

KITSAULT MINE PROJECT

ASSESSMENT REPORT

With Respect to
the Application by Avanti Kitsault Mine Ltd.
for an Environmental Assessment Certificate
pursuant to the *Environmental Assessment Act*, S.B.C. 2002, c.43

Prepared by:

Environmental Assessment Office

March 1, 2013



Preface

The Environmental Assessment Office (EAO) manages the assessment of proposed major projects in British Columbia, as required by the *Environmental Assessment Act*. The process includes:

- opportunities for the involvement of all interested parties;
- consultations with First Nations and Treaty Nations;
- technical studies to identify and examine potential significant adverse effects;
- strategies to prevent, or reduce, adverse effects; and,
- development of comprehensive reports summarizing input and findings.

At the conclusion of each environmental assessment, EAO provides a comprehensive assessment report (Assessment Report), and makes recommendations to the Minister of Environment and, for the mine proposals, to the Minister of Energy, Mines and Natural Gas. The Ministers may decide to certify a project, decline to certify a project, or require further assessment.

This Assessment Report considers the proposed project's potential to cause significant adverse environmental, economic, social, heritage and health effects. It identifies measures to prevent or reduce adverse effects, and sets out EAO's analysis and conclusions. It also documents the work undertaken by EAO to consult and accommodate First Nations and Treaty Nations, in keeping with the Supreme Court of Canada's direction in *Haida v. Minister of Forests* and related case law.

Information and records relating to environmental assessments is available on the EAO website at www.eao.gov.bc.ca. Questions or comments can be directed to:

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Acronyms Used in this Report

Act:	British Columbia <i>Environmental Assessment Act</i> , S.B.C. 2002, c. 43.
AEMP:	Aquatic Effects Monitoring Program
AIA:	Archaeological Impact Assessment
AIR:	Application Information Requirements
AOA:	Archaeological Overview Assessment
ARD:	Acid rock drainage
BC:	British Columbia
BCWQG:	British Columbia Water Quality Guidelines
BCIOM:	BC Input/Output Model
BGC:	Biogeoclimatic Ecosystem Classification
BMP:	Best Management Practices
CCME:	Canadian Council of Ministers of the Environment
CEA Agency:	Canadian Environmental Assessment Agency
CESA:	Cumulative Effects Study Area(s)
CMT:	Culturally-modified trees
CO ₂ :	Carbon dioxide
CO:	Carbon monoxide
COPC:	Chemical of Potential Concern
COS:	Coarse ore stockpile
COSEWIC:	Committee on the Status of Endangered Wildlife in Canada
dBA:	Decibel A-scale
DFO:	Department of Fisheries and Oceans Canada
DO:	Dissolved oxygen
EA:	Environmental Assessment
EAO:	British Columbia Environmental Assessment Office
EC:	Environment Canada
EEM:	Environmental Effects Monitoring
EMS:	Environmental Management System
ESCIA:	Environmental, Social and Cultural Impact Assessment
FHCP:	Fish Habitat and Compensation Plan
FLNR:	British Columbia Ministry of Forests, Lands and Natural Resource Operations
FSR:	Forest Service Road
GCO:	Gitxsan Chiefs Office
GDP:	Gross Domestic Product
GHCO:	Gitanyow Hereditary Chief's Office
ha:	Hectare
HDS:	High density sludge
Hwy:	Highway
IBA(s):	Impact Benefit Agreement (s)
JAG:	British Columbia Ministry of Justice and Attorney General
KSM:	Kerr-Sulphurets-Mitchell Copper/Gold Mine Project
kV:	Kilovolt

LGS:	Low grade stockpile
LSA:	Local Study Area
EMPs:	Environmental Management Plans
LiDAR:	Light Detection and Ranging
m:	Metre(s)
MEMP:	Marine Environmental Monitoring Program
MDL:	Method Detection Limit
ML:	Metal Leaching
MMER:	Metal Mine Effluent Regulations
MOE:	British Columbia Ministry of Environment
MOTI:	British Columbia Ministry of Transportation and Infrastructure
Mt:	Million tonnes
NAG:	Non-acid generating
NFA:	Nisga'a Final Agreement
NLG:	Nisga'a Lisims Government
NO _x :	Nitrogen oxides
NTL:	Northwest Transmission Line
NWA:	Nass Wildlife Area
NWMPs:	North Water Management Ponds
PAG:	Potentially acid-generating
PYs:	Person years
RSA:	Regional Study Area
RUEA:	Road Use Effects Assessment
RUIA:	Road Use Impact Study
RUP:	Road Use Permit
SARA:	<i>Species at Risk Act</i>
SSWQO:	Site Specific Water Quality Objectives
SUP:	Special Use Permit
SWMP:	South Water Management Pond
TEM:	Terrestrial Ecosystem Mapping
TSS:	Total suspended solids
TMF:	Tailings Management Facility(s)
VC:	Valued Component(s)
WQMTs:	Water Quality Management Targets
WRMF:	Waste Rock Management Facility
WSC:	Water Survey of Canada

SUMMARY OF THE ASSESSMENT REPORT

Overview of the Proposed Project

Avanti Kitsault Mine Ltd. (Proponent) is proposing to redevelop a brownfield site, a historic mine which last operated in 1982, and develop an open pit molybdenum mine with an ore extraction rate of between 40,000 and 50,000 tonnes per day, located approximately 140 kilometres (km) north of Prince Rupert, located at the head of Alice Arm, BC (proposed Project). The proposed Project is situated within the Nass Area and the Nass Wildlife Area (NWA) (which is included in the Nass Area) but outside of the Nisga'a Lands, all as defined in the in the Nisga'a Final Agreement (NFA). The proposed Project is also located within the claimed traditional territory of the Metlakatla First Nation.

The mine site is currently accessed from Highway (Hwy) 16 via a 194-km series of Forest Service Roads (FSRs), or via an alternate route which joins the FSR system from Hwy 37 (see Figure 1). The transportation corridors between the proposed Project site and Hwy 16 pass through the Nisga'a Lands, the Nass Area and the traditional territories of Metlakatla First Nation, Kitsumkalum First Nation, Kitselas First Nation, several *wilps* of the Gitxsan Nation and a number of *wilps* of the Gitanyow Nation.

Overview of the Environmental Assessment

Environmental Assessment Office (EAO) assessed whether the proposed Project is likely to result in any significant adverse environmental, social, economic, heritage and health effects. The Environmental Assessment (EA) focused on assessing specific potential effects on the following aspects:

- Groundwater quality and quantity
- Surface water quality and quantity
- Freshwater and Marine aquatic resources
- Terrain, surficial geology and soils
- Vegetation and plant communities
- Wildlife and wildlife habitat
- Employment and economy
- Community services and infrastructure
- Land and resource use
- Visual quality
- Heritage and archaeological resources
- Health
- Transportation
- Nisga'a Nation and First Nations Consultations

EAO assessed relevant issues raised by First Nations and the Nisga'a Nation during the course of the EA and whether the Crown has fulfilled its obligations for consultation and accommodation and with respect to its obligations under the NFA. This Assessment Report, EAO's Nisga'a Nation Report and First Nations Consultation Report have been provided to the responsible Ministers for consideration in their decision of whether or not to issue an EA Certificate for the proposed Project.

EAO is satisfied that:

- consultation with government agencies and the public has been adequately carried out by the Proponent;
- relevant issues identified by the public and government agencies were duly considered and assessed by the Proponent during the review of the Application;
- the Crown's consultation duty with First Nations has been discharged;
- the Crown has met its obligations under the NFA; and,
- the proposed Project is not likely to result in any significant adverse effect.

PART A – INTRODUCTION AND BACKGROUND

1 Purpose of the Report

The purpose of this Report is to summarize the EA of the application (Application) by the Proponent for an EA Certificate for the proposed Project. EAO is required to prepare this Report for provincial Ministers who are responsible for making a decision on the proposed Project under section 17 of the BC *Environmental Assessment Act* (Act). For mine projects the deciding Ministers are the Minister of the Environment and the Minister of Energy, Mines and Natural Gas.

The Report:

- describes the proposed Project, provincial EA process, and consultations undertaken during the EA;
- describes EAO's requirements under the NFA and its assessment pursuant to those requirements;
- identifies the potential environmental, economic, social, heritage and health effects of the proposed Project and how the Proponent proposes to mitigate effects;
- identifies the residual effects after mitigation;
- identifies the commitments proposed by the Proponent; and,
- sets out conclusions based on the proposed Project's potential for significant adverse residual effects.

2 Project Overview

2.1 Proponent

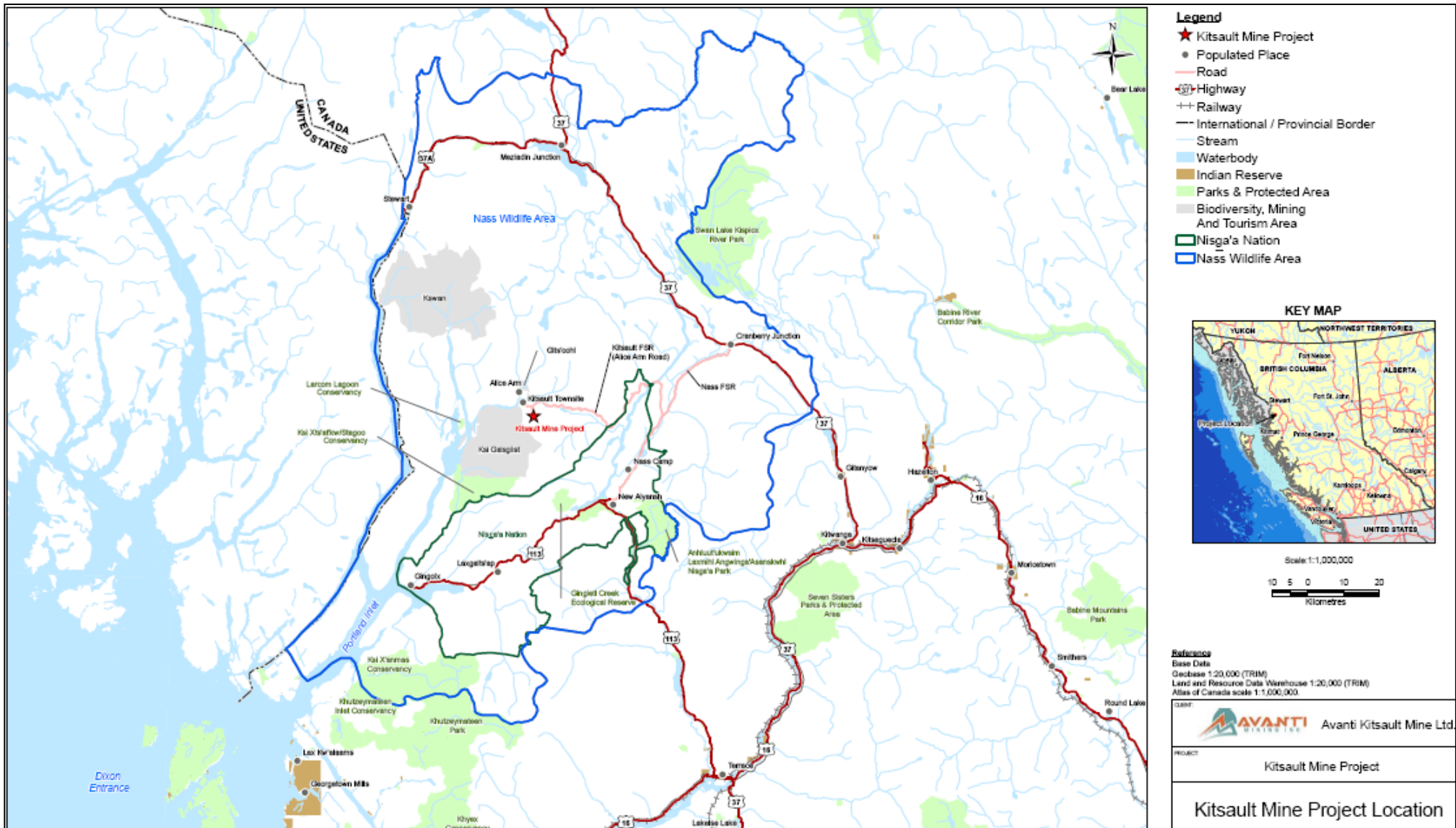
The Proponent for the proposed Project is Avanti Kitsault Mine Ltd., a wholly-owned subsidiary of Avanti Mining Inc., an exploration and development company with its registered office in Vancouver, BC.

2.2 Project Location

The proposed Project is located on Crown land 140 km north of Prince Rupert, at the head of Alice Arm, BC and is within the Nass Area as defined in the NFA.

The proposed Project is situated on site of the old open pit, centred on 55° 25' 19" north latitude and 129° 25' 10" west longitude, and at an elevation of about 600 metres (m) above mean sea level. The mine tenure includes approximately 548 hectares (ha).

Figure 1: Regional Map of the Proposed Project Location



Notes:

- 1) The legend and green boundary labelled “Nisga’a Nation” refers to the boundary of “Nisga’a Lands” as per NFA.
- 2) The Nass Area (boundary not shown) applies to Nisga’a Treaty Rights that are different than those in the NWA and Nisga’a Lands, as per NFA.

2.3 Project Description

The Proponent is proposing to redevelop a historic molybdenum mine which operated between 1968 and 1972 and again between 1981 and 1982. The proposed Project is an open pit molybdenum mine with an ore extraction rate of between 40,000 and 50,000 tonnes per day.

The proposed Project is a truck-shovel open pit mine, operating 24 hours per day for 365 days per year, together with milling facilities for molybdenum ore crushing, grinding and flotation. Over the expected 16 years of operation, the proposed Project would produce over 374 million pounds of molybdenum. The total disturbance area of the mine site and off-site facilities is estimated to be 700 ha, with an additional buffer zone of approximately 350 ha for a total proposed Project area of 1,050 ha. The Application outlines a 25-month construction period, followed by the start of commercial operations, subject to the receipt of all required approvals.

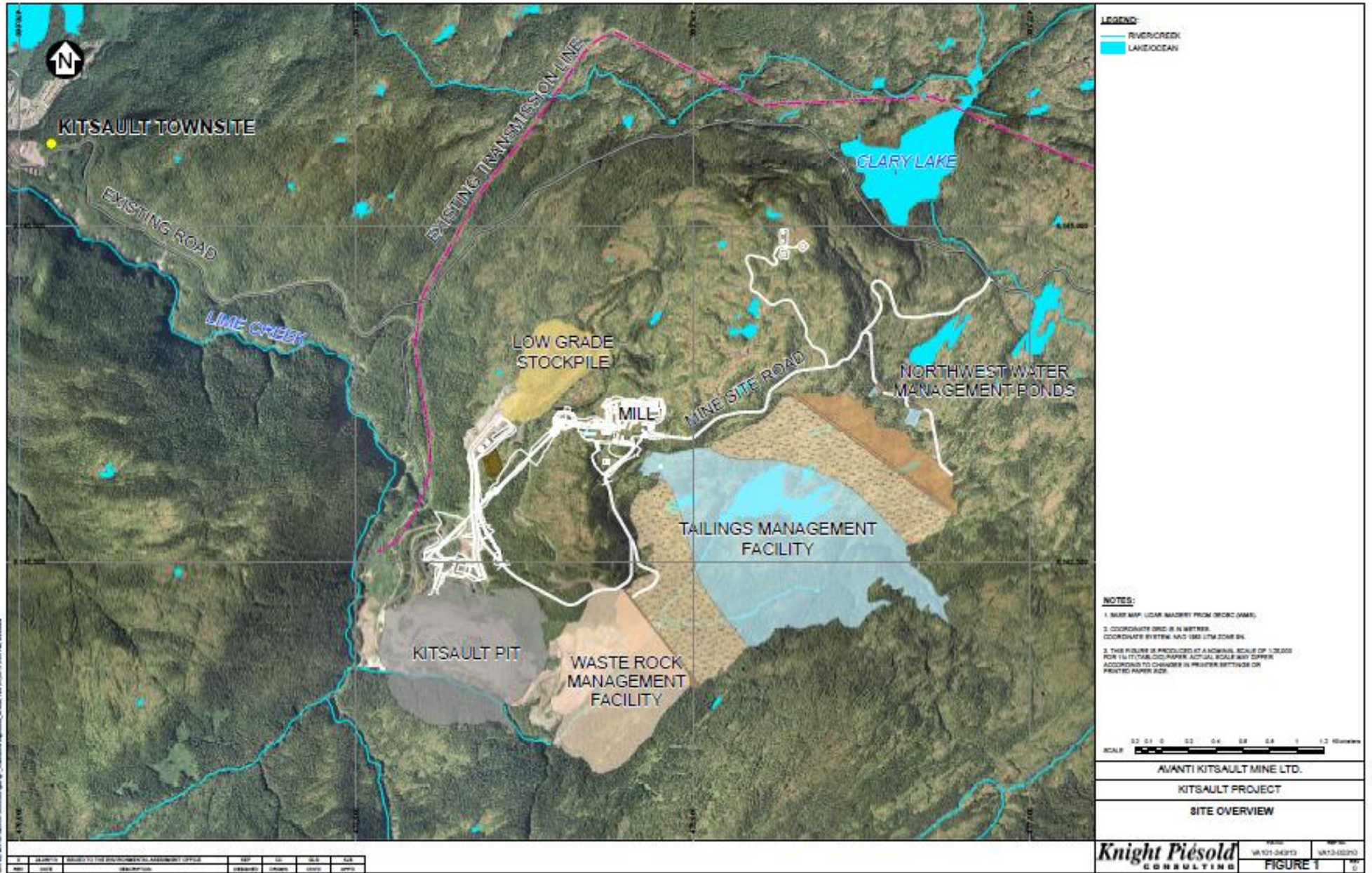
The mine site is currently accessed from Hwy 16 via a 194-km series of FSRs, or via an alternate route which joins the FSR system from Hwy 37. The mine site is serviced by an existing BC Hydro 138 kilovolt (kV) transmission line between the mine site and New Aiyansh, BC.

The scope of the proposed Project consists of the following on-site and off-site components and activities, some of which are shown in Figure 2:

- a 40,000 to 50,000 tonnes per day open pit mine and processing plant;
- mine waste rock and tailings management facilities (TMF) including containment embankments;
- waste rock storage;
- low grade ore stockpile;
- site runoff, diversion and water collection system;
- fresh water supply and treatment system;
- sewage and waste water management facility;
- borrow pit, overburden and topsoil storage;
- construction camps and permanent building complex;
- explosives manufacturing plant and storage;
- fuel storage and/or distribution;
- associated mine facilities such as administration offices, truck shop for vehicle and equipment maintenance, change-house, and laboratories;

- an existing 138 kV transmission line from New Aiyansh to a new substation at the proposed Project site (to be constructed);
- existing roads to access the proposed Project site including the Nass FSR, Nass-Kinskuch FSR, Nass-Kwinatahl FSR and Alice Arm-Kitsault FSR; and,
- transportation of concentrate by truck from the mine site to the port of Vancouver.

Figure 2: Main Proposed Mine Site Components



2.3.1 Changes from the Original Mine Design as a Result of the EA Process

Concerns with initial Mine Plan in the Application

The Proponent submitted an Application to EAO in April 2012 which included water quality predictions within the receiving environment. Concerns were raised by technical reviewers early in the review. These concerns were primarily focused on water quality, water management and potential aquatic effects to the freshwater and marine receiving environment.

Some of the key concerns with the Application included:

- water quality in the Lime Creek Watershed;
- water quality in the Clary Creek Watershed;
- effects to marine and aquatic species, including benthic invertebrates;
- marine water quality in Alice Arm; and,
- baseline water quality data set included impacts from historic mining and therefore was not representative of natural conditions.

Concerns were also raised by technical reviewers regarding the terrestrial environment. These concerns focused on mine site wetlands and transportation and wildlife. Some specific terrestrial environment concerns with the Application included:

- mine plan and location of mine components;
- removal of wetlands in the TMF area;
- reclamation and closure plan; and,
- transportation options and potential effects on the Nass moose population from increased mine-related traffic and access from winter plowing of the Nass FSR.

Project changes during EA review period

In response to issues and concerns raised by the Working Group and EAO, the Proponent developed a number of supplemental technical memorandums and information packages which were distributed on July 31, 2012, September 28, 2012, October 1, 2012, and October 31, 2012. Most of the supplemental information addressed changes to the Proponent's water management plans, revised water quality modelling results, freshwater and marine aquatic effects assessments and management plan frameworks. A number of the supplemental memorandums also addressed terrestrial wildlife and transportation-related issues.

The supplemental technical memorandums provided by the Proponent during the EA review are posted to EAO's website at:

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html

Due to the large volume of technical responses, the Proponent requested and was granted a three week suspension in October 2012 in order for the Working Group to review the memorandums supplied by the Proponent.

In response to this information and the concerns expressed by EAO and the Working Group, the Proponent made a number of major changes to the proposed Project design including additional mitigation measures to address these concerns. These are outlined in Table 1 below. The revised project design and additional mitigation measures are further defined in the Certified Project Description and Table of Conditions (Appendix 2).

Table 1: Summary of Major Changes to the Proposed Project

Mine Component	Previous Proposal	Revised Proposal
Low Grade Ore Stockpile Seepage and Runoff	Not directed to TMF	Collected and directed to TMF during all phases of the proposed Project as required per Condition 5 and <i>Mines Act</i> permit requirements.
Existing Clary and Patsy Dump Seepage and Runoff	Not directed to TMF	Collected and directed to TMF during all phases of the proposed Project as required per Condition 5 and <i>Mines Act</i> permit requirements.
North Water Management Ponds (NWMPs)	Pump back of water to TMF during operations.	Continuous pump back of water from the NWMPs to the TMF for all phases of the proposed Project, as required per Condition 5 and <i>Mines Act</i> permit requirements. Seepage collection pumps to capture all of the seepage water that bypasses the NWMPs.
Water Management	Disproportional discharge as compared to the natural hydrology of Lime Creek.	Continuous discharge from the TMF throughout the year, with percentage of total discharge modified to reflect the natural hydrograph, as per discharge permit requirements.

<p>Water Treatment</p>	<p>The provision for water treatment in the Post-Closure phase if acidic conditions develop.</p>	<p>Commitment to Condition 4 and 6. Additional water treatment to ensure protection of aquatic life:</p> <ul style="list-style-type: none"> • Operational water treatment in the TMF reclaim water cycle (i.e. in-Mill water treatment); • Closure water treatment in the TMF utilizing reclaim system (i.e. in-Mill water treatment); and in-pit water treatment during the last year of Closure; and, • Post-Closure (neutral conditions) treatment of South Water Management Pond (SWMP) water.
<p>Waste Rock</p>	<p>No segregation of non-acid generating (NAG) and potentially acid generating (PAG) waste rock.</p>	<p>As per Condition 2 and 3 and permit requirements.</p> <ol style="list-style-type: none"> a. Proponent to complete an assessment of the potential benefits of segregation of waste rock and submerging PAG waste rock in the Open Pit, if measurable benefits are found to long term water quality then b; b. Assess whether it is technically feasible to segregate waste rock that would lead to measurable long term water quality benefits, and if technically feasibly then c; c. Develop a plan to segregate waste rock and submerge PAG waste rock in the Open Pit during reclamation and closure to realize the benefits to long term water quality.

TMF Wetlands	Re-establish wetlands during reclamation of the TMF	As per Condition 13, Proponent to undertake additional surveys and develop a Wetland Compensation Plan to address residual effects to red- and blue-listed ecological wetland communities.
Transportation and Wildlife	No formal management plan	Develop a Wildlife Corridor Management Plan and a Transportation Safety Management Plan. Commitment to additional mitigation measures as per Conditions 15 to 21 regarding Transportation and Road Use.

2.3.2 Final Mine Plan Proposed by Proponent

The final mine plan proposed by the Proponent is defined in the Certified Project Description and summarized below. Access to the mine was not changed as a result of the Proponent's changes to the mine plan.

The proposed Project is still proposed as an open pit mine utilizing conventional truck and shovel equipment. Molybdenum ore will be processed at a rate of between 40,000 t/d and 50,000 t/d, for up to 16 years. The final dimensions of the Kitsault Pit are proposed to be approximately 1.2 km in diameter and 300 m deep, with a volume of 134.9 million cubic metres (Mm³).

The Proponent's proposed waste management plan is to store waste rock on land in a waste rock management facility (WRMF). A total of up to 210 Million tonnes (Mt) of waste rock is expected to be generated over the life of the mine. Up to 160 Mt will be placed in the WRMF.

A short-term stockpile will be used to store small quantities of ore (up to 340 thousand tonnes) before it is sent for processing. A long-term stockpile will store low grade ore (up to 35 Mt) mined early in the life of the proposed Project and milled toward the end of operations. In the event that the low grade ore is not fully milled during operations, the contingency plan is to put this rock into the pit and submerge.

Processing facilities will process ore mined from the Kitsault Pit into a concentrate. The primary crusher will be used. The crushed ore will be conveyed over a horizontal length of up to 1,500 m to the coarse ore stockpile (COS) west of the Process Plant. The

Process Plant will include the mills, flotation cells, several related ancillary structures, and process systems.

The TMF will manage tailings (i.e., the waterborne unthickened slurry of materials left over after the process of separating the valuable fraction of molybdenum concentrate from the uneconomic ore produced at the processing facilities). The total tailings production will be up to 16 Mt per year. The TMF has been designed for secure and permanent storage of approximately 270 Mt of tailings. The TMF includes provision, if the proposed Project were expanded, to store up to 300 Mt of tailings.

The tailings impoundment and supernatant¹ pond will be created by two embankments constructed with a combination of local borrow materials, the cyclone sand fraction of the tailings, and waste rock from the mining operation. The TMF includes a South (rockfill) Embankment, a Northeast (cyclone sand) Embankment, cyclone sand towers, bulk and cleaner tailings delivery and distribution pipeworks, freshwater channel diversions, a seepage collection system, a reclaim system to recycle water to the Process Plant, and a surplus water system to release water to Lime Creek.

Contact water (i.e., water, seepage, or runoff that has been in contact with historic mining features and new mine facilities such as the Kitsault Pit, the WRMF, ore stockpiles, and TMF embankments) will be pumped back to the TMF during all mine phases and managed within the mine site with one point of active discharge to Lime Creek as per permit requirements and applicable regulations. This process will be maintained until closure.

Freshwater runoff from upstream areas not affected by the mining operation will be diverted to reduce the amount of water in contact with disturbed areas of the mine site; this includes diverting Patsy Creek around the Kitsault Pit (on a bench along the south wall of the Kitsault Pit) toward Lime Creek. A collection system of ditches, pipes, sumps, and pumps will be used to manage water. The Kitsault Pit water will be managed within the mine site and discharged to Lime Creek as per permit requirements and appropriate regulations.

Water in contact with the Low Grade Stockpile (LGS) includes seepage and surface runoff. A vertical sump located downstream of the LGS will collect water that comes into contact with it. LGS contact water will be pumped back to the TMF during all mine phases and managed within the mine site and discharged to Lime Creek as per permit requirements and applicable regulations.

¹ Water that is used in mine processing, which forms a pond in the TMF as suspended solids (tailings) settle out of the effluent from the processing plant.

Water in contact with the WRMF includes seepage and surface runoff. A vertical sump or wet well located downstream of the WRMF will collect water that comes into contact with it and the surrounding area, as well as leakage from the drainage ditches located to the south of the WRMF. WRMF contact water will be pumped back to the TMF during operations and managed within the mine site and discharged to Lime Creek as per permit requirements and applicable regulations and as described in the Certified Project Description and to meet conditions.

Up to 12 Mm³ of water will be impounded in the TMF prior to start-up. Ongoing operations will reclaim water from the TMF pumping it from the TMF supernatant pond to a process water-holding tank at the mill. A reclaim water pump will be mounted on a floating barge located on the TMF pond.

Active discharge of surplus water to the receiving environment will be required throughout the mine life to maintain a water balance in the TMF. Surplus water will be stored on-site within the TMF, pumped from the supernatant pond to the Mine Water Discharge point north of the Kitsault Pit and ultimately discharged to Lime Creek downstream of the Kitsault Pit.

During Operations, in-mill treatment via sulphide addition to the tailings slurry or process tailing streams will precipitate metal sulfides. An impermeable barrier (i.e. TMF divider) has been suggested by the Proponent to meet water quality conditions. It could be constructed within the tailings impoundment to separate filtered from unfiltered supernatant water. Supernatant water from the unfiltered section of the tailings pond could be drawn through microfilters and discharged to the filtered section. Discharge to the environment from the TMF could occur from the filtered water containment area. The exact type of treatment technology used would be determined in permitting, but discharge would have to meet EA Certificate conditions.

During closure, treatment as described above for the Operations phase will continue throughout the Closure phase. In addition, lime and coagulants will be added to the pit lake prior to discharge from the pit. Post-closure (under neutral and acidic conditions) water treatment will be with high density sludge (HDS) lime treatment and sulphide addition.

Closure of the TMF will involve maintaining an open water body or lake over a portion of the tailing sand beaches in perpetuity. Areas of the south and north beaches not covered by water will be reclaimed to a stable upland. At closure, reclamation material will be placed over the non-inundated tailings beaches (north and south) and the downstream slope of the Northeast Embankment.

The north and south beaches will be fertilised in accordance with soil requirements and seeded with the annual ground cover. The next step involves planting the native deciduous tree and shrub. Leaf litter and coarse woody debris (including stumps and

root systems) will also be applied. These areas will be re-vegetated in accordance with the specifications to meet end land use objectives, erosion prevention, and invasive plant control.

3 Assessment Process

3.1 Provincial EA Process – Major Milestones

- On March 19, 2010, the Proponent submitted a Project Description to EAO and requested that the Executive Director of EAO designate the proposed Project as reviewable project under section 7(3) of the Act.
- On April 8, 2010, EAO issued an Order to designate the proposed Project as a reviewable project under section 7(3) of the Act (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_356_32043.html).
- The EA process started on June 24, 2010, when EAO issued an Order to this effect under section 10 of the Act (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_356_32390.html).
- On November 24, 2010, EAO issued an Order under section 11 of the Act which defined the scope of the proposed Project, and the procedures and methods for conducting the review (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_356_32892.html).
- On June 3, 2011, EAO issued an Order under section 13 of the Act which modified the scope of the proposed Project and added additional First Nations to be consulted (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_356_33426.html).
- On October 6, 2011, EAO approved final Application Information Requirements (AIR) to the Proponent (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_356_33754.html).
- On December 22, 2011, the Proponent submitted their initial Application for evaluation.
- On January 6, 2012, EAO extended the time limit of the evaluation of the Application, by 15 days, under section 24(4) of the Act. On February 2, 2012, EAO further extended the time limit of the evaluation of the Application, by 10 days, under section 24(4) of the Act. Both changes were at the request of the Proponent to allow reviewers additional time to screen the Application against AIR. (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_356_33984.html http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_356_34042.html).
- On February 17, 2012, EAO determined that the Application contained the information required by the AIR. EAO indicated that the 180 day period would commence when the Proponent provided their final updated Application (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html).

- On April 30, 2012, the Proponent submitted an updated Application and EAO distributed the Application to Working Group members. The 180-day review began.
- On September 28, 2012, the Proponent requested a three week timeline suspension to enable the Working Group to review new water management and treatment information. The request was granted by EAO on October 1, 2012, on day 154 of the 180-day EA review, and the suspension was again lifted on October 22, 2012.
- On March 1, 2013, EAO referred the proposed Project to Ministers for a decision on whether to issue an EA Certificate.
- On March 1, 2013, EAO extended the time limit for the 180 day review, by 104 days, under section 24(4) of the Act.

3.2 Public Consultation

EAO invited public comment on the draft AIR for the proposed Project from March 9, 2011, to April 8, 2011, and held an open house in Terrace, BC, which was attended by 57 people. The key issues raised by the public included: impacts to wetland function, aquatic and marine life, community water system, human health and safety, and tourism and economic opportunities for surrounding communities.

Kitsault Resort Ltd. which is a private company, who purchased the historic Kitsault town site with the vision of transforming it into a wilderness resort, raised a number of issues in their submission to EAO during the public comment period. They included:

- water quality with respect to public health and ecological impacts;
- human health impacts from noise, dust and air quality;
- access road safety;
- safety concerns associated with the storage and use of explosives and the location of the TMF;
- low grade ore stockpile and WRMF;
- cumulative water quality effects on groundwater and in Lime Creek;
- safety concerns relating to catastrophic events; and,
- economic effects on environmental tourism values and the operation of Kitsault Resort Ltd.

EAO received comments from four individuals and organizations, including the Kitsault Resort Ltd., on the draft AIR, and considered those comments prior to issuing the final AIR to the Proponent on October 6, 2011.

The formal review of the Application was initiated on April 30, 2012, and the Application was posted to EAO's electronic Project Information Centre (e-PIC).

(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html)

The Application was made available to the public in local libraries in Terrace and Prince Rupert, BC.

A 30-day public comment period on the Application was held from May 11, 2012, to June 11, 2012. The public comment period and open house was advertised in one local newspaper in the week prior to the open house.

An open house was held by EAO during the Application review period, in Terrace on May 23, 2012, and was attended by 25 people. The open house provided information about the provincial and federal EA process and provided information on the proposed Project.

EAO received comments from 10 individuals and organizations, including Kitsault Resort Ltd. Issues raised by the public generally included: impacts to air quality, ground and surface water quality, marine aquatic life; dust, noise, vibrations, health and safety, tourism; increased traffic; and potential economic, employment and business benefits to the local communities. Most comments were extremely positive and focused on the economic benefits of the proposed Project.

Throughout the review of the Application, EAO continued a dialogue with Kitsault Resorts Ltd., visited the property and met with Kitsault Resorts Ltd. and the Proponent in an attempt to resolve issues related to potential effects on their interests.

A summary of the Proponent's consultations which contains details of public consultations in the Pre-application period and a consultation plan for the Application review period are included in section 4.5 of the Application

(http://a100.gov.bc.ca/appsdata/epic/documents/p356/d34296/1335994225310_c972ed43a4f0a29ee25796d6b050c5ba9d0f1f3a2c79eb6501fa247c9b6b170a.pdf).

3.3 Nisga'a Nation Consultation

The mine site (proposed Project footprint) is situated within the Nass Area but falls outside of Nisga'a Lands. The transportation route for the proposed Project is situated within the Nass Area and within Nisga'a Lands. Nisga'a Nation, as represented by Nisga'a Lisims Government (NLG) participated in the technical Working Group and Transportation Working Group, were kept fully informed of progress of the EA and were provided with all information that was sent to the Working Groups.

A separate Nisga'a Nation Report provides a detailed review of Nisga'a Nation consultations and EAO conclusions with respect to the obligations under Chapter 10 of the NFA. That Report is in [Part D](#) of this document.

3.4 First Nations Consultation

The proposed Project is situated within the asserted traditional territory of the Metlakatla First Nation. Metlakatla First Nation participated in the technical Working Group, were kept fully informed of progress of the EA, and were provided with all information that was sent to the Working Group.

The transportation route of the proposed Project is situated within the asserted traditional territories of several First Nations, including the Metlakatla First Nation, Kitsumkalum First Nation, Kitselas First Nation, Gitksan Nation and the Gitanyow Nation. These First Nations were invited to participate in the EA as members of the Transportation Working Group.

[Part C](#) of this Report provides a detailed review of First Nations consultations and EAO conclusions with respect to the consultation process, and the potential for impacts to asserted aboriginal rights.

PART B – ASSESSMENT OF POTENTIAL EFFECTS, MITIGATION, AND SIGNIFICANCE OF RESIDUAL EFFECTS

4 General

4.1 Assessment Methodology

4.1.1 Assessment of Potential Significant Adverse Effects Methodology

In undertaking this evaluation, EAO assessed whether the Project as proposed is likely to have significant adverse environmental, economic, social, heritage and health effects, including cumulative impacts, having regard to the mitigation measures proposed in the Application or otherwise developed through the EA process. This section is intended only as summary of the methodology followed by EAO.

To determine what may constitute a “significant” residual cumulative effect, EAO uses the following definitions²:

Context

- Refers to the ability of the environment to accept change.
- The adverse environmental effects of projects may be more significant if they occur in areas or regions that:
 - Have already been adversely affected by human activities; and/or,
 - Are ecologically fragile and have little resilience to imposed stresses.

Duration and Frequency

- This refers to the length of time the effect lasts and how often the effect occurs;
 - Duration of the impact relates to the period from the start of the impact to the end of the impact. The definition does not differentiate between construction, operation, or decommissioning and reclamation. Examples include:
 - Immediate (impact occurs for less than two days);
 - Short-term (impact occurs for two days or longer but less than one year);
 - Medium-term (impact occurs for one year or longer but less than ten years); and,
 - Long-term (impact occurs for ten years or longer).

² This is generally consistent with the analysis used in federal EAs under the *Canadian Environmental Assessment Act*, although EAO has added the factor of “probability”.

- Frequency of occurrence refers to how often the impact will occur during a specified period of time. Examples include:
 - Frequent;
 - Infrequent;
 - Isolated (impact occurs during a specified period);
 - Occasional (impact occurs intermittently and sporadically over assessment period);
 - Regular (impact occurs regularly over assessment period); or,
 - Continuous (impact occurs continually over assessment period).

Geographic Extent

- This refers to the extent of change over the geographic area of the proposed Project, or the area of impact in relation to the proposed Project. For example:
 - Widespread;
 - Local (impact confined to the area directly disturbed by project facilities);
 - Subregional (impact extends beyond area of direct disturbance but is limited to the Local Study Area (LSA));
 - Regional (impact extends beyond the LSA but is limited to the Regional Study Area (RSA)); and,
 - Extra-regional (impact extends beyond the regional study area).
- When considering this criterion, it will be important to take into account the extent to which adverse environmental effects caused by the proposed Project may occur in areas far removed from it (e.g., acid rain and the long-range transportation of atmospheric pollutants), as well as contribute to any cumulative environmental effects.

Magnitude

- Refers to the severity of the adverse environmental effects. For example:
 - Negligible (no discernible impact);
 - Low;
 - Medium; or,
 - High.
- Minor or inconsequential effects may not be significant. On the other hand, if the effects are major or catastrophic, the adverse environmental effects will be significant.
- When using this criterion, it is important to consider the extent to which the proposed Project could trigger or contribute to any cumulative environmental effects.

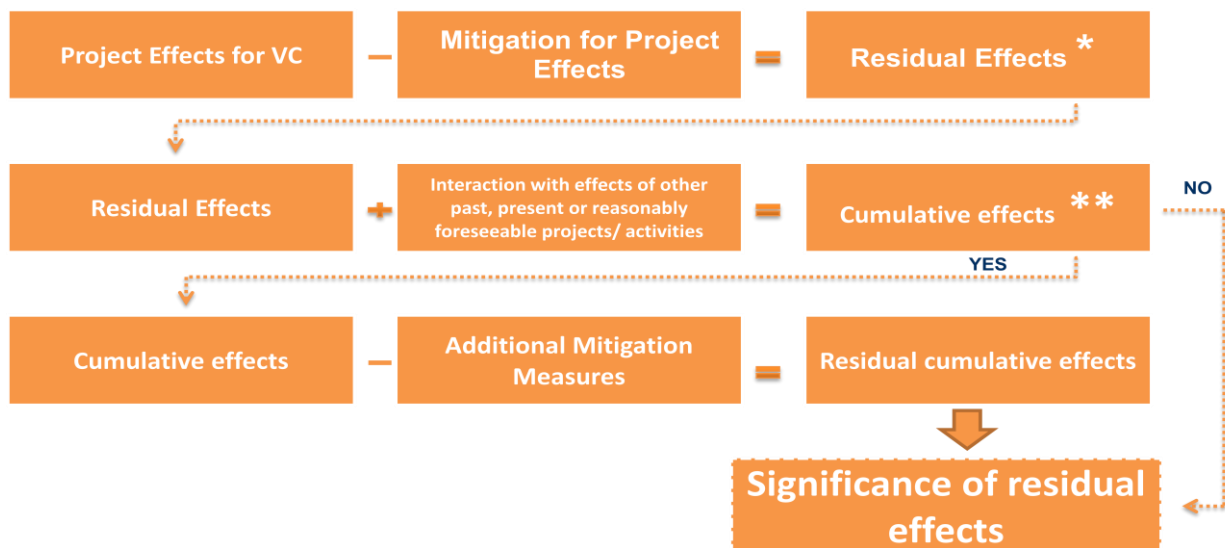
Probability

- The likelihood that an adverse effect will occur.
- If there is a high probability that the identified significant adverse environmental effects will occur, obviously they are likely. Conversely, if there is a low probability of occurrence, the significant adverse environmental effects are unlikely.

Reversibility

- This refers to the degree to which the effect is reversible or permanent. For example:
 - Reversible in short-term (impact can be reversed in less than one year);
 - Reversible in medium-term (impact can be reversed in one year or more, but less than ten years);
 - Reversible in long-term (impact can be reversed in ten years or more); or,
 - Irreversible (impact is permanent).
- Reversible adverse environmental effects may be less significant than adverse environmental effects that are irreversible. In practice, it can be difficult to know whether the adverse environmental effects of a project will be irreversible or not.
- It will be important to consider any planned decommissioning activities that may influence the degree to which the adverse environmental effects are reversible or irreversible.

Figure 3: EAO Flow Chart for Determining Significant Residual Cumulative Effects



* If there are no residual effects, no further steps are needed.

**If there are no cumulative effects, the significance of the residual effects should be determined.

The specific parameters for assessing the level of significance vary according to the valued component (VC); that is, a “local” effect for a grizzly bear has a different geographic measurement than a “local” effect for an invertebrate.

4.1.2 Ensuring the Crown’s Duties to Consult and Accommodate First Nations

EAO is also required to ensure that the honour of the Crown is discharged by ensuring appropriate consultation and accommodation of First Nation interests in respect of the decision by ministers as to whether to issue an EA Certificate. First Nations’ comments and interests in terms of consultation and specific consideration of the Crown’s duty to consult and accommodate First Nations’ interests are specifically factored into the analysis in [Part C](#) of this Report. There is often considerable overlap between the interests of First Nations and the assessment of environmental, economic, social, heritage and health effects. First Nations’ comments and interests that directly relate to the environmental, economic, social, heritage and health assessments are discussed in [Part B](#) of this Report.

4.1.3 Ensuring the Crown’s Obligations to Uphold the Terms of the NFA

EAO is also required to ensure that the Crown’s obligations under the NFA are met. There is considerable overlap between the obligations under Chapter 10 of the NFA and the assessment of environmental, economic, social, heritage and health effects considered under the Act. Nisga’a Nation comments and interests in terms of consultation are specifically addressed in EAO’s Nisga’a Nation Consultation Report in [Part D](#). NFA can be found at <http://www.nnkn.ca/files/u28/nis-eng.pdf>.

4.1.4 Spatial Boundaries

The Proponent’s Application contains details on the spatial extent of the study area boundaries for assessing potential project impacts. The Application includes several figures which depict the study areas for specific disciplines. The spatial extent of a LSA and RSA boundaries for specific disciplines are described in Table 2 below:

Table 2: Spatial Area Study Boundaries for Potential Effects

Discipline/VC	LSA (ha)	RSA (ha)
Air/Environmental Health	5,000	15,400
Terrestrial (Soils and Geomorphology)	2,500	5,200
Noise	4,000	20,000
Fisheries, Aquatics and Surface Water	6,400	18,500
Human Health and Socio-Economics	238,000	5,000,000
Visual	2,600	126,000
Land and Resource Use	2,600	77,000
Wildlife and Vegetation	2,000	5,200
Archaeology	2,700	164,000
Marine Aquatics and Fisheries	851	2,700

4.1.5 Temporal Boundaries

Temporal boundaries for the effects assessment are defined by the characteristics of the proposed Project and the VCs being assessed, and include the time prior to project-related activity (baseline) and the periods when the VC will be affected by the proposed Project. Details are provided in the Proponent's Application. Table 3 below illustrates the phases of the proposed Project and activities associated with each phase.

Table 3: Description of each Phase of the Proposed Project

Phase	Duration (months or years)	Description
Construction	25 months	Construction of: interim water management facilities (e.g., diversion ditches, sediment ponds and temporary coffer dams for construction); mine processing facilities (the mill building, semi-mobile crusher, the overland conveyor, the mill conveyor and the pebble circuit); TMF; camp complex (accommodations for workers); earthworks (including removal and stockpiling of topsoil and organics) and foundations; and open pit preparation. Construction of water treatment facilities as per permit requirements and applicable regulations.

Operations	16 years	Mining, processing/milling, operation of explosives plant and water management facilities, ongoing establishment of the TMF, and transportation of concentrate, supplies and personnel. Construction and operation of water treatment facilities as per permit requirements and applicable regulations.
Closure and Decommissioning	15 – 17 years	Facility demolition, dismantling and removal, and site reclamation. At the outset of the closure phase, the water management system would be reconfigured to allow the open pit to fill with water discharged from the TMF and other sources on the mine site. It is expected to take 15 to 17 years for the pit lake to build up to the level of the pit rim. Construction and operation of water treatment facilities as per permit requirements and applicable regulations. This phase ends when the pit begins to discharge to the environment.
Post-closure	5+ years	Construction and operation of water treatment facilities. Ongoing environmental monitoring and site management to ensure effective reclamation as per permit requirements and applicable regulations.

4.2 Cumulative Effects

EAO integrates potential cumulative effects into the significance analysis of relevant valued environmental, economic, social, heritage and health components as identified by EAO, the Proponent, Working Group members or the public. EAO considers potential cumulative effects through:

- An examination of background information on relevant VCs including:
 - Approved land use plans that designate the most appropriate activities on the land base; and,
 - Historical data, trends and comprehensive baseline studies that set out the current conditions and factor in effects of prior developments.
- An identification of potential impacts of the proposed Project on relevant VCs.
- An identification of potential overlapping impacts due to other developments, even if not directly related to the proposed Project.
- An identification of predicted impacts from future developments that are reasonably foreseeable and sufficiently certain to proceed.

- An assessment of the potential for residual adverse effects, taking into account the mitigation measures proposed by the Proponent for the proposed Project.
- An assessment of the significance of any residual effects after mitigation, considering the following factors: magnitude, geographic extent, duration and frequency, reversibility, context and probability.

The cumulative effects of the proposed Project on VCs are evaluated by EAO based on past, present and reasonably foreseeable project and/or activities included in the cumulative effects assessment as described in Table 4 below.

Table 4: Projects and Activities Included in the Cumulative Effects Assessment

Project/Facility/Activity	Description/ Location	Status of operations	Temporal timeframe
Kitsault Resort Ltd. (formerly Kitsault townsite).	Located 5 km northwest of the proposed Project by road. The Kitsault townsite was built in 1978 to support the molybdenum mining operation of Amax of Canada Ltd. Purchased by a new owner, Krishnan Suthanthiran in 2005.	In January 2013, the owner announced a plan to develop the property into an LNG/oil refining and export facility.	Ongoing
Water Licenses	Within the RSA, there are ten active water licence applications and three current water licences. One registered groundwater well is located near the site of the historic open pit mine.	Conceptual. Syntaris Power Corp. has requested a waterpower licence over a relatively large area that overlaps a small portion of the proposed Project footprint.	Operations

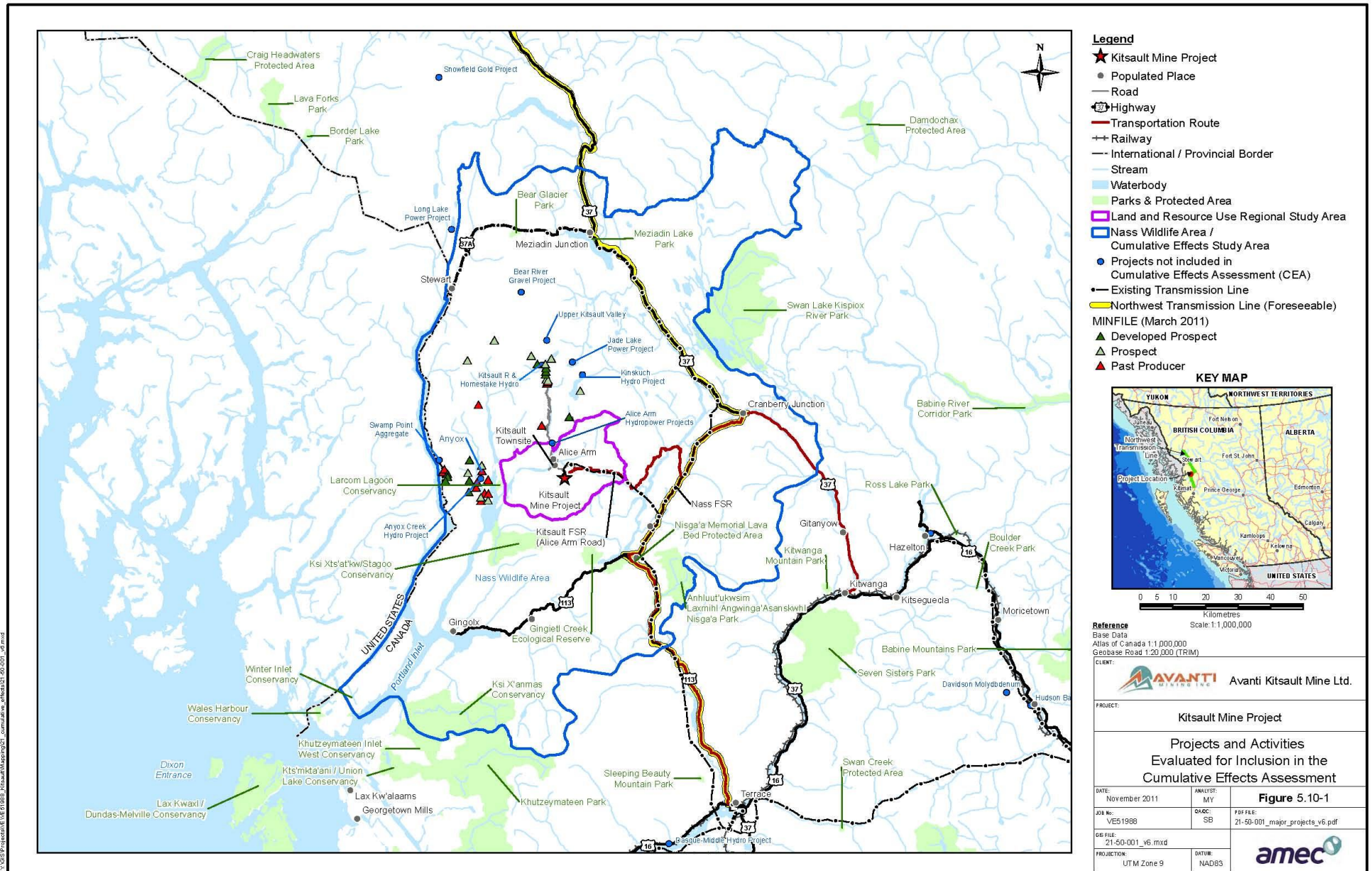
Project/Facility/Activity	Description/ Location	Status of operations	Temporal timeframe
Trapping and guide outfitting	Coast Mountain Outfitters (also known as Milligan's Outfitting) holds a Guiding Territory Certificate for the entire RSA. Registered trap line #0614T-088 encompasses the entire proposed Project footprint.	Operational	Ongoing
Marine traffic (Alice Arm Lodge water taxi and recreational users)	Alice Arm	Ongoing	Ongoing
Recreational fishing	Alice Arm, Kitsault River, Illiance River.	Ongoing	Ongoing
Nisga'a Nation and First Nations' hunting, trapping, fishing and other uses	The proposed Project is located within the NWA and the larger Nass Area, within which Nisga'a citizens have the right to harvest wildlife, fish and migratory birds as defined by the NFA.	Ongoing	Long-term
BC Hydro's Northwest Transmission Line (NTL) Project	A 344 km 287 kV transmission line along Hwy 37 from Terrace to Bob Quinn, BC. Received an EA Certificate, February 23, 2011.	Clearing and access construction presently underway	Operational by 2014
Kerr-Sulphurets-Mitchell (KSM) Project	Copper and gold open pit mine, located 65 km Northwest of Stewart, BC.	Pre-application stage of EA	Predicted construction by 2015.

Note:

- 1) This table only includes projects and activities included in the cumulative effects assessment as per the Proponent's Application section 5 Assessment Methodology for determining potential cumulative effects.
- 2) The Proponent's Application Table 5.10-1: Project Inclusion List included all projects and activities considered and identified which were or were not carried forward in the cumulative effects assessment along with supporting rationale based on the assessment methodology.

As shown in Figure 4 below, the Proponent's Application included a map of all the projects and activities evaluated for inclusion in the cumulative effects assessment. This figure shows the cumulative effects assessment Study Area boundary (same boundary as the NWA) and shows which projects were not included in the cumulative effects assessment.

Figure 4: Projects and Activities Evaluated for Inclusion in the Cumulative Effects Assessment



5 Assessment of Potential Environmental Effects

5.1 Aquatic Environment – Surface Water and Sediment Quality

5.1.1 Background Information

Water quality was the predominant issue discussed in the EA for the proposed Project. Water quality is clearly linked and connected to a variety of VC's including surface hydrology, groundwater, freshwater and marine aquatic resources, wildlife and human health. For the purposes of the EA, these VCs are discussed separately. This Report also breaks water down into its separate components of water quality and quantity of both surface water and groundwater; and in terms of potential aquatic effects to freshwater and marine receiving environments.

