements of the *Metal and Diamond Mining Effluent Regulations* and subsection 36(3) of the *Fisheries Act*, prior to any

discharge, including discharge into Goldslide Creek, during all phases of the Project and until such time that water is suitable for direct discharge into the environment. When treating contact water, the Proponent would take into account the water quality thresholds in the Canadian Council of Ministers of the Environment's *Water Quality Guidelines for the Protection of Aquatic Life* and in B.C.'s *Water Quality Guidelines for the Protection of Aquatic Life*.

- Place all acid-generating and potentially acid generating tailings into the tailings management facility and submerge tailings under a water cover during operation.
- Maintain the flow rates downstream of the tailings management facility discharge location in Bitter Creek within the range of naturally occurring low-flow and peak-flow rates for the applicable months of the year as identified in table 5-7 and table 5-8 of Appendix 12-A of the EIS by controlling and volume and timing of discharges to Bitter Creek.
- Complete, prior to construction and in consultation with relevant authorities, a geological and geochemical characterization of the geologic material in the Project area. The proponent would subsequently update the water quality model conducted for the environmental assessment to predict adverse effects on water quality during all phases of the Project, based on information from the completed geological and geochemical characterization. As part of the geological and geochemical characterization, the proponent would:
 - Describe the geology and the distribution of the nature of reactive geologic material in the Project area;
 - Conduct humidity cell studies to predict the time to onset of neutralizing potential depletion and acidic drainage for waste rock using samples that are geologically and spatially representative of the Project area, taking into account the *Mine Environment Neutral Drainage Program's Prediction Manual for Drainage Chemistry from Sulphidic Geological Materials (2009)*;
 - Conduct field tests to measure rate of geochemical change (neutralizing potential depletion and acid generation) for tailings for periods of time that would be determined in consultation with relevant authorities;
 - Determine the impact of freezing on the rate of sulphide oxidation and the depletion of neutralizing potential in the crib field test pads and legacy waste rock pile using total inorganic carbon –neutralizing potential calculations;
 - Predict drainage chemistry from cemented backfill and associated adverse effects on water quality in the mine pool; and
 - Conduct long-term trickle leach columns based on long-term strength of acidic drainage.
- Develop, prior to construction and to the satisfaction of Fisheries and Oceans Canada and in consultation with Nisga'a Lisims Government (NLG), any offsetting plan(s) related to any residual serious harm to fish associated with the carrying out of the Project. The proponent would submit any approved offsetting plan(s) to the Agency prior to implementation.
- If any fish habitat offsetting measure(s) proposed in any offsetting plan(s) may cause adverse environmental effects not considered in the EA, develop and implement, following consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities, measures to mitigate those effects. The proponent would submit these measures to the Agency prior to implementation.
- Develop and implement, prior to construction and in consultation with NLG and relevant authorities, a follow-up program to verify the accuracy of the EA as it pertains to fish and fish habitat including any update to the predicted adverse effects to water quality as described above, and to determine the effectiveness of mitigation measures. The proponent would implement the follow-up program,

including the monitoring requirements of the *Metal and Diamond Mining Effluent Regulations* during all phases of the Project. As part of implementation of the follow-up program, the proponent would:

- Monitor water quality in Bitter Creek, Goldslide Creek and Bear River year round;
- Develop, in consultation with NLG and relevant authorities, and implement modified or additional mitigation measures if monitoring results show any exceedances of water quality objectives and benchmarks identified by British Columbia for the Project to protect aquatic life.
- Implement measures identified in Section 8.1.1 (Access) to prevent adverse environmental effects to Nisga'a treaty rights to access Nisga'a Lands and other lands set out in the Treaty and to Nisga'a treaty rights and interests related to fisheries.

8.1.3 Wildlife

Under Chapter 9 of the Treaty, Nisga'a citizens have the right to harvest for domestic purposes "designated species" of wildlife and the right to trap furbearers within the Nass Wildlife Area. Nisga'a citizens also have the right to harvest migratory birds within the Nass Area for domestic purposes and the right to barter and trade migratory birds in accordance with the Treaty. These rights are subject to measures necessary for conservation, public health, and safety.

There are specific Nisga'a Nation wildlife allocations under the Treaty for currently designated species: mountain goat, moose, and grizzly bear. The proponent also identified three furbearer species in the Project area which Nisga'a citizens have a right to trap: wolverine, hoary marmot and marten. The proponent assessed changes to habitat availability (habitat loss, habitat alteration, and sensory disturbance), changes to habitat distribution (disruption of movement), mortality risk (direct and indirect) and effects from chemical hazards and attractants for all species. Section 7.3 of this report assesses the potential effects of the Project on species at risk (i.e. grizzly bear and wolverine) in greater detail. The assessment of potential effects to mountain goat, moose, hoary marmot and marten is not a requirement of CEEA 2012, however due to potential impacts on Nisga'a treaty rights and interests, the Agency conducted an effects assessment.

Potential Effects of the Project

Increased harvesting pressure from recreational hunters and trappers using the Project access and haul roads may reduce wildlife availability. Project-related noise, increased human presence, dust and change to the visual landscape may lead to a lower quality hunting or trapping experience and possible avoidance of the area. These effects would be confined to the Bitter Creek valley, but persist through all phases of the Project. Nisga'a citizens' access to the Bitter Creek valley is expected to be limited during all phases of the Project.

Mountain goat would be most affected by habitat loss or alteration in the local study area and sensory disturbance from the operation of mechanized equipment, helicopter use and avalanche control activities. The proponent intends to artificially trigger avalanches to reduce the risk to workers from naturally occurring avalanches. The potential effects of snow release from artificially triggered

avalanches and the potential sensory disturbance from noise and helicopter use from avalanche control activities would affect mountain goat and grizzly bear and their denning habitat.

Moose would also be sensitive to humans and vehicle disturbance around the mine site and process plant. Winter living habitat is often the limiting factor for moose as their movement can be restricted by the inaccessibility of high elevation habitat (above 900 metres) and high snow depth (above 40 centimetres). The Project could pose additional limits to their movement.

Loss or alteration of old growth forests and changes to prey availability (e.g. hoary marmot and grouse) could affect wolverines. Less than one percent of suitable habitat for wolverine (i.e. growing and winter living habitats) in the regional study area is expected to be lost or altered. The proponent predicted loss of marten habitat due to vegetation clearing and sensory disturbance and habitat alteration for hoary marmot. Project-related effects on wildlife habitat are described in Table 12.

Mountain goat movement between summer and winter living habitats, natal areas and mineral licks is critical for the species' annual life requisites (i.e. requirements for survival at different life stages of a species). The proponent identified high mountain goat activity in the Project area (reporting 2,000 goat detections between June and August 2016) with the Project footprint located within 100 meters of a possible mineral lick and overlapping with five trails. The proponent predicted that mountain goat are likely to avoid the Project area during construction and operation, especially the Project infrastructure along Goldslide Creek, thereby restricting mountain goat movement between the east and west side of Bitter Creek. Avalanche control activities are not predicted to present a barrier to mountain goat movement, since these activities would occur sporadically and for short periods of time. The proponent indicated that there would be minimal overlap between Project roads and suitable moose habitat, reducing the likelihood of disruption to moose movement.

The disruption of movement was identified as a potential effect for marten, but not wolverine because effects to movement related to the access and haul roads are not anticipated given the low traffic volume, or hoary marmot because suitable habitat does not overlap with the Project footprint. While marten avoid open areas such as roads and forest edges, the species does occasionally cross these areas exposing them to predation and interactions with humans.

Table 12 Disturbance to Wildlife Habitat in the Local Study Area and Regional Study Area

Life requisites	Local study area			Regional study area		
	Total suitable habitat (hectares)	Suitable habitat lost or altered (hectares)	Percentage of suitable habitat loss or altered (%)	Total suitable habitat (hectares)	Suitable habitat lost or altered (hectares)	Percentage of suitable habitat loss or altered (%)
Mountain goat						
Summer living	1,910	321	17	38,961	321	<1
Winter living	2,275	1,172	52	14,162	1,172	<1
Moose						
Summer living	446	38	9	10,076	38	<1
Winter living	172	16	9	1,955	16	<1
Marten						
Winter living	1,157	49	4	21,175	49	<1
Hoary marmot						
Summer living	684	31	5	N/A	N/A	N/A
Grizzly bear						
Early spring feeding	1,237	51	4	13,858	51	<1
Late spring feeding	2,072	42	2	9,722	42	<1
Summer feeding	5,115	204	4	41,428	204	<1
Fall feeding	1,885	172	9	27,532	172	<1
Winter denning	757	8	1	6,496	8	<1
Wolverine						
Growing living	8,457	465	5	59,311	465	<1
Winter denning	1,157	49	4	10,906	49	<1

N/A means that habitat availability was not assessed because of the smaller home range of the specific species.

The proponent considered vehicle collisions and increased access by hunters as risk to mortality of mountain goats. Increased access after closure for hunters seeking game would be more pronounced for mountain goat, considering their higher abundance in the Project area. Mortality could also result from triggered avalanches and falls while mountain goats flee from helicopters. However, the proponent considered indirect effects resulting from sensory disturbance such as induced stress and increased energetic output, and displacement from preferred habitat (e.g. winter periods when their range of movement is already limited by deep snow) to be more likely than direct mortality. Collisions pose a higher risk for moose because of their frequent interactions with vehicles on high-traffic roads (e.g. highways), however traffic in the local study area is expected to increase minimally (i.e. by three percent along Highway 37A).

Mortality risk for grizzly bear may also increase due to vehicle collisions as well as habitat displacement and interactions with humans. The proponent noted that the access road could facilitate human access to the area and increase hunting pressure on grizzly bear. Potential mortality of furbearers from Project-related activities include vehicle collisions (specifically for hoary marmot and marten), vegetation clearing (especially if overlapping with breeding periods and endangering females and their young), and capture by trappers accessing Project roads. The proponent does not predict many interactions between wolverines and humans since wolverines tend to avoid road traffic.

The proponent considered the potential for chemical hazards to affect the health of wildlife. Exposure to chemical hazards may result from direct contact through uptake from water, dust, soil or sediment (e.g. on-site ponds or roadside pools) or indirectly through ingestion of contaminated food sources. The proponent also considered the potential for Project features, including odours from garbage and food waste, grey water, sewage, and lighting, to attract wildlife and pose a health or mortality risk.

Measures to Prevent or Mitigate Effects

The proponent proposed to develop, in consultation with NLG and other appropriate parties, an Access Management Plan to limit access to the Project area and to ensure appropriate access for Nisga'a citizens to exercise their wildlife harvesting rights in the Bitter Creek valley. The proponent also committed to enforce a no-hunting policy for Project employees and contractors in the Bitter Creek valley.

For effects to habitat availability, the proponent committed to avoid undertaking vegetation clearing and construction activities during sensitive periods where possible (Table 13). The proponent committed to establishing non-disturbance buffers, where possible, around all important wildlife features (Table 13). For instance, the proponent committed to minimizing helicopter use and avalanche control within one to two kilometres of high suitability grizzly bear denning habitat and known den sites and to performing ground-based surveys prior to blasting from November to July and stop blasting if mountain goats are observed within 1,000 metres of the blast area. Active avalanche control would be implemented to mitigate snow avalanche disturbance and mortality risks to mountain goat.

For effects on habitat distribution and mortality risk from collisions with wildlife, proposed mitigation measures include managing snow bank height along Project roads, establishing periodic breaks and escape routes in snowbanks to minimize physical barriers for wildlife movement, improving road conditions through vegetation management and wildlife signage to increase wildlife visibility and wildlife right-of-way, and minimizing Project traffic to reduce noise. To reduce mortality risk, the proponent proposed a 50 kilometres per hour speed limit along the access and haul roads, a no-hunting policy for Project employees and guests, access restrictions into the Bitter Creek valley, and a road-wildlife reporting program. The proponent also committed to permanently decommissioning the full length of the access and haul roads following the operation of the mine.

Table 13 Wildlife Non-Disturbance Buffer Zones and Sensitive Periods

Species	Buffer Zones (metres)	Sensitive Periods
Mountain goat	<ul style="list-style-type: none"> • 500 metres around winter range, kidding and early rearing, mineral lick areas, escape terrain and connecting trails • 2,000 metres for avalanche control helicopters 	<ul style="list-style-type: none"> • Critical periods for birthing period: January through early July • Cautionary periods for winter ruts: November to May
Moose	<ul style="list-style-type: none"> • 200 metres from wetlands and riparian areas 	<ul style="list-style-type: none"> • Critical periods for birthing period: May to early July • Cautionary periods for winter ruts: November to May
Grizzly bear	<ul style="list-style-type: none"> • 60 metres from dens • 500 metres for avalanche control helicopters 	<ul style="list-style-type: none"> • Critical periods for breeding and hibernating periods: October through spring for winter denning
Wolverine	<ul style="list-style-type: none"> • 500 metres from dens 	<ul style="list-style-type: none"> • Cautionary periods: February to June
Marten	<ul style="list-style-type: none"> • 60 metres from dens 	<ul style="list-style-type: none"> • Cautionary periods : March to September
Hoary marmot	<ul style="list-style-type: none"> • 20 metres around a colony 	<ul style="list-style-type: none"> • Not applicable

To mitigate the effects of chemical hazards and to attractants, the proponent committed to implementing a no-littering or intentional attraction policy, installing bear-proof waste receptacles, maintaining Project roads to avoid de-icing or dust suppression, especially in winter as salt attracts mountain goats, and designing the Project to limit new access to alpine areas within known goat ranges.

Views Expressed by Nisga'a Lisims Government

NLG expressed concern that the new road access would serve as a pathway for wolves to enter the Bitter Creek valley and prey on mountain goats. The proponent responded to the concern by indicating that indirect mortality risk due to facilitated predation (e.g. from wolves) was considered but was not determined to be an interaction with the Project. Mountain goat and moose are the two wildlife valued components that have the possibility of being affected while facilitated predation was not considered relevant for mountain goat because they use steep, rocky outcrops as suitable habitat in order to avoid predation. The access and haul roads would not enable access to the steep rocky outcrops that goats prefer as suitable habitat.

NLG expressed the concern that mountain goat could be affected by avalanche control activities. In response, the proponent revised its effects assessment by increasing the zone of influence to 2,000 metres thus increasing the area considered for effects on suitable habitat in the local and regional study areas (Table 13). The proponent responded to the concerns about avalanche control activities and acknowledged that the potential effects of disturbance associated with avalanche control on mountain

goat populations is a key knowledge gap. The proponent indicated that there was no direct data and limited indirect data to parametrize this effect in the analysis. Although the effects assessment of habitat availability indicates that a high proportion of the area (and, by assumption, to goats occurring in the area) could be exposed to disturbance (i.e. seeing or hearing a helicopter), a mechanism linking that type of occasional disturbance to population effects is weak and speculative (e.g. that stress could result in reduced fitness or survivorship).

The proponent noted that based on working group discussions and the request for a cumulative assessment of effects to mountain goat in Block 25, there is a need for monitoring during the construction and operational phases of the Project, and that this would likely involve other users in the area (e.g. Ministry of Transportation and Infrastructure). The proponent acknowledged that Block 25 is a suitable area to conduct regular (semi-annual) goat surveys and committed to conducting these surveys, which would contribute to regional data on the goat population in addition to providing a basis for monitoring and adaptive management of potential effects of the Project on mountain goat.

In order to minimize the potential effects of avalanche control activities on mountain goat, the proponent would develop an Avalanche Management Plan that will include monitoring and mitigation strategies for mountain goat, within an adaptive management framework. This plan will be submitted to B.C. and NLG for review prior to Project construction.

NLG expressed uncertainty as to whether the use of a 500 metre zone of influence for mountain goat was appropriate, given that a distance of 1,800 metres have been found to be applicable for other mining projects. The proponent responded to the concern by indicating that although mountain goat are sensitive to human disturbance, habituation represents one possible factor that affects the variation in the response distances and degree of response by goats to disturbance reported in the empirical literature. The proponent did not contend that habituation is likely to occur at the Project (although some form of desensitization is possible) and did not use potential habituation to minimize or reduce the analysis of predicted Project effects. The proponent acknowledged that the weight of evidence suggests that goats do not tend to habituate to industrial disturbances and aircraft and as such, the zones of influence and potential responses used in the effects assessment are neutral to conservatively risk averse based on the literature. For the recent analysis of potential effects of avalanche control the proponent used a 2,000 metre zone of influence, which corresponds to one of the largest response distances for goats that is reported in the literature.

The proponent indicated that the zones of influence distances used in its assessment (500 metres for ground-based disturbances and 2,000 metres for helicopter disturbance) were based on management buffer zones in the provincial *Management Plan for the Mountain Goat (*Oreamnos americanus*) in British Columbia* that were based on consideration of multiple studies by several mountain goat experts.

As part of its Wildlife Management Plan, the proponent would implement best management practices and mitigation measures to ensure that the effects to mountain goat and their habitat is avoided or minimized. The Environmental Management System would also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on mountain goat.

NLG requested a map overlapping avalanche control activities and suitable mountain goat and grizzly bear habitat, and a discussion on how the avalanche control activities would potentially impact the species. In response, the proponent provided a map showing the overlap between Project activities and the mountain goat winter habitat. In addition, the proponent responded that the activities are not expected to affect grizzly bear denning habitat since the area of the activities minimally overlaps with winter living habitat. Additionally, the snow accumulation caused by the activities is not expected to exceed levels occurring in spring when bears emerge from their dens naturally. The proponent predicted that less than one percent of each suitable habitat (i.e. early spring feeding, late spring feeding, summer feeding, fall feeding and winter denning) would be lost or altered in the regional study area (Table 13). NLG raised concerns about avalanche control activities affecting grizzly bear denning, and the proponent agreed that the activities could, in general, disrupt hibernation, leading to den abandonment and potential mortality, especially for female with newborn cubs. However, after considering the specifics of the Project, the proponent concluded that avalanche control activities would not affect grizzly bear denning.

NLG raised concerns about avalanche control activities affecting grizzly bear denning. In its response, the proponent assessed the effects to grizzly bear given the avalanche control areas, including sensory disturbance, and noted that avalanche control activities are not expected to affect grizzly bear denning. There is low risk of overlap of avalanche zone with the specific habitats associated with dens because runout and accumulation zones are moisture-receiving sites and dens tend to occur in mesic or submesic sites. If additional snow accumulated over occupied bear dens during avalanche control activities, this occurrence is not expected to exceed levels of snow accumulation that bears could normally encounter prior to spring melt and emergence from dens.

NLG expressed the concern that mountain goats may move through areas upslope of Bromley Humps, and indicated that this area should be included as part of mountain goat monitoring. The proponent indicated that no wildlife cameras were set up in the vicinity of the Bromley Humps infrastructure in 2016 or 2017. The Bromley Humps infrastructure is located below the treeline between approximately 365 to 730 metre elevation and although the terrain is relatively steep, it does not offer much escape terrain compared to the more steep and rugged terrain at higher elevations. All mountain goat populations are associated with steep, rugged, 'escape' terrain, which is critical for predator avoidance.

The proponent noted that two wildlife cameras (TC1 and TC2) were deployed along the proposed access road below the treeline in 2016 approximately 1.6 kilometres north and 3.0 kilometres north, respectively, of the Bromley Humps Infrastructure. No mountain goats were detected.

The 2017 Mountain Goat Trail Camera Program was designed to capture goat use in the local study area during summer, particularly in the Goldslide Creek area. The objectives of the 2017 camera program included obtaining better information on mountain goat use within the Goldslide Creek area, comparing relative goat use within the Goldslide Creek area to other areas with the local study area, and examining potential evidence of regional movements in the local study area between adjacent areas. Camera sites in 2017 were located in higher elevation habitats (between approximately 1,200 and 1,600 metres) close to escape terrain where high goat use was detected (e.g. tracks, beds, pellet groups, hair, dug up areas,

exposed soils). Since the Bromley Humps Infrastructure is located at lower elevations below the treeline with minimal escape terrain nearby, and no previous goat use was detected, trail cameras were not deployed at this location in 2017. The proponent noted that monitoring for purposes of adaptive management would include the Bromley Humps area and that the Wildlife Management Plan would include this requirement.

NLG expressed concerns about the potential cumulative effects of the Project on mountain goat, and noted that a cumulative effects assessment on mountain goat in the north side of the Nass River in the Nass Wildlife Area is overdue. However, NLG also expressed that they would not expect the proponent to lead the initiative, but rather support and participate in it, should a larger cumulative effects assessment be taken on. NLG indicated that helicopter flights for heli-skiing and avalanche control, road use for mineral exploration, and forestry, logging, and blasting for avalanche control may be affecting mountain goat in the region, including Block 25 which is the management unit for mountain goat under the *Nisga'a Final Agreement*.

Agency Conclusion on Residual Effects

The Agency has identified the following mitigation measures to address effects on Nisga'a treaty rights and interests pertaining to wildlife. The Agency is continuing to consult with NLG on whether the Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests.

- Prevent employees and contractors associated with the Project from hunting in the Bitter Creek valley during all phases of the Project, unless the proponent provides access to an employee or contractor in accordance with the mitigation measure listed under Section 8.1.1 pertaining to access of a Nisga'a citizen.
- Identify, prior to construction and in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities, time periods during which construction activities may not be carried out to protect wildlife during sensitive life stages including for mountain goat, grizzly bear, moose, hoary marmot, marten, and wolverine. In doing so, the Proponent would:
 - Apply B.C.'s *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia* when identifying these time periods;
 - Notify, prior to construction, the Agency of these time periods and of the areas within which each of these time periods would apply; and
 - Conduct construction activities during these time periods, unless not technically feasible.
- If construction during time periods referred to above is not technically feasible, the proponent would develop and implement additional mitigation measures, in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities to protect mountain goat, grizzly bear, moose, hoary marmot, marten, and wolverine during construction. In doing so, the proponent would:
 - Develop and implement additional mitigation measures, including species-specific non-disturbance setback distances around habitat features used by each species for critical life functions, to protect wildlife during sensitive life stages. The proponent would apply B.C.'s

Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia when developing these setback distances; and

- Notify the Agency of the additional mitigation measures referred to above prior to implementation, including the setback distance identified for each species, the habitat feature(s) and construction activity(ies) applicable to each setback distance and the period(s) of time during which each setback distance would be applied.
- Avoid helicopter overflights and blasting disturbance within two kilometres of grizzly bear known denning sites and identified potential denning habitat, unless required for safety reasons.
 - If overflight or blasting is required for safety reasons within two kilometres of known denning sites or identified potential denning habitat during critical periods for denning grizzly bears (October 1 to the end of winter conditions), the proponent would keep a line-of-sight distance of 500 metres from known denning sites and identified potential denning habitat.
- Avoid helicopter overflights within two kilometres or less and a 500 metre absolute altitude from the mountain goat ungulate winter range, unless required safety reasons.
- Avoid surface blasting, including for avalanche control purposes, if the proponent observes mountain goat within one kilometre of the blast area, unless required for safety reasons.
- During all phases of the Project, manage snow bank height along the access and haul roads to create and maintain escape pathways at periodic distances to allow ungulates to exit the plowed roads in winter.
- Install and maintain, during all phases of the Project, wildlife crossing signs along the access and haul roads.
- Avoid use of salt for de-icing or traction control on the access and haul roads during all phases of the Project, unless all other methods used for de-icing or traction control purposes do not meet safety requirements.
- Manage vegetation height and composition along the access and haul roads to increase sight lines for drivers and visibility of wildlife during all phases of the Project.
- Reclaim the access and haul roads at the end of decommissioning, unless otherwise required by NLG or relevant authorities.
- Implement measures identified in Section 8.1.1 (Access) to prevent adverse environmental effects to Nisga'a treaty rights to access Nisga'a Lands and other lands set out in the Treaty and to Nisga'a treaty rights and interests related to wildlife.
- Develop, prior to operation and in consultation with NLG, a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to mountain goat. As part of the implementation of the follow-up program, the proponent would:
 - Conduct mountain goat population surveys once every three years starting during the first year of operation; and
 - Develop the methodology for the surveys in consultation with NLG prior to the implementation of the follow-up program.
- Implement the follow-up programs identified in Sections 8.1.2 (Fisheries) and 8.1.4 (Migratory Birds).

