Kitsault Mine Project

Environmental Effects Summary

prepared by:

CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY

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1.0 INTRODUCTION

The purpose of this Environmental Effects Summary (EES) is to support public participation in the environmental assessment (EA) of the proposed Kitsault Mine Project (the Project) under the Canadian Environmental Assessment Act (the Act). In accordance with the Act's requirements, Avanti Kitsault Mine Ltd. (Avanti), the Project proponent, has submitted an Environmental Impact Statement (EIS) for the Project, presenting the findings of its assessment of the Project's potential effects. The same document has been submitted to the Province of British Columbia (BC) as an Application for an environmental assessment (EA) Certificate for the Project, made under section 16 of the BC Environmental Assessment Act (BCEAA). More information on the federal environmental assessment of the Project can be found on the Canadian Environmental Assessment Registry at www.ceaa-acee.gc.ca under reference number 10-03-57958.

The public is invited to share comments on any aspect of the EES, which summarizes key information from the EIS, including details of the Project, public participation and the findings of Avanti's environmental effects assessments. The deadline for submission of public comments to the Canadian Environmental Assessment Agency (Agency) is June 11, 2012.

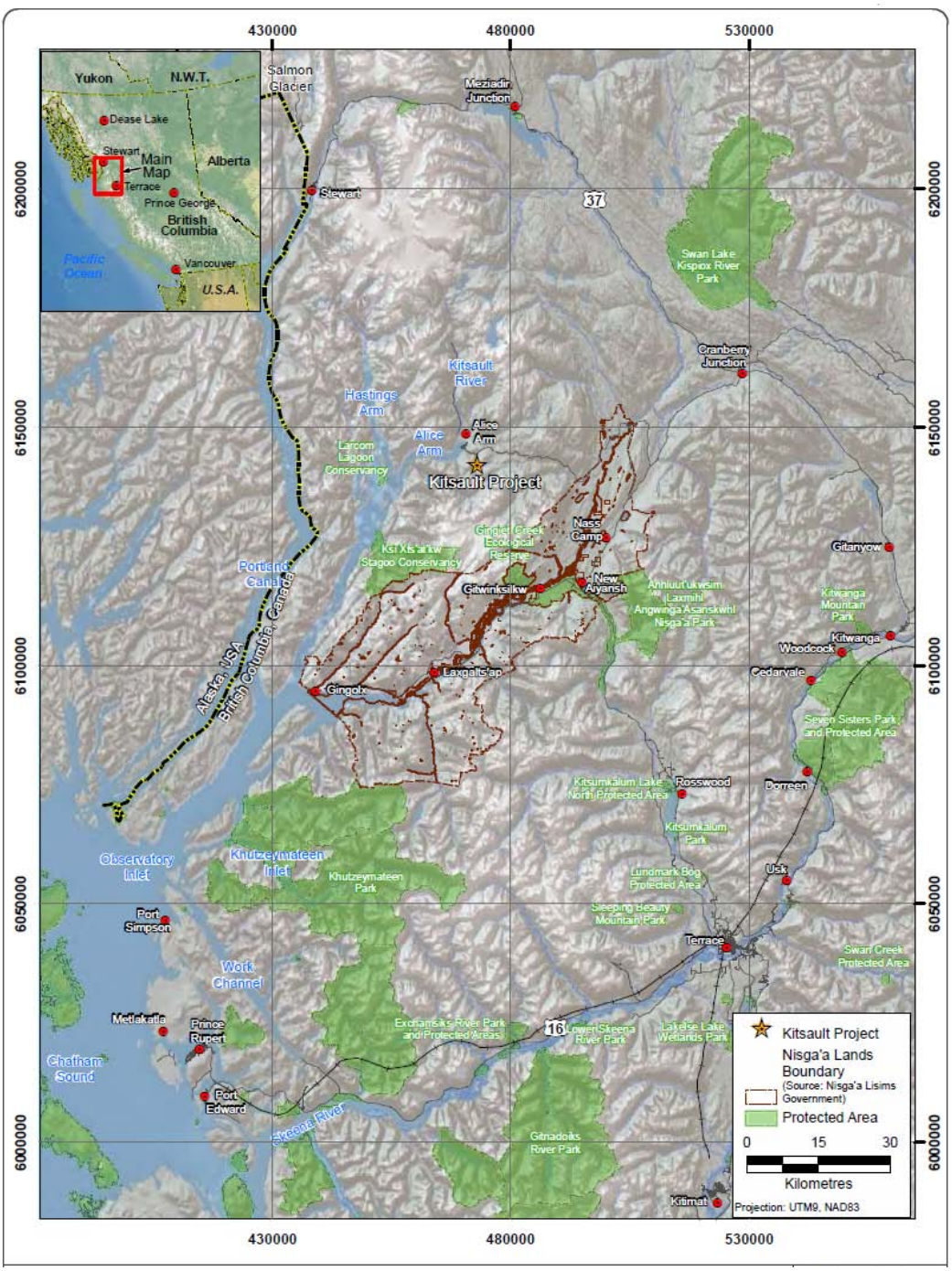
Following the receipt and consideration of public comments on the EES, the Agency will prepare a Comprehensive Study Report (CSR) that will describe the Project, identify potential environmental effects and measures proposed to mitigate those effects, and discuss the significance of any residual environmental effects taking into account the proposed mitigation measures. The public will be invited to provide comments on the CSR before it is submitted to the Minister of the Environment for a final EA decision on the Project.