This section provides an overview of the watersheds within the Project Area, freshwater and marine receiving environments and key surface water and sediment quality issues in order to help the reader understand the interconnection of these issues and potential effects to freshwater and marine ecosystem components.

Other key issues in the assessment of potential effects to the aquatic environment regarding surface hydrology (water quantity) and groundwater VC's are summarized in section 5.2 and 5.3 respectively. The assessment of potential effects to freshwater and marine aquatic resources VC's are summarized in section 5.4 and 5.5 respectively.

Watershed Overview

The proposed Project mine site is located within three small watersheds (Lime Creek, Patsy Creek and Clary Creek Watersheds), all which drain into the marine environment in Alice Arm, as shown in Figure 5 below.

Most of the historic and proposed mine site facilities are located within the Patsy Creek watershed (including Patsy Lake), which is a tributary to the Lime Creek watershed draining directly into Alice Arm. The total surface area to be disturbed from the proposed Project facilities footprint within the Patsy Creek watershed is approximately 8.7 km², which represents 21.9% of the total Lime Creek watershed area which is 39.7 km².

A smaller portion of the mine infrastructure is located within the Clary Creek watershed (including Lake 901 and Clary Lake), which is a tributary to the Illiance River draining into Alice Arm near the head of the inlet. The total surface area to be disturbed from the proposed Project facilities footprint within the Clary Creek watershed is approximately 1.8 km², which represents 4.9% of the total Clary Creek watershed area which is 36.7 km².

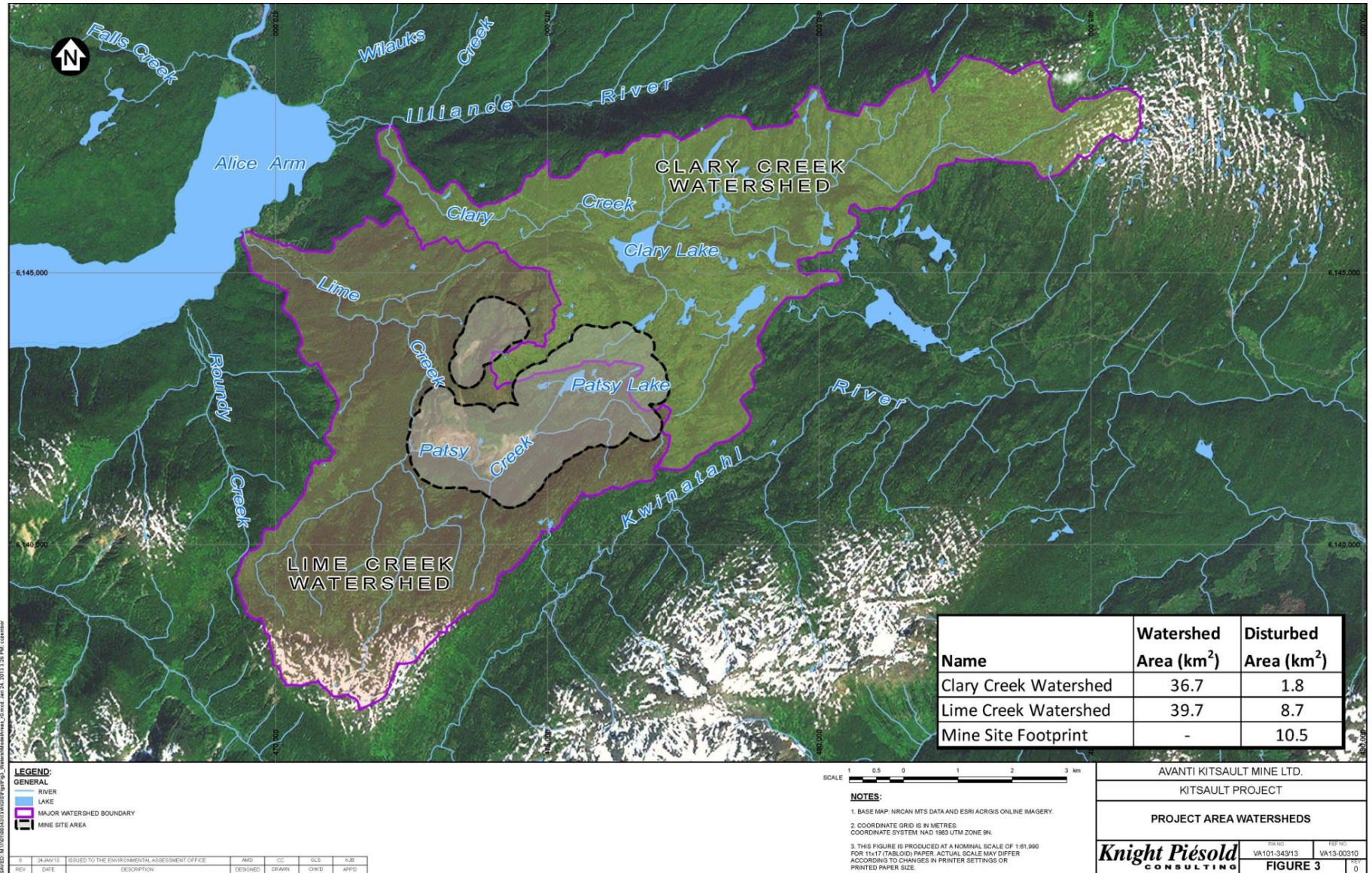
Other adjacent watersheds draining into Alice Arm include Roundy Creek and the Kitsault River; however, these watersheds are not affected by the proposed Project and

do not receive drainage from the Project area.

The Kitsault River is the largest watershed draining into Alice Arm and accounts for about 57 percent (%) of the total fresh water discharge to Alice Arm. For watershed context, the Lime Creek watershed accounts for approximately 5% of the total fresh water discharge into Alice Arm; and the Illiance River accounts for approximately 17%.

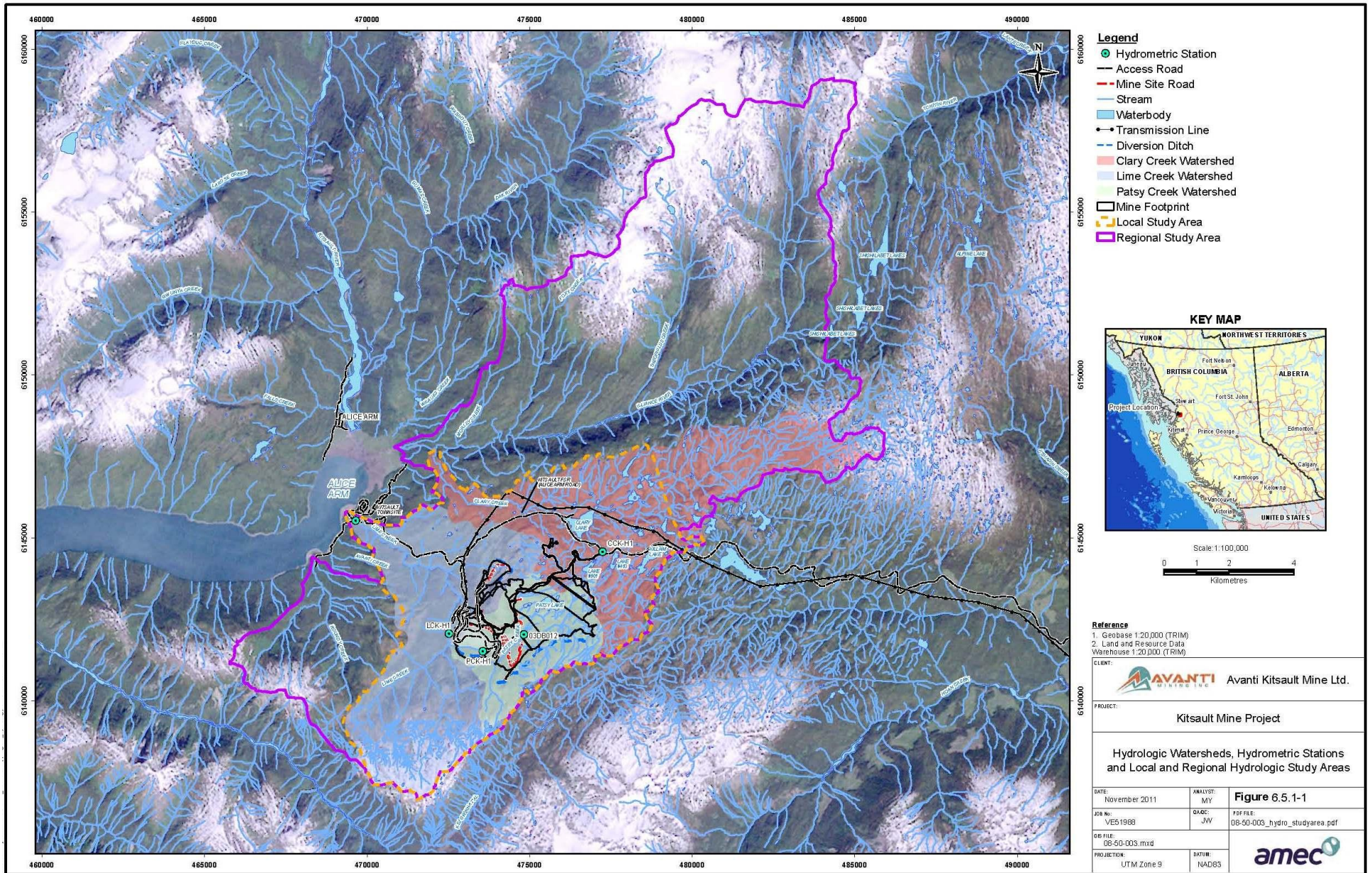
As shown in Figure 5, the Kitsault River estuary is located at the head of Alice Arm in close proximity to the Illiance River and Lime Creek estuaries resulting in overlapping sediment deposition zones and combined influences on marine water quality and sediment quality in Alice Arm. Figure 6 also shows the proposed Project area footprint within Lime Creek, Patsy Creek and Clary Creek Watersheds; and the LSA and RSA used in the Proponent's Application for aquatic environment VC's surface water and sediment quality, surface hydrology and freshwater aquatic resources.

Figure 5: Lime Creek, Patsy Creek and Clary Creek Watersheds and Footprint within the Proposed Project Area



Note: The Kitsault River is the largest watershed draining into Alice Arm (shown in top left of Figure, west of the Illiande River). See Figure 6.

Figure 6: Watersheds within the LSA and RSA and Footprint within the Proposed Project Area



Historic mining impacts and current water quality

As part of the cumulative effects assessment in their Application, the Proponent looked at historic mining impacts in other areas of Alice Arm. The Kitsault River, a major watershed influencing marine water and sediment quality in Alice Arm, has also been impacted from historic mining projects. Most significant was the Dolly Varden Mine, a silver mine which operated periodically from 1910-1959. The historic Anyox Smelter³ in Observatory Inlet located west of Alice Arm, which operated from 1910-1935, also contributed metal loading to the marine environment from discharge of slag waste from ore smelting operations.

The proposed Project site itself experienced two periods of historic mining. The first was from 1968 to 1972 and the second from 1981 to 1982. The first round of mining involved direct tailings discharge to Lime Creek and the more recent mining operations involved submarine disposal of tailings into Alice Arm on the ocean bottom.

The potential impact of historic mining and its contribution to diminished water quality in Lime Creek and in Alice Arm was a significant issue discussed during the EA. The Proponent's Application notes that historic mine facilities remaining in the proposed Project area include the original Kitsault open pit and the Patsy and Clary waste rock dumps, 3 and 27 Mt of waste rock respectively. These facilities are impacting current water quality conditions in Lime Creek.

In order to be able to more accurately discuss and separate historic impacts of mining from current or proposed mining activities, the Proponent was asked, during the review of the Application, to differentiate between current "baseline" (which reviewers suggested was not an accurate description of a baseline since it was already being impacted by historic activities) and pre-mining "pristine" water quality. In order to provide this information, the Proponent sampled actual water quality in upper Lime Creek and upper Patsy Creek (upstream of the influence from historic mining activities) and blended these two data sets together using a water quality model to create a synthetic data set of pre-mining "natural" water quality conditions downstream of the mine site near the confluence of Lime Creek and Patsy Creek. The modelled assumption of water quality prior to historical mining activity was called "natural" and was used to compare against current conditions and future predicted water quality in Lime Creek. Water quality monitoring locations where samples were collected are shown in Figure 7 below.

³ The historic Anyox Smelter in Observatory Inlet west of Alice Arm shut down operations in 1935, however it continues to contribute metal loadings to the marine environment from ARD and metal leaching generated from the underground workings and exposed tailings area.

Throughout this Report, a number of phrases are used to describe water quality conditions at different monitoring locations in Lime Creek and Patsy Creek, as described below:

- LC1 – this is the historic water quality monitoring station on lower Lime Creek. It is located near the mouth of Lime Creek approximately 0.5 km upstream from where it enters Alice Arm. For reference and watershed context, LC1 is located approximately 5.5 km downstream of the mine site. The upper limit of fish distribution in Lime Creek is located approximately 1.8 km upstream from the mouth of Lime Creek due to a fish barrier⁴;
- LC2 – is located near the mine site immediately downstream of the confluence of upper Lime Creek and Patsy Creek. LC2 is also the modelling point where the Proponent combined water quality data sets from upper Lime Creek (LC3) and upper Patsy Creek (PC2) to synthesize pre-mining “natural LC2” water quality conditions. For reference and watershed context, LC2 is approximately 6 km upstream from the mouth of Lime Creek. The proposed single point of discharge of mine effluent to Lime Creek during operations, closure and post-closure is located just upstream of LC2, adjacent to the existing Kitsault open pit;
- LC3 – this is where pristine water from upper Lime Creek was collected upstream of the influence from historic and proposed mining activities; and,
- PC2 – this is where pristine water from upper Patsy Creek was collected upstream of the influence from historic and proposed mining activities.

As a result of this modelling effort, there are actually three types of baselines which were discussed and used in the EA. They include:

- “Pristine” - actual water quality upstream of historic mining. This corresponds to PC2 and LC3 monitoring locations which represent background water quality upstream of the influence from historic mine facilities;
- “Natural” - a modelled assumption of what water quality at the mine would have been prior to mining. This is modelled at a point which corresponds to LC2; and,

⁴ An 8 m high waterfall located in Lime Creek 1.8 km upstream from Alice Arm. Dolly Varden adults were captured immediately below this waterfall which is the upper limit of all fish distribution in Lime Creek. The first impediment to upstream fish passage to most fish species utilizing lower Lime Creek, (including juvenile coho salmon and juvenile Dolly Varden), is a 3 m high bedrock cascade located approximately 268 m upstream from Alice Arm. Lime Creek upstream of the 8 m high waterfall at km 1.8 and the Patsy Creek watershed within the mine footprint is non-fish bearing.

- “Current” – this is current water quality which has been impacted by historic mining and is based on samples collected at LC1⁵ and LC2⁶ from 2009-2012.

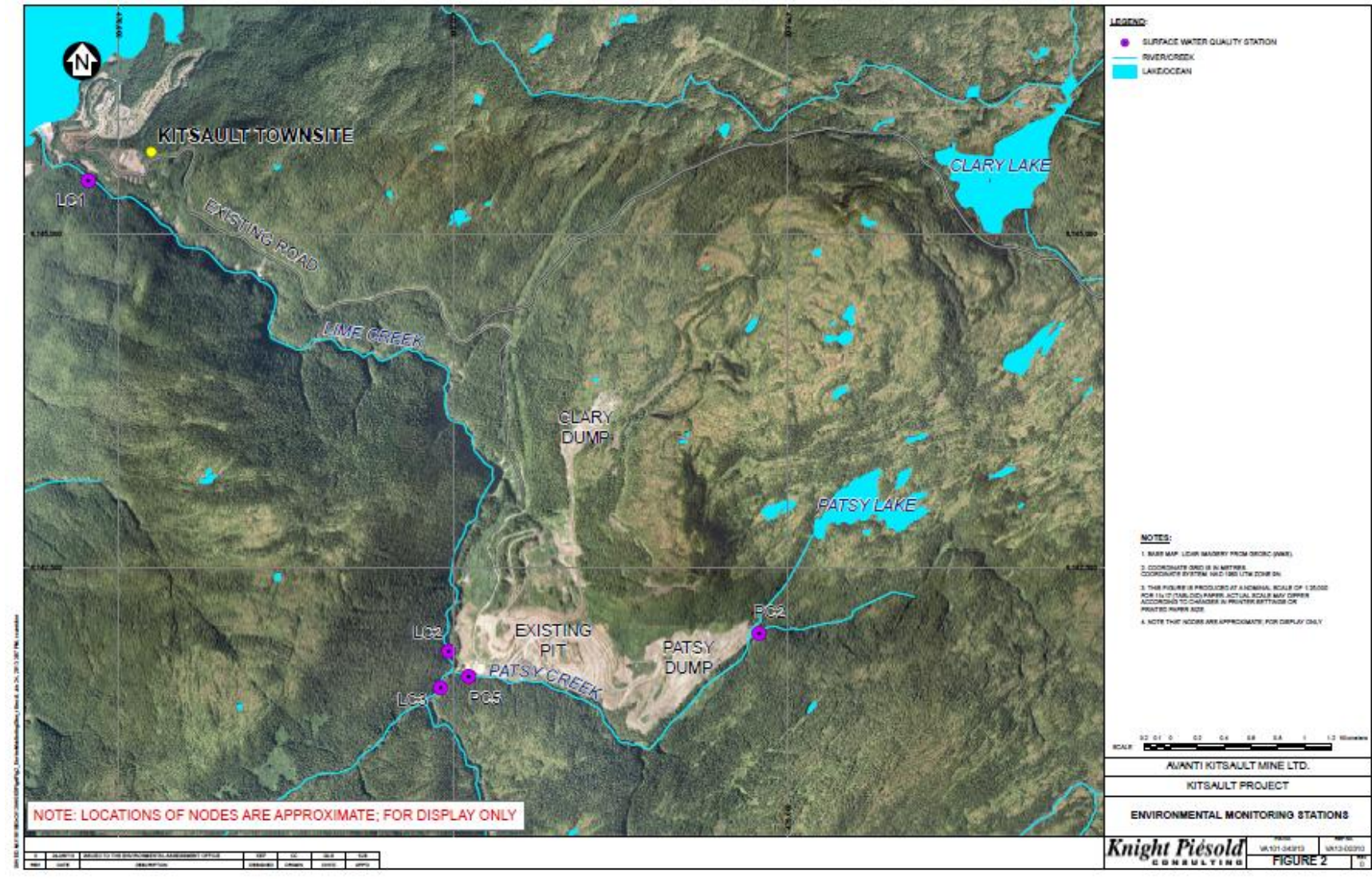
It should be noted that “natural” modelled conditions at LC2 are based on water quality data from upstream of both the historic mining area and the mineralized zone that makes up the Kitsault deposit. Patsy Creek flows through the Kitsault deposit and has eroded into parts of the deposit over time contributing to metal levels in downstream water quality and sediment quality in Lime Creek. Other sources currently contributing to metal loadings to Lime Creek include the historic mine infrastructure such as the existing pit and Patsy and Clary waste rock dumps shown on Figure 7 below. Because the “natural” modelled data do not include the influence of the Kitsault deposit, the “natural” modelled conditions may understate dissolved metal levels at LC2. The degree of mineralization and influence from the Kitsault deposit on current and natural background water quality was an issue which arose in the later stages of the review. This issue was further discussed and the Proponent provided additional context in supplemental memorandums regarding the water quality modelling methods and results.

It is worth noting that without water quality data collected prior to mining over 40 years ago, which does not exist, it is impossible to know what pre-mining “pristine” water in lower Lime Creek would have been. The Proponent’s water quality modelling to synthesize pre-mining “natural” water quality at LC2 represents the best estimate available in effort to understand what the water quality conditions may have been prior to mining, and to understand how historic mining impacts are influencing current conditions in lower Lime Creek.

⁵ Current water quality at LC1 is based monthly samples collected from March 2009 to June 2012.

⁶ Water quality sampling at LC2, however, is periodic and limited due to safety concerns. The Proponent notes the LC2 sampling point is in a steep canyon and winter avalanche hazards sometimes do not allow for safe sampling. The Proponent has committed to conducting a terrain hazard analysis and developing a plan to facilitate safe access for future water quality monitoring at LC2.

Figure 7: Water Quality Monitoring Locations in the Lime Creek Watershed



Baseline Water Quality – Lime Creek Watershed

The Application (section 6.6) notes that “current” baseline water quality data were collected by various consultants from 1990 to 2010. The Proponent conducted additional baseline water quality monitoring from 2010-2011. Streams in the proposed Project area are generally typical of BC coastal streams, having low alkalinity and hardness, slightly acidic to slightly basic pH, and low nutrient and metal concentrations.

The Application notes, however, that Lime Creek is an exception and current water quality has elevated metal concentrations because it receives drainage from highly mineralized areas and existing mine infrastructure, including the historic Kitsault pit and waste rock dumps. The Application presents current water quality information for six surface water monitoring stations located throughout Lime Creek and Patsy Creek.

This information shows exceedances of British Columbia Water Quality Guidelines (BCWQG) and Canadian Council of Ministers of the Environment (CCME) guidelines for a number of parameters of concern. These parameters include fluoride, nitrite, sulphate, aluminum, cadmium, copper, iron, molybdenum and zinc. The existing water quality data indicate that water quality guidelines for one or more parameters of concern are always exceeded in Lime Creek (LC1) under current conditions. However, several of these parameters of concern exceed guidelines only periodically at certain times of the year and only at some sampling stations.

The range and frequency of exceedances of BCWQG under current conditions at LC1 (using the 30 day max criteria) were further discussed in supplemental reports provided by the Proponent including revised water quality modelling results and a sensitivity analysis of current water quality data. The range and frequency of exceedances above BCWQG are both important for providing context to the magnitude of the exceedances and assessing potential effects to aquatic life.

BCWQG and CCME guidelines for protection of freshwater aquatic life are meant to be protective of the most sensitive receptors and thus are applied across BC as an initial tool when predicting effects to the environment. It is important to note that these guidelines apply to receiving waters and are not legally enforceable. Whereas, discharge permit regulations (i.e. waste discharge authorization under the *BC Environmental Management Act*) apply to effluent quality and are legally enforceable.

The Application notes that the most significant stream total metal concentrations occurred at the Patsy Creek sampling station adjacent to the historic Kitsault Pit during low flow periods. Current water quality exceeded the BCWQG Maximum guidelines for cadmium, chromium, and copper while the CCME guidelines were exceeded by aluminum, cadmium, chromium, copper, iron, lead, and molybdenum.

Information presented by the Proponent during the review of the Application also showed that the “natural” pre-mining water quality modelling predictions for Lime Creek had a number of exceedances for BCWQG during certain times of year for a number of parameters, including aluminum, cadmium, copper and molybdenum⁷.

Baseline Water Quality - Clary Creek/Illiance River Watershed

The Application also contains information on water quality monitoring locations sampled in the Clary Creek and Illiance River Watersheds, which drains to the northeast of the TMF. This watershed includes Clary Lake and Lake 901 and eventually drains into Alice Arm.

The Application provides information that shows that most parameters were within the BCWQG for the protection of freshwater aquatic life. Exceptions to this included water samples collected near the bottom of Clary and Lake 901, which had a number of parameters exceeding the BCWQG. Cadmium has been noted to have exceedances in the Illiance River, both upstream and downstream of the confluence with Clary Creek.

Baseline Sediment Quality

Baseline sediment quality in Patsy Creek, Lime Creek and Clary Creek Watersheds were discussed in the Application (section 6.6).

The Application provides information which shows that baseline sediment quality in streams within the proposed Project area frequently exceeds applicable government guidelines, due to local mineralization and the spatial overlap with historic mining activities in the Patsy Creek/Lime Creek watershed. The Proponent’s Application Appendix 3C: “Geochemical Characterization Kitsault Molybdenum Project” (SRK Consulting, 2011) provides data and detailed discussions regarding the local mineralization and historical mining activities in the proposed Project Area.

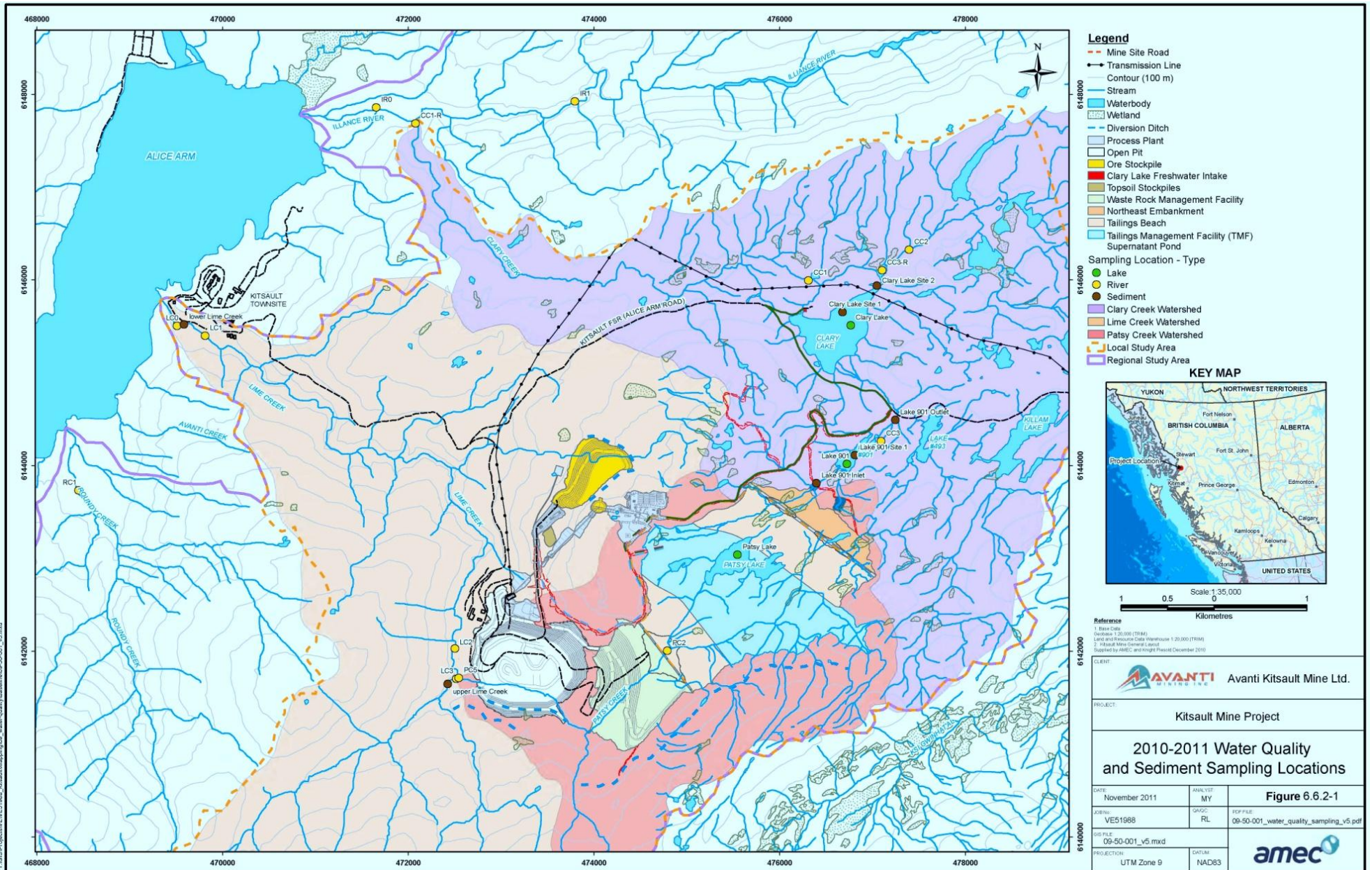
Stream sediments exceeded guidelines at all sampling sites in 2009 and 2010. Arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, silver and zinc exceeded guidelines in stream sampling sites. Arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver and zinc exceeded guidelines in lake bottom sediment sampling sites.

The sediments from Patsy Lake were also observed to have high metal concentrations exceeding guidelines for arsenic, cadmium, chromium, copper, mercury, and zinc.

Figure 8 below shows locations of sediment sampling within the proposed Project Area.

⁷ The Proponent notes that the model for “natural” water conditions likely under-estimates metal loading because it is very likely that Patsy Creek would have been subject to increased natural metal loadings as it passed through the deposit area. This assumption is challenged by some reviewers.

Figure 8: 2010-2011 Water Quality and Sediment Sampling Locations



Marine Baseline Water Quality and Sediment Quality – Alice Arm

Marine water quality and sediment quality in Alice Arm was another significant issue discussed during the EA, with particular concerns raised by Nisga'a Lisims Government (NLG) regarding historical mining impacts, current baseline conditions with sediment quality exceeding marine guidelines for protection of aquatic life, potential ecological effects and potential human health effects from the consumption of shellfish.

Marine water quality and sediment quality were selected as VC's and discussed separately in the Proponent's Application section 6.8 (Marine Aquatic Resources). Detailed baseline information was provided in Application Appendix 6.8-A: Marine Aquatic Resources Baseline Report.

Key marine water quality and sediment quality issues and concerns identified during Application Review are summarized in section 5.5 of this Report.

In addition to historic mining impacts regarding tailings discharged to Alice Arm, as discussed earlier in this Report, a brief overview of marine baseline information is provided here as it is important for context and consideration in the assessment of freshwater (surface water) quality and sediment quality in Lime Creek, VC interactions and potential marine aquatic effects in Alice Arm, particularly to marine sediment quality and aquatic life within the Lime Creek estuary.

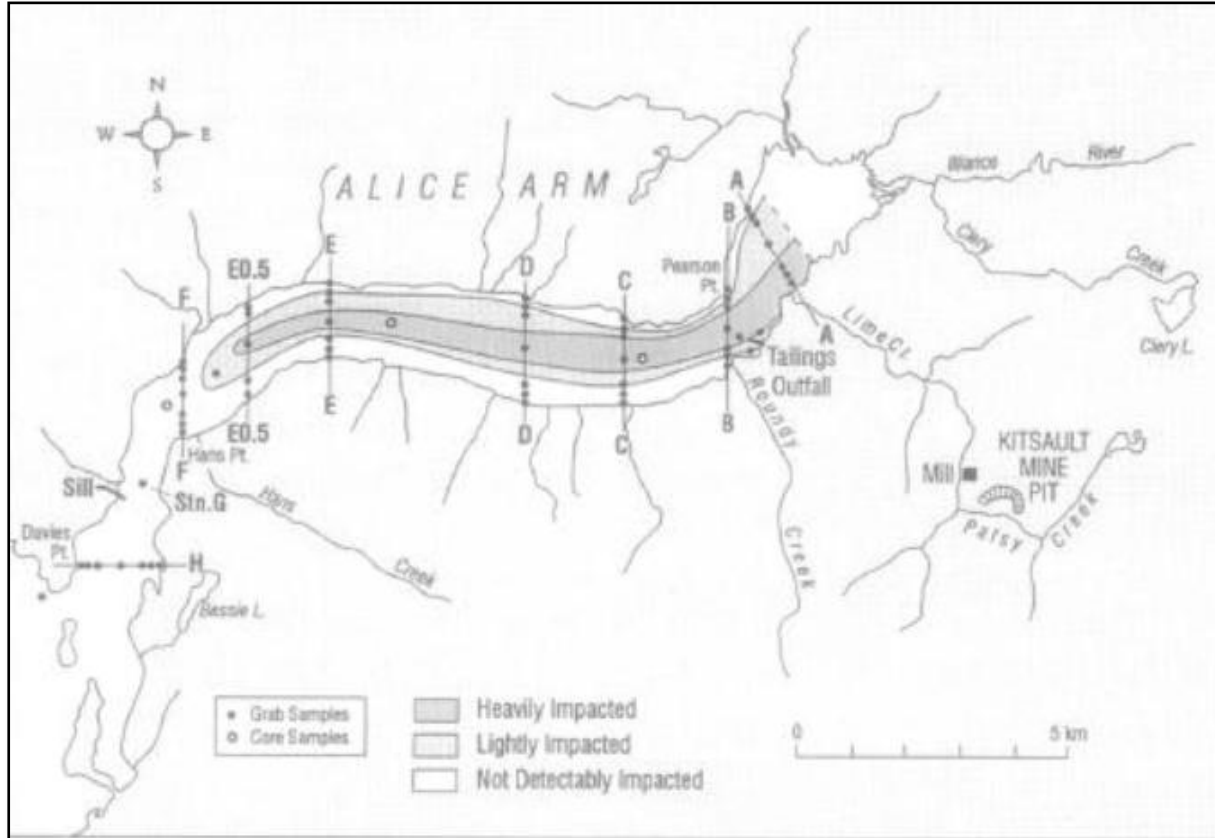
It is also important for context, as noted previously, the Lime Creek watershed accounts for approximately 5% of the total fresh water discharge into Alice Arm. The proposed Project's single point of release of mine effluent from the TMF is located in Lime Creek upstream of LC2, which is approximately 6 km upstream from the Lime Creek estuary in Alice Arm.

The Proponent's Application and supplemental memorandums provided information on previous studies by Odhiambo et al. (1996) which identified historic impact areas in Alice Arm with sediment quality exceeding BC guidelines. This is shown in Figure 9 below. This study identified a heavily impacted area of approximately 14 square km extending from the head of Alice Arm near the Kitsault River and Lime Creek to the sill of the inlet located near Hans Creek. The historic impact area is largely a result of previous Kitsault mine operations from 1968-1971 and 1981-1982 with tailings disposal to Lime Creek and direct discharge of tailings to Alice Arm via a submarine tailings outfall located offshore west of Lime Creek.

A recent independent study entitled "Environmental Impact Assessment of Alice Arm" completed by Helen Ford (2012) for the BC Ministry of Environment (MOE) showed evidence of historic contamination with elevated metal concentrations in marine sediment and shellfish tissue in Alice Arm likely attributable to historic tailings discharges to Lime Creek and Alice Arm. Both of these reports highlighted the need for

comprehensive monitoring of water quality, sediment quality and representative marine organisms.

Figure 9: Historic Tailings Impact Area in Alice Arm Based on Sediment Quality Study by Odhiambo et al. (1996)



Other potential sources of impacts to sediment quality in Alice Arm include the historic Dolly Varden Mine within the Kitsault River Watershed, as well as other human activities and natural geologic and hydrologic conditions within the Kitsault River and other watersheds draining into Alice Arm. Other potential sources of metal loadings to sediment quality and shellfish tissue with elevated metal levels in Alice Arm could include historic marine disposal of slag waste from the Anyox ore smelter operations in Observatory Inlet, located west of Alice Arm, although the presence of the inlet sill (i.e. ocean bottom shelf) at the entrance into Alice Arm may influence marine sediment transport from Observatory Inlet. As noted previously, the Anyox Smelter operated from 1910-1935; however, it continues to contribute metal loadings to the marine environment from acid rock drainage (ARD) and metal leaching generated from the underground workings and exposed tailings area.

A full discussion on Surface Water and Sediment Quality can be found in Proponent's Application and supplemental technical memorandums posted to EAO's website at: http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html

5.1.2 Project Issues, Effects and Proposed Mitigation in the Application

The Application provided information on the potential impacts, without mitigation, to surface water from a range of mine infrastructure, including seepage, runoff and discharge from the various proposed facilities, including the TMF, open pit, WRMF, existing waste rock, low grade ore stockpile and other associated structures. These effects would occur throughout construction, operations, closure and post-closure. Potential effects on the Lime Creek and Clary Creek Watersheds included:

- changes in surface water quality in the proposed Project area;
- changes in metals, nutrients and major ions concentrations in the receiving waters;
- changes in runoff, groundwater, and seepage influenced by Metal Leaching (ML) ML/ARD; and,
- changes in sediment quality from metals export and sedimentation associated with the proposed mining activities influencing downstream sediment in receiving waters.

The Application included water treatment mitigation proposed during post-closure when the Proponent assumed the onset of wide spread ARD would occur; however, no treatment was initially proposed during operations or closure.

Water Quality Model Predictions Presented in the Application

The Application provided a significant amount of information on the Proponent's water quality model, which predicted surface water quality effects at all phases of the proposed Project. Effects were generally predicted to peak towards the end of operations and would decline gradually through closure and post-closure. The proposed treatment of mine contact water approximately 35 years into post-closure was assumed to improve water quality significantly over previous mine phases.

Information in the Application predicted that water quality in Lime Creek would exceed a number of BCWQG parameters (30 day or maximum) in Lime Creek for fluoride, sulphate, aluminum, cadmium, chromium (VI), copper, mercury and zinc.

The Proponent noted that the key parameter of concern for the Lime Creek watershed was cadmium⁸, with modelled concentrations shown in the Application at times being as high as 18 times BCWQG during operations and 14 times the BCWQG during the post-closure period prior to treatment. A number of other parameters were predicted to exceed guidelines in lower Lime Creek.

The Application notes that, during post-closure, exceedances for all metals and parameters of concern in Lime Creek were predicted to decline over time. However, at year 34, the model presented in the Application assumed (based on an assessment of ARD potential) that the waste rock dumps would begin to turn acidic and begin leaching metals at a higher rate. The Proponent provided for the contingency of a water treatment facility at post-closure if required.

Similar to predicted effects in the Lime Creek drainage, the Application predicted that key parameters of concern for the Clary Creek watershed (Lake 901 in particular) would be cadmium and mercury. These parameters would reach peak concentrations shortly after closure once the seepage ponds near the northwest tailings dam would be left to naturally spill towards Lake 901.

Water quality predictions in the Clary Creek watershed were predominantly driven by seepage through the cyclone sand dam⁹. Modelled cadmium concentrations for the Clary Creek watershed shown in the Application reached levels up to 40 times higher than BCWQG during closure/post-closure phase, while mercury was up to 6 times higher than BCWQG. Other parameters that exceeded BCWQG were sulphate, aluminum, arsenic, cadmium, chromium, copper, iron, lead, selenium and zinc.

The Application states that some water quality issues result in BCWQG exceedances further downstream into Clary Lake, but only cadmium persists into the Illiance River, where current baseline conditions already exceed guideline limits. Baseline water quality sampling on the Illiance River in March 2012, identified cadmium exceeding the BCWQG, both upstream and downstream of the confluence with Clary Creek.

Summary of Mitigation Proposed in the Application

The Application outlined the Proponent's mitigations to address sedimentation and water quality effects. The Application proposed Best Management Practices (BMP) and a range of water quality mitigation measures incorporated into project design elements

⁸ One of the most toxic of the heavy metals, cadmium is known to affect the calcium balance in aquatic organisms. In fish, it does so by competing with calcium for binding sites on the gill surfaces. Sufficiently high cadmium concentrations can lead to severe calcium deficiency, leading to death. Longer exposure to lower cadmium concentrations may also impair growth, reproduction and survival in fish and lead to higher cadmium concentrations in tissues, which could pose risks to wildlife.

⁹ "Cyclone" sand is actually finely ground rock which is produced as a by-product of tailings. It has the consistency of fine sand and is commonly used in mine related construction, dams in particular.

as well as specific environmental management plans (EMPs) to mitigate potential impacts to water quality.

The Proponent's Water Management Plan described in the Application includes the following mitigation measures:

- Separation of contact and non-contact water, storage of contact water in a tailings facility, collection of seepage to the tailings impoundment and a commitment to treat water when and if necessary;
- Measures to minimize erosion in disturbed areas, prevent release of sediment-laden water to receiving environments;
- Re-using the water present within the proposed Project footprint to the extent practicable by collecting and managing site runoff from disturbed areas, maximizing the recycle of process water, and storing surplus water within the TMF until discharge is required; and,
- A range of water diversion, collection and control structures, groundwater monitoring and erosion control measures.

In the Application, the Proponent also proposed to undertake research, should an EA Certificate be issued, which would support the development of site specific water quality management targets (WQMTs) for those parameters of concern which have naturally high background concentrations and which exceeded BCWQG. The Application indicated that any discharge from the proposed Project would meet the WQMT's which would be developed at permitting. The Application stated that these WQMTs would be protective of aquatic life and would be developed in consultation with regulatory permitting agencies for the mine waste discharge permit required under the *BC Environmental Management Act* and Metal Mine Effluent Regulations (MMER) under the *Fisheries Act*.

The Application proposes water treatment for the post-closure phase, not during operations. The Proponent concluded that ARD is not likely to start during the operating life of the mine and that a lag time of at least 50 years after the beginning of mining was predicted before the onset of ARD. According to the Proponent, this would negate the need for water treatment during mine operations (Year 1 to 16) and in the immediate post-closure period.

The Application estimates that annual groundwater and seepage flow which would require treatment is about 2.4 Mm³ or an average flow of 300 cubic metres (m³) per hour¹⁰. The treatment method proposed in the Application is lime addition with HDS production.

¹⁰ For reference, an Olympic sized swimming pool is 2500 m³.

5.1.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the early review of the Application a number of key concerns related to water quality were raised by members of the Working Group. The main themes of these concerns included:

- Concerns that the Proponent had modelled exceedances of BCWQG but had not provided information showing these exceedances would not result in significant adverse effects to water quality and aquatic life;
- Concerns about how historic mining was characterized in baseline information;
- Concerns that the Proponent had not committed to firm water management as a component of the proposed Project;
- Concerns about the impacts of reduced water quality on human health due to consumption of seafood; and,
- Concerns about the ability to detect changes in water and sediment quality in Alice Arm and Lime Creek given the historic impact of mining.

In order to address these concerns, the Proponent provided a series of supplemental technical memorandums and associated commitments on July 31, 2012, and again on September 28, 2012. These commitments, as well as the revisions to the effects assessment, are discussed in more detail below and can be found at (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_pro.html).

Commitments for Water Treatment and Water Management

The Certified Project Description and Table of Conditions 4, 5, 6 and 7 describe the Proponent's additional mitigation commitments regarding water treatment and water management.

The original Application proposed active water treatment as a mitigation method for managing ARD from the WRMF only during the post-closure phase of the proposed Project, with the onset of acidic conditions. However, during the review of the Application, numerous questions were raised concerning the need for water treatment through the operations, closure and post-closure, prior to the onset of acidic conditions. To address these concerns, the Proponent committed to water treatment as a way to mitigate water quality effects during all mine phases.

In summary, the Proponent's main new commitments¹¹ include:

¹¹ These three points are reflected in Condition 4 and 6.

- in-mill water treatment during operational and closure phases;
- in-pit water treatment during the last year of the closure phase; and,
- active water treatment during the post-closure phase.

Proposed Water Treatment During Operations

The proposed water treatment during operations would involve the addition of lime and sulphide reagents to the tailings slurry within the mill circuit itself as opposed to a separate, stand-alone water treatment plant. The addition of lime and sulphide would cause dissolved metals in the tailings supernatant to precipitate as solids, which would be carried out with the tailings solids for deposition in the TMF. The Proponent also proposed dividing the TMF with an impermeable barrier into an area of unfiltered water and an area of filtered water as a possible option for water treatment. Microfilters could be installed and water would be drawn from the area of unfiltered water into the area of filtered water, which could then be discharged into the receiving environment. The microfiltration technology for additional treatment is considered as a second step in the TMF water treatment process if required to meet water quality discharge permit criteria, as per Condition 4 and 6. The proposed water treatment has been presented at a conceptual level. Detailed design would be further defined if an EA Certificate is issued and the proposed Project proceeds through the permitting process.

EAO notes that the proposed water treatment system is based on a case study conducted at the Bunker Hill Mine, which indicated that the levels of cadmium and other metals can be reduced to acceptable levels using a lime-sulphide treatment process, followed by microfiltration. Microfiltration was shown to be the key to the success of this treatment process.

The Proponent notes that cadmium is expected to be the primary challenge in terms of water treatment during the operations phase. Therefore, the performance of cadmium removal is highlighted in the discussion below. However, aluminum, copper, chromium, zinc, nickel, lead and mercury are expected to be removed to low concentrations using the proposed lime/sulphide treatment process, when combined with microfiltration of the effluent prior to discharge to the environment.

Proposed water treatment during closure

The water quality modeling results presented in the Proponent's original Application assumed that the open pit lake would be allowed to fill during the closure phase and then discharge into Lime Creek without application of water quality mitigating measures. In other words, water sources that were predicted to flow to the Pit would do so unmitigated and the ultimate quality of the pit lake would be the simple sum of the contributing sources.

Since the original Application, the Proponent has committed to lime addition as a mitigation measure to address water quality issues in the pit lake before it begins to discharge to Lime Creek at the beginning of the post-closure phase. The Proponent considers lime addition to be the best method for mitigating elevated concentrations of dissolved metals in the pit lake. The proposed method of application is to apply a single dose of lime if using a batch treatment approach or continuous addition as the pit is filling. Either method would occur prior to any discharge to Lime Creek.

Proposed Water Treatment at Post-Closure (neutral and acidic conditions)

In the EA Application, the Proponent originally proposed a conventional HDS water treatment plant when acidic conditions occurred. However, given the Proponent's approach to meeting a higher water quality standard, they have now committed to add sulphide to the HDS process in order to further improve water quality. This approach is demonstrated to be effective for both the treatment of ARD impacted water and for treating water with elevated concentrations of dissolved metals in neutral conditions.

Additional Water Management Mitigation Measures

In addition to the water treatment commitments listed above, during the review of the Application the Proponent also made a number of new commitments to manage contact water from the main sources of mine contact water¹², which include the TMF, WRMF, Kitsault Pit and LGS.

The Proponent has proposed to manage contact water in each project phase as follows:

- Operations: All mine contact water from the LGS, Kitsault Pit and WRMF, as well as all other site components, will be pumped to the TMF. Any water discharged into Lime Creek would only come from the TMF as per permit requirements and appropriate regulations.
- Closure: During closure, TMF water will continue to be treated with the in-Mill treatment system presented above and would be the only source of water discharged into Lime Creek. Contact water from the WRMF and other site components would be directed to the open pit and the pit would be allowed to fill with water. Water in the open pit would be treated with lime prior to discharge in order to meet requirements as provided in an *Environmental Management Act* waste discharge permit and the conditions of the EA Certificate, if issued.
- Post-Closure: During post-closure, water from the TMF would be directed to the Kitsault Pit and the in-Mill treatment plant closed. Runoff from the WRMF would

¹² "Contact water" is any water which has been in contact with mine related infrastructure or disturbed rock or soil.

be treated by a new stand-alone water treatment plant and then discharged to the Kitsault Pit. The Kitsault Pit will be the single point of discharge to Lime Creek.

The Proponent also committed to ensure that the percentage of total excess water discharged from the TMF was modified to reflect the natural hydrograph of Lime Creek throughout the year. This is discussed in more detail in section 5.2 Surface Hydrology.

Revised Water Quality Predictions for Lime Creek Watershed

As a result of the Proponent's new water treatment and management commitments, water quality predictions in Lime Creek during key periods of mine life are predicted to meet BCWQG for protection of aquatic life for all parameters except for aluminum, sulphate and cadmium. The predicted water quality also represents an improvement over current water quality conditions in Lime Creek for most parameters based on predicted average, noting that current water quality, as discussed previously, has been impacted by past mining activities and potentially naturally high background conditions.

The key predicted parameter of concern for the Lime Creek watershed was cadmium. As noted above, the Proponent's original EA Application modeled concentrations of cadmium at times as high as 18 times the aquatic life guideline limit during operations. Other parameters of concern in the base case scenario for Lime Creek are sulphate, aluminum, chromium, copper, lead, nickel, selenium and, zinc.

Graphs in this section are shown for cadmium, sulphate and selenium in order to visually show examples of concentrations of concern, but all other parameters of concern are summarized in Table 5 at the end of this section. The graphs and summary table below show predicted average concentrations during project operations, closure and post-closure compared with BCWQG and current baseline water quality. EAO notes that concentrations vary over the year and averages are shown to be illustrative.

In the documents supporting their new commitments, the Proponent presented water quality concentrations for the "worst case" periods of time during various phases of mine life and compared them to the current water quality data for Lower Lime Creek at LC1¹³. These "worst case" key periods of time presented on each graph are the following:

- Operations Year 13 – this is when the concentrations of all parameters peak in the TMF and consequently in Lime Creek.
- Closure Year 14 – this represents the peak concentrations of the parameters of concern in the TMF and consequently in Lime Creek.

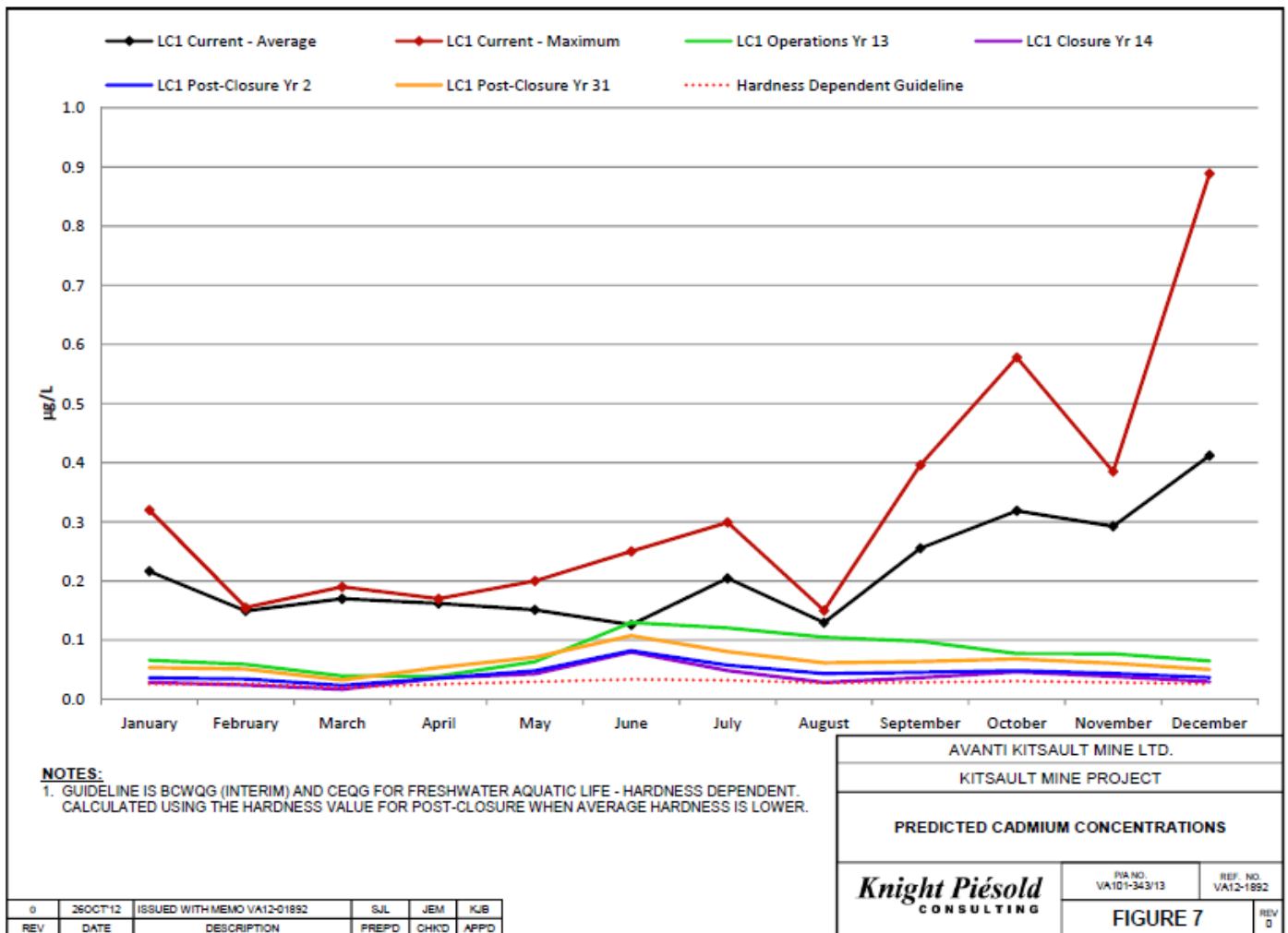
¹³ EAO asked the Proponent to use LC1 throughout the modelling as an analogue for the receiving environment, as it is close to where fish habitat begins on lower Lime Creek.

- Post-Closure Year 2 – represents the second year after the Kitsault Pit begins to overflow, when those parameters not affected by in-pit water treatment are found at elevated concentrations in Lime Creek.
- Post-Closure Year 31 – represents a year in Post-Closure when equilibrium conditions are expected to have been established in the Kitsault Pit and consequently in Lime Creek.

Cadmium

The Proponent presented information which shows that the predicted cadmium in the water at Lime Creek falls below the current monthly average concentration of cadmium for all but one month in Operations at year 13. However, it should also be noted that current water quality data, as well as the majority of the modelled “natural” water also exceed the BCWQG guidelines. The predicted cadmium concentrations for each “mine phase” are shown on Figure 10 below.