8.1.4 Migratory Birds

The proponent assessed the potential effects of the Project on migratory birds. The assessment focused on changes to habitat availability (habitat loss, habitat alteration, and sensory disturbance), changes to habitat distribution (disruption of movement), mortality risk (direct and indirect) and effects from chemical hazards and attractants for all species.

Potential Effects of the Project

Increased harvesting pressure from recreational hunters using the Project access and haul roads may reduce migratory bird availability. Project-related noise, increased human presence, dust and change to the visual landscape may lead to a lower quality hunting experience and possible avoidance of the area. These effects would be confined to the Bitter Creek valley, but persist through all phases of the Project. Nisga'a citizens' access to the Bitter Creek valley is expected to be limited during all phases of the Project.

The proponent predicts direct loss of migratory bird habitat would result from vegetation clearing and ground disturbance, while indirect habitat loss would occur through sensory disturbance. Clearing of trees near Project infrastructure would create wind exposure, increase predation, and lead to other edge effects (i.e. effects occurring at the boundaries of a habitat). The proponent predicted that less than three percent of suitable habitat guilds and habitat for migratory bird species at risk would be lost or altered.

Physical barriers include Project infrastructure such as roads, powerlines and facilities that could disrupt wildlife movement on land and between water bodies. The proponent did not assess changes to bird habitat distribution and noted that birds can avoid disruptions to movement and habitat edge effects by flying over physical barriers.

Collisions with vehicles or Project infrastructure represent the greatest risk of mortality to birds, particularly for common nighthawk because they nest on gravel roads and could collide with vehicles; and marbled murrelet because they fly at or above forest canopies and could collide with powerlines. More details on the effects to migratory birds are presented in Section 6.2 of this report.

Measures to Prevent or Mitigate Effects

The proponent proposed to develop, in consultation with NLG and other appropriate parties, an Access Management Plan to limit access to the Project area and to ensure appropriate access for Nisga'a citizens to exercise their migratory bird harvesting rights in the Bitter Creek valley. The proponent also committed to enforce a no-hunting policy for Project employees and contractors in the Bitter Creek valley.

The proponent prepared a Wildlife Management Plan that presented mitigation measures to minimize the adverse effects to wildlife species, including migratory birds. As part of this plan, the proponent committed to measures to mitigate effects to habitat availability including scheduling vegetation clearing and construction activities outside sensitive bird breeding periods where possible, and

establishing a buffer zone of at least 30 meters around active nests to prevent their destruction or disruption. If vegetation clearing and construction activities must proceed during sensitive bird breeding periods, the proponent committed to conducting pre-clearing surveys to identify nests to be avoided and developing site specific procedures to protect nests. At closure, the proponent committed to revegetating and reclaiming the Project area to remove barriers, facilitate wildlife movement, and restore habitat suitability to pre-disturbance conditions.

The proponent also committed to measures to mitigate mortality risk, including controlling Project lighting, employing deterrents (e.g. noise makers and fencing) to discourage migratory birds from entering Project buildings for refuge, shelter, nesting, roosting and other infrastructure including on-site settling sumps, ponds, and the tailings management facility and potentially becoming entrapped. The proponent also committed to considering the Avian Power Line Interaction Committee's guidance *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (October 2012), which identifies mitigation measures to reduce mortality risk, in the final design of the powerline.

The proponent committed to intercepting, routing, and treating contact water to on-site settling sumps, ponds, and the tailings management facility prior to discharging to the environment where the chemical hazards could lead to mortality of migratory birds. Hazardous materials (e.g. used batteries, petroleum product containers, grey water, sewage, contaminated soil or snow) would be managed according to the *Transportation of Dangerous Goods Act*. The proponent also stated that fuel would be stored on-site in double walled tanks to prevent potential spills.

The proponent committed to employing deterrents (e.g. air horns, noise makers, fencing) to discourage migratory birds from entering Project infrastructure (including on-site settling sumps, ponds, and the tailings management facility) for refuge, shelter, nesting, and roosting, and potentially becoming entrapped.

The identified measures will serve to prevent or mitigate the resulting effects on Nisga'a harvesting interests in relation to migratory birds.

Views Expressed by Nisga'a Lisims Government

The Agency did not receive any comments on the effects assessment for migratory birds from NLG.

Agency Conclusion on Residual Effects

The Agency has identified the following mitigation measures to address effects on Nisga'a treaty rights and interests pertaining to migratory birds. The Agency is continuing to consult with NLG on whether the Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests.

- Prevent Project employees and contractors from hunting in the Bitter Creek valley during all phases of the Project unless the proponent provides access to an employee or contractor in accordance with the mitigation measures listed under Section 8.1.1 pertaining to access of a Nisga'a citizen.

- Carry out the Project in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the proponent would develop, prior to construction and in consultation with relevant authorities, a migratory birds management plan that takes into account Environment and Climate Change Canada's *Avoidance Guidelines* and the risk of incidental take. The migratory birds management plan would also include measures the proponent would implement if migratory birds or their nests are found. The proponent would implement the migratory birds management plan during all phases of the Project. The proponent's actions when implementing the migratory birds management plan shall be in compliance with the *Migratory Birds Convention Act, 1994*, the *Migratory Birds Regulations* and with the *Species at Risk Act*.
- As part of development and implementation of the migratory birds management plan, the proponent would develop and implement mitigation measures related to sensitive periods and locations for migratory birds, including mitigation measures that would consider critical habitat identified for black swift, common nighthawk, marbled murrelet, olive-sided flycatcher in recovery strategies under the *Species at Risk Act* and suitable habitat identified by the proponent in figures 16.7-21, 16.7-22, 16.7-23 and 16.7-24 of the EIS.
- Control lighting required for all phases of the Project, including direction, timing and intensity, to avoid adverse effects on migratory birds and on listed species at risk, while meeting health and safety requirements.
- Deter migratory birds from using on-site settling sumps, ponds, tailings management facility, and other water management structures containing contact water.
- Undertake, in consultation with NLG and relevant authorities, progressive reclamation of all areas disturbed by the Project. The proponent would identify, in consultation with NLG and relevant authorities, plant species native to the area of the Project for revegetation as part of progressive reclamation, including species suitable to create habitats for migratory birds, listed species at risk, and species of interest to Indigenous peoples.
- Develop a follow-up program, prior to construction and in consultation with NLG, to verify the accuracy of the EA and determine the effectiveness of mitigation measures to avoid harm to migratory birds, their eggs and nests, including mitigation measures described above. The proponent would implement the follow-up program during all phases of the Project. As part of the implementation of the follow-up program, the proponent would:
 - Monitor use of on-site settling sumps, ponds, the tailings management facility, and other water management structures containing contact water for use by migratory birds; and
 - Monitor migratory bird collisions with vehicles and Project infrastructure.
- The proponent would develop, prior to construction and in consultation with the NLG, a follow-up program to assess the effectiveness of the progressive reclamation activities, including the establishment of plant species native to the Project area and suitable to create habitat for migratory birds, listed species at risk, and species of interest to Indigenous people.
- Implement measures identified in Section 8.1.1 (Access) to prevent adverse environmental effects to Nisga'a treaty rights to access Nisga'a Lands and other lands set out in the Treaty and to Nisga'a treaty rights and interests related to migratory birds.

8.1.5 Guide Outfitting

Potential Effects of the Project

Chapter 9 of the Treaty includes provisions relating to guiding on Nisga'a Lands and in the Nisga'a Wildlife Area. Nisga'a Nation holds a guide outfitting licence in an area that includes the Bitter Creek valley. Mountain goat is the primary wildlife species hunted in the Bitter Creek valley under the licence, but they also guide hunting trips for grizzly bear. The proponent determined that the Project may result in reduced availability of mountain goat and their habitat in the Bitter Creek valley, increased hunting pressure due to greater public access to the Bitter Creek valley, and Project-related noise, increased human presence, dust and change to the visual landscape, which may negatively impact the user's experience of a remote and pristine wilderness. The access and haul roads, powerline, and various facilities of the Project infrastructure would be visible to guide outfitting clients. These effects would persist through all phases of the Project.

The proponent noted that mountain goat may change their seasonal movements in response to Project activities and noise, making them more or less accessible to hunters. In either case, the proponent concluded that guide outfitters may need to adjust their expeditions.

The proponent noted that the Bitter Creek valley is a valuable part of the licence area. The proponent concluded that while Nisga'a Nation may not be able to use the Bitter Creek valley for guide outfitting as a result of Project effects, the size of the Bitter Creek valley in relation to the Nisga'a Nation guide outfitting licence territory likely provides productive alternate hunting areas for guide outfitting. Increased hunting pressure is therefore not expected to have an adverse impact on Nisga'a Nation guide outfitting.

The proponent noted NLG purchased the guide outfitter licence to use it to bring training and employment opportunities to Nisga'a citizens. The potential socio-economic impacts of the Project on Nisga'a citizens are presented in Section 8.2.

Measures to Prevent or Mitigate Effects

The measures identified in Sections 8.1.1 and 8.1.3 to avoid or mitigate effects on access and wildlife will serve to avoid or mitigate the effects on Nisga'a guide outfitting interests. The proponent has committed to engage with Nisga'a Guide Outfitters to avoid or minimize the effects of the Project on their rights and interests.

Views Expressed by Nisga'a Lisims Government

The Agency did not receive any comments on the effects assessment for guide outfitting from NLG.

Agency Conclusion on Residual Effects

The Agency has identified mitigation measures to address effects on Nisga'a treaty rights and interests pertaining to guide outfitting in Sections 8.1.1 and 8.1.3. The Agency is continuing to consult with NLG

on whether the Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests.

8.1.6 Cultural Artifacts and Heritage

Potential Effects of the Project

Chapter 17 of the Treaty includes provisions relating to Nisga'a heritage sites, artifacts and human remains on Nisga'a Lands or on Category A Lands. As the Project is outside of Nisga'a Lands and Category A Lands, these provisions do not apply. The proponent stated that during discussions with NLG, no archaeological sites or other cultural heritage resources were identified and that the archaeological potential of the Project area is low due to the steeply sloping or heavily disturbed terrain (due to past land use or natural processes). There is a low potential for culturally modified trees or archeological remains within the Project area.

Measures to Prevent or Mitigate Effects

The proponent committed to implementing a chance find protocol during the construction, operation, and closure and reclamation of the Project to mitigate potential effects from disturbances of unidentified archaeological, paleontological, cultural, or heritage resources. The chance find protocol outlines the process to be followed should previously undiscovered archaeological, paleontological, heritage, and cultural resources be identified which includes stopping work at the location, ensuring protection of the resource, and promptly notifying NLG and B.C.'s Archaeology Branch.

Potential effects on cultural and heritage resources caused by changes to access would be mitigated by the implementation of an Access Management Plan to be developed in consultation with NLG.

Views Expressed by Nisga'a Lisims Government

The Agency did not receive any comments on the effects assessment for cultural artifacts and heritage from NLG.

Agency Conclusion on Residual Effects

The Agency has identified the following mitigation measures to address effects on Nisga'a treaty rights and interests pertaining to cultural artifacts and heritage. The Agency is continuing to consult with NLG on whether the Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests.

- Develop, prior to construction and in consultation with NLG and relevant authorities, a chance find protocol for any previously undiscovered structures, sites, or things of historical, archaeological, paleontological, or architectural significance or physical or cultural heritage resources discovered within the Project area. As part of the chance find protocol, the proponent would:
 - Immediately halt work at the location of the discovery;

- Delineate an area of at least 30 metres around the discovery as a no-work zone. The no-work zone requirement shall not apply to action(s) required to be undertaken to protect the integrity of the discovery;
- Inform the Agency and NLG within 24 hours of the discovery, and allow NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C. to monitor archaeological works; and
- Consult with NLG and relevant authorities, on the manner by which to comply with all applicable legislative or legal requirements and associated regulations and protocols respecting the discovery, recording, transferring and safekeeping of previously unidentified structures, sites or things of historical, archaeological, paleontological or architectural significance.
- Implement measures identified in Section 8.1.1 (Access) to prevent adverse environmental effects to Nisga'a treaty rights to access Nisga'a Lands and other lands set out in the Treaty and to cultural artifacts and heritage.

8.1.7 Agency Conclusion on Paragraph 8(e) Effects Assessment

The Agency has identified mitigation measures in Sections 8.1.1 through 8.1.6 as well as the following mitigation measures to address effects. The Agency is continuing to consult with NLG on whether the Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests.

- Retain, prior to construction, the service of an independent environmental monitor, who is a qualified individual as it pertains to environmental monitoring of mining projects in B.C., to observe, record, and report on the implementation of the mitigation measures.
- The proponent would, through contract, give the independent environmental monitor the authority to stop Project activities that do not comply with the mitigation measures.
- The proponent would require the independent environmental monitor to prepare monthly reports that include:
 - A description, including through photographic evidence, of the Project activities that occurred and the mitigation measures that were applied during the period covered by the report; and
 - A description, including through photo evidence, of occurrences of non-compliance related to the implementation of mitigation measures observed during the period covered by the report, including
 - The date of the occurrence(s) of non-compliance;
 - Whether Project activities were stopped as a result of the occurrence(s) of non-compliance;
 - How the occurrence(s) of non-compliance was or were corrected and the date that the corrective action(s) was or were completed; and
 - If any, the status of pending occurrence(s) of non-compliance that have not been corrected yet by the proponent, and a description of any adverse environmental effect(s) associated with the occurrence(s) of non-compliance.
- The proponent would require the independent environmental monitor to provide the reports to the Agency, NLG, and relevant federal authorities within 10 days of their production. The proponent would require the independent environmental monitor to retain the reports until the end of decommissioning

- The proponent would require the independent environmental monitor to report all occurrence(s) of non-compliance observed by the independent environmental monitor directly to the Agency, NLG, and relevant federal authorities within 48 hours of the observation of the occurrence(s) of non-compliance.

8.2 Assessment of Paragraph 8(f) Effects

The proponent prepared an Economic, Social and Cultural Impact Assessment as part of its EIS in accordance with Chapter 10, paragraph 8(f) of the Treaty and the *Nisga’a Economic, Social and Cultural Impact Assessment Guidelines*. The assessment identified and evaluated the potential effects of the Project on the existing and future economic, social and cultural well-being of Nisga’a citizens (Table 14).

NLG requested that no primary data be collected from NLG, the Nisga’a Village Governments or Nisga’a citizens given the existence of similar reports completed in recent years for other EAs. As a result, the proponent relied on 8(f) assessments done on five recent EAs that were supplemented by information from other relevant research and reports.

Table 14 Nisga’a Nation Interests Considered in Chapter 10, Paragraph 8(f) Effects Assessment

Economic Effects	Social Effects	Cultural Effects
<ul style="list-style-type: none"> • Nisga’a citizens’ employment, work patterns and income levels • Nisga’a Nation business activities • Natural resource activity and related earnings or values • Nisga’a economic activity • NLG revenues • Future Nisga’a Nation economic opportunities and development 	<ul style="list-style-type: none"> • Migration and population • Nisga’a infrastructure and services • Nisga’a occupational and non-occupational health and accident risks • Crime • Family and community well-being 	<ul style="list-style-type: none"> • Heritage and cultural resources • Nisga’a cultural activities and practices within Nisga’a villages and elsewhere • Nisga’a language

8.2.1 Potential Effects to Economic Well-Being

Nisga’a Citizens’ Employment and Income

The proponent predicted that the Project would create approximately 20 direct, indirect (jobs created by the proponent as it purchases supplies or other items for the Project) or induced jobs (jobs created by employees of the proponent spending their money) for Nisga’a citizens during construction and approximately eight direct, indirect or induced jobs per year during the operation of the mine. Wages in the mining industry are high compared to other sectors of the economy. Potential barriers to direct jobs

include limited relevant work experience among Nisga'a citizens and the distance from Nisga'a villages to the Project (approximately 200 kilometres by road from Gitlaxt'aamiks to Stewart).

The proponent was not able to estimate the number of employment opportunities for Nisga'a citizens during the closure and reclamation or post-closure phases of the Project. The shift from employment during the construction and operation phases to unemployment or underemployment during the later Project phases is anticipated to cause financial hardship and stress and may be of high consequence for some individuals and families. However, the effects of loss of Project-related employment may be offset by the skills and experience gained through Project-related training and experience, which should be highly transferable to work at other mines, similar resource developments, or heavy industrial projects.

Nisga'a Business Activities

The Project may attract some workers away from Nisga'a businesses and services through labour market competition. The proponent expects this effect to be offset through Nisga'a business and contracting opportunities. While adverse effects to Nisga'a businesses associated with the loss of Project-related contracts could occur at the time of closure, capacity built by Nisga'a businesses is expected to have long-lasting beneficial effects, similar to the transferability of skills and experience gained by workers on the Project. Overall, the adverse effect on Nisga'a business activities is predicted to be minimal.

Natural Resource Activity and Related Earnings or Values

Natural resource jobs and activities with an economic value include fishing, hunting and trapping, guide outfitting, mineral and energy resource exploration, recreation and tourism, timber harvesting, and harvesting of botanical forest products. The proponent noted that there is no commercial fishery and no evidence of fishing for Dolly Varden in the Bitter Creek valley; therefore there is no interaction between the Project and earnings or values related to this natural resource activity.

The proponent noted the NLG purchased a guide outfitter licence to bring training and employment opportunities to Nisga'a citizens. Potential impacts of the Project on the guide outfitting licence are discussed above in Section 8.1.5. The proponent indicated that there are no anticipated measurable economic effects on Nisga'a guide outfitting interests.

Potential impacts of the Project on hunting and trapping, and related mitigation measures, are discussed above in Section 8.1.3. The proponent did not assess effects on economic values associated with hunting or trapping.

Nisga'a treaty rights to timber and mineral resource harvesting apply to Nisga'a Lands and therefore do not apply to the Project because it is located outside of Nisga'a Lands. The proponent predicted the Project would have no impact on earnings and values related to recreation or tourism, because there are no such businesses in the Project area, other than guide outfitting. Pine mushroom harvesting is a source of botanical forest products harvesting revenue, provides employment and is culturally significant. The proponent concluded that pine mushroom harvesting in the Bitter Creek valley is unlikely at present due to lack of access, but that increased access could provide economic opportunity if pine mushroom habitat exists.

Nisga'a Economic Activity and Nisga'a Lisims Government Expenditures

The proponent identified that NLG would be affected by the costs associated with their participation in the regulatory and permitting processes related to the Project. The proponent provided funding to support NLG's participation in the regulatory and permitting processes and committed to continue discussions with NLG to come to an agreement on offsetting costs associated with Project review.

The proponent predicted that NLG would not experience direct costs to Nisga'a Nation infrastructure, facilities or services from the Project because of the geographic separation between the Project and Nisga'a Lands.

Nisga'a Citizens' Future Economic Opportunities and Economic Development

The proponent predicted the Project would not adversely affect the potential for Nisga'a citizens to develop future economic opportunities or the economic development of the Nisga'a Nation. Capacity development of Nisga'a citizens, including skills, experience and training gained through Project-related employment and business opportunities may have a positive impact on Nisga'a citizens' future economic opportunities and economic development. The proponent concluded that increased Nisga'a Nation access to the Bitter Creek valley may provide future economic opportunity for pine mushroom harvesting if pine mushroom habitat exists there.

8.2.2 Potential Effects to Social Well-Being

Migration and Population, Infrastructure and Services, and Crime in Nisga'a Nation Communities

The Project is not expected to have a measurable effect on migration or population in the Nisga'a villages (i.e. people moving to, or returning to, or leaving Nisga'a Lands) because the Project is approximately 200 kilometres by road from Gitlaxt'aamiks. For the same reason, the Project is not expected to have any effect on community infrastructure or services, or a measurable effect on crime levels in the Nisga'a villages.

Occupational and Non-Occupational Accident Risks

Nisga'a citizens employed on the Project would be exposed to the occupational health and safety risks associated with mining and large-scale construction, which may result in injury and associated social impacts. The proponent stated that occupational accident risks would be managed through the development and implementation of several risk management plans for occupational health and safety, risk management and emergency response, air quality and dust management, noise abatement, spill contingency and access.

The proponent anticipated little change in the level of exposure of Nisga'a citizens to non-occupational accident risks. The proponent noted that increased industrial transportation may affect road safety. The proponent indicated it would not use roads used by Nisga'a citizens living in the Nass Valley (i.e. Highway 113, Nass Road, Gingolx Road, and the Nass Forest Service Road) to transport Project-related

goods or services, and therefore no risks to Nisga'a citizens are anticipated. The Project would use Highway 37A to transport employees and some supplies from Stewart to the turnoff of the Project access road. Traffic volume along that stretch of highway is anticipated to increase by 2.38 percent during construction and 3.12 percent during operation. Supplies and workers may travel between Terrace and other communities along Highway 37 and 37A. The proponent anticipated traffic volume along Highway 37 between Meziadin Junction and Kitwanga would increase approximately 0.06 percent during construction and 0.13 percent during operation. The proponent anticipated a possible one percent increase in vehicle collisions due to the Project and proposed to cap daily working hours for drivers and promote safe driving practices.

Section 7.1 of this report describes potential accidents and malfunctions and their associated potential risks to Nisga'a economic, social and cultural well-being, including health. The proponent identified 15 potential accidents and malfunctions with eight considered to be of moderate risk, and seven of low risk. The accidents and malfunctions of moderate risk include a tailings dam breach, accidental discharge of sediment and metals from the tailings management facility or waste rock stockpile, hazardous materials release to land, hazardous materials release to water, explosive accidents, waste rock stockpile slope failure, failure of underground mine stability, and helicopter or vehicle accidents. The proponent stated that a tailings dam breach could result in significant effects on Nisga'a treaty rights to harvest and manage Nass salmon, steelhead, and eulachon as well as significant effects to human health. Explosive accidents, waste rock stockpile slope failure, failure of underground mine stability, and vehicle accidents resulting in injury or death could result in significant effects to Nisga'a Nation social well-being and human health. The proponent stated that accidental discharge of sediment and metals from the tailings management facility and hazardous materials spills to land or water would not result in significant effects to Nisga'a Nation interests or human health. The proponent did not identify any high or extreme risk accidents or malfunctions.

The proponent proposed measures to avoid or prevent potential accidents and malfunctions, and contingency and response plans that would be implemented should an accident or malfunction occur. The Agency concludes that although accidents and malfunctions such as a tailings dam breach could result in significant adverse effects environmental effects, these accidents and malfunctions are unlikely to occur.

Occupational and Non-occupational Health Risks

Section 6.5 of this report describes the potential effects of the Project on the health of Indigenous peoples. The proponent's health assessment determined that potential adverse health effects from the Project, such as changes in noise, surface and drinking water quality, air quality, and country foods, would be limited to the Project area. The proponent did not identify residual effects on the quality or quantity of country foods; but the Agency concluded that there would be residual effects to human health from consumption of country foods. The proponent assessed the effects of the Project on noise, air quality and human health. For noise and air quality, the proponent concluded that there would be residual effects, but that these effects would not result in a residual effect to human health. The proponent completed a human health risk assessment for a number of potential receptors and applied

conservative assumptions (e.g. receptors exclusively consumed the traditional food associated with the highest risk). The proponent concluded that with the implementation of the mitigation measures, residual effects on Indigenous health from changes to air quality or traditional foods are not expected. Nisga'a workers employed at the mine would be exposed to health risks from changes in noise levels and air and water quality. The proponent stated that occupational health risks would be managed through the development and implementation of risk management plans for occupational health and safety, risk management and emergency response, air quality and dust management, noise abatement, and spill contingency.