1.1 Project Background and Overview

The Project is located at the site of former mining operations about 140 kilometres (km) north of Prince Rupert, BC, and south of the head of Alice Arm (Figure 1). The Kitsault mineral property has been explored since 1911, and was mined intermittently between 1968 and 1982. The old open pit is the principal feature of the historic 'brownfield' site.

The Project involves a truck-shovel open pit mine, operating 24 hours per day, 365 days per year. Avanti will mine and produce between 40,000 and 50,000 tonnes per day of ore. Mined molybdenum ore will be crushed and transported to a processing plant. Coarse waste will be trucked to a permanent Waste Rock Management Facility (WRMF), and fine tailings will be transported through a pipeline to a partially flooded Tailings Management Facility (TMF), with potentially acid-generating tailings that are kept permanently under water. Undesired or low-grade ore would be stockpiled for possible processing near the end of mine life.

Figure 1: Kitsault Mine Project Location



A water management system will be developed to redirect water that does not come into contact with mining activity (non-contact runoff) around the minesite, while used (contact) water would be recycled as much as possible, with any additional water stored in the TMF. An on-site camp will house both workers during construction (up to 700) and operations (up to 300).

The Project will rely on a network of existing local roads and highways (Highway 113 and Highway 37) for transport between the mine site and Highway 16. Electrical power will reach the mine site through an existing 42-km, 138-kilovolt overhead transmission line from New Aiyansh to a new substation located near the plant site. Molybdenum concentrate, the by-product of the mine processing activities, will be transported by truck to Port Metro Vancouver, where it will be shipped by sea to production facilities overseas.

After mining has stopped, Avanti will start to dismantle and remove buildings and structures and reclaim the site. Water from the TMF and elsewhere on the mine site will be allowed to fill the open pit for approximately 15 to 17 years. During this time, non-contact water will continue to be re-directed around disturbed areas. Once the pit lake begins to overflow the pit rim and flow into Lime Creek, Avanti will begin to monitor and manage the site on an ongoing basis for at least five years.

1.2 Nisga'a Nation Rights and Interests

The proposed Project is approximately 25 km outside Nisga'a Lands, and is within the Nass Wildlife Area and Nass Area as defined in the Nisga'a Final Agreement (NFA), a treaty under the *Constitution Act* between the Nisga'a Nation, the Government of Canada, and the Government of BC, which became effective in 2000. The NFA sets out the terms of ownership, use, and management of lands and resources in and around the Nass River that have been and continue to be occupied and used by Nisga'a people since time immemorial. The Nisga'a Nation has constitutionally-protected rights to fish, trap, hunt, and harvest a variety of water- and land-based flora and fauna for cultural, economic, and sustenance purposes with specific annual allocations for moose, grizzly bears, mountain goats, salmon, and steelhead. The NFA also defines the rights to self-government of the Nisga'a Nation, including governance structures and processes, and the jurisdiction of the Nisga'a Nation over health, social, educational, and cultural services and programs.

Chapter 10 of the NFA further states that the Nisga'a Nation may require an environmental assessment to examine the potential effects of a project to its lands, rights, and citizens as defined in the NFA, including interests in areas outside Nisga'a Lands. In line with this provision, the Government of Canada and the Government of BC must assess the effects of projects on the existing and future economic, social, and cultural well-being of potentially affected Nisga'a citizens. The findings of the Economic, Social and Cultural Impact Assessment (ESCIA) are summarized in Section 3.3.5 of this document.

1.3 Potentially Affected Aboriginal Groups

The asserted territory of the Metlakatla First Nation overlaps with the Project footprint and sections of the proposed transportation routes (i.e., Hwy 113 to Hwy 16). The Metlakatla have land planning interests as part of the North Coast Land Use Plan, and wish to protect their ability to practice traditional land use activities, including fishing, hunting, trapping and resource gathering.

Project-related traffic along the transportation routes could also affect activities occurring within the traditional territories of other Aboriginal groups, including the Kitsumkalum First Nation, Kitselas First Nation, Gitxsan Chiefs' Office, Gitanyow Hereditary Chiefs Office including five *Huwilp*: *wilp* Gwass Hlaam; *wilp* Gwinuu; *wilp* Wiitaxhayetwx-Sidok; and *wilp* Gamlaxyeltxw, and *wilp* Luuxhon, and the Métis Nation of BC. These Aboriginal groups claim a range of Aboriginal rights, such as rights to harvest and manage natural resources, rights to self-government and retaining cultural identity, as well as other land ownership and jurisdictional rights.