Figure 10: Predicted Cadmium Concentrations for Key Periods of Mine Life

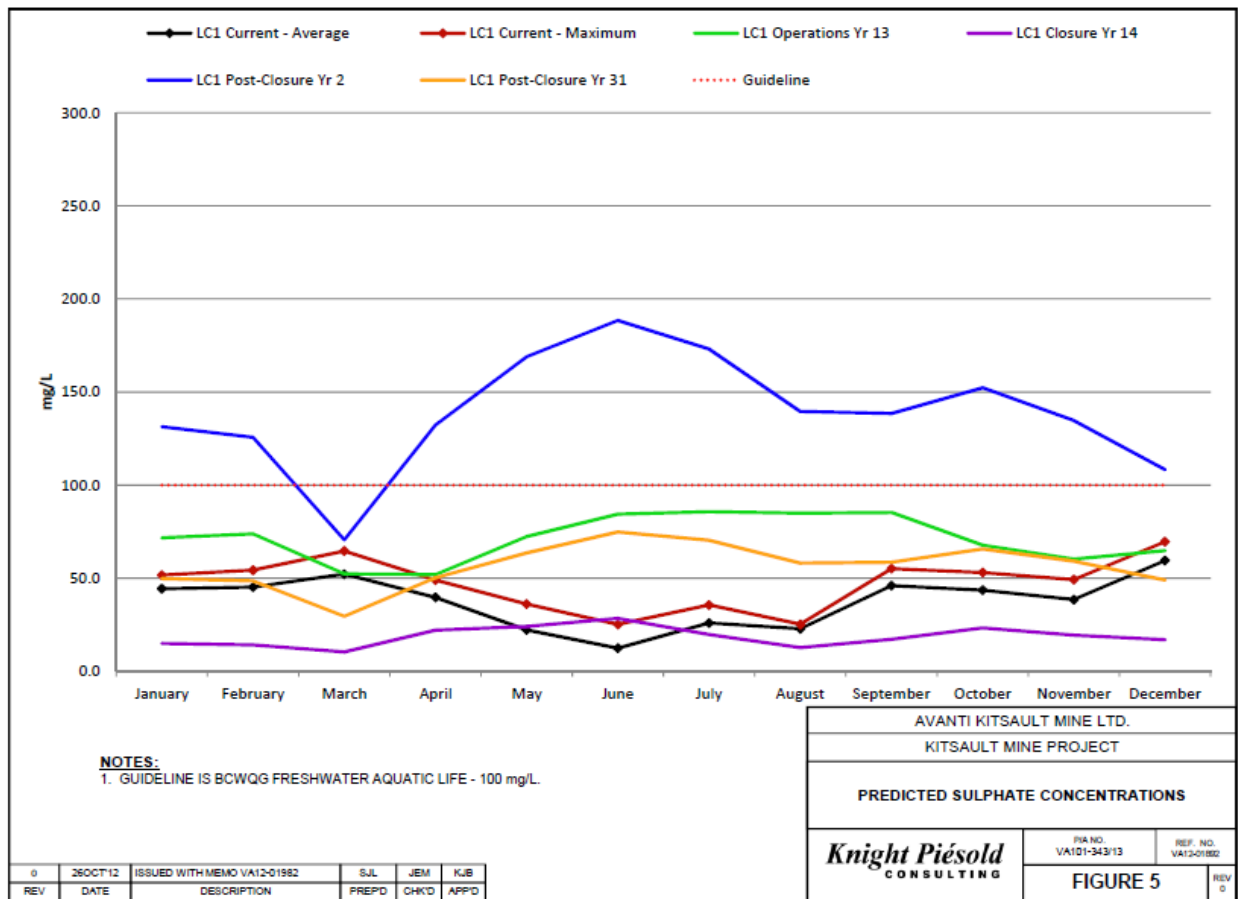


Sulphate

The Proponent's revised water quality models show that predicted sulphate concentrations, unlike other parameters of concern, don't generally improve through the various phases of mine life. Sulphate concentrations are at their highest in early post-closure, immediately after the Kitsault Pit begins to spill into Lime Creek. However, sulphate only exceeds BCWQG during high precipitation times of the year (e.g. winter and spring freshet).

The Proponent notes that BCWQG exceedances during wet times of the year in early post-closure occur because the proposed treatment of lime addition to the open pit in the last year of closure does not work to reduce sulphate concentrations. As a result, the initial post-closure concentrations of sulphate in the Kitsault Pit are elevated, but over a period of several years the concentration comes down to an equilibrium range that is fully below the 100 mg/L BCWQG limit. The predicted sulphate concentrations for each "mine phase" compared to BCWQG limit are shown below in Figure 11.

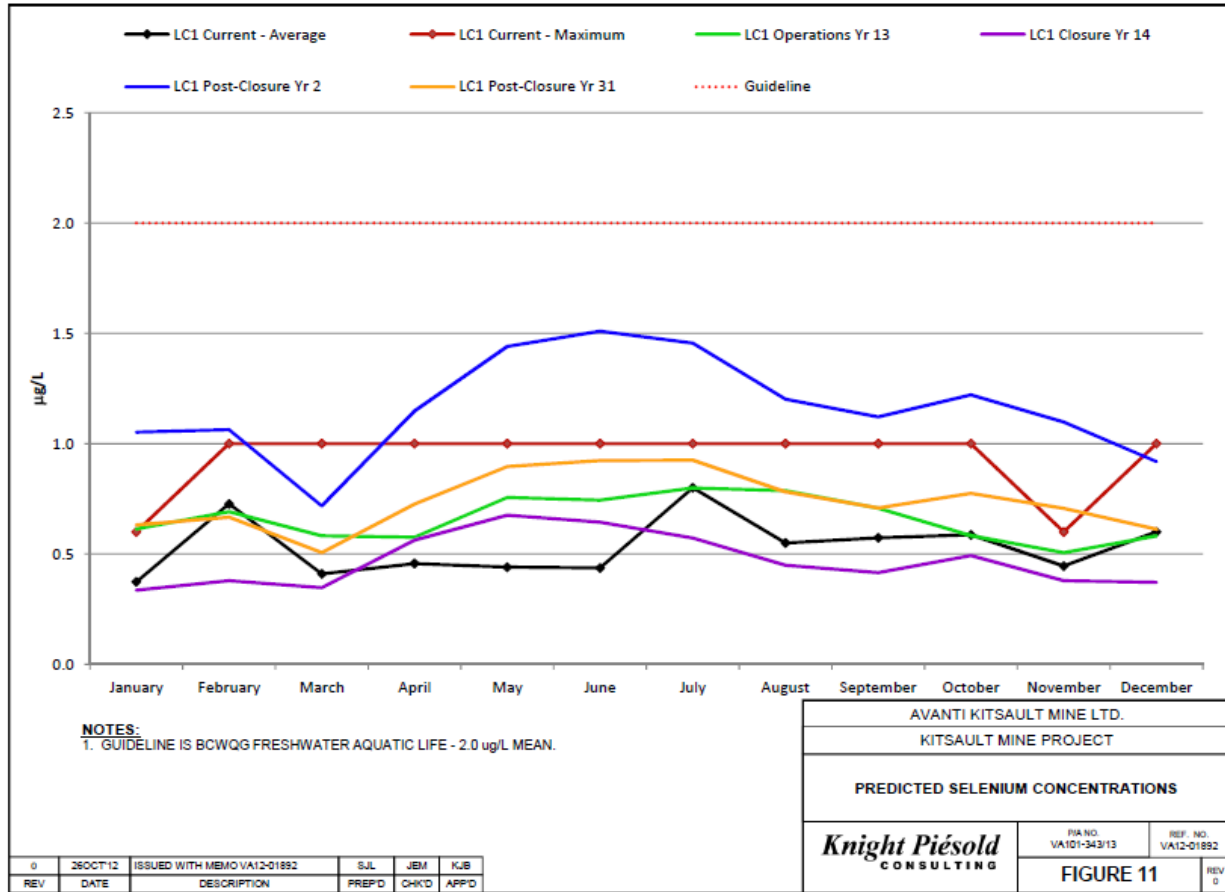
Figure 11: Predicted Sulphate Concentrations for Key Periods of Mine Life



Selenium

The Proponent's selenium predictions show concentrations similar to current values for Lower Lime Creek. As with sulphate, concentrations are highest in early post-closure and exceed peak current values for the majority of the year; however no values exceed the 2.0 µg/L BCWQG. The selenium concentrations predicted for each "mine phase" are shown below in Figure 12.

Figure 12: Predicted Selenium Concentrations for Key Periods of Mine Life



Summary of Water Quality Modelling Results for Parameters of Concern in Lime Creek

Table 5 below provides a summary of predicted average water quality for key parameters of concern (including sulphate, aluminum, cadmium, chromium, copper, lead, selenium, and zinc) during Operations, Closure and Post-Closure in comparison to BCWQG and current (baseline) average concentrations at LC1 in Lower Lime Creek.

Table 5 is presented in order to show a high level summary of the water quality modelling results with predicted future reductions in contaminant levels, and therefore improvements in water quality, compared to current conditions in Lime Creek and

BCWQG for the protection of aquatic life. The predicted improvement in water quality in Lime Creek throughout the life of the project is a key finding of the EA review and a key factor considered in EAO's significance analysis and conclusion that the project is not likely to result in a significant adverse effects to water quality or aquatic life in Lime Creek and Alice Arm.

Based on the Proponent's water quality modelling results at LC1, Table 5 shows a summary of the predicted minimum and maximum monthly average and annual average concentrations with highlights to identify which concentrations are below (green), approaching (yellow) or exceeding (red) the calculated BCWQG. This summary table indicates the proposed water management mitigation measures and water quality at LC1 is predicted to be protective of aquatic life, with most parameters predicted to be below the BCWQG highlighted in green (except cadmium and sulphate, highlighted in red), and overall predicts an improvement in water quality compared to current conditions.

It is important to understand that these predictions are based on existing water quality data (including current and historical data), computer modelling and assumed conditions in the future presuming the full implementation and effectiveness of proposed mitigation measures (as defined in the Certified Project Description and Table of Conditions). Therefore, the model predictions represent the best current estimate available on likely future water quality, and are being used as the basis for the conclusions in this assessment.

Detailed information on water quality modelling results, proposed water management and water treatment mitigation measures were provided in several technical memorandums provided by the proponent as supplemental EA information to address key issues raised during the EA review. The supplemental technical memorandums provided during the EA Review including a more detailed discussion on the Proponent's revised water quality modelling results, water management and water treatment mitigation measures, as well as the revisions to the Proponent's effects assessment can be found on EAO's website:

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_pro.html.

Further information if required to develop site-specific water quality objectives (WQO) and/or effluent discharge permit compliance criteria will be completed in the permitting stage in consultation with permitting agencies and NLG should the project receive a conditional EA Certificate to proceed.

Table 5: Predicted Average Water Quality in Lime Creek Compared with BCWQG and Current Water Quality at LC1

	Operations Year 13				Closure Year 14				Post-Closure Year 2				Post-Closure Year 31				Current			
	Minimum	Annual Average	Maximum	BCWQG	Minimum	Annual Average	Maximum	BCWQG	Minimum	Annual Average	Maximum	BCWQG	Minimum	Annual Average	Maximum	BCWQG	Minimum	Annual Average	Maximum	BCWQG
Sulphate (mg/L)	51.82	71.23	85.73	100	10.33	18.57 *	28.39	100	70.59	138.65	188.48	100	29.46	56.42	74.75	100	7.09	37.67	69.60	100
Aluminum (µg/L)	30.51	60.69	84.31	50 ¹ /100 ²	20.21	36.18 *	53.86	50 ¹ /100 ²	23.66	41.89	60.58	50 ¹ /100 ²	19.11	33.45 *	49.75	50 ¹ /100 ²	10.70	36.43	93.20	50 ¹ /100 ²
Cadmium (µg/L)	0.04	0.08 *	0.13	0.04	0.02	0.04 *	0.08	0.01	0.02	0.04 *	0.08	0.05	0.03	0.06 *	0.11	0.03	0.06	0.22	0.89	0.02
Chromium (µg/L)	0.25	0.47 *	0.81	1.00	0.25	0.47 *	0.83	1.00	0.37	0.56 *	0.86	1.00	0.31	0.50 *	0.80	1.00	0.10	0.66	1.50	1.00
Copper (µg/L)	0.63	0.85 *	1.41	4.55	0.49	0.64 *	1.08	2.00	0.80	1.21	1.65	8.22	0.52	0.66 *	1.11	3.27	0.40	0.98	1.50	2.75
Lead (µg/L)	0.20	0.30 *	0.40	7.08	0.10	0.18 *	0.30	3.86	1.29	2.63	3.55	11.33	1.31	2.66	3.58	5.78	0.10	0.35	0.63	5.15
Selenium (µg/L)	0.51	0.66	0.80	2.00	0.34	0.47 *	0.68	2.00	0.72	1.16	1.51	2.00	0.51	0.74	0.93	2.00	0.10	0.53	1.00	2.0
Zinc (µg/L)	3.20	4.94 *	5.88	25.52	1.80	2.93 *	3.68	7.50	3.91	6.79	8.82	94.13	2.29	3.55 *	4.33	8.69	2.00	5.52	15.30	7.87

- NOTES:**
1. AVERAGE BCWQG VALUES ARE CALCULATED WITH AVERAGE ANNUAL HARDNESS VALUES FOR Cd, Cu, Pb, AND Zn.
 2. THE AVERAGE OF THE HARDNESS VALUES USED FOR KEY YEARS ARE AS FOLLOWS:
OPERATION YEAR 13 - 114 mg/L CaCO₃; CLOSURE YEAR 14 - 25 mg/L CaCO₃; POST-CLOSURE YEAR 2 - 206 mg/L CaCO₃; POST-CLOSURE YEAR 31 - 86 mg/L CaCO₃.
 3. CURRENT CONDITIONS ARE AVERAGE MEASURED CONCENTRATIONS BASED ON MONTHLY DATA SAMPLED AT LC1 DURING WATER QUALITY SAMPLING FROM MARCH 2009 TO JUNE 2012.
 4. ALUMINUM - ¹ BCWQG 30-DAY GUIDELINE, ² BCWQG MAXIMUM.
 5. CONCENTRATION BELOW CALCULATED BCWQG.
 6. CONCENTRATION APPROACHING CALCULATED BCWQG.
 7. CONCENTRATION EXCEEDING CALCULATED BCWQG.
 8. * PREDICTED ANNUAL AVERAGE IS LOWER THAN CURRENT ANNUAL AVERAGE WATER QUALITY CONCENTRATION.
 9. MAXIMUMS AND MINIMUMS ARE MONTHLY MODELED DATA FROM THE WATER QUALITY MODEL; AVERAGES ARE CONCENTRATIONS CALCULATED FROM MONTHLY MODELED DATA FROM THE WATER QUALITY MODEL.

Figures 13-15 below provide a schematic overview of existing water quality conditions in the Lime Creek watershed compared to water quality after implementation of the proposed mine site water management. Graphs are shown for existing conditions, operations and post-closure, and also show how the Proponent has proposed to move water around the site in each of the phases

The Figures show predicted water quality averages in LC1, LC2, LC3, PC2, PC5, as well as current water quality and compare that to the BCWQG limit for cadmium. EAO requested that the Proponent prepare these diagrams for cadmium as a representative parameter of concern to illustrate the effectiveness of their proposed water management and treatment. **Note that yearly averages for water quality are shown on these figures. As with Table 5 above, yearly numbers are shown for simplicity sake, however, the numbers presented are higher for certain times of the year and lower at other times.**

The Proponent notes that, where predicted concentrations periodically exceed the BCWQG, the parameter is most often also exceeding guidelines under current conditions. This is likely due to both mineralization within the watershed and historical impacts from mining. The predicted water quality is also most often improved over current conditions due to water management and treatment proposed during all phases.

Based on the low level and limited duration of periodic exceedances above BCWQG for parameters of concern predicted (with modelling predictions under worst case scenarios) in mine discharge following treatment, and subsequent dilution prior to reaching fish bearing waters in Lower Lime Creek and Alice Arm, the Proponent predicts that water quality of mine discharge would be protective of aquatic life throughout all project phases.

Figure 13: Existing Conditions Schematic of the Lime Creek / Clary Creek Watershed and Current Water Quality Concentrations for Cadmium in comparison to BCWQG

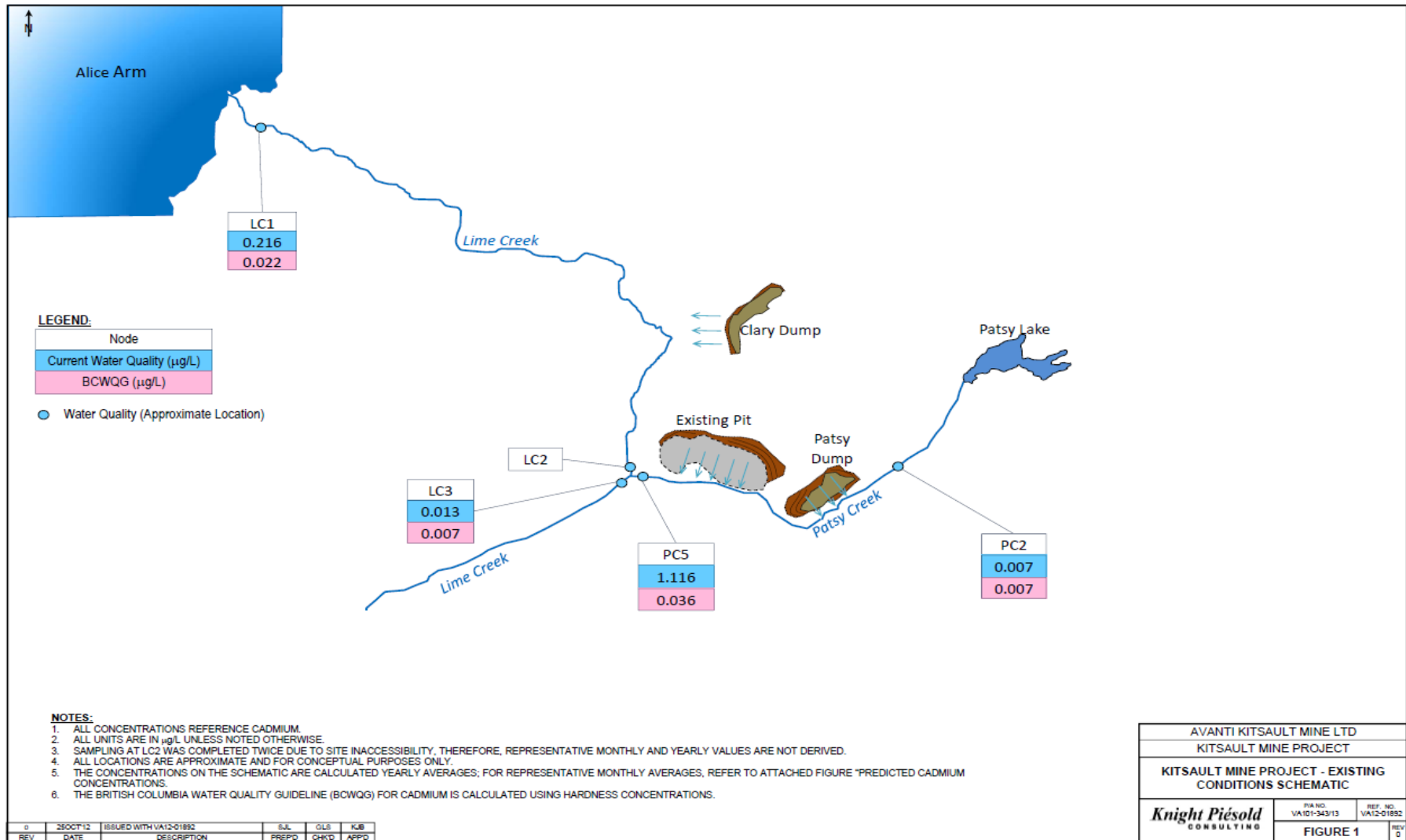


Figure 14: Proposed Mine Site Water Management Plan Schematic – Operations Year 13 and Predicted Cadmium Concentrations in comparison to BCWQG

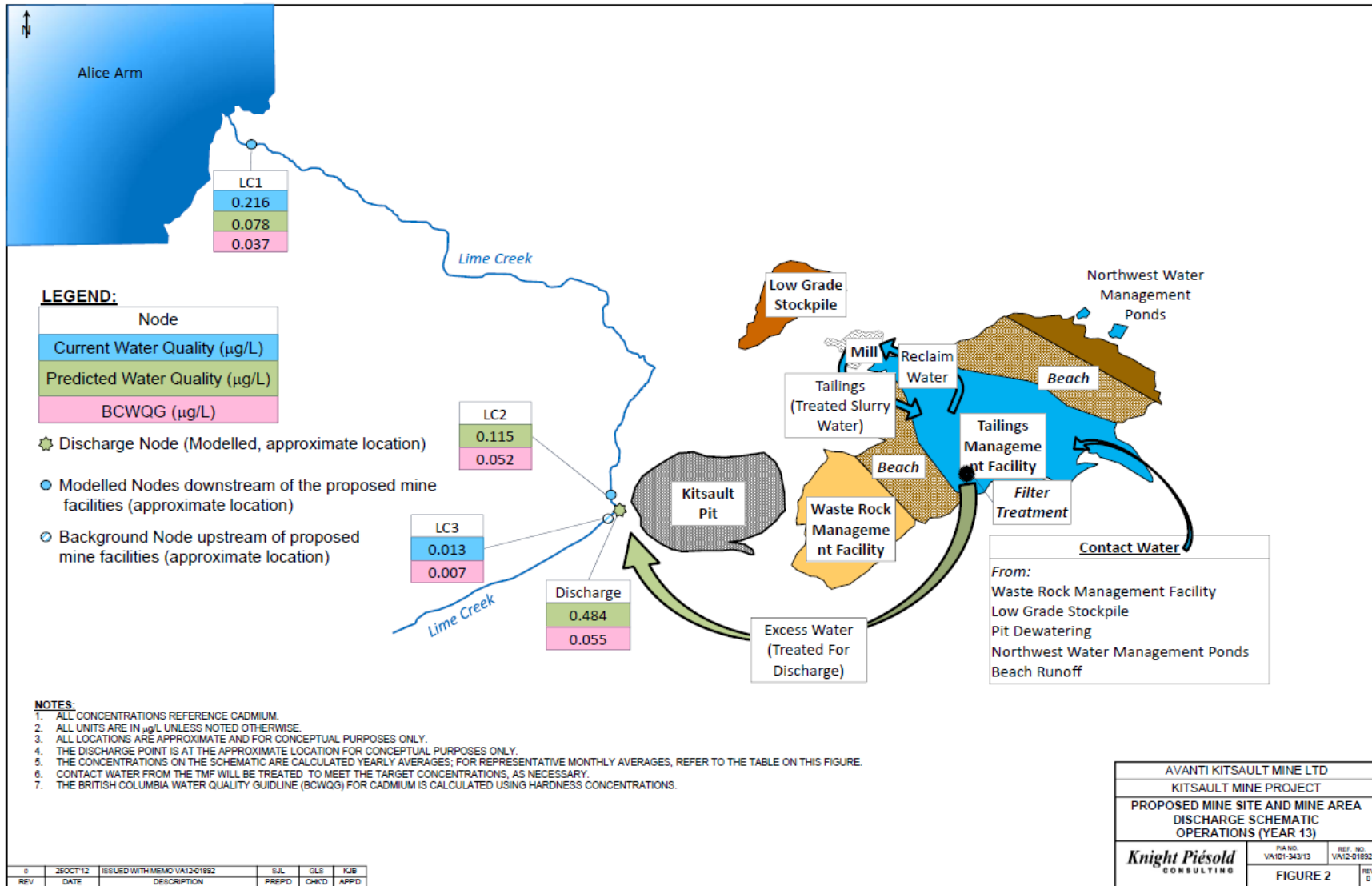
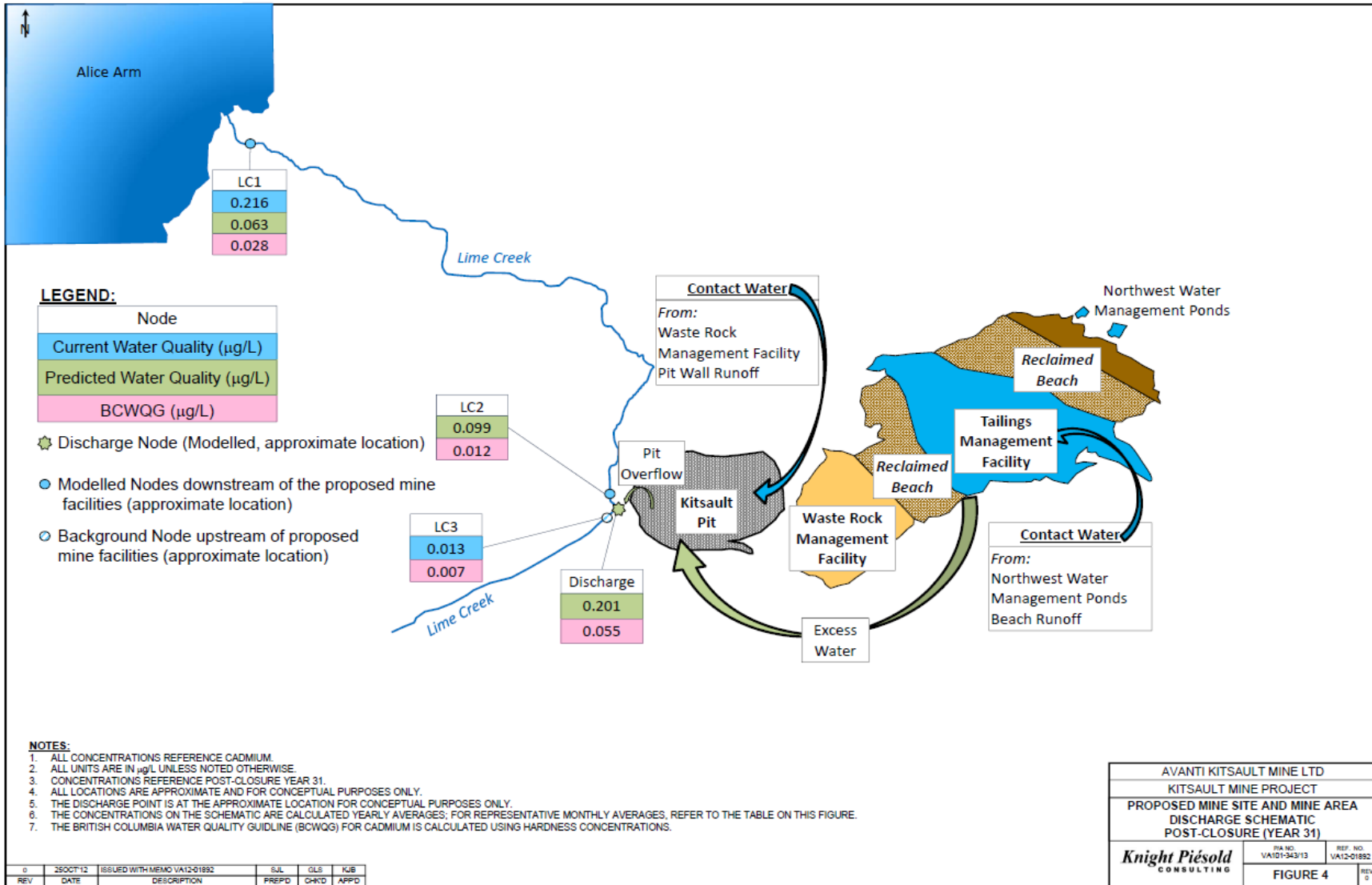


Figure 15: Proposed Mine Site Water Management Plan Schematic – Post-Closure Year 31 and Predicted Cadmium



Revised Water Quality Predictions in Clary Creek Watershed

The Proponent's new mitigation measures proposed for the Clary Creek Watershed include the collection and return of seepage and runoff from the northeast tailings embankment to the TMF, which ultimately discharges to Lime Creek. Two seepage collection mitigation measures are proposed and have been modeled:

- Seepage pump back wells strategically placed between the TMF/NWMPs and Lake 901, with continuous pump back of water at a rate of approximately 3 L/s; and,
- Continuous collection and pump back of water that is captured in the NWMPs.

These additional mitigation measures ensure that seepage and runoff from the TMF, Northeast Embankment and NWMPs will not discharge to the Clary Creek Watershed, and all mine contact water will be conveyed to the TMF and discharged to Lime Creek. Within the revised water quality modelling predictions, there are no observed impacts to Lake 901, Clary Lake or further downstream in Clary Creek or the Illiance River Watershed.

Summary of Issues and Mitigation

During the review of the Application, additional issues were raised by the agencies, NLG, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued. Examples of some of the key issues and additional commitments include:

- Concerns were expressed by reviewers that the definition of "baseline" water quality in Lime Creek should be based on an understanding not only of current water quality in Lime Creek, which has been impacted by historic mining, but of "natural", pre-mine water quality in Lime Creek.
 - The Proponent took measurements of the natural water quality in Lime Creek and Patsy Creek upstream of historic mining and synthesized an artificial "natural" water quality in order to predict "pre-mine" conditions in Lime Creek, immediately below the confluence of Lime Creek and Patsy Creek. Water quality comparisons were made against both current water quality and this "natural" water quality.
 - The "Natural LC2" data have been used on graphs and tables for comparison of modeled data to baseline, to provide context to the actual change from background conditions.

- While the primary modelling point for effects was chosen to be LC1, a number of reviewers sought additional information on water quality modelling at LC2.
 - LC2 is a surface water monitoring location within direct proximity downstream of the point of discharge from the proposed mine site. However, the proponent focused their assessment on LC1, approximately 5 km downstream of LC2, for the following reasons:
 - LC2 is within a steep valley with limited access throughout the year and is not safe during the winter due to avalanche hazards.
 - The waters at LC2 are not fish bearing – a fish barrier approximately 4 km downstream of LC2 prevents fish from accessing the upper portion of Lime Creek. The Proponent instead focused their assessment on the fish bearing waters of LC1 and the VCs listed in the AIR.
- Reviewers requested additional water quality information at LC1 for “natural” conditions (pre-mine baseline) in Lower Lime Creek, as only “current” conditions at LC1 were presented in the Application.
 - During the review period, the Proponent provided an estimate of “natural” water quality at LC2 but did not provide an estimate of “natural” water quality at LC1 citing a higher degree of uncertainty in the data due to the distance between LC2 and LC1. The Proponent notes that “natural” water quality conditions in Lime Creek at LC1 were not modelled because water quality downstream of highly mineralized areas will often have relatively higher levels of dissolved metals originating from the mineralized area. Predicting downstream “natural” water quality results in the removal of the influence from this mineralized zone and likely results in an underestimation of the downstream concentrations in Lime Creek.
- The original application stated that all seepage management infrastructure for the Lake 901 watershed would be decommissioned at closure, resulting in substantial predicted spikes in certain parameters of concern in Lake 901, and Clary Lake.
 - As a result of Working Group and EAO comments, the Proponent has committed to maintaining this infrastructure indefinitely, subject to review by the permitting agencies.
- Concerns were expressed by reviewers about water quality in both Lime Creek and Clary Creek Watersheds. In particular, reviewers noted that a number of parameters of concern exceeded BCWQG.
 - In response, the Proponent initially provided a series of water management and water treatment “scenarios” and approaches which they committed to

consider, if required, at permitting. When this approach was not supported by EAO, the Proponent undertook further assessment and modelling and committed to a firm water management and treatment regime which consisted of:

- Developing an in-mill lime and sulphide treatment and filtration system.
- Implementing lime treatment for the Kitsault Pit prior to discharge into Lime Creek.
- Developing a conventional HDS and sulphide treatment plant during post-closure to address acidic and non-acidic conditions in the WRMF.
- Developing a water management and discharge system where all mine site contact water is returned to the TMF for treatment prior to being discharged to Lime Creek.
- Constructing *pump back systems for the Northeast Collection Ponds* and drilling groundwater monitoring and pump-back wells.
- Additionally, a new Condition 4 was developed that states:
 - (1) The EAC Holder must ensure that, during the operations, closure and post-closure phases of the Project, water quality at LC2, LC1 and Lake 901 meets British Columbia Water Quality Guidelines¹⁴, unless the Ministry of Environment has approved Site Specific WQO (Site Specific Water Quality Objectives) for specific contaminants in accordance with 4(3) below, in which event the Site Specific WQO for the contaminant will supersede and replace the British Columbia Water Quality Guidelines level for the purposes of this Condition 4.
 - (2) Despite Condition 4(1), if at any time there is an exceedance of either a British Columbia Water Quality Guideline or Site Specific Water Quality Objective, as applicable, (exceedance), then the EAC Holder will not be out of compliance with Condition 4(1) if, immediately upon becoming aware of such exceedance, the EAC Holder:
 - (a) notifies the Ministry of Environment and the Nisga'a Lisims Government of the exceedance; and,

¹⁴ Includes: BC Ministry of Environment. 2013. Water Quality Guidelines (Criteria) Reports [Internet]. Victoria, BC. Accessed on-line at: http://www.env.gov.bc.ca/wat/wq/wq_guidelines.html and, *A Compendium of Working Water Quality Guidelines for British Columbia*. N. K. Nagpal, L. W. Pommen, L. G. Swain, 2006; or in a provincially published superseding document.

- (b) after making reasonable efforts to consult with the Nisga'a Lisims Government, and as directed by the Ministry of Environment:
 - (i) takes such corrective measures as are necessary in order to meet Condition 4(1) as soon as reasonably possible in the circumstances; and,
 - (ii) mitigates, where possible, measurable effects of the exceedance, as directed by the Ministry of Environment, using methods approved by the Ministry of Environment.
 - (3) If required under 4(1) the EAC Holder must develop, after making reasonable efforts to consult Nisga'a Lisims Government, Site Specific WQO for mine related contaminants occurring at LC1, LC2 and Lake 901;
 - (a) prior to commencing the operations phase of the Project; and,
 - (b) in accordance with "*Methods for Deriving Site-Specific Water Quality Objectives in B.C. and Yukon (BCMOE 1997)*" or a provincially published superseding document.
- Concerns were expressed regarding the range and frequency of exceedances above BCWQG currently occurring under current conditions at LC1 (using the 30 day max criteria) and in modelled predictions throughout the mine life. The range and frequency of exceedances above BCWQG are both important for providing context to the magnitude of the exceedances and assessing potential effects to aquatic life.
 - In response, the Proponent provided supplemental technical memorandums including a sensitivity analysis of current water quality data sets and modelled data to identify potential range and frequency of exceedances above BCWQG under worst case and best case scenarios and various methods for using non-detection limits in analytical data. Additional assessment of potential water quality effects to aquatic life has also been addressed in supplemental report "Lime Creek Aquatic Life Assessment" (Avanti Kitsault Mine Ltd., January 29, 2013).
 - Concerns were expressed that the original Application showed increased concentrations of several parameters through winter months, when water flow is at its lowest and unmitigated discharge would comprise a higher amount of water in Lime Creek.

- The Proponent committed to a new water management model that would result in discharges following the natural hydrograph, resulting in an improvement in water quality in Lime Creek.
- Changes to the hydrograph (with year round discharge proportional to natural flows) are not expected to have harmful effects to fish and fish habitat in lower Lime Creek and are discussed in more detail in section 5.2 Surface Hydrology and 5.4 Freshwater Aquatic Resources.
- Concerns were expressed about the Low Grade Ore Stockpile, and its contribution to overall metal loadings through time. Reviewers asked the Proponent to re-evaluate milling low grade ore instead of stockpiling it. They asked the Proponent undertake a cost benefit analysis of storing LGS in order to reduce the mine footprint, reduce the long-term site liability, reduce on-going loading to the receiving environment, reduce potential bonding requirements, and maximize resource extraction/usage over the life of the mine.
 - The Proponent responded that the incremental cost of placing and treating run-off from LGS material is about \$5 million per year. This cost allows the average grade to be increased about 23% over the Life of Mine. The increase in grade results in a 26% increase in metal produced, for additional \$450 million of revenue. This increase in revenue over cost is considered enough to progressively bond for the cost of placing low grade ore back in the pit on closure if it is not milled.
 - The Proponent also committed to place all LGS into the pit and submerging it with water if it is not milled.
 - A new Condition 2 was added that states:

The EAC Holder must, prior to initiation of construction, conduct a technical evaluation that considers environmental and financial aspects, to determine the feasibility for relocating the Low Grade Ore (LGO) stockpile to a location adjacent to the open pit. If, in the opinion of the Ministry of Energy, Mines and Natural Gas, the technical evaluation supports the relocation of the LGO, then the EAC Holder must locate the LGO at a location supported by the technical feasibility study. At mine closure, the EAC Holder must either mill the stockpiled LGO or move it to the open pit for permanent subaqueous storage.
- Reviewers noted a concern that segregation of PAG rock from NAG rock was not part of waste rock management in the Application. It was noted that segregating PAG could allow for a more cost effective closure option and potentially eliminate the need for treatment in the long term if PAG rock was stored sub-aqueously.

- The Proponent's block models have indicated that the mineralization of the deposit make segregation of PAG from NAG rock very difficult at an operational scale.
- The Proponent committed to a three part program where they would
 - 1) assess the technical feasibility of segregating waste rock
 - 2) if segregation is feasible, examine the long term water-quality benefits of segregation, and
 - 3) if there are benefits, develop a plan to implement and manage waste rock segregation.
- A new condition was added that states:
 - The EAC Holder must complete, prior to the second year of operations, an assessment of the technical feasibility to segregate and submerge waste rock based on its potential for ARD and the measureable long-term benefits to water quality from segregating and/or submerging waste rock. If, in the opinion of the Ministry of Energy, Mines and Natural Gas and the Ministry of Environment, segregating and/or submerging waste rock is technically feasible and beneficial to the long term predicted water quality, the EAC Holder must develop a plan for approval by the Ministry of Energy, Mines and Natural Gas and the Ministry of Environment and, upon approval, segregate and/or submerge waste rock.
- Reviewers expressed concern that the Proponent had proposed to develop site specific WQMTs and/or WQO at the permitting phase of the proposed Project, resulting in uncertainty in assessing potential aquatic effects at the EA stage.
 - The Proponent, in their addendums to the original Application, committed to a number of new water treatment options, including an in-mill treatment and filtration system, conventional HDS treatment with sulphide addition in post-closure, and a new water management system which significantly improves water quality in the Lime Creek and Clary Creek Watersheds.
 - In response to concerns regarding potential effects to aquatic life from changes in water quality, the Proponent provided EAO with a supplemental report titled: "Lime Creek Aquatic Life Assessment Report" (Avanti, January 29, 2013).
 - See new Condition 4 which references BCWQG and Site Specific WQO rather than targets.
- Reviewers noted concerns over the "additive" nature of metals and parameters of concern in the receiving environment; that is, is there a cumulative effect of having a number of parameters of concern close to *BCWQG*.

- The proponent put forward that, without site specific test work on the mixture of metals of concern, it is very difficult to ascertain if there would be additive effects. The proponent presented information that shows some metals can function in an additive manner and thereby increasing toxicity, while other mixtures may in fact off-set toxicity of other metals.
- Pilot-scale toxicity testing will be done at the permitting stage to assess potential additive effects of the mixture of metals of concern for protection of aquatic life.
- Reviewers asked why the Proponent could not mill existing waste rock, recognizing that the cut-off for economic ore in the 1970s and 1980s would be considerably higher than present time.
 - The Proponent notes that waste piles cannot be effectively drilled, sampled or analyzed in their “waste dump” state. The voids in the spoil dumps do not allow drilling to yield satisfactory return and what returns are obtained are not reliable due to lack of recovery of sample. Without reliable drill data, waste piles cannot be modeled or classified.
- Reviewers wanted a better understanding of why the Proponent did not submerge PAG waste rock subaqueously (i.e. submerged under water). A number of reviewers felt that creating a co-disposal facility (tailings and waste rock) where PAG waste rock was deposited sub-aqueously could potentially avoid the need for long term water treatment requirements.
 - The Proponent submitted an assessment of alternatives for waste rock management specifically related to PAG waste rock. From the Proponent’s assessment, the following conclusions were made:
 - Creating a larger facility to submerge waste rock would spread the mine footprint fully within two watersheds (Lime Creek and Clary Creek), as opposed to primarily one watershed (Lime Creek).
 - Mine waste management in two watersheds may still require water treatment at both locations, as sub-aqueous waste rock may prevent the onset of ARD, but not necessarily prevent ML into the water column.
 - The pit walls will still be a source of metals, which may or may not require water treatment on its own.
 - Fish and fish habitat would be lost at the alternative PAG waste rock disposal location within the Clary Watershed.
 - Costs, under either a co-disposal scenario or submerged waste rock scenario, would be significantly higher.

- The 30 Mt of historical waste rock at site has yet to develop large-scale ARD. Predictions indicate it could be a very long time before this occurs, and it is not certain that it will ever occur. As a result, the selection of sub-aqueous disposal for waste rock at the proposed Project is deemed inappropriate, given the timeframe for the known risks.
 - EAO also notes that managing waste rock includes submerging in open pit on closure.
- Reviewers raised the question if it is feasible to segregate non-PAG waste rock proposed to be used for fill for the conveyor route, of which approximately half of the construction fill will be sourced from open pit waste rock.
 - The Proponent is confident that sufficient non-PAG rock is available and could be successfully segregated through sampling and analysis in a manner similar to determining ore grade. An alternative to using non-PAG waste rock material would be to use basalt, which is also non-PAG. This material would be sourced from additional cut into the basalt within the alignment of the proposed conveyor.
- Reviewers raised questions and concern regarding the predicted effectiveness and efficiency of the pump back wells and seepage collection pumps to be installed between the TMF and NWMPs proposed as water quality mitigation measures to prevent seepage and runoff discharging to Lake 901 and Clary Creek Watershed.
 - The Proponent is committed to installing pump back wells down-gradient of the water collection ponds at the base of the Northeast Embankment of the TMF.
 - With the pump back wells, all runoff and seepage from the mine site would be collected and managed within the Lime Creek watershed, and thus there would be no effects from the proposed Project within the Clary Creek Watershed.
 - In response to further questions raised, the Proponent provided a supplemental technical memorandum titled "*Kitsault Mine Project Pump-back Wells Down-gradient of the Northeast Embankment and the North Water Management Ponds*" (Knight Piesold Ltd., January 18, 2013). This supplemental memorandum provides additional details regarding the predicted effectiveness and efficiency of the pump back wells and seepage collection pumps and predicted water quality in Lake 901. This memorandum is summarized below:

- The proposed Project EA base case water quality predictions for Lake 901 were developed upon the assumption that up to 10% of the contact water within the NWMPs was lost as seepage that would, based upon the current understanding of the groundwater hydrology, end up in Lake 901.
- In addition, as tailings consolidate in the model, 70% of the pore water was assumed to go to the supernatant pond in the TMF and of the remaining 30%, 10% was assumed to seep through the base of the TMF towards Lake 901.
- Additional mitigation features were included in the revised water management scenario water quality prediction model as a result of on-going discussions pertaining to water management features that would improve predicted water quality in the Clary Creek watershed, Lake 901 in particular.
- A network of seepage pump-back wells have been proposed for installation down-gradient of the NWMPs, between these two ponds and Lake 901. The precise location and number of wells has not been determined; however, the average combined pumping rate was estimated to be 3 L/s. Full capture resulting from operation of the pumpback wells is achievable and has been modelled by imposing a groundwater gradient reversal upstream of Lake 901.
- With full capture, no changes to Lake 901 water quality are predicted as a result of mine seepage. Thus with the additional mitigation of the pump-back wells requested during the review of the proposed Project, there is no predicted interaction between the TMF and Lake 901 water quality.
- In addition, new Condition 4 requires that water quality in Lake 901 meet either BCWQG or Site Specific WQO, which will be protective of the receiving environment.
- Concerns were noted about implementation of the proposed water treatment technology, and in particular how effective it could be, recognizing it was conceptual and based on results from other mines as opposed to being based on bench scale test or pilot plants.
 - The Proponent provided support for the proposed water treatment technology based on operational data from other mines. In addition, the Proponent indicated there is no basis for asserting or suspecting that the treatment process would not be effective for treatment of the primary parameter of interest (cadmium). Specifically, in the context of water treatment at the Kitsault Mine, the performance of the proposed treatment plant would be contingent on the extent to which engineering controls

(dosing, settling and filtration, process controls, etc.) are implemented, as opposed to the feasibility of the technology.

- The Proponent also completed a sensitivity analysis relating to the variability in the performance of the treatment for cadmium in the mill and the SWMP treatment facilities, and in the batch treatment process in the Kitsault Pit, by varying the effluent quality by 500% and 1,000%. The reduced concentrations in the treated effluent resulted in minimal variability in predicted downstream water quality. The increased concentrations in treated effluent resulted in downstream predicted cadmium concentrations that exceeded the original case, but these concentrations are not significantly higher, and are generally below the average and maximum current LC1 cadmium concentrations.
- Concerns were noted regarding the level of uncertainty in the baseline water quality data as a result of modeling assumptions regarding the treatment of non-detect values. The Proponent used a “half detect” method for substitution for all non-detect values in the baseline data; concerns were raised that this approach implied that there were higher concentrations in background water quality than actually present, particularly for cadmium.
 - In response, a sensitivity analysis of the water quality model was conducted to assess the variability of predicted cadmium concentrations at LC1 (Lower Lime Creek) that results from variable baseline input values. The sensitivity analysis included the following: Method Detection Limit (MDL) value of zero (“0”; lower bound), the equivalent (full) MDL value, and an upper bound (maximum monthly background input values). The MDL sensitivity analysis revealed that there is very little variability in predicted cadmium concentrations at LC1 between methods; furthermore, the predicted cadmium concentrations are not significantly higher using the maximum monthly background inputs to the model. The predicted cadmium concentrations generally fall below the range of current concentrations at LC1 and never exceed the maximum values.

5.1.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures identified in the Application and supplemental technical memorandums, EAO concludes that the proposed Project would result in residual adverse effects on water and sediment quality over “natural” pre-mining conditions for some parameters.

Current baseline conditions with ongoing residual effects from historic mine facilities impacting water quality and sediment quality in Lime Creek and Patsy Creek Watersheds were also important factors in considering residual and cumulative effects

of the proposed Project. The historic mine is currently in its post-closure phase having completed reclamation requirements. However, if the site were to be left in its current condition¹⁵, with historic waste rock dumps and the Kitsault pit impacting water quality in Lime Creek, there would be ongoing and increasingly significant impacts expected over time due to potential ML and ARD with no additional mitigation to prevent adverse effects.

Other cumulative effects on surface water quality, linked to current or foreseeable projects or land uses, are not anticipated, either because they are not typically associated with water quality or sediment quality effects or due to the distance of such activities from the proposed Project footprint and the Lime/Patsy and Clary Creek Watersheds.

EAO has undertaken the following significance analysis on the residual adverse effects on water and sediment quality, taking into account direct and cumulative residual effects.

Table 6: EAO's Significance Analysis for Aquatic Environment – Surface Water and Sediment Quality

Factor	Rationale
Context	<p>The proposed mining operation is located within the Lime/Patsy and Clary Creek Watersheds. “Current” baseline surface water quality and sediment quality at, and downstream of, the historic Kitsault mine site exhibit elevated levels of a number of parameters of concern. However, “natural” baseline concentrations may often exceed applicable water quality and sediment quality guidelines, due to natural conditions and mineralization within the watersheds, but also due to historical mining activities.</p> <p>Lime Creek flows into Alice Arm, near the historic Kitsault townsite, and Clary Creek drains into the Illiance River, which also flows into Alice Arm. Alice Arm has been impacted by past mining activities in the Kitsault River (i.e. Dolly Varden Mine) and from historic mining of the Kitsault deposit.</p> <p>The lower 1.8 km portion of Lime Creek near the ocean is fish bearing and supports dolly varden char and coho salmon. Lake 901 (within the Clary Creek watershed) is stocked with rainbow trout.</p>

¹⁵ EAO notes that the Proponent is also the current owner of the site and has certain management obligations which are outside the scope of the current EA.

	<p>Fish in the downstream receiving environment are subject to potential water quality effects from the proposed Project. The areas upstream of the lower 1.8 km portion of Lime Creek, while not fish bearing, contain aquatic organisms important to fish survival and as part of the food chain.</p> <p>Lime Creek makes a relatively small freshwater contribution to Alice Arm (5%) compared to those of the Kitsault River (57%), the Illiance River (17%), and other smaller creeks (21%).</p> <p>Water quality and sediment quality play an important role in ecosystem health and human health from the harvest of fish and shellfish in Alice Arm and is very important to the Nisga'a Nation. The NFA sets out Nisga'a guide-angling and other rights in the Kitsault and Illiance Rivers, and in river systems in surrounding areas, as well as a right to harvest fish and shellfish in Alice Arm and intertidal bivalves in Observatory Inlet.</p> <p>Potential adverse effects to human health may result from consumption of fish and shellfish in Alice Arm which currently exhibit elevated metal levels.</p> <p>The Metlakatla First Nation also has asserted rights in Alice Arm, some of which could relate to the harvest of marine plants and animals.</p>
<p>Probability</p>	<p>EAO also notes that, unlike other mining projects where the probability of an effect is usually negative, the modeling presented during the EA shows that water quality will likely improve for most parameters but worsen for several others, notably cadmium and sulphate. However, with the addition of a modified Condition 4, which requires the Proponent to meet either BCWQG or Site Specific WQO, the probability of water quality effects is considered to be low. The probability is also dependent on the expected effectiveness of the Proponent's proposed mitigation measures for water management and water treatment.</p> <p>In consideration of the proposed mitigation measures for water treatment and water management, with selected methods and technologies proven to be effective on other mining projects, there is low probability that negative residual effects will occur, provided the mitigation measures are implemented as proposed and</p>

	<p>monitored to evaluate their ongoing effectiveness in successfully mitigating water quality and sediment quality effects.</p> <p>EAO has a high degree of certainty that any residual effects would be detected in the Project’s Environmental Management System (EMS) and Monitoring Programs including a marine environment monitoring program (MEMP) and Freshwater Aquatic Effects Monitoring Program (AEMP). To further reduce the probability of residual effects, the Proponent’s EMS includes adaptive management measures to be implemented based on monitoring results to ensure mitigation measures are effective in minimizing and avoid potential adverse environmental effects.</p>
<p>Magnitude</p>	<p>Considering the high degree of certainty that the Proponent’s mitigations will be successful, residual water quality effects are predicted to be of low magnitude during construction (primarily related to suspended solids, as mining operations would not have begun), low magnitude during operations and through closure and post-closure for the Lime Creek drainage and low during all phases for the Clary Creek drainage. This low magnitude is defined by adherence to Condition 4, which relates to BCWQG or Site Specific WQO, which will be protective of the aquatic receiving environment at all points around the mine (LC1, LC2 and Lake 901).</p> <p>In the absence of mitigation, or should the Proponent’s mitigation measures fail to protect water quality and sediment quality, the ecological implications would depend on the scale and scope of the exceedance, noting that any new effects to aquatic life and human health in the receiving environment would be cumulative to past impacts. Potential adverse aquatic effects may include bio-accumulation or increased metal concentration in fish and shellfish tissue, which may cause reproductive effects and population level impacts to aquatic organisms with resulting negative effects on human health.</p> <p>The Proponent’s mitigation commitments for effective water treatment and water management, specifically meeting BCWQG and/or Site Specific WQO during the operations, closure and post-closure phases of the proposed Project are important to ensuring the proposed Project will not cause significant adverse residual or cumulative effects.</p>

	<p>The ecological implications of residual effects on both surface water quality and sediment quality are low for all project phases having regard to proposed mitigation measures and an effective implementation of monitoring programs.</p>
<p>Geographic Extent</p>	<p>Residual water quality effects are predicted to be local in scope during construction and sub-regional in scale at all subsequent project phases, limited to the Project affected watersheds in the RSA. Residual sediment quality effects are sub-regional at all project phases, limited to the proposed Project affected watersheds in the RSA and portions of Alice Arm.</p> <p>The geographic extent of potential residual and cumulative effects includes the proposed Project affected watersheds (Lime Creek, Patsy Creek and Clary Creek) and Alice Arm marine environment. However, having regard to the Proponent’s mitigation commitments for water treatment and water management during all project phases, there are no cumulative effects expected to water quality or sediment quality.</p>
<p>Duration and Frequency</p>	<p>Effects of change to water quality in Lime Creek are predicted to begin during construction, primarily related to suspended solids during construction and continue through post-closure and into the far future.</p> <p>Based on the Proponent’s water quality modelling predictions and with effective implementation of mitigation measures including water treatment and additional water management during operations, closure and post-closure, any water quality effects (occurrences of parameters exceeding aquatic life guidelines) are expected to be infrequent, isolated and of short duration, as Condition 4 would require the Proponent to take immediate action should an exceedance be detected.</p> <p>Effects would likely be linked to natural flow events in the Lime Creek and Clary Creek drainages (e.g. periods of either high precipitation or low precipitation depending on the parameter) and events beyond the capacity of the Proponent to predict.</p>

Reversibility	Water quality effects in the Lime and Clary Creek drainages are expected to be long term and not reversible, considering current technology. Water treatment is expected to be required for at least 100 years and possibly longer.
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5.1.5 Conclusion

EAO has considered the values in the receiving environment as well as the significant dilution of the marine environment, and also the fact that the proposed Project, should it receive an EA Certificate, is likely to improve water quality in Lime Creek over current conditions for most parameters, although we note current water quality is likely being impacted both by past mining and naturally occurring mineralization. We have also considered the low probability of effects, low magnitude of those effects as well as the long term, infrequent and short term nature of potential effects during all project phases.

These conclusions have been informed by water quality and treatment commitments developed by the Proponent and in particular Condition 4 to ensure water quality in the receiving environment meets BCWQG or Site Specific WQO for protection of aquatic life during all phases of the proposed Project. We have also considered the high likelihood that the Proponent’s mitigations will perform as designed.