Family and Community Well-Being

The proponent determined that due to the predicted negligible migration of people into Nisga'a villages, it is unlikely that family or community well-being would be impacted. There is a potential for family and community well-being to be negatively impacted due to changes to work schedules and increased income for Nisga'a citizens who have Project-related employment or business. The proponent anticipates that due to workers working long shifts and having periods away from home, Nisga'a communities may experience negative social impacts related to family breakdown, substance abuse, gambling, violence and crime. The proponent noted that in the event of injuries or fatalities resulting from a motor vehicle accident, an explosive accident, a failure of the waste rock dumps or stockpiles, or a failure of underground mine stability, a significant effect on Nisga'a citizens' well-being may occur as a result of grieving the loss of a colleague or community member.

8.2.3 Potential Effects to Cultural Well-Being

Chapter 2 of the Treaty states that Nisga'a citizens have the right to practice the Nisga'a culture, and to use the Nisga'a language, in a manner consistent with the Treaty.

Project-related employment may conflict with Nisga'a citizens' ability to participate in and maintain cultural activities and practices essential to the maintenance of Nisga'a culture. The proponent has committed to working with NLG to identify measures to develop human resource policies that recognize and accommodate cultural practices.

The proponent anticipates that the Project would have no effect on the Nisga'a Nation's maintenance or enhancement of the Nisga'a language or on Nisga'a Nation language revitalization efforts.

8.2.4 Mitigation of Effects on the Economic, Social and Cultural Well-Being of Nisga'a Citizens

The proponent committed to working with NLG to identify and attract qualified Nisga'a citizens and businesses for employment and contract opportunities. The proponent committed to engage with NLG to avoid or minimize the effects of the Project on their guide outfitting interests. Measures to avoid or reduce the effects on family and community well-being, applicable to all Project employees and proponent workplaces, could include a drug and alcohol policy substance abuse prevention, rehabilitation and aftercare guidance, on-site counselling, and money management training.

The proponent also committed to design and implement follow-up measures to monitor economic, social and cultural changes that may result from the Project, such as employment, training, and procurement opportunities as well as tracking compliance with all management and human resource development plans.

8.2.5 Views Expressed by Nisga'a Lisims Government

NLG expressed concern regarding the proponent's assessment of the best available technology for tailings management. NLG requested the proponent reconsider dry stack tailings and/or paste backfill of tailings as a means of reducing the consequence of failure of the tailings management facility. The proponent provided further environmental, technical, social and economic information for both options, but ultimately concluded that the selection of thickened slurry tailings remained the most appropriate option.

NLG expressed concern regarding the potential effects of avalanches leading to a potential catastrophic failure of the tailings management facility. In the event of a tailings dam failure, the proponent would follow an Emergency Response Plan, which would include procedures for notification of appropriate authorities, reporting, and roles and responsibilities. The proponent prepared a conceptual Emergency Response Plan as part of the EA and committed to developing a detailed plan prior to Project construction.

Health

NLG indicated that given the potential for Nisga'a citizens to harvest country foods in the vicinity of the Project, it agreed with the Agency's conclusion that there would be residual effects to human health from consumption of country foods.

Health Canada and NLG conducted a review of the proponent's human health risk assessment. Based on the findings of this review, the proponent made a number of changes to the methodology of the human health risk assessment including selecting more conservative and applicable criteria for identifying contaminants of potential concern, adjusting the proportion of inorganic arsenic from one percent to a more conservative 10 percent of total arsenic, and providing a less conservative assessment using a country food basket approach, which considered that individuals' daily consumption would include a variety of food types.

Health Canada and NLG had concern with the uncertainty in the human health risk assessment and the proponent's overall health effects assessment. They identified the need for a follow-up program, should the Project proceed, in order to confirm the human health effects once the Project is in operation. The uncertainty in the risk assessment was driven by the limited baseline sampling, and the fact that bioconcentration factors were calculated using samples that were not co-located (i.e. water and fish tissue samples taken from the same location). In addition, Health Canada and NLG had the following concerns with the assessment.

Arsenic in Traditional Foods

NLG expressed concern regarding the risks associated with exposure to arsenic in traditional foods. The proponent reiterated that there is scientific uncertainty associated with the conclusion of the human health risk assessment and committed to monitoring the effects to human health. The proponent noted that it is committed to further discussions and consideration on monitoring of relevance to the health effects assessment, including but not limited to vegetation tissue sampling, soil sampling, and animal tissue sampling.

Arsenic Relative Absorption Factors

Health Canada and NLG noted that the proponent's assessment assumed oral relative absorption factors of 0.29 and 0.5 for inorganic arsenic for plants and fish, respectively, and pointed to Health Canada's guidance which indicates that a relative absorption factor of 1.0 should be used. In response, the proponent noted that changing the relative absorption factor of 0.5 to 1.0 would not change the health risk associated with the Project specifically, because the relative absorption factor is applied in the same way to both the baseline and predicted risk scenario. However, Health Canada indicated that this interpretation was incorrect because the calculation of dose would be different. Health Canada noted that sufficient supporting rationale was not provided including justification showing how the selected values of 0.29 and 0.5 were applicable to this specific Project and site. The Agency considered this advice as part of its characterization and assessment of residual effects and is recommending a potential condition that, if accepted by the Minister of Environment and Climate Change, would require the proponent to use a relative absorption factor of 1.0 for any future updates to the human health risk assessment, for all contaminants of concern, to support the understanding of risks to any receptors that hunt, trap, fish, gather food or live in the Bitter Creek valley.

Background Risks

NLG noted that there are several contaminants of potential concern with hazard quotients that exceeded the acceptable risk threshold of 0.2 under both baseline and predicted future conditions. Given that the risk to receptors would be a combination of exposures to background levels of contaminants of potential concern and Project-related contributions, NLG requested that risks be assessed after considering total risk (i.e. background risk in addition to Project-related risks). Health Canada also noted during several stages of the review process that evaluation of overall risk (background exposure plus incremental risks) will help determine how the future conditions would impact human health. The proponent responded that their approach to determining significance of the Project was to assess the risks associated with the Project rather than the total risks. The Agency considered the background risk associated with existing levels of contaminants in the environment as part of its characterization and assessment of residual effects.

Non-threshold Air Contaminants

NLG expressed concern with the air quality assessment, including the consideration of non-threshold contaminants in the effects assessment. The proponent responded that air concentrations of contaminants were based on conservative estimates of source chemical contributions, and based on the worst case scenario in close proximity to project infrastructure. The proponent committed to developing

and implementing a detailed Air Quality and Dust Management Plan, which would include monitoring of nitrogen dioxide and particulate matter.

8.2.6 Agency Conclusion on Paragraph 8(f) Effects Assessment

Taking into account the following key mitigation measures, the Agency concludes that the Project would result in both positive and negative effects on the existing and future economic, social and cultural well-being of Nisga'a citizens who may be affected by the Project.

- Mitigate, during all phases of the Project, emissions of fugitive dust and particulate matter, including through point source emission control measures and improvement and treatment of unpaved road surfaces.
- Establish a speed limit of no more than 50 kilometres per hour on the access and haul roads and require employees and contractors associated with the Project to abide by those limits.
- Ensure, during all phases of the Project, that noise does not exceed the background noise level of 35 decibels during all phases of the Project at the boundary of the local study area identified by the Proponent in figure 8.3-1 of the EIS.
- Develop, prior to construction and in consultation with NLG and relevant authorities, a follow-up program to verify the accuracy of the EA as it pertains to adverse environmental effects on the health of Indigenous peoples caused by changes in concentrations of contaminants of potential concern in air, water, soil, vegetation, and fish. As part of the development of the follow-up program, the proponent would identify the species of plants and fish exposed to these contaminants that the proponent must monitor as part of the follow-up program. The proponent would implement the follow-up program during all phases of the Project. As part of implementation of the follow-up program would:
 - Conduct baseline sampling, prior to construction, for contaminants of potential concern in soil, water, plant tissue, and fish tissue. In doing so, the proponent would co-locate soil sampling from the root zone with plant tissue sampling and would co-locate water sampling with fish sampling in order to establish site-specific bioconcentration factors;
 - Monitor concentrations of nitrogen dioxide, ozone, sulfur dioxide, particulate matter (PM2.5 and PM10), and total suspended particulate), and metals in dustfall at the nearest open air location to where maximum concentrations are predicted to occur;
 - Monitor contaminants of potential concern in soil, water, vegetation and fish. In doing so, the proponent would co-locate soil sampling from the root zone with plant tissue sampling and would co-locate water sampling with fish sampling;
 - If the results of sampling and monitoring indicate that concentrations of contaminants of potential concern exceed those predicted during the EA, the proponent would update the human health risk assessment using the site-specific bioconcentration factors, and sampling and monitoring results. In doing so, the proponent would assume that 100 percent of all contaminants of potential concern from country foods are absorbed.
- Develop, prior to construction and in consultation with NLG and relevant authorities, and implement, during all phases of the Project, a plan to communicate the results of the follow-up program to NLG and relevant authorities. The communication plan would include procedures to communicate any update to the human health risk assessment and potential associated health risks in plain language, and the modified or additional mitigation measures implemented.

- Take all reasonable measures to prevent accidents and malfunctions that may result in adverse environmental effects.
- Prior to construction, consult with NLG and relevant authorities on measures to be implemented to prevent accidents and malfunctions.
- Develop, prior to construction and in consultation with NLG and relevant authorities, an accidents and malfunctions response plan in relation to the Project. The accidents and malfunctions plan would include:
 - The types of accidents and malfunctions that may cause adverse environmental effects; and
 - The measures to be implemented in response to each type of accident and malfunction to mitigate any adverse environmental effects caused by the accident or malfunction.
- In the event of an accident and malfunction with the potential to cause adverse environmental effects, the proponent would immediately implement measures appropriate to the accident and malfunction response, and would:
 - Notify, as soon as possible, NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities of the accident or malfunction, and notify the Agency in writing no later than 24 hours following the accident or malfunction. For the notification to NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and the Agency, the proponent would specify:
 - The date the accident or malfunction occurred;
 - A summary description of the accident or malfunction; and
 - A list of any substances potentially released into the environment as a result of the accident or malfunction.
 - Submit a written report to the Agency no later than 30 days after the day on which the accident or malfunction occurred. The written report would include:
 - A detailed description of the accident or malfunction and its adverse effects;
 - A description of the measures that were taken to mitigate the adverse environmental effects caused by the accident or malfunction;
 - Any views from NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities received with respect to the accident and malfunction, its adverse environmental effects and the measures taken by the proponent to mitigate these environmental effects;
 - A description of any residual adverse effects and any modified or additional measures required by the proponent to mitigate residual adverse environmental effects; and
 - Details concerning the implementation of the accident and malfunction response plan referred to above.
 - Submit a written report to the Agency no later than 90 days after the day on which the accident or malfunction took place, that includes a description of the changes made to avoid a subsequent occurrence and the modified or additional measure(s) implemented by the proponent to mitigate and monitor residual effects and to carry out any required progressive reclamation. The report would also include all additional views from NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities received by the proponent.
- Develop a communication plan, in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C. The proponent would develop the communication plan prior to construction and would implement and keep it up to date during all phases of the Project. The plan would include:

- The types of accidents and malfunctions requiring the proponent to notify each of NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C.;
- The manner by which NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. would be notified of an accident and malfunction and any opportunities for NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. to assist in the response to the accident or malfunction; and
- The contact information of representatives of the proponent that NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. may contact and the representative of each of NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C. to which the proponent provides notification.

9 Impacts on Potential or Established Aboriginal or Treaty Rights

9.1 Aboriginal Rights in the Project Area

The *Constitution Act, 1982* recognizes and affirms existing Aboriginal and treaty rights. The Agency identified three Indigenous groups that may be adversely impacted by the Project: Nisga'a Nation, Tsetsaut/Skii km Lax Ha and Métis Nation B.C. For the purposes of the EA, the Agency assessed Aboriginal rights as articulated either by the Indigenous group directly, or based on information available to the Agency. The EA process is not a rights determination process, and the information received from Indigenous groups has been taken at face value for the purposes of understanding the potential interactions between the Project and the area over which groups may engage in current use activities or exercise Aboriginal rights.

Nisga'a Nation

The Nisga'a Nation, Canada and B.C. have a treaty, the *Nisga'a Final Agreement*. The Treaty defines Nisga'a Nation rights and interests and the geographic areas in which they apply, including: (1) Nisga'a Lands containing the four Nisga'a villages; (2) the 27,000 square kilometre Nass Area; and (3) within the Nass Area, the 16,101 square kilometre Nass Wildlife Area. The Project falls within the Nass Wildlife Area and is 66 km northwest of the boundary of Nisga'a Lands. The Project is subject to the Treaty because of the potential effects of the Project on residents of Nisga'a Lands, Nisga'a Lands, and Nisga'a interests. Section 8 of this report provides an assessment of the potential effects of the Project on Nisga'a rights and interests, mitigation measures and the Agency's conclusions with respect to paragraphs 8 (e) and (f) of Chapter 10 of the Treaty.

Tsetsaut/Skii km Lax Ha

Tsetsaut/Skii km Lax Ha asserts that its traditional territory, which it refers to as *Laxwiiyip*, extends from the north side of Cranberry River, along the Nass and Bell Irving rivers, past Bell I and II to Ningunsaw Pass. The northern extent of the territory is Beaver Pond (in Ningunsaw Pass) with historical and current use extending as far northwest as the Iskut River. Tsetsaut/Skii km Lax Ha's asserted traditional territory, in which it claims Aboriginal title and the right to fish, hunt and trap, and harvest plants, overlaps with the Project.

In 2017, Tsetsaut/Skii km Lax Ha estimated that there are approximately 35 members. Many Tsetsaut/Skii km Lax Ha members live in Hazelton or New Hazelton, B.C., which are approximately 250 kilometres southeast of the Project, while some members live in other locations in B.C. and the United States.

Tsetsaut/Skii km Lax Ha asserted that they are an independent group for the purposes of Crown consultation and not a "wilp", or house group, of the Gitksan Nation. The Agency consulted Tsetsaut/Skii

km Lax Ha for the purposes of the EA, as the Agency had done in previous EAs. However, the Agency has not taken a position on the relative independence of Tsetsaut/Skii km Lax Ha from the Gitksan Nation.

Métis Nation B.C.

Métis Nation B.C. is a consultative body representing chartered Métis communities in B.C. that asserts, on behalf of its membership, Métis fishing, hunting, trapping and gathering rights and traditional uses. The closest Métis chartered communities to the Project are the Northwest B.C. Métis Association (based out of Terrace) and the Tri-River Métis Association (based out of Smithers). Métis Nation B.C. indicated members of their chartered communities harvest resources in the Project area and provided a map identifying a trapping site, a tent site and a mountain goat hunting site within the Project area. The proponent indicated that consultation efforts and the review of secondary information did not identify information about the historical or current use of these sites. The Agency did not receive any additional information from Métis Nation B.C.

9.2 Potential Adverse Impacts of the Project on Aboriginal Rights

The following sections describe the potential adverse impacts of the Project on the Aboriginal rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. The Project has the potential to cause adverse environmental effects, which may in turn cause adverse impacts to Aboriginal rights related to the practices of fishing, hunting and trapping, and plant gathering/harvesting. Potential environmental effects on health and socio-economic conditions, current use of lands and resources for traditional purposes, and physical or cultural heritage, and historical, archeological, paleontological, or architectural sites or structures are described in Sections 6.3 to 6.5 of this report. Appendix E summarizes concerns raised by NLG, Tsetsaut/Skii km Lax Ha and Métis Nation B.C. during the EA process.

9.2.1 Proponent's Assessment

Fishing Rights

Tsetsaut/Skii km Lax Ha harvests fish species such as salmon, trout, and Dolly Varden throughout their traditional territory. Métis Nation B.C. asserts fishing rights in the vicinity of the Project. The proponent identified environmental effects from the Project which may impact fishing rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. Section 6.1 (Fish and Fish Habitat) of this report describes the Project-related impacts to fish and fish habitat while Section 6.3 (Current Use of Lands and Resources for Traditional Purposes) presents the proponent's assessment of predicted effects on Aboriginal fishing, including changes in access to the Bitter Creek valley.

The proponent concluded that potential effects to fish and fish habitat would occur as a result of habitat loss, increased fishing pressure, blasting, and changes in aquatic resources, water quality, sediment quality and stream flows. The Project would affect Dolly Varden, the only consumable fish species found in the Project area. The proponent indicated that changes in surface water quality (i.e. elevated levels of antimony, cadmium, chromium, cobalt, copper, mercury and selenium, silver and zinc) may affect the quantity and quality of Dolly Varden.

Increased fishing pressure from recreational fishers using the Project access and haul roads may reduce Dolly Varden availability. Project-related noise, increased human presence, dust and change to the visual landscape may lead to a lower quality fishing experience and possible avoidance of the area. These effects would be confined to the Bitter Creek valley, but persist through all phases of the Project. Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens' access to Bitter Creek valley is expected to be limited during all phases of the Project.

Bitter Creek flows into Bear River which supports a number of fish species, but residual effects to fish are expected to be limited to Bitter Creek and are not expected to extend into Bear River.

Although potential Project-related effects on fish and fish habitat and the fishing rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. were identified, the proponent indicated that consultation activities and review of secondary information did not identify evidence of fishing sites in the Bitter Creek valley used by Tsetsaut/Skii km Lax Ha or Métis Nation B.C. As such, the proponent predicted a low impact on the fishing rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

Hunting and Trapping Rights

Tsetsaut/Skii km Lax Ha traditionally hunt moose, grizzly and black bear, mountain goat and birds such as ptarmigan, grouse and Canadian geese throughout their traditional territory. Métis Nation B.C. indicated members of their chartered communities hunt and trap in the Project area and provided a map identifying a trapping site, a tent site, and a mountain goat hunting site within the local study area.

The proponent assessed changes to habitat availability (habitat loss, habitat alteration, and sensory disturbance), changes to habitat distribution (disruption of movement), mortality risk (direct and indirect) and effects from chemical hazards and attractants for all species. These effects may impact the hunting and trapping rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. The proponent anticipates that the Project may result in a reduction of the availability of wildlife (including mountain goat, moose, grizzly bear, furbearers and migratory birds) as a result of loss or alteration of wildlife habitat, and increased mortality risk from collisions with Project-related traffic and increased access by recreational hunters resulting from increased public access to the Bitter Creek valley. Section 7.3 of this report assesses in greater detail the potential effects of the Project on species at risk (i.e. grizzly bear and wolverine). Section 7.1 describes the potential effects on wildlife and migratory birds as a result of accidents and malfunctions that may occur as a result of the Project and which could negatively impact Aboriginal hunting and trapping rights.

The proponent noted that Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens may be excluded from the Bitter Creek valley during the life of the Project for health and safety reasons. These access restrictions may impact the hunting and trapping rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. within the Bitter Creek valley. In addition to a reduction in wildlife and access to the Bitter Creek valley, changes to the experience of hunting and trapping may result from increased public access to, and presence in, the Bitter Creek valley. Project-related noise, dust and change to the visual landscape will be confined to the Bitter Creek valley but will persist through all phases of the Project. These changes may also lead to a lower quality hunting and trapping experience and possible avoidance of the area.

Although potential Project-related effects on moose, mountain goat and birds were identified, the proponent indicated that consultation activities and review of secondary information did not identify any hunting or trapping sites in the Project area used by Tsetsaut/Skii km Lax Ha or reveal any further information about the historical or current use of the three sites identified by Métis Nation B.C or the potential impacts of the Project on those sites. Based on these considerations, the proponent predicted a low impact on the hunting and trapping rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

Plant Gathering and Harvesting Rights

Tsetsaut/Skii km Lax Ha gather and harvest berries, fiddleheads, dandelions, yarrow, devil's club and willow and the proponent found that these are all likely to occur in the Bitter Creek valley.

The proponent indicated that surface disturbance, dust, and the potential spread of invasive plant species would result in the loss and alteration of ecosystem and vegetation abundance, distribution and/or function. The proponent stated that effects cannot be fully mitigated and thus loss and/or alteration of alpine and parkland ecosystems, old and mature forested ecosystems, B.C. Conservation Data Centre listed floodplain and wetland ecosystems, and rare plants and lichens and associated habitat are predicted. Construction of the access road into the Bitter Creek valley may increase plant gathering activities by Project employees and contractors and the public, resulting in a reduction in resource availability. These effects may negatively impact the plant harvesting rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

The proponent noted that Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens may be excluded from areas surrounding Project infrastructure for health and safety reasons, and prevented from accessing the Bitter Creek valley by way of a gate that would be installed near the entrance to the access road. These access restrictions could negatively impact Aboriginal hunting and trapping rights.

In addition to changes to plant availability, changes to the experience of plant gathering may result from increased Project employee and contractor and public access to, and presence in, the Bitter Creek valley. The Project would result in increased noise and dust, and change the visual landscape, effects that may lead to a lower quality plant gathering experience and possible avoidance of the area by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. citizens. These effects may negatively impact the plant harvesting rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

Although potential Project-related effects on plant harvesting were identified, the proponent indicated that consultation efforts and the review of secondary information did not identify evidence of plant gathering or harvesting in the Bitter Creek valley by Tsetsaut/Skii km Lax Ha or Métis Nation B.C. As a result, the proponent predicted low impact on Tsetsaut/Skii km Lax Ha and Métis Nation B.C. plant gathering and harvesting rights.

Cultural Use Rights

Tsetsaut/Skii km Lax Ha and Métis Nation B.C. access to the Bitter Creek valley is expected to be limited during construction, operation, decommissioning and closure, and post-closure due to safety considerations and Project disturbance.

The proponent determined that air contaminant concentrations are predicted to be below ambient air quality objectives within 500 metres of Project infrastructure and within 50 metres of the access road. The proponent anticipated no air quality effects to the cultural value for Tsetsaut/Skii km Lax Ha or Métis Nation B.C. because of their limited use of the Bitter Creek valley. Similarly, no visual quality effects to the cultural value are anticipated. The proponent predicted that noise levels generated by the processing plant and the mine portals would not exceed the nighttime noise criteria threshold of 45 A-weighted decibels beyond 950 metres from the noise sources during construction and 1.2 kilometres during operations. Noise levels near the outer spatial extent of the local study area were predicted to be at or below 35 A-weighted decibels, which is equivalent to the assumed background noise level. Noise levels from surface blasting would only take place during the construction phase and would meet Environment and Climate Change Canada's *Environmental Code of Practice for Metal Mines* criteria threshold of 128 decibels outside the immediate blast areas. The proponent predicted no noise effects to the cultural value of the Bitter Creek valley for Tsetsaut/Skii km Lax Ha or Métis Nation B.C. considering their limited use and the limited extent of noise effects.

The proponent concluded that with the minimal use of the Bitter Creek valley and implementation of mitigation measures, there would be no impacts on cultural use rights of the Tsetsaut/Skii km Lax Ha or Métis Nation B.C.