2.0 EA PROCESS

2.1 Federal EA Process

2.1.1 Applicability of the Act

Assessment of the Project under the Act is triggered by the need for Avanti to acquire certain regulatory approvals listed in the Act's *Law List Regulations*, including:

- authorizations issued by Fisheries and Oceans Canada under the federal *Fisheries Act* where the harmful alteration, disruption, or destruction (HADD) of fish habitat is anticipated; and

- a license for an on-site explosives factory and magazine, issued by Natural Resources Canada under the federal *Explosives Act*.

In addition, under the *Metal Mine Effluent Regulations* (*MMER*) of the *Fisheries Act*, Environment Canada (EC) may need to consider an amendment of Schedule 2 of the *MMER* to allow deposition of a deleterious substance within waters frequented by fish. Transport Canada has concluded that *Navigable Water Protection Act* approvals are not required.

The Project is subject to a comprehensive study level of review under the Act's *Comprehensive Study List Regulations*, since it is a metal mine other than a gold mine with an ore production level exceeding the threshold of 3,000 tonnes per day.

2.1.2 Joint Federal / Provincial EA Process

Since the Project is also being assessed under the *BCEAA*, the EA of the Project is being conducted jointly by the federal and provincial governments through a cooperative process, in accordance with the principles of the 2004 "Canada-BC Agreement for Environmental Assessment Cooperation."

The joint review is led by a Working Group established by the BC Environmental Assessment Office (BC EAO), with representation from the Nisga'a Nation, potentially affected Aboriginal groups, and relevant federal, provincial, and local government agencies to advise on the progress and conduct of the EA. The Working Group provides an inter-governmental forum for discussing issues raised during the review and assessment of proposed Project-related activities.

2.1.3 Scope of the Project and the Assessment for EA Review Purposes

The federal scope of the Project includes all stages of the Project (i.e., construction, operations, decommissioning / closure, and post-closure) and describes the on-site and off-site facilities, systems and activities. The scope of the Project includes all Project elements mentioned in section 1.1 (Project Background and Overview) of this document.

Section 16 of the Act describes the factors to be considered in the scope for all federal environment assessments:

- potential environmental effects;
- accidents or malfunctions;
- cumulative environmental effects (CEEs);
- the significance of any identified residual environmental effects;
- comments received from the public;
- technically and economically feasible impact management measures; and
- other matters considered relevant to the EA.

Comprehensive studies must also consider the purpose of the Project, technically and economically feasible atlernative means of carrying out the Project and their environmental effects, follow-up programs and monitoring, and the ongoing capacity of potentially affected renewable resources to meet present and future needs.

For this Project, other relevant matters include (1) consideration of Nisga'a Nation interests as defined under the NFA and (2) providing a detailed rationale for selecting the preferred TMF site.

2.1.4 Federal EA Responsibilities

Pursuant to the amendments to the Act that came into force in July 2010, the Agency is responsible for the conduct of the comprehensive study until the Comprehensive Study Report (CSR) is submitted to the Minister of the Environment. This includes ensuring that federal authorities fulfill their obligations under the Act in a timely manner, and coordinating the federal EA process with BC's EA requirements to the extent possible. Fisheries and Oceans Canada, Natural Resources Canada are providing responsible authority advice in carrying out the comprehensive study.

Environment Canada, Health Canada and Aboriginal Affairs and Northern Development Canada are also providing expert advice to the Agency on the comprehensive study.

Following the public comment on the Agency's CSR, the Minister of the Environment will consider the CSR and any public comments before issuing an EA decision statement on whether the Project is, or is not, likely to cause significant adverse environmental effects, taking into account mitigation measures the Minister considers appropriate. At the same time the Minister of the Environment makes a decision on the EA of the Project under section 23 of the Act, a federal NFA Project Recommendation will also be issued, which will take into account potential effects on Nisga'a rights and interests in considering whether the Project should proceed.

2.2 Consultation Activities

2.2.1 Government and Stakeholder Engagement

To date, Avanti has consulted with federal, provincial and local government authorities, interested stakeholders, and the general public. Consultation activities have focused on issues appropriate to each authority and its regulatory, technical and policy requirements.

Avanti has also met with local community and elected representatives to describe the Project and discuss issues and concerns. In March 2011, Avanti hosted a public open house in Terrace, BC to introduce project details, answer questions, and gather initial views about the Project and the environmental assessment process.

Supplementing the open house, Avanti has also provided online information through its website, delivered presentations and provided fact sheets and printed materials, and responded to queries and correspondence about the Project. Avanti plans to continue consultations with the public and government agencies to address issues raised during the EA.

2.2.2 Nisga'a Nation

Avanti's consultation with the Nisga'a Nation with respect to the Project has involved discussions about the potential effects of the Project on rights defined in the NFA. Consultation has taken place through one-to-one meetings with Nisga'a representatives,

community meetings, Working Group discussions, and the development of the ESCIA report. Avanti used information from the data gathered in assessing the economic, social, and cultural effects of the project on the well-being of Nisga'a citizens.