Finally, EAO notes that, with respect to potential cumulative effects, the Proponent has committed to implementing a comprehensive freshwater AEMP, environmental effects monitoring (EEM) program and a MEMP for permitting under the BC *Environmental Management Act*. EAO has a high degree of confidence that these monitoring programs would detect any effects and influence appropriate management actions.

Considering the above analysis and having regard to the Proponent’s commitments for mitigation of water quality impacts including mine water management and water treatment (which would become legally binding as a condition of a certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on water quality and sediment quality.

5.2 Aquatic Environment – Surface Hydrology

5.2.1 Background Information

Hydrology (surface water quantity) was selected as an aquatic environment VC for this EA because hydrological conditions affect water quality and sediment quality which, in turn, affect fish, aquatic habitat and wildlife habitat.

The LSA for the hydrological assessment is based on the footprint of the proposed

Project and associated activities that could cause surface water quantity and flow effects that, in turn, could affect aquatic habitat and fish populations. The hydrology RSA and rationale included in the Proponent's Application included the following watersheds:

- Lime Creek (including the Patsy Creek tributary): there are potential effects from the proposed Project facilities footprint which result in changes in stream flow due to storage of mine contact water within the TMF. The total surface area of disturbance from all the proposed Project facilities footprint within the Lime Creek/Patsy Creek Watershed is approximately 8.7 km², which represents 21.9% of the total watershed area (39.7 km²).
- Clary Creek (a tributary to the Illiance River): there are potential for effects from the proposed TMF footprint encroaching into the drainage area for Lake 901 as well as changes to stream flow and lake levels due to utilisation of Clary Lake as a freshwater source. The total surface area of disturbance from all the proposed Project facilities footprint within the Clary Creek Watershed is approximately 1.8 km², which represents 4.9% of the total watershed area, which is 36.7 km².
- Illiance River (the lower portion downstream of Clary Creek): there are potential changes to stream flow due to freshwater extraction from Clary Lake for mining activities.

Watersheds within the proposed Project footprint, as well as the placement of mine infrastructure and water management plans during each project phase are shown on Figures 13-15 provided earlier in section 5.1.1.

Lime Creek / Patsy Creek Watershed

The main stem of Lime Creek is situated to the west of the mine footprint. Patsy Creek, a small tributary of Lime Creek, has a number of small ponds, including Patsy Lake. Patsy Lake and the ponds are located within the mine footprint. Downstream of Patsy Creek, Lime Creek flows in a north-westerly direction past Kitsault townsite into Alice Arm at sea level. A significant barrier to fish is located approximately 1,800 m up Lime Creek. As a result, most of Lime Creek and all of Patsy Creek are non-fish bearing.

The majority of the proposed Project facilities are located in the Lime Creek/Patsy Creek watershed, including the TMF, the WRMF, the Kitsault Pit and several diversion channels. This mine infrastructure would modify the flow pattern of Patsy Creek Watershed.

Clary Creek Watershed

The Clary Creek Watershed is situated to the north and east of the proposed Project area. Several lakes and ponds, including Clary Lake and Lake 901, are located in the

headwaters of Clary Creek, which flows in a north-westerly direction and discharges into the lower Illiance River.

Flowing in a south-westerly direction, the lower Illiance River discharges into Alice Arm at sea level. The Application notes that the proposed Project is expected to affect the Clary Creek watershed from construction to post-closure due to the establishment of the proposed TMF and withdrawal of water from Clary Lake to meet the water consumption requirements of the processing facility and the potable water needs of the camp. The proposed TMF though predominately within the Lime Creek / Patsy Creek watershed, encroaches into the Clary Creek Watershed and thus has the potential to alter flows within a small headwater stream and lake; Lake 901 and its inflows.

Illiance River Watershed

The Illiance River watershed upstream of the Clary Creek and Illiance River confluence has no interaction with the mining activities and thus was not part of the Proponent's assessment. The Illiance River below the confluence of Clary Creek could potentially be affected by flow and quantity changes in the Clary Creek Watershed and was therefore assessed by the Proponent.

Method in the Application

The Proponent estimated hydrological characteristics of drainage systems using a regional hydrologic model to extrapolate monitoring data from four current on-site monitoring stations, combined with long-term data collected in the past by the Water Survey of Canada (WSC).

The Application describes annual hydrographs of local streams typically have a bi-modal shape, with the highest peak occurring in the spring freshet period and a secondary peak occurring in the late fall or early winter period.

A full discussion on Surface Hydrology can be found in the Proponent's Application section 6.5 and supplemental technical memorandum posted to EAO's website at: http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html

5.2.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Application notes that the proposed Project has the potential, with its water diversion, obstruction, and withdrawal activities, to cause changes in water flow and quantity within the three identified watersheds. In addition, this potential alteration of stream flow and/or quantity has the potential to affect other proposed Project related VCs, such as water and sediment quality as well as aquatic resources and wildlife VCs.

Key hydrological issues discussed in the Proponent's Application included potential impacts at all project phases on natural stream conditions, annual flows, seasonal distribution of flow (high and low flows) and lake levels. The Application noted that

changes in these parameters, if unmitigated, could affect other VCs such as water and sediment quality and aquatic and wildlife resources.

The Application notes the following activities could change the runoff from the watersheds within the proposed Project area:

- construction of the TMF, the Kitsault Pit, the WRMF, other mining infrastructure, and water diversions would change flow patterns within the watersheds;
- creation of the TMF would increase evaporation and local seepage due to creation of a larger surface water area. This would also be the case for the Kitsault Pit once it is filled following Year 16 of operations;
- construction of the mine facilities would affect runoff coefficients and infiltration by increasing the impervious area within the watersheds;
- waste rock and the low grade ore stockpile would affect runoff coefficients, infiltration, and evaporation by changing the characteristics of the natural landscape; and,
- Kitsault Pit de-watering would affect the groundwater flows by allowing the water to exit to the surface where it may not have before.

The proposed mine facilities with the largest potential for affecting downstream flows are the TMF, WRMF, Kitsault Pit, south diversion channel, Patsy Creek diversion and the diversion of water from Lake 493 to Lake 901.

Lime Creek Hydrology Effects

The proposed water management plan in the Application involved storage of mine contact water within the TMF and diverting non-contact water (unaffected upstream drainage) around the mine site to Lime Creek. During operations, excess untreated mine effluent from the TMF was proposed to be released to a single point of discharge to Lime Creek near LC2. The TMF would have sufficient capacity to store water without requiring discharge for most of the year if needed. However, seasonal discharge of water was proposed as an option to mitigate potential flow reduction effects to fish habitat in Lower Lime Creek. For decommissioning and closure, and continuing into post-closure, the Kitsault Pit would be filled and excess water would be discharged from the pit to Lime Creek near LC2.

The filling of the Kitsault Pit with water during decommissioning would greatly affect flows in Lime Creek, with reductions of up to 40% in average annual flows immediately downstream of the mine site, and up to 29% where Lime Creek flows into Alice Arm. In addition, the Application described baseline average annual and low flows in the Lime Creek and Clary Creek Watersheds being reduced at all project phases prior to post-closure. In Lime Creek, average annual flows could decrease by up to 20%,

10-year 7-day low flows by up to 40%, and 100-year 7-day low flows by up to 50%. Peak (10-year and 200-year) flows during these phases would be reduced by up to 39%.

During post-closure, the Application said that average annual flows, peak flows and low flows are expected to be up to 5% higher than baseline levels, linked to flow contributions from the TMF.

In addition to changes in flow, the Application says other potential hydrologic effects in Lower Lime Creek could include changes in water quality, sediment loading, stream temperature, benthic invertebrate production, fish habitat quality and fish utilization. Other flow related effects include changes in stream channel hydraulics (depth, velocity, wetted width), natural stream erosion processes (bank erosion, bedload transport), recruitment and retention of spawning gravel and large woody debris, all of which are important factors in maintaining fish habitat and aquatic ecosystem interactions.

Potential hydrologic effects to fish and aquatic resources in Lime Creek are further discussed in section 5.4 Freshwater Aquatic Resources.

Clary Creek Hydrology Effects

Within the Clary Creek Watershed, the TMF, water management features and water withdrawal have the potential to affect natural streams, drainage areas, annual flows, seasonal distribution of flow, high- and low-flow conditions and lake levels in Clary Lake and Lake 901.

The Proponent predicted that potential reductions in Clary Creek flows during all project phases prior to post-closure are more modest than those in Lime Creek – for average annual flows, up to 8%, for peak (10-year and 200-year) flows, up to 7%, and for the 10-year 7-day low flows, up to 17% (100-year 7-day low flows are unaffected).

For all project phases, the Application notes maximum predicted changes in average annual, peak and 7-day low flows as being within 2% of baseline flows along the Illiance River below Clary Creek. Minor lowering (up to 5%) of Clary Lake levels is predicted, and there would be little or no effect on Lake 901 levels.

Clary Lake levels could be reduced modestly at all proposed project phases. During construction and operations, no effects are expected on Lake 901, but lake level increases are expected during decommissioning and at post-closure. Lake 901 flows to Clary Lake. The construction of the TMF and flow diversion would affect Clary Creek Watershed and would have the potential to reduce lake levels due to an anticipated reduction in drainage area. Lake level effects on Lake 901 would be fully mitigated by the diversion of water from Lake 493 outflow to Lake 901.

The Proponent evaluated stream flow on the Illiance River downstream of confluence with Clary Creek and concluded the proposed Project would not affect the seasonal distribution or quantity of flow in the lower Illiance River.

Summary of Mitigation Proposed in the Application

The Application states that surface water flows and quantities affected by the proposed Project footprint would be managed under the proposed Water Management Plan, which includes management of all water in contact with a mining activity.

Proposed mitigation measures to reduce impacts on flow levels include:

- maximizing water recycle as much as possible; and,
- regulating discharge from mining activities to mimic baseline conditions, or to compensate for flow losses during low-flow periods, and increasing flow volumes in freshwater diversions.

5.2.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the early review of the Application, a number of key concerns related to water quantity were raised by members of the Working Group. The main themes of these concerns included:

- potential impacts to fish, fish habitat, and aquatic life, including invertebrates and aquatic plants in Lower Lime Creek and the Clary Creek Watershed (Lake 901, Clary Lake) due to reduced flows;
- concerns that the conceptual water management plan presented in the Application was not specific enough to quantify the water quality effects from contact water, including runoff and seepage from the TMF and PAG material stored in the LGS and WRMF; and,
- concerns with water balance and water quality modelling methods and analysis and in particular how accurate the models were in representing baseline flow conditions and assessing potential hydrologic and water quality effects over the life of the proposed Project.

Additional Water Management Mitigation Commitments

During the Application Review, and in response to the concerns noted above, the Proponent made a number of new commitments to additional water management mitigation measures to reduce potential impacts to surface hydrology and water quality in the downstream receiving environment in Lime Creek and Clary Creek Watersheds.

In order to address the issues raised during Application Review, the Proponent provided a series of supplemental technical memorandums and associated commitments on

July 31, 2012 and again on September 28, 2012.

(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_pro.html)

These memorandums included three main water quantity commitments. The first was to a revised water management plan which focused on collecting the main sources of mine contact water¹⁶, which include the TMF, WRMF, Kitsault Pit and LGS. This water would be collected and pumped back to the TMF. The specifics of this commitment are shown in Figures 10-13, presented earlier in section 5.1.1.

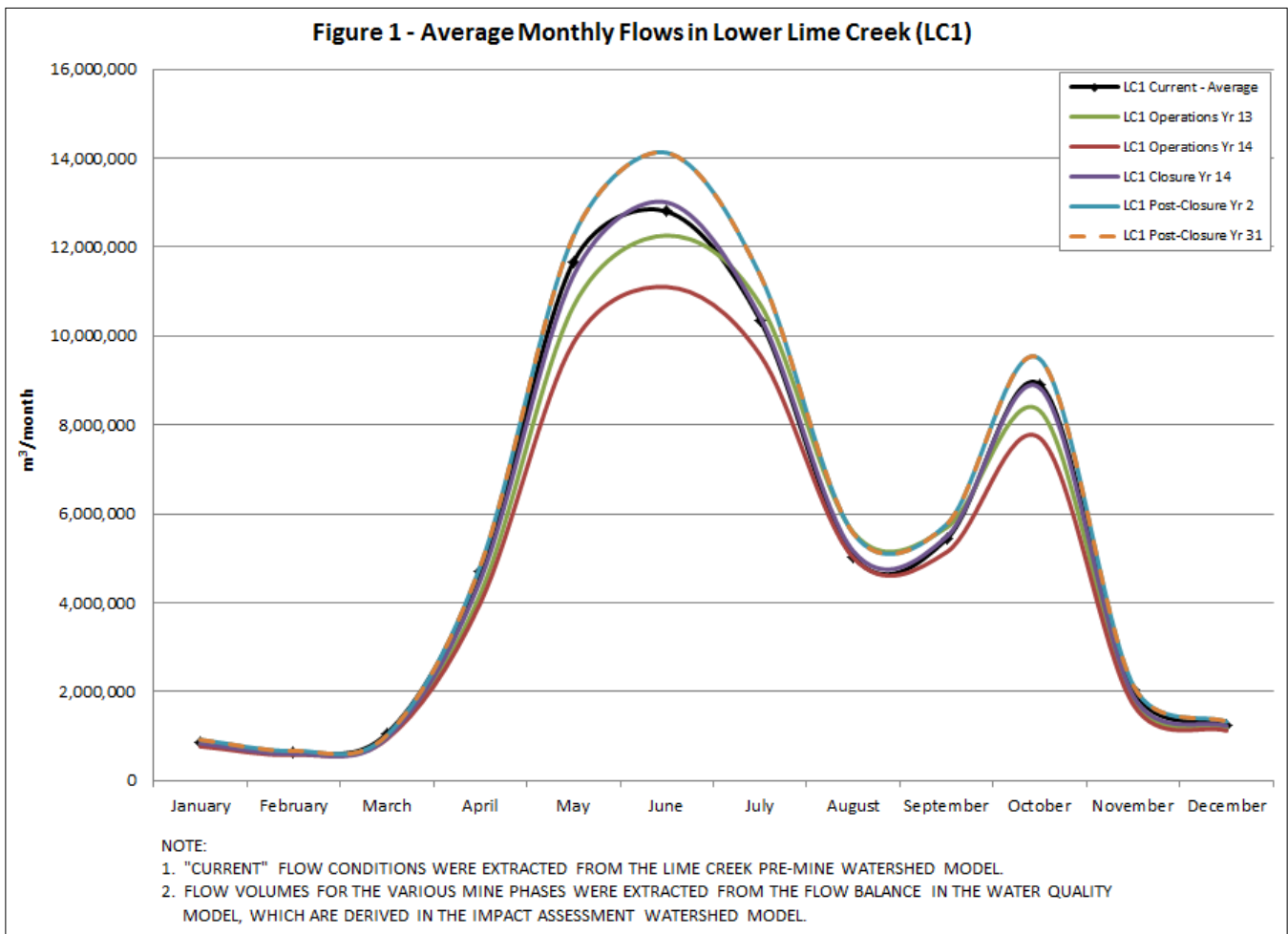
The second main commitment to mitigate potential flow related effects in Lime Creek was to ensure that the percentage of total excess water discharged from the TMF into Lime Creek was modified to reflect the natural hydrograph of Lime Creek throughout the year. This commitment would ensure that the seasonal distribution of high and low flows in Lime Creek would be maintained.

Based on the new commitments for additional water management and changes to the watershed model used in the Application, the Proponent provided a revised assessment of potential effects in Lower Lime Creek. This revised assessment showed that excess mine water from the TMF will be discharged to Lime Creek proportional to the baseline hydrograph. This is illustrated below in Figure 16.

Figure 16 below is a hydrograph of Lime Creek at LC1 which shows average monthly flows. It compares existing baseline conditions with the “base case” presented in the Proponent’s original Application as well as the revised water management plans during operations at year 13, closure at year 2 and post-closure at year 31.

¹⁶ “Contact water” is any water which has been in contact with mine related infrastructure or disturbed rock or soil.

Figure 16: Hydrograph of Average Monthly Flows at LC1 in Lower Lime Creek



The third Proponent commitment related to measures to protect Lake 901 and the Clary Creek Watershed¹⁷, including the collection and return of seepage and runoff from the north side of the Project area to the TMF, which ultimately discharges to Lime Creek. Seepage collection mitigation measures proposed include:

- installing pump back wells down-gradient of the NWMPs located at the base of the Northeast Embankment of the TMF;
- continuous pump back of water from the NWMPs to the TMF for all phases of the proposed Project; and,
- seepage collection pumps to capture the seepage water that bypasses the NWMPs.

¹⁷ EAO notes that, while this was presented as a water quantity commitment, it primarily relates to water quality.

Based on revised modelling results for the selected water management plan, the Proponent stated there would be no observed impacts to Lake 901 or further downstream in the watershed.

During the review of the Application, additional issues were raised by the agencies, NLG, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued.

Key hydrology issues raised during the Application Review included:

- As noted above, reviewers expressed a clear desire to have a specific commitment with respect to the water management plan during closure and post-closure. In particular, a clear conceptual model of the water flows and contaminant loads for closure and post-closure, the concept for water treatment sludge management post-closure; and long-term mitigation strategies for reclamation such as cover design.
 - As noted above the Proponent made a series of commitments to a specific water management plan which included the collection of mine contact water and discharge from a single point, following the natural hydrograph of Lime Creek for all discharges, and pumpback wells for areas between Lake 901 and the Northeast dam. These are described in the Certified Project Description.
- Reviewers noted that a key input to the water balance model for the TMF was not reflective of the site water balance as measured by streamflow.
 - The Proponent adjusted the model to a more representative value, resulting in forecasted discharges from the TMF increased by +25% during wet years and decreasing 25% during dry years. Reviewers noted this has implications for the maximum permitted discharge from the mine site, but acknowledged this could be addressed during permitting by applying sensitivity analyses to predicted water volumes. They viewed that exact flow regimes could be developed at permitting given the Proponent's commitment to store and discharge mine water from the TMF.
- Reviewers noted a zone of basalt rock near the upper height of the TMF and expressed a concern that this type of rock had not been characterized and may result in greater groundwater seepage.
 - In response, the Proponent committed to maintain the TMF pond height below this contact zone. The Proponent will also conduct seepage surveys along this contact zone throughout operations and closure.
- Reviewers raised concern about the range of potential changes in hydrology and stream temperature used in the Proponent's effects assessment.
 - In response to these concerns, the Proponent provided a supplemental report titled: "*Lime Creek Aquatic Life Assessment Report*"

(Avanti Kitsault Mine Ltd., January 29, 2013).

- The Proponent's assessment of the effects of potential changes in hydrology and temperature and level of information provided at the EA stage in modelling a range of potential hydrologic effects has been reviewed by EAO and MOE as adequate to predict potential effects. As a result of mining practices, should water temperatures and flows differ from predictions, these issues can be addressed through adaptive management in permitting.

5.2.4 Residual Effects and Cumulative Effects

The revised water management plan presented by the Proponent provides additional mitigation measures and reduces potential residual effects on surface water hydrology. After considering all relevant mitigation measures, EAO concludes that the proposed Project would still result in residual adverse effects on surface water hydrology.

For cumulative effects assessment, the effects of the Project were assessed along with other water users in the Lime Creek Watershed including the Kitsault Resort townsite. The Kitsault Resort townsite water supply is groundwater fed and the volume of withdrawal is not significant to cause any adverse effect.

There are also three water licenses which could potentially be affected by changes in flows expected from the proposed Project or could in turn affect those flows. Two of the water licences are located on Lime Creek and are applications for power generation. The other water licence is located on Clary Creek and is also for power generation. Potential future use of these watercourses for power generation and the likelihood of these projects proceeding in the reasonably foreseeable future is considered low considering the early stage of these applications.

The historical Kitsault mine altered natural streams with the development of the existing Kitsault Pit area and deposition of tailings material into Lime Creek. There are no other reasonably foreseeable projects that could interact with the hydrology in the proposed Project affected watersheds. Therefore, other than historical changes to hydrology associated with the Kitsault Mine, there are no cumulative effects for the Hydrology VC.

EAO has undertaken the following significance analysis on the residual adverse effects on surface water hydrology, taking into account direct and cumulative residual effects.

Table 7: EAO's Significance Analysis for Aquatic Environment – Surface Hydrology

Factor	Rationale
Context	<p>The total surface area of disturbance from the proposed Project facilities footprint within the Lime Creek/Patsy Creek Watershed is approximately 8.7 km², which represents 21.9% of the total watershed area, which is 39.7 km².</p> <p>The total surface area of disturbance from the proposed Project facilities footprint within the Clary Creek Watershed is approximately 1.8 km², which represents 4.9% of the total watershed area, which is 36.7 km².</p> <p>The Lime and Clary Creek / Illiance River drainages fall within the Nass Area and the NWA as defined by the NFA. The NFA defines Nisga'a Nation rights pertaining to water volume entitlements for the Nass River and its tributaries for domestic, industrial, and commercial purposes. The NFA also designates various rivers for Nisga'a Nation guide angling activities, including two rivers in proximity to the mine site, the Illiance and Kitsault Rivers.</p> <p>Various species of fish are present at the downstream end of Lime Creek, near the intertidal zone of Alice Arm. There is a fish barrier approximately 1.8 km up Lime Creek. Other species of aquatic life, including invertebrates and aquatic plants, are present in the areas upstream of LC1 and downstream of the mine discharge point.</p>
Probability	<p>There is a high degree of certainty that residual effects on water flow would occur in both the Lime Creek and Clary Creek drainages.</p>
Magnitude	<p>During operations, discharges from the mine site are expected to be representative of naturally occurring conditions and the natural hydrograph within Lime Creek. There would be a net storage of water from the mine site catchment and thus an overall reduction in the annual volume of water released to Lime Creek relative to current conditions of about 11% annually. This represents a reduction in volume of 13% in the average spring freshet peak flow, a 14% reduction in fall flows during the rainy period, and up to an 11% reduction during the low flow winter period. Given these flows are within the range of natural variation, the overall effect is</p>

	<p>considered to have a low to moderate magnitude during the 15 years of operations.</p> <p>There is a similar reduction in annual volume during closure, with peak freshet and fall flows as predicted during operations due to the filling of the Pit via direct precipitation and release of runoff from the WRMF to the Pit. The shape of the natural hydrograph is still maintained although flows are reduced, and therefore the magnitude remains low to moderate.</p> <p>During post-closure, there is a slight increase in the annual volume in Lime Creek relative to current conditions due to a small increase in the catchment of Lime Creek that results from the project. Also, during post-closure the mine site area no longer stores water. The total annual volume of water in Lime Creek increases by 7% and the peak spring freshet flow increases by 10%. The shape of the natural hydrograph is still maintained although flows are reduced, and therefore the magnitude remains low.</p> <p>The magnitude of the surface hydrology effect to Lake 901 is moderate, as the predicted loss of groundwater due the creation of the TMF will be offset from pumping water from Lake 493 to support the Fish Habitat and Compensation Plan (FHCP).</p>
Geographic Extent	<p>All flow reduction effects in the Lime and Clary Creek drainages are considered local in scope. Lime Creek represents only 5% of the total flows into Alice Arm, so any changes in the flow regime are likely to have a relatively small effect on surface waters beyond the watershed boundaries.</p> <p>Effects on Clary Lake and Lake 901 levels are local in scope.</p>
Duration and Frequency	<p>Residual effects are considered continuous for all project phases, including post-closure.</p>
Reversibility	<p>Residual effects are not reversible and a new long-term flow regime will be established during and following the post-closure phase.</p>

5.2.5 Conclusion

EAO notes that most of the watershed areas predicted to be affected by the proposed Project footprint are non-fish bearing, or have likely been artificially enhanced through

stocking programs¹⁸. Only the lowest 1.8 km of Lime Creek contains fish species that could potentially be affected by flow changes, although aquatic invertebrates occur in all streams and creeks throughout the project area. EAO also notes that, with the effective implementation of the Proponent's water treatment plan, hydrology in lower Lime Creek would likely be within the range of average annual low and high flows. We are aware that Lower Lime Creek has relatively modest fish values and have considered the local nature of effects, relatively low magnitude of changes in hydrology and the permanence of effects in flows when making a conclusion.

We are also aware that DFO will require a FHCP for any reductions of flows and associated impacts to fish habitat supporting a stocked population of rainbow trout in Lake 901 which may occur due to proposed Project.

Considering the above analysis and having regard to the Proponent's commitments to implement mitigation measures described in the Certified Project Description (which would become legally binding as a condition of a EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on surface water hydrology.

5.3 Aquatic Environment – Groundwater

For the groundwater resources assessment, the following VCs were selected:

- groundwater flow;
- groundwater quality;
- groundwater recharge and discharge; and,
- groundwater and surface water interaction.

The Proponent developed spatial boundaries for the groundwater VCs for geographic areas with a reasonable likelihood of being subject to direct or indirect proposed Project effects. The LSA is the same as for the surface water hydrology, surface water quality, and freshwater aquatic resources. The LSA is based on the proposed Project footprint and associated activities that could affect groundwater conditions both up and down-gradient from the proposed Project.

¹⁸ The Proponent presented information in the Application that the source of rainbow trout in the Clary Creek watershed upstream of the waterfalls is from stocking. The BC MOE has stocked rainbow trout into Killam Lake, upstream of Clary Lake, on at least six occasions since 1988; however, the presence of rainbow trout in Clary Lake during a 1979 survey indicated that rainbow trout were stocked into the Clary Creek watershed either before the province began keeping stocking records or were stocked by someone or some other agency before the province began stocking in 1988. The Proponent has assumed that initial stocking of rainbow trout into the Clary Creek watershed would most likely have been done from float plane or helicopter by the province or by employees of previous Kitsault mine operations after the road from Kitsault to Clary Lake was built in 1967. As a result, it may be that Lake 901 and Clary Lake were stocked with rainbow trout by residents of the Kitsault townsite during the early 1980s.

The RSA comprises the Lime Creek Watershed, the Clary Creek Watershed and the Illiance River Watershed. The Proponent's primary focus was on effects in Patsy Creek, Lime Creek, Clary Creek and the lower reach of the Illiance River.

5.3.1 Background Information

Groundwater Flow

The Proponent investigated baseline groundwater flow conditions by means of groundwater monitoring wells, boreholes and packer tests from which hydrostratigraphic¹⁹ conditions could be evaluated, and subsurface hydraulic conductivity (and also chemical composition) could be measured. The Proponent modelled baseline-level groundwater flows within the proposed Project area to estimate pit-dewatering rates.

Groundwater Quality

The Proponent is conducting quarterly groundwater chemical quality monitoring at priority locations, and would continue this monitoring into operations to confirm baseline groundwater chemical quality and to minimize the volume of contaminated groundwater that would require handling during operations and post-closure.

Groundwater Recharge and Discharge

The Proponent conducted baseline field surveys for the groundwater recharge and discharge VC as part of the fieldwork for the groundwater flow and quality VCs, and covered the Lime, Patsy and Clary Creek Watersheds and the Illiance River. The Proponent estimated baseline groundwater recharge and discharge volumes for the proposed Project area using a month-to-month moisture budget approach that accounts for interaction of surface water and groundwater flow components. Model inputs include climate information, stream flow information, snowpack information, and groundwater piezometric²⁰ surface information.

Groundwater and Surface Water Interaction

Baseline field surveys for the groundwater and surface water interaction VC were conducted as part of the fieldwork for the groundwater flow and groundwater quality VCs, and covered the Lime Creek, Patsy Creek, Clary Creek and Illiance River Watersheds. Based on the field investigations, the Proponent developed a watershed model that incorporated groundwater flow and groundwater quality.

¹⁹ Hydrostratigraphy is the identification of map-able units on the basis of hydraulic properties (aquifer/aquitard) that have considerable lateral extent and that also form a geologic framework for a reasonably distinct hydrogeologic system.

²⁰ Fluid pressure

A full discussion on Groundwater can be found in Proponent's Application and supplemental technical memorandums posted to EAO's website at:
http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html

5.3.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Proposed Project activities within the Patsy Creek Watershed include:

- a portion of the proposed TMF and the entire WRMF and its associated seepage collection pond;
- pipeline systems associated with the TMF and other water management facilities;
- the Kitsault Pit, which would affect hydrologic gradients along the boundary between Patsy and Lime Creek Watersheds, and flow conditions within Lime Creek; and,
- the South Diversion Channel, virtually all of the Southwest Diversion Channel and the South Pit Wall diversion channel.

Proposed Project activities within the Lime / Patsy Creek Watershed include:

- the Kitsault Pit, the primary crusher, the waterbox, the topsoil stockpiles, the fuel storage facility, the COS, the LGS and its seepage collection pond, and the LGS diversion channel; and,
- changes in hydrologic gradients along the boundary between the Lime and Patsy Creek Watersheds, and in flows within Lime Creek associated with the Kitsault Pit.

Proposed Project facilities within the Clary Creek Watershed include:

- a small portion of the proposed TMF alignment and associated seepage collection ponds and changes to hydrologic gradients along the boundary between the Clary Creek and Patsy Lake Watersheds, linked to the TMF;
- a portion of the process plant and camp accommodations;
- pipeline systems associated with the TMF and other water management facilities;
- the explosive magazines, cap magazines, ammonium nitrate storage facility, and the emulsion plant;
- the east mine site access road; and,
- Clary Lake, the proposed Project's non-potable water source.

Mining has the potential to substantively alter groundwater conditions at a mine site, which may in turn affect surface water flow volumes and quality, sediment quality, freshwater fisheries and even downstream marine conditions.

The Proponent assessed potential Project effects on groundwater characteristics and stream base flows, taking into account such factors as proposed water handling

procedures, water balance predictions, contingencies for potential higher-than-expected inflows, impacts of open pit development on groundwater flows, quality and links with surface water, and potential Project effects on groundwater recharge (surficial and bedrock aquifers).

Groundwater Flow

The Application reports that most anticipated operations-phase groundwater flow alterations associated with the proposed Project are expected to occur through development and use of the Kitsault Pit, the TMF, and associated surface water diversion channels.

During the operations phase, surface water within the Patsy and Lime Creek Watersheds would be diverted around the Kitsault Pit via surface water diversion channels. The Proponent reports in the Application that these diversion channels are unlikely to significantly affect groundwater flow, since the anticipated scale of flow diversion is small compared to that of the watershed. Ultimately, these diversion channels would discharge at or near locations where diverted surface water would have otherwise discharged naturally.

The Application reports that any extracted water that infiltrates the Patsy Creek Watershed is unlikely to affect groundwater flow within this watershed or the hydraulically down-gradient Lime Creek drainage, since the extracted groundwater would have originated within these drainages. The Proponent expects that a relatively small volume of extracted pit water would discharge to the Clary Creek Watershed via seepage from the TMF. Changes in infiltration or surface flows within a small portion the Clary Creek Watershed within the propose Project footprint would not likely result in watershed-scale groundwater effects.

During decommissioning, the groundwater flow regime near the Kitsault Pit would resemble baseline conditions. The presence of the TMF would alter groundwater flow predominantly in the Lime Creek Watershed. If long-term surface water works are left in place post-closure to manage Project related surface water flow, chemistry, or physical issues and if such works failed, groundwater flow could be affected.

Groundwater Quality

Potentially affected groundwater quality associated with mining in the Kitsault Pit has the potential to affect freshwater and sediment quality, surface water hydrology, freshwater fisheries, terrestrial environment, wildlife and their habitat, and environmental health in and near groundwater discharge areas and hydraulically down-gradient drinking water sources.

Uncontrolled release of contaminants of potential concern (spills or poor materials handling practices) could occur in association with various facilities and activities. Other sources of potential groundwater contamination include:

- development, use and reclamation of the LGS area, the WRMF and the TMF;
- surface water and waste water management facilities and works;
- blasting (due to development of blasting residue); and,
- if surface water management works are left in place, any failure of such works to operate as designed.

The long-term presence of the pit lake at closure could affect the chemical quality of bedrock groundwater through the presence of blasting residue and the discharge of ML/ARD to pit lake water which could then infiltrate into bedrock groundwater. Bedrock groundwater recharge rates due to infiltrating pit lake water may be higher than estimated during the baseline studies. If pit lake water infiltration rates are sufficiently high, pit lake filling rates, pit lake water discharge rates to surface, and surface water flow rates and levels could be affected.

Groundwater Recharge and Discharge

Any activities that redirect flow, or any dewatering activities to reduce water levels in the Kitsault Pit or other excavations, could affect groundwater recharge and discharge capabilities at all project phases. Many of the potential effects are the same as for the groundwater flow VC.

Baseline groundwater flow near the Kitsault Pit would be re-established during mine decommissioning. Baseline groundwater flow near the TMF may not be completely re-established during decommissioning because the TMF would remain as a permanent new reclaimed feature. Baseline groundwater flow near and hydraulically down-gradient from the surface water diversion channels would be re-established during decommissioning.

Groundwater and Surface Water Interaction

The Application says that mine-related activities could potentially affect groundwater and surface water interaction during the construction, operations, closure and decommissioning, and post-closure phases. Groundwater recharge and discharge rates, local surface water flow rates and levels, and local surface water chemical quality could be affected throughout the mine site facilities. Around the Kitsault Pit, local bedrock groundwater recharge, discharge, and flow rates, surface water flow rates and levels, surface water chemical quality and overburden aquifer chemical quality could be affected.

Summary of Mitigation Proposed in the Application

Groundwater Flow

The Proponent has designed hydrogeological mitigation methods to reduce the impact on stream flow rates and reduce the seepage and other contact water that may be lost to the area surrounding the proposed Project through the groundwater flow system.

The Proponent proposes the following measures to avoid or minimize potential effects of the proposed Project on groundwater flow:

- regular scheduled monitoring of bedrock groundwater hydraulic head, bedrock groundwater chemical quality, surface water flow conditions, surface water levels and surface water turbidity in bedrock groundwater monitoring wells near, and hydraulically down-gradient from the Kitsault Pit;
- monitor the WRMF, LGS and other embankments or works with a potential to yield groundwater seepage for the occurrence of seepage, and if so, the chemical quality and rate of such seepage;
- if groundwater monitoring results reveal unacceptable quantity or quality effects, mitigation measures could include installation of seepage collection trenches and/or groundwater interception wells;
- discharging water extracted from the Patsy Creek and Lime Creek Watersheds back into these watersheds at hydraulically up-gradient locations within the headwaters of these watersheds would help maintain their water balances, and compensate for local surface water body dewatering effects associated with pit dewatering; and,
- diversion channels could be equipped with flow regulators to better regulate the flow response during heavy precipitation events and spring freshet.

Groundwater Quality

The Proponent proposes the following measures to avoid or minimize potential effects of the proposed Project on groundwater quality:

- groundwater quality would be protected by adhering to procedures and safeguards built into the many relevant component EMPs, including those proposed for the explosives manufacturing facilities, explosives magazines, storage and mixing areas for process metallurgical, assay, and other laboratory reagents and chemicals, tank farms and other fuels storage and fuelling facilities, shop and other equipment repair or maintenance facilities, scrap or outdoor materials storage areas;
- regular monitoring of groundwater chemical quality hydraulically down-gradient from the Project would be conducted at all project phases to test for potential COPCs, including blasting residue. Specific monitoring locations would include sites located hydraulically down-gradient from the open pit, LGS, WRMF and TMF, and the monitoring would be complementary to surface water quality

monitoring; and,

- if groundwater quality fails to satisfy permit discharge requirements or applicable guidelines, the groundwater monitoring program would be modified as required to assess the potential for suspect quality groundwater to affect the quality of surface water bodies and hydraulically down-gradient drinking water. Where necessary, additional mitigation measures would be identified and implemented as warranted.

Groundwater Recharge and Discharge

- the proposed mitigation measures for the groundwater flow and groundwater quality VCs would also mitigate potential effects to groundwater recharge and discharge;
- during operations, the Proponent has proposed mapping and hydraulic characterisation of significant permeable or potentially permeable bedrock features to assess potential effects on bedrock infiltration rates of the post-closure pit lake water, predicted pit lake filling rates, predicted pit lake water discharge rates to surface water, and predicted effects to surface water flow and quality hydraulically down-gradient from the pit lake. If mitigation measures are warranted (such as timely sealing of permeable bedrock features), the Proponent proposed to identify and implement before the pit is allowed to flood; and,
- regularly scheduled monitoring of groundwater conditions at all project phases.

Groundwater and Surface Water Interaction

- the proposed mitigation measures for the groundwater flow and groundwater quality VCs would also mitigate potential effects to groundwater and surface water interaction.

5.3.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the agencies, NLG, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued. Examples of some of the key issues and additional commitments include:

- Reviewers raised concern that the effects scoping in the Application was centered upon potential larger, regional effects. Many of the Project activities were identified as having no interaction with groundwater, which reviewers felt may underestimate the potential influence on local groundwater, due to localized recharge and subsequent impact at a localized level. Reviewers felt a more accurate description could be "limited impact" dependent upon localized ground conditions (e.g. impermeable layers, preferred flow layers/flow paths). Reviewers felt the cumulative

effects of all small, discreet sources could result in a significant effect to groundwater.

- The Proponent noted that the Application focused on assessing key groundwater issues and developing mitigation measures for potential groundwater effects to the receiving environment. Most of the activities listed as having groundwater interactions are typical for a mining operation. BMPs and specific mitigation measures for many of the activities exist to assist in minimizing potential effects to groundwater and other VCs, which will be further defined during the permitting stage. More specifically, the Proponent noted:
 - The WRMF is ideally situated between the TMF and the Open Pit, which focuses this disturbance in an area already heavily impacting groundwater from historical mining activity. Moving it elsewhere would simply increase the impacts to groundwater where none exist under this mine development plan;
 - The tank farm could result in a localized impact, but it should be acknowledged that the designs put forward and those ultimately approved via permitting will be very robust, utilizing concrete bases, oil/water separators and double walled enviro-tanks, which has been a standard BMP at mines for several decades;
 - The LGS will have some impact to groundwater, and this is acknowledged. The impacts to water quality are already accounted for in the water quality model, as are reductions to groundwater flow and recharge. As it is a temporary stockpile, so too will be the associated effects. Earlier iterations of the design had the WRMF in this location, but a conscious effort was made to only install a temporary and smaller stockpile at this location (i.e. the LGS) so as to mitigate longer-term impacts to groundwater; and,
 - With respect to cumulative effects from smaller impacts that may become significant, the Proponent assessed this is an unlikely scenario, given the thoroughness of identifying activities and then focusing on those that result in key issues. In addition, the proposed location of the facilities was considered in such a manner as to have redundant systems to mitigate potential impacts to groundwater.
- Reviewers raised concern that groundwater flow rates were described in terms of annual averages. The concern was that these averages would underestimate potential effects given the likely significant differences in seasonal peak surface water flows and associated infiltration rates, resulting in groundwater flows being significantly greater at certain times of the year.
 - The Proponent responded that reference to average annual estimates was meant to summarize the findings of the modelling and that the surface and groundwater (watershed) model that was used had a monthly time step throughout all phases of the project. As a result, those times of year with higher

groundwater (or lower) flow are represented in the model, which was the basis for the flow and quality impact assessment for the proposed Project.

- Reviewers commented on the assumption made in the Application that there will be no groundwater flow to Lime Creek from the open pit during the closure period (while the pit is filling). There is no way to confirm this assumption at this stage, therefore monitoring of the pit lake water quality and down gradient pathways and receptors will continue throughout the closure period.
 - The Proponent responded that mitigation options are available (e.g. batch treatment of the pit lake, routing through a water treatment plant or pumping water back to the Tailings Storage Facility) if water quality in the pit lake does not meet expectations.
- Reviewers noted the Application stated that all seepage management infrastructure (e.g. pumpback wells) for the Lake 901 watershed would be decommissioned at closure, which would result in significant predicted spikes in water quality parameters of concern in Lake 901, and Clary Lake.
 - As a result of Working Group member comments, the Proponent committed to maintaining this infrastructure indefinitely, subject to review by the permitting agencies.

5.3.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures, EAO concludes that the proposed Project would result in residual adverse effects on groundwater.

Cumulative effects of historic mining activity and the Kitsault townsite are reflected in the baseline characterisation of groundwater. No interaction is anticipated between Project related groundwater effects and the effects of other human activities or current or reasonably foreseeable projects, therefore no cumulative effects are anticipated.

EAO has undertaken the following significance analysis on the residual adverse effects on groundwater, taking into account direct and cumulative residual effects.

Table 8: EAO's Significance Analysis for Aquatic Environment – Groundwater

Factor	Rationale
Context	Groundwater flow beneath the LSA and RSA is influenced primarily by local climatic and hydraulic conditions within each of the four small subject watersheds. Groundwater generally recharges from precipitation near the watershed boundaries, flows down-slope over exposed bedrock or through thin overburden to stream valleys or local, topographically low areas such as ponds. Most groundwater would discharge through the watershed boundary near the boundary's lowest elevation, with most groundwater within the

	<p>project footprint reporting to Lime Creek.</p> <p>VCs such as surface water flows and water quality could potentially be affected by changes in groundwater conditions. Preserving stream flow and water quality is important for the protection of freshwater and marine ecosystem components including fish, aquatic plants and invertebrates. Human health and food safety are also linked to water quality which can be affected by changes in groundwater conditions.</p> <p>Residual effects of groundwater and surface water interaction could potentially lead to changes in surface flow and water quality at all project phases.</p> <p>Within the Lime Creek watershed, there is a ground water well at Kitsault Resort which currently supplies the resort with its drinking water. There is also a registered groundwater well near the historic Kitsault Pit which is not currently in use.</p>
Probability	<p>There is a high degree of certainty that groundwater would be changed during operations due to the construction of the TMF, diversion from catchment areas and dewatering associated with the open pit and seepage ponds/dewatering wells. There is a high degree of certainty that these effects would continue, albeit with a less extent, in post-closure once the pit is filled with water and diversion structures are removed.</p>
Magnitude	<p>Mining activities have the potential to disrupt groundwater flows, affect groundwater chemistry and indirectly, both surface water flows and quality. The post-closure groundwater system would function in a manner similar to the baseline groundwater system, with similar flows and quality, except for some modification of groundwater regimes around the TMF.</p> <p>During operations, the magnitude of changes to groundwater flow is considered moderate, reducing to low to moderate once the open pit is filled and diversion structures are removed during closure and decommissioning. The presence of the pit will have resulted in a local cone of depression which will change in gradient and extent as the pit fills during closure and decommissioning. Groundwater flow volume may regain equilibrium; however, the overall flow regime around the pit will change as the pit fills.</p> <p>The magnitude of effects to Lake 901 is moderate, with loss of</p>

	groundwater flows likely offset through pumping water from Lake 493 to support the FHCP.
Geographic Extent	With mitigation measures implemented, any proposed Project related effects would be local and limited primarily to the Lime Creek watershed, although the Clary Creek watershed would be impacted to a lesser extent. The geographic extent of potential groundwater effects within the Clary Creek watershed is limited primarily to Lake 901 with seepage collection and pump-back wells proposed to mitigate potential groundwater effects from the TMF. The potential local effects are not expected to change groundwater flow or quality at the watershed scale, providing that monitoring and any necessary follow-up mitigation measures are effectively implemented.
Duration and Frequency	The duration and frequency of the residual effects are expected to be continuous at all proposed project phases.
Reversibility	All residual effects to groundwater are considered permanent, recognizing that the TMF and open pit are permanent additions to the landscape.

5.3.5 Conclusion

EAO has considered the fact that groundwater effects would be local and limited primarily to the Lime Creek watershed and to Lake 901. EAO notes the local and relatively low magnitude of effects as well as the certainty and permanence of these effects. EAO considers the ecological implications of potential effects to be low and has a high degree of certainty that the mitigation measures proposed are likely to perform as they are designed.

EAO notes the Proponents commitments to implement the Groundwater Monitoring and Mitigation Plan and Mine Water Monitoring Plan frameworks identified in the Certified Project Description, as well as mitigation measures for ARD and Water Management/Treatment identified in the Table of Conditions are expected to be successful in mitigating potential groundwater effects during all phases of the Project.

Considering the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on groundwater.

5.4 Aquatic Environment – Freshwater Aquatic Resources

5.4.1 Background Information

In the Application, the Proponent selected four freshwater aquatic VCs for assessment of effects. The VCs included:

- Dolly Varden Char;
- Coho Salmon;
- Rainbow Trout; and,
- Benthic Macro-Invertebrates²¹ (BMI).

The LSAs and RSAs for the freshwater aquatic VCs differ from one VC to another, and were described in the Application separately for each individual VC. Cumulative Effects Study Area (CESA) was defined based on potential interactions with other VCs with residual effects on aquatic resources from the proposed Project; and potential residual effects of other past, present, or reasonably foreseeable future projects or activities.

Table 9 below explains the various types of effects each of the VCs could experience in each Study Area.

Table 9: Various Types of Effects each of the VCs could Experience in each Study Area

VC	LSA	RSA	CESA
Dolly Varden Char	<p>Lime Creek Watershed including the following watercourses and water bodies:</p> <ul style="list-style-type: none"> • Patsy Lake • Patsy Creek Watershed • Lime Creek 	<p>Includes the LSA plus the adjacent watersheds known to support Dolly Varden that may be affected by potential indirect effects of the proposed Project:</p> <ul style="list-style-type: none"> • Lime Creek Watershed • Clary Creek Watershed 	<p>Includes the following watersheds:</p> <ul style="list-style-type: none"> • Lime Creek Watershed • Clary Creek Watershed • Roundy Creek • Illiance River • Kitsault River • Alice Arm • Observatory Inlet

²¹ Benthic macroinvertebrates are small, bottom dwelling aquatic insects which inhabit lakes and streams. This highly diverse group of insects is used as an indicator of changes in biodiversity.

		<ul style="list-style-type: none"> • Illiance River 	
Coho Salmon	<p>Lime Creek Watershed including the following watercourses and water bodies:</p> <ul style="list-style-type: none"> • Patsy Lake • Patsy Creek Watershed • Lime Creek 	<p>Includes the LSA plus the adjacent watersheds known to support coho salmon that may be affected by potential indirect effects of the proposed Project:</p> <ul style="list-style-type: none"> • Lime Creek Watershed • Clary Creek Watershed • Illiance River 	<p>Includes the following watersheds:</p> <ul style="list-style-type: none"> • Lime Creek Watershed • Clary Creek Watershed • Roundy Creek • Illiance River • Kitsault River • Alice Arm • Observatory Inlet
Rainbow Trout	<p>Clary Creek Watershed upstream of the Clary Lake outlet to Lake 901 and Lake 493</p>	<p>Includes the lakes and streams within the LSA plus Clary Creek from the outlet of Clary Lake downstream to the impassable waterfalls near the confluence with the Illiance River.</p>	<p>Includes the Clary Creek Watershed and the following lakes and streams:</p> <ul style="list-style-type: none"> • Killam Lake • Unnamed lakes and streams draining the northeastern portion of Clary Creek Watershed to Clary Lake
Benthic macro-invertebrates	<p>Lime Creek Watershed including the following watercourses and water bodies:</p> <ul style="list-style-type: none"> • Patsy Lake • Patsy Creek Watershed • Lime Creek <p>Upper Clary Creek Watershed including the two headwater</p>	<p>Includes the LSA plus the adjacent watersheds that may be affected by potential indirect effects of the proposed Project:</p> <ul style="list-style-type: none"> • Lime Creek Watershed • Clary Creek Watershed 	<p>Includes the following watersheds:</p> <ul style="list-style-type: none"> • Lime Creek Watershed • Clary Creek Watershed • Roundy Creek • Illiance River • Kitsault River

	tributaries of Lake 901 that are potentially affected by the northeast embankment of the TMF: stream 76800 and ILP 887	<ul style="list-style-type: none"> • Illiance River 	
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Based on their fieldwork, the Proponent concluded that Dolly Varden in Lower Lime Creek were limited to the downstream section below an 8 m waterfall located approximately 1.8 km upstream from the mouth of Lime Creek where it enters Alice Arm. No fish of any species were found above these falls. Dolly Varden were found in all four downstream reaches within Lower Lime Creek, indicating that the 3 m cascade located about 268 m upstream from Alice Arm is not a barrier to fish. Spawning Dolly Varden were found immediately below the impassable 8 m falls.

The Proponent concluded coho salmon parr (juvenile coho) only utilize the lowest reach of Lime Creek from the mouth at Alice Arm to the 3 m cascade at 268 m upstream for rearing habitat. Although marginal habitat quality exists in the creek for spawning and rearing of coho salmon, they concluded a coho salmon run likely does not currently exist in Lime Creek, although not enough data has been collected to confirm that.

Coho salmon are also known to be present in the Illiance River and in the lower reach of Clary Creek downstream of a very large impassable waterfall. There are no predicted project related effects to coho salmon in Clary Creek or the Illiance River.

Previously stocked resident populations of rainbow trout are present in lakes within the Clary Creek Watershed including Clary Lake, Lake 901 and Lake 493. Potential effects to rainbow trout include a loss of spawning habitat within inlet tributaries to Lake 901 within the footprint of the TFM Northeast Embankment, and changes to lake levels in Lake 901 and Clary Lake.

A full discussion on Freshwater Aquatic Resources can be found in the Proponent’s Application and supplemental technical memorandums posted to EAO’s website at: http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html

5.4.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Proponent’s Application provides a detailed assessment of issues and effects on freshwater aquatic resources. The Proponent included a description of the types of impacts which could occur to each of the four species selected as VCs.

Changes in Surface Water Quality

As discussed earlier in this Report in section 5.1, water quality modelling results presented in the Application predicted mine water discharge during each proposed Project phase would result in periodic exceedances of BCWQG and CCME guidelines for the protection of aquatic life in Lower Lime Creek.

The proponent acknowledged that lethal or chronic health effects to Dolly Varden, coho salmon and other freshwater aquatic biota in Lime Creek due to water quality changes caused by the proposed Project would be unacceptable. As such, the proponent committed to working with Environment Canada (EC), Department of Fisheries and Oceans Canada (DFO), BC MOE, and the NLG to determine if and what site-specific water quality targets or objectives would be appropriate for each chemical of concern with predicted exceedances of existing guidelines for the protection of aquatic life in Lime Creek and Alice Arm.

The proponent also committed to monitoring water quality in their mine effluent and in Lime Creek as part of any future EEM Program and to providing water treatment of their mine effluent if required.

Changes in Surface Hydrology

As discussed earlier in this Report section 5.2, changes in stream flow in Lower Lime Creek were predicted during each project phase due to changes to the upstream catchment areas (primarily Patsy Creek) within the proposed mine footprint. Hydrological changes in Lime Creek /Patsy Creek watershed were predicted to result during construction and operations from diverting and storing upstream catchment area run-off in the TMF for start-up processing requirements and management of mine tailings, diversion of streams, annual discharge of excess accumulated run-off in the TMF; and filling of the Kitsault Pit at closure.

Potential hydrology-related effects to freshwater aquatic resources in Lower Lime Creek include changes in stream flow, water quality, sediment loading, stream temperature and benthic invertebrate production which are important factors to fish habitat. Other potential flow related effects include changes in stream channel hydraulics (depth, velocity, wetted width) and natural stream erosion processes such as bank erosion, stream bed erosion, recruitment and retention of spawning gravel and large woody debris, all of which are important factors in maintaining fish habitat and aquatic ecosystem interactions.

In order to determine whether an assessment on potential effects from flow reductions was necessary, the Proponent calculated a minimum water threshold for Lower Lime

Creek using the BC Instream Flow Guidelines²². They used a 20 year daily flow record for Lime Creek obtained from a previously operated WSC stream gauge in lower Lime Creek. The results suggested that an assessment should be conducted.

Data were collected, hydraulic relationships between discharge and water depth were developed and a comparison of water depths and water velocities predicted to occur to those known to be suitable for Dolly Varden spawning and egg incubation was conducted. The predicted reductions in water depth and water velocity in pool tail-outs and riffle crests in lower Lime Creek would not be sufficient to decrease the suitability of these mesohabitat types for Dolly Varden spawning and egg incubation. Dolly Varden would continue to be able to use these habitats for spawning, egg survival and annual recruitment during construction and operation of the proposed Project with no likely reduction in spawning success from pre-mine, baseline conditions.

Similarly, flow reductions during July and August, the critical summer rearing months for coho salmon parr, were also predicted to occur. The predicted flow reductions in lower Lime Creek are unlikely to adversely affect existing coho salmon parr summer or winter habitat in the lowest reaches of the stream.

Temperature Changes

The TMF and Kitsault Pit are located in the Patsy Creek watershed, a headwater tributary to Lime Creek. The Application says that water temperatures in Lime Creek could change when the discharge in Patsy Creek is altered from being largely determined by outflows from Patsy Lake during pre-mine conditions to being largely determined by outflows from the TMF during construction, operations and closure phases and from the Kitsault Pit during the post-closure phase. These activities could result in water discharged from the TMF and Kitsault Pit to Patsy Creek which is substantially colder or warmer than naturally occurring water temperatures.

During the post-closure phase, water released from the Kitsault Pit to Patsy Creek (via the spillway) may be warmer in summer with delays in the spring warm-up and fall cool-down periods compared to current temperatures in Patsy Creek. No changes in winter water temperatures are expected because, similar to Patsy Lake, the surface of the end-pit lake is expected to freeze and water temperatures drawn off the top of the lake are expected to be near zero.