9.2.2 Views Expressed by Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

During the Agency's public comment period on the Project Description, Tsetsaut/Skii km Lax Ha advised the Agency that they are a hunting, trapping, fishing, and resource harvesting community, whose traditional territory is dotted with highly valued historical, cultural, and berry, plant, and mushroom harvesting sites. They consume blueberries, cranberries, dandelions and fiddleheads and gather other plants including willow, devil's club, and yarrow. They trade soapberries for herring eggs and seaweed. They fish salmonid species, eulachon, and lake trout, hunt moose and bear, and trap beaver, martin, and wolverine. Tsetsaut/Skii km Lax Ha indicated they have a tenure system that allows for exclusive resource use, territorial management and decision-making under the guidance of the hereditary chief. Managing resources in Tsetsaut/Skii km Lax Ha territory is critically linked to continued existence, wealth, and status in the feasting system. Tsetsaut/Skii km Lax Ha did not comment during the EA on Project-related impacts on the exercise of their cultural rights or rights to fish, hunt, trap, gather and harvest plants in the Bitter Creek valley. They indicated that Aboriginal title was the overarching concern of the Tsetsaut/Skii km Lax Ha that stands to be affected by the Project, which is discussed in Section 9.2.3.

Tsetsaut/Skii km Lax Ha expressed concern about effects on furbearers as a result of a Project-related increase in predator wolf populations in the Bitter Creek valley. The proponent responded to the concern by indicating that indirect mortality risk due to facilitated predation (e.g. from wolves) was considered but was not determined to be an interaction as a result of the Project. Mountain goat and moose are the two wildlife valued components that have the possibility of being affected. Facilitated predation was not considered relevant for mountain goat because they use steep, rocky outcrops as

suitable habitat in order to avoid predation. The access road, and haul road, would not enable access to the steep rocky outcrops that goats prefer as suitable habitat.

Métis Nation B.C. identified three sites in the Project area: one trapping, one overnight, and one mountain goat harvesting. They did not provide additional information on the specific location of these sites or the historic or current use of these sites. Métis Nation B.C. advised the Agency that Métis citizens in Terrace, Rupert, Smithers, and Stewart harvest country foods for sustenance purposes and hunt, fish, trap, and gather in the area of the Project. Métis Nation B.C. provided comments during the development of the EIS Guidelines regarding the potential impacts of the Project on all of their Aboriginal rights including hunting, fishing, trapping, and gathering for sustenance purposes. Métis Nation B.C. identified concerns regarding fish health, the abundance of wildlife, and their ability to access resources in the Project area. They also identified three sites in the Project area for trapping, overnight, and mountain goat harvesting.

9.2.3 Agency's Views

The Agency conducted its assessment of impacts to Aboriginal rights based on information in the proponent's EIS and associated documents, and information provided by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. Section 6.3 outlines the Agency's assessment of predicted effects of the Project on current use of lands and resources by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. including access, fishing, hunting, trapping, plant gathering and harvesting.

Fishing Rights

The Agency agrees with the proponent that the impacts to the fishing rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. are expected to be low considering no fishing sites were identified in the Project area.

Hunting and Trapping Rights

The Agency agrees with the proponent that the Project would have low potential impacts to the hunting and trapping rights of Tsetsaut/Skii km Lax Ha taking into account the limited hunting and trapping activities by community members in the Project area. Similarly, the Agency agrees that the Project would have low potential impacts to the Métis Nation B.C. hunting and trapping rights. Métis Nation B.C. has identified a trapping site and a mountain goat harvesting site in the Project area, but no additional information has revealed historical or current member use of these sites.

Plant Gathering and Harvesting Rights

The Agency agrees with the proponent that the Project would have low potential impacts to the plant gathering and harvesting rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. taking into account the absence of plant gathering and harvesting activities by community members in the area of the Project.

Cultural Use

The Agency finds that the exercise of Aboriginal rights may be negatively impacted by several pathways including the changes to the environment caused by the Project from dust, noise, light, and changes in access. The Agency agrees with the proponent that the Project would have low potential impacts to the cultural use rights of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. taking into account the minimal use by community members of the Project area.

Aboriginal Title

Tsetsaut/Skii km Lax Ha asserts Aboriginal title over the lands throughout their traditional territory. They indicated in consultation with the Agency, B.C. Environmental Assessment Office, and the proponent that Aboriginal title was the overarching concern of the Tsetsaut/Skii km Lax Ha that stands to be affected by the Project. The proponent identified this issue but did not assess nor take a position on the potential adverse impacts of the Project on Aboriginal title.

The Agency acknowledges that it is Tsetsaut/Skii km Lax Ha's perspective that the Project may have impacts on Aboriginal title. During the EA process, Tsetsaut/Skii km Lax Ha did not identify specific adverse impacts of the Project on Aboriginal title or propose ways to avoid or mitigate potential adverse impacts. The Agency considers that the mitigation and accommodation measures identified in Section 9.3 may help to address the concerns raised by Tsetsaut/Skii km Lax Ha that the Project may have impacts on Aboriginal title.

9.3 Proposed Mitigation and Accommodation Measures

The Agency is of the view that the implementation of the following key mitigation measures is required to support accommodation of potential impacts to Aboriginal rights, including fishing, hunting and trapping, plant gathering and harvesting, cultural use and title.

- Prohibit public access to the access road.
- Provide access to the Bitter Creek valley through use of the access and haul roads, during all phases of the Project, to members of Tsetsaut/Skii km Lax Ha and Métis Nation B.C. for practicing traditional activities to the extent that such access is safe. The proponent would consult with Tsetsaut/Skii km Lax Ha and Métis Nation B.C. prior to construction to identify the manner by which this access will be provided. The proponent would notify Tsetsaut/Skii km Lax Ha and Métis Nation B.C. in a timely manner if access to the Bitter Creek valley through use of the access or haul road must be prohibited temporarily for safety reasons.
- Prohibit employees and contractors associated with the Project from fishing and hunting in the Bitter Creek valley.
- Identify, prior to construction and in consultation with the Nisga'a Lisims Government (NLG), Tsetsaut/Skii km Lax Ha and Métis Nation B.C. and relevant authorities, time periods during which construction activities may not be carried out to protect wildlife during sensitive life states including for mountain goat, grizzly bear, moose, hoary marmot, marten and wolverine. In doing so, the proponent would:

- Apply B.C.'s *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia* when identifying these time periods;
- Notify, prior to construction, the Agency of these time periods and of the areas within which each of these time periods would apply;
- Conduct construction activities during these time periods, unless not technically feasible.
- If construction during time periods referred to above are not technically feasible, the proponent would develop and implement additional mitigation measures, in consultation with the NLG, Tsetsault/Skii km Lax Ha, Métis Nation B.C. and relevant authorities, to protect mountain goat, grizzly bear, moose, hoary marmot, marten and wolverine during construction. In doing so, the proponent would:
 - Develop and implement additional mitigation measures, including species-specific non-disturbance setback distances around habitat features used by each species for critical life functions, to protect wildlife during sensitive life stages. The proponent would take into account B.C.'s *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia* when developing the setback distances.
 - Notify the Agency of these additional mitigation measures prior to implementation, including the setback distance identified for each species, the habitat feature(s) and construction activity(ies) applicable to each setback distance and the period(s) of time during which each setback distance will be applied.
- Avoid helicopter overflights and blasting disturbance within two kilometres of grizzly bear known denning sites and identified potential denning habitat, unless required for safety reasons
 - If overflight or blasting is required for safety reasons within two kilometres of known denning sites or identified potential denning habitat during critical periods for denning grizzly bear (October 1 to the end of winter conditions), the proponent would keep a line-of-sight distance of 500 metres from known denning sites and identified potential denning habitat.
- Avoid helicopter overflights within two kilometres or less than 500 metre absolute altitude from the mountain goat ungulate winter range, unless required safety reasons.
- Avoid surface blasting, including for avalanche control purposes if the proponent observes mountain goat within one kilometre of the blast area.
- Manage, during all phases of the Project, snow bank height along the access and haul roads and to create and maintain escape pathways at periodic distances to allow ungulates to exit the plowed roads in winter.
- Install and maintain, during all phases of the Project, wildlife crossing signs along the access and haul roads.
- Avoid use of salt for de-icing or traction control on the access and haul roads, unless required for safety reasons.
- Manage vegetation height and composition along the access and haul roads to increase sight lines for drivers and visibility of wildlife.
- Reclaim the access and haul roads at the end of decommissioning, unless otherwise required by NLG or relevant authorities.
- Implement measures identified in sections 6.1 (Fish and Fish Habitat), 6.2 (Migratory Birds), 6.5 (Health and Socio-economic Conditions), and 6.6 (Physical and Cultural Heritage).

Need for and Requirements of Follow-up

After considering the follow-up program proposed by the proponent, expert advice from federal authorities, and comments received by NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C., and the public, the Agency identified the following requirements for a follow-up program:

- Develop, prior to operation and in consultation with the Nisga'a Lisims Government, a follow-up program to verify the accuracy of the EA and the effectiveness of the mitigation measures as it pertain to mountain goat. As part of the implementation of the follow-up program, the proponent would:
 - Conduct mountain goat population surveys once every three years starting during the first year of operation; and
 - Develop the methodology for the surveys in consultation with the NLG prior to the implementation of the follow-up program.
- Implement the follow-up programs identified in Section 6.1 (Fish and Fish Habitat) and 6.2 (Migratory Birds).

9.4 Agency Conclusion Regarding Impacts to Aboriginal Rights

After taking into consideration the mitigation and accommodation measures proposed in relation to the impacts to Aboriginal rights, the Agency is of the view that the Project would result in low impacts on the exercise of Aboriginal rights by Tsetsaut/Skii km Lax Ha and Métis Nation B.C.

The Agency recognizes that consultation is ongoing and further information regarding potential impacts may be forthcoming. Input from Tsetsaut/Skii km Lax Ha and Métis Nation B.C. on the draft EA Report will be considered and assist the Agency in finalizing its conclusion regarding the potential impacts from the Project on Aboriginal rights.

10 Conclusion and Recommendations of the Agency

In preparing the Draft EA Report, the Agency took into account the proponent's EIS, its responses to information requests, and the views of government agencies, Indigenous groups, and the public.

The environmental effects of the Project and their significance have been determined using assessment methods and analytical tools that reflect current accepted practices of environmental and socio-economic assessment practitioners, including consideration of potential accidents and malfunctions.

The Agency concludes that taking into account the implementation of mitigation measures, the Project is not likely to cause significant adverse environmental effects as defined in CEAA 2012.

The Agency is continuing to consult with NLG on whether the Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests in accordance with paragraph 8(e) of the *Nisga'a Final Agreement*. The Agency concludes that the Project would result in both positive and negative effects on the existing and future economic, social and cultural well-being of Nisga'a citizens who may be affected by the Project as defined by paragraph 8(f) of the *Nisga'a Final Agreement*.

The Agency has identified key mitigation measures and follow-up program requirements for consideration by the Minister of Environment and Climate Change in establishing conditions as part of the EA Decision Statement, in the event that the Project is permitted to proceed.

10.1 Appendices

Appendix A Environmental Effects Rating Criteria

Valued Component	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility
Fish and fish habitat	<p>Low: Measurable effect on habitat function is anticipated but on low quality, marginal or non-critical habitat; anticipated mortality risk to fish species</p> <p>Moderate: Measurable effect on habitat function is anticipated on moderate, high quality or critical habitat; anticipated mortality risk to fish species</p> <p>High: Measurable effect on habitat function is anticipated on important habitat for provincially-listed species or <i>Species at Risk Act</i> listed species; anticipated mortality risk to provincially-listed species or <i>Species at Risk Act</i> listed species</p>	<p>Landscape: The residual effect extends across the local study area.</p> <p>Regional: The residual effect extends across the regional study area.</p> <p>Beyond Regional: The residual effect extends possibly across or beyond the province.</p>	<p>General: Effect is expected to occur outside a sensitive timing period (e.g. outside the breeding season).</p> <p>Sensitive: Effect is expected to occur during a sensitive period of time (e.g. immediately before, after or during the breeding season).</p>	<p>Once: The residual effect occurs once during any phase of the Project.</p> <p>Sporadic: The residual effect occurs at intermittent intervals during any phase of the Project.</p> <p>Regular: The residual effect occurs on a regular basis during any phase of the Project.</p> <p>Continuous: The residual effect occurs continuously during any phase of the Project.</p>	<p>Short-term: The residual effect is limited to construction (18 months).</p> <p>Medium-term: The residual effect lasts until closure (12.5 years).</p> <p>Long-term: The residual effect lasts beyond post-closure (beyond 22.5 years).</p>	<p>Reversible: The residual environmental effect is reversible within the temporal boundary of the assessment</p> <p>Irreversible: The residual environmental effect is not reversible within the temporal boundary of the assessment or the duration of the residual effects is undefined or permanent.</p>

Valued Component	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility
Migratory birds	<p>Low: The residual effect differs from the average value for baseline conditions, but is within the range of natural variation and well below a guideline or threshold value.</p> <p>Moderate: The residual effect differs from the average value for baseline conditions and approaches the limits of natural variation, but is below or equal to a guideline or threshold value.</p> <p>High: The residual effect differs from the average value for baseline conditions and is a detectable change beyond the range of natural variation (i.e. change of state from baseline conditions) and exceeds a guideline or threshold value.</p>	<p>Landscape: The residual effect extends across the local study area.</p> <p>Regional: The residual effect extends across the regional study area.</p> <p>Beyond Regional: The residual effect extends possibly across or beyond the province.</p>	<p>General: Effect is expected to occur outside a sensitive timing period (e.g. outside the breeding season).</p> <p>Sensitive: Effect is expected to occur during a sensitive period of time (e.g. immediately before, after, or during the breeding season).</p>	<p>Once: The residual effect occurs once during any phase of the Project.</p> <p>Sporadic: The residual effect occurs at intermittent intervals during any phase of the Project.</p> <p>Regular: The residual effect occurs on a regular basis during any phase of the Project.</p> <p>Continuous: The residual effect occurs continuously during any phase of the Project.</p>	<p>Short-term: The residual effect lasts up to 18 months (end of construction).</p> <p>Medium-term: The residual effect lasts up to 7.5 years (end of operation).</p> <p>Long-term: The residual effect lasts up to 22.5 years (end of post-closure).</p> <p>Far Future: The residual effect lasts beyond 22.5 years (beyond post-closure).</p>	<p>Reversible: The residual environmental effect is reversible within the temporal boundary of the assessment.</p> <p>Irreversible: The residual environmental effect is not reversible within the temporal boundary of the assessment or the duration of the residual effects is undefined or permanent.</p>

Valued Component	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility
Current use of lands and resources for traditional purposes	<p>Low: The magnitude of the effect differs from baseline use conditions, but the activity could be practiced in the same or similar manner as before.</p> <p>Moderate: The magnitude of the effect differs from the baseline use conditions and preferred locations and means for practicing the activity may be lost or modified.</p> <p>High: The magnitude of the effect differs from baseline use conditions and the activity can no longer be carried out in the preferred manner and locations.</p>	<p>Landscape: The residual effect extends across the local study area.</p> <p>Regional: The residual effect extends across the regional study area.</p> <p>Beyond Regional: The residual effect extends possibly across or beyond the province.</p>	Not applicable	<p>Once: The residual effect occurs once during any phase of the Project.</p> <p>Sporadic: The residual effect occurs at intermittent intervals during any phase of the Project.</p> <p>Regular: The residual effect occurs on a regular basis during any phase of the Project.</p> <p>Continuous: The residual effect occurs continuously during any phase of the Project.</p>	<p>Short-term: The residual effect lasts up to 18 months (end of construction).</p> <p>Medium-term: The residual effect lasts up to 7.5 years (end of operation).</p> <p>Long-term: The residual effect lasts up to 22.5 years (end of post-closure).</p> <p>Far Future: The residual effect lasts beyond 22.5 years (beyond post-closure).</p>	<p>Reversible: The residual environmental effect is reversible within the temporal boundary of the assessment</p> <p>Irreversible: The residual environmental effect is not reversible within the temporal boundary of the assessment or the duration of the residual effects is undefined or permanent.</p>

Valued Component	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility
Aboriginal peoples – Health and socio-economic conditions	<p>Low: Exposures are well below health-based guidelines.</p> <p>Moderate: Exposures are below health-based guidelines.</p> <p>High: Exposures are above health-based guidelines.</p>	<p>Landscape: The residual effect extends across the local study area.</p> <p>Regional: The residual effect extends across the regional study area.</p> <p>Beyond Regional: The residual effect extends possibly across or beyond the province.</p>	Not applicable	<p>Once: The residual effect occurs once during any phase of the Project.</p> <p>Sporadic: The residual effect occurs at intermittent intervals during any phase of the Project.</p> <p>Regular: The residual effect occurs on a regular basis during any phase of the Project.</p> <p>Continuous: The residual effect occurs continuously during any phase of the Project.</p>	<p>Short-term: The residual effect lasts up to 18 months (end of construction).</p> <p>Medium-term: The residual effect lasts up to 7.5 years (end of operation).</p> <p>Long-term: The residual effect lasts up to 22.5 years (end of post-closure).</p> <p>Far Future: The residual effect lasts beyond 22.5 years (beyond post-closure).</p>	<p>Reversible: The residual environmental effect is reversible within the temporal boundary of the assessment</p> <p>Irreversible: The residual environmental effect is not reversible within the temporal boundary of the assessment or the duration of the residual effects is undefined or permanent.</p>

Valued Component	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility
Transboundary effects - Greenhouse gas emissions	<p>Low: The residual effect differs from the average value for baseline conditions, but is well below a guideline or threshold value.</p> <p>Moderate: The residual effect differs from the average value for baseline conditions but is below or equal to a guideline or threshold value.</p> <p>High: The residual effect differs from the average value for baseline conditions and exceeds a guideline or threshold value.</p>	<p>Landscape: The residual effect extends across the local study area.</p> <p>Regional: The residual effect extends across the regional study area.</p> <p>Beyond Regional: The residual effect extends possibly across or beyond the province.</p> <p>Global: the residual effect extends worldwide.</p>	Not applicable	<p>Once: The residual effect occurs once during any phase of the Project.</p> <p>Sporadic: The residual effect occurs at intermittent intervals during any phase of the Project.</p> <p>Regular: The residual effect occurs on a regular basis during any phase of the Project.</p> <p>Continuous: The residual effect occurs continuously during any phase of the Project.</p>	<p>Short-term: The residual effect lasts up to 18 months (end of construction).</p> <p>Medium-term: The residual effect lasts up to 7.5 years (end of operation).</p> <p>Long-term: The residual effect lasts up to 22.5 years (end of post-closure).</p> <p>Far Future: The residual effect lasts beyond 22.5 years (beyond post-closure).</p>	<p>Reversible: The residual environmental effect is reversible within the temporal boundary of the assessment</p> <p>Irreversible: The residual environmental effect is not reversible within the temporal boundary of the assessment or the duration of the residual effects is undefined or permanent.</p>

Appendix B Summary of Environmental Effects Assessment

Predicted Residual effects	Characterization of Residual Effects	Conclusion and Rationale
Fish and Fish Habitat		
<p>Direct habitat loss</p> <p>Habitat loss would occur as a result of infilling of a 174 metre section of Bitter Creek for the access road. Approximately 10,500 square meters of instream habitat and 27,000 square meters of riparian habitat would be lost and offset.</p>	<p>Magnitude: Low Geographic extent: Landscape Timing: General Frequency: Once Duration: Short-term Reversibility: Reversible</p>	<p>Not significant</p> <p>The Project would result in loss of instream and riparian habitat, however, habitat loss is limited to habitat commonly found in the Bitter Creek watershed and likely limited to migration and juvenile rearing. The effects to fish would be reversible because fish habitat losses would be offset with habitat of similar function and attributes to the habitat lost as part of the detailed offsetting plan which would be developed as part of the application for a <i>Fisheries Act</i> authorization.</p>
<p>Changes to fish health from changes in surface water quality</p> <p>Changes in surface water quality would occur as a result of discharges from mine infrastructure including dewatering of the underground mine, effluent discharges from the tailings management facility, and contact water runoff. Sub-lethal effects on fish as a result of changes to water quality would be contaminant dependent.</p>	<p>Magnitude: Low Geographic extent: Landscape Timing: Sensitive Frequency: Sporadic Duration: Long-term Reversibility: Irreversible</p>	<p>Not significant</p> <p>Discharges attributed to Project activities would result in elevated levels of antimony, cadmium, chromium, cobalt, copper, mercury, selenium, silver, and zinc in the fish bearing reaches of Bitter Creek or Bear River compared to guidelines. The Agency does not consider the effects of changes in surface water quality to fish and fish habitat to be reversible because the effects, based on the surface water quality assessment, are not reversible in the long term.</p>

Predicted Residual effects	Characterization of Residual Effects	Conclusion and Rationale
<p>Changes to fish habitat from changes in stream flows</p> <p>Increases or decreases in stream flows would occur as a result of dewatering of the underground mine, water withdrawals, and installation of surface water management facilities. Changes in stream flows can decrease the quality of habitat available for fish.</p> <p>Predicted worst case increases in stream flows during operations in the fish bearing portions of Bitter Creek under average conditions are approximately 5 percent and 4 percent for BC06 and BC02 respectively in December. Under dry conditions the worst case increases are 22 percent and 14% BC06 and BC02 respectively in December.</p>	<p>Magnitude: Low Geographic extent: Landscape Timing: Sensitive Frequency: Regular Duration: Medium-term Reversibility: Reversible</p>	<p>Not significant</p> <p>There is a high degree of natural variability in the stream flows experienced by the fish in the creeks of the local study area. The predicted flow changes are within the range of natural variability. Furthermore, affected waters in Bitter Creek and Bear River present low quality fish habitat.</p>
Migratory Birds		
<p>Changes to habitat availability</p> <p>Clearing of trees and other vegetation near Project infrastructure would remove suitable nesting and resident species habitat, create wind exposure, and increase predation, while human presence and sensory disturbance such as light and noise during construction and operation would also decrease the suitability of habitats adjacent to the Project area. A total of 1,045 hectares of habitat would be lost, which represents a maximum of three percent of available habitat in the regional study area for specific species.</p>	<p>Magnitude: Moderate Geographic extent: Landscape Timing: Sensitive Frequency: Once (for land clearing); continuous (for sensory disturbance) Duration: Long-term Reversibility: Reversible</p>	<p>Not significant</p> <p>The Project would reduce habitat available for migratory birds, including migratory bird species at risk. The effect would be reversible upon successful reclamation of the Project area.</p>

Predicted Residual effects	Characterization of Residual Effects	Conclusion and Rationale
<p>Mortality risk</p> <p>The Project would increase mortality risk for common nighthawk and marbled murrelet as a result of collisions with vehicles, Project infrastructure, powerlines, and exposure to chemical hazards and attractants.</p>	<p>Magnitude: Low Geographic extent: Landscape Timing: Sensitive Frequency: Sporadic Duration: Long-term Reversibility: Reversible</p>	<p>Not significant</p> <p>Effects to migratory bird mortality risk would be low in magnitude. It is expected that the loss of a few individuals within a regional population would be offset by natural recruitment through reproduction and migration.</p>
<p>Indigenous Peoples: Current Use of Lands and Resources for Traditional Purposes</p>		
<p>Changes to access to Bitter Creek valley</p> <p>The Project would restrict access of Indigenous peoples to the Bitter Creek valley for fishing, hunting, trapping, and gathering plants. The Project both facilitates access to the Bitter Creek valley given that there is no current road into the valley, and limits Indigenous peoples' access because the proponent would install a locked, manned gate along the access road near the Clements Lake turnoff.</p>	<p>Magnitude: Low Geographic extent: Landscape Frequency: Continuous Duration: Long-term Reversibility: Reversible</p>	<p>Not significant</p> <p>There is limited evidence of current use of the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. The proponent would provide Tsetsaut/Skii km Lax Ha and Métis Nation B.C with access to the Bitter Creek valley through use of the access road, subject to safety considerations.</p>
<p>Changes to fishing</p> <p>Changes to fishing by Indigenous peoples may occur as a result of effects on fish and fish habitat and increased recreational fishing by the public.</p>	<p>Magnitude: Low Geographic extent: Landscape Frequency: Continuous Duration: Far Future Reversibility: Irreversible</p>	<p>Not significant</p> <p>There is limited evidence of current fishing in Bitter Creek by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. In addition, Dolly Varden present in Bitter Creek are small (7 to 20 centimeters in length), so are unlikely to provide good fishing opportunities. Residual effects to fishing would be limited to Bitter Creek, but would be irreversible because of irreversible changes to water quality.</p>