The Agency has provided funding to the Nisga'a Nation to assist in the review of environmental assessment documents and in providing input to the comprehensive study.

Additional consultation with the Nisga'a Nation will be coordinated by Avanti, the BCEAO, and the Agency during the completion of the comprehensive study and upon release of the CSR.

2.2.3 Aboriginal Groups

Avanti has met with Aboriginal groups to discuss the potential effects of the Project on Aboriginal rights as well as current use of the lands and resources for traditional purposes. To date, consultation has been occurred through in-person meetings, circulation of project-related materials, and written responses to questions and concerns.

Aboriginal groups have expressed concern about the potential for increased wildlife mortality due to vehicular collisions, the potential for spills and accidents near waterbodies, the impacts of greater access leading to increased hunting and poaching pressures, and the protection of culturally important sites and community health and safety.

Avanti has proposed measures to minimize the potential for any such effects, including the implementation of a "no-hunting" policy for employees and participation in a Transportation sub-group focused on addressing road traffic issues related to the Project. Avanti followed up with correspondence on issues raised during the meetings, and proposes to continue its engagement efforts during the EIS review.

The Agency provided funding to Aboriginal groups to support their participation in the EA.

3.0 ASSESSMENT OF THE POTENTIAL EFFECTS OF THE PROJECT

Avanti assessed the potential effects of the Project on different environmental and socio-economic Valued Components (VCs). Key findings from these assessments are summarised below and in Table 1.

The environmental VCs considered in the EA include:

- Air quality, climate, and noise / vibration effects;
- Groundwater and surface water quantity and quality;
- Sediment quality;
- Freshwater and marine aquatic systems;
- Soils, terrain, and surficial geology; and

- Vegetation and wildlife.

Social-economic VCs were also considered in the EA, including:

- Land and resource use
    - Hunting, fishing and trapping
    - Commercial ventures
    - Transportation and access
- Cultural sites / areas
- Public health

These socio-economic VCs are linked to aspects of the natural environment that could potentially be affected by the Project,

3.1 Potential Environmental Effects

An environmental effect was assessed on the basis of the sensitivity of the component potentially affected, the nature of the interaction between the component and the Project, the likelihood of the effect occuring; proposed mitigation measures to eliminate or lessen the effect; and the magnitude, geographic extent, duration, frequency, reversibility, and ecological context of any residual effect after taking into account the implementation of mitigation measures.

Of the set of potential environmental effects that Avanti had assessed in the EA, there were three areas that warranted particular attention and focus: 1) surface water quality, 2) freshwater aquatic resource effects, and 3) moose populations.

3.1.1 Surface Water Quality Effects

Most of the mine facilities are located within the Patsy Creek drainage, a small waterbody of Lime Creek that drains into Alice Arm. Various fish species are present in Lime Creek near the intertidal zone of Alice Arm. A smaller portion of the mine site is located within the Clary Creek watershed, which drains via the Illiance River into Alice Arm.

Much of the area proposed for project activity within the Lime / Patsy and Clary Creek watersheds was disturbed by previous mining that included historic mine site roads, an open pit, two waste rock areas, a power line, and much of the existing local forest service road system. This historic disturbance is reflected in the surface water baseline information used for the EA.

Baseline surface water quality results at, and downstream of, the former Kitsault mine site shows higher levels of some chemicals (i.e. cadmium) that exceed applicable water quality guidelines. Although mitigation measures are predicted to largely prevent metals export in sediments, many surface water quality parameters will exceed guideline limits, even after

mitigation is applied. Avanti proposes to work with Environment Canada, the BC Ministry of Environment and the Nisga'a Nation to determine whether site-specific water quality objectives should be established for certain chemicals, and if so, to select appropriate thresholds to protect freshwater aquatic biota.

Avanti proposes to develop and implement a water management plan that will minimise the contribution of chemicals to the receiving environment by incorporating a range of mitigation measures to manage, monitor and control runoff, sedimentation and stream diversions. Water quality in the Project's mine effluent will be monitored as part of a follow-up Environmental Effects Monitoring program.

The management of metal leaching and acid rock drainage potential is an important component for EA consideration. Avanti proposes to install a water treatment facility to ensure that metal leaching and acid rock drainage from exposed rock in the open pit walls or stored materials (e.g., concentrate, waste rock, topsoil and tailings) do not develop following closure of the mine.

Avanti will also manage flows in waterbodies for the purposes of maintaining compensatory fish habitat and ensure process water and storage of surplus water in the TMF are maximised. Effects on water quality are expected to be localised to the local study area, and predicted residual effects on water quality (and sediment quality) are predicted to be minor.

3.1.2 Freshwater Aquatic Resources Effects

Avanti assessesed four freshwater aquatic VCs, including Dolly Varden, Coho salmon, rainbow trout and benthic macro-invertebrates. A resident Dolly Varden population and Coho salmon parr from other salmon stocks are found in lower Lime Creek. A stocked rainbow trout population is present in streams and lakes in the Clary Creek watershed.