Based on the above situations, the potential exists for water temperatures in Patsy Creek and lower Lime Creek to be altered during all seasons and during all phases of the proposed Project compared to water temperatures currently experienced

²² The BC Instream Flow Minimum Threshold for fish bearing streams is a seasonally-adjusted threshold for alterations to natural stream flows designed to protect fish and fish habitat. Essentially, it determines the minimum amount of water fish require for survival.

by fish present in lower Lime Creek. As Dolly Varden char and coho salmon are cold-water species with a relatively narrow range of preferred water temperatures, changes in temperature could reduce growth rates or increase mortality of Dolly Varden char and coho salmon parr rearing in Lime Creek or result in increased mortality.

No mitigation measures were proposed in the Application to specifically eliminate or reduce the potential changes in water temperatures in Lime Creek. However, some of the potential changes in water temperature created by the Project would at least partially be attenuated by the continued influence provided by run-off from the unaffected upper Lime Creek watershed, run-off from the diverted upper Patsy Creek watershed, and run-off from the unaffected Lime Creek tributaries downstream of the Patsy Creek confluence.

The Application states that it is unlikely that water temperatures in lower Lime Creek would increase outside the range of natural variability during any phase of the proposed Project. As a result, no significant residual effect on juvenile Dolly Varden rearing in lower Lime Creek in summer or to Dolly Varden egg's incubating in lower Lime Creek in winter is expected to occur. It also states that any water temperature changes that would occur would likely be insufficient to alter the growth or survival of coho salmon parr²³ in summer or to alter the survival of coho salmon parr in winter.

Changes to BMI communities

The Proponent's Application noted a number of potential effects to BMI communities. The Application included assessments for the following effects:

- loss or alteration of habitat,
- potential change in surface water quality,
- potential change in hydrology,
- potential change in water temperature,
- potential change in lake levels in Clary Lake; and,
- potential changes to benthic invertebrate community abundance, species composition and potential effects to fish in relation to BMI being an important source of food for fish.

Habitat loss effects

The Application states that losses in habitat are assumed to have a not significant (moderate) effect on BMI in the Lime Creek watershed because the habitat losses would be limited in geographic extent to Patsy Lake and Patsy Creek and because the ecological context of the loss of BMI from Patsy Lake and Patsy Creek is assumed to be

²³ A juvenile salmon at the stage after a fry and prior to becoming a smolt.

low. Loss of BMI production in Patsy Lake and Patsy Creek would be considered more ecologically important if they supported a fish community or fish species commonly utilized by humans.

The Application notes that the loss of Patsy Lake and Patsy Creek represents a loss of 100% of the lake habitat and 28% of the stream habitat in the Lime Creek watershed. The losses in habitat were assumed to have a not significant (moderate) effect on BMI in the Lime Creek watershed because the habitat losses would be limited in geographic extent to Patsy Lake and Patsy Creek and because the ecological context of the loss of BMI from Patsy Lake and Patsy Creek is assumed to be low. This was because the Proponent found that it was unlikely that Patsy Lake provides habitat or produces any BMI species not found elsewhere in the Kitsault area and because Patsy Lake and Patsy Creek are non-fish-bearing.

The Application says production of BMI from Patsy Lake and Patsy Creek represents a relatively small portion of the total invertebrate drift contributing as a food source to fish within the lower 1.8 km section of lower Lime Creek. It also notes that there are no direct effects to the habitat of the BMI species within that section of Lime Creek from the Patsy Creek confluence to the waterfall at km 1.8 km. Similarly, the Application says that the loss of BMI habitat would only result in a minor effect on BMI in the Clary Lake watershed.

Water quality effects

As discussed earlier in this Report in section 5.1, water quality modelling results presented in the Application predicted mine water discharge during each project phase would result in periodic exceedances of BCWQG and CCME guidelines for the protection of aquatic life in Lower Lime Creek. The Proponent's original Application noted that they would work with agencies to develop water quality targets which would be protective of aquatic resources, including BMI.

Stream flow effects

Effects on BMI due to potential changes in stream flows were assessed based on results of a watershed model that predicted annual, monthly, peak instantaneous, and 7-day low flows in the Lime Creek watershed; and in the Lake 901 inlet and outlet; in Clary Creek downstream of Lake 901; and the Clary Lake outlet.

The Application predicted that decreases in average water velocities in riffle and pool tail-out habitats would be unlikely to decrease the suitability of these habitats for the BMI community present in lower Lime Creek. It also said that the abundance or composition of the BMI community would not change. The Proponent also found that the BMI communities in the Clary Creek watershed would not be substantially changed during any phase of the Project.

Water temperature effects

As it is unlikely that water temperatures in Lime Creek will increase outside the range of natural variability during any phase of the Project, the Application states that no significant residual effect on BMI in Lime Creek due to change in water temperatures was expected to occur.

Clary Lake effects

In the Application, no significant residual effect to the BMI community in Clary Lake was predicted to occur due to predicted changes in lake levels in Clary Lake.

BMI as a food source for fish effects

The Application says that potential changes to the benthic invertebrate community in Lime Creek had the potential to affect coho salmon because they are their primary food source. Impacts on coho salmon parr would be similar to those on Dolly Varden and other fish species if benthic invertebrates were affected. In relation to BMI as a food source, the Application states the following conclusions:

- The small change in wetted width predicted to occur due to flow reductions caused by the Project is unlikely to have a large effect on the number of benthic invertebrates available to drift downstream to Dolly Varden or coho salmon parr;
- The flow reductions predicted to occur in Lime Creek are unlikely to be large enough to reduce the water velocities or depths preferred by the mayflies, stoneflies, and caddisflies that currently dominate the benthic macro-invertebrate community of Lime Creek;
- The flow reductions predicted to occur in Lime Creek are unlikely to be large enough to reduce the delivery of benthic invertebrate drift to Dolly Varden or coho salmon in lower Lime Creek;
- The small changes in water temperatures predicted to occur are unlikely to alter the benthic invertebrate community of Lime Creek in favour of prey items not preferred by Dolly Varden or coho salmon parr; and,
- Water quality of the discharge effluent from the proposed Project would be monitored such that no water would be released downstream that didn't meet site-specific WQO designed to ensure the protection of freshwater aquatic biota in Lime Creek, including the benthic macro-invertebrate community.

As a result of the assessment of these effects, the Application concluded that no significant residual effects to benthic invertebrate production or drift (from flow rate, water temperature, and water quality) in Lime Creek were predicted to occur.

Direct habitat impacts

The Application states there will be a direct loss of non-fish bearing aquatic habitat within the Patsy Creek Watershed (a tributary to Lime Creek), including wetlands within the proposed footprint of the TMF and WRMF. There are no direct habitat impacts to Lime Creek below the confluence with Patsy Creek resulting from the proposed Project facilities.

Within the Clary Creek Watershed, spawning habitat for rainbow trout within two inlet tributaries of Lake 901 would be lost due to construction of the TMF Northeast Embankment. These tributary streams are fish-bearing and are known to be used by a stocked population of rainbow trout in Lake 901 for spawning and rearing. Unmitigated, the effect of the loss of fish habitat in these streams would result in the potential extirpation of rainbow trout in Lake 901, since these two streams provide the only spawning habitat for rainbow trout in the lake.

The Application also notes that, without mitigation, lake levels in Lake 901 and Clary Lake would be reduced during all project phases, more so in Lake 901, where the two streams affected by the TMF provide 84% of the total annual inflow volume to Lake 901.

Construction of the TMF would also result in the loss of non-fish bearing aquatic habitat in Patsy Creek, a tributary to Lime Creek as well as off-channel wetland habitat present within the proposed TMF footprint. Direct impacts include a loss of aquatic habitat area, changes in habitat type and habitat quality for benthic invertebrates, amphibians and waterfowl. Indirect impacts, such as a loss of food and nutrient contribution to downstream fish bearing habitat in Lower Lime Creek, may result from changes in aquatic habitat and benthic invertebrate production within the proposed Project footprint.

Dust and emissions

In their Application, the Proponent stated that emissions from burning of fossil fuels in trucks, shovels, and generators and dust generated from blasting, drilling, loading trucks, and driving machinery on mine roads are not expected to affect water quality. Emissions such as SO_x and NO_x were not expected to accumulate in Lime Creek.

Summary of Mitigation Proposed in the Application

The Application outlined the Proponent's mitigations to address effects to freshwater aquatic resources. The Application proposed a range of water quality and mitigation measures incorporated into project design elements as well as specific operational policies. Proposed mitigation measures include:

- no fishing policy for all workers and contractors while on-site;
- implementation of the Water Management Plan in order to:

- maximise the diversion of clean non-contact water around the proposed Project components;
- utilising water within the proposed Project area to the maximum practicable extent by collecting and managing site runoff from disturbed areas;
- maximise the recycling of process water between the TMF and mill; and,
- releasing accumulated surplus water in the TMF in excess of mill processing requirements to Lime Creek if it meets effluent discharge limits.
- strategies included in the plan to mitigate changes in surface water quality in Lime Creek and the Clary Creek Watershed included:
 - an Erosion and Sediment Control Plan;
 - a Reclamation and Closure Plan; and,
 - the use of BMPs prior to, and during, construction activities.
- design and installation of the gravity fed diversion between Lake 493 and Lake 901 to mitigate potential adverse effects on lake levels in Lake 901 and Clary Lake, following DFO guidelines to minimize the potential for entrainment;
- develop and implement a FHCP as required by DFO, noting that two fish habitat compensation plans may be required, one for HADD of fish habitat and one for MMER amendment;
- development of Site Specific WQMTs and/or WQO, to be developed during the permitting process, which will be protective of aquatic life and mitigate potential adverse effects to fish in the receiving environment; and,
- water treatment of mine effluent, if required. Water treatment was proposed to be implemented in closure and post-closure if necessary to prevent water quality impacts to fish and other freshwater aquatic resources in Lower Lime Creek.

5.4.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the agencies, NLG, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued.

The main themes of issues raised included:

- potential effects to BMI, Dolly Varden char and coho salmon parr from changes in water quality and reduction in stream flow in Lower Lime Creek;
- potential cumulative aquatic ecosystem effects from long term metal loading in Lime Creek water quality and sediment quality from the proposed Project in addition to historic impacts from previous mining activity and natural conditions with elevated parameters of concern; and,

- loss of rainbow trout spawning habitat in inlets to Lake 901 within the Clary Creek Watershed due to encroachment of the TMF Northeast Embankment, and change in lake levels in Lake 901 and Clary Lake.

In response to issues and concerns raised regarding freshwater aquatic resources, the Proponent provided a series of technical memorandums on July 31, 2012, and on September 28, 2012, with additional mitigation commitments for water treatment and water management (as discussed in detail in section 5.1 and 5.2), as well as development of fish habitat and wetland compensation plans to ensure the proposed Project is protective of aquatic life in the Lime Creek and Clary Creek Watershed.

Key issues and responses include:

- Reviewers raised concern regarding the discharge of mine effluent to Lime Creek (near LC2) with predicted exceedances of BCWQG for several parameters of concern at LC1 and potential water quality effects to fish in Lower Lime Creek.
 - The Proponent provided additional water quality mitigation commitments including a revised water management plan and water treatment during all project phases to ensure water quality in mine effluent is protective of aquatic life. These additional mitigation commitments are specified in the Certified Project Description and Table of Conditions (Appendix 2).
 - New Condition 4 referenced LC2 as well as Lake 901 and directs that water quality meet BCWQG or Site Specific WQO.
- Reviewers raised concern regarding potential water quantity and flow related effects to downstream fish bearing habitat in Lower Lime Creek.
 - The Proponent committed to implementing a revised water management plan with additional mitigation measures to ensure discharge of mine contact water from the TMF is released year round proportional to the natural hydrograph (average monthly flows) in Lower Lime Creek to mitigate potential aquatic effects.
- Reviewers raised concern regarding potential effects to BMI community composition and abundance in Lime Creek resulting from changes in water quality, stream flow and alteration of non-fish bearing habitat in the upper Lime Creek Watershed (including Patsy Creek and Patsy Lake within the proposed Project footprint); and potential downstream effects to BMI as an important food source for Dolly Varden and coho salmon parr in Lower Lime Creek.
 - In response to these concerns, the Proponent provided EAO with a supplemental report titled: "*Lime Creek Aquatic Life Assessment Report*" (Avanti, January 29, 2013).
 - This supplemental report adds to the previous aquatic effects assessment information and conclusions in the Proponent's Application.
 - Furthermore, the supplemental report provides detailed supporting

information on sampling methodology and analysis of BMI baseline data collected in 2009 and 2010 following EC's Canadian Aquatic Biodiversity Information Network (CABIN) guidelines.

- Includes a detailed effects assessment on BMI community composition and abundance within both the non-fish bearing and fish-bearing sections within the Lime Creek Watershed.
 - Analyzes the diet of Dolly Varden captured in Lower Lime Creek and assesses potential project effects on food availability in relation to potential changes in BMI community composition and relative abundance.
 - The effects assessment considers current conditions and potential project related effects to the BMI community from predicted changes in water quality, stream flow, water temperature and alteration of habitat in the upper non-fish bearing section of the Lime Creek Watershed (including Patsy Creek and Patsy Lake within the Project footprint); as well as potential downstream water quality and stream flow related effects to BMI production within the fish-bearing section of Lower Lime Creek.
 - In determining potential effects to BMI as a source of food for fish in Lower Lime Creek, the aquatic effects assessment considered the relatively low contribution and low significance of BMI production expected to be lost from alteration of non-fish bearing aquatic and riparian habitat within the Project footprint (i.e. wetlands, Patsy Lake, Patsy Creek). It also considered the relatively low contribution of BMI production from Lime Creek between LC2 and LC1 (i.e. downstream of proposed mine effluent) and invertebrate drift downstream, in comparison to the BMI community in the fish-bearing section of Lower Lime Creek as the primary source of BMI contributing to the diet of Dolly Varden and coho salmon parr.
 - The effects assessment is based on the additional water management and water treatment mitigation measures, revised water quality modelling results and the Proponent's commitment to meet BCWQG or develop site-specific WQO (as specified in Condition 4) to ensure water quality in Lime Creek will be protective of aquatic life throughout all phases of the proposed Project.
 - *The "Lime Creek Aquatic Life Assessment Report"* (Avanti, January 29, 2013) further supports the EAO's conclusion that the proposed Project is not likely to result in significant adverse effects to BMI or fish in Lime Creek.
- Reviewers raised concern regarding the predicted loss of rainbow trout spawning habitat in inlets to Lake 901; and changes in lake levels in Lake 901 and Clary Lake due to drainage encroachment of the TMF Northeast Embankment.
 - The Proponent committed to developing and implementing a FHCP to the satisfaction of DFO which will ensure no net loss in the productive capacity of fish habitat as required for the Project's

Fisheries Act Authorization. A technically feasible FHCP was developed in consultation with Working Group members.

- The lost volume in Lake 901 and Clary Lake and changes in lake levels due to catchment reduction will be compensated by diverting water from Lake 493.
- Potential water quality impacts from mine contact water runoff and seepage from the north side of the proposed Project area to stocked rainbow trout in Lake 901 and Clary Lake within the Clary Creek Watershed.
 - Additional mitigation measures were proposed to protect Lake 901 and the Clary Creek Watershed including collection and return of all seepage and runoff from the north side of the Project area to the TMF, which ultimately discharges to Lime Creek.
 - Based on revised modelling results for the selected water management and treatment plans, there are no observed impacts to Lake 901 or further downstream in the Clary Creek watershed. The lost volume in Lake 901 due to catchment reduction and groundwater seepage collection will be compensated through Lake 493 which was assumed to have similar chemistry to Lake 901.
- Reviewers raised concerns regarding the loss of non-fish bearing wetland habitat within the TMF footprint. Wetlands provide important watershed functions and may provide habitat for migratory birds, amphibians, and species at risk (western toad and olive-sided flycatcher). Requests were made for the Proponent to provide additional baseline survey information on wetland classification, species at risk and develop a Wetland Compensation Plan following guidance provided in the Federal Policy on Wetland Conservation.
 - In response to these concerns, the proponent provided technical memorandums(http://a100.gov.bc.ca/appsdata/epic/html/depoly/epic_project_doc_list_356_r_pro.html) and made additional mitigation commitments including the following which are captured in the Table of Conditions.
 - The Proponent committed to undertake further site survey and characterization of blue- and red-listed wetland communities within the Kitsault mine footprint, including an assessment of blue- and red-listed wetland function as it relates to habitat for migratory birds and species at risk, prior to construction, for use in the development of a Wetland Habitat Compensation Plan.
 - The Proponent committed to developing a Wetland Habitat Compensation Plan, to the satisfaction of EC prior to issuance of the federal authorization, to address residual effects to red- and blue-listed ecological wetland communities and their functions resulting from the issuance of the federal authorization, unless it is determined that the 1991 Federal Policy on Wetland Conservation does not apply to the Kitsault Mine Project.

5.4.4 Residual Effects and Cumulative Effects

Having regard to all relevant mitigation measures including water management and water treatment mitigation measures, EAO concludes that there should be no residual effects to aquatic resources on the Illiance River downstream of Clary Lake.

EAO concludes that there will, however, be residual effects on freshwater aquatic resources in the Lime Creek and Clary Creek watersheds.

With respect to potential cumulative effects of other past, present, or reasonably foreseeable future project or land uses were on aquatic resources, they are limited to effects of past mining at Kitsault, including effects from the historical deposit of mine tailings in Lime Creek and the straightening of the lower reach of Lime Creek during construction of the town of Kitsault. On-going and future commercial and / or recreational fishing, including the fishing in Kitsault and Illiance rivers guided by Nisga’a citizens was considered negligible.

EAO has undertaken the following significance analysis on the residual adverse effects on freshwater aquatic resources, taking into account direct and cumulative residual effects.

Table 10: EAO's Significance Analysis for Aquatic Environment – Freshwater Aquatic Resources

Factor	Rationale
Context	<p>Patsy Creek, a tributary to the Lime Creek Watershed within the Project footprint is non-fish bearing. Dolly Varden char and coho salmon parr utilize the lower 1.8 km section of Lime Creek below a barrier falls, located approximately 4 km downstream from the proposed mine site and effluent discharge point. This lower section of Lime Creek was previously channelized during construction of the historic Kitsault townsite, and impacted by previous mining activity.</p> <p>The current habitat quality in Lime Creek is considered marginal, and fish habitat values are currently impacted by water quality in Lime Creek with periodic exceedances of guidelines for protection of aquatic life.</p> <p>The proposed Project is within the Nass Area. The Nisga’a Nation has a right to harvest fish within the Nass Area and wildlife fish in the NWA. The Nisga’a Nation also have specific Nass salmon and steelhead entitlements.</p> <p>Coho salmon and Dolly Varden are in two of the 15 designated rivers close to the mine site - the Kitsault and Illiance Rivers, for</p>

	<p>which the Nisga'a Nation have guiding entitlements in the NFA.</p> <p>The Metlakatla First Nation also have asserted aboriginal rights, including title, in the area of the mine site and that right could include an interest in freshwater aquatic species.</p> <p>Coho salmon stocks in the Nass Area remain healthy (NLG 2010) indicating that current fishing levels are sustainable.</p> <p>Rainbow trout populations potentially affected within Lake 901 and Clary Lake were previously stocked and these lakes were likely historically non-fish bearing.</p> <p>A FHCP is proposed which is designed to result in no net loss in the productive capacity of fish habitat. In the overall watershed and ecological context, impacts to rainbow trout in Lake 901 and Clary Lake are considered to be of low significance.</p> <p>The loss of Patsy Lake and Patsy Creek represents a loss of 100% of the lake habitat and 28% of the stream habitat in the Lime Creek. Production of BMI from Patsy Lake and Patsy Creek represents a relatively small portion of the total invertebrate drift contributing as a food source to fish within the lower 1.8 km section of lower Lime Creek.</p>
Probability	<p>The probability that surface water quality and hydrology effects would affect aquatic resources in lower Lime Creek is rated as low to moderate. This rating reflects the new Condition 4 and commitments in the Certified Project Description relating to the maintenance of flow rates in Lime Creek.</p> <p>In the Clary Creek drainage, there is a high probability that there will be rainbow trout habitat loss, that Lake 901 levels would be affected, and that flow volumes and velocity would be reduced. However, there is a moderate to high probability that the FHCP can be developed to replace or compensate for this habitat loss. As a result, probability of effects is low to moderate.</p> <p>There is a high degree of probability that the new Condition 4 and other Proponent's mitigation measures to protect water quality in Lake 901 and Clary Lake will be successful.</p>
Magnitude	<p>The magnitude of residual effects is rated low for effects on all aquatic resources in Lime Creek, considering Condition 4, which will</p>

	<p>ensure that all water quality is protective of aquatic resources at both LC1 and LC2. The magnitude of residual water quality effects on aquatic resources in Lake 901 is also considered low with the inclusion of Lake 901 in Condition 4.</p> <p>The magnitude of effects on rainbow trout populations in Lake 901 is very high in the absence of successful mitigation. A FHCP will be required by Canada to mitigate this effect. Effects after mitigation are low to moderate.</p>
Geographic Extent	<p>The geographic scope of residual effects on all freshwater aquatic resources for all proposed project phases is considered local for both lower Lime Creek and the Clary Creek drainage.</p> <p>Any loss in BMI production from Patsy Lake and Patsy Creek would be limited in geographic extent to Patsy Lake and Patsy Creek and Lime Creek.</p>
Duration and Frequency	<p>The durations of potential residual effects to aquatic resources are generally short-term and infrequent for construction, primarily relating to sediment events and very long term and continuous for operations, closure and post-closure.</p>
Reversibility	<p>Residual effects are considered irreversible for all freshwater aquatic VCs at all proposed project phases.</p>

5.4.5 Conclusion

EAO concludes that, with the mitigation measures proposed by the Proponent and described in the Table of Conditions and Certified Project Description, there is a low to moderate probability of any residual effects to aquatic resources occurring in Lime Creek. Those effects that do occur are likely to be low in magnitude and local in extent, only impacting small local populations in Lime Creek. EAO has also considered the relatively modest fish habitat in lower Lime Creek as well as the long term and irreversible nature of the effects.

EAO concludes that there will be effects to rainbow trout in Lake 901 due to changes in water levels and loss of spawning habitat. EAO notes that these losses are subject to a FHCP to be considered for approval by Canada. We also note the very local extent of that effect and that rainbow trout populations in Clary Creek and Lake 901 have likely been introduced through an artificial stocking program.

Potential effects to the abundance and composition of BMI communities in Lime Creek

and Clary Creek Watersheds are expected to be low in magnitude, local in extent and limited to direct effects from habitat loss and alteration within the proposed Project footprint primarily within the non-fish bearing Patsy Lake and Patsy Creek and the relatively small area of fish bearing habitat and BMI production to be lost within the inlet tributaries of Lake 901. In consideration of the proposed mitigation measures and significance analysis for freshwater aquatic resources, EAO concludes that potential changes to the BMI community are not likely to result in any significant adverse effects including potential indirect effects as a food source to fish in lower Lime Creek and Lake 901.

Considering the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on freshwater aquatic resources.

5.5 Aquatic Environment – Marine Aquatic Resources

5.5.1 Background Information

The Proponent's marine aquatic resources assessment addresses the potential effects of the proposed Project on both marine estuarine water quality and select marine biota, linked primarily to surface drainage from the mine site. Marine water quality influences the types of biota that can use marine waters near the proposed Project, and the health of these organisms.

For the marine aquatic resources assessment, the Proponent selected the following VCs:

- marine water quality (water and sediment quality); and,
- marine biota (plankton, intertidal and shallow subtidal benthic invertebrates, marine fishes, marine mammals, and marine birds).

The LSA included in the Application encompassed a 5 km section of near-shore area along the eastern side of Alice Arm, extending from the vicinity of the Illiance River at the head of the inlet to southwest of Roundy Creek. This area includes two existing permitted barge landing facilities, a historical submarine tailings disposal outfall, and a historical log sorting and disposal site. The RSA, which included cumulative effects, covered the entire length of Alice Arm.

The Proponent's previous plans to transport construction supplies and ore concentrate by barge were abandoned in favour of transport by truck. As a result, plans for upgrades to the barge landing facilities and marine transport activities were discontinued and removed from the proposed Project design and were not included in the scope of the EA.

In the Application, the Proponent provided a review of historical oceanographic and marine biological studies of Alice Arm published over the last 40 years which included technical reports, journal articles, and studies by DFO, EC and BC MOE. These studies collectively document the impact to the marine environment attributable to submarine tailings disposal into Alice Arm associated with historical mining activities at the Kitsault deposit and discharges from other regional mining sites.

Marine Water Quality Baseline Summary – Alice Arm

Alice Arm is a glacially-fed, steep-sided, U-shaped fjord approximately 19 km long and 1.4 km wide and reaches a maximum depth of 386 m. Alice Arm is located east of Hastings Arm, and is one of the terminal branches of Observatory Inlet located approximately 140 km north of Prince Rupert. See Figure 17 below of Alice Arm showing locations of Lime Creek, the Illiance River and Kitsault River estuaries.

Figure 17: Alice Arm Showing Locations of Lime Creek, the Illiance River and Kitsault River Estuaries



Historical studies have characterised Alice Arm as heavily influenced by seasonal freshwater discharge, with high runoff during summer snow melt and low freshwater discharge during winter months. Alice Arm has two major rivers, the Kitsault and Illiance River, and several smaller creeks including Lime Creek flowing into the head of the inlet which influence marine water quality, including surface temperature, salinity, dissolved oxygen (DO) and chemical composition.

The distribution of temperature and salinity in Alice Arm is heavily influenced by freshwater discharge. In summer months, high runoff from snow melt produces a distinct horizontal stratification of temperature and salinity in Alice Arm. Low discharge during winter months (December through January) leads to near equal temperature and salinity at most depths throughout the inlet, with the exception of a shallow layer of cold freshwater close to the river mouths at the head of Alice Arm.

Specific conductivity and salinity profiles in Alice Arm indicates a shallow, 2 m deep freshwater lens above denser and more saline marine waters resulting from freshwater discharges of the Kitsault and Illiance Rivers and Lime Creek. DO concentrations in Alice Arm remain high throughout the year in both shallow and deep waters, with bottom values never dropping below 50% saturation, indicating frequent renewals.

Total suspended solids (TSS) concentrations were lowest in surficial water and higher in deeper water. Surface water TSS decreased with distance from the Kitsault River, with the lowest surface water turbidity recorded at the mouth of Lime Creek.

Concentrations of total aluminum, iron, manganese, and, to a lesser degree, copper, lead, and zinc were higher in surface waters than at depth. This suggests that these metals are entering Alice Arm through riverine inputs, primarily the Kitsault River and the Illiance River which are the two largest watersheds draining into Alice Arm.

The total and dissolved concentrations of barium, boron, calcium, magnesium, molybdenum, potassium, sodium, strontium, and uranium were nearly identical, indicating that these elements occurred primarily in the dissolved state, rather than bound to particulates (i.e. suspended solids / sediment).

The only element exceeding BCMWQG is boron, which exceeded the guideline at every station. The marine water quality guideline for boron of 1.2 mg/L is lower than the concentration of boron reported in natural seawater of 4.4 mg/L.

A report prepared for BC MOE "*Environmental Impact Assessment of Alice Arm*" (Ford, 2012) summarized existing marine water and sediment quality and identified historic impact areas in Alice Arm with sediment quality exceeding BC aquatic life guidelines.

Previous marine sediment quality studies by Odhiambo et al. (1996) identified a heavily impacted area of approximately 14 square km extending from the head of Alice Arm near the Kitsault River (See Figure 7 provided in section 5.1). The historic impact area is largely a result of previous Kitsault mine operations from 1968-1971 and 1981-1982 which included tailings disposal to Lime Creek and direct discharge of tailings to Alice Arm via a submarine tailings outfall. The historic submarine tailings outfall, which discharged tailings during previous Kitsault mine operations from 1981-1982, was located on the ocean floor at a depth of 40 m approximately 1 km west of Lime Creek.

The Ford (2012) report and previous studies by Odhiambo et al. (1996) both highlight the need for comprehensive monitoring of marine water quality, sediment quality and representative marine organisms.

The Ford (2012) report was published following submission of the Proponent's Application, therefore was not included in the list of historical and recent reports used in the Application as references in the marine baseline and effects assessments. However, during the Application Review, the Proponent reviewed the Ford report and in response to issues raised made subsequent revisions to the proposed Project's MEMP framework.

The Proponent's proposed MEMP framework is summarized in the Certified Project Description (Appendix 2). The MEMP framework is presented in detail in supplemental information reviewed in Marine Monitoring Program Technical Working Group Meetings during Application Review.

Marine Biota - Baseline Summary

Marine baseline studies were conducted in Alice Arm in 2009 and 2010 to characterise and inventory marine fish and fish habitat resources near or potentially affected by the proposed Project. Marine biota of Alice Arm includes planktonic organisms, benthic invertebrates, marine fish (including shellfish) and marine mammals. Five habitat types were identified in the LSA including intertidal gravel beach, shallow subtidal mud and sand areas, deep subtidal mud areas, rocky outcrops and an estuarine mud flat.

Fish and crab community sampling enumerated 20 species within the study area. The greatest species abundance was located in the productive intertidal environment adjacent to the outflows of Lime and Roundy Creeks. The majority of the catch consisted of six species: Dolly Varden char; Chinook and coho salmon; shiner perch; and sculpins and dungeness crab.

Dolly Varden char, an important sport fishing species, was the most abundant fish species in the sampling area. Chinook and coho salmon smolts, both important commercial and recreational sport fishing species, were captured near the mouths of Lime and Roundy Creeks. Dungeness crabs were captured throughout the study area

and caught in high numbers in the Illiance River estuary. Very few flatfish were captured with gear although they did appear frequently during the underwater video transects in 2009 and 2010.

Six marine mammal species of conservation concern potentially occur in Portland Inlet and Observatory Inlet, of which Alice Arm is at the most inland tip: grey whale, harbour porpoise, humpback whale, northern resident population orca; west coast transient population orca; and Steller sea lion. These species and their habitats are provided special protection under the *Species at Risk Act* (SARA).

Marine mammal surveys were conducted in Alice Arm in 2009 identified harbour seals and harbour porpoises, while surveys in Observatory Inlet identified harbour seals, harbour porpoises, and Dall's porpoises. One humpback whale was observed in Portland Inlet, approximately 80 km from Alice Arm. Across both surveys harbour seals were the most commonly observed species in Alice Arm. Several other marine mammals, including a sea lion species, an unidentified whale species, and river otters were also incidentally observed.

Of the five marine mammal species identified during surveys, two are of conservation concern: harbour porpoise; and humpback whale. Harbour seals and harbour porpoises appear to be residents in the inlet.

A full discussion on Marine Aquatic Resources can be found in Proponent's Application and supplemental technical memorandums posted to EAO's website at:

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html

5.5.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

In the Application, the Proponent concluded that, since no project related activities would occur in marine waters or along the shoreline of Alice Arm, there would be no direct project effects on the marine environment. However, they noted that direct effects on freshwater quality and quantity in Lime Creek would have some potential to interact with marine water near the mouth of Lime Creek, especially during operations and post-closure.

They note that the only mechanism by which project related activity could affect marine biota would be through changes in marine water quality. Marine water quality changes, if they occurred, could affect all types of marine biota, including planktonic organisms, benthic invertebrates, fish, marine birds and marine mammals.

The range of marine water quality effects outlined in the Application included the potential for the proposed Project to degrade near-shore marine water quality near the mouth of Lime Creek, potentially affecting marine biota, and cause deposition of chemical contaminants adsorbed to waterborne particulates, affecting sediment quality

within benthic marine invertebrate habitat. Contaminants, whether in dissolved form or particle-bound, could affect marine biota by direct uptake or through the food chain.

Historic mining impacts were also included in the Proponent's assessment of cumulative effects in the marine environment. They note historic Kitsault Mine operations resulted in negative impacts to surface water and sediment quality from direct tailings discharge into Lime Creek and Alice Arm. In addition to historic mine impacts and potential cumulative effects from the proposed Project on freshwater and marine ecosystem health, there are also potential issues noted regarding potential impacts to human health from harvesting fish and shellfish with elevated metal levels in Alice Arm.²⁴

Summary of Mitigation Proposed in the Application

The proposed mitigation measures to maintain freshwater water quality in Lime Creek and Clary Creek (as described in section 5.1 Surface Water and Sediment Quality) were identified by the Proponent to be appropriate to also mitigate against potential effects to marine water quality.

5.5.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the agencies, NLG, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contains specific mitigation measures, which would be legally enforceable if an EA Certificate is issued. Examples of some of the key issues and additional commitments include:

- Concerns were expressed that the original Application did not include a full and complete understanding of the existing baseline conditions of Alice Arm and in particular the current condition of sediments impacted by historic mining tailings disposal. This issue was raised when a report prepared for BC MOE "*Environmental Impact Assessment of Alice Arm*" (Ford, 2012) was released during the review of the Application. Reviewers sought additional information which would indicate if shellfish were safe to eat in Alice Arm, and in particular, how much could be consumed safely.

²⁴ Historical impacts to the marine environment in Alice Arm and a review of historical data available on elevated metal concentrations in sediment and shellfish tissue were evaluated in a report prepared for BC MOE "*Environmental Impact Assessment of Alice Arm*" (Helen Ford, 2012). However, this study on historical impacts to Alice Arm was not published until after the Proponent submitted the Application.

- Concerns were expressed that there was no comprehensive marine effects assessment in the original Application, and marine sediments were not assessed, which represented a material deficiency in the EA to determine potential ecological and human health effects.
 - In response to these concerns, the Proponent provided a supplemental memorandum “Re: *Response to Nisga’a Nation’s January 8, 2013 Marine Environment Comments on KMP-EAO Draft Assessment Report*” (AMEC, January 29, 2013). This supplemental memorandum summarizes the marine effects assessment information contained in detailed in the Application, including assessment of marine water quality, sediment quality, marine biota including an evaluation of shellfish metal concentrations to address ecological and human health concerns raised.
 - As described in the supplemental memorandum, the Application’s marine effects assessment (section 6.8 and Appendices) included an extensive suite of baseline studies which were conducted to characterize the chemical and physical marine environment in the local and regional study area in Alice Arm.
 - In addition to baseline studies conducted by the Proponent, academic and agency studies for marine monitoring and research conducted in Alice Arm over the last 30 years were also summarized in the Application to evaluate historical and current conditions in Alice Arm.
 - Marine sediments were analyzed for a suite of physical and chemical parameters as part of the Project baseline studies. Nine sediment samples were collected by AMEC in 2010 at three locations (mouth of Lime Creek, Illiance/Kitsault river mouths, and a reference location off Pearson Point). These samples were analyzed for metals and organics and the benthic infauna were identified and tabulated.
 - In addition, sampling was conducted to characterize biological communities (phytoplankton, zooplankton, benthic invertebrates, fish, marine mammals, and marine birds). Underwater video surveys were also conducted to document submerged vegetation and benthic macrofauna.
 - The Proponent’s memorandums showed that very little dilution of Lime Creek’s discharge with Alice Arm water is required to meet BC marine water quality guidelines. The freshwater discharged to Alice Arm is less dense than the marine waters and therefore occupies the top of the water column. The water gradually mixes with the underlying water as the water moves in a generally southerly direction down Alice Arm. Benthic organisms or demersal fish are not likely to come into contact with the freshwater except possibly in a small region near the mouth of Lime Creek. The low dilution factors imply that the spatial area of elevated metal concentrations will be small and confined to the top of the water

column. As noted in the EA, the small spatial area likely to be affected before dilution causes the water to meet BC guidelines is very unlikely to have a significant adverse impact on the populations of marine biota in Alice Arm.

- Reviewers wanted to ensure a very robust marine EEM Program would be put in place to ensure that there would be no effects and if there were, how would they be detected, results communicated and negative effects mitigated.
 - In response to these concerns, the Proponent presented a conceptual MEMP framework at a Working Group meeting on August 13, 2012.
 - A Marine Monitoring Technical Subgroup meeting was held on August 29, 2012 to have a more detailed discussion of the marine monitoring framework, issues raised, objectives, monitoring locations, species selection, statistical design and adaptive management and other technical issues related to a monitoring program.
 - The Proponent committed to developing a MEMP to the approval of the MOE, in consultation with the Nisga'a Nation. A framework, setting out the objectives and core elements of the MEMP are included in the Certified Project Description. The MEMP would be designed to: "Determine whether the mining operations of the Project result in a statistically significant change in project-related metal concentrations in shellfish from current reference conditions in Alice Arm."
 - The Proponent committed to use the results of the MEMP as a feedback mechanism to determine the effectiveness of the mine's management practices in mitigating effects on marine water uses and to determine if additional management actions are warranted to prevent or address potential impacts.
 - The Proponent committed to work with Federal, Provincial and Nisga'a Lisims governments and the Metlakatla First Nation during all stages of the MEMP and will share the collected data with those parties involved with the MEMP.
 - The Proponent committed to complete 2 years of marine baseline prior the commencement of mine operations.
 - As referenced in section 5.1 Water and Sediment Quality, the Proponent also committed to additional water treatment and water management during operations, closure and post-closure, which result in a significant improvement in water quality over the predictions provided in the Proponent's original EA Application.
- The NLG expressed concern that the MEMP, as designed by the Proponent, is not designed to monitor and detect impacts to non-marine wildlife and sought a broader design which reflected a broader ecological approach.
 - The Proponent made significant changes to the MEMP to include an ecosystem approach and included a number of species, at the request of

the NLG, which could provide indicators of any uptake to lower and higher level mammals. Specifically, the Proponent included bivalves (i.e. clams), intertidal fish (e.g. sculpins) and invertebrates (e.g. polychaetes) to the design framework.

5.5.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures identified in the Application and supplemental technical memorandums, EAO concludes that the proposed Project would result in residual adverse effects on marine aquatic resources. The proposed Project could affect marine water quality primarily due its cumulative interaction with water quality and sediment effects from the historic Kitsault mine workings.

EAO has undertaken the following significance analysis on the residual adverse effects on water and sediment quality, taking into account direct and cumulative residual effects.

Table 11: EAO's Significance Analysis for Aquatic Environment – Marine Aquatic Resources

Factor	Rationale
Context	<p>Alice Arm, the closest body of seawater to the proposed Project, is located approximately 7 km northwest of the proposed Project site. It is one of two terminal branches of Observatory Inlet, Hasting Arm being the other.</p> <p>Like most North American west coast inlets, Alice Arm is a glacially-fed fjord with significant freshwater influence. Two major rivers, the Kitsault and Illiance Rivers, and several smaller creeks, including Lime Creek, flow into the head and sides of the inlet.</p> <p>Alice Arm provides valuable habitat for many species of benthic infauna and epifauna, fish, marine mammals and marine birds.</p> <p>The Nisga'a Nation holds marine harvesting rights under the NFA. The NFA defines Nisga'a Nation rights to harvest marine resources, including aquatic plants, throughout the Nass Area, and, in particular, south of the proposed Project site. The maintenance of water quality in the Nisga'a Nation's intertidal bivalve harvest (in the northern part of Observatory</p>

	<p>Inlet extending to the southern portion of Alice Arm) is important during harvest periods between 1 October and 31 March each year.</p> <p>The Metlakatla First Nation have stated that they use and continue to use, marine resources, including fish, shellfish, herring eggs, oolichan, seal grease, berries and seaweed, for food, social, ceremonial and commercial purposes. Maintenance of marine water quality is important for continued Metlakatla First Nation marine harvest.</p> <p>Lime Creek, which is the main drainage from mine infrastructure and the main pathway for any degraded water quality from the proposed Project, makes a relatively small freshwater contribution to Alice Arm (5%) compared to those of the Kitsault River (57%), the Illiance River (17%), and other smaller creeks (21%).</p> <p>The proposed Project would likely improve marine water quality over current conditions, due to improved water management.</p>
<p>Probability</p>	<p>With effective implementation of mitigation measures, in particular water management Condition 4, probability of direct and indirect effects to marine environment VCs is predicted to be very low.</p> <p>The MEMP is expected to have a high probability of detecting potential Project related effects to the marine environment. If effects are detected in the monitoring program, the adaptive management response will be to implement additional mitigation measures to ensure the proposed Project related effects do not result in a significant adverse impact.</p> <p>The probability that potential residual effects from the proposed Project on the marine environment will cause a cumulative effect is rated as low.</p>

	<p>Although sediment quality and shellfish tissue metal concentrations in Alice Arm have been impacted from historical tailings discharge, considering the improvement in water quality should the mine be developed, there is a high probability that water quality in Alice Arm will be improved.</p>
<p>Magnitude</p>	<p>The magnitude of potential effects to marine aquatic resource from changes to flow and water quality in the estuary of Lime Creek, the Illiance River to the marine environment in Alice Arm is considered low during all project phases.</p> <p>The proposed water management plan includes key mitigation measures to avoid impacts to water quantity and quality in proposed Project affected watersheds. Mine water discharge from the TMF to Lime Creek is proposed year round, proportional to the natural hydrology (average monthly flows) to mitigate changes to flow in Lime Creek. Water quality in lower Lime Creek discharging to the marine environment will meet, according to conditions, BCWQG or other site-specific WQO for the protection of aquatic life or to be approved by MOE.</p> <p>No population scale effects are predicted to marine aquatic organisms in Alice Arm. There are no intertidal or sub-tidal marine habitat area losses or direct physical impacts associated with the proposed Project.</p>
<p>Geographic Extent</p>	<p>The geographic extent of any effects to marine aquatic resources are limited to the Lime Creek and Illiance River estuaries and nearby sediment deposition and transport zones in Alice Arm resulting from discharges from Project affected watersheds (Lime Creek/Patsy Creek and Clary Creek/Illiance River).</p> <p>The marine environment geographic extent includes overlap with historic impacts areas and non-project affected watersheds including the Kitsault River</p>

	<p>estuary. The Kitsault River discharge into Alice Arm is a major source of sediment deposition, sediment quality and water quality in Alice Arm and has an influence on marine VCs such as shell fish tissue metal concentrations.</p> <p>The MEMP will include historical impact sites and reference sites selected to detect if there are statistically significant changes in water quality, sediment quality and shell fish tissue metal concentrations; and to determine if these changes are the proposed Project related residual effect, cumulative effect or if attributable to historical impacts and/or natural temporal or spatial variability in the marine environment. These sites are expected to be located throughout Alice Arm.</p> <p>As a result, the geographic scope of all potential residual effects at all project phases is considered local for all marine environment VCs.</p>
<p>Duration and Frequency</p>	<p>The duration of potential residual effects are generally short-term for construction and long-term for operations, closure and post-closure. The frequency of all types of potential residual effects for all marine aquatic VCs is considered continuous throughout all project phases, as water from Lime and Clary Creek will flow continuously throughout the life of the proposed Project.</p>
<p>Reversibility</p>	<p>The residual effects are considered very long term (irreversible) for all marine aquatic VCs at all project phases.</p>

5.5.5 Conclusion

EAO has considered the valuable marine aquatic resources in Alice Arm and the importance of these resources to the Nisga’a Nation and Metlakatla First Nation and in particular the potential for human health impacts due to the bio-accumulation of metals in fish and shellfish tissue. We recognize the historic impact of past mining operations on Alice Arm which may have contributed to these issues, but we are also aware that the proposed Project, should it proceed, would likely result in an improvement over current water quality in Lime Creek and therefore in Alice Arm, reducing the potential for

negative effects to marine aquatic resources. We have also considered that the Lime Creek drainage contributes only a very small portion of fresh water to Alice Arm (5%) and have considered the significant dilution factor of that fresh water in the marine environment. EAO has also considered the proposed MEMP and is satisfied that the program would be robust, involve the Nisga'a Nation in its development during permitting and would detect any changes in the marine environment. These factors outweigh the long term and continuous nature of any residual effects.

Considering the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on marine aquatic resources.

5.6 Terrain, Surficial Geology and Soils

5.6.1 Background Information

Terrain, surficial geology and soils were characterized in the Proponent's Application by means of a literature review, soil and terrain mapping, aerial photographs, and Light Detection and Ranging (LiDAR) based contours and hill shade images. These information sources formed the basis of the baseline for the assessment. The Proponent's assessment considered the anticipated effects of changing slope gradients and re-contouring of the topography as a result of the proposed Project.

For the purpose of this effects assessment the Proponent considered four VCs, including: physiography and topography, surficial geology, soil cover, and soil quality.

The LSA for the terrain, surficial geology and soils VCs includes the proposed Project footprint plus a 500 m buffer surrounding the permanent features in the proposed Project footprint. The RSA encompasses the area contained in a 500 m buffer zone around the LSA.

The topography of the proposed Project area ranges from gently undulating topography to steep bedrock controlled slopes and deeply incised drainage channels. Lower relief areas are situated on the plateau where the Power plant is proposed, and high relief slopes occur in the Patsy Creek drainage channel.

5.6.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Physiography and Topography

Alterations to the local topography would occur through excavating, mine infrastructure installation, and resource extraction during construction and operation, and final re-grading upon closure, resulting in potential effects on terrain stability and an increased

rate of surface erosion. The WRMF, TMF and the Kitsault Pit are expected to undergo the most extensive alterations from the baseline topographic conditions.

The baseline of the majority of the site facilities is Class 2, 3 or 4 (slope gradient of 15% to 70%) and after extensive alterations at the full proposed Project extent, the slope gradients would be Class 1 (slope gradient below 15%), resulting in a lower slope gradient than baseline.

Surficial Geology

Potential Project related effects on baseline surficial geology would be associated with removing overburden material, changing terrain stability affecting the rate of erosion and re-contouring of the land surface.

The proposed Project components which would be associated with the highest degree of alteration in surficial material would be the open pit, the TMF and the WRMF, and also the highest degree of redistribution of surficial materials during closure.

Soil Cover

The potential effect on soil cover would be a result of disturbance to baseline soil units during construction; and soil redistribution of reclamation material, including capping the overburden material with soil to facilitate the reclamation and revegetation of the site during the decommissioning and closure phase.

Soil Quality

Physical and/or chemical soil alteration of soil may be a result of soil contamination, terrain instability and accelerated erosion, dust deposition, soil reclamation suitability, soil disturbance and soil redistribution, due to construction, operation, decommissioning and closure activities.

A full discussion on Terrain, Surficial Geology and Soils can be found in Proponent's Application and supplemental technical memorandums posted to EAO's website at: http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html

Summary of Mitigation Proposed in the Application

The potential effects on physiography and topography, surficial geology, soil cover and quality, within the proposed Project footprint would be managed or minimize through the following proposed mitigation measures:

- minimize the footprint through:
 - facility location planning - grouping facilities in centralised areas and development of a functional Project footprint, especially for the TMF - the administrative buildings, processing facilities and support buildings and the TMF are grouped as closely as possible to minimise the aerial extent of

disturbance;

- use of waste rock as construction material whenever technically feasible – this minimises use of new borrow areas and reduces the size of waste dumps;
- use of existing forestry roads to reduce the site access footprint and minimise new site access disturbances;
- sourcing construction aggregate within areas of anticipated disturbance (where available); and,
- use of existing disturbed areas for expansion of new facilities, where feasible.
- erosion control measures and maintenance of slope gradients at all phases;
- soil and vegetation monitoring of redistributed soil with additional mitigation measures to include adding surface organics to increase the organic content of the salvaged topsoil/ subsoil material, applying fertilisers to improve nutrient content and refining erosion control plans to minimise loss of soil material from the stockpile; and,
- salvage and store suitable materials stripped from construction sites for reclamation, and site reclamation following mine closure.

5.6.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the agencies, NLG, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued. Examples of some of the key issues and additional commitments include:

- Reviewers recommended that the Proponent use native grass seed mix for revegetation and consult with the Northwest Invasive Plant Council and advised the Proponent to commit to a threshold of no introduction of invasive species for measuring the success of the proposed mitigation measures.
 - The Proponent responded that mitigation measures and vegetation monitoring plan would involve regulatory agencies and NLG, and continue ongoing dialogue with agencies and NLG to address issues.
- Reviewers expressed concerns about closure details such as where topsoil and closure and reclamation materials would come from and if there were sufficient materials to ensure adequate cover for long term closure.
 - The Proponent provided a conceptual closure plan that quantified the quantity and source of reclamation materials required at closure. Additional details will be required during the permitting stage.

5.6.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures, EAO concludes that the proposed Project would not result in residual adverse effects on terrain, surficial geology and soils.

5.6.5 Conclusion

EAO notes that the proposed Project is a brownfield site and has experienced several periods of past mining. Extensive past modification of the soils and terrain has occurred. EAO is satisfied the permitting agencies will ensure that closure and reclamation plans and monitoring will ensure soils are properly managed and conserved.

Having regard to the Proponent's commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on terrain surficial geology and soils.

5.7 Terrestrial Environment – Vegetation and Plant Communities

5.7.1 Background Information

The Proponent considered six VCs in its assessment of the potential effects of the proposed Project on vegetation and plant communities:

- Ecosystem composition;
- Wetland ecosystems
- Old forests;
- Species at risk;
- Ecological communities at risk; and,
- Cultural plants.

The LSA for the vegetation assessment is the area encompassed by the proposed Project footprint plus a buffer zone of 500 m around that footprint. The LSA incorporates the zone of direct proposed Project effects on-site and in contiguous areas, and covers 1,980 ha. The RSA encompasses 5,200 ha, including the LSA plus a 500 m buffer to the east, Clary Lake, Patsy Creek and Lime Creek drainage from upper Lime Creek to the outlet to Alice Arm, Roundy Creek at the outlet to Alice Arm, and the Kitsault townsite.

Ecosystem Composition

The baseline for ecosystems composition includes the landscape within the LSA, and for the purpose of this assessment was divided into three main Biogeoclimatic

Ecosystem Classification (BGC) units:

- Coastal Western hemlock Wet Submaritime Montane Variant (CWHws2);
- Mountain Hemlock Moist Maritime Leeward Variant (MHmm2); and,
- Mountain Hemlock Moist Maritime Parkland Subzone (MHmmp);

The Application summarizes the change in the area for each ecosystem from baseline to closure phase, following reclamation, and provides details on the area and percentage of ecosystems by BGC unit in the LSA that may be potentially lost due to the proposed Project facilities.

Wetland Ecosystems

The Application provides figures that depict the distribution of wetlands within the LSA. Wetlands occur in all three BGC units, and cover 480 ha or 24 % of the LSA.

Old forests

Old forests are defined as structure stage 7, forests greater than 250 years old. The Proponent conducted an effects assessment on the removal of old growth forests. Old growth forests comprise 306 ha, or 15%, of the LSA and 811 ha or 16% of the RSA.

Species at Risk

The assessment of potential effects for Species at Risk is based on site specific baseline reporting conducted by the Proponent for the proposed Project. For the purpose of this assessment, Species at Risk were defined in the Application as vascular and non-vascular species listed by the BC Conservation Data Center and ranked as Red or Blue-listed; and, vascular and non-vascular species listed as Special Concern, Threatened or Endangered under SARA and Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Based on the Proponent's 2010 field studies, there were no Species at Risk observed. As a result, and in order to complete their assessment, the Proponent ranked BGC ecosystem units to determine their potential to support potentially occurring species of risk in the LSA. The Proponent determined that those ecosystems ranked as having "high" potential for having Species at Risk (which they defined as having the potential for 8 or more Species at Risk) totaled 41 ha or 2% of the LSA.

Ecological communities at risk

The assessment of effects on ecological communities at risk is based on site specific baseline reporting for the proposed Project conducted in 2009 and 2010. The Proponent

identified two Blue-listed²⁵ ecological communities at risk. These communities covered approximately 15 ha or less than 1 % of the LSA.

Cultural plants

Cultural plants include plant species used for medicine, dietary and spiritual religious purposes, and utensils and dyes. The Proponent's cultural plant assessment focussed on the presence of large cedar trees, pine mushroom habitat, cultural plant potential and edible berry-producing plant species. Pine mushrooms were evaluated separately from food plants, because, in addition to their importance as food, they are of economic importance in the region.

Through Terrestrial Ecosystem Mapping (TEM), the Proponent identified 235 ha or 15% of the LSA as having potential large cedar trees; potential pine mushroom habitat associated with CWHws2 site series 03 (WH-lodgepole pine-feathermoss) located adjacent to the proposed Project footprint; and approximately 10% of the LSA having a high potential for cultural plant species.

Vegetation data collected for the LSA were used to rank the ecosystem units for their potential to produce edible berry species. Approximately 27 ha or 1% of the LSA has a high potential and 563 ha, or 24% of the LSA, has low potential to contain edible berry species such as crowberry – bog berry – alpine azalea.

A full discussion on Vegetation and Plant Communities can be found in Proponent's Application and supplemental technical memorandums posted to EAO's website at: http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_356_r_app.html

5.7.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Potential direct proposed Project effects on vegetation and plant communities may include:

- direct loss of baseline ecosystems due to construction-phase land clearing;

²⁵ "Blue list" includes any ecological community, and indigenous species and subspecies considered to be of special concern in BC and particularly sensitive to human activities or natural events. Blue listed elements are at risk, but are not Extirpated, Endangered or Threatened.

"Red list" includes any ecological community, and indigenous species and subspecies that is Extirpated, Endangered, or Threatened in BC, meaning they no longer exist in the wild in BC, or face imminent extirpation or extinction. Threatened elements are likely to become endangered if limiting factors are not reversed.