Predicted Residual effects	Characterization of Residual Effects	Conclusion and Rationale
<p>Changes to hunting and trapping</p> <p>Changes to hunting and trapping by Indigenous peoples in the Bitter Creek valley may occur as a result of effects to wildlife, and increased recreational hunting by the public.</p>	<p>Magnitude: Low Geographic extent: Landscape Frequency: Continuous Duration: Long-term Reversibility: Reversible</p>	<p>Not significant</p> <p>There is limited evidence of current hunting or trapping in the Bitter Creek valley by Tsetsaut/Skii km Lax Ha and Métis Nation B.C. Residual effects to hunting and trapping would be limited to the Bitter Creek valley, and would be reversible upon successful reclamation of the Project area.</p>
<p>Changes to plant gathering</p> <p>Changes to plant gathering by Indigenous peoples in the Bitter Creek valley from surface disturbance, dust and invasive species, and changes to the experience of plant gathering, health and safety.</p>	<p>Magnitude: Low Geographic extent: Landscape Frequency: Continuous Duration: Far future Reversibility: Irreversible</p>	<p>Not significant</p> <p>There is limited evidence of current plant gathering in the Bitter Creek valley by Indigenous peoples. Residual effects to plant gathering would occur as a result of loss of plant resources, abundance and distribution. The residual effect would be irreversible because of irreversible changes to plant resources.</p>
Indigenous Peoples: Health and Socio-Economic Conditions		
<p>Health effect from decreased air quality</p> <p>Exhaust and air emissions from mine equipment and the process plant may cause adverse effects to health of Indigenous people using the Project area. The Project would increase nitrogen dioxide, sulphur dioxide, carbon monoxide, and particulate matter in the air.</p>	<p>Magnitude: Low to moderate Geographic extent: Landscape Frequency: Continuous Duration: Medium-term Reversibility: Reversible</p>	<p>Not significant</p> <p>Increases in air emissions are predicted to be below but approaching provincial and federal air quality objectives. For nitrogen dioxide, maximum predicted concentrations were predicted to be 187 micrograms per cubic metre which is just 1 micrograms per cubic metre below the current provincial and federal air quality objective. Residual effects are anticipated to be reversible because air quality is expected to return to baseline levels during post-closure.</p>

Predicted Residual effects	Characterization of Residual Effects	Conclusion and Rationale
<p>Health effect from reduced quality of traditional foods</p> <p>The Project is expected to reduce the quality of traditional foods as a result of increases in contaminants of potential concern in air, water, and soil. The proponent conducted a human health risk assessment that indicated that several estimates of non-cancer contaminants of potential concern had hazard quotients that exceeded the Health Canada acceptable hazard quotient threshold of 0.2 in the baseline condition and predicted future conditions.</p>	<p>Magnitude: Low Geographic extent: Landscape Frequency: Continuous Duration: Long-term Reversibility: Reversible</p>	<p>Not significant</p> <p>The Agency acknowledges that several estimates of non-cancer contaminants of potential concern had hazard quotients that exceeded the Health Canada acceptable hazard quotient threshold of 0.2 in the baseline condition and predicted future conditions, but that the proponent’s conclusion was that the Project would not result in a measurable change to health risk. However, the Agency understands that there is uncertainty in the assessment driven by limited baseline information. Taking into account the uncertainty in the human health risk, the Agency considers the adverse residual effects to human health from contaminants in country foods to be low in magnitude, and has identified the need for a follow-up program to monitor changes to contaminants of potential concern in the environment and risks to human health.</p>
<p>Health effect from diminished surface water quality</p> <p>Changes in contaminants of surface water that could be consumed by Indigenous people, increasing the contaminants of potential concern ingested.</p>	<p>Magnitude: Low Geographic extent: Landscape Frequency: Continuous Duration: Long-term Reversibility: Reversible</p>	<p>Not significant</p> <p>The maximum predicted concentration of arsenic is approaching Health Canada’s maximum acceptable concentration of 0.010 micrograms per litre. Therefore, the magnitude of the residual effects resulting from decreasing surface water quality would be low. Contaminants of potential concern are expected to be released into Bitter Creek throughout construction and operation; therefore, residual health effects are anticipated to be long-term in duration, and reversible at the end of post-closure.</p>

Predicted Residual effects	Characterization of Residual Effects	Conclusion and Rationale
<p>Health effect from increased noise</p> <p>Project activities may affect Indigenous people spending time in the area through annoyance. Noise levels are predicted to reach the background noise level of approximately 35 decibels near the outer edge of the local study area.</p>	<p>Magnitude: Low Geographic extent: Landscape Frequency: Continuous Duration: Long-term Reversibility: Reversible</p>	<p>Not significant</p> <p>The Agency concludes that the magnitude of residual effects of increased noise on human health would be low. Residual noise effects would occur for the life of the Project and would be reversible after closure.</p>
Transboundary Effects		
<p>Increase in greenhouse emissions</p> <p>GHGs emissions would be generated from mine fleet vehicles and equipment. The Project is expected to release 12,168 tonnes of CO₂e per year during construction, and 4,937 tonnes of CO₂e per year during operation.</p>	<p>Magnitude: Low Geographic extent: Global Frequency: Continuous Duration: Far future Reversibility: Irreversible</p>	<p>Not significant</p> <p>The Project would primarily use electric power, and therefore the primary source of greenhouse emissions would be from mine fleet vehicles and equipment. Greenhouse emissions from the Project would contribute only 0.0081 percent to provincial emissions and 0.0007 percent to national emissions during operation.</p>

List of Key Mitigation Measures, Monitoring, and Follow-up Considered by the Agency

Valued Component	Mitigation Measures, Monitoring and Follow-up
Effects identified under subsection 5(1) of the CEAA 2012	
Fish and fish habitat	<p>Mitigation measures</p> <ul style="list-style-type: none"> • Conduct in-water construction activities during the timing windows for carrying out work in fish habitat defined for the Skeena region by B.C. for Dolly Varden in the <i>Terms and Conditions for changes in and about a stream specified by Ministry of Forests, Lands, Natural Resources Operations, and Rural Development Habitat Officers, Skeena Region (April 2018)</i>, unless otherwise allowed by relevant authorities. If the Proponent is allowed by relevant authorities to conduct in-water construction activities outside of these timing windows, the Proponent would develop and implement additional mitigation measures for in-water construction activities other than the application of timing windows to protect fish during sensitive life stages. The proponent would submit these measures to the Agency prior to implementation. • Implement, during all phases of the Project, measures to control erosion and sedimentation, including along the access and haul roads, to avoid the deposit of deleterious substances in water frequented by fish. • Restore riparian buffer strips disturbed by Project construction activities to their baseline width and capacity as soon as possible as the construction work is completed. The proponent would use plant species native to the area when restoring the riparian zone. • The proponent shall comply with the <i>Metal and Diamond Mining Effluent Regulations</i> and subsection 36(3) of the <i>Fisheries Act</i>. In doing so, the proponent would: • Collect supernatant and seepage from the tailings management facility, and treat all collected supernatant and seepage that would not meet the requirements of the <i>Metal and Diamond Mining Effluent Regulations</i> and subsection 36(3) of the <i>Fisheries Act</i> prior to any discharge, including discharge into Bitter Creek, during operation and decommissioning and until such time that water is suitable for direct discharge into the environment. When treating supernatant and seepage, the Proponent would take into account the water quality thresholds in the Canadian Council of Ministers of the Environment’s Water Quality Guidelines for the Protection of Aquatic Life and in B.C.’s Water Quality Guidelines for the Protection of Aquatic Life; and • Collect and treat any contact water that would not meet the requirements of the <i>Metal and Diamond Mining</i>

Valued Component	Mitigation Measures, Monitoring and Follow-up
	<p><i>Effluent Regulations</i> and subsection 36(3) of the <i>Fisheries Act</i>, prior to any discharge, including discharge into Goldslide Creek, during all phases of the Project and until such time that water is suitable for direct discharge into the environment. When treating contact water, the Proponent would take into account the water quality thresholds in the Canadian Council of Ministers of the Environment's Water Quality Guidelines for the Protection of Aquatic Life and in B.C.'s Water Quality Guidelines for the Protection of Aquatic Life.</p> <ul style="list-style-type: none"> • Place all acid-generating and potentially acid generating tailings into the tailings management facility and submerge tailings under a water cover during operation. • Maintain the flow rates downstream of the tailings management facility discharge location in Bitter Creek within the range of naturally occurring low-flow and peak-flow rates for the applicable months of the year as identified in table 5-7 and table 5-8 of Appendix 12-A of the EIS by controlling and volume and timing of discharges to Bitter Creek. • Complete, prior to construction and in consultation with relevant authorities, a geological and geochemical characterization of the geologic material in the Project area. The proponent would subsequently update the water quality model conducted for the EA to predict adverse effects on water quality during all phases of the Project, based on information from the completed geological and geochemical characterization. As part of the geological and geochemical characterization, the proponent would: <ul style="list-style-type: none"> • Describe the geology and the distribution and nature of reactive geologic material in the Project area; • Conduct humidity cell studies to predict the time to onset of neutralizing potential depletion and acidic drainage for waste rock using samples that are geologically and spatially representative of the Project area, taking into account the Mine Environment Neutral Drainage Program's <i>Prediction Manual for Drainage Chemistry from Sulphidic Geological Materials</i> (2009); • Conduct field tests to measure rate of geochemical change (neutralizing potential depletion and acid generation) for tailings for periods of time that would be determined in consultation with relevant authorities; • Determine the impact of freezing on the rate of sulphide oxidation and the depletion of neutralizing potential in the crib field test pads and legacy waste rock pile using total inorganic carbon - neutralizing potential calculations; • Predict drainage chemistry from cemented backfill and associated adverse effects on water quality in the mine pool; and • Conduct long-term trickle leach columns based on long-term strength of acidic drainage.

Valued Component	Mitigation Measures, Monitoring and Follow-up
	<ul style="list-style-type: none"> • Develop, prior to construction and to the satisfaction of Fisheries and Oceans Canada and in consultation with NLG, any offsetting plan(s) related to any residual serious harm to fish associated with the carrying out of the Project. The proponent would submit any approved offsetting plan(s) to the Agency prior to implementation. • If any fish habitat offsetting measure(s) proposed in any offsetting plan(s) may cause adverse environmental effects not considered in the EA, develop and implement, following consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities, measures to mitigate those effects. The proponent would submit these measures to the Agency prior to implementation. <p>Monitoring and Follow-up</p> <ul style="list-style-type: none"> • Develop and implement, prior to construction and in consultation with NLG, a follow-up program to verify the accuracy of the EA as it pertains to fish and fish habitat including any update to the predicted adverse effects to water quality as described above, and to determine the effectiveness of mitigation measures. The proponent would implement the follow-up program, including the monitoring requirements of the <i>Metal and Diamond Mining Effluent Regulations</i> during all phases of the Project. As part of implementation of the follow-up program, the proponent would: <ul style="list-style-type: none"> • Monitor water quality in Bitter Creek, Goldslide Creek, and Bear River year round; • Develop, in consultation with NLG and relevant authorities, and implement modified or additional mitigation measures if monitoring results show any exceedances of water quality objectives and benchmarks identified by British Columbia for the Project to protect aquatic life.
Migratory birds	<p>Mitigation measures</p> <ul style="list-style-type: none"> • Carry out the Project in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the proponent would develop, prior to construction and in consultation with relevant authorities, a migratory birds management plan that takes into account Environment and Climate Change Canada’s <i>Avoidance Guidelines</i> and the risk of incidental take. The migratory birds management plan shall also include measures the proponent would implement take if migratory birds or their nests are found. The proponent would implement the migratory birds management plan during all phases of the Project. The proponent’s actions when implementing the migratory birds management plan shall be in compliance with the <i>Migratory Birds Convention Act, 1994</i>, the <i>Migratory Birds Regulations</i> and with the <i>Species at Risk Act</i>. • As part of development and implementation of the migratory birds management plan, the proponent would

Valued Component	Mitigation Measures, Monitoring and Follow-up
	<p>develop and implement mitigation measures related to sensitive periods and locations for migratory birds, including mitigation measures that would consider critical habitat identified for black swift, common nighthawk, marbled murrelet, olive-sided flycatcher in recovery strategies under the <i>Species at Risk Act</i> and suitable habitat identified by the proponent in figures 16.7-21, 16.7-22, 16.7-23 and 16.7-24 of the EIS.</p> <ul style="list-style-type: none"> • Control lighting required for all phases of the Project, including direction, timing and intensity, to avoid adverse effects on migratory birds and on listed species at risk, while meeting health and safety requirements. • Deter migratory birds from using on-site settling sumps, ponds, the tailings management facility, and other water management structures containing contact water. • Undertake, in consultation with NLG and relevant authorities, progressive reclamation of all areas disturbed by the Project. The proponent would identify, in consultation with NLG and relevant authorities, plant species native to the area of the Project for revegetation as part of progressive reclamation, including species suitable to create habitats for migratory birds, listed species at risk, and species of interest to Indigenous peoples. <p>Monitoring and Follow-up</p> <ul style="list-style-type: none"> • Develop, prior to construction and in consultation with NLG and relevant authorities, a follow-up program to verify the accuracy of the EA and determine the effectiveness of mitigation measures to avoid harm to migratory birds, their eggs and nests, including mitigation measures described above. The proponent would implement the follow-up program during all phases of the Project. As part of the implementation of the follow-up program, the proponent would: <ul style="list-style-type: none"> ○ Monitor use of on-site settling sumps, ponds, the tailings management facility, and other water management structures containing contact water for use by migratory birds; and ○ Monitor migratory bird collisions with vehicles and Project infrastructure. • The proponent would develop, prior to construction and in consultation with NLG a follow-up program to assess the effectiveness of the progressive reclamation activities, including the establishment of plant species native to the Project area and suitable to create habitat for migratory birds, listed species at risk, and species of interest to Indigenous people.
Current use of lands and resources for traditional purposes by Aboriginal peoples	<ul style="list-style-type: none"> • Prohibit public access to the access and haul roads during all phases of the Project. • Provide access to the Bitter Creek valley through use of the access and haul roads, during all phases of the Project, to Nisga’a citizens to exercise rights under the <i>Nisga’a Final Agreement</i> to the extent that such access is safe. The proponent would consult with NLG prior to construction to identify the manner by which the

Valued Component	Mitigation Measures, Monitoring and Follow-up
	<p>proponent would provide this access. The proponent would notify NLG in a timely manner if the proponent must prohibit access temporarily for safety reasons.</p> <ul style="list-style-type: none"> • Provide access to the Bitter Creek valley through use of the access and haul roads, during all phases of the Project, to Tsetsaut/Skii km Lax Ha and Métis Nation B.C. for practicing traditional activities, to the extent that such access is safe. The proponent would consult with Tsetsaut/Skii km Lax Ha and Métis Nation B.C. prior to construction to identify the manner by which this access will be provided. The proponent would notify Tsetsaut/Skii km Lax Ha and Métis Nation B.C. in a timely manner if the proponent must prohibit access temporarily for safety reasons. • Prohibit Project employees and contractors from fishing and hunting in the Bitter Creek valley during all phases of the Project unless the proponent provides access to an employee or contractor in accordance with the above. • Identify, prior to construction and in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities, time periods during which construction activities may not be carried out to protect wildlife during sensitive life stages including for mountain goat, grizzly bear, moose, hoary marmot, marten and wolverine. In doing so, the proponent would: <ul style="list-style-type: none"> ○ Apply B.C.'s <i>Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia</i> when identifying these time periods; ○ Notify, prior to construction, the Agency of these time periods and of the areas within which each of these time periods would apply; and ○ Conduct construction activities during these time periods, unless not technically feasible. • If construction during time periods referred to above is not technically feasible, the proponent would develop and implement additional mitigation measures, in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities to protect mountain goat, grizzly bear, moose, hoary marmot, marten, and wolverine during construction. In doing so, the proponent would: <ul style="list-style-type: none"> ○ Develop and implement additional mitigation measures, including species-specific non-disturbance setback distances around habitat features used by each species for critical life functions, to protect wildlife during sensitive life stages. The proponent would apply B.C.'s <i>Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia</i> when developing the setback distances; and ○ Notify the Agency of the additional mitigation measures referred to above prior to implementation, including the setback distance identified for each species, the habitat feature(s) and construction

Valued Component	Mitigation Measures, Monitoring and Follow-up
	<p>activity(ies) applicable to each setback distance and the period(s) of time during which each setback distance would be applied.</p> <ul style="list-style-type: none"> • Avoid helicopter overflights and blasting disturbance within two kilometres of grizzly bear known denning sites and identified denning habitat, unless required for safety reasons. <ul style="list-style-type: none"> ○ If overflight or blasting is required for safety reasons within two kilometres of known denning sites of identified denning habitat during critical periods for denning grizzly bears (October 1 to end of winter conditions), the proponent would keep a line-of-sight distance of 500 metres from known denning sites and identified potential denning habitat. • Avoid helicopter overflights within two kilometres or with less than a 500 metre absolute altitude from the mountain goat ungulate winter range, unless required safety reasons. • Avoid surface blasting, including for avalanche control purposes if the proponent observes mountain goat within one kilometre of the blast area, unless required for safety reasons. • During all phases of the Project, manage snow bank height along the access and haul roads to create and maintain escape pathways at periodic distances to allow ungulates to exit the plowed roads in winter. • Install and maintain, during all phases of the Project, wildlife crossing signs along the access and haul roads. • Avoid use of salt for de-icing or traction control on the access and haul roads during all phases of the Project, unless all other methods used for de-icing or traction control purposes do not meet safety requirements. • Manage vegetation height and composition along the access and haul roads to increase sight lines for drivers and visibility of wildlife during all phases of the Project. • Reclaim the access and haul roads at the end of decommissioning, unless otherwise required by NLG or relevant authorities. <p>Monitoring and Follow-up</p> <ul style="list-style-type: none"> • Develop, prior to operation and in consultation with NLG, a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertain to mountain goat. As part of the implementation of the follow-up program, the Proponent would: <ul style="list-style-type: none"> ○ Conduct mountain goat population surveys once every three years starting during the first year of operation; and ○ Develop the methodology for the surveys in consultation with NLG prior to the implementation of the

Valued Component	Mitigation Measures, Monitoring and Follow-up
	follow-up program.
Health and socio-economic conditions of Aboriginal peoples	<p>Mitigation measures</p> <ul style="list-style-type: none"> • Mitigate, during all phases of the Project, emissions of fugitive dust and particulate matter, including through point source emission control measures and improvement and treatment of unpaved road surfaces. • Establish a speed limit of no more than 50 kilometres per hour on the access and haul roads and require employees and contractors associated by the Project to abide by those limits. • Ensure, during all phases of the Project, that noise generated by the Project does not exceed the background noise level of 35 decibels at the boundary of the local study area identified by the Proponent in figure 8.3-1 of the EIS. <p>Monitoring and Follow-up</p> <ul style="list-style-type: none"> • Develop, prior to construction and in consultation with NLG and relevant authorities, a follow-up program to verify the accuracy of the EA as it pertains to adverse environmental effects on the health of Indigenous peoples caused by changes in concentrations of contaminants of potential concern in air, water, soil, vegetation, and fish. As part of the development of the follow-up program, the proponent shall identify the species of plants and fish exposed to these contaminants that the proponent must monitor. The proponent would implement the follow-up program during all phases of the Project. As part of implementation of the follow-up program, the proponent would: <ul style="list-style-type: none"> ○ Conduct baseline sampling, prior to construction, for contaminants of potential concern in soil, water, plant tissue, and fish tissue. In doing so, the proponent would co-locate soil sampling from the root zone with plant tissue sampling and would co-locate water sampling with fish sampling in order to establish site-specific bioconcentration factors; ○ Monitor air concentrations of nitrogen dioxide, ozone, sulfur dioxide, particulate matter (PM_{2.5} and PM₁₀), and total suspended particulate), and metals in dustfall at the nearest open air location to where maximum concentrations are predicted to occur; ○ Monitor contaminants of potential concern in soil, water, vegetation and fish. In doing so, the proponent would co-locate soil sampling from the root zone with plant tissue sampling and would co-locate water sampling with fish sampling; and ○ If the results of sampling and monitoring indicate that concentrations of contaminants of potential concern exceed those predicted during the EA, the proponent would update the human health risk assessment using

Valued Component	Mitigation Measures, Monitoring and Follow-up
	<p>the site-specific bioconcentration factors, and the sampling and monitoring results referred to above. In doing so, the proponent would assume that 100 percent of all contaminants of potential concern from country foods are absorbed.</p> <ul style="list-style-type: none"> • Develop, prior to construction and in consultation with NLG and relevant authorities, and implement, during all phases of the Project, a plan to communicate the results of the follow-up program to NLG and relevant authorities. The communication plan would include procedures to communicate any update to the human health risk assessment and potential associated health risks in plain language, and the modified or additional mitigation measures implemented.
Physical and cultural heritage, or historical, archaeological, paleontological or architectural sites or structures	<ul style="list-style-type: none"> • Develop, prior to construction and in consultation with NLG and relevant authorities, a chance find protocol for any previously undiscovered structures, sites, or things of historical, archaeological, paleontological, or architectural significance or physical or cultural heritage resources discovered within the Project area. As part of the chance find protocol, the proponent would: <ul style="list-style-type: none"> ○ Immediately halt work at the location of the discovery; ○ Delineate an area of at least 30 metres around the discovery as a no-work zone. The no-work zone requirement shall not apply to action(s) required to be undertaken to protect the integrity of the discovery; ○ Inform the Agency and NLG within 24 hours of the discovery, and allow NLG to monitor archaeological works; and ○ Consult with NLG and relevant authorities, on the manner by which to comply with all applicable legislative or legal requirements and associated regulations and protocols respecting the discovery, recording, transferring and safekeeping of previously unidentified structures, sites or things of historical, archaeological, paleontological or architectural significance.
Other measures	
Species at risk	<p>Mitigation measures</p> <ul style="list-style-type: none"> • Identify, prior to construction and in consultation with relevant authorities, time periods during which construction may not be carried out to protect western screech owl, northern goshawk, little brown myotis, northern myotis, and western toad during sensitive life stages. In doing so, the proponent would: <ul style="list-style-type: none"> ○ Apply B.C.'s <i>Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia</i> when identifying these time periods;