Dolly Varden and Coho salmon parr could be potentially affected by water quality, changes in Lime Creek flow volumes, water temperatures and the quantity of invertebrate drift. Avanti predicts that mitigation measures will maintain stream flow volumes and depths, water temperatures and invertebrate drift at acceptable levels for Dolly Varden, and also for Coho salmon parr use in lower Lime Creek. With respect to the effects of water temperature changes on Coho salmon parr, releases of water from the TMF and pit lake are not predicted to raise summer water temperatures.

Fishing pressures on Dolly Varden in Alice Arm, Kitsault and Illiance rivers are predicted to be low since Dolly Varden are not a target fish species for recreational fisheries in the area.

Resident rainbow trout is the only fish species known to be present in the Clary Creek watershed. Besides water quality issues, there are also concerns around increased fishing pressure due to angling, loss of habitat at stream crossings, and the interaction of trout around pumps to supply freshwater (in Clary Lake) and to pipe water between lakes. Avanti proposes to implement a 'No Fishing' policy for mine site workers, design intake pipes that

meet Fisheries and Oceans Canada "Freshwater End-of-Pipe Intake Fish Screen Guidelines", preserve existing lake levels for trout spawning by piping water between lakes, make culvert repairs to re-establish access for trout passage, and develop a Fish Habitat Compensation Plan.

3.1.3 Moose Effects

The regional moose population has declined in recent years. For the Nisga'a Nation, moose harvesting rights are defined under the NFA. The Nisga'a Nation, Gitxsan Nation, and Gitanyow *wilps* have expressed concerns about the potential for increased moose mortality as a result of the Project. Potential displacement of moose from their typical winter range and increased moose mortality could be linked to increases in traffic and winter access along existing forest service roads. The mine site area, however, has relatively low-quality moose winter habitat, and potential moose displacement is predicted to be minimal.

The Nass FSR and the Nass-Kinskuch FSR, which bisect moose winter range, are not currently ploughed in winter. Project-related ploughing of these roads and an increase in winter traffic could disturb moose in adjacent habitats, increase moose mortality from vehicle interactions, and increase winter access for unregulated hunting.

To mininize these impacts, Avanti proposes to implement a 'No Hunting' policy for mine site workers, maintain breaks in snow banks along ploughed forest service roads, establish wildlife incident and accident reporting, and improve mitigation performance through adaptive management. With these measures in place, Avanti anticipates that the residual effects on moose populations locally and regionally will be minor. Avanti will continue to work with the Nisga'a Nation, Aboriginal groups, and government bodies as part of the Transportation sub-group to address Project-related transportation effects and issues.

3.2 Conclusions and Commitments

Avanti's assessment conclusions are summarised in Table 1. For environmental effects that cannot be completely avoided or mitigated through re-design, relocation or mitigation measures, Table 1 identifies the relevant Project phase, the likely source of the potential effect, proposed mitigation measures, and Avanti's significance rating for the residual effect.

The EIS provides a consolidated listing of Avanti's commitments for managing the potential effects of the Project. Notable commitments include:

- Restrict the Project footprint to existing disturbed areas to the extent possible;
- Develop an Environmental Management System comprising more than 20 issue-specific environmental management plans (e.g. for air quality, sediment control, wildlife management, etc.), and in particular, a Water Management Plan that addresses water quality protection and water conservation (flow maintenance and recycling) issues will be a key environmental management plan;

- Develop monitoring and follow-up programs in at least ten key areas (e.g. atmosphere, water quality, fish, wildlife, ML / ARD, etc.), integrated with the environmental management plans;
- Install a water treatment facility (e.g. ML / ARD) to ensure that water quality objectives set for the receiving environment are satisfied;
- Develop a Fish Habitat Compensation Program acceptable to Fisheries and Oceans Canada, and impose "No Fishing" and "No Hunting" policies for the Project's workforce, and a Bear Management Plan to minimize contact and conflict with bears;
- Map (and if possible, avoid) key environmental features (e.g. old forests, riparian areas, wetlands, ecosystems at risk, etc.) during footprint finalization, and if possible, clear land outside amphibian and bird breeding periods, and where not possible, conduct amphibian and nesting surveys prior to land clearing;
- Develop a Transportation and Access Management Plan to minimize traffic / wildlife conflicts; and
- During closure and post-closure, restore the land to the same or a similar end land use, with ecological systems functioning similar to baseline systems.

3.3 Specific Federal EA Information Requirements

3.3.1 Cumulative Environmental Effects

Avanti examined how the effects of the Project might combine with past, present and reasonably foreseeable projects. A cumulative environmental effects (CEE) assessment was conducted for water quality, freshwater aquatic resources, physiography / topography, wildlife and their habitat, land and resource use, and visual aesthetics.

For physiography / topography, water quality, and freshwater aquatic resources, effects are primarily linked to historical mining activities at the mine site, and are reflected in the description of the baseline environment. Effects on moose, grizzly bears, land and resource use and visual aesthetics are related to increased vehicle traffic along the two transportation routes. With implementation of traffic management measures, the potential residual cumulative effects associated with the Project are predicted to be minor.