- alteration of baseline ecosystems during construction and operations, linked to such factors as air quality changes (affecting rates of photosynthesis), drawdown of the water table in wetlands, alteration of vegetation overstorey and understorey, and physical topography reconfiguration;
- vegetation degradation due to particulate dust (linked to traffic and use of heavy equipment) or encroachment by invasive species (linked to vegetation clearing and additional traffic); and,
- the results of reclamation and re-vegetation of mining-related disturbances after mining activity ceases - either restoring or changing baseline ecosystems.

Specific effects for the following VCs were noted in the Application:

Ecosystem Composition

- Upland ecosystems such as willow thickets and various hemlock / cedar / fir assemblages would have an initial loss of 440 ha (35% of the baseline area of upland site types) but would, as a result of re-vegetation during reclamation, have a total long-term loss of 120 ha, or 10% of the baseline;
- Wetland ecosystems, such as marsh, fen, bog, shallow open waters would have an initial loss of 113 ha (24% of the area of wetland site types) but would, as a result of re-vegetation during reclamation, be reduced to 77 ha, or 16% loss from baseline; and,
- Non-vegetated, sparsely vegetated and anthropogenic site series (e.g. cliff, lake, talus, rock would have an initial loss of 32 ha (35% of the area of these site types), reduced to 19 ha (21%) once reclamation is completed.

The Application says 195 ha, or 11% of the baseline LSA ecosystems would be lost at the site of the TMF. There will be an overall decline in moister sites and non-vegetated units in the LSA.

Wetland Ecosystems

The development of the proposed Project infrastructure would directly remove 113 ha of wetlands from the LSA, primarily from the development of the TMF. This represents 25% of the MHmm2 BGC unit, primarily an area of shallow open water, due to incorporation of Patsy Lake into the TMF. Other potentially affected wetland ecosystems include wetland fens, sphagnum and skunk cabbage communities and Sitka sedge-peat moss. The Application notes that site reclamation will reduce the percentage of affected areas for many of these wetland site series.

Old Forests

The loss of 46 ha, or 15% of the old growth forests in the LSA, are expected due to the development of the proposed Project. This is primarily in the area of the waste rock dumps and TMF.

Species at Risk

During construction, 34 ha, representing 13% of ecosystems with high or medium capacity to support species at risk will be removed. This includes a loss of 3 ha, or 7%, of all high potential ecosystems. The loss of high and medium potential ecosystems will be reduced to 6% (16 ha), once reclamation has been completed, including 2 ha (4%) in the high potential category.

The Application notes that alteration of baseline landforms and modification of groundwater regimes during construction and operations, and dust deposition and removal of understorey vegetation at all Project phases, could contribute to a reduced capacity to support plant Species at Risk.

Ecological Communities at Risk:

The Application predicts less than 1 ha, or 15% of ecological communities at risk in the LSA, would be lost to land clearing. This 1 ha is all within the Amabilis fir-Western red cedar-oak fern site series.

Cultural Plants

The Application predicted that 35 ha, or 2% of ecosystems in the LSA that could potentially support large cedar trees, would be removed. This represents about 15% of the baseline inventory of ecosystems suitable for cedar growth within the LSA. Loss of pine mushroom habitat is estimated at less than 1 ha, or 1% of available habitat. Neither of these losses would be reduced through reclamation.

Project development would result in the loss of 369 ha or 31% of ecosystems with high or medium potential to support cultural plants. Following reclamation, it is estimated that this loss would be reduced to 193 ha or 16% of ecosystems with high or medium potential to support cultural plants.

Project development would result in the loss of 274 ha or 38% of ecosystems with a high or medium potential to support edible berry-producing species. Once reclamation is completed, the Proponent estimated that this loss would be reduced to 96 ha or 13% of those ecosystems.

Summary of Mitigation Proposed in the Application

- minimise the proposed Project footprint, confining as much activity as possible to previously disturbed areas and preserving the existing on-site hydrological regime to the extent possible;
- measures to prevent the introduction of invasive species including vehicle washing and site reclamation using native species;
- salvage and stockpiling of topsoil and peat soils for use in reclamation;
- plant transplanting and seed collection; and,

- site reclamation and re-vegetation when operations cease (with native species, including species used by members of Nisga'a Nation and First Nations).

A pre-construction assessment will be conducted to identify and, where possible, avoid old forest ecosystems. The possibility of harvesting the trees that must be removed would be explored with the Nisga'a Nation and First Nations.

5.7.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the agencies, NLG, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued. Examples of some of the key issues and additional commitments include:

- Reviewers requested that the Proponent avoid or mitigate impacts to species at risk, including a request for a wetland compensation plan to address residual effects to red listed Stika Sedge – Peat Moss wetland community.
 - The Proponent responded to this concern by way of a memorandum, dated August 16, 2012. The Proponent notes that based on the Terrestrial Ecosystems Mapping, 16 ha of Stika Sedge – Peat Moss was identified within the proposed Project footprint.
 - In response to a request from EC for a wetland compensation program, the Proponent committed to conduct further wetland site classification and assessment to expand on the existing wetland information prior to construction.
 - EAO understands that Canada will require wetland compensation consistent with federal policy.
- EC advised the Proponent the no-net-loss goal of the *Federal Policy on Wetland Conservation* applies to the proposed Project because provincially-listed wetlands located within the TMF would be impacted through the issuance of a federal permit. They also recommended the Proponent's Wetland Compensation Plan address residual effects to all red- and blue-listed ecological wetland communities and their supporting functions.
- EC recommended the Proponent to undertake a wetlands functions assessment as it relates to habitat for migratory birds and species at risk.
 - In response the Proponent committed to develop a Wetland Habitat Compensation Plan prior to the issuance of the federal authorization, to the satisfaction of EC, to address residual effects to red- and blue-listed ecological wetland communities and their functions resulting from the issuance of the federal authorization. As this would be a federal requirement, it was removed from the Table of Conditions.

- The Proponent commits to undertake further site survey and characterization of red- and blue-listed wetland communities within the mine site, including an assessment of red- and blue-listed wetland function as it relates to habitat for migratory birds and species at risk, prior to construction.
- Reviewers recommended that the Proponent implement a science-based field program to assess the potential presence of *Nephroma occultum*, a lichen species at risk listed as Special Concern by COSEWIC and listed in SARA Schedule 1, which potentially occurs in the proposed Project area.
 - The Proponent responded to this concern by way of a memorandum, dated August 16, 2012, and noted that during vegetation surveys undertaken in 2009 in conjunction of fieldwork for TEM, *Nephroma occultum* was not detected.
 - The Proponent commits to undertaking a site assessment survey for the presence of *Nephroma occultum* by a lichen specialist, in and near the immediate mine site footprint, prior to construction.

5.7.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures, EAO concludes that the proposed Project would result in residual adverse effects on vegetation and plant communities.

Historic exploration and mining effects are reflected in the baseline setting for the VC discussed in this section. The two reasonably foreseeable future projects in the region – BC Hydro’s NTL Project, the proposed KSM Project - do not encroach on the RSA, and will not impact the vegetation VCs potentially affected by the proposed Project.

EAO has undertaken the following significance analysis on the residual adverse effects on vegetation and plant communities, taking into account direct and cumulative residual effects.

Table 12: EAO's Significance Analysis for Terrestrial Environment – Vegetation and Plant Communities

Factor	Rationale
Context	<p>The proposed Project would affect ecosystems within three BGC units that have been affected by past exploration and mining activities.</p> <p>The mine site falls outside of Nisga'a Lands. Nisga'a Lands are located approximately 25 km to the east of the mine site footprint. In the past, and continuing today, Nisga'a people have harvested a variety of plants, berries, mushrooms and trees for nutritional, medicinal, construction, economic and ceremonial purposes.</p> <p>The Nisga'a Nation and First Nations in the coastal region have used, and continue to use, Red-cedar and Yellow-cedar for traditional and cultural purposes. A Nisga'a corporation, Lisims Forest Resources, manages the marketing and sale of Nisga'a forest resources, including timber products (hemlock, balsam fir, cedar, spruce and deciduous trees) and non-timber products (such as pine mushrooms).</p> <p>First Nations harvest a wide range of vegetation along the proposed transportation corridors throughout the summer and fall months. Cedar and pine mushrooms are of particular cultural and economic importance to many of the First Nations.</p> <p>Exploration and mining activities during the last 50 years have affected ecosystem composition through disturbance of the natural setting and baseline conditions of the site. Recent changes are linked to the 1996-2006 reclamation activity.</p> <p>The complete restoration of baseline soil, vegetation and habitat conditions following the development of the proposed Project, or any mine, is not possible.</p> <p>The ecological implications of residual vegetation effects are considered low for at-risk species and at-risk ecological communities given the relatively modest extent of suitable habitat, the common occurrence of wetlands throughout the LSA and RSA and the fact that no potentially affected species have been identified in the baseline vegetation records for the LSA. Ecological implications are rated medium for other vegetation VCs, notably impacts on wetlands.</p>

Probability	There is a high level of certainty that these residual effects will be experienced.
Magnitude	<p>The TMF would be reclaimed on closure as an open water body, and would be responsible for a loss of 195 ha of vegetation, or 11% of the LSA.</p> <p>113 ha of wetlands would be removed by the proposed Project, although the Proponent proposes to reclaim approximately 36 ha, resulting in 77 ha of wetlands permanently lost. This represents a loss of approximately 16% of wetlands in LSA and 8% of wetlands in RSA. There are a total of 480 ha of wetlands in the 2000 ha LSA and 969 ha of wetlands in 5200 ha RSA.</p> <p>There is a direct loss of 16 ha red-listed wetlands from the project footprint. That wetland ecosystem occurs in 42 ha of the LSA and 102 ha of the RSA, representing a 33% and 16% loss of those ecosystems in the LSA and RSA respectively. This 16 ha loss will be compensated by the Proponent’s Wetland Habitat Compensation Plan.</p> <p>Regarding ecosystems ranked as high for potentially occurring plant species at risk, there are a total of 256 ha of this ecosystem in the LSA, with direct loss of 34 ha, representing 13% of high and medium ranked ecosystems in the LSA.</p> <p>With respect to other ecological communities listed at risk, there would only be a direct loss of less than one ha of upland forested ecosystem.</p> <p>The primary effect on cultural plants would be from the loss of large cedar trees and berry-producing and cultural species during construction and operations. Approximately 35 ha, or 2% of ecosystems in the LSA which could potentially support large cedar trees would be lost, while less than 1 ha (<1%) of available pine mushroom habitat would be lost.</p> <p>Approximately 193 ha (16%) of ecosystems with high or medium potential to support cultural plants would be removed, and 96 ha (13%) of ecosystems with a high or medium potential to support berry-producing species would be lost.</p> <p>Considering these relatively small impacts on the regional and LSAs, overall magnitude of effects is considered low to moderate.</p>

Geographic Extent	Local, and do not extend outside the small RSA.
Duration and Frequency	Effects to vegetation are expected to occur during construction and are of long term duration, as ecosystem diversity is expected to take decades to reappear. For wetlands the effects would be permanent. For species and communities at risk, the effects would occur during construction and, as with effects to vegetation, would only cease when ecosystem diversity is restored decades later.
Reversibility	All residual vegetation effects are considered reversible over the long term, except impacts on wetlands, which are considered irreversible. Residual effects on old growth forests are only reversible over a very long period of time (250 years).

5.7.5 Conclusion

EAO notes that the potential effects of the proposed Project occur partially within the footprint of a brownfield site, although new infrastructure is considerable larger than the historic impact due to the development of the TMF, which would have a permanent impact on a number of wetlands. EAO also notes that a number of the ecosystems being impacted contain culturally important vegetation, such as large cedar trees, berries, medicinal plants and pine mushrooms. However, EAO is aware that many of these ecosystems occur commonly in the surrounding area and that the proposed Project will have a relatively small, albeit permanent impact on these ecosystems. Adverse vegetation effects would be largely localised to the LSA and would be time-limited, except for some permanent changes in wetland ecosystems within the proposed Project footprint and the removal of some old growth forest. EAO notes that the residual effects are not expected to impair the long-term sustainability of the current baseline vegetation found in the LSA (with the obvious exception of those areas which are lost to development of the site) or to have ecological implications outside the LSA. The reclaimed post-mining landscape is expected to function in an ecologically similar manner to the baseline ecosystems.

Considering the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on vegetation and plant communities.

5.8 Wildlife and Wildlife Habitat

5.8.1 Background Information

Wildlife and wildlife baseline conditions were characterized in the Proponent's Application by means of literature review, field surveys conducted by the Proponent, and habitat suitability modelling.

To assess the potential effects on wildlife and wildlife habitat the Proponent selected the following prominent wildlife species and habitats in the proposed Project area:

- Western toad;
- Olive-sided flycatcher;
- Sooty grouse;
- Northern goshawk;
- American marten;
- Moose;
- Mountain goat; and,
- Grizzly bear.

For all VCs, the LSA is the area encompassed by the proposed Project footprint plus a 500 m wide buffer around that footprint, and incorporates the zone of direct effects, both on-site and in contiguous areas, and covers 1,980 ha. The RSA encompasses 5,200 ha, including the LSA plus a 500 m buffer to the east, Clary Lake, Patsy Creek and Lime Creek drainage from upper Lime Creek to the outlet to Alice Arm, Roundy Creek at the outlet to Alice Arm, and the Kitsault townsite. It incorporates areas that may experience both direct and indirect effects.

The CESA comprises the area within which past, present and reasonably foreseeable future human activities which have a temporal and spatial overlap with the proposed Project's residual effects could lead to overlapping residual effects on wildlife VCs.

Western Toad

Western Toad is listed as a Species of Concern by COSEWIC, listed under SARA, and is provincially a Blue Listed species. The Proponent was selected Western Toad as a VC to represent amphibians for the proposed Project. Surveys were conducted on Western Toad in 2009 and 2010 to identify suitable breeding habitat for western toad. The surveys identified 10 adult western toads during road transect surveys along Alice Arm Road, near Clary Lake, and between Clary Lake and Killam Lake. Two western toads were also observed north of the TMF area. The wetland surveys, a combination of ground and aerial surveys, did not detect any evidence of western toad breeding habitat. However, the area identified around Lake 493, northeast of the TMF,

containing shallow aquatic areas and gently sloping banks, would likely support western toad breeding habitat. The development of the proposed Project footprint would remove 113 ha or 24% of wetland habitat in the LSA.

Olive-sided flycatcher

The olive-sided flycatcher was selected as a focal VC to represent a group of songbirds because it is federally designated as a threatened species under SARA, Blue Listed provincially, and present within the proposed Project area. Information on olive-sided flycatcher was collected in the LSA and RSA during surveys conducted by the Proponent in 2009 and 2010. In 2009, five olive-sided flycatcher individuals were identified, outside of the proposed Project footprint, along the Kitsault/Alice Arm Road, in Mountain Hemlock BGC. In 2010, olive-sided flycatchers were identified north of Patsy Lake.

Habitat mapping for olive-sided flycatcher breeding habitat was conducted by determining its life requisites that are critical for survival and cross referenced with suitable habitat identified in TEM. The breeding habitat of the olive-sided flycatcher is critical to its survival, such as forested edges of lakes, wetlands, ponds and streams. Based on the olive-sided flycatcher life requisites, the Proponent estimated that 649 ha, or 33 % of the LSA is potential breeding habitat. Of this habitat, approximately 228 ha of potential breeding habitat would be lost or altered by the proposed Project footprint, including the removal of Patsy Lake and surrounding forested area from the development of the proposed TMF.

Sooty Grouse

The sooty grouse was selected as a VC to represent upland game birds and presence in the proposed Project area. It is also Blue Listed provincially. The Proponent conducted terrestrial breeding surveys through variable radius point count surveys in 2009 and 2010 in the LSA. The sooty grouse share similar life requisites to other upland birds found along the north coast region of BC, and have been identified along with other grouse in the NWA.

Sixteen individuals were observed and two were heard during surveys conducted in 2009, and eight sooty grouse were detected within the study area in 2010. Habitat mapping was conducted for the proposed Project through TEM. Breeding or nesting habitat is consistent with mature and old-growth forests having diversity, moderate canopy closure with patchy open areas, large trees, and open understory. Based on the mapping, life requisites and nesting requirements, approximately, 1409 ha or 71% of the LSA is potential breeding habitat for sooty grouse and 502 ha, representing 36%, of potential breeding habitat for sooty grouse would be removed by the proposed Project footprint.

Northern Goshawk

Northern Goshawk was selected as a VC to represent raptors for the proposed Project. The proposed Project area borders the Northern Goshawk North Coast Conservation Region. Baseline northern goshawk call back surveys conducted in 2009 did not confirm the presence of northern goshawk in the area, although three other species of raptors (bald eagles, golden eagles and great gray owls) were observed during wildlife surveys. The Proponent confirmed breeding habitat for bald eagles, a pair of bald eagles was observed at a nest, and another bald eagle was observed at a second nest location.

The Proponent identified approximately 120 ha, representing 6% of the LSA, as potential breeding habitat. Of this habitat, 72 ha or 60% would be lost or altered by the proposed Project.

American marten

The American marten was selected by the Proponent as a VC to represent the furbearers for the proposed Project. The Proponent did not conduct specific studies for furbearers. During baseline wildlife surveys for the proposed Project, terrestrial mammal species or sightings of these species were observed by the Proponent, including fisher, lynx, American marten, red fox, American mink, and gray wolf. Black bear, grizzly bear and cougar were also present in the area.

For the proposed Project, American marten habitat use was modelled for winter conditions. The modeling identified approximately 856 ha of potential American marten suitable winter habitat, characterized by a closed coniferous canopy forest (associated with old-growth forest), within the LSA. Of this habitat, approximately 321 ha or 36% would be lost or altered due to the proposed Project development.

Mountain Goat

The Proponent selected the mountain goat as a VC to represent mountain ungulates for the proposed Project. The Proponent conducted aerial surveys for mountain goats in the summer and winter in 2009, and in winter 2010, and subdivided the surveys into 23 units. The baseline study covers 724 km². The 2009 surveys focused on the survey units surrounding the proposed mine site. During the surveys, seven mountain goats were observed in the winter and five goats were observed in the summer. Generally, the RSA does not provide suitable escape terrain, such as rocky bluffs and cliffs with good visibility, or support large mountain goat populations. Mountain goats were observed at a distances greater than five km from the proposed mine site, and few mountain goats were observed at low elevation forested habitat near the Illiance River. The Proponent's assessment on the potential impacts to mountain goat was limited to habitats within lower elevations.

The Proponent did not conduct specific habitat mapping for mountain goats as their range is located outside the RSA, in excess of 5 km. The proposed Project does not overlap or cross any areas identified by the province as mountain goat winter range.

Moose

The Proponent selected moose as a VC to represent large ungulates for the proposed Project. Although moose is a yellow listed species, and not considered a species at risk or concern under provincial or federal legislation, local conservation initiatives for moose are integrated into regional resource management plans. The Proponent notes in its Application that recent surveys in the NWA suggest that moose populations have declined significantly since 2001. In its assessment on moose, the Proponent also considered existing information sources, including recent studies conducted by wildlife biologists.

During aerial surveys for moose conducted by the Proponent in winter 2009 27 moose were observed, including 17 cows, eight bulls, one calf and one unclassified individual. The study area was divided into 11 survey units, based on potential wintering habitat that could be affected by proposed Project development. During winter these surveys, moose were observed in four areas at lower elevations along Alice Arm and the Kitsault River and estuary.

Moose winter habitat was modelled, including habitat suitability based on winter food and cover habitat. Based on the model, the Proponent identified approximately 209 ha of potential moose winter habitat in the LSA. Of this habitat, approximately, 31 ha of suitable winter habitat for moose would be lost or altered due to the development of the proposed Project mine site.

Grizzly bear

The Proponent selected grizzly bear as the VC to represent large omnivorous mammals for the proposed Project. Grizzly bear is a provincially Blue listed species and is also designated by COSEWIC as a species of special concern. The Proponent did not conduct specific field surveys for grizzly bear, rather conducted general wildlife studies. During wildlife studies in 2009, the Proponent did not observe grizzly bear; although in 2010, a grizzly bear was sighted near Clary Lake.

In 2010, the Proponent conducted a habitat assessment in the proposed Project area and along the access road. The results of the assessment show that the majority of the proposed Project site includes moderate habitat suitability for grizzly bear, mainly associated with bog/fen complexes northeast of the old Kitsault mine. Also, the area of the existing Kitsault mine pit was seeded with grass and clover and is used by black bears for feeding in the area, particularly in the spring. The area cleared for the existing transmission line right-of-way for the old Kitsault mine is populated by berry producing

shrubs, a preferred forage for black bears and grizzly bears, and likely used by bears in the summer and fall.

A full discussion on Wildlife and Wildlife Habitat can be found in Proponent's Application and supplemental technical memorandums posted to EAO's website at:

http://a100.gov.bc.ca/appsdata/epic/html/dep/epic_project_doc_list_356_r_app.html

5.8.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Application says that the proposed Project could adversely affect wildlife and wildlife habitat, both directly and indirectly, during the construction, operations and decommissioning phases. The proposed Project has the potential to adversely affect all wildlife VCs to some degree in the following ways:

Habitat loss/changes in habitat availability

Habitat loss would be caused primarily by land clearing during construction. Small animals with limited mobility and small home territories (e.g., small mammals and amphibians) may be affected to a greater degree than highly mobile species with large home ranges (e.g., grizzly bears, raptors and ducks). Wetland loss through the infilling of Patsy Lake and the dewatering of Lake 901 and Clary Lake would also lead to habitat loss. Habitat degradation could also occur and may be linked to particulate fallout, traffic and equipment emissions, noise, vibration and night lighting, and accidental spills of hazardous materials.

Disruption and displacement

This effect could occur when mine facilities and activities cross wildlife travel routes (e.g., within corridors used by young animals to disperse into secure territories, or around feeding and nesting areas). As well, wildlife may be deterred from feeding or breeding activities by noise and the proximity of Project related activity, leading potentially to abandonment of key habitats such as wetlands, ponds, creeks, and den sites.

Wildlife mortality risks

This effect is associated with wildlife/vehicle collisions, increased hunting along the mine access road, grubbing and soil removal resulting in mortality of small mammals, amphibians and reptiles and land clearing during the nesting season and the potential for destruction of bears where they may be attracted to garbage and pose a risk to human life.

Risks to wildlife along the transportation corridors are discussed in [Section 10](#) – Transportation.

Summary of Mitigation Proposed in the Application

The Application outlines a broad range of mitigation measures to reduce potential effects on wildlife. For all phases of mine development, the Application identified interactions, mitigation for those interactions and noted that residual effects remain as not all effects can be mitigated. Examples of some of their measures include:

- Where possible, land clearing will be completed outside the bird breeding window (April, 1 to July, 31) to minimise nest mortality;
- Pre-clearing western toad surveys and nest surveys prior to clearing. If toads are found, salvage to reduce mortality effects. If nests are found, efforts would be made to maximise nest avoidance opportunities;
- Sensitive habitats adjacent to worksites would be identified in the Wildlife Management Plan and avoided, where possible;
- Natural vegetation, including trees, snags, shrubs, downed logs and ground cover will be retained in sensitive habitats, where feasible;
- For construction, mine planning would make as much use as possible of previously cleared areas to minimise the encroachment of the proposed Project footprint into previously undisturbed wildlife habitat. The concentrate load-out facility and much of the mine site power line and access road would be constructed in existing clear-cut areas, thereby minimising the loss of wildlife habitat;
- During operations, when new habitat disturbance would be localised, efforts would focus on preventing wildlife from being attracted to working areas. This would involve some use of fencing plus refuse control and truck driver training;
- Ongoing monitoring and reporting of wildlife observations and incidents;
- Use of non-palatable de-icing products and re-vegetation species at the road's edge to reduce the attraction of moose to the access road. Installation of signage at known wildlife crossing points;
- Set speed restrictions along roads and ensure that road design provides good visibility to drivers at all times, to reduce vehicle/ wildlife collision mortality effects;
- With the restoration of a self-sustaining vegetation cover and the rehabilitation of watercourses during the decommissioning and post-closure phases, the Proponent anticipates that the restored habitat would once again support the wildlife that presently exist in the LSA and surrounding areas, although habitat composition would be somewhat altered; and,
- During the first few years following the commencement of the post-closure phase, the successional growth of restored habitat may temporarily provide the wildlife with favourable – perhaps even improved – conditions.

5.8.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

Note: wildlife issues relating to the transportation corridors are addressed in [Section 10](#) Transportation.

During the review of the Application, additional issues were raised by the agencies, NLG, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued. Examples of some of the key issues and additional commitments include:

- Reviewers recommended the Proponent remove carrion along the FSRs as a measure to mitigate grizzly bear attraction to roads and resulting interactions with mine-related vehicles.
 - In response, the Proponent committed to reporting and removing carrion along mine site roads. Dead or injured large mammals observed along the transportation route will be recorded and reported to Conservation Officers and Aboriginal communities. Details on the procedures and protocols for reporting and the subsequent removal of these animals will be a component of the Wildlife Corridor Management Plan.
- Reviewers recommended the Proponent collaboratively complete the mine site Wildlife Management Plan with specific details on incorporation of exclusion fencing for bears and proactive strategies to minimize human-bear interactions, particularly in spring when bears typically seek out human habitats.
 - In response, the Proponent committed to develop a Bear Management Plan, a component of the Mine Site Wildlife Management Plan, that includes measures to reduce bear-human conflicts and considers exclusion fencing of areas of increased risk to wildlife and human safety to the approval of MOE and Ministry of Forests, Lands and Natural Resource Operations (FLNR), and in consultation with NLG. Details are provided in Table of Conditions.
- Reviewers requested the Proponent plan and implement effective mitigation measures to ensure wildlife are excluded from areas of waste or contaminants during all phases of mining activity, and to develop a monitoring plan to monitor potential locations of waste or contaminants and the efficiency of wildlife exclusion mitigation measures in preventing wildlife from accessing these areas.
 - The Proponent responded that hazardous materials and hazardous wastes will be properly stored, contained, and handled as per permit requirements, and managed through a Hazardous Materials Management Plan and Hazardous Waste Management Plan (or similar) as outlined in the Application. In consideration to water quality, the Proponent will monitor contact water quality at key locations within the mine site area as per permit

requirements. As part of the mine site Wildlife Management Plan, the Proponent will regularly inspect waste disposal facilities and areas of standing water at the mine site for wildlife occurrence, and develop and implement protocols and procedures in the event of wildlife occurrence which may include additional monitoring, deterrence, exclusion or other suitable mitigation measures.

- Reviewers requested the Proponent undertake additional survey to identify, for the purposes of avoiding, western toad migration routes and seasonal habitats, and apply appropriate mitigation measures (such as drift fencing, underpasses, traffic control, limiting creation of ephemeral ponds) to avoid or reduce potential harm to individuals during road construction.
 - In response, the Proponent committed to develop a Mine Site Wildlife Management Plan for permitting with details on mitigation strategies for amphibians.
- Reviewers requested the Proponent identify potential hibernacula sites at the proposed Project for the purposes of avoidance and mitigation of such important sites to bat species at risk.
 - In response, the Proponent committed to undertaking a desk-based exercise to characterize and identify potential hibernacula sites in and near the immediate Project footprint prior to construction, and develop and implement protocols and procedural guidance in the event a bat hibernacula site is identified in or immediately near the mine site. Details are provided in the Table of Conditions.
- Reviewers requested the Proponent avoid suitable marbled murrelet habitat and western-screech owl habitat (old growth) undertake surveys to determine breeding presence.
 - In response, the Proponent committed to undertaking a desk-based habitat assessment for marbled murrelet breeding habitat in and near the immediate Kitsault Mine footprint prior to mine site construction, and develop and implement protocols and procedural guidance to reduce the likelihood of impacting identified habitats during marbled murrelet breeding period. The Proponent also committed to develop an Active Migratory Bird Nest Survey in collaboration with MOE and FLNR to reduce the likelihood of destroying bird nests during vegetation clearing. Details are provided in the Table of Conditions.
 - The Proponent acknowledged that old growth is sensitive habitat, and has committed to develop a site map of sensitive wildlife habitats in and near the immediate Kitsault Mine footprint prior to construction, and develop and implement site-specific mitigation measures to reduce the likelihood of impacting such habitats or wildlife within those habitats during construction and operations. Details are provided in the Table of Conditions.

5.8.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures, EAO concludes that the proposed Project would result in residual adverse effects on wildlife and their habitat due to removal, alteration and degradation of wildlife habitat, disruption and disturbance of wildlife, and direct mortality of wildlife due to construction-related incidents, accidents and wildlife/human conflicts.

EAO has undertaken the following significance analysis on the residual adverse effects on wildlife and their habitat, taking into account direct and cumulative residual effects.

Table 13: EAO's Significance Analysis for Wildlife and Wildlife Habitat

Factor	Rationale
Context	<p>The LSA supports a wide range of wildlife species and habitat types, although much of the proposed Project footprint is a brownfield site with relatively modest wildlife values.</p> <p>Wildlife values found in the Project footprint are not particularly scarce, and are widely distributed in the surrounding LSA and RSA. Local and regional populations of most species are healthy in this area of BC, although regional moose populations have declined over the last decade. Moose values in the LSA are modest, with more important habitats found at elevations lower than the mine site and closer to the Nass River.</p> <p>The proposed Project is located within the NWA. Nisga'a Nation have the right to harvest wildlife within the NWA. The NFA sets out specific allocations for moose, mountain goat and grizzly bear. Nisga'a citizens trap and hunt within these areas, and have rights to four trap lines in the vicinity of, although not overlapping, the proposed Project footprint. The NFA establishes a wildlife committee to facilitate wildlife management within the NWA.</p> <p>There is a healthy regional population of western toads and Olive-sided flycatcher in the region, although both species are listed under SARA.</p> <p>Sooty grouse is believed to be a year-round resident of the LSA and is provincially Blue-listed. Sooty grouse is likely a species that is hunted by First Nations in the area.</p> <p>American marten is a small furbearer that is common to the coastal forests of BC. It is present in low densities the LSA, and is</p>

	<p>considered valuable for trappers and the Nisga'a Nation.</p> <p>There are eleven trap line tenures within or surrounding the LSA. The proposed Project footprint overlaps with one registered trap line, but not with any portion of the four known Nisga'a trap lines in the area.</p> <p>Compared to the RSA, the LSA has relatively low-quality moose winter habitat, as is typical with coastal rainforests. Some moose winter thermal and security cover exists, and winter forage is present, but high snow depths tend to limit moose travel.</p> <p>The access road from the Nass FSR to the proposed mine site appears to be used regularly as a travel corridor by moose.</p> <p>Much of the LSA is of moderate (class 3) value for grizzly bear. This is mainly due to the bog / fen complexes northeast of the old Kitsault mine which is of moderate suitability for grizzly bear. Although the regional population is relatively healthy, the species is provincially Blue-listed, and is listed as special concern by COSEWIC.</p> <p>Within the NWA, the Nisga'a Nation has rights to a percentage of the annual allowable grizzly bear harvest. Grizzly bears hold cultural and spiritual importance for the Nisga'a Nation and First Nations in the area, connected to use of body parts in ceremonial dress and as part of the story line for their ancestors.</p>
<p>Probability</p>	<p>The probability that these residual wildlife effects will be experienced ranges generally from medium (for wildlife mortality and some animal displacement effects) to high (for habitat removal / alteration and other animal displacement effects).</p>
<p>Magnitude</p>	<p>Considering that the RSA contains numerous wetlands and terrestrial habitats offering similar habitat to that being lost, combined with the fact that most wetlands in the LSA are not considered suitable for breeding, the magnitude of impact on toads is considered low.</p> <p>Lost marten habitat is not of the highest quality because of snow depths at the elevation of the mine site and better marten winter habitat is widely available at lower elevations in the RSA. As a result, the magnitude of impacts on American marten is considered low.</p>

A total of 209 ha, or 10.5% of the LSA, have been classified as potential winter moose habitat. The relatively small area of moose winter range in the LSA is partly due to historic mining activities, as the original land clearing may have removed areas of suitable shelter and forage. Moose were found by the Proponent to use lower elevation areas along Alice Arm and the Kitsault River estuary. As a result of the relatively low area of potential winter moose habitat impacted by the proposed Project, the magnitude of impacts is considered low.

Much of the bog/fen complexes northeast of the old Kitsault mine are considered moderate value for grizzly bear. Although the regional population is relatively healthy, the species is provincially Blue-listed, and is listed as special concern by COSEWIC. The relatively small size of the proposed Project footprint compared to the very large size of grizzly bear home ranges means that residual effects predicted on grizzly bears resulting from habitat loss is considered low. However, the anticipated increased frequency of Project traffic associated with the transport of equipment, ore concentrate, and labour, together with the plowing of roads and the attractants at the project site would increase the interactions of humans and grizzly bears and the likelihood of incidental grizzly bear mortality risk. Considering that grizzly bear is a species of concern with lower reproductive rates, potential mortality particularly of females could affect productivity of the local population. Overall magnitude of impacts to grizzly bear is considered low to moderate.

While Olive sided flycatcher is threatened under SARA, the affected habitat types are widespread outside the proposed Project footprint and the population has a healthy regional habitat status. Magnitude of impacts is considered low.

While sooty grouse is provincially Blue-listed, suitable sooty grouse habitat is abundant in the RSA and alternative nesting areas for displaced birds should be widely available. Magnitude of impacts is considered low.

Overall, the magnitude of residual effects during construction, operations and decommissioning is rated low for all wildlife VCs. For some wildlife VCs (e.g. northern grouse, American marten and mountain goat), very little use is made of LSA habitats, and habitat loss is of low magnitude. Wildlife mortality along the access road would be of low to medium magnitude, providing the proposed

	<p>measures - traffic speed controls, improved sight lines, seeding roadsides with non-attractive plant species, removing carrion from the roadbed, etc. – are effectively implemented.</p>
Geographic Extent	<p>The geographic scope of residual wildlife effects is localised to the LSA, with few broader wildlife implications in surrounding areas including the transportation route. The abundance of individuals of particular species may decline, at least during construction and operations, but this effect will be largely localised to the immediate area of the proposed Project footprint.</p> <p>During construction, local mortality effects can be reduced by conducting nesting and amphibian searches prior to land clearing. Most VC species are mobile enough to seek alternative habitat if displaced through mining-related disturbance.</p>
Duration and Frequency	<p>Duration of residual wildlife effects is predicted to be long-term and will continue until habitats are replaced or restored on closure. Frequency is generally expected to be either continuous (for disturbance effects such as noise and some displacement effects) or infrequent (for wildlife mortality effects and other displacement effects) during construction and operations.</p> <p>During decommissioning, duration and frequency may remain at similar levels, but as the level of on-site activity declines, or where site reclamation begins to reverse earlier habitat effects, the residual effects may be short-term.</p>
Reversibility	<p>Mortality of individual animals is non-reversible.</p> <p>Residual effects are considered reversible over time (when re-vegetation begins to replace suitable habitat and structure) except where habitat is permanently removed during the construction phase.</p>

5.8.5 Conclusion

EAO notes that that the proposed Project occurs partially within the footprint of a brownfield site, although new infrastructure is considerable larger than the historic footprint. This is both a benefit, considering that many areas have degraded habitat, but EAO is also aware that this is a cumulative impact. EAO notes the low to moderate habitat values in the area throughout the mine footprint and the fact that similar habitat appears to be available in surrounding areas, thus minimizing the geographic scope of impacts. As a result, while impacts, including direct mortality and displacement are very

likely, the overall magnitude of those impacts appears to be relatively low and would occur primarily during construction and the 16 years of operations. At least some of that habitat would be replaced during closure and reclamation.

Considering the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on wildlife and wildlife habitat.

6 Assessment of Potential Economic Effects

6.1 Economic Effects

6.1.1 Background Information

The Application provides background information on communities that could potentially be affected by the proposed Project. Nine VCs were selected by the Proponent, to assess the proposed Project's economic impacts. However, for the purpose of this Report, the economic section will primarily focus on provincial economy and government revenues, employment and income, business opportunities and economic development and land based-livelihoods.

Both LSA and RSA were selected for the Proponent's economic assessment. The LSA consists of communities closest to the mine site, including the four Nisga'a villages, the Kitsault Resort (known as Kitsault townsite) and the community at Alice Arm. The RSA includes the communities of Terrace, Smithers, Prince Rupert, Stewart, and the various smaller and First Nations reserves in the Kitimat Stikine Regional District Electoral Areas.

An economic study report was prepared by the Proponent and provides past and current economic conditions observed in the province, and regional and local communities.

The assessment of the economic effects is based on the results of the BC Input/Output Model (BCIOM) related to expenditures and employment at the mine site. Based on information provided by the Proponent, BC Stats produced estimates of the proposed Project effects on provincial Gross Domestic Product (GDP), income, government revenue and total employment.

Potential impacts on Nisga'a Nation economic well-being are in [Part D](#) of this Report.

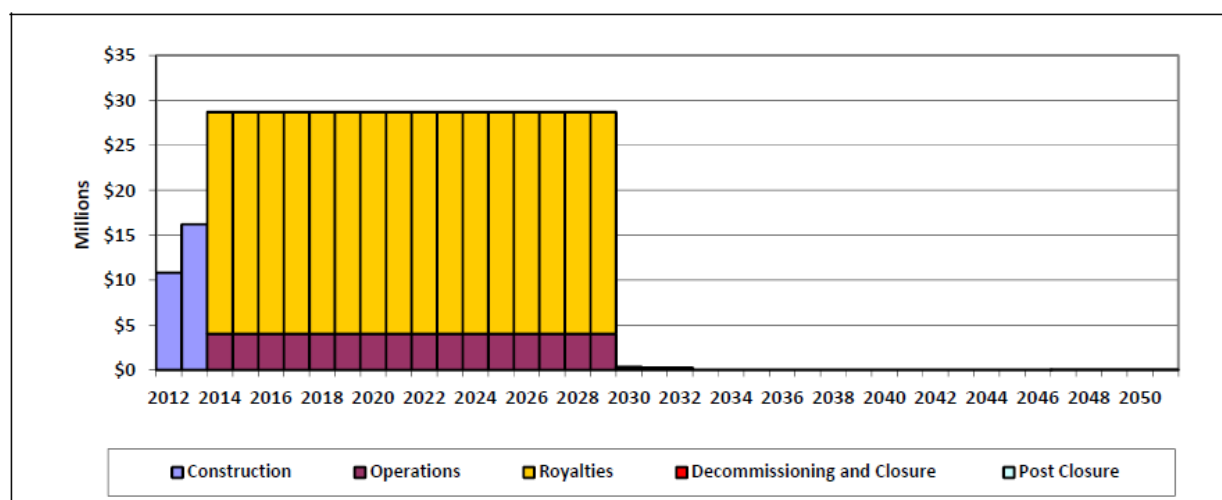
6.1.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Provincial Economy and Government Revenues

Overall effects

The Proponent's Application says that the greatest project effect on provincial revenues would occur during operations, when royalties are collected in addition to personal and corporate income taxes as well as sales tax. This is illustrated below in Figure 18.

Figure 18: Project Effects on BC Revenue 2012-2040



Construction phase effects

The economic activity associated with the construction phase is anticipated to contribute to government tax revenues in the form of personal taxes and corporate income taxes. The Application states that the Proponent will generate \$54 million in direct tax revenue, of which \$33 million will go to the federal government, \$18 million to the province, and \$3 million to local government. Total of all direct, indirect and induced provincial taxes are assumed to be about \$27 million during construction.

The Application states that the estimated construction cost of the proposed Project would total \$836 million, with \$487 million spent in BC.

Operations phase effects

The Application estimates \$6 million annually in direct taxes during operations, with \$2 million to the federal government and \$3 million to provincial government, and \$1 million in direct local government taxes.

The Proponent estimates a \$4 million net smelter royalty and \$21 million pre-tax cash royalty.

The Application states that Proponent expenditures during the proposed Project’s 16 year operations phase are predicted to reach \$120 million annually.

Decommissioning and closure phase effects

The Application estimates \$1.5 million annually in all direct federal, provincial and local taxes from the proposed Project during the decommissioning and closure phases.

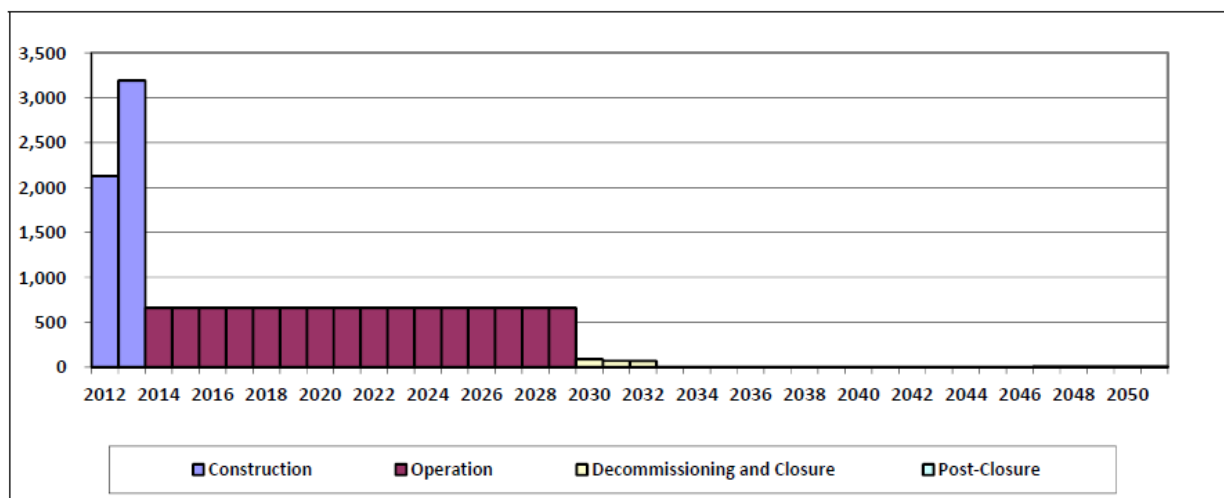
Employment and Income

The construction, operation, decommissioning and closure of the proposed Project would generate employment and income for workers in communities proximate to the proposed Project and surrounding region.

Overall effects

The Application notes that effect on total employment in BC over the life of the mine are highest during the two year construction period with 5,323 person years (PYs) of employment or about 2,660 PYs for each year of construction. This is shown below in Figure 19.

Figure 19: Project Effects on Employment in British Columbia (2012-2051)



Construction phase effects

The results of the BCIOM presented in the Application state that the construction phase will create 960 PYs of direct employment at the mine, with 80% taken by BC residents, including 10% by regional residents. Construction will also generate an estimated 4,363 PYs of supply contractor, indirect and induced employment for BC residents, with some 210 PYs being filled by regional residents. Because of the nature of construction work, many of these jobs are expected to be part-time, temporary, and/or contract, although some would be directly with the Proponent.

Provincial GDP will reportedly increase by a total of \$133 million as a result of spending on wages and salaries paid to workers and an additional \$336 million in GDP increase from direct, indirect and induced wages and salaries to suppliers.

Operations phase effects

During the 16 years of operations, the Application predicts the proposed Project will employ about 300 people, with 270 being BC residents, including 60 regional residents.

Operations will also generate an estimated 391 PYs annually of supply contractor, indirect and induced employment within BC, including 26 PYs for regional residents; employment is likely to be more full-time and longer term than construction.

In addition to increased employment, the Application states that household income directly received as remuneration by the direct proposed Project employees is predicted to amount to \$21 million during operations. Provincial GDP will reportedly increase by a total of \$43 million as a result of direct, indirect and induced employment from suppliers with the proposed Project.

Decommissioning and closure phase effects

During decommissioning and closure, over a period of 16 years, the number of workers would vary each month. A total of 248 PYs of employment will be required during the closure phase.

- 51 PYs, or 3 employees per year directly with Proponent (assumed to be BC residents);
- 97 PYs of direct employment from suppliers;
- 55 PYs in indirect employment from suppliers; and,
- 46 PYs in induced employment from suppliers.

Household income generated during the closure phase of the proposed Project is estimated to be about \$4 million from direct employment with the Proponent. Provincial GDP will reportedly increase by a total of \$22 million as a result of direct, indirect and induced employment from suppliers to the proposed Project.

Business Opportunities and Economic Development

Regional suppliers may supply a range of goods and services - road maintenance, snow removal, delivering gravel for winter road maintenance, expediting, bussing workers to and from the camp, camp maintenance and transporting concentrate.

During construction, about \$24.6 million in goods and services would be purchased from regional suppliers, with most being purchased during the peak construction year. In that year, about direct 94 jobs would be created for regional businesses, as well as 31 indirect jobs, all predominantly in the Terrace area.

During operations, annual purchases from regional businesses are expected to be about \$3,600,000, creating about 14 direct business jobs and 12 indirect jobs per year, all predominantly in the Terrace area.

Goods and services valued at \$3.2 million would be purchased from regional suppliers the first two years of decommissioning (creating six or seven direct business jobs). Purchases would essentially cease for the remainder of the decommissioning phase (years three through fifteen).

Annual purchases of goods and services from regional suppliers during post-closure would be about \$600,000 per year.

Effects on Land based Livelihoods

Kitsault Resort

The Proponent's LSA for the economic assessment overlaps with the Kitsault townsite (now known as the "Kitsault Resort"), located approximately 5 km north of the proposed Project. The town site was built to support the employees of the mine which previously operated by Amax of Canada Ltd., between 1979 and 1981. When the prices of molybdenum dropped in 1982, the mine shut down and employees left the townsite, leaving it abandoned. The townsite and the surrounding 80 ha was purchased from the then owner Aluminerie Lauralco Inc., in 2005 with the objective to redevelop the town site and develop an "eco-village" with a health and wellness emphasis and promote ecotourism. Over the past five years, the current owners report that approximately \$1 million annually has been invested in the Kitsault Resort, with expenditures expected to increase in 2013.

In January 2013, the owner announced a plan to develop the property into an LNG/oil refining and export facility.

Noise, water quality, visual disturbances and dust generated by the construction and operation of the proposed Project (and the general proximity of the mine from the townsite) have the potential to influence the future economic prospects of and operations of the Kitsault Resort.

Guide Outfitters

The RSA for the socio-economic effects assessment overlaps with a small portion of a tenure of one guide outfitter (Coast Mountain Outfitters). A very small portion, 0.03% (701 ha of the total 2,680,823 ha) of the tenure would be lost due to the development of the mine.

The Application identified that the construction, operation and decommissioning/closure of the proposed Project may contribute to a decrease in guide outfitting opportunities.

Trapline Holders

One registered trapline tenure (TR614T008) overlaps with proposed Project footprint. A small portion, 3.3% (or 701 ha of the total 21,327 ha) of the trapline tenure would be lost due to the development of the proposed Project.

The Application identified that the construction, operation and decommissioning/closure of the proposed Project may contribute to a decreases in trapping opportunities.

Summary of Mitigation Proposed in the Application

Provincial Economy and Government Revenues

The Application reports that since the overall economic effects of construction and operation of the proposed Project on the provincial economy and government revenues are positive.

During decommissioning, there would be employment and business losses, although a slight rebound would be possible during post-closure. The Proponent reports that there may be negative effects, though mitigated at the regional (rather than the provincial) level.

Employment, Income and Business Opportunities

The Proponent expects that their hiring and procurement plans and policies, and strategies would mitigate difficulties faced by regional residents in accessing the proposed Project related job opportunities, including:

- Recruitment, Training and Employment Plan to help attract local and RSA residents into the proposed Project's workforce. During construction the plan would include:
 - preferred status to qualified Nisga'a Nation and Aboriginal businesses;
 - a pre-employment training strategy;
 - construction contractors will be encouraged to hire local residents; and,
 - on-the-job training opportunities.

For the operations phase, the goal of the Recruitment, Training and Employment Plan will be to optimize employee recruitment from within Nisga'a Villages and elsewhere in the region, including:

- A pre-employment training strategy would involve assessing existing skills and then collaborating with NLG, First Nations, regional communities, trainings institutions, and government agencies to develop and deliver appropriate training;
- The Proponent will prioritise recruitment of employees from north-central BC, particularly from within the RSA;
- The Proponent is committed to increasing the percentage of Nisga'a and Aboriginal construction and operations workers, working closely with the employment and training officers in Nisga'a Villages, First Nation communities, and with Band Councils, to establish working conditions that support a multi-cultural workforce;
- The Proponent will use local and regional suppliers that are able to provide products and services at competitive prices within competitive timeframes;
- The Proponent will work with NLG and potentially affected First Nations to

increase the participation of Aboriginal-owned businesses in providing goods and services to the proposed Project;

- The Proponent's business policies will include processes to assist Nisga'a Nation and Aboriginal businesses in bidding for contracts, and a published list of project requirements for goods and services; and,
- The Proponent would ensure that its contractors comply to the extent practical with its policies respecting recruitment, training, safety, procurement and environmental responsibility.

6.1.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the agencies, NLG²⁶, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued. Examples of some of the key issues and additional commitments include:

- The owners of Kitsault Resorts raised concern about the potential monetary loss to ecotourism activity and operation of the Kitsault Resort, as a result of the proposed Project related construction and operation activities.
 - The Proponent has committed to negotiating of a communications Memorandum of Understanding that details how the Proponent would engage with the owners of the Kitsault Resorts on a broad range of issues; and,
 - The Proponent has also committed to implementing a water quality monitoring plan, air quality and noise monitoring plan and fully sharing the result of ongoing monitoring with the owners of Kitsault Resorts.
- The Proponent informed EAO that the guide outfitter, Coast Mountain Outfitters, whose tenure (a portion of) overlaps with the proposed Project, did not raise any concerns.
- The Proponent informed EAO that holders of trapline tenure are supportive of the proposed Project, but raised concerns relating to year round road access having an impact on wildlife populations (particularly as it relates to "fur theft", as well as not wanting to lose access to areas around the area of the proposed mine.
 - The Proponent noted that gates would reduce public access to the portions of the mine site;

²⁶ A full discussion and analysis of how the proposed Project would affect Nisga'a Nation economic "well-being" as outlined in the NFA is included in [Part D](#) including those issues specific to the Nisga'a Nation.

- The Proponent also noted that as part of their transportation commitments there is funding for Conservation Officers to reduce unregulated moose hunting; and,
- The Proponent committed that they would not limit access to the trapline tenure, except when conditions are not safe.

6.1.4 Residual Effects and Cumulative Effects

In consideration of EAO's assessment of the Application, and comments from the public, EAO finds that several land-based tourism, guiding and trap line holders could be potentially impacted by the proposed Project; however, the relatively small potential impacts have been mitigated as a result of the Proponent's commitments. Net beneficial effects on the economy from the proposed Project are anticipated.

6.1.5 Conclusion

EAO is aware that Kitsault Resorts have expressed concerns about the proximity of the proposed Project to their property and possible effects to their future expansion opportunities. However, EAO is also aware that the former Kitsault townsite was purchased under a "as-is, where-is" condition, reflecting the location of the townsite next to a mine²⁷. EAO is also aware of a BC Supreme Court decision which provides direction with respect to the Proponent's access to the property. EAO understand that, while Kitsault Resorts do have a small number of current clients and visitors, their primary economic concerns likely relate to their future business aspirations and are concerned that the proximity of a mine would limit those desires. With this in mind, EAO concludes that the Proponent's commitments are reasonable and should mitigate concerns regarding any effects of the proposed Project on Kitsault Resorts.

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project would not have residual adverse economic effects with the implementation of mitigation measures.

²⁷ EAO is also aware that, on January 8, 2013, Kitsault Resorts announced the plan of establishing of LNG plant, refinery, and export terminal in Kitsault, BC. A Press Conference was held on that day which provided additional details on the proposed facility, which was estimated to cost \$20 to \$30 billion.

7 Assessment of Potential Social Effects

7.1 Social Effects

7.1.1 Background Information

The Application provided background information on communities in the region that could potentially be affected by the proposed Project. Eight VCs were selected by the Proponent, which outlined issues and interest-based human environment elements valued by members of the communities in the proposed Project's study area.

For the purposes of social impact assessment, the LSA and RSA are the same for the economic effects assessment except for the land and resource use VC. The LSA for population and demographics and services and infrastructure comprises of four Nisga'a Villages²⁸ and surrounding lands, while the RSA includes four distinct regions in northwestern BC that are expected to experience social effects associated with the proposed Project. For the land and resource use VC, the LSA and RSA are defined to reflect the distribution of the land uses most likely to be affected by Project development.

7.1.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Employment and training

The Application provides details on both the positive and negative effects of increased employment in the region. Some effects described in the Application include employment opportunities available to LSA residents during construction and operations would help to reduce unemployment, offer new types of jobs and higher incomes, improve worker skills and provide on-the-job work experience, and generally diversify the economy of individual communities. However, limitations to employment such as training and education would reduce some local residents ability to benefit from the employment generated from the propose Project.

The majority of the labour force is likely to consist of non-local residents, skilled labours who would be required to relocate to the region or to commute. The proposed Project would generate an increase in employment for the in-migrant workers in the short term during construction and operations, then a decrease as operations wind down. At the end of the mine life, there would be a loss of employment, resulting in a potential decline in population due to the out-migration of workers and a less diverse community.

²⁸ Social effects of transportation are addressed in Section 10 of this Report.

The Application notes that the proposed Project would generate a demand for education programs to address the training needs of the local community are anticipated to increase. Local residents could take advantage of training offered by the Proponent during construction and operations which could provide residents with opportunities to pursue higher paying jobs outside of the region.