Valued Component	Mitigation Measures, Monitoring and Follow-up
	<ul style="list-style-type: none"> ○ Notify the Agency, prior to construction, of these time periods and of the areas within which each of these time periods would apply prior to construction; and ○ Conduct construction during these time periods, unless not technically feasible. ● If construction during time periods referred to above is not technically feasible, the proponent would develop conduct pre-clearing surveys and develop and implement additional mitigation measures to protect western screech owl, northern goshawk, little brown myotis, northern myotis, and western toad during construction. In doing so, the proponent would: <ul style="list-style-type: none"> ○ Develop, in consultation with relevant authorities, and implement species-specific non-disturbance setback distances around habitat features used by each species for critical life functions and identified through pre-clearing surveys. The proponent would apply B.C.'s <i>Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia</i> when identifying these setback distances; and ○ Notify the Agency of the additional mitigation measures prior to implementation, including the setback distance identified for each species, the habitat feature(s) and construction activity(ies) applicable to each setback distance and the period(s) of time during which each setback distance would be applied. ● Construct and maintain, during all phases of the Project, wildlife tunnels and fencing along the access and haul roads to allow passage of western toad beneath the roads as close as possible to existing migration corridors, taking into account B.C.'s <i>Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia</i>. <p>Monitoring and Follow-up</p> <ul style="list-style-type: none"> ● Develop, prior to construction and in consultation with relevant authorities, a follow-up program to verify the accuracy of the EA and determine the effectiveness of mitigation measures to avoid harm to listed species at risk, including mitigation measures identified above. The proponent would implement the follow-up program during all phases the Project. As part of implementation of the follow-up program, the proponent would: <ul style="list-style-type: none"> ○ Monitor the use of habitat features, including nests, hibernacula and roosts, by western screech owl, northern goshawk, little brown myotis, and northern myotis; ○ Monitor western usage of the wildlife tunnels; and ○ Monitor ventilation shafts, portal entrance, tailings management facility, and open waterbodies for use by listed species at risk.
Accidents and	<ul style="list-style-type: none"> ● Take all reasonable measures to prevent accidents and malfunctions that may result in adverse environmental

Valued Component	Mitigation Measures, Monitoring and Follow-up
malfunctions	<p>effects.</p> <ul style="list-style-type: none"> • Prior to construction, consult with NLG and relevant authorities on measures to be implemented to prevent accidents and malfunctions. • Prior to consultation and in consultation with NLG, develop an accidents and malfunctions response plan in relation to the Project. The accidents and malfunctions plan would include: <ul style="list-style-type: none"> ○ The types of accidents and malfunctions that may cause adverse environmental effects; and ○ The measures to be implemented in response to each type of accident and malfunction to mitigate any adverse environmental effects caused by the accident or malfunction. • In the event of an accident and malfunction with the potential to cause adverse environmental effects, the proponent would immediately implement measures appropriate to the accident and malfunction response, and would: <ul style="list-style-type: none"> ○ Notify, as soon as possible, NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities of the accident or malfunction, and notify the Agency in writing no later than 24 hours following the accident or malfunction. For the notification to NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and the Agency, the proponent would specify: <ul style="list-style-type: none"> ▪ The date the accident of malfunction occurred; ▪ A summary description of the accident or malfunction; and ▪ A list of any substances potentially released into the environment as a result of the accident or malfunction. ○ Submit a written report to the Agency no later than 30 days after the day on which the accident or malfunction occurred. The written report would include: <ul style="list-style-type: none"> ▪ A detailed description of the accident or malfunction and its adverse effects; ▪ A description of the measures that were taken to mitigate the adverse environmental effects caused by the accident or malfunction; ▪ Any views from NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities received with respect to the accident and malfunction, its adverse environmental effects and the measures taken by the proponent to mitigate these environmental effects; ▪ A description of any residual adverse effects and any modified or additional measures required by the

Valued Component	Mitigation Measures, Monitoring and Follow-up
	<p>proponent to mitigate residual adverse environmental effects; and</p> <ul style="list-style-type: none"> ▪ Details concerning the implementation of the accident and malfunction response plan referred to above. ○ Submit a written report to the Agency no later than 90 days after the day on which the accident or malfunction took place, that includes a description of the changes made to avoid a subsequent occurrence and the modified or additional measure(s) implemented by the proponent to mitigate and monitor residual effects and to carry out any required progressive reclamation. The report would also include all additional views from NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C., and relevant authorities received by the proponent. • Develop a communication plan, in consultation with NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C. The proponent would develop the communication plan prior to construction and would implement and keep it up to date during all phases of the Project. The plan would include: <ul style="list-style-type: none"> ○ The types of accidents and malfunctions requiring the proponent to notify each of NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C.; ○ The manner by which NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. would be notified of an accident and malfunction and any opportunities for NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. to assist in the response to the accident or malfunction; and ○ The contact information of representatives of the proponent that NLG, Tsetsaut/Skii km Lax Ha, and Métis Nation B.C. may contact and the representative of each of NLG, Tsetsaut/Skii km Lax Ha, Métis Nation B.C. to which the proponent provides notification.
Independent environmental monitor	<ul style="list-style-type: none"> • Prior to construction, retain the service of an independent environmental monitor, who is a qualified individual as it pertains to environmental monitoring of mining projects in B.C., to observe, record, and report on the implementation of the mitigation measures. • The proponent would, through contract, give the independent environmental monitor the authority to stop Project activities that do not comply with the mitigation measures. • The proponent would require the independent environmental monitor to prepare monthly reports that include: <ul style="list-style-type: none"> ○ A description, including through photo evidence, of the Project activities that occurred and the mitigation measures that were applied during the period covered by the report; and • A description, including through photo evidence, of occurrence(s) of non-compliance related to the

Valued Component	Mitigation Measures, Monitoring and Follow-up
	<p>implementation of mitigation measures observed during the period covered by the report, including</p> <ul style="list-style-type: none"> ▪ The date of the occurrence(s) of non-compliance; ▪ Whether Project activities were stopped as a result of the occurrence(s) of non-compliance; ▪ How the occurrence(s) of non-compliance was or were corrected and the date that the corrective action(s) was or were completed; and ▪ If any, the status of pending occurrence(s) non-compliance that have not been corrected yet by the proponent, and a description of any adverse environmental effect(s) associated with the occurrence(s) of non-compliance. <ul style="list-style-type: none"> • The proponent would require the independent environmental monitor to provide the reports to the Agency, NLG, and relevant authorities within 10 days of their production. The proponent would require the independent environmental monitor to retain the reports referred to above until the end of decommissioning. • The proponent would require the independent environmental monitor to report all occurrence(s) of non-compliance observed by the independent environmental monitor directly to the Agency, NLG, and relevant federal authorities within 48 hours of the observation of the occurrence(s) of non-compliance.

Appendix D Mitigation Measures, Monitoring, and Follow-up Activities Proposed by the Proponent

The proponent has committed to implementing a number of mitigation measures to reduce adverse effects from the Project. The following table presents the mitigation measures committed to by the proponent that are relevant to the federal EA process. This table is provided for informational purposes only; key mitigation measures are described in Appendix C.

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
Fish and fish habitat	<p>Mitigation measures</p> <p><u>Mitigation measures for change in water quality and quantity</u></p> <ul style="list-style-type: none"> • The use of potentially acid generating material for construction will be minimized • Metal leaching/acid rock drainage will be managed by submerging tailings in the tailings management facility, and by flooding the underground workings at closure • Hazardous materials (e.g., used batteries, petroleum product containers, grey water and sewage, contaminated soil or snow) will be handled, stored, transported, and disposed in accordance with the <i>Transportation of Dangerous Goods Act</i> • As part of ore processing, cyanide destruction will occur in order to keep potentially harmful levels of cyanide from being discharged to the receiving environment • Cyanide will be used in a manner consistent with the International Cyanide Management Code (International Cyanide Management Institute). Cyanide will only be used to recover gold and the process plant will incorporate cyanide detoxification prior to release to the tailings management facility. Cyanide-containing effluent will be analyzed and treated as required prior to discharge to the receiving environment to ensure cyanide concentrations are below maximum authorized limits • Infrastructure will be located, whenever feasible, on competent bedrock or appropriate base material that will limit permeability and transport of potentially poor quality water into freshwater • Contact water will be intercepted and routed to on-site settling sumps, ponds, or the tailings management facility and will be analyzed and treated as required • The tailings management facility has been designed with an impermeable liner to limit seepage to the receiving environment

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<ul style="list-style-type: none"> • The tailings management facility basin and stage 1 raise will be fully lined before operations to limit seepage. During closure, the tailings management facility will be covered with a geomembrane liner and soil cover to limit infiltration and the ingress of oxygen • Oily water treatment separators at equipment maintenance facilities will be used to minimize water and surface hydrocarbon contaminants • Hydraulic plugs will be installed and the underground will be flooded on closure to prevent continued geochemical reactivity of the fractured zone and backfilled material • As the mine is being backfilled during operations, some waste rock will be cemented as Cemented Rock Fill (CRF) and the talus backfill will be mixed with lime to reduce metals and acidity loading from the backfill • The process plant has been designed to use reclaimed water from the tailings management facility, thereby reducing the amount of water required from local natural surface waters • Water will be recycled / reused where possible • Water withdrawal will remain within limits specified in applicable authorizations and permits to avoid adverse impacts to streamflows, fish and fish habitat • Facilities will be designed to prevent and contain chemical/fuel/oil spillage • A spill response procedure will be developed as part of the spill contingency plan including both internal (IDM) and external (regulatory agencies) reporting requirements • Discharge from the tailings management facility to Bitter Creek will be staged to the extent possible to match the receiving environment hydrograph • Culverts will be appropriately sized to individual stream crossings and maintained to ensure unimpeded passage • Clean, non-contact catchment water will be diverted away from the tailings management facility and other project infrastructure to maintain water quality and natural drainage networks as much as possible • The primary mining method being employed is longhole stoping utilizing waste rock and cemented rock fill as structural backfill. The mining and backfilling will be designed such that interaction with the hydraulic regime is minimized. Surface disturbance by mining will be limited to the upper portal, lower portal, and vent portal. Waste rock and ore will be temporarily stored on surface in stockpiles • In order to prevent significant sulphide oxidation under temporary tailings management facility closure

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<p>circumstances, the tailings pond will be managed to maximized coverage of the tailings surface area by the pond</p> <ul style="list-style-type: none"> • The volume of water in the tailings pond will be managed to ensure sufficient water is available throughout periods of low flow and during winter months to maintain the reclaim rate to the process plant, to monitor flows in and out of the system, and to minimize freshwater withdrawal from Bitter Creek • Should ice buildup affect the tailings management facility liner, mitigation measures will be investigated and may include altering the deposition strategy to ensure a layer of tailings exists on the tailings management facility basin liner around the entire facility • Additional surface water toxicity testing will be completed and include long-term toxicity tests on sensitive invertebrate species that measure endpoints like reproduction • Sediment toxicity testing will be completed prior to construction <p><u>Mitigation measures for erosion and sedimentation</u></p> <ul style="list-style-type: none"> • Sediment and sediment laden water near waters frequented by fish will be managed according to the Erosion and Sediment Control Plan • Erosion potential will be reduced by conducting sensitive work during periods of low runoff as much as possible • Exposed landscape surfaces will be protected, where practicable, by the installation of covering material like riprap, aggregate, or rolled erosion control products • Excavations will follow the requirements outlined in the Health, Safety and Reclamation Code for Mines in BC, specifically for locating utilities, cut slope angles, shoring (if required), access procedures, barriers and stockpile setbacks • The length and steepness of disturbed slopes will be limited to minimize runoff energy • Temporary water management structures, which may include ditches, ponds and sumps, will be developed to manage surface water during construction, prior to the development of permanent water management structures • Sediment loading in runoff will be minimized by the application of measures to intercept total suspended solids before it reaches the freshwater environment. Sediment control measures may include: Setbacks to preserve riparian zones; installation of synthetic permeable barriers, fibre rolls, and/or silt fences as required;

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<p>installation of check dams, gabions, and sediment basins to reduce flow velocities and encourage sediment deposition; and locating stockpiles above the high water mark of watercourses</p> <ul style="list-style-type: none"> • The area of landscape disturbance will be minimized and ecosystem-based revegetation and progressive reclamation will occur where practical to minimize erosion potential, introduction of invasive plants, and to facilitate initiation of successional ecological processes • Seeding will utilize non-forage vegetation species, native to the region, for roadside sediment and erosion control • Stockpile berms will be revegetated • Roots and groundcover will be retained where possible to maintain slope stability and prevent surface erosion • Develop and implement an erosion and sediment control plan for the site that minimizes risk of sedimentation of the water body during all phases of the Project. Traditional sediment control measures, such as sediment fences, silt booms and silt curtains are not anticipated because the sediment load in Bitter Creek is extremely high, causing such measures to be unmanageable • Shoreline or banks disturbed by any activity associated with the road construction will be stabilized to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site <p><u>Mitigation measures for habitat loss</u></p> <ul style="list-style-type: none"> • Instream work will be conducted during periods of lowest risk to fish and wildlife species and habitat where practicable • The duration of any instream works will be minimized to reduce disturbance of riparian vegetation at stream crossings • Efforts will be made during the final design stage to have the right-of-way cross each stream as close to perpendicular as possible to minimize the amount of riparian vegetation that may need to be disturbed during construction • All temporary works, silt curtains, construction material or debris, etc. will be completely removed from the waterway when work is completed • With the exception of machine fording, vehicular access across a watercourse will be by road or bridge, or

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<p>other acceptable method</p> <ul style="list-style-type: none"> • Where practicable, machinery fording a watercourse to bring equipment required for construction to the opposite side will be limited to a one-time event (over and back) and should occur only if an existing crossing at a nearby location is not available or practical to use • Infrastructure (including the access road) should be designed to minimize the footprint of disturbance in order to minimize habitat loss for fish and wildlife. Whenever possible Project roads and road embankments will be constructed in a manner to minimize the potential to act as physical barriers or filters to wildlife movement, these include the following: Minimizing the number of tributary crossings; Ensuring that crossings are sized appropriately to reduce flow restrictions; Avoiding crossing higher quality habitat where practicable designing crossings perpendicular to tributaries • Setback and buffer distances from surface watercourses and riparian features will be implemented and maintained • Adverse effects will be minimized to terrestrial ecosystems that depend on hydrological connectivity and flow through management by ensuring free passage of water through fill materials (i.e. using clear span bridges, ditches or culverts) • Riparian areas will be managed per the legislated reserve and/or management zone setbacks and work practices established under the B.C. <i>Forest & Range Practices Act</i>, where feasible • Instream work will be conducted during low-flow periods, when possible, and in areas where no spawning habitat occurs • Contain and stabilize waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high-water mark of nearby water bodies to prevent re-entry • Minimize clearing of riparian vegetation • The removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the water body below the ordinary high-water mark will be minimized. If material is removed from the water body, it will be set aside and returned to the original location, once construction activities are completed. • Riparian vegetation at or under the road/powerline right-of-way will be managed in accordance with Approved Work Practices for Managing Riparian Vegetation (BC Hydro)

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<ul style="list-style-type: none"> • The bed and banks of Bitter Creek will be restored to their original contour and gradient, where applicable. If the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage will be restored. • Where replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, appropriately-sized, clean rock will be used and installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment <p><u>Mitigation measures for direct mortality</u></p> <ul style="list-style-type: none"> • Where pumps are used in fish-bearing watercourses or where fish salvage has not occurred, the intakes will be screened in accordance with the Fresh Water Intake End of Pipe Screening Guideline (DFO), e.g., screens with openings no larger than 2.54 mm. Outlets will have a diffuser or be located in an area not subject to erosion from outflows • Fishing and hunting by Project employees, contractors and consultants will be prohibited within Red Mountain Project footprint • All in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows, or result in the stranding or death of fish <p><u>Mitigation measures for explosives</u></p> <ul style="list-style-type: none"> • Explosives will be stored on-site in an approved Explosive Magazine during operations • Measures will be implemented to prevent or avoid the destruction of fish, or any potentially harmful effects to fish habitat, when using explosives in or around water frequented by fish • Blasting activities and handling of explosives during road construction will avoid spillage and minimize ammonium blasting residue to lower potential for ammonium contamination • All blasts will be prepared and charge holes fired in proper sequence by a person with a blasting certificate, as per industry standards and Health, Safety and Reclamation (HSR) Code for Mines in BC (2017) requirements <p><u>Mitigation measures for petroleum products</u></p> <ul style="list-style-type: none"> • Fuel will be stored on-site in a double walled tank • All mobile equipment will be inspected as required (minimum once per shift) by the operator for potential leaks • Any machinery identified as having the potential to result in a fluid release or leak will be repaired prior to

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<p>use</p> <ul style="list-style-type: none"> • Refueling will occur at a refueling point with drainage capture/collection installed. In the event that refueling occurs elsewhere, drip trays will be used under vehicles and equipment • Refueling and maintenance activities will not occur within 15 metres of a watercourse or waterbody except where required due to equipment breakdown or approved activities near water • The fuel tanks, hazardous materials storage area, and the explosives magazine(s) will be designed and constructed to minimize leaks and spills reaching freshwater environment <p>Monitoring and follow-up activities</p> <ul style="list-style-type: none"> • Monitoring of reclaimed riparian areas will be conducted periodically to ensure they are revegetated • Excess water from the underground workings and the tailings management facility to be discharged to the receiving environment will be monitored. Treatment will be undertaken if necessary to ensure water quality meets regulatory requirements • An Aquatic Effects Management and Response Plan (AEMRP) will be in place that outlines the aquatic effects management and response to be carried out during all phases of the Project • The generation of ML/ARD conditions and sulphidic oxidation will be monitored through performance monitoring of the tailings management facility which includes water quality and effluent monitoring downstream of the tailings management facility. These techniques and others will be evaluated as part of the reclamation research programs during the operating life of the mine, which are a requirement of the <i>Mines Act</i> permit for B.C. • Regular inspections will be conducted to ensure drainage, erosion, and sediment control measures are effective and functioning properly; all necessary repairs and adjustments will be conducted in a timely manner • Inspections of water management facilities will be scheduled and conducted to ensure they are functioning properly and as intended • Additional benthic baseline tissue data will be collected prior to construction/operations • As part of monitoring under the <i>Metal Mining Effluent Regulations</i>, end of pipe acute toxicity testing will be required for discharges, as well as chronic (sublethal) toxicity testing in the receiving environment • Monitoring and treat tailings management facility seepage until such a point that the collected tailings

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<p>management facility seepage meets BC Water Quality guidelines and Metal Mining Effluent Regulations for discharge quality.</p> <ul style="list-style-type: none"> • Cyanide will be included in the list of water quality parameters to be monitored as part of the AEMP • During operations, water quality from the underground mine will be monitored for a full suite of parameters on a weekly basis, including: anions, nutrients, total organic carbon, dissolved organic carbon, and total and dissolved metals. It is anticipated that the results would be periodically compared to the water quality predictions for the underground mine. If the results show substantial deviations from the predicted values, further investigation of specific sources within the underground mine would be initiated to understand whether further mitigation measures are required. Further details on monitoring and adaptive management plans will be provided in the <i>Mines Act</i> permit application • During the post-closure phase, monitoring of surface water quality is expected to continue at the mine site • Analytical results generated from baseline and subsequent collections of water, sediment, and benthic invertebrate and fish tissue will be evaluated according to Se implementation guidance provided in the B.C. MOE Companion Document to: Ambient Water Quality Guidelines for Selenium Update (BCMOE 2014b) • IDM will collect various media (i.e., sediment, benthic tissue (i.e., at Goldslide Creek only), fish tissue) prior to the commencement of mining operations. These baseline data will be used to support comparisons to predictions and future results from the Aquatic Environmental Monitoring Program (AEMP) • A Selenium Management Plan will be developed and implemented by IDM • The cyanide destruction process will be monitored
Migratory birds	<p>Mitigation measures</p> <p><u>Mitigation measures for sensory disturbance</u></p> <ul style="list-style-type: none"> • Vegetation clearing and construction activities will be timed to avoid sensitive habitats during sensitive periods for wildlife valued components (e.g. mountain goat, grizzly bear, marmot, and migratory birds) whenever possible. If construction cannot be scheduled outside of sensitive periods for wildlife valued components, a Qualified Environmental Professional will conduct species-specific pre-clearing surveys within suitable habitat, and site specific procedures will be developed • Employees will be educated to assess and adaptively manage driving activities during crepuscular hours (i.e., dawn and dusk), which are periods of high wildlife activity

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<ul style="list-style-type: none"> • Harassing, approaching, or otherwise interfering with wildlife will be prohibited, such as chasing wildlife with a motorized vehicle • IDM will clearly mark known wildlife habitat features or sensitive areas, including appropriate no-disturbance buffers, on site plans and in the field <p><u>Mitigation measures for direct mortality, and habitat loss or alteration</u></p> <ul style="list-style-type: none"> • Powerlines will be designed and situated following guidelines for bird protection to minimize strikes and electrocutions. Measures will be taken to discourage birds, particularly raptors, from nesting on power poles • A species-specific buffer will be employed around all probable or actual nest sites that are detected during pre-clearing nest surveys or on infrastructure. Species specific buffers will be selected using guidance from General Nesting Periods of Migratory Birds in Canada (ECCC). These nests will be monitored until the young have fledged or the nest is abandoned. The minimum buffer distance of 30 m will be utilized wherever practicable as determined by a Qualified Environmental Professional, assuming Project operability <p><u>Mitigation measures for attractants</u></p> <ul style="list-style-type: none"> • Deterrents (e.g., noise makers, wire barricades) will be used as necessary to discourage wildlife from entering the tailings management facility, ponds, onsite setting sumps, and other Project infrastructure for refuge, shelter, nesting, or roosting opportunities and potentially becoming entrapped • A policy of no feeding and no intentional attraction of wildlife will be developed, disseminated to all Project and contractor employees during employee orientation, and enforced <p>Monitoring and follow-up activities</p> <ul style="list-style-type: none"> • The tailings management facility will be monitored for use by migratory birds • Appropriately trained personnel will monitor and evaluate human-wildlife conflicts carefully using the protocol for human-wildlife interactions to determine whether an animal should be considered a problem animal and appropriate course of action will be implemented • The implementation of any wildlife deterrents will be monitored regularly during construction and operation, and adaptive management would be undertaken as necessary to address any issues that may arise
Current use of lands and resources for traditional purposes	<p>Mitigation measures</p> <ul style="list-style-type: none"> • IDM will develop, in consultation with appropriate parties, an Access Management Plan to limit access to the Project area. The Access Management Plan will consider individuals' safety with respect to an active mining

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<p>project; individuals' Aboriginal and treaty rights in the Project area; existing tenured or licensed activities in the Project area; and existing recreational values in the Project area.</p> <ul style="list-style-type: none"> • Pre-construction surveys will be conducted to delineate relevant boundaries of the B.C. Conservation Data Centre listed ecosystems and the location of B.C. Conservation Data Centre listed ecosystems will be communicated to ground crews. "No work" zones and/or buffers will be delineated accordingly, where feasible. • A Vegetation and Ecosystems Management Plan will be implemented, including the following measures where practicable: conduct pre-construction invasive plant surveys within the Project footprint to determine the presence/absence of invasive plants; remove existing invasive plant populations to prevent the spread to adjacent areas; and establish an early detection, inventory, control, and monitoring and follow up program. • The area of landscape disturbance will be minimized and ecosystem-based revegetation and progressive reclamation will occur where practical to minimize erosion potential, introduction of invasive plants, and to facilitate initiation of successional ecological processes • The clearing of vegetation and soil will be minimized to the extent possible, and avoided where practicable for unique features identified by Qualified Environmental Professionals, including wetlands, exposed bedrock, cliffs etc. • Ensure that a qualified environmental monitor, capable of identifying rare plants and lichens is on site (at the clearing location) during vegetation-clearing activities in known rare plant habitat • Removal of alpine and parkland, old and mature forest, wetland, floodplain, and BC CDC listed ecosystems will be minimized through Project design and avoided if possible • Construction activities will minimize risk to old and mature forest wildlife habitat, such adhering to sensitive periods, specific guidelines, and applicable legislation for wildlife species of concern that use old and mature forest • Implement ecosystem-based revegetation and progressive reclamation promptly to minimize introduction of invasive plants and to facilitate initiation of successional ecological processes • Rare plant protection and management measures will include the following, where practicable: avoid surface disturbance in areas with known rare plant and lichen populations; avoid use of all herbicide sprays within 200 metres of rare plant and lichen populations and limit such use to direct application; create exclusion zones around rare plant and lichen habitats to minimize effects related to surface clearing, fugitive dust, and