3.3.2 Potential Effects on Species at Risk

Based on the federal *Species at Risk Act* (SARA), fourteen Schedule 1 listed species either occur or could occur within or near the Project area.

Three SARA-listed bird species – the Olive-sided Flycatcher, Marbled Murrelet, and the Great Blue Heron – have been observed at the mine site. Avanti proposes to conduct pre-clearing nest surveys during the breeding period to prevent any potential interaction and disturbance with nesting birds that are breeding in and around the area of the Project. By

initiating these surveys, Avanti does not anticipate any changes to listed bird species and their critical habitat.

The Western Toad and Coastal Tailed Frog represent two SARA-listed amphibian species (Schedule 1) that either occur or potentially occur within the area. While Western Toads have been observed in and around the Project area, no breeding activity has been recorded as the area appears to lacks ideal breeding habitat. No Coastal Tailed Frogs, tadpoles or eggs were identified during baseline surveys.

Avanti proposes to conduct pre-clearing amphibian surveys during breeding periods to minimise any potential effects on the western toad and coastal tailed frog and any other listed amphibian species. No Project-related effects on marine species are anticipated since Project effects on marine water quality VCs are predicted to be minor.

3.3.3 Accidents and Malfunctions

Risk management and contingency planning strategies are designed to minimise the risk of accidents and their consequences on people and the environment. Accidents and malfunctions related to the Project that were considered to be of high risk (i.e., low risk of occurrence, but serious consequences) included wildfire, accidental explosions, motor vehicle accidents, failures of containment ponds, accidental release of ore and waste from stockpiles, and ML / ARD.

Avanti's proposed management systems involves a suite of measures to reduce the risk of such events including personnel training, equipment maintenance, risk assessment during Project design, adaptive management to continually appraise risks and improve mitigation, emergency response and contingency plans, and execution of the site environmental management plan.

3.3.4 Follow-up Program and Monitoring

The EIS presents a follow-up program designed to verify the accuracy of EA predictions, determine the effectiveness of mitigation measures, and guide adaptive management strategies in response to unanticipated environmental effects. Avanti proposes to work with federal and provincial agencies, the Nisga'a Nation and Aboriginal groups to ensure monitoring and follow-up programs comply with applicable government requirements and also address the rights and interests of the Nisga'a Nation and Aboriginal groups.

Proposed monitoring and follow-up programs will be developed for atmospheric effects, aquatic effects, fish and fish habitat, terrain and geotechnical conditions, ML / ARD, soils, and vegetation and wildlife. These programs would form the basis of any necessary adaptive management strategy to address any unanticipated environmental effects that may arise over the duration of the Project.

3.3.5 Economic, Social and Cultural Impacts to Nisga'a Nation

A range of potential economic, social, and cultural impacts of the proposed Project on the Nisga'a Nation, its lands, and citizens are identified, discussed, and addressed in the Kitsault EIS and the ESCIA, which were supported by primary baseline data from household and business surveys and focus groups with residents from Nisga'a Villages and Nisga'a Urban Locals (Rescan 2012).

Effects considered include increased employment and business opportunities for the Nisga'a labour force and businesses, increased income, decreased unemployment rates, increased labour qualifications, increased in-migration to the Nass Valley, increased demand on health, social, and educational services administered by the Nisga'a Lisims Government, increased demand for village infrastructure, a mixture of challenges and opportunities for family and community well-being and cultural activities (e.g., harvesting, attending Nisga'a events, and speaking the Nisga'a language), increased risk associated with Nisga'a citizens working at the mine site and traveling along the Kitsault transportation route, and the possibility of chance finds of archaeological and heritage sites. Most of the effects relevant to the Nisga'a Nation have been assessed as minor with the exception of the economic effects, which are beneficial in relation to employment, income, and contract opportunities.

In terms of Nisga'a resource harvest and management rights defined in the NFA, Avanti expects minimal effects on fish, wildlife, vegetation, air, marine, and water with the exception for Nisga'a moose and grizzly bear allocations. Rescan (2012) also conducted a cumulative incremental effects assessment of key VCs, including employment and population shifts.

Avanit proposes mitigation measures, commitments, and management plans to address Nisga'a-specific effects of the proposed Project. Many of the mitigation measures involve discussions and collaboration between the proponent and the Nisga'a Nation to address Nisga'a employment, business contracts, training, capacity building, and managing natural resources. Avanti will also collaborate with the Nisga'a Nation on developing a Recruitment, Training, and Employment Plan and plans to conduct a cultural needs assessment among Nisga'a mine employees to develop meaningful and relevant programs and initiatives to support and promote Nisga'a cultural experiences and values.

Chance discoveries of archaeological significance during proposed Project construction will be managed in accordance to the Archaeological and Cultural Heritage Resource Management Plan, which includes notification of the Nisga'a Nation. The Transportation and Access Management Plan will also be finalised with input from the Nisga'a Nation. Avanti plans to share information about the proposed Project activities and will communicate on a regular basis issues of importance to the Nisga'a Nation such as transportation, migration, education, health, water quality, wildlife, and access.