Demographics

The Application notes that the proposed Project could attract workers to the region in pursuit of jobs, altering the population and demographic structure of the study areas. The magnitude of the effect would depend on the extent to which employment opportunities are filled by existing residents or in-migrants. The Application notes that the proposed Project could cause the population in the region to increase by a total of 250 persons during construction and 238 persons during the operation phase.

With mine closure, the proposed Project's labour force would decrease. The population implications of closure will depend on the economic conditions at that time, and whether regional residents leaving jobs with the proposed Project would be able to find employment and maintain residence in the RSA. If not, they may need to relocate out of the region to find employment.

Services

The Application notes that an increase in local and regional populations associated with an influx of job seekers and their dependents could place increased demands on regional services and infrastructure during construction and operation. During decommissioning and closure there would be a decline in population and the demand for services would return to base case conditions.

The demand for housing and changes to the housing market would be linked to the changes in population from the in-migrant workers employed by the proposed Project. The Application notes that about 167 dwelling units would be required for in-migrating construction workers, and that many of these would be rented rather than purchased. During the 16-year operations phase, approximately 90 additional dwelling units would be needed, and many of these would be purchased. Since it is not expected that many operations workers would leave the RSA once mining ceases, selling of homes would be of limited scale during decommissioning and closure.

Mining-related activities such as transport of workers and supplies to and from the mine site and provision of services to the camp at the mine site during construction and operations could also place increased demands on regional services. Local and regional public services that could be affected include health care, social services and emergency protection services.

Increases in traffic accidents on area roads is considered the mostly likely source of increased demand on regional services, and is not directly linked to the numbers of in-migrating workers and dependents.

Summary of Mitigation Proposed in the Application

- competitive package of employment conditions to both residents and non-resident workers;
- discourage worker in-migration by making it possible for workers from outside the RSA to take proposed Project related employment without having to relocate themselves and their families to the region. This would reduce the potential demand of these workers and their families for local and regional housing, infrastructure and services;
- sponsor training to increase the pool of qualified regional residents;
- provide bus transportation between Terrace and the mine site for contractors and workers from outside the region;
- implement a regularised work rotation schedule to help construction workers from outside the region to maintain a stable family life without having to relocate their families to the region for a relatively short period of time;
- subsidised or free charter flights to operations workers recruited from hub locations elsewhere in BC, thus making it possible for workers to maintain a household outside the RSA; and,
- communicate mine schedules and activities clearly to service providers at all phases of the proposed Project.

7.1.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, no additional issues were raised by the Working Group, First Nations, NLG²⁹ and the public.

Concerns raised by First Nations are included in the First Nations consultation reports in [Part C](#) of this Report.

7.1.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures, EAO concludes that the proposed Project would result in residual adverse effects on regional demographics and services as follows:

²⁹ A full discussion and analysis of how the proposed Project would affect Nisga'a Nation social "well-being" as outlined in the NFA is included in [Part D](#) including those issues specific to the Nisga'a Nation.

- During construction and operations, there would be increased regional (and possibly local) population, and increased demand for services and infrastructure.
- During decommissioning, a more gradual decline in populations and service demands would be expected.

EAO has undertaken the following significance analysis on the residual adverse effects on regional demographics, services and infrastructure, taking into account direct and cumulative residual effects.

Table 14: EAO’s Significance Analysis for Potential Social Effects

Factor	Rationale
Context	<p>Existing regional services and infrastructure in Northwestern BC’s are conditioned to adapt to ongoing demographic fluctuations associated with the boom/bust resource economy. Despite this, governments and communities continue to improve infrastructure and services, such as training and education. No major capacity shortfalls in services have been identified through the assessment process.</p> <p>Much of the proposed Project’s workforce would be drawn from outside the region due to the limited supply of qualified resident workers, and an influx of in-migrant workers and their families could bring increased social problems, as well as placing new demands on existing services.</p>
Probability	<p>There is a high degree of certainty that these residual effects would occur. Some workers would migrate into the region with their families, especially during operations, and they would place increased demands on services and infrastructure. Conversely, there is a high probability that some workers and their families would leave the region when the mine closes.</p>
Magnitude	<p>Given baseline regional population fluctuations that range in extreme years from 700 persons arriving to 1,000 persons leaving the region, the predicted relocation of 250 persons to the region during construction, and then 235 during operations, is modest, and falls well within the historical range of regional population fluctuations.</p> <p>The predicted magnitude of population increases during construction and operations is considered low, as is the associated</p>

	<p>incremental demand for services and infrastructure, with little change expected in the availability, quality or costing of these services.</p> <p>Upon closure, operations-phase workers would not all leave the region looking for work, and the associated population change could be even more modest than that at proposed Project start-up. The population implications of closure would depend on economic conditions at that time, and the availability of alternative employment in the region, but would be, at most, low.</p>
Geographic Extent	The population and related service and infrastructure implications of proposed Project development are rated regional in geographic scope.
Duration and Frequency	Residual population effects, and associated service impacts, are rated short-term and continuous for construction, and long-term and continuous for operations and decommissioning / closure.
Reversibility	Residual effects at the construction, operations and decommissioning phases are reversible.

7.1.5 Conclusion

Considering the above analysis and having regard to the Proponent’s commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have any significant adverse social effects to employment and training, demographics and services.

8 Assessment of Potential Heritage Effects

8.1 Archaeological and Heritage Resources

8.1.1 Background Information

The Application contains the results of background research on archaeological resources, an archaeological overview assessment (AOA) and two archaeological impact assessments (AIA), conducted in 2009 and 2010. For the heritage effects assessment, the Proponent conducted a baseline review of archaeological resources, identification of archaeological sites and an evaluation of archaeological resource potential within the LSA.

A LSA of 2,740 ha was delineated for the purposes of the heritage effects assessment. The proposed Project facility footprint occupies about 25% (670 ha) of the LSA. A RSA was also defined for the heritage effects assessment, a larger geographic scope, to include lands that drain into Alice Arm and Observatory Inlet and the Nass River valley. Prince Rupert and the lower Skeena River (to Kitselas Canyon) were included in the baseline study.

The AOA conducted in 2009, concluded that some of the lands within the proposed Project area exhibited high or moderate archaeological potential and recommended that a detailed AIA be completed for lands assessed as having moderate to high archaeological potential. The results of the AIAs, determined that within the proposed Project footprint (670 ha or 24.5% of the lands within the LSA), moderate archaeological potential lands account for 0.02% of the proposed Project footprint, and high archaeological potential lands account for 0.002% of the proposed Project footprint³⁰; and within the LSA, 86 ha of the lands have moderate archaeological potential, and 7 ha of lands have high archaeological potential.

The results of the background research concluded and the AIAs confirmed that no archaeological sites have been recorded in the LSA, including the proposed Project footprint. However, 29 archaeological sites³¹ were identified in the RSA including habitation sites (semi-permanent or transitory, village sites, and seasonal camps), midden sites, wetsites, fish weirs, subsistence features, artifact scatters, lithic procurement sites, rock art, burial places, petroforms, culturally-modified trees (CMT), trails and historic sites. The closest protected archaeological site (a historic fishing camp, GiTi-1) is located within the RSA, approximately 15 km north of the head of Alice Arm.

The NFA identifies five Nisga'a heritage sites outside of the mine site and outside of Nisga'a Lands but within the Nass Area, one of which (the Grease Trail at the Cranberry River) is located 2 km from a section of one of the proposed Project's access roads.

8.1.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Application stated that no documented archaeological sites would be affected by the proposed Project. However, undocumented sites may be uncovered and potentially impacted during land altering activities during the construction of mine infrastructure and new roads or site clearing.

³⁰ Table 9.2.2-1 in the Application

³¹ Table 1.5-1 of Appendix 9.0-A of the Application

Summary of Mitigation Proposed in the Application

- Archaeological and Cultural Heritage Resources Management Plan would guide identification, recording, assessment, consultation and avoidance and/or data recovery mitigation options;
- If an archaeological site cannot be avoided through proposed Project design changes or site protection, and would be impacted, systematic data recovery (scientific archaeological excavation) would mitigate the impact by collecting and preserving information about the site for future generations in accordance with the requirements under the *Heritage Conservation Act*; and,
- Provide education opportunities for Aboriginal education facilitators.

8.1.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, no additional issues were raised by the Working Group, Nisga'a Nation, First Nations and the public with respect to potential impacts to archaeological and heritage resources:

8.1.4 Residual Effects and Cumulative Effects

Based on the information presented in the Application and the Working Group's consideration of this information, EAO finds there would not be adverse residual heritage effects as a result of the proposed Project.

8.1.5 Conclusion

Having regard to the Proponent's commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project would not have residual adverse effects on archaeological and heritage resources.

9 Assessment of Potential Health Effects

9.1 Human Health

9.1.1 Background Information

For the human health effects assessment, the Proponent evaluated human exposure to noise and environmental contaminants in air quality, drinking water, surface water and country foods. Potential exposure was focused on permanent, temporary or seasonal residents or land users located or traveling in the vicinity of the proposed Project.

The Application notes there is little potential for exposure related to the proposed Project that would affect human receptors in the LSA, since there are no permanent

residents in the LSA³². Therefore, the majority of the human receptor locations were chosen within the RSA. For purposes of the assessment, the Proponent considered the effects of the proposed Project on human health at the following human receptor locations that overlap with the LSA including the Nisga'a trappers in the vicinity of the proposed Project; and within the RSA, including recreational users in the Nisga'a Commercial Recreational Tenure area; users of the Nisga'a Fee Simple Land Tenure area³³; fishing boat and water taxi users in Alice Arm and in close proximity to Kitsault Resorts; and seasonal, temporary and permanent residents of Kitsault Resorts.

For the purposes of this assessment, the Proponent considered Nisga'a citizens and people from other First Nations, as well as children, seniors, individuals with suppressed immune systems, and people suffering from cardio-respiratory problems and / or impaired respiratory function.

9.1.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Noise

The Application states that the noise effect threshold criteria of 55 decibel A-scale (dBA) during daytime and 45 dBA during nighttime is not expected to be exceeded within the proposed Project boundary or in other areas of the LSA and RSA as a result of the proposed Project. The Proponent's noise modelling results indicate that the maximum sound pressure level at the proposed Project boundary would increase by 5 dBA to about 45 dBA during the construction and operations phases. It is not expected that the exposure to those in the area for a short term (such as trappers) during the mine life would be disturbed. Away from the proposed Project boundary, noise levels would be lower still for human receptors, who may include permanent residents and temporary and seasonal land users in the noise RSA. Direct and indirect proposed Project effects on human health are unlikely, although noise-sensitive individuals could still become potentially annoyed by sound pressure levels that fall below established noise effect criteria.

Air Quality

The Application states that exposures to all pollutants with Ambient Air Quality Objectives would meet or better these established objectives, even in 'worst case' conditions. As such, health effects are unlikely to occur for permanent, temporary or

³² EAO notes there is usually a winter caretaker at Kitsault Resorts.

³³ A full discussion and analysis of how the proposed Project would affect Nisga'a Nation rights and interests in the NFA is included in [Part D](#) including those issues specific to the Nisga'a Nation.

seasonal populations in the air quality LSA and RSA during the construction, operations and decommissioning phases.

Surface Water Quality and Country Foods

The application notes that potential exposure to arsenic and molybdenum could occur for people consuming untreated mine contact water, soil, and terrestrial plants from the environmental health LSA and RSA. The conservative scenarios used in the application represent exposure scenarios that are highly unlikely to occur within the LSA as it is unlikely for an individual to be exposed (through ingestion and/or contact) to the reference concentrations every day for their entire life. The risk factor calculations for acute effects were based on an assumed scenario for toddlers who spend all of their time either at the mine site or in the RSA and could potentially be exposed via direct contact with soil, and ingestion of surface water and country foods (traditional plant foods, wild game, and fish). Potential exposure scenarios for carcinogenic effects were conservatively based on the assumption that a receptor would live in the LSA for 24 hours a day, 7 days a week, and 365 days a year for 70 years, and would be exposed to the 95th percentile of the baseline COPC concentration in the soil, water, fish and country foods every day. Because of the conservative assumptions used in the potential exposure scenarios, the likelihood of non-carcinogenic or carcinogenic health effects occurring for individuals as a result of the proposed Project is low.

Drinking Water Quality

The proposed Project's drinking water would be sourced from Clary Lake. During sampling, drinking water quality guidelines were exceeded for hardness, color, and turbidity, which is typical in untreated water sources. Mean concentrations of iron and manganese were also higher than drinking water guidelines in Clary Lake.

One active groundwater drinking water source has been identified at the Kitsault Resort/townsite. The water is sourced from two wells located at the center of the resort that fall within the Lime Creek groundwater sub-catchment area. The Northern Health Unit has rated this as a high-risk drinking water source, due to the condition of the water storage tank rather than because of poor groundwater quality.

Clary Lake is the only proposed surface drinking water source for the proposed Project located in the LSA. All other potential surface drinking water sources in the RSA, including those on Nisga'a Lands, are located outside of the LSA. There is no potential exposure pathways between the proposed Project and water supplies of surrounding communities, therefore, water sources would not be affected by the proposed Project development.

The Application says that groundwater may be affected by both the TMF and the WRMF. However, the volume of groundwater on-site predicted to interact with the proposed Project is in the order of 3% of all groundwater flow associated with the mine footprint. The Application described groundwater quality effects as not significant, and ongoing groundwater monitoring is proposed to verify this prediction.

During all phases of the proposed Project, the Application says that drinking water in the proposed Project's water treatment system would be monitored and treated as required to meet established provincial drinking water guidelines and standards. The potable water for use by employees would be piped to a potable water treatment system prior to distribution to the main Process Plant facilities and the camp.

Summary of Mitigation Proposed in the Application

The Application states that because negative health effects are unlikely to occur, no mitigation measures are proposed in addition to those already proposed in other relevant sections of the Application (e.g. water quality, marine aquatic resources). A communications procedure would alert concerned parties (e.g. Northern Health Authority; Health Canada and local communities) of any suspected or known proposed Project related effect or event that could affect human health. Through such communications, mitigation measures would be developed in detail, and with the expectation that mitigation success would be high.

9.1.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the agencies, NLG³⁴, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contains specific mitigation measures, which would be legally enforceable if an EA Certificate is issued. Examples of some of the key issues and additional commitments include:

- Kitsault Resorts Ltd. raised the following issues in their submission to EAO during the public comment period and in subsequent correspondence to EAO: water quality with respect to public health and ecological impacts; human health impacts from noise, dust and air quality; and the cumulative water quality effects on groundwater and in Lime Creek. The owners of Kitsault Resorts requested that the Proponent establish permanent air, noise, vibration, surface and

³⁴ A full discussion and analysis of how the proposed Project would affect Nisga'a Nation economic "well-being" as outlined in the NFA is included in [Part D](#) including those issues specific to the Nisga'a Nation.

groundwater monitoring stations within the Resort property and report the results of all monitoring to them. They also requested full effects assessments of the impact of the proposed Project on Kitsault Resorts:

- The Proponent has committed to making reasonable efforts to negotiate of a communications Memorandum of Understanding that details how the Proponent would engage with the owners of the Kitsault Resorts on a broad range of issues.
- The Proponent has committed to implementing a water quality monitoring plan, air quality and noise monitoring plan and fully sharing the result of ongoing monitoring with the owners of Kitsault Resorts.
- Health Canada and NLG raised the concern of the potential human health risk associated with Nisga'a citizens' consumption of harvested country foods exposed to concentrations of contaminants/metals through soil and surface water. Health Canada advised the Proponent to conduct a more detailed Nisga'a dietary survey, including consumption rates, frequencies and portion sizes of country foods for different age/gender groups, and collect information on the tissues from each type of country food consumed. This would provide a more representative measure of human health risk. Health Canada also advised the Proponent to undertake arsenic speciation of seafood as well as other country foods and reanalyze archived shellfish samples.
 - The Proponent has committed to implement the following measures:
 - In subsequent assessments of health risks related to consumption of country foods, apply conservative consumption values when assessing risk, i.e. will apply the consumption rate from the Nisga'a Environmental, Social and Cultural Impact Assessment (ESCIA) Survey;
 - As information becomes available on concentrations of contaminants in shellfish through monitoring programs, the information will be used in country foods and health reporting and "follow-up monitoring";
 - Incorporate additional speciation analysis into project related monitoring programs. i.e. speciate inorganic arsenic in shellfish tissue; and,
 - Include cadmium in future monitoring as well as monitoring of mine-related increases of COPC concentrations in country foods.

9.1.4 Residual Effects and Cumulative Effects

There are relatively few effects on overall human health from the proposed Project, primarily due to the low numbers of permanent residents or temporary and seasonal land users in the LSA. Based on the findings of the relevant VC assessments, the only identified potential residual human health effects are exposures to certain parameters through the consumption of fish and shellfish in Lime Creek and Alice Arm.

EAO also notes that historic mining activities may have contributed to elevated levels of some parameters (this is discussed in greater detail in section 5.1 Water and Sediment Quality and section 5.5 Marine Aquatic Resources).

Table 15: EAO's Significance Analysis for Potential Health Effects

Factor	Rationale
Context	<p>Alice Arm, the closest body of seawater to the proposed Project), is located approximately 7 km northwest of the proposed Project site. It is one of two terminal branches of Observatory Inlet, Hasting Arm being the other.</p> <p>Alice Arm provides valuable habitat for many species of benthic infauna and epifauna, fish, marine mammals and marine birds.</p> <p>The Nisga'a Nation holds marine harvesting rights under the NFA. The NFA defines Nisga'a Nation rights to harvest marine resources, including aquatic plants, throughout the Nass Area, and, in particular, south of the proposed Project site. The maintenance of water quality in the Nisga'a Nation's intertidal bivalve harvest (in the northern part of Observatory Inlet extending to the southern portion of Alice Arm) is critical during harvest periods between October 1, and March 31, each year.</p> <p>The Metlakatla First Nation has marine interests, including marine water quality, adjacent to the proposed Project. The Metlakatla First Nation have stated that they use and continue to use, marine resources, including fish, shellfish, herring eggs, oolichan, seal grease, berries and seaweed, for food, social, ceremonial and commercial purposes. Maintenance of marine water quality is important for continued Metlakatla First Nation marine harvest.</p> <p>Lime Creek, which is the main drainage from mine infrastructure and the main pathway for any degraded water quality from the proposed Project, makes a relatively small freshwater contribution to Alice Arm (5%) compared to those of the Kitsault River (57%), the Illiance River (17%), and other smaller creeks (21%).</p> <p>Alice Arm has been impacted by past mining activities (both previous mining at the site of the proposed Project and other</p>

	<p>mining activities in Observatory Inlet and the upper Kitsault River).</p> <p>The proposed Project would likely improve water quality over current conditions, due to improved water management.</p> <p>There have been no significant residual adverse effects noted to wildlife or fish, both of which would be important country foods for the Nisga'a Nation, First Nations and recreational users.</p>
<p>Probability</p>	<p>Having regard to the prior conclusion that the proposed Project is not likely to have significant adverse effects in respect of the aquatic environment, the probability of direct and indirect effects to human health from consumption of the marine resources primarily consumed by humans is very low. Based on water quality modeling results, treatment of mine water discharge to Lime Creek will meet most guidelines for the protection of freshwater aquatic life and will likely have minimal to no effect in the marine receiving environment, particularly with the considerable dilution of Lime Creek in Alice Arm.</p> <p>The MEMP is expected to have a high probability of detecting potential Project related effects to the marine environment, and includes adaptive management monitoring responses to ensure impacts to the marine environment are mitigated. If effects are detected in the monitoring program, the adaptive management response will be to implement additional mitigation measures to ensure the proposed Project related effects do not result in a significant adverse impact.</p> <p>The probability that potential residual effects from the proposed Project on the marine environment will cause a cumulative effect is rated as low. Potential cumulative effects, such as increasing in metals loading and shellfish tissue metal concentrations in Alice Arm, are unlikely to be caused from the proposed Project, considering the Proponent's commitments to water management and treatment.</p> <p>Considering the improvement in water quality should the mine be developed, there is a high probability that water quality in</p>

	Alice Arm will be improved.
Magnitude	<p>The magnitude of potential effects to human health from increased metal loadings to marine aquatic resources from changes to flow and water quality in the estuary of Lime Creek to the marine environment in Alice Arm is considered very low during all project phases.</p> <p>The proposed water management plan includes key mitigation measures to avoid impacts to water quantity and quality in Project affected watersheds. Mine water discharge from the TMF to Lime Creek is proposed year round, proportional to the natural hydrology (average monthly flows) to mitigate changes to flow in Lime Creek. Water quality in lower Lime Creek discharging to the marine environment is predicted to meet BCWQG or other site-specific WQO for the protection of aquatic life or to be approved by MOE.</p>
Geographic Extent	<p>The geographic extent to any effects to human health due to consumption of marine aquatic resources would be limited to the harvest of any marine resources in the Lime Creek and estuary and nearby sediment deposition and transport zones in Alice Arm resulting from discharges from the proposed Project affected watersheds (Lime Creek/Patsy Creek).</p> <p>The marine environment geographic extent includes overlap with historic impacts areas and non-project affected watersheds including the Kitsault River estuary. The Kitsault River discharge into Alice Arm is a major source of sediment deposition, sediment quality and water quality in Alice Arm and has an influence on marine VCs such as shell fish tissue metal concentrations.</p> <p>The Proponent's MEMP will include reference sites to detect if there are statistically significant changes in water quality, sediment quality and shell fish tissue metal concentrations; and to determine if these changes are a project related residual effect, cumulative effect or if attributable to historical impacts and/or natural temporal or spatial variability in the marine environment. These sites are expected to be located in Observatory Inlet.</p> <p>As a result, the geographic scope of all potential residual</p>

	effects to human health at all project phases is considered local.
Duration and Frequency	<p>The duration of potential human health impacts would vary by parameter. Some metals may accumulate in human tissues while others may not. The frequency of effects would also depend upon how often marine resources were being consumed and much was consumed.</p> <p>Considering the low probability and magnitude of these effects and the high confidence that any changes in marine resource could be detected, effects would be considered short term and infrequent.</p>
Reversibility	The residual effect on human health from the consumption of marine resources again depends on the parameter being consumed and how much is being consumed over what period. Provided monitoring is implemented as required, and that consumption of marine resources follows Health Canada guidelines, any effects which do occur should be reversible.

EAO has considered the importance of the marine aquatic resources in Alice Arm to the Nisga'a Nation and Metlakatla First Nation and in particular the potential for human health impacts due to the bio-accumulation of metals in fish and shellfish tissue. We recognize the historic impact of past mining operations on Alice Arm which may have contributed to these issues, but we are also aware that the proposed Project, should it proceed, would likely result in an improvement over current water quality in Lime Creek and therefore in Alice Arm, reducing the potential for negative effects to marine aquatic resources. We have also considered that the Lime Creek drainage contributes only a very small portion of fresh water to Alice Arm (5%) and have considered the significant dilution factor of that fresh water in the marine environment.

EAO has also considered the proposed MEMP and is satisfied that the program would be robust, involve the Nisga'a Nation, EC and Health Canada in its development during permitting and would detect any changes in the marine environment. EAO is also satisfied that Environment Canada, Northern Health Authority and Nisga'a Valley Health Authority, and Health Canada assess monitoring data and provide warnings on consumption rates and levels should risks to human health become apparent. EAO is confident the proposed mitigation measures and MEMP will prevent potential human health impacts.

With respect to country foods, no pathways for human health effects have been

identified and, with no significant adverse effects on fish or wildlife, effects on country foods are considered negligible.

9.1.5 Conclusion

Considering the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on marine aquatic resources.

10 Assessment of Potential Road Use Effects

10.1 Transportation

10.1.1 Background Information

This section of the Assessment Report is intended to be a stand-alone document which reports on the assessment of potential impacts on those VCs located along the transportation route to the proposed mine site. EAO directed the Proponent to prepare a separate Road Use Effects Assessment (RUEA) for their two proposed routes from the mine site to Hwy 16. The effects assessment stopped at Hwy 16 because EAO concluded that the additional incremental traffic added only a negligible amount of new traffic to that route.

The Proponent's full assessment can be found in the RUEA, which forms Appendix 8.0-C of their Application.

The Kitsault mine site is accessed from either Hwy 113 or Hwy 37. See Figure 20 below for descriptions of the transportation access routes.

Highway 37

Hwy 37 is a north-south two-lane Hwy starting at the junction of Hwy 16 at Kitwanga and terminating at the Yukon – BC border. The Kitsault transportation route overlaps with the first 76 km of the Hwy from junction of Highway 16 to Cranberry Junction. Hwy 37 is passable by most types of vehicles, including private passenger car, truck, and industrial traffic. The conditions along Hwy 37 are, at times, challenging and change quickly and maintenance during poor weather conditions can contribute to increased accidents and collisions with wildlife. The Hwy connects the community of Gitanyow Nation and further north the Tahltan communities of Dease Lake and Iskut, and Telegraph Creek to service centres in Smithers and Terrace. The Hwy also supports industrial traffic related to mining and forestry to port and rail infrastructure. The Hwy is a popular tourist scenic route as it is one of two access points from BC to the Alaska Hwy.

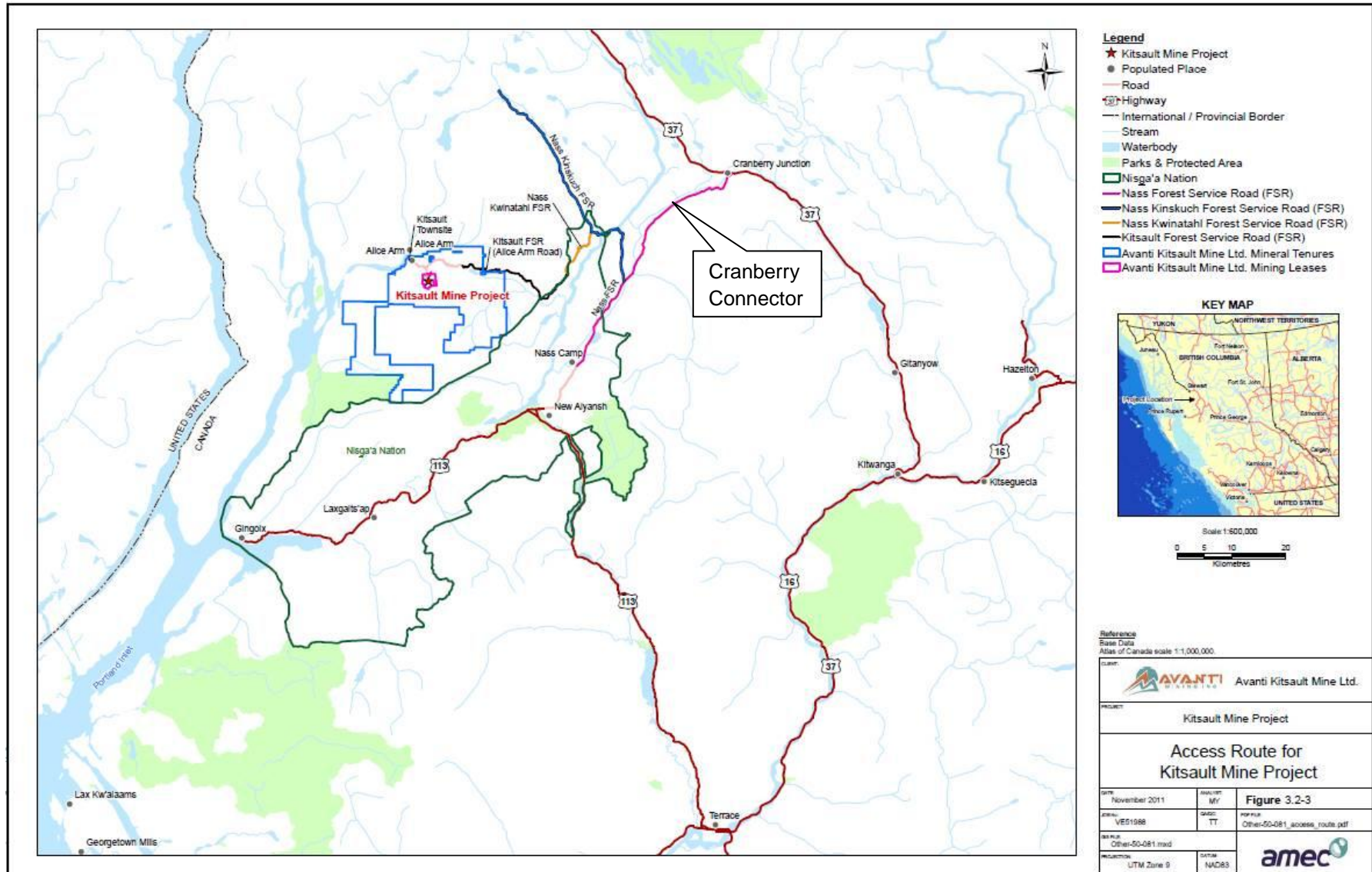
From Hwy 37 at Cranberry Junction, the route turns west along the Nass FSR, which is also called the Cranberry Connector. The Nass FSR is a gravel road which is characterized by poor drainage, poor surface conditions, poor alignment, poor sight lines, and narrow width. In addition to its industrial uses, the Nass FSR also functions as an emergency and alternate route during closures greater than 24 hours along Hwy 16 between Terrace and Kitwanga. Unless maintained by an industrial user, the road is generally not passable in the winter.

At the 31 km point on the Nass FSR, the route turns north along the Nass-Kinskuch FSR and then west towards Alice Arm, crossing the Nass Bridge to the Nass-Kwinatahl FSR junction. From that junction, the FSR heads southwest parallel to the Nass River for approximately 10 km until it reaches the abandoned Kwinatahl logging camp. From the Kwinatahl camp, the road trends northwest approximately 33 km along the Kitsault/Alice Arm Road to the mine site with another 4 km to the Kitsault townsite. FLNR and industrial users are responsible for use, maintenance, repair, and traffic management along FSRs, including the Nass FSR. The Nass Kinskuch, Nass-Kwinatahl and the Kitsault/Alice Arm FSRs support industrial traffic, including forestry and mining. The proponent holds a Special Use Permit (SUP) and a Road Use Permit (RUP) from the west end of the Nass (Hwy 113- Nass FSR junction) to the Kitsault mine site.

Highway 113

From Hwy 113 (called the Nisga'a Hwy) at its junction in Terrace, the route to the mine site is along a north-south, then east-west two-lane paved Hwy. The Hwy connects Terrace to the northerly Nisga'a Villages of New Aiyansh, Laxgalts'ap, Gingolx, and Gitwinksihlkw. The traffic along the Hwy is a mix of private and tourism vehicles and industrial traffic for mining and forestry. From New Aiyansh, the route continues on past Nass Camp on the Nass FSR until it reaches the 31 km point on the Nass FSR. From that point it follows the same route to the mine as that outlined above.

Figure 20: Transportation Routes



Traffic Volumes

The Proponent reports that, during construction, an estimated total of 6,200 truckloads of construction personnel, materials and supplies would be transported along the two transportation corridors, averaging 11 to 22 return trips to and from the mine site per day over a 12-hour period, five to seven days per week, and rising to 22 to 54 return trips daily by heavy vehicles at peak times. Up to 10 light passenger vehicles (mainly half-ton trucks) would also travel to and from the site daily.

During operations, an estimated total of more than 6,400 return vehicle trips to and from the mine site would be made each year, carrying personnel and mining and camp supplies. The daily maximum number of return trips would be about 27. Traffic may be concentrated within one or two peak hours during morning and evening commuting periods, with as many as 22 vehicles travelling to or from the mine during those periods, although divided between the two road corridors.

Traffic volumes during decommissioning would be much lower. Concentrate shipments would cease, and there would be far fewer passenger vehicles. Heavy trucks and trailers would represent the largest proportion of traffic in the early years of closure, when equipment and materials are removed from the site. Any water treatment processes would require at least two trucks a month transporting lime to the mine site.

Table 16: Traffic Volumes - Construction and Operations

Highway	Phase	Existing Traffic (SADT)	Mine-related Traffic (Max VPD)**	Percentage (Mine related to Existing Traffic)	Combined Traffic (Daily)	Recent Max* (SADT)	Historic Max (SADT)
Hwy 37	Construction	977 (2010)	108	11.1%	1,085	1,179 (2004)	3,800 (1989)
Hwy 37	Operations	977 (2010)	54	5.5%	1,031	1,179 (2004)	3,800 (1989)
Hwy 113	Construction	424 (2008)	108	25.5%	532	1,018 (2005)	2,700 (1988)
Hwy 113	Operations	424 (2008)	54	12.7%	478	1,018 (2005)	2,700 (1988)
Nass FSR	Construction	59 (2008)	108	183%	167		110 (1987)
Nass FSR	Operations	59 (2008)	54	91.5%	113		110 (1987)

Note: SADT - Summer Average Daily Traffic; VPD - vehicles per day

*recent maximum recorded along Hwy in last ten years across all traffic measurement sites

**assumes maximum vehicle per day volumes and 100% of mine traffic on each route

VCs

Transportation of materials, supplies, and personnel to and from the proposed Project mine site has the potential for effects on environmental, economic, social, cultural, and health components. The Proponent assessed possible interactions of traffic related to the proposed Project with existing traffic and adjacent activities and habitat along the FSRs from the mine site to the Nass FSR, the Nass FSR, Hwy 37 and Hwy 113. Based on those interactions, they selected the following VCs to be assessed based on their direct and indirect interactions with the Kitsault transportation route:

- **Air Quality:** Air quality may decrease and noise levels may increase with additional mine-related traffic along the transportation corridors;
- **Water Quality and Environmental Health:** May be affected by accidents and malfunctions, which may cause an indirect effect on environmental health, including humans, mammals, birds, amphibians, fish, and invertebrates;
- **Wildlife:** Furbearers, grizzly and black bears, moose, and birds may be exposed to greater risk of injury or mortality along the Kitsault transportation routes due to increased mine-related traffic during construction and operations;
- **Economic:** Transportation-related roadside expenditures and contracts may increase regional employment and business opportunities;
- **Social:** Transportation-related activities may create a greater demand on regional services and infrastructure, and degrade or impede access to land use and cultural sites in the areas adjacent to the transportation corridors; and,
- **Human Health and Safety:** Local residents and visitors traveling along the Kitsault transportation route may be exposed to a greater risk of accidents resulting in possible injury or death.

The Proponent identified and assessed potential effects, mitigation measures, and residual effects for each VC. Effects were determined using existing and mine-related traffic and accident data, scientific research and knowledge, available information from the Nisga'a Nation and First Nations, risk assessment results and feedback from the Transportation Working Group.

10.1.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Proponent's Application identified a number of effects, which are listed below. These effects primarily come from the transportation of equipment, supplies, materials, and labour would occur throughout the proposed Project's construction, operations and closure phases. This traffic could adversely affect road infrastructure, its users, the adjacent environment, and the cultural and resource use activities of the Nisga'a Nation

and First Nations.

EAO's assessment of matters specific to the Nisga'a Nation are discussed in [Part D](#). Impacts to First Nations are discussed in the relevant First Nations Consultation Report in [Part C](#).

Air Quality Effects

The Proponent noted that transportation-related activities are expected to adversely affect air quality (including increased dust and emissions) and increase noise levels. The addition of mine-related construction and operations traffic at peak periods to existing traffic levels represents between 11.1% and 5.5% of existing traffic levels along Hwy 37, and 25.5% and 12.7% along Hwy 113. Average daily round trips are expected to be much lower than peak levels.

Increase of emissions based on the introduction of heavy industrial traffic from the proposed Project would add a higher percentage of emissions as compared to a corresponding increase in passenger and light truck traffic. Since the Proponent assumes both routes will be used, air quality impacts would not occur in one particular concentrated area.

There is a potential for increased dust from vehicular traffic traveling from the Kitsault mine site along the FSRs to Hwy 37 and Hwy 113, including the Nass FSR. Dust may adversely affect road-side plant species and communities or waterbodies and temporarily obscure visibility along the FSRs.

The Proponent notes that molybdenum concentrate will be contained in "super-sacks", which can sustain several roll-overs, and, as such, reduces risk of contaminating the receiving environment and also reduces human exposure to ore, even in the case of accidents.

Noise was also noted as a potential effect, particularly with respect to the community of Rosswood and the Nass FSR.

Water Quality and Environmental Health Effects

The Application describes direct effects to water quality as potentially occurring during accidents or malfunctions along the Kitsault transportation route. Indirect transportation-related effects on environmental health (including humans, mammals, birds, fish, amphibians, and invertebrates) may occur during accidents and spills near or into major waterbodies and tributaries along the Nass FSR, Hwy 37, and Hwy 113. The four major types of accidents and malfunctions from transportation noted are:

- Motor vehicle accidents - injury or loss of life, spills of hazardous or non-hazardous substances to land or water, fires;
- Hazardous substance spills - health hazard, injury, contaminated soil, contaminated water, impacts to aquatic organisms;

- Chronic dust - dust generation, inhalable and respirable suspended particulate; and,
- Chronic vehicle emissions - exhaust gases (e.g. carbon monoxide (CO) and carbon dioxide (CO₂), nitrogen oxides, sulphur oxides).

The Proponent undertook a risk assessment based on the probability and consequences of accidents or malfunctions along the transportation route. The assessment concluded that spills of chemicals and/or fuel from transport trucks along the transportation route near waterbodies could affect to aquatic organisms. It notes that process chemicals required for the proposed Project are relatively low in toxicity when diluted, resulting in short-term effects to waterbodies, where spills to land would be cleaned up immediately. The assessment predicted low likelihood of spills from transportation accidents; however, if they do occur, the environmental damage and safety hazards may be moderate to high depending on the size of the spill and the waterbody.

Vehicle fires as a result of collision could occur on the access road. The risk of a vehicle fire along the transportation route is low but the consequences with respect to safety of people are high. Attendance at a vehicle fire on the access road would depend on the location. Close to the mine, the mine first aid staff would attend once notified. A vehicle fire could result in injury or death of occupants.

Wildlife Effects

The Application stated that increased traffic levels from mine-related transportation activities may cause adverse effects on wildlife populations (including moose, bears, furbearers, and birds) along the Kitsault transportation route during the construction, operations, and decommissioning/closure phases of the proposed Project. In particular, potential effects may include injury or direct mortality of wildlife due to vehicle collisions, increased winter access and associated increase in human use of the Nass FSR from Nass Camp to Cranberry Junction, and potential habitat degradation from spills and malfunctions.

The Application says that it is difficult to predict how this increase in traffic volume along Hwy 37 and 113 and existing network of forestry roads (including the Kitsault/Alice Arm Road, Nass-Kwinatahl, Nass-Kinskuch, Nass FSR) may alter wildlife collision risks. However, the Application notes that higher mortality risks would occur where traffic volumes increase near or adjacent to preferred habitat, occupied habitat, and where current traffic volumes are limited.

Based on existing data along Hwy 37 and 113, there are periods of time where certain wildlife species are more at risk of vehicle collisions. Moose collisions are reported more frequently during winter months. During winter, moose are concentrated along low elevation wetland-timber complexes, where snow depths are limited. Much of Hwy 37 and 113 bisect or parallel moose winter range habitat. The

Cranberry Connector is identified as being of particular importance, with high value moose winter range that is occupied during winter.

Bear mortality risk from vehicle collisions is relatively higher during the summer and fall months (August to September). During these periods, bears are often found at lower elevation areas in wetland complexes, roadside verges that contain berry plants, and near salmon spawning streams. There are areas of higher value habitat for grizzly bear foraging along Hwy 37 and Hwy 113. The RUEA contains maps of higher value wildlife areas.

The Application describes that, while there is already an existing network of access roads to the proposed Project, the area from the mine site to the junction of Hwy 37 (through the Cranberry Junction) has been unplowed during recent winters and traffic is relatively low compared to Hwy 37 and 113 during the remaining months.

Moose winter range habitat occurs through the Cranberry Connector and vehicle traffic along this area during winter could increase the potential risk of moose mortality from vehicle collisions. The Application notes that snow removal during winter along the Nass FSR to Cranberry Junction also opens the existing road year-round and increases winter access for the general public. The increase in human activity in the area and year-round access could facilitate more interest and use of the area for potentially unregulated hunting and poaching.

Beyond risks of collisions with wildlife and increased access, spills along the Kitsault transportation route may occur with mine-related traffic during all phases of the proposed Project. The four primary environmental receptors of a spill are: surface fresh water; groundwater; air; and soil. Secondary effects on terrestrial, aquatic or marine animals and plants may occur following exposure to the spilled substance. Accidental spills or releases of chemical contaminants may degrade wildlife habitat, alter wildlife presence, and change use patterns in the area of the spill.

The Application summarizes identified species-specific roadway effects for moose, bears, furbearers, and birds as follows:

- Moose mortality risk appears to be higher in winter when moose occur in low elevation winter range habitats adjacent to roadways and Hwys, particularly along the Cranberry Connector and areas along Hwy 37 and 113;
- Plowing of the Nass FSR north to Cranberry Junction may increase moose mortality risk from vehicle collisions and winter access to moose winter range. Snow banks can trap moose along the road and increase the risk of mortality from vehicle collisions. Increased access to moose winter range can also lead to increase in unregulated hunting pressure on moose. Regulated hunting occurs outside the winter season and is not the primary concern;

- Bear collisions with mine traffic may be concentrated in the active bear season from late April to October. Poor visibility and high quality bear habitat along the roadside may increase bear accidents with mine-related vehicles;
- Marten and other furbearers may experience incidental mortality due to vehicular collisions along the Kitsault transportation route. Furthermore, furbearers, such as beaver, may cause complications with road-related infrastructures including culverts. Beaver can inhabit culverts, causing flooding and requiring regular maintenance and removal of beaver; and,
- There is anticipated potential mortality of sooty grouse due to mine traffic. Grouse are especially attracted to roadways as a means of obtaining grit. The northern goshawk is linked to grouse as it is one of its important food sources. The northern goshawk is at a risk of collisions with vehicles due to the presence of their prey along road shoulders.

Based on existing conditions, the Application states that the species of most concern and at relatively greater risk of colliding with vehicular traffic along the Kitsault transportation route are moose. Several Nisga'a Nation, Aboriginal, and provincial sources indicate that the moose populations in the Nass Valley and the Cranberry areas are in decline with limited entry or closure of moose hunts in some areas to introduce conservation measures to help the population recover. Given the current status of moose populations along the Kitsault transportation route, the adverse effect of industrial accidents with wildlife, as well as the potential in increased hunting pressures, during construction and operations phases may exacerbate the existing conditions.

The grizzly and black bear populations along the Kitsault transportation route are reported to be stable. While bears are the species with the second highest hits along Hwy 37 and 113, their population is not in decline in the same way as the moose population. As such, the mine-related traffic may collide with bears along the Kitsault transportation route; however, the rate at which this may occur would not affect the sustainability of the population.

The existing effects of roadway traffic on furbearers are low with a total of four reported hits along Hwy 113 from 2003 to 2010 and three reported hits on Hwy 37 from 1991 to 2010. Furbearer populations are assumed to be stable. As such, the effect of mine-related traffic on furbearer populations is expected to be minimal. EAO notes however, that the Gitanyow Nation have noted that effects to furbearers may be much higher than this number due to underreporting of collisions with furbearers. Gitanyow Nation also notes that furbearers have an important ecosystem function and are important to their aboriginal rights.

Economic Effects

The Application notes direct and indirect economic effects of the Kitsault transportation route. These include increased regional employment and business opportunities due to demand for transportation-related commercial operator services, and increased

expenditures at roadside transportation-related services in communities along Hwy 37 and Hwy 113.

The Proponent anticipates several major transportation-related business contracts during construction and operations. Total construction costs are expected to be \$837,000,000, of which 5% (\$41,550,000) is estimated to be spent on transportation, with \$22,800,000 of the transportation costs are assumed to be expended in BC with the remainder elsewhere in Canada and internationally. The Application also estimates that proposed Project operations would result in about 86 new jobs in the region, some of which may include mine-related transportation. Specific transportation figures are not provided.

Social Effects

Transportation of equipment, personnel, and materials to and from the Kitsault mine site is described in the Application to have the following possible effects on important land use and cultural sites, and regional social services:

- increased traffic related to the proposed Project may impede or delay access to cultural sites during response to accidents and / or spills;
- increased traffic related to the proposed Project may attract additional interest from non-residents;
- increased risk of accidents and/or spills may place a greater demand on already limited regional social services, including police and ambulance services; and,
- increased noise may interrupt and degrade enjoyment of roadside land uses and residential properties.

Increased number of accidents along the Kitsault transportation route may increase the demand on limited police and ambulance services in the region. Depending on where the accident occurs, response may arrive from a number of different communities, some which may require extensive travel time or air access at great expense. While the cost of accidents is recuperated by the province from the proponent, there is an opportunity cost to using these regional services. During response to mine-related accidents along the Kitsault transportation routes, communities may be left with no or limited services for the duration of the response, which may extend from several hours to a day.

There are several permanent communities along Hwy 113, of which Rosswood is the most proximate and may directly experience the increased noise levels beyond 3 dBA. New Aiyansh is a distance from Hwy 113, and is not expected to experience the same level of noise disturbance from industrial traffic, given the sound buffering effect from distance and vegetation.

Human Health Effects

The Application describes the main human health issues related to the proposed Project to come from collisions between existing traffic (mostly passenger and light truck) and industrial traffic to and from the mine site.

The traffic levels related to the proposed Project combined with the existing traffic from the most recent traffic counts are represented in Table 15 above for each road and Hwy of the Kitsault transportation route. Most of the construction materials, equipment, and freight will be obtained from outside the transportation study area.

The Proponent notes that, generally, the mine-related traffic represents a range of increase in existing traffic ranging from quite small (5.5%) to a more moderate increase of 25.5% of existing summer average daily traffic. The only exception is the Nass FSR, which could see traffic levels increases of close to 200% during construction and almost double during operations compared to recent traffic data.

The Application includes information on the main contributing factors to accidents along Hwy 37. Speed, weather, fatigue, alcohol, driving without due care and attention, road condition and animal collisions are all the main reported causes of accidents.

Given all these considerations, the Proponent concludes that accidents related to the increase in mine-related traffic during construction and operations are not expected to increase accident levels substantially. Risks of vehicular incidents are expected to drop off during closure and post-closure as the level of traffic associated with the proposed Project decreases.

Beyond safety issues arising from traveling along roads and Hwy along the Kitsault transportation route, the Proponent also assessed the three intersections along Hwy 113 (including Greenville, Skateen Avenue, Hwy 16), and two intersections along Hwy 37 (Kitwanga with Hwy 16 and at Cranberry Junction with the Nass FSR). The Proponent concluded that two of three intersections along Hwy 113 were insufficient in size to accommodate the two largest mine-related trucks (i.e., WB-20 and B-train). Only the intersection with Hwy 16 was suited for the large mine traffic, while the other two intersections caused severe tracking into opposing lanes. The intersections on Hwy 37 were assessed by McElhanney to be undersized resulting in potential tracking of design vehicles (McElhanney 2011b).

Summary of Mitigation Proposed in the Application

Full details on mitigation proposed by the Proponent can be found in the Application/RUEA. A summary of the mitigation initially proposed includes:

- The Proponent would apply for Special Use Permits for the Nass and Kinskuch FSRs, which would allow the Proponent to assume overall responsibility for road maintenance, dust suppression and snow removal on these roads;

- The Proponent would monitor road conditions continuously at all project phases, and apply dust suppression materials regularly to the road surface, to minimise the risk of traffic accidents and enhance motor vehicle safety for users of these roads;
- The Proponent would restrict traffic volumes and increase motor vehicle and worker safety by not allowing contractors and workers to drive to the mine site;
- The Proponent would develop an emergency response plan, including protocols to be followed in the event of a motor vehicle accident, a cargo spill of fuel or other hazardous materials;
- The Proponent would require truck drivers to exercise caution and reduce speed when passing through areas with wildlife signage; and,
- The Proponent would monitor and collect data on vehicle-wildlife collisions near the mine footprint and along access roads.

10.1.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the agencies, NLG, First Nations and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Certified Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued.

- Moose/wildlife issue one: Plowing of snow can trap moose on the transportation route and result in an increased risk of moose-vehicle collisions.
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include snow removal that will include pullouts for wildlife escape routes at key locations along the FSRs. The design, location and frequency of the pullouts will be set through discussions with FLNR, Gitanyow and the Nisga'a Nation and will consider best available scientific research.
- Moose/wildlife issue two: Vegetation along road right-of-ways can hide animals foraging along road verges, decrease vehicle driver line of sight and driver ability to react to animals along the road. Clearing of vegetation along the FSRs right-of-way in manner that ensures line-of-sight for vehicles to see wildlife and ensures limited wildlife attraction.
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include inspecting the FSRs for reduced visibility and in areas where line-of-sight need improvements, vegetation brushing will be implemented to improve wildlife visibility. Brushing widths, ensuring any seeding programs do not improve forage conditions adjacent to corridors, frequency, and riparian set-backs will be set through discussions with FLNR, Gitanyow and Nisga'a Nation and will

consider best available scientific research.

- Moose/wildlife issue three: High wildlife use areas require identification and increased mitigation measures to minimize potential collisions with vehicles.
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include development of a map of the transportation route of important environmental features and sensitive moose habitats with measures specific to reduce disturbance to these areas (for example reduced speed limits, increased signage, increased vegetation brushing widths, snow plow escape routes). This map will be distributed to mine-related vehicle drivers through the Traffic Control Plan (a component of the Transportation Safety Plan).
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include placement of wildlife signage along the FSRs in areas of potential wildlife collisions with emphasis on high moose areas. The design and placement of signage will be set through discussions with FLNR, Gitanyow and Nisga'a Nation.
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include identification of sections of the FSRs where areas of potential or realized large mammal-vehicle collisions occur and speed reductions of mine-related traffic adjusted accordingly (based on time of season, time of day and/or location).
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which would include development of protocols for reduced vehicle movement during dawn and dusk periods, and convoys (a component of the Traffic Control Plan).
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which would include a Large Mammal Monitoring and Reporting Program³⁵. Components of this plan will include:
 - Procedures for contractor initiation and training;
 - Protocols for a signed agreement with contractor companies, independent drivers, and mine employee drivers that includes successive levels of penalties or consequences for non-compliance;
 - Equipping identified mine-related vehicles with a GPS wildlife recording device;
 - Procedures for recording and reporting of large mammal-vehicle near miss, injury or mortality, and observations of dead large mammals;

³⁵ Large mammal means moose, bear, and goat

- Data reporting protocols and specific radio communication protocols for distributing information on large mammal observations and incidents;
- Assessment and reporting of results to identify high potential areas (location, time of day, season) for large mammal-vehicle collisions; and,
- Compliance monitoring, including periodic audits for conformance and to assess the effectiveness of the program and identify opportunities for improvements.
- The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which would include protocols and procedures for immediately reporting moose kills and injury to Conservation Officers, Ministry of Transportation and Infrastructure (MOTI), NLG, Gitanyow Hereditary Chiefs, Gitxsan First Nation, and Kitsumkalum First Nation.
- Maintaining and plowing the Cranberry Connector during winter can allow hunter access to an area with high quality moose winter range along the road, increasing unregulated and illegal hunting and putting the moose population further at risk.
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction. Parts of the Plan will include:
 - No hunting and fishing policy for all employees and contractors while working directly or indirectly for the proposed Project;
 - Observe/Record/Report Program developed in consultation with regional Conservation Officers; and,
 - Employee Education and Environmental Awareness Program, with emphasis on:
 - Transportation route use and operating protocols and wildlife concerns, which includes communication on areas of high moose risk, moose population and overharvesting concerns, and mitigation measures and strategies to minimize transportation effects on moose.
 - Wildlife observation and interaction reporting, including communication on the Large Mammal Monitoring and Reporting Program.
 - EAO has recommended that the Proponent be required to provide \$100,000 annually payable on April 1 of each year, to the Province of British Columbia, starting with the commencement of construction and ceasing with the commencement of closure. The EAC Holder must enter into a Contribution Agreement or a similar mechanism to the satisfaction of the Ministry of Forests, Lands and Natural Resource Operations which

outlines terms of the annual contribution. The funding will be used to support the following two initiatives:

- Efforts to support recovery of the Nass moose population, including, but not limited to education and communication, inventory, monitoring, collection of harvest data, signage and programs to increase knowledge of human interactions with moose; and,
 - The Northwest Assessment and Monitoring Trust, a Ministry of Forest, Lands and Natural Resource Operations initiative to provide a coordinated approach to managing and mitigating the potential cumulative effects to aquatic and wildlife populations along Highway 37.
- Requests that the Proponent provide funding for a permanent structure (e.g. cabin) along the Nass FSR for the purpose of accommodating Conservation Officers and other enforcement staff.
 - The Proponent committed to providing accommodation to Conservation Officers or other provincially recognized enforcement staff undertaking enforcement activities along the transportation route at the Proponent's on-site mine facilities for the period of time in which enforcement activities are undertaken.
 - Concerns about human safety issues and accidents due to excessive speed, drug and alcohol use and fatigue of mine employees and contractors, especially after then have finished their shifts. A particular emphasis was placed on monitoring and ensuring that speed limits and commitments are met.
 - The Proponent committed to develop a Transportation Safety Plan prior to construction. The would include the following components:
 - Measures along mine site roads to advise or warn drivers of speed limit changes, corner speeds, road segments with limited visibility, turning vehicles, and other identifiable hazards; measures must be suitable to FLNR and MOTI.
 - Details on how the Proponent will monitor and ensure compliance with speed limits along the entire transportation route and penalties for non-compliance.
 - Details on a zero tolerance drug and alcohol policy and how the Proponent will monitor and ensure compliance by mine employees and contractors.
 - A map of important cultural sites with measures specific to increase human safety at these areas (for example reduced speed limits, increased signage, pull-out areas). This map will be distributed to mine-related vehicle drivers through the Traffic Control Plan.