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<p>invasive plant introduction</p> <p>Monitoring and follow-up activities</p> <ul style="list-style-type: none"> • Monitoring of reclaimed areas will be conducted periodically to ensure they are revegetated and results will be incorporated into annual reclamation reports • Closure plans for reclaimed areas will be developed to establish site conditions that allow for realistic and operationally feasible ecological goals that take into consideration ecosystem function and wildlife habitat objectives
<p>Health and socio-economic conditions of Indigenous peoples</p>	<p>Mitigation measures</p> <p><u>Mitigation measures for air quality – human health</u></p> <ul style="list-style-type: none"> • Underground mining will result in significant reductions in Project disturbance areas and emissions, such as from fuel burned during excavating and hauling waste rock, and blasting underground • Dust suppression methods (i.e. wetting work areas and storage piles, installing equipment covers, and using dust hoods and shields), including water or other dust suppressant on roads to minimize dust from ore and waste rock haulage and grading, will be used as needed and when ambient air temperatures permit • Windbreaks or fence will be installed where practicable around known problem areas or stockpiles to limit the dispersion of dust emissions from equipment and stockpiles, or activities likely to generate dust • Stockpiles and storage areas will be designed and managed to minimize emission of dust • The road design has been optimized to minimize the distance travelled, which will reduce noise, dust, and emissions associated with construction and operation • Vehicles will be driven at designated speeds on Project roads, to limit dust generation • Roads will be regularly maintained and kept in good repair • Tailings disposal methods have been designed to reduce beach/dust sources and generation. The operational tailings pond volume in the tailings management facility will be managed to ensure that the beaches are saturated, which will reduce the potential for dust generation • Use of vapour recovery units at fuel and chemical storage tanks will be implemented • Where practicable, low emissions equipment that meets the latest applicable Canada emissions standards and guidelines will be selected

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<ul style="list-style-type: none"> • Equipment will be properly maintained. Equipment logbooks should be maintained for each vehicle and inspections, maintenance and service records will be recorded as per the Health, Safety and Reclamation Code for Mines in B.C. • Equipment will be turned off when not in use, where practical, to avoid unnecessary idling of motors • The ventilation systems for the underground mine will be designed to dilute and remove dust, diesel emissions, and blasting fumes, and will maintain compliance with BC mine regulations • The number of trips for ore and waste rock transport will be minimized along the haul road • Cyanide will be used as part of mineral processing to leach gold and silver into solution and for adsorption of the precious metals onto activated carbon. Management strategies will be implemented to prevent the creation of hydrogen cyanide gas • Apply water sprays and/or dust suppressants when dusty conditions are visibly present and where dustfall monitoring determines suppression is required • Training and instruction will be provided to all on-site staff with duties related to the operation of equipment that emit air pollutants, generate dust, or controls air emissions (e.g., the required measures to be implemented during start-up, shut down, and emergency conditions) <p><u>Mitigation measures for noise – human health</u></p> <ul style="list-style-type: none"> • All mobile and stationary engines will have regular servicing to maintain efficiency • Equipment will be fitted with appropriate mufflers and silencers that meet manufacturers' recommendations for optimal attenuation • During operation, impulse events, such as blasting, will be limited to certain times of the day. Instantaneous charge per delay will be minimized to suit blast • Underground mining will result in significant reductions in noise emitted by the Project for excavating and hauling waste rock <p>Monitoring and follow-up activities</p> <ul style="list-style-type: none"> • The need for any corrective actions to on-site emission management or installation of additional control measures in relation to air quality or dust will be determined on a case-by-case basis. Indications of the need for corrective actions and additional control measures may include: If monitoring data shows exceedances of applicable standards; If monitoring data shows an increasing trend in contaminant concentrations; and If

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<p>issues are raised by on-site staff, regulators or local communities.</p> <ul style="list-style-type: none"> • A noise monitoring program will be incorporated into the Noise Abatement Plan and will be undertaken to assess the magnitude of noise impacts from Project activities.
Physical or cultural heritage and historical, archaeological, paleontological or architectural sites or structures	<p>Mitigation measures</p> <ul style="list-style-type: none"> • IDM will implement a cultural and heritage resources chance find procedure, which outlines the actions and communications to be undertaken should previously unknown archaeological, paleontological, heritage, and cultural resources be discovered
Species at risk	<p>Mitigation measures</p> <p><u>Mitigation measures for sensory disturbance</u></p> <ul style="list-style-type: none"> • Directed / focused lighting will be used where possible rather than broad area lighting to minimize sensory disturbance to wildlife. Timer systems will be considered, where appropriate, to limit light disturbance and reduce power consumption. Light in non-essential areas will only be used when necessary without compromising worker safety. Types of illumination should be light-emitting diode (LED) if possible since they produce little heat and have more focused light spectrums that are less appealing to insects and thus do not attract bats. • Where practical, and not a risk to human safety, a stop work policy will be implemented when wildlife in the area may be endangered (i.e. risk of physical injury or death) by the work being conducted <p><u>Mitigation measures for direct mortality, and habitat loss or alteration</u></p> <ul style="list-style-type: none"> • If migration routes for western toad are identified that cross the access road or haul road, access would be facilitated using drift fences or other means to direct toads through passages such as culverts • Wildlife will be given the right-of-way on all roads at all times • Vegetation along Project road sides will be mowed/brushed as necessary to ensure visibility of animals and reduce the risk of wildlife-vehicle collisions • Measures will be implemented to minimize potential project effects in identified high-quality wildlife habitats and movement corridors, including signage along Project roads in high-value wildlife areas or known wildlife travel corridors to warn vehicle operators of the potential to encounter wildlife

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<ul style="list-style-type: none"> • Roads will be designed with clear lines of sight to increase the ability of drivers to see wildlife or other hazards • A maximum speed limit of 50 kilometres per hour will be established to minimize risk of wildlife collisions. Speed limits may be reduced in areas with increased grades, sharp corners or limited visibility to minimize the risk of wildlife collisions. • Personal firearms will be prohibited from the Project site • Buildings will be designed and maintained to exclude wildlife • The mine portals and underground workings will be designed to minimize the potential for bats to gain access. Measures will also be taken to reduce the risk of bats gaining access to underground infrastructure, such as tight mesh and use of artificial light and motion. If bats gain access and use the substructure for maternal roosts or hibernacula, adaptive measures will be incorporated for their protection and continued access, and B.C. MFLNRO will be contacted and made aware of the use. • No-disturbance buffers will be established around identified wildlife habitat features (e.g., mineral licks, dens, and bat roosts) during sensitive periods, as per the setback distances identified the Wildlife Management Plan • If blasting is required within a no-disturbance buffer around a sensitive wildlife receptor, a site-specific mitigation plan will be developed • The clearing of vegetation and soil will be minimized to the extent possible, and avoided where practicable for unique features, including wetlands, exposed bedrock, cliffs etc., which often provide high value habitat to wildlife and may support sensitive vegetation communities and growth forms • Closure plans for reclaimed areas will be developed to establish site conditions that allow for realistic and operationally feasible ecological goals that take into consideration ecosystem function and wildlife habitat objectives • Removal of alpine and parkland, old and mature forest, wetland, floodplain, and B.C. Conservation Data Centre listed ecosystems will be minimized through Project design and avoided if possible • Construction activities will minimize risk to old and mature forest wildlife habitat, such adhering to sensitive periods, specific guidelines, and applicable legislation for wildlife species of concern that use old and mature forest

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<ul style="list-style-type: none"> • The design of the access road optimizes the utilization of the existing forestry road to avoid and minimize new disturbance • Pre-construction surveys will be conducted to delineate relevant boundaries of the B.C. Conservation Data Centre listed ecosystems and “no work” zones and/or buffers will be delineated accordingly. • Snow bank height along Project roads will be managed and will include periodic breaks to minimize the potential for roads to act as physical barriers or filters to wildlife movement. Creating escape pathways (i.e., gaps) in snowbanks will allow wildlife (e.g., moose) to exit road areas • Mitigation measures for attractants <ul style="list-style-type: none"> • IDM will develop a no littering policy • General waste will be separated at the source and will be handled, stored, and transported offsite for disposal at an approved facility • Creation of pools attractive to amphibians along roads and within facility areas will be avoided • A waste and wildlife attractant management protocol will be developed as part of the Wildlife Management Plan to ensure wildlife do not have access to temporary on-site waste storage areas, contaminated areas, and attractants • The use of wildlife-attracting dust suppressants will be avoided if possible • The use of salt in traction grit for winter road management will be avoided where practicable • Petroleum products will be stored in holding tanks or closed facilities that exclude wildlife • Additional wildlife exclusion measures may be implemented if waste storage areas are frequently accessed by bears, wolverine, or other wildlife • Monitoring and follow-up activities <ul style="list-style-type: none"> • Reclamation activities will be undertaken and designed to remove barriers and facilitate unobstructed wildlife movement following mine closure • An adaptive management plan specific to the valued component or wildlife species of concern will be developed by a Qualified Environmental Professional and implemented • A facility-specific monitoring program will be included with the Wildlife Management Plan to assess the effectiveness of mitigation measures for minimizing disturbance and effects of the Project on wildlife

Valued Component	Mitigation Measures, Monitoring, and Follow-up Activities
	<ul style="list-style-type: none"> • A focal species monitoring program will be included with the Wildlife Management Plan to monitor Project-related effects on specific wildlife species • Wildlife deterrents, such as fences, noise makers, and wire barricades that aim to discourage wildlife from entering infrastructure that may potentially entrap the animal will be considered as part of a suite of adaptive response measures whereby monitoring and inspection will determine whether additional measures are warranted to exclude wildlife from infrastructure areas or areas identified as a wildlife hazard • IDM will include ongoing wildlife observation/monitoring as part of the Wildlife Management Plan • Deterrents to prevent wildlife from becoming entrapped in on-site settling sumps, ponds, or the tailings management facility • Monitoring for the purposes of adaptive management will include the Bromley Humps area (as part of the wildlife management plan) • IDM will ensure that a research program is designed to test the reclamation and closure plans and to clarify any uncertainties and unknowns
<p><i>Nisga'a Final Agreement</i> Chapter 10, paragraph 8(f)</p>	<p>Mitigation measures</p> <ul style="list-style-type: none"> • Pre-recruitment information sessions will be conducted with Nisga'a Employment Skills and Training and relevant and interested organizations and agencies • Preference will be placed on hiring Nisga'a citizens, as well as citizens of communities within the regional study area for Project-related employment • Potential contracting opportunities will be maximized for Nisga'a citizens and communities within the regional study area for revenue to the local economy • A work program will be developed and implemented for increasing Nisga'a employee retention. Specific activities include: 1) providing a worker schedule that enables individuals to continue to participate in the subsistence economy through land use and harvesting activities; 2) preferential hiring of Nisga'a citizens to maximize the potential gain in mining and other work experience, which in turn promotes the development of human capital in the region; and 3) timely communication of all employment opportunities and related skills requirements

Appendix E Summary of Key Concerns from the Nisga’a Lisims Government, Tsetsaut/Skii km Lax Ha and Métis Nation B.C. Raised During Consultation

Appendix E includes comments received from the Nisga’a Lisims Government, Tsetsaut/Skii km Lax Ha and Métis Nation B.C., and responses provided at the time of the publication of Draft EA Report.

Group	Subject	Comment or Concern	Summary of Proponent’s Response	Agency Response
Overarching concerns				
Nisga’a Lisims Government	Access	<p>NLG expressed the concern that increased access to the Bitter Creek valley may lead to recreational pressure on wildlife, fish and plant resources and may lead to impacts to treaty rights and interests.</p> <p>NLG indicated that the access and haul roads should be both deactivated and rehabilitated as part of Project closure, unless there is another use for the roads.</p>	<p>The proponent committed to establishing a locked, manned gate near the junction of Highway 37A to deter unauthorized entry to the Project. The proponent also committed to develop, in consultation with NLG and other appropriate parties, an access management plan to limit access to the Project area, mitigate the effects of road use on the environment, and ensure appropriate access for Nisga’a citizens to exercise their rights and interests in the Project area. It is expected that most personnel would be housed in accommodation in Stewart and transported to the Project by bus which would limit vehicle traffic. Project road use will be restricted only to persons required for Project construction, operation, and maintenance.</p> <p>The proponent will prohibit employees and contractors from fishing or hunting in the Project area and committed to permanently deactivating the full length of the access road upchain of Clements Lake.</p>	<p>The Agency has assessed the potential effects of the construction and use of the access and haul roads on Nisga’a treaty rights and interests, including access.</p> <p>The Agency is recommending potential conditions which would prohibit public access to the access and haul roads; prohibit employees and contractors associated with the Project from fishing and hunting in the Bitter Creek valley; ensure the proponent, in consultation with NLG, provides Nisga’a citizens with access to the Bitter Creek valley, to the extent that such access is safe; and require the Proponent to reclaim the access and haul roads at the end of decommissioning, unless otherwise required by NLG or relevant authorities.</p>

Group	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
				<p>The Agency concludes that the Project is not expected to have adverse environmental effects on Nisga'a treaty rights and interests.</p>
<p>Accidents and malfunctions</p>				
<p>Nisga'a Lisims Government</p>	<p>Tailings Best Available Technology (BAT) assessment</p>	<p>NLG noted that social and environmental factors may not have been appropriately considered as part of the best available technology (BAT) assessment for tailings.</p>	<p>The proponent's description and characterization of the final five assessed alternatives (i.e. candidates 1 through 5) is presented in section 8.3 of the revised Mine Waste Alternatives Assessment (2018 02 10 Red Mtn-NLG EMPR-Alt Means of Undertaking the Proj and Geotech TMF-Comments 331.2 541.2 to 544.2).</p> <p>The proponent agreed that physical stability of the tailings management facility is a key aspect of an overall evaluation and should have a commensurate high weighting.</p> <p>The proponent noted that the Multiple Accounts Assessment weighted scoring system and sensitivity analyses were developed as per federal and provincial guidelines such that subjectivity and bias towards any one aspect of the design of a tailings management facility is eliminated. Stronger weighting can be applied to accounts, sub-accounts and indicators as part of the sensitivity analyses to allow for value-based judgments to be applied.</p> <p>The proponent noted that through the inclusion of Appendix A2 (2018 02 10 Red Mtn-NLG EMPR-Alt Means of Undertaking the Proj and Geotech TMF-Comments 331.2 541.2 to 544.2), and in an attempt to provide a clearer rationale and justification for the scoring of each indicator for each candidate, a number of candidates had been re-evaluated. This resulted in some changes to the final total weighted scores to the five final candidates. However, the outcome of the assessment was unaffected by these adjustments.</p>	<p>The Agency has assessed the alternative means of carrying out the Project, on Nisga'a treaty rights and interests.</p> <p>Based on a review of the proponent's analysis, the Agency is satisfied that the proponent has sufficiently assessed alternative means of carrying out the Project, including the factors considered as part of the assessment of tailings technology alternatives, for the purposes of assessing the environmental effects of the Project under CEAA 2012.</p>

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Nisga'a Lisims Government	Tailings Best Available Technology (BAT) assessment	NLG commented that cemented tailings may reduce the risks associated with a catastrophic dam failure.	<p>The proponent suggested that it is possible that the addition of cement may mitigate some of the metal leaching/acid rock drainage generating conditions, however only low cement content (approximately 0.5% to 1.0%) is assumed to be included to generate cemented tailings. Further assessment of the tailings would be required to fully assess the impact of the cement addition to the tailings geochemistry.</p> <p>The proponent committed to evaluating the feasibility of cemented tailings with NLG outside of the EA process.</p>	<p>The Agency has assessed the alternative means of carrying out the Project, on Nisga'a treaty rights and interests.</p> <p>As part of the EA, the Agency assessed the Project as proposed by the proponent. Based on a review of the proponent's analysis, the Agency is satisfied that the proponent has sufficiently assessed alternative means of carrying out the Project for the purposes of assessing the environmental effects of the Project under CEAA 2012.</p> <p>The Agency understands that the proponent has committed to continue to investigate this option with NLG. Should the proponent decide to make a change to tailings technology at a later time, the proponent would be required to notify the Agency.</p>
Nisga'a Lisims Government	Dam failure	NLG expressed concerns about the effects from a failure of the tailings management facility, and expressed the concern that the consequence of a dam failure would be high because the tailings are potentially acid	The proponent stated that the feasibility design of the tailings management facility embankments followed the relevant federal and provincial guidelines, including the Canadian Dam Safety Guidelines (CDA, 2013) and the more recent Technical Bulletin on the Application of the Guidelines to Mining Dams (CDA, 2014), as well as the Health, Safety and Reclamation Code for Mines in BC (EMPR, 2017). In addition, site characterization for the tailing management facility embankment footprints were completed in accordance with the recent Engineer and Geoscientists BC Site Characterization	The Agency has assessed effects of accidents and malfunctions which may occur as a result of the Project, including failure of the tailings management facility, on Nisga'a treaty rights and interests. The Agency is of the view that the proponent would take reasonable measures, including designing and building the tailings management

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		generating.	<p>Guidelines for Dams in BC (EGBC, 2016).</p> <p>The proponent will develop an Operations, Maintenance and Surveillance Manual as part of the permit application process which will describe in detail the long-term monitoring programs for embankment performance criteria. The tailings management facility monitoring program is presented in section 9.3 of the proponent's Tailings and Water Management Feasibility Design Report of Appendix 1-H (KP, 2017).</p> <p>The proponent will advance the detailed avalanche mapping and development of the Avalanche Management Plan for the Mines Act Permit application, which will include hazard zones identification and mitigations and management of hazard zones considering infrastructure downslope.</p>	<p>facility in accordance with the Canadian Dam Association <i>Dam Safety Guidelines</i> to avoid or prevent potential accidents and malfunctions, and has incorporated mitigation measures into design to mitigate the risk and effects from accidents and malfunctions including a potential failure of the tailings management facility. Based on a review of the proponent's analysis, the Agency is satisfied with the proponent's characterization of accidents and malfunctions under CEAA 2012.</p>
Métis Nation B.C.	Terrain stability/ blasting	Concerns were raised about the potential for the Project to increase frequency and intensity of snow avalanches, and resulting risks to the public from avalanches	<p>The proponent indicated that there is the potential for increased avalanche activity following removal of vegetation. The proponent noted that the key mitigation measure for terrain stability is to avoid the placement of infrastructure in areas with known terrain stability issues.</p> <p>With respect to potential risks to the public, the proponent would develop an Avalanche Management Plan. In addition, public access to the mine site would be restricted by a manned, locked gate and signage near the junction of the access road and Highway 37A.</p>	<p>The Agency has assessed the effects of accidents and malfunctions which may occur as a result of the Project, including explosive accidents, and is satisfied with the proponent's characterization of accidents and malfunctions under CEAA 2012.</p> <p>The Agency has also assessed effects to the current use of lands and resources for traditional purposes. The Agency is recommending potential conditions which would require the proponent to prohibit public access to the access and haul roads, while providing Indigenous peoples access to the Bitter Creek valley to the extent that such</p>

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				<p>access is safe. These recommended potential conditions would require the proponent to consult with Métis Nation B.C. to identify the manner in which access would be provided.</p> <p>Finally, the Agency notes that the provincial government has proposed a condition which would require the proponent to develop and implement an Avalanche Management Plan that would include mitigation measures to reduce risk to infrastructure, human health and safety, and wildlife.</p>
Métis Nation B.C.	Reporting framework	Concerns were raised about the reporting framework for a spill, accident, or malfunction	<p>The proponent's assessment of accidents and malfunctions, including potential effects of an accident or malfunction on the health and socio-economic conditions, physical and cultural heritage and the current use of lands and resources of the Métis Nation B.C., is presented in Chapter 23 of the Environmental Impact Statement. The proponent proposed mitigation measures to address the risks of any accidents and malfunctions, including the establishment of an on-site Emergency Response Team, a Risk Management and Emergency Response Plan, and a Spill Contingency Plan. A component of the Risk Management and Emergency Response Plan involves pre-planned notifications that will occur internally and externally to the Project, depending on the nature and extent of the emergency. The proponent committed to develop, prior to construction, a procedure to engage with and notify authorities, stakeholders, Indigenous</p>	<p>The Agency has assessed the effects of accidents and malfunctions which may occur as a result of the Project.</p> <p>The Agency is recommending a potential condition which would require the proponent to develop an accident and malfunction response plan, in consultation with Indigenous groups and relevant authorities. In the event of an accident or malfunction, the proponent would be required to notify Indigenous groups and relevant authorities of the accident or malfunction and</p>

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			groups, and communities in the event of an emergency.	immediately implement measures to mitigate any adverse environmental effects as a result of the accident or malfunction. The potential condition would also require the proponent to submit a written report to the Agency detailing changes made to avoid a subsequent occurrence of the accident or malfunction, implementation of any modified or additional mitigation measures and additional views from Indigenous groups received by the proponent.
Water quality				
Nisga'a Lisims Government	Tailings Best Available Technology (BAT) assessment	NLG expressed concerns with the placement of potentially acid generating tailings in a conventional tailings management facility. NLG commented that placing tailings underground as paste tailings may mitigate the release of contaminants while limiting loadings to groundwater from talus.	The proponent's evaluation of paste backfill as an additional candidate is presented in two technical memoranda (2018 01 08 Red Mtn-US EPA NLG EMPR-Alternative Means-Comments 14 330 331 541 543 544 643 732 733, and 2018 02 10 Red Mtn-NLG EMPR-Alt Means of Undertaking the Proj and Geotech TMF-Comments 331.2 541.2 to 544.2). The proponent also noted that there is not enough capacity in the underground workings to store all tailings and therefore, all design option must include at least some tailings storage on surface.	Based on a review of the proponent's analysis, the Agency is satisfied that the proponent has sufficiently assessed alternative means of carrying out the Project for the purposes of assessing the environmental effects of the Project under CEAA 2012.
Nisga'a Lisims	Water quality modelling	NLG expressed concern with the use of dissolved metals (versus total	The proponent provided an updated surface water quality effects assessment using total metals and characterized the magnitude of effects on water quality as part of a technical	The Agency has assessed effects of the Project on fish and fish habitat and health and socio-

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Government	and predictions	metals) for bioaccumulative substances as part of the surface water quality effects assessment.	memo (2018 04 27 Red Mtn – Swq Effects Assessment Total Metals + Baseline Hardness). The proponent also noted that total metal predictions were used in the revised human health risk assessment.	economic conditions, and impacts to Nisga'a treaty rights and interests. The Agency notes that the proponent updated its assessment using total metals for both valued components and the Agency considered this updated information in its assessment.
Nisga'a Lisims Government	Water treatment	NLG expressed concerns with the feasibility of implementing a modular water treatment plant, particularly upon short notice, as a contingency measure in the event that water does not meet requirements for discharge.	The proponent stated that it has communicated with leaders in the water treatment industry and confirmed that trailer-mounted mobile water filtration/treatment units, housed in sea cans, can be mobilized to site and operational within two weeks. The proponent noted that many treatment solutions are available that can accommodate a suite of known parameters, and discharge volumes that exceed 1000's of gallons per minute. As part of the application for a B.C. <i>Environmental Management Act</i> discharge permit, the proponent will provide the specifications for a contingency mobile unit that would be selected to address exceedances in dissolved metals and total suspended solids. Any reagents, flocculants or coagulants used to facilitate this contingency treatment would need to be provided to B.C.'s Ministry of Environment as part of the permit application, along with treatment procedures. Should treatment be required, during construction, operations, or closure, the permit would already be in place to allow discharge using an approved treatment system.	The Agency has assessed effects of the Project on fish and fish habitat, and impacts of the Project on Nisga'a treaty rights and interests. The Agency is satisfied that the proponent could mobilize a water treatment plan in an appropriate timeframe and has contingency options for managing water in the interim. The Agency is recommending a potential condition which would require the proponent to collect and treat contact water that does not meet the limits identified in the <i>Metal and Diamond Mining Effluent Regulations</i> and subsection 36(3) of the <i>Fisheries Act</i> prior to discharge into Bitter Creek.
Métis Nation B.C.	Groundwat-	Concerns were raised about the impacts of seepage from the tailings management	The proponent has confirmed that seepage from the tailings management facility was included in the water quality model. During operations, it is assumed that 80% of the groundwater seepage would report to the seepage collection ponds and	The Agency has assessed effects of the Project on fish and fish habitat, health and socio-economic conditions, and the