Table 1: Summary of Primary Potential Residual Environmental Effects

Potential Residual Effect	Project Phase	Contributing Project Activity or Physical Works	Proposed Mitigation	Significance
Environment - Atmosphere				
Deterioration of air quality and emissions of greenhouse gases.	Construction, Operation, Decommissiong / Closure	Equipment and vehicle emissions, fugitive dust from construction of Waste Rock Management Facility (WRMF) and Tailings Management Facility (TMF), and along forest service roads from moving vehicles.	Use modern construction / mining equipment, proper equipment maintenance, limit equipment idling, minimise land disturbance and clearing / grubbing, impose speed limits on unpaved surfaces, optimise vehicle movements, dust suppression.	Negative, not significant (minor)
Environment - Hydrology				
Change to hydrology of Lime Creek / Patsy Creek.	All	Construction, operation of TMF, Kitsault Pit, WRMF, south diversion channel, and Patsy Creek diversion.	Maximise water recycling, regulate discharge from mining facilities to mimic baseline conditions and compensate for peak and low flow periods, increase volume of freshwater diversions.	Negative, not significant (moderate)
Change in hydrology of Clary Creek.	All	Construction, operation of TMF, WRMF, diversion of water from Lake 493 to Lake 901, use of Clary Lake as freshwater source.	Same as for Lime Creek / Patsy Creek	Negative, not significant (minor)
Environment - Surface Water and Sediment Quality				
Change in surface water quality.	All	Discharges, seepages, surface runoff from TMF, open pit, WRMF, coarse ore stockpile, low grade stockpile (LGS).	Water Management Plan, sediment and erosion control, water treatment facility (if necessary).	Negative, not significant (minor)
Change in sediment quality.	All	Interaction with surface water - discharges, seepage, surface runoff from TMF, open pit, WRMF, coarse ore stockpile, LGS.	Same as for changes in surface water quality	Negative, not significant (negligible)

Potential Residual Effect	Project Phase	Contributing Project Activity or Physical Works	Proposed Mitigation	Significance
Environment - Freshwater Aquatic Resources				
Change in Dolly Varden growth, health, survival in lower Lime Creek.	All	TMF, open pit construction, operation, closure, including effluent release from TMF and overflow from pit post-closure.	'No fishing' policy, Water Management Plan.	Negative, not significant (minor)
Change in growth, health, survival of Coho salmon parr in lower Lime Creek.	All	TMF, open pit construction, operation, closure, including effluent release from TMF and overflow from pit post-closure.	Water Management Plan.	Negative, not significant (minor)
Loss of fish habitat for rainbow trout.	All	TMF and northeast seepage collection pond construction, operation, closure.	No fishing policy, intake screens, use of "Freshwater Intake End-of-Pipe Fish Screen Guidelines", Fish Habitat Compensation Plan, Water Management Plan.	Negative, not significant (moderate)
Change in fish passage at stream crossings along Kitsault Road.	All	Removal of hung culvert on Lake 901 outlet.	Installed per DFO Pacific Region Operational Statements, BC Fish-stream Crossing Guidebook, and BC Forest Road Engineering Guidebook.	Positive, not significant (minor)
Change in rainbow trout health, growth, and survival in Clary Creek Watershed.	All	Construction, operation, closure of TMF, northeast seepage control ponds; water diversions.	No fishing policy, intake screens, use of "Freshwater Intake End-of-Pipe Fish Screen Guidelines", Fish Habitat Compensation Plan, Water Management Plan.	Negative, not significant (minor)
Change in bentho macro-invertebrates abundance and composition in Lime and Clary Creek watersheds.	All	TMF, open pit construction, operation, closure, including effluent release from TMF and overflow from pit post-closure; northeast seepage collection ponds; water diversions.	Fish Habitat Compensation Plan, Water Management Plan.	Negative, not significant (minor)
Environment - Terrain, Surficial Geology and Soils				