Group	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
	er quality	facility on groundwater quality	<p>would be pumped back to the tailings management facility. The remaining 20% of the seepage reports to Bitter Creek upstream of the model node for BC06, which captures all of the Project impacts from the Bromley Humps and cirque areas. During closure, it is assumed that all of the groundwater seepage would report to Bitter Creek at this same location. Chapter 13 of the Environmental Impact Statement discusses the effects from the TMF discharges into the receiving environment.</p>	<p>current use of lands and resources for traditional purposes, including those changes resulting from changes to surface water from seepage and discharges from the tailings management facility and other Project infrastructure. The Agency is recommending a potential condition which would require the proponent to collect and treat contact water that does not meet the limits identified in the <i>Metal and Diamond Mining Effluent Regulations</i> and subsection 36(3) of the <i>Fisheries Act</i> prior to discharge into Bitter Creek.</p> <p>The Agency characterizes the effects on fish and fish habitat as a result of changes in surface water quality as moderate in magnitude because concentrations of several metals exceed guidelines. Taking into account the implementation of key mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects to fish and fish habitat, health and socio-economic conditions, and the current use of lands and resources for traditional purposes.</p>

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Fish and fish habitat				
Nisga'a Lisims Government	Aquatic resources and fish	NLG expressed concerns with the potential effects of selenium. NLG noted that the Bitter Creek system is sensitive to uptake of selenium. At different sampling points in the Project area, baseline periphyton and benthic invertebrates are above guidelines, baseline water levels are above B.C. alert concentration, Canadian Council of Ministers of the Environment water quality guidelines and B.C. water quality guidelines.	<p>The proponent noted that it is unlikely that a sufficient volume of benthic invertebrate tissue can be collected from sampling stations and noted that fish tissue selenium is a better indicator of aquatic ecological risk than selenium in benthic invertebrate tissue. The proponent committed to collecting this additional sediment, benthic tissue and fish tissue during the 2018 sampling season and conducting bioaccumulation modelling in support of the permitting process and development of the detailed Aquatic Effects Monitoring Program.</p> <p>The proponent agreed to develop and implement a Selenium Management Plan, if required following additional baseline sampling and modelling work.</p> <p>The proponent also noted that although predicted fish tissue predictions exceed B.C. Ministry of Environment selenium aquatic life guidelines, they are still below the toxicological threshold specific to Dolly Varden in the literature.</p>	<p>The Agency has assessed effects of the Project on fish and fish habitat, including effects resulting from contaminants of potential concern such as selenium, and impacts of the Project on Nisga'a treaty rights and interests.</p> <p>The Agency characterizes the effect on fish and fish habitat as a result of changes in surface water quality as moderate in magnitude because concentrations of several metals, including selenium, exceed guidelines.</p> <p>The Agency is recommending a potential condition which would require follow-up and monitoring of water quality for contaminants of potential concern in Bitter Creek and Goldslide Creek.</p> <p>The Agency notes that the provincial government has proposed a condition which would require the proponent to conduct a selenium ecological risk assessment in consultation with NLG and provincial authorities.</p>
Nisga'a Lisims Government	Water quality changes on	NLG expressed concerns with the residual effects on fish and aquatic	The proponent's assessment of Project effects on surface water quality, including mitigation measures proposed to reduce exceedances for contaminants of potential concern in	The Agency has assessed effects of the Project on fish and fish

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	fish and aquatic resources	resources from changes in water quality, including uptake of increased selenium, arsenic, mercury, and other contaminants of potential concern.	<p>the receiving environment is presented in Chapter 13 of the EIS. The proponent noted that the mitigation measures were developed using a stepwise approach to avoid, minimize, and mitigate potential effects to surface water quality. These measures were refined based on iterations of the water load and balance model and incorporated practical techniques and best available technologies to reduce exceedances for contaminants of potential concern (e.g. water treatment of discharge to the receiving environment to meet <i>Metal and Diamond Mining Effluent Regulations</i> limits, a cyanide destruction circuit, and recycling of process water to the maximum practical extent). The proponent noted that the measures are considered effective to reduce exceedances for contaminants of potential concern in the receiving environment and committed to developing and implementing an Aquatic Effects Monitoring Program to monitor the effectiveness of mitigation measures, and include adaptive management strategies, if required.</p> <p>The proponent indicated its intention to initiate a water quality working group as part of the development of science-based environmental benchmarks for water quality.</p>	<p>habitat, including effects resulting from contaminants of potential concern such as selenium, and on Nisga'a treaty rights and interests.</p> <p>The Agency characterizes the effects on fish and fish habitat as a result of changes in surface water quality as moderate in magnitude because concentrations of several metals, including cadmium, selenium, silver, and zinc, exceed guidelines.</p> <p>The Agency is recommending a potential condition which would require follow-up and monitoring of water quality for contaminants of potential concern in Bitter Creek and Goldslide Creek.</p> <p>The Agency notes that the provincial government has proposed a condition which would require the proponent to conduct a selenium ecological risk assessment in consultation with NLG and provincial authorities.</p>
Nisga'a Lisims Government	Aquatics Effects Monitoring Program	NLG expressed an interest in participating in the design and review of additional benthic invertebrate tissue sampling program. NLG noted that there should be sufficient sampling	<p>The proponent responded to the request in a memorandum (2018 02 10 Red Mtn - ENV NLG - Selenium - Comments 130.2, 155.2, 195.2, 308.2, 310.2, 321.2, 322.2, 446.2), indicating it agrees to conduct benthic invertebrate tissue sampling and analysis in 2018 as the baseline program for the Aquatics Effects Monitoring Program.</p> <p>The proponent noted that finalization of the Aquatics Effects Monitoring Program, including sampling sites and protocols,</p>	<p>The Agency has assessed effects of the Project on fish and fish habitat and on Nisga'a treaty rights and interests.</p> <p>The Agency notes that the provincial government has proposed a condition which would require the proponent to conduct</p>

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		effort and replicates at potential Aquatic Effects Monitoring Program sites in 2018 in order to develop a site-specific selenium bioaccumulation model.	will be completed during the application process for the mine discharge permit, in consultation with NLG, and will be signed off by B.C.	additional baseline information, including periphyton, macrophyte, benthic invertebrates, and fish tissue chemistry, and periphyton and benthic invertebrate communities. The proponent would be required to develop the plan to collect this additional baseline information in consultation with NLG.
Wildlife				
Nisga'a Lisims Government and Tsetsaut/Skii km Lax Ha	Mountain goat	NLG expressed the concern that the new road access would serve as a pathway for wolves to enter the Bitter Creek valley and prey on mountain goat.	The proponent responded to the concern by indicating that indirect mortality risk due to facilitated predation (e.g. from wolves) was considered but was not determined to be an interaction as a result of the Project. Mountain goat and moose are the two wildlife valued components that have the possibility of being affected. Facilitated predation was not considered relevant for mountain goat because they use steep, rocky outcrops as suitable habitat in order to avoid predation. The access road, and haul road, would not enable access to the steep rocky outcrops that goats prefer as suitable habitat.	The Agency has assessed impacts of the Project on Nisga'a treaty rights and interests, including impacts to wildlife and on the current use of lands and resources for traditional purposes, including changes to hunting and trapping. The Agency is recommending a potential condition which would require the proponent to conduct mountain goat population surveys once every three years, beginning in the first year of operation. Taking into account the implementation of key mitigation measures, the Agency concludes that the Project cannot reasonably be expected to have adverse environmental effects on Nisga'a harvesting interests in relation to wildlife. and is not likely to cause significant adverse

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				environmental effects to the current use of lands and resources for traditional purposes..
Nisga'a Lisims Government	Mountain goat	NLG expressed uncertainty as to whether the use of a 500 metre zone of influence for mountain goat was appropriate, given that a distance of 1800 metres have been found to be applicable for other mining projects.	<p>The proponent responded to the concern by indicating that although mountain goat are sensitive to human disturbance, habituation represents one possible factor that affects the variation in the response distances and degree of response by goats to disturbance reported in the empirical literature. The proponent did not contend that habituation is likely to occur at the Project (although some form of desensitization is possible) and did not use potential habituation to minimize or reduce the analysis of predicted Project effects. The proponent acknowledged that the weight of evidence suggests that goats do not tend to habituate to industrial disturbances and aircraft and as such, the zones of influence and potential responses used in the effects assessment are neutral to conservatively risk averse based on the literature. For the recent analysis of potential effects of avalanche control the proponent used a 2000m zone of influence, which corresponds to one of the largest response distances for goats that is reported in the literature.</p> <p>The proponent indicated that the zones of influence distances used in the proponent's assessment (500 metres for ground-based disturbances and 2000 metres for helicopter disturbance) (2018 01- 16 Red Mtn-FLNRO NLG-Wildlife-Comments 228 to 230 232 to 236 240 to 243 245 473 480) were based on management buffer zones in the provincial <i>Management Plan for the Mountain Goat (Oreamnos americanus) in British Columbia</i> that were based on consideration of multiple studies by several mountain goat experts. Population was not one of the measurement indicators within the scope of the effects assessment as per the Environmental Impact Statement Guidelines.</p>	<p>The Agency has assessed impacts of the Project on Nisga'a treaty rights and interests, including impacts to wildlife.</p> <p>The Agency is recommending a potential condition which would require the proponent to conduct mountain goat population surveys once every three years, beginning in the first year of operation. The proponent would be required to develop the methodology for the surveys in consultation with NLG.</p> <p>Taking into account the implementation of key mitigation measures, the Agency concludes that the Project cannot reasonably be expected to have adverse environmental effects on Nisga'a harvesting interests in relation to wildlife.</p>

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			<p>As part of its Wildlife Management Plan, the proponent would implement best management practices and mitigation measures to ensure that the effects to mountain goat and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on mountain goats.</p>	
Nisga'a Lisims Government	Mountain goat	NLG expressed concern about the effects of avalanche control activities on mountain goat	<p>The proponent provided a technical memorandum (2018 02 10 Red Mtn – FLNRO NLG – Wildlife – Comment 228.2) responding to the concerns about avalanche control activities. The proponent acknowledged that the potential effects of disturbance associated with avalanche control on mountain goat populations is a key knowledge gap. The proponent indicated that there was no direct data and limited indirect data to parametrize this effect in the analysis. Although the effects assessment of habitat availability indicates that a high proportion of the area (and, by assumption, to goats occurring in the area) could be exposed to disturbance (i.e. seeing or hearing a helicopter), a mechanism linking that type of occasional disturbance to population effects is weak and speculative (e.g. that stress could result in reduced fitness or survivorship).</p> <p>The proponent noted that based on working group discussions, the request for a cumulative assessment of effects to mountain goat in Block 25 is a monitoring requirement for the construction and operational phases of the Project, and that this would likely include other users in the area (e.g. Ministry of Transportation and Infrastructure). The proponent acknowledged that Block 25 is a suitable area to conduct regular (semi-annual) goat surveys and commitment to these surveys would contribute to regional data on the goat population in addition to providing a basis for monitoring and adaptive management of potential effects</p>	<p>The Agency has assessed impacts of the Project on Nisga'a treaty rights and interests, including impacts to wildlife.</p> <p>The Agency is recommending potential conditions that would prohibit the proponent from conducting helicopter overflights within two kilometres and 500 metre vertical separation from mountain goat ungulate winter range, unless required for safety reasons; and prohibit the proponent from blasting for avalanche control, if the proponent observes mountain goat within 1,000 metres of the blast area.</p> <p>Taking into account the implementation of key mitigation measures, the Agency concludes that the Project cannot reasonably be expected to have adverse environmental effects on Nisga'a harvesting interests in relation to wildlife.</p>

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			<p>of the Project on mountain goat.</p> <p>In order to minimize the potential effects of avalanche control activities on mountain goat, the proponent would develop an Avalanche Management Plan that will include monitoring and mitigation strategies for mountain goat, within an adaptive management framework. This plan will be submitted to B.C. and NLG for review prior to Project construction.</p>	
Nisga'a Lisims Government	Mountain goat	<p>NLG expressed the concern that mountain goat may move through area upslope of Bromley Humps. NLG indicated that this area should be included as part of mountain goat monitoring.</p>	<p>The proponent indicated that no wildlife cameras were set up in the vicinity of the Bromley Humps infrastructure in 2016 or 2017. The Bromley Humps infrastructure is located below the treeline between approximately 365 to 730 metre elevation and although the terrain is relatively steep, it does not offer much escape terrain compared to the more steep and rugged terrain at higher elevations. All mountain goat populations are associated with steep, rugged, 'escape' terrain, which is critical for predator avoidance.</p> <p>The proponent noted that two wildlife cameras (TC1 and TC2) were deployed along the proposed access road and mountain goats were detected.</p> <p>The 2017 Mountain Goat Trail Camera Program was designed to capture goat use in the local study area during summer, particularly in the Goldslide Creek area. The objectives of the 2017 camera program included obtaining better information on mountain goat use within the Goldslide Creek area, comparing relative goat use within the Goldslide Creek area to other areas with the local study area, and examining potential evidence of regional movements in the local study area between adjacent areas. Camera sites in 2017 were located in higher elevation habitats (between approximately 1,200 and 1,600 metres) close to escape terrain where high goat use was detected (e.g. tracks, beds, pellet groups, hair, dug up areas, exposed soils). Since the Bromley Humps Infrastructure is located at lower elevations below the treeline with minimal</p>	<p>The Agency has assessed impacts of the Project on Nisga'a treaty rights and interests, including impacts to wildlife.</p> <p>The Agency is recommending a potential condition which would require the proponent to conduct mountain goat population surveys once every three years, beginning in the first year of operation. The proponent would be required to develop the methodology for the surveys in consultation with NLG.</p> <p>Taking into account the implementation of key mitigation measures, the Agency concludes that the Project cannot reasonably be expected to have adverse environmental effects on Nisga'a harvesting interests in relation to wildlife.</p>

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			<p>escape terrain nearby, and no previous goat use was detected, trail cameras were not deployed at this location in 2017.</p> <p>The proponent noted that monitoring for purposes of adaptive management would include the Bromley Humps area and that the Wildlife Management Plan would include this requirement.</p>	
Nisga'a Lisims Government	Grizzly bear	NLG expressed concerns with the potential effects of avalanche control activities on denning grizzly bear.	<p>The proponent provided technical memoranda to respond to the concern (2018 01- 16 Red Mtn-FLNRO NLG-Wildlife-Comments 228 to 230 232 to 236 240 to 243 245 473 480 and 2018 02 10 Red Mtn – FLNRO NLG – Wildlife – Comment 228.2). The proponent assessed the effects to grizzly bear given the avalanche control areas, including sensory disturbance, and noted that avalanche control activities are not expected to affect grizzly bear denning. There is low risk of overlap of avalanche zone with the specific habitats associated with dens because runout and accumulation zones are moisture-receiving sites and dens tend to occur in mesic or submesic sites. If additional snow accumulated over occupied bear dens during avalanche control activities, this occurrence is not expected to exceed levels of snow accumulation that bears could normally encounter prior to spring melt and emergence from dens.</p>	<p>The Agency has assessed impacts of the Project on Nisga'a treaty rights and interests, including impacts to wildlife.</p> <p>The Agency is recommending potential conditions that would prohibit the proponent from conducting helicopter overflights and blasting within two kilometres of grizzly bear denning habitat and known denning sites, unless required for safety reasons; and maintaining a line-of-sight distance of 500 meters when conducting helicopter overflights or blasting within two kilometres of denning habitat and known denning sites during critical periods for denning grizzly bear (October to spring).</p> <p>Taking into account the implementation of key mitigation measures, the Agency concludes that the Project cannot reasonably be expected to have adverse environmental effects on</p>

Group	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
				Nisga'a harvesting interests in relation to wildlife.
Métis Nation B.C.	Wildlife mitigation measures	Concerns were raised that mitigation measures that will be included in the proponent's Wildlife Management Plan are unavailable for review and comment. Mitigation measures should therefore be included in this Environmental Impact Statement	The proponent's proposed Wildlife Management Plan is described in Chapter 29 of the Environmental Impact Statement and includes a description of general wildlife protection measures (e.g., project design considerations and wildlife protection policies, etc.), site activity based protection measures (e.g., timing of vegetation clearing, no disturbance buffers, etc.), and species-specific protection measures (e.g., mountain goat best management practices, pre-clearing surveys for bats, etc.). In addition, the proponent proposed a wildlife monitoring program to verify potential project effects to wildlife, evaluate the effectiveness of mitigation measures, identify unanticipated effects from the Project, and inform adaptive management measures.	The Agency has assessed effects of the Project on the current use of lands and resources for traditional purposes, including changes to hunting and trapping. The Agency is recommending potential conditions which would require the proponent to implement specific key mitigation measures in consultation with Indigenous groups that are specific actions to mitigate effects to wildlife rather than plans. The Agency is seeking Métis Nation B.C.'s views on these potential conditions during the public comment period on the Draft EA Report.
Human health				
Nisga'a Lisims Government	Arsenic	NLG expressed concern regarding the risks associated with exposure to arsenic in country foods.	The proponent reiterated that there is scientific uncertainty associated with the conclusion of the human health risk assessment and indicated that effects to human health would be monitored. The proponent noted that it is committed to further discussions and consideration on monitoring of relevance to the health effects assessment, including but not limited to vegetation tissue sampling, soil sampling, and animal tissue sampling.	The Agency has assessed effects of the Project on health and socio-economic conditions of Aboriginal peoples, including effects resulting from exposure to contaminants of potential concern in country foods. The Agency is recommending a potential condition that would require the proponent to develop

Group	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
				<p>a follow-up program, in consultation with NLG, to verify the accuracy of the EA as it pertains to adverse effects on the health of Nisga'a citizens caused by changes in concentrations of contaminants of potential concern in air, water, soil, vegetation and fish. The proponent would also be required to develop a plan to communicate the results of the follow-up program and any modified or additional mitigation.</p> <p>Taking into account the implementation of key mitigation measures, the Agency concludes that the Project is likely to result in residual effects to human health from reduced quality of country foods</p>
Nisga'a Lisims Government	Air quality	NLG expressed concern with the air quality assessment, including the consideration of non-threshold contaminants in the effects assessment	<p>The proponent responded that air concentrations of contaminants were based on conservative estimates of source chemical contributions, and based on the worst case scenario in close proximity to project infrastructure.</p> <p>The proponent committed to developing and implementing a detailed Air Quality and Dust Management Plan, which would include real-time monitoring, and monitoring of NO₂ and particulate matter.</p>	<p>The Agency has assessed effects of the Project on health and socio-economic conditions of Aboriginal peoples, including effects resulting from diminished air quality.</p> <p>The Agency is recommending a potential condition that would require the proponent to develop and implement a follow-up program, in consultation with NLG, to verify the accuracy of the EA as it pertains to adverse effects</p>

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				<p>on the health of Nisga'a citizens. As a component of the follow-up program, the proponent would be required to conduct air monitoring of particulate matter and nitrogen dioxide, among other contaminants.</p> <p>Taking into account the implementation of key mitigation measures, the Agency concludes that the Project is likely to result in residual effects to health from decreased air quality, including increased exposure to non-threshold contaminants.</p>
Nisga'a Lisims Government	Treaty right to hunt, trap, fish, gather food and live in the Bitter Creek valley	NLG commented that the assessment should identify the potential risks to Nisga'a citizens who choose to exercise their right to hunt, trap, fish, gather food, and live in the Bitter Creek area for their entire lives.	The proponent acknowledged the right of Nisga'a citizens to occupy the land in the Bitter Creek area, but is of the view that the assumption that exposures are not occurring at all times is reasonable. The proponent indicated that the exposure assumptions represent reasonable maximum exposure scenarios and noted that one of the challenges with risk assessment is arriving at a selection of receptors and exposure scenarios that are agreeable to all parties and reflect reasonable, likely exposure scenarios. The intent and principal goal of most regulatory environmental risk assessment efforts is to consider the middle and most significant portion of the curve – the receptor types and exposure scenarios that are most reasonable and likely to occur and, as a result, be protective of the greatest portion of the potentially affected population. The proponent recognized the possibility of unique scenarios with potentially extreme outcomes (e.g. an individual disobeys signage and engineered controls to enter an area where high exposure to chemicals is likely and, as a result, places them in a situation of high risk). This type of	<p>The Agency has assessed impacts of the Project on Nisga'a treaty rights and interests, including risks to Nisga'a citizens who choose to exercise treaty rights in the Bitter Creek valley.</p> <p>The Agency is recommending a potential condition which would require the proponent to monitor concentrations of contaminants of potential concern in soil, water, vegetation, and fish, and to update the human health risk assessment if sampling results exceed the predictions made during the EA.</p>

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			scenario is a low probability/high consequence risk and is typically handled quite differently from typical regulatory risk assessment efforts.	
Aboriginal rights				
Tsetsaut/ Skii km Lax Ha	Aboriginal title	Aboriginal title is the overarching interest of Tsetsaut/Skii km Lax Ha	The proponent deferred to the Crown.	The Agency acknowledges that it is Tsetsaut/Skii km Lax Ha's perspective that the Project may have impacts on their Aboriginal title. There is insufficient information in which to assess the level of seriousness of potential impacts on Tsetsaut/Skii km Lax Ha title. Based on the limited information it has, the Agency considers the mitigation and accommodation measures identified to date may help to address the impact of the Project on impacts on Tsetsaut/Skii km Lax Ha title.
Plant harvesting				
Métis Nation B.C.	Invasive species	Concern about the spread of invasive plants on newly disturbed lands in remote areas. Métis Nation B.C. recommended cleaning vehicles and equipment prior to site entry.	The proponent proposed a Vegetation and Ecosystems Management Plan that would minimize the area of landscape disturbance and initiate ecosystem-based revegetation and progressive reclamation to minimize the introduction of invasive plants, and facilitate initiation of successional ecological processes. In addition, revegetation will be undertaken with seeds suitable for the local area and ecosystems, and during the appropriate growing season and conditions to avoid establishment of invasive species among other objectives. The proposed Vegetation and Ecosystems Management Plan	The Agency has assessed effects of the Project on the current use of lands and resources for traditional purposes, including effects to plant harvesting. The Agency notes that the provincial government has proposed a condition which would require the proponent to develop a Construction Environmental Management Plan and

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			<p>also includes other measures that will be implemented to minimize the introduction of invasive species, where practicable:</p> <ul style="list-style-type: none"> • Conduct pre-construction invasive plant surveys within the Project footprint to determine the presence/absence of invasive plants; • Remove existing invasive plant populations to prevent the spread to adjacent areas; and • Establish an early detection, inventory, control, and monitoring and follow up program in accordance with Provincial guidance and expert recommendations. 	<p>Preconstruction Vegetation Clearing Environmental Management Plan that must include measures for invasive plants management.</p> <p>Taking into account the implementation of key mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects to the current use of lands and resources for traditional purposes.</p>