Potential Residual Effect	Project Phase	Contributing Project Activity or Physical Works	Proposed Mitigation	Significance
Alteration of baseline landscape condition.	All	Surface disturbance linked to construction, particularly TMF, WRMF, open pit.	Footprint minimisation, erosion control, Reclamation and Closure Plan.	Negative, not significant (moderate)
Environment – Vegetation and Plant Communities				
Loss of baseline ecosystems.	Construction, Operation, Decommissiong /Closure	Physical disturbance from footprint development, particularly TMF.	Dust suppression, minimisation of footprint, soil salvage for reclamation, Reclamation and Closure Plan, Vegetation Management Plan.	Negative, not Significant (minor)
Loss of baseline wetlands to TMF Supernatant Pond.	Construction, Operation	Physical disturbance from footprint development, particularly TMF.	Minimise Project footprint, map on-site wetlands, soil salvage for reclamation, Reclamation and Closure Plan.	Negative, not significant (minor)
Loss of old forests.	Construction, Operation	Physical disturbance from footprint development, particularly WRMF, TMF and northeast seepage collection pond.	Minimise Project footprint, map on-site old forest stands, Timber Salvage Plan, Vegetation Management Plan, Reclamation and Closure Plan.	Negative, not significant (minor)
Loss of potential ecosystems for species at risk.	Construction, Operation	Physical disturbance from footprint development.	Minimise Project footprint, avoid species at risk during site clearing, manage invasive species, soil salvage for reclamation, Reclamation and Closure Plan.	Negative, not significant (minor)
Loss of ecological communities at risk.	Construction, Operation	Physical disturbance from footprint development.	Minimise Project footprint, manage invasive species, map on- site ecological communities, soil salvage for reclamation, Reclamation and Closure Plan.	Negative, not significant (minor)
Loss of cultural plants and habitat for cultural plants.	Construction, Operation	Physical disturbance from footprint development.	Minimise Project footprint, Timber Salvage Plan, manage invasive species, soil salvage for reclamation, Reclamation and Closure Plan.	Negative, not significant (minor)
Environment – Wildlife and Their Habitat				

Potential Residual Effect	Project Phase	Contributing Project Activity or Physical Works	Proposed Mitigation	Significance
Direct habitat loss, mortality and disruption of movement of Western toad.	Construction, Operation, Decommissiong /Closure	Ground disturbance within or near wetland areas from footprint development and presence of TMF and WRMF.	Minimise Project footprint, Wildlife Management Plan, Reclamation and Closure Plan, Environmental Management System.	Negative, not significant (minor)
Direct habitat loss, mortality and disturbance of olive-sided flycatcher.	Construction, Operation	Vegetation clearing and tree felling linked to footprint development, and noise disturbance during ground clearing activities	Minimise Project footprint, habitat avoidance, avoid vegetation and tree clearing during bird breeding periods, pre-clearing nest surveys prior to clearing within bird breeding periods, Noise Management Plan, Reclamation and Closure Plan (re-vegetation, water quality and aquatic monitoring).	Negative, not significant (minor)
Direct habitat loss, mortality and disturbance of sooty grouse.	Construction, Operation	Vegetation clearing and noise disturbance from footprint development and vehicle traffic.	No hunting policy, minimise Project footprint, habitat avoidance, avoid vegetation and tree clearing during bird breeding periods, pre-clearing nest surveys prior to clearing within bird breeding periods, speed limits, Noise Management Plan, Reclamation and Closure Plan (re-vegetation, water quality and aquatic monitoring).	Negative, not significant (minor)
Direct habitat loss and potential mortality of American marten.	Construction, Operation	Vegetation clearing and tree felling from footprint development, and vehicle traffic.	Minimise Project footprint, Wildlife Management Plan (carrion removal), Solid Waste Management Plan, enforce speed limits and manage gate site access points, Reclamation and Closure Plan (re-vegetation, water quality and aquatic monitoring).	Negative, not significant (minor)
Direct mortality and disturbance of moose.	Construction, Operation, Decommissiong /Closure	Vehicle traffic along the transportation route, and increased access to moose winter range from winter ploughing of Nass forest service roads.	Minimise Project footprint, Wildlife Management Plan (no hunting policy, wildlife observations, incident and accident reporting), enforce speed limits, manage gate site access points, road management (lines-of-sight maintained, breaks in winter snow banks provided), Noise Management Plan, Reclamation and Closure Plan (re-vegetation, water quality /aquatic monitoring).	Negative, not significant (moderate)

Potential Residual Effect	Project Phase	Contributing Project Activity or Physical Works	Proposed Mitigation	Significance
Attraction to site and direct mortality of grizzly bear.	Construction, Operation	Human activity and solid waste associated with mine site, and vehicle traffic along transportation route.	Minimise Project footprint, Wildlife Management Plan (no hunting policy, wildlife observations, incident and accident reporting, carrion removal), Solid Waste Management Plan, Bear Management Plan, enforce speed limits, manage gate site access points, road management (lines-of-sight maintained, breaks in winter snow banks provided), Noise Management Plan, Reclamation and Closure Plan (re-vegetation, water quality / aquatic monitoring).	Negative, not significant (minor)
Social - Transportation				
Increased dust, risks of collisions with other vehicles and animals, load spills with increased traffic.	Construction, Operation, Decommissiong /Closure	Project traffic along transportation route.	Traffic safety protocols, regulatory and cautionary signage and self-policing by contractors, maintenance, dust suppression and snow removal, and emergency response plan implementation.	Negative, not significant (minor)
Decreased trapping and guide outfitting opportunities.	Construction, Operation, Decommissiong /Closure	Physical disturbance, presence of footprint and operations.	Minimise Project footprint; Reclamation and Closure Plan, ongoing communication with local stakeholders.	Negative, not significant (negligible)
Change in ambience along transportation routes linked to increased noise, vibration, decreased visual quality with increased traffic.	Construction, Operation	Project traffic along transportation route.	Implementation of Transportation and Access Management Plan.	Negative, not significant (minor)