- Protocols for winter and extreme weather driving, including driving at reduced speeds during low visibility, driving with chains during snow / icy conditions, and no driving during white-out conditions.
- Details on measures to increase visibility along the FSRs, including dust suppression measures and frequency of application, location of pull-overs, and vegetation brushing (in concert with requirements of the Wildlife Corridor Management Plan).
- Development of a Traffic Control Plan to ensure all traffic movements along the transportation route conform to a standard set of rules and guidelines. The Traffic Control Plan will include, but not be limited to:
 - Protocols for a signed road user contract for employees, contractor companies, and independent drivers that drive on the transportation route for the purpose of the proposed Project, which includes successive levels of penalties or consequences for non-compliance;
 - Description of activities along the transportation route, including road map, radio frequency map, signage map, important environmental feature map, important cultural sites and high use area map;
 - Contact information for key personnel and emergencies; and,
 - Protocols for arriving to site (orientation and reporting-in) and leaving site (reporting-out), and recording of traffic movements in-out of site.
- The Proponent committed to a speed limit reduction for mine-related vehicles from 80km/hr to 50 km/hr from kilometre 0-51 of the Nass FSR (Cranberry Connector).
- The Proponent committed to address safety and engineering issues at the intersection of Hwy 37 and the Nass FSR.
- Concerns about potential impacts to wildlife and fish from accidents and malfunctions, in particular spills of process chemicals and fuel into waterways and areas of environmental sensitivity.
 - The Proponent committed to the development of a Transportation Safety Plan, to be completed prior to construction, that would include the following elements:
 - Develop a site map of locations of areas of higher environmental risk in the case of an accident or spill. This map will be distributed to mine-related vehicle drivers through the Traffic Control Plan.
 - Undertake additional survey to assess the transportation routes for heavy-haul traffic, including determination of the limiting dimensions and weight that may be transported along the routes, and effectiveness of existing roadside and bridge barriers along the FSRs.

- Details on how the Proponent will ensure proper training, inspections, and record-keeping procedures for transportation of hazardous materials and wastes.
- Mobile spill response unit and trained Emergency Response Team based at the mine site and outfitted with self-contained collection of spill response materials for rapid deployment to spill sites.
- Based on the assessment of high environmental risk areas where additional forms of barrier protection (such as rails, no-post barriers or wire rail type barriers) is needed along the FSRs, the Proponent commits to implement forms of barrier protection.
- Concerns about monitoring of fatalities of all vertebrates and not just large mammals, with a particular emphasis on impacts to Western toad.
 - The Proponent has committed, in its Wildlife Corridor Management Plan, to address monitoring of large mammals including moose, bear and goat fatalities. As part of the mine site wildlife management plan, the Proponent has committed to identify measures to mitigate impacts to western toad breeding sites and during dispersal from breeding sites.
 - The Proponent has also committed to share information with respect to their traffic schedules and volumes, and wildlife and human accident data, with other project Proponents who are currently undergoing or will during the life of the proposed Project undergo an assessment under the Act and who will be using traffic infrastructure in the same region as the proposed Project.
- Desire for the Proponent to commit to participating in a cross industry strategy or road use plan to examine road options and impacts to wildlife along the Cranberry Connector as well as any future regional cumulative effects assessments or planning exercises that overlap with the Hwy 37 Corridor.
 - The Proponent committed to actively participating in any cross industry or government strategies, planning exercises or studies which address Cranberry Connector road use and/or cumulative effects of the use of the Hwy 37 and 113 corridors.
- Desire to see more coordination for training and operation of spill response stations located along transportation corridors.
 - The Proponent committed to developing a Geographic Response Plan on how to effectively coordinate and provide training and spill response approaches with the MOE and those community members with responsibility for spill response activities. As part of this plan, the Proponent committed to provide remote emergency spill kits at five strategic locations along the transportation route in consultation with the MOE, FLNR, Nisga'a Nation, Gitanyow Nation and Kitsumkalum First Nation.

10.1.4 Residual Effects and Cumulative Effects

Based on the information presented in the Application and the Working Group's consideration of this information, EAO finds there would be adverse residual transportation effects as a result of the proposed Project.

The Application also describes cumulative effects related to increased vehicular traffic of the proposed Project, which would interact in combination with potential transportation effects from past, present, and reasonably foreseeable projects.

The Proponent originally generated possible scenarios which considered traffic generated from the proposed Project in combination with construction and operations traffic of the NTL and the KSM mine projects. The Proponent notes that quantifying the extent of cumulative traffic and access effects is challenging due to the limited traffic data available for "reasonably foreseeable" projects and the uncertainty of the timing of the construction and operations phases of each project. EAO also recognizes that the development of any or all of the proposed mines which would utilize Hwy 37 is dependent upon a wide range of possible factors, ranging from economic conditions to future regulatory review processes.

The Application predicted there may be a short-term cumulative effect during construction related to increased wildlife/vehicle collisions and an increase in the risk of spills, which could result in effects to water, fish, vegetation, humans, and wildlife. It also stated that the potential combination of the proposed Project's year round maintenance of the Nass FSR and the NTL's possible construction of additional access in the Cranberry and Kiteen areas may result in increased third party interest and use (e.g. hunting, fishing, and pine mushroom harvesting) in the areas adjacent to the Nass FSR.

During review of the Application, EAO and members of the Transportation Working Group requested the Proponent to revise their cumulative effects assessment to include other potential projects which could utilize Hwy 37. In response to this concern, the Proponent added additional mine projects and associated traffic in consideration of cumulative effects and presented these at the July 10, 2012 Transportation Working Group meeting. The traffic levels related to the proposed Project combined with potential traffic from foreseeable projects are represented below in Table 17.

Table 17: Traffic Estimates for Hwy 37 from Meziadin Junction-Kitwanga

	Construction	Operations
Kitsault	25	18
Schaft Creek	75	31
Galore Creek	75	31
KSM	100	61
Morrison	0	18
Red Chris	25	15
Kutcho	20	10
TOTAL	320	184

Note: Daily average round trips

The Proponent's assessment was that the cumulative risk of accidents involving humans and wildlife and spills into waterbodies along the transportation route are not expected to increase risk levels substantially.

A summary of mitigation initially proposed for cumulative effects includes:

- The proponent would coordinate and communicate with other projects to exchange information on traffic schedules, volume, and composition, and wildlife and human accident data;
- The proponent would discuss and harmonise accident and spill mitigation with other projects anticipated in the areas to allow for adequate and coordinated responses during spill and accident scenarios;
- The proponent would cooperate and participate in future regional cumulative effects assessment and planning efforts related to traffic along Hwy 37 and 113; and,
- The Proponent must contribute \$100,000 annually to the Fish and Wildlife Branch, at least \$40,000 of which would be used to support a Hwy 37 Assessment and Monitoring Trust, a FLNR initiative to provide a coordinated approach to managing and mitigating the potential cumulative effects to aquatic and wildlife populations along Hwy 37.

EAO concludes that there are cumulative residual adverse effects based on the interaction of the Proponent's mine-related traffic and other traffic on Hwy 37. EAO's analysis of the significance of potential residual effects is as follows:

Table 18: EAO's Significance Analysis for Potential Road Use Effects

Factor	Rationale
Context	<p>Hwy 37 and Hwy 113 are well-used and maintained Provincial Hwys which EAO understands have been designed and engineered to accommodate significant levels of commercial, residential and industrial traffic. These roads are considered to be an adequate standard for road access to the proposed Project without significant upgrades.</p> <p>However, portions of the Nass FSR (aka the Cranberry Connector) and other FSRs are not currently maintained as year-round road corridors and are currently in poor condition and would require upgrades in order to safely accommodate year-round industrial traffic. Portions of the Cranberry Connector have not been used by industrial traffic for a number of years.</p> <p>The Cranberry Connector is currently open to public and other industrial use.</p> <p>Excessive speed, substance abuse, fatigue and poor road conditions are the major causes of collisions between vehicles and wildlife. Many of these issues can be addressed through careful management of mine-related traffic.</p> <p>Many of these issues can be addressed through careful management of mine-related traffic.</p> <p>Portions of the Proponent's proposed travel routes pass through areas of sensitive wildlife habitat. In particular, EAO understands that moose populations in the Nass are at risk and have been declining for a number of years.</p> <p>The Provincial Government has restricted resident and non-resident (i.e. guiding) of moose in the Nass, and therefore the only regulated moose hunting is undertaken by the Nisga'a Nation, who have rights to harvest wildlife (including moose) under the NFA. The area in question also overlaps with the asserted traditional territory of the Gitanyow Nation, who assert an aboriginal right to hunt in this area. While there are no Provincially regulated restrictions on Gitanyow Nation hunting of moose, Gitanyow Nation has informed EAO that under the Gitanyow Ayookxw there are laws relating to requiring Chief's permission to hunt, utilizing all edible portions of</p>

animals and practicing conservation. They have stated that, for the 2012/2013 hunting season the Gitanyow a number of restrictions in place including a quota of 25 bulls and season which will end on January 15. This harvest strategy is being co-implemented with the Province and Conservation Officers who are enforcing the initiative. The Gitanyow Nation have also informed EAO that the Gitksan Nation asserted a right to hunt within the Nass. EAO is not aware of any other First Nations who would be hunting pursuant to an aboriginal right to hunt in this area.

Moose are important to the Nisga'a Nation and the Nisga'a Nation have recently limited their harvest of moose to a very short, bull-only season with numbers which are much lower than their treaty entitlement. Moose are also important to the Gitanyow Nation, who have aboriginal rights to hunt in areas of the transportation route and have recently implemented an initiative to encourage respect and awareness for the moose populations and their traditional customs regarding hunting. The area in question overlaps four Gitanyow *wilp* territories: *wilp* Watakeyetsxw, *wilp* Gamlaxyeltxw, *wilp* Gwaas Hlaam and *wilp* Gwinuu. The Gitanyow Nation also note that any negative effects on moose populations would likely also have social, cultural and health effects on members of the Gitanyow Nation, as moose is readily available source of healthy, low-fat protein.

The Proponent's travel routes also pass through numerous areas of sensitive fish habitat and along important riparian areas. The Cranberry River is considered a very important area for a number of species of salmon and is a significant contributor to salmon populations in the Nass River. The transportation route also traverses the Nass River, one of the most important fish-bearing rivers in the Province, which makes its health critical to the treaty rights of the Nisga'a Nation and the asserted aboriginal rights of other First Nations in BC's Northwest.

EAO understands that proposed Project related traffic will contribute additional incremental traffic volumes ranging from 5.5% during operations on Hwy 37 up to almost 200% of additional incremental traffic on the Nass FSR during constructions.

The NFA includes a reference to extending the Nisga'a Hwy from Nass Camp to Hwy 37. The NFA says "British Columbia will

	<p>consider the extension of the Nisga’a Hwy from Nass Camp to connect with Hwy 37, in accordance with provincial priorities and having regard to British Columbia’s long term goal of completing that extension.” EAO notes that this extension is supported by the NLG.</p> <p>EAO also notes that the Proponent is not the sole user of any of the FSRs or Provincial Hwys although they would assume primary responsibility for maintenance of the Cranberry Connector through the conditions of a permit.</p>
<p>Probability</p>	<p>Air Quality:</p> <ul style="list-style-type: none"> • Air quality is likely to decline along portions of the transportation route due to increased emissions and dust from mine-related traffic. <p>Water quality and environmental health:</p> <ul style="list-style-type: none"> • There is a low probability that accidents and malfunctions (e.g. spills) will result in negative effects to water quality and environmental health in the transportation corridor. <p>Wildlife:</p> <ul style="list-style-type: none"> • There is likely to be negative effects to moose and other wildlife populations along the transportation corridors. <p>Economic:</p> <ul style="list-style-type: none"> • There will likely be either neutral or positive economic effects along the transportation routes. <p>Social:</p> <ul style="list-style-type: none"> • There is a low probability that increased dust, noise or displacement due to additional incremental traffic will have negative effects on users in the transportation corridors. • Any impacts which do occur would likely be only on a seasonable basis and be concentrated in specific areas (e.g. Rosswood, formal recreation sites and informal areas used for recreation (e.g. roadside parking near popular fishing areas). <p>Human health and safety:</p> <ul style="list-style-type: none"> • There is a low probability of accidents and collisions occurring along the transportation route.

<p>Magnitude</p>	<p>Air Quality:</p> <ul style="list-style-type: none"> • While impacts to air quality from dust and vehicle emissions are expected to occur throughout the life the project, given the relatively small number of vehicles, the limited geographic extent of the impacts, and the reversibility of any impacts, it is unlikely that air quality will be degraded over baseline conditions. • There is a very low magnitude of effect on air quality. <p>Water quality and environmental health:</p> <ul style="list-style-type: none"> • The magnitude of an accidents and malfunction (e.g. spills) which occurs along the transportation corridor is subject to uncertainty. Accidents or spills are likely to be very low in magnitude if the spill is small and is does not occur in a sensitive area, where the magnitude can be larger where the spill or accident occurs in a waterway (e.g. river or creek) or a sensitive wetland adjacent to a travel corridor, as water quality impacts may be transferred away from these linear corridors. <p>Wildlife:</p> <ul style="list-style-type: none"> • Mortalities to individual animals are expected along the transportation corridors. For those populations which are not currently red or blue listed (such as black bears) these individual mortalities are likely to be of low magnitude and are not expected to cause impacts to larger regional populations. • The Nass Valley moose population is currently considered at some risk by the Provincial Fish and Wildlife Branch due to declining populations. The Cranberry Connector passes through important winter moose range. During the winter, moose congregate in this area and are particularly sensitive to hunting pressure because they have limited opportunities for escape and for evasion. • Negative effects of increased access to the moose population wintering in the area of the Cranberry Connector are expected because: <ul style="list-style-type: none"> • there is a larger incremental increase in traffic volumes in this area as opposed to other areas of the transportation corridors; • there is a change in the current pattern of use (i.e. the road currently has a low level of maintenance
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	<p>in the summer and has not been plowed in the winter for a number of years).</p> <ul style="list-style-type: none"> Recognizing the decrease in the Nass Valley moose population, the magnitude of effects from mine-related traffic and increased public access through the Cranberry Connector during critical moose wintering is considered moderate. <p>Economic:</p> <ul style="list-style-type: none"> The magnitude of any positive economic impacts from transportation is considered low and would likely accumulate in regional centers such as Terrace and Smithers. <p>Social:</p> <ul style="list-style-type: none"> Considering the fact that the transportation corridors are already used by industrial traffic, the relatively low number of vehicles, and the site specific nature of any impacts, the magnitude of any social effects from dust, noise or displacement due to additional vehicle traffic is considered low. <p>Human health and safety:</p> <ul style="list-style-type: none"> Should a specific accident or collision result in a fatality or serious injury, the individual event itself could be considered extremely high in magnitude. Considering the very low probability of accidents and collisions, the overall magnitude of negative effects is very low.
<p>Geographic Extent</p>	<p>Air Quality:</p> <ul style="list-style-type: none"> Air quality impacts will be limited to linear areas within and adjacent to the transportation corridors. <p>Water quality and environmental health:</p> <ul style="list-style-type: none"> Geographic extent of the impacts or effects from any accidents and malfunctions (e.g. spills) are difficult to quantify as it depends on the parameters of the event. Effects from small spills in terrestrial areas are likely to be very local and limited to those areas directly adjacent to the transportation corridors. However, if a spill occurs in a waterway or a sensitive wetland adjacent to a travel corridor (e.g. Nass River), water quality impacts may be transferred away from these

	<p>linear corridors and potentially greater distances.</p> <p>Wildlife:</p> <ul style="list-style-type: none"> • There is uncertainty regarding the geographic extent of an effect. If individual mortalities are low, the geographic extent of the effect may only be limited to those areas of adjacent to the transportation corridors. Should mortalities increase, or should certain more sensitive individuals (e.g. cow moose) be impacted to a greater degree, regional populations of wildlife (e.g. Nass moose) may be impacted. <p>Economic:</p> <ul style="list-style-type: none"> • Any positive economic impacts from transportation will be sub regional in nature, and would likely be primarily reflected in regional centers such as Terrace and Smithers. <p>Social:</p> <ul style="list-style-type: none"> • Any social impacts caused from increased dust, noise or displacement due to additional vehicle traffic will occur in the transportation corridors themselves or areas directly adjacent to these corridors. • Certain areas, such as Rosswood and formal/informal recreation sites along the routes may also be impacted on a seasonal basis. <p>Human health and safety:</p> <ul style="list-style-type: none"> • Any human health and safety impacts from accidents will occur within the road corridors.
<p>Duration and Frequency</p>	<p>Air Quality:</p> <ul style="list-style-type: none"> • Air quality impacts will be intermittent and frequent during construction and operations and intermittent and infrequent during closure and post-closure. <p>Water quality and environmental health:</p> <ul style="list-style-type: none"> • Any water quality impacts are expected to be extremely infrequent and individual events unpredictable and accidental. • The duration of any effect would be dependent upon the type spill or accident. The strategic placement of spill kits as well as having an approved spill response plan in place should ensure spills are addressed quickly and that lasting effects are minimized or eliminated.

	<p>Wildlife:</p> <ul style="list-style-type: none"> • Direct mortality to wildlife is expected to occur infrequently, with individual events unpredictable and accidental. • Collision risks are highest during the 2 year construction period with larger volumes of vehicle traffic as well as in the winter, when snow banks are highest and wildlife spend more time in lower areas adjacent to road corridors. • Frequency of collisions should decrease during operations when vehicle traffic diminishes to approximately half of construction level traffic numbers and will likely become rare into the closure and post-closure phases. <p>Economic:</p> <ul style="list-style-type: none"> • Any positive economic impacts from transportation will be continuous and frequent during construction and operations and infrequent during closure and post-closure. <p>Social:</p> <ul style="list-style-type: none"> • Any social impacts caused from increased dust, noise or displacement due to additional vehicle traffic will be intermittent and frequent during construction and operations and intermittent and infrequent during closure and post-closure. <p>Human health and safety:</p> <p>Any human health and safety effects from accidents will be extremely infrequent and unpredictable, and would only occur during the life of the proposed Project.</p>
<p>Reversibility</p>	<p>Air Quality:</p> <ul style="list-style-type: none"> • Any air quality impacts which do occur are expected to recover to baseline levels at the end of closure. <p>Water quality and environmental health:</p> <ul style="list-style-type: none"> • Impacts or effects from any accidents and malfunctions (e.g. spills) which do occur will likely be reversible if they are relatively small and have localized effects. However, larger spills with cascading events which would result in a catastrophic impact (e.g. a very large spill which occurs in a very sensitive area at a critical time of year, which impacts a small, sensitive and important population of fish

	<p>e.g. salmon and steelhead) could have effects which will take longer to recover to baseline levels.</p> <p>Wildlife:</p> <ul style="list-style-type: none"> • Mortality to individual animals is not reversible. • Mortality of individual animals whose regional populations are not currently at risk (e.g. black bear) is unlikely to result in an irreversible impact to regional populations. • Over the life of the project, individual moose mortality may result in impacts to regional moose populations which mean that recovery would take an extended period of time and make moose populations more difficult to fully recover. <p>Economic:</p> <ul style="list-style-type: none"> • Any positive economic impacts from transportation are expected to decline over the life of the project, with a peak occurring during operations and gradually declining through operations, closure and post-closure. <p>Social:</p> <ul style="list-style-type: none"> • Any social impacts caused from increased dust, noise or displacement due to additional vehicle traffic are expected to decline over the life of the project, with a peak occurring during operations and gradually declining through operations, closure and post-closure. <p>Human health and safety:</p> <p style="padding-left: 40px;">Any human health and safety impacts from accidents would cease with the end of the proposed Project.</p>
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10.1.5 Conclusion

Considering the above analysis and having regard to the Proponent’s commitments (which would become legally binding as a condition of an EA Certificate), EAO determines that the proposed Project is not likely to have significant adverse effects on social, economic, human health and safety, air quality and water quality and environmental health VCs associated with transportation.

With respect to the Cranberry Connector and the issue of winter road access over the existing road, EAO notes a number of factors which should be considered prior to a finding of adverse effects:

- The Gitanyow Hereditary Chiefs Office note that they are extremely concerned that the additional moose harvest and mortalities from vehicle collisions, resulting

from use of the Cranberry Connector in the winter will make rebuilding the moose population extremely difficult if not impossible. They reference the Gitanyow Lax Yip Land Use Plan as identifying the proposed transportation corridor as important Nass Moose Winter Range and have described that moose are vitally important to their aboriginal rights and their food security. The Gitanyow Nation are also concerned that the use of the Cranberry connector and Hwy 37 for the transportation of materials during the construction / operation of the Kitsault Mine will significantly increase the potential for spills and accidents on land and in waterways, potentially compromising the valuable fish and wildlife resources that the Gitanyow Nation rely upon for their well-being.

- The position of the Gitanyow *wilp* Luuxhon, who feels that allowing the Proponent to use the road is economically beneficial and that the moose conservation issue is larger than a single road user³⁶;
- The fact the road, should the Proponent not be certified to use it, would still be open to other industrial users;
- The position of the NLG, who feel that closing the road in winter, would shift unregulated and illegal hunting elsewhere in the Nass, and result in more vehicles travelling the Nisga'a Hwy, which could have additional safety considerations. The Nisga'a also view the road an alternative access to their communities and an important safety feature and one that is important to facilitate the exercise of Treaty rights as well as to give rise to socio-economic opportunities;
- The Proponent's consideration that, should they not be permitted to use the road from December 1 - April 1, that it will result in additional costs of \$1-2.5 million a year during construction and \$2.7 million a year during operations;
- EAO is also aware that many of the issues relating to the decline and recovery of the Nass moose population, and the potential contribution of road use on the Cranberry Connector and Hwy 37 and very complex and related to a number of issues including illegal and unregulated hunting, land use decisions, habitat loss and alteration and access. EAO notes that use and regulation of the Cranberry Connector but one of these issues and a solution to declining moose populations is outside the scope of one road user to address; and,
- EAO also notes that regulation of FSRs comes under the jurisdiction of the FLNR, who have the statutory authority for managing these roads. Nothing in an

³⁶ EAO notes the asserted territory of *wilp* Luuxhon has a small overlap with the proposed transportation route and none of that is on the "Cranberry Connector"

EA Certificate, should one be issued, is intended to fetter the ability of decision makers to develop more restrictive conditions for road use on the network of FSRs described in the Proponent's Application.

Having considered all these factors, EAO concludes that Ministers should add a Condition, should they issue an EA Certificate for the proposed Project, requiring the Proponent to make an annual contribution of \$100,000 annually payable on April 1 of each year, to the Province of British Columbia, starting with the commencement of construction and ceasing with the commencement of closure. The EAC Holder must enter into a Contribution Agreement or a similar mechanism to the satisfaction of the Ministry of Forests, Lands and Natural Resource Operations which outlines terms of the annual contribution. The funding will be used to support the following two initiatives:

- (a) Efforts to support recovery of the Nass moose population, including, but not limited to education and communication, inventory, monitoring, collection of harvest data, signage and programs to increase knowledge of human interactions with moose; and,
- (b) The Northwest Assessment and Monitoring Trust, a Ministry of Forest, Lands and Natural Resource Operations initiative to provide a coordinated approach to managing and mitigating the potential cumulative effects to aquatic and wildlife populations along Highway 37.

With the addition of this Condition, EAO is satisfied that the proposed Project would not likely result in significant adverse effects to wildlife.

11 Environmental Management Plans

A number of the Proponent's Commitments discussed above related to the establishment of various EMPs. As these would be an important part of the Proponent's strategy for avoiding or mitigating adverse environmental, social, economic, health and heritage effects from the construction, operation and closure of the proposed Project.

The Proponent must develop and implement EMPs prior to construction to provide guidance for both construction and operations on actions and activities to be implemented as required to mitigate potential adverse impacts.

Details on each of the EMPs can be found in the Application (and in addendums to the Application submitted during the review of the Application), they include the following plans. Those plans marked with an asterisk are NOT mandatory under permitting/licensing requirements:

- Air Quality Management;
- Aquatic Resource Management;
- Construction Management Plan;
- Freshwater Resources Management;
- Marine Environment Management;
- Archaeology and Cultural Heritage Resources Management;
- Dust Management Plan;
- Erosion and Sediment Control;
- Vegetation Management Plan;
- Emergency and Spill Response;
- Hazardous Materials Management;
- Hazardous Waste Management;
- Mine Waste Management;
- Noise Management;
- Occupational Health and Safety;
- Reclamation and Closure;
- Recruitment, Training and Employment*;
- Soil Management;
- Solid Waste (Domestic Refuse) Management;
- Transportation and Access Management (mine site)*;
- Transportation Safety Plan*;
- Traffic Control Plan;
- Wildlife Corridor Management Plan*;
- Waste Water Management;
- Tailings and Mine Water Management; and,
- Mine Site Wildlife Management Plan.

The Proponent must submit the EMPs to the appropriate environmental agencies for review and input before work commences. The EMPs are considered preliminary at this time and would be completed in greater detail by the Proponent during the detailed design stage of the proposed Project. Key components of several of the EMPs are included in the Certified Project Description (Appendix 2).

12 PART C – FIRST NATIONS CONSULTATION

12.1 Gitanyow Nation

12.1.1 Gitanyow Nation Occupation and Use of Proposed Project Area

Gitanyow Nation are a Gitksan group of Tsimshian and Athapaskan heritage who speak a dialect of the Nass-Gitksan division of the Tsimshian language family. Historically, Gitanyow Nation were one of seven Gitksan village groups located in the middle Skeena Valley, but much of their territory was in the Nass watershed. Hunting, fishing and harvesting plants were important traditional activities. The Kitwanga valley and the Cranberry River valley were important resource areas used by Gitanyow Nation for fishing, hunting, trapping and harvesting plants. Gitanyow Nation lived in, and utilized various parts of, their territory at different times of the year, moving between the shared tribal winter village at Kitwancool and separate *wilp* hunting and fishing territories in the valleys of Kitwanga, Cranberry, Kiteen, Nass, Kinskuch, Meziadin, Kispiox and elsewhere. At the time of European contact and throughout the 19th century, Kitwancool at the forks of the Kitwanga and Kitwancool Rivers was the Gitanyow Nation winter village.

Gitanyow Nation are comprised of eight *wilps*, each of which asserts its own territories. The Gitanyow Hereditary Chief's Office (GHCO) is the body mandated by most of the *wilps* to negotiate on their behalf. GHCO promotes the involvement of all of the eight *wilps* or *huwilp* in land management.

Figure 21 Gitanyow Nation Asserted Traditional Territory

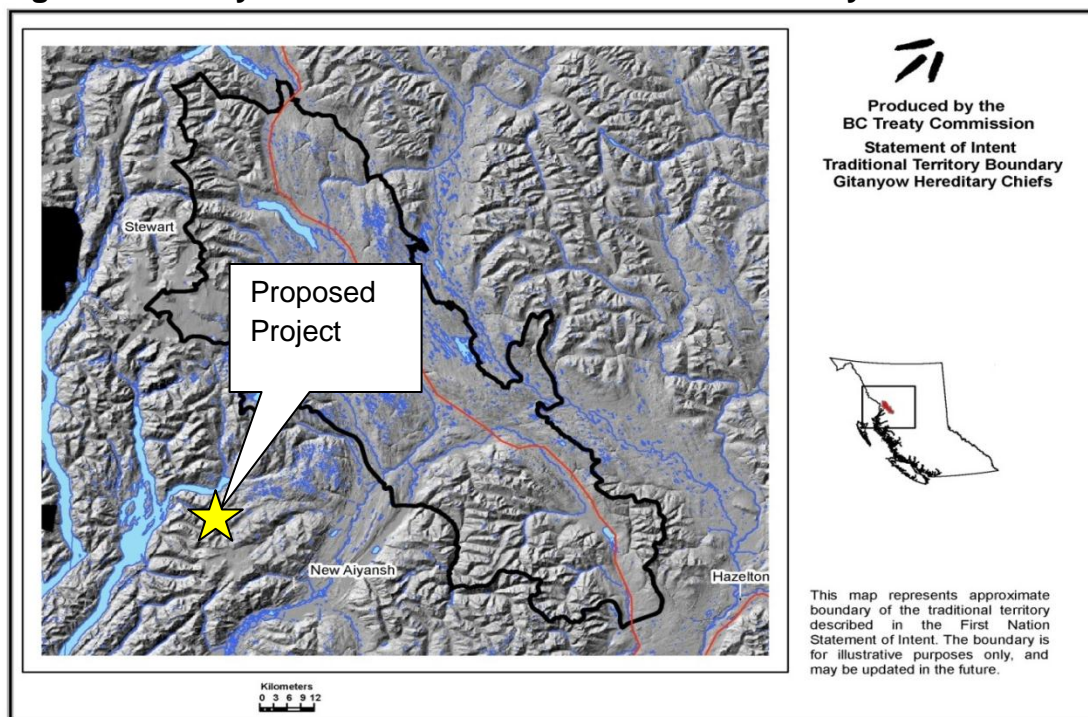
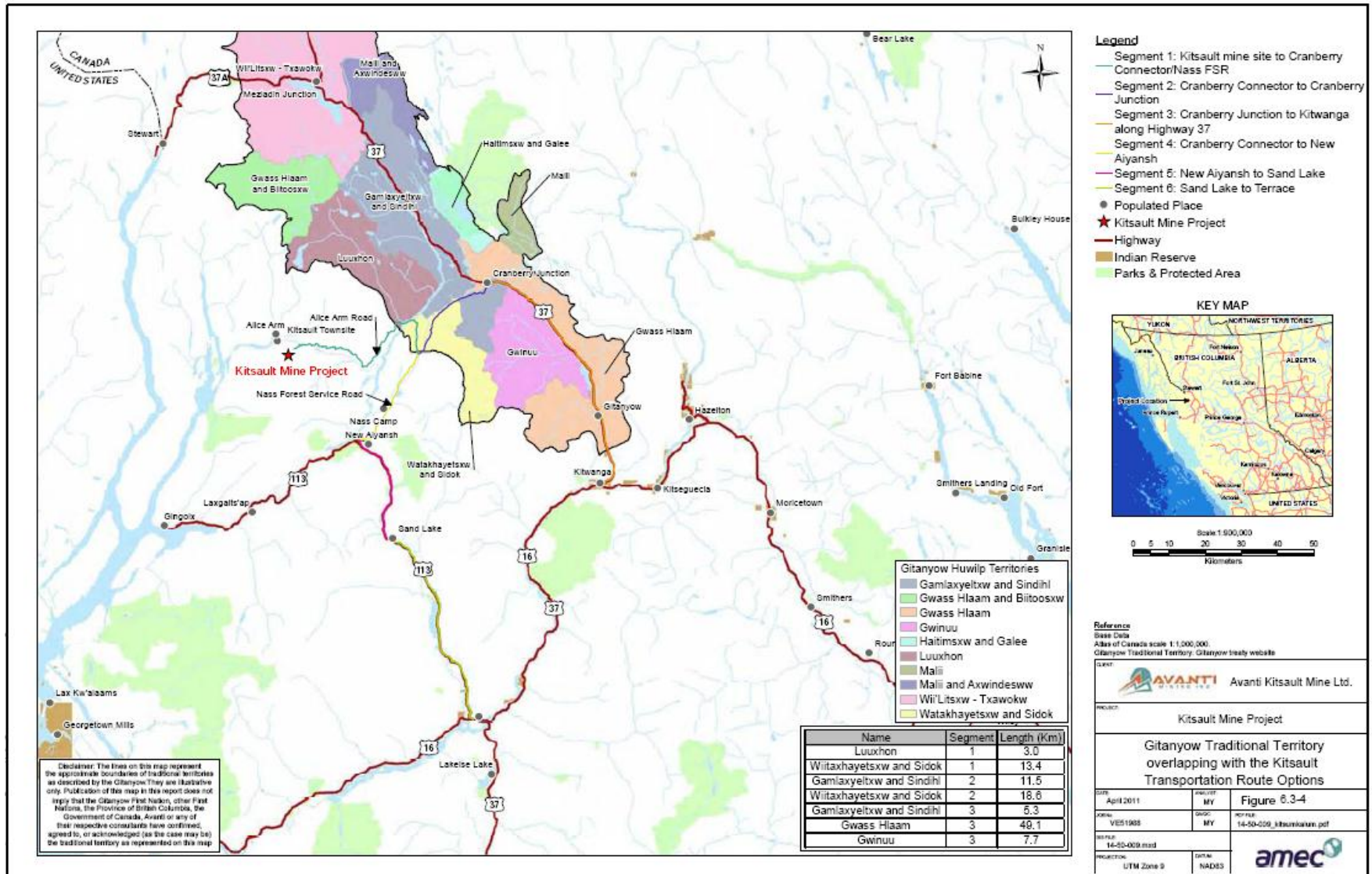


Figure 22 Gitanyow *huwilp* which Overlaps with the Kitsault Transportation Corridor



12.1.2 Gitanyow Nation Traditional Use of the Proposed Project Area

Approximately 108.6 km of the transportation corridor of the proposed Project traverses through three sub-areas of the Gitanyow Nation's asserted territory (Figure 22), including Kitwanga Valley, Cranberry River Valley, part of the lower Kiteen River, and a portion of Nass between Kinskuch and Tchitin Rivers. The transportation corridor goes through approximately 3 km of *wilp* Luuxhon and then through 32 km of *wilp* Watakhayetsxw, 16.8 km of *wilp* Gamlaxyeltxw, 7.7 km of *wilp* Gwinuu, and 49.1 km of *wilp* Gwaas Hlaam.

A review of the provincial ethnographic research, "Gitanyow First Nation: Review of Anthropological and Historical Sources Relating to the Use and Occupation of Land" (December 2008), indicates historical use by Gitanyow Nation throughout this transportation corridor, including harvest of fish, moose, deer and other mammals and the harvest of plants and berries. GHCO have indicated to EAO that the area around the Cranberry Junction, along Hwy 37 and the Cranberry Connector along the Nass FSR are critical moose overwintering habitat and the area supports a significant amount of the moose harvested by Gitanyow Nation. As well, the Cranberry River is an important spawning and rearing habitat, utilized by Gitanyow Nation. Salmon habitat is especially important to Gitanyow Nation, because they rely on salmon and other fish species for sustenance and culture purposes. GHCO informed EAO that the Cranberry Canyon is valued by Gitanyow Nation for the harvest of Chinook, coho and steelhead. GHCO have also indicated that Gitanyow Nation seasonally harvest plants and fungi, including pine mushrooms, of social and economic importance to Gitanyow Nation, along sections of the Nass FSR (including the Cranberry Connector) and Hwy 37 located within the Gitanyow Nation Traditional Territory. The proposed transportation route overlaps with the areas used by Gitanyow Nation to gather berries and harvest pine mushrooms. GHCO also indicated that the Kitwanga Watershed (includes the Kitwanga River) is very important to Gitanyow Nation because it provides salmon, moose and other foods and medicines relied upon for sustenance by Gitanyow Nation. The transportation route parallels the Kitwanga River and associated ecosystem network for 46 km. The Kitwanga River is highly valued for sockeye salmon, harvested by Gitanyow Nation.

12.1.3 Gitanyow Nation Aboriginal Rights (including title)

A consideration of Gitanyow Nation's asserted aboriginal rights and title that may be impacted by the proposed Project, and the transportation route in particular, was approached on the basis of information currently available to the province, including information provided during consultation, and will be based on the guidance the courts have provided regarding how such rights can be established. The strength of the claim to aboriginal rights is assessed on the basis of information indicating where that

First Nation engaged in an activity, practice, tradition or custom, in the area of the proposed government decision, which was integral to its distinctive culture prior to contact with Europeans. The strength of a First Nation's claim to aboriginal title will be assessed on the basis of information regarding definite tracts where that First Nation exclusively occupied the land (e.g. village sites, enclosed or cultivated fields) or where there were specific sites of regular and intensive use in 1846. According to ethnographers, Gitanyow Nation appear to have been hunting and fishing on Cranberry River and Kiteen River during the first half of the 19th century and some may have been living regularly at villages along the Cranberry River. Gitanyow Nation appear to have also been hunting and fishing in the Kitwanga valley, and occupied a winter village at Kitwancool, south of Kitanwancool Lake. These areas are in close proximity to the transportation route for the proposed Project.

It is EAO's assessment, based on current information available, and having regard to the applicable legal test, that the area to the proposed transportation route is an area Gitanyow Nation traditionally used for hunting, fishing and gathering and as such, would support a strong claim to an aboriginal right to hunt, gather, and fish in this area. The information reviewed to date indicates that historically, this area was used seasonally for hunting, gathering and fishing, which supports a strong claim to aboriginal rights to hunt and trap. The information also indicates that portions of the transportation corridor route are in close to moderate proximity to the village sites, including at Kitwancool and some sites along Cranberry River, which would support moderate to strong claims of aboriginal title to those particular portions of the route.

In approaching the assessment of potential impacts to Gitanyow Nation's aboriginal rights and title claims, EAO has focused on the potential adverse effects flowing from the proposed Project. Although cumulative effects related to use of the road and the cumulative risk of vehicle accidents along the transportation corridor is considered, as will be further discussed, EAO did not seek to resolve any outstanding issues in relation to previous decisions related to the road. Given the previous existence of the road, EAO has considered that the transportation component of the proposed Project would have negligible impacts to Gitanyow Nation's claim to aboriginal title. EAO has considered that there is a potential for the transportation component of the proposed Project to impact on hunting and fishing, and have assessed the degree of that impact on Gitanyow Nation's strong claims to aboriginal rights to hunt and fish in the area, to be moderate. On this basis, EAO determined that the scope of the duty to consult with Gitanyow Nation was in the middle portion of the *Haida* spectrum. In EAO's view, the consultation process with Gitanyow Nation, through engagement by the Proponent as well as directly by EAO, adequately fulfills the Crown's duty to consult in these circumstances.

12.1.4 Consultation with Gitanyow Nation

12.1.4.1 Gitanyow Nation involvement with EAO

Gitanyow Nation (via GHCO)

On September 1, 2010, EAO notified Gitanyow Nation, through the *wilp* Wiitaxhayetwx, *wilp* Luuxhon, and GHCO that the EA for the proposed Project had begun. The letter explained the nature of the proposed Project and advised that no new mine infrastructure would be in Gitanyow Nation territory. EAO provided a preliminary assessment of potential impacts on Gitanyow Nation rights and invited Gitanyow Nation to participate in the EA. The GHCO letter advised that EAO intended to consult with two of the eight *wilps* and copy the remaining six *wilps* on the letter. EAO requested feedback on whether the analysis was correct and sought confirmation if GHCO wanted to participate in the EA. EAO further explained that if it did not receive a response, that EAO will only continue to consult the two identified *wilps*.

On December 13, 2010, by letter, GHCO informed EAO that they reviewed the Project Description and determined that the proposed Project would adversely impact four *wilps*. GHCO requested that four *wilps* (Gamlaxyeltxw, Gwass Hlaam, Gwinuu, and Wataxhayetsxw) and GHCO, be included in the section 11 Order.

By way of letter, on March 2, 2011, GHCO reconfirmed that the proposed Project would impact those four *wilps* and again requested that the section 11 Order be amended to include the identified *huwilp* who would potentially be impacted by the proposed Project.

On March 10, 2011, EAO wrote to Gitanyow Nation to communicate that EAO is providing GHCO with a draft section 13 Order for review and comment, amending the section 11 Order, and proposes to continue to consult with Gitanyow Nation, only in relation to the potential impacts of truck transportation of the proposed Project. EAO indicated that its preliminary assessment regarding EAO's duty to consult with GHCO was on the low end of the *Haida* spectrum.

On March 16, 2011, GHCO wrote to EAO stating that they did not agree with EAO's preliminary assessment regarding EAO's duty to consult with GHCO. GHCO provided the distances within each *wilp* that would be traversed by the proposed Project's transportation corridors. GHCO stated that the proposed transportation route traverses prime resource gathering sites and important wildlife habitat areas of the four identified *wilps*, thus; it has the potential to significantly affect the identified Gitanyow *huwilp* lands and resources and the exercise of their aboriginal rights, including title, on those lands for the next 15 years.

GHCO provided detail comments on the draft section 13 Order, requesting revisions related to Gitanyow *huwilp* of Wataxhayetsxw, Gwass Hlaam, Gamlaxyeltxw and Gwinuu.

GHCO also raised the following concerns:

- Particularly concerned about the moose population, which has been in decline for at least the last five years, as moose is an important source of food. The recently completed Gitanyow *huwilp* Socio-Cultural Study showed that over 90 % of Gitanyow *wilp* members rely on their *wilp* territories for food; this is especially true for moose. Extremely concerned about the effects of increased traffic and hunting pressure on the already strained moose populations;
- Human safety concerns due to increased traffic and potential to impede access while hunting and gathering foods, medicinal plants and harvesting mushrooms;
- Downstream effects from an accident along the transportation route; and,
- Cumulative effects of transportation on Hwy 37 and impacts to Gitanyow Nation wildlife, food and medicinal plants and the exercise of aboriginal rights.

On April 1, 2011, EAO wrote to advise GHCO that based on information from GHCO (letter dated March 16, 2011), EAO has revised its preliminary assessment of its duty to consult with Gitanyow Nation at the low end of the *Haida* spectrum and provided the reasons for EAO's preliminary assessment:

- Proposed Project's transportation route options are on existing roads;
- Additional traffic from proposed traffic is minimal in comparison to existing traffic; and,
- Existing roads are regulated and maintained by provincial agencies and policy.

EAO noted that EAO proposes to consult with Gitanyow Nation only in relation to the potential impacts of truck transportation. EAO acknowledged that in Gitanyow Nation's view, Gitanyow Nation's aboriginal right to hunt throughout the Gitanyow Nation territory may be adversely impacted by the truck transportation. In the letter, EAO states that as noted in its earlier letter (dated March 10, 2011), in EAO's preliminary view, it is unlikely that the incremental truck traffic would have a significant adverse impact on Gitanyow Nation's asserted right and is supported by a strong *prima facie* case. In the letter, EAO also responded to points Gitanyow Nation raised in its letter of March 16, 2011, and proposed a meeting to discuss the information provided by GHCO and EAO's approach to consultation with Gitanyow Nation. EAO responded to Gitanyow Nation's proposed changes to the section 13 Order, and stated that EAO will revise the section 13 Order to expand the definition of First Nations to include the individual *wilp*, and reference each of the four *wilps* and GHCO in relevant sections of the section 13 Order. EAO also responded to Gitanyow's concerns on cumulative effects.

On June 6, 2011, by letter to GHCO and the Hereditary Chiefs of five *huwilp*, including *wilp* Luuxhon, EAO provided the final section 13 Order, signed June 3, 2011. The letter outlined the changes included in the section 13 Order, which amended the section 11 Order: now includes GHCO and four *wilps* in definition of First Nations, and deleted sections 27.1 and 27.2 and replaced with revised wording. EAO sought

confirmation of EAO's analysis that the only potential impacts on Gitanyow Nation are related to the transportation route. EAO also advised that specific section of the AIR would consider impacts from the proposed Project site to Hwy 16 and a Transportation Working Group would be formed.

On July 21, 2011, EAO met with representatives of GHCO. At the meeting GHCO expressed the following concerns:

- Cumulative impacts of proposed truck transportation through their territory including the potential to lower moose population levels to a point that would prohibit hunting; and,
- Impacts to moose in critical winter habitat along the Cranberry Connector.

On July 27, 2011, Gitanyow Nation submitted a proposal to EAO for a Road Use Study on Hwy 37 through Gitanyow Nation Territory. The proposed study was intended to examine the effect of a number of proposed new mines in the northwest.

On September 12, 2011, EAO wrote to GHCO regarding several proposed mine projects, and offered "block" capacity funding to GHCO to participate in the Pre-application stage of the EA for these proposed projects, one of which was the proposed Project. EAO requested confirmation if funding should be sent to GHCO on behalf of the *huwilp*.

Prior to the Proponent submitting its Application to EAO for the 30-day screening in December 2011, representatives of Gitanyow Nation, through the Working Group, were invited to participate in the screening evaluation of the Proponent's Application, specifically, the RUEA. The Proponent submitted its Application on December 22, 2012, to members of the Working Group who confirmed they wish to participate in the evaluation, including representatives of Gitanyow Nation.

On January 10, 2012, EAO provided Gitanyow *huwilp* Society (representing GHCO) additional capacity funding to participate in the Application stage of the EA.

On January 23, 2012, EAO met with representatives of GHCO to discuss multiple projects in the EA process, including the proposed Project, regarding the transportation corridors and Road Use Studies. GHCO sought clarification as to the structure and timing of the Proponent's RUEA.

A transportation technical Working Group meeting was held on January 26, 2012, to discuss the adequacy of the Proponent's RUEA. Representatives of Gitanyow Nation attended and raised the following:

- Questioned the accuracy of the data reported regarding wildlife collisions. They appear to be under reported, and the traffic volumes do not relate to wildlife accidents;
- Requested the Proponent collect baseline data along the Cranberry Connector (Nass FSR) for the past three years;

- The RUEA does not present an accurate picture of the present moose population in the Nass area;
- Suggested RCMP be invited to attend the Transportation Working Group to speak to the enforcement of speed limits, given that this is the RCMP's responsibility;
- Concern about the scope of the cumulative effects assessment and the Proponent's prediction of the significance of the potential cumulative effects due to the lack of information and assumptions; and,
- Concern about the RUEA, including missing fisheries information, watersheds/fish resources should be rated by importance, map showing district 10, updated moose data an analysis, incomplete Gitanyow Nation cultural site list, and missing references to statistics.

On February 10, 2012, representatives of Gitanyow Nation submitted comments to EAO on the Proponent's RUEA. Gitanyow Nation's comments included a request that EAO not approve the RUEA until the data gaps are filled and this information be provided, requested by Gitanyow Nation, to enable Gitanyow Nation to effectively determine potential impacts of their aboriginal interests, as outlined in the letter.

On February 21, 2012, EAO wrote to GHCO to advise that the Proponent's Application had been accepted for review, following a determination that it contained the information specified in the AIR. However, the Proponent would be revising the Application to address a number of concerns, and would provide a new, updated Application to EAO for distribution to the Working Group.

Representatives of Gitanyow Nation were notified through the Working Group that the Proponent submitted a revised Application on April 30, 2012, which triggered the commencement of the 180-day Application review. EAO invited Gitanyow Nation through the Transportation Working Group to comment on the Application, specifically, related to the RUEA.

On June 4, 2012, on behalf of Gitanyow Nation, GHCO provided EAO with comments on the final RUEA for the proposed Project, including that the Proponent had not correctly evaluated the potential effects of the proposed Project on the environment, not recommended adequate mitigation measures to protect values of importance to Gitanyow Nation, and that the cumulative effects assessment was weak.

On June 13, 2012, GHCO wrote to EAO and CEA Agency following up from the June 5, 2012 meeting in Smithers, and outlined significant Gitanyow Nation concerns regarding the transportation through the Gitanyow Nation Territory, identifying potential mitigation strategies to mitigate effects on moose and other critical environmental values and laid out Gitanyow Nation's concerns over the Proponent's inadequate cumulative effects assessment. GHCO requested a meeting to discuss these issues.

Transportation technical Working Group meetings were held on June 5, 2012, and July 10, 2012. Representatives of Gitanyow Nation attended these meetings and raised the following:

- Noted the importance of brushing combined with vegetation management along roadsides/highways as a mitigation measure;
- Asked for cost estimate if the Proponent did not use the Cranberry Connector (Nass FSR) for transportation in the winter;
- Advised that the Proponent not use the Cranberry Connector (0-30 km) while moose are overwintering in the area because moose are very vulnerable to over harvest and vehicle collision, concentrated in these high valued wintering areas;
- Would like to see increased enforcement by Conservation Officers in the Nass Area;
- Concerned about cumulative effects of traffic from all mine projects and activities on moose populations due to wildlife-vehicle collisions, specifically low moose population numbers. Concerned that the cumulative effect assessment for the proposed Project was not comprehensive in considering known projects (such as Morrison Mine and Shaft Creek) and all the activities that could impact a VC;
- Suggested that the Proponent pinpoint the problem areas on access/transportation routes specifically where wildlife may be impacted;
- Wants to see greater level of detail in proposed mitigation measures. Noted the following mitigation measures: speed, fencing (shown to reduce moose – vehicle collisions by 80 %), vegetation management (clearing, increase visibility, brushing) along roadsides, diversionary trails and feeding (clear trails away from Hwy, leave feed at end of trail to lure moose away from problem areas on Hwys to give them better access to areas). Noted that there should be joint responsibility for mitigation measures for cumulative effects from transportation from large projects (MOTI, Proponents). Also noted: an example in Alaska, where trails were cleared away from Hwys and feed placed at the end of the trails to attract moose and lure moose away from Hwys;
- Stated Gitanyow Nation have the right to hunt moose, and if the moose population further declines then there would be less moose available to Gitanyow Nation, to practice their right to hunt/harvest moose;
- Stated Gitanyow Nation had wildlife monitors out in their territory for four months this winter collecting wildlife data, and this data is very useful. Proponents could contribute funding to this program (operate through FLNR);
- Gitanyow Nation committed to work with the Proponent to provide further detailed fisheries information and identifying important areas and measures to mitigate impacts. Suggested guardrails or other protective devices be placed along certain locations along Cranberry River to protect areas with high fish value and sensitive habitats; and,

- Stated concerns with potential accidents and malfunctions, noting that response teams are located in southern BC; far away from the proposed Project area. Suggested a mitigation measure; to train First Nation members in spill response who would be more able to respond, as members, located in close proximity to the proposed Project site, would be able to respond more quickly. Also, to limit the transportation of dangerous goods to certain times, including during bad winter conditions.

On July 27, 2012, GHCO submitted “A Preliminary Survey of Aquatic Ecosystems on Gitanyow Territory for Contamination Risk due to Commercial Vehicle Accidents Relating to the Proposed Kitsault Avanti Mine” to the Proponent, EAO, and CEA Agency in response to the request for Gitanyow Nation provide a list and a map showing the locations of key aquatic systems requiring additional protection. Gitanyow Nation biologists conducted a detailed survey of the entire Kitsault route (found within Gitanyow Territory), and were accompanied by the Proponent (mine site manager). Based on the survey, Gitanyow Nation provided detailed recommendations in order to help safe guard important fisheries habitats within the Cranberry and Kitwanga Watersheds.

By letter to EAO on August 20, 2012, GHCO commented on the recent discussions at Transportation Working Group meetings regarding the mitigation measures and options to reduce potential for impacts to wildlife and fish. The letter included a synopsis of main issues raised and potential Proponent’s commitments, as well as an agreement to meet with EAO.

On September 3, 2012, GCHO wrote to EAO to comment on the Proponent’s response to Gitanyow Nation’s concerns, dated July 31, 2012. GHCO’s comments included:

- Rebuilding moose populations requires a holistic approach that involves drastically reducing the harvest of cow moose, decreasing the number of road killed moose and managing predators and moose habitat;
- Conditions proposed by the Proponent are inadequate to mitigate impacts to moose, moose populations and aquatic resources;
- The Proponent does not believe that collecting more accurate baseline data pre-project is warranted; EAO and other companies are willing to contribute funding towards collecting baseline traffic data; concerns about funding will be spent on traffic only. Gitanyow Nation believes it makes sense to collect actual wildlife sightings and road kill data prior to construction; and,
- GHCO proposed a number of conditions:
 - Closure of Nass FSR from December to March until moose population levels increase;
 - Adaptively manage access to the Nass FSR;

- Long term funding for enforcement, monitoring and education for the Conservation Officer Service;
- Long term funding for the Gitanyow Wildlife Program;
- Funding for permanent structure/accommodation along the Nass FSR for provincial and Gitanyow Nation staff presence year round; and,
- Additional protection for aquatic resources.

A representative of Gitanyow Nation attended the October 11, 2012 Transportation Working Group meeting, and raised the following issues:

- The Proponent should provide more detail on spill response in the draft Certified Project Description;
- Prefer the consistent use of 'consult' in Table of Conditions and Certified Project Description;
- Seeking commitment from Proponent to provide funding to First Nations to help develop various plans (e.g. wildlife management plan, traffic safety plan, etc.);
- The Proponent's commitment to provide \$150,000 funding per year for the first three years of the proposed Project for enforcement, will not be enough to mitigate impact to moose if the Proponent is using the Cranberry Connector open during the winter; and,
- Suggested a trust fund be set up for moose conservation and that an inclusive Nass wildlife committee be formed and to meet twice yearly to establish funding priorities.

By way of a letter, October 21, 2012, GHCO wrote to EAO in response to NLG's position that NLG strongly oppose FLNR proposal (letter dated October 3, 2012 to EAO) to close the Cranberry Connector from December 1 to March 30 to mitigate impacts of the proposed Project on declining moose populations.

On October 22, 2012, GHCO submitted comments to EAO on the Proponent's draft Certified Project Description and their responses to comments on the Transportation Issues Memorandum and covering letter September 28, 2012. GHCO reiterated their concerns and interests related to the proposed Project that, in GHCO's view, have not been addressed or accommodated by the Proponent. Gitanyow Nation summarized their comments on their concerns, on the three documents, as follows:

- Human safety, spill response, the collection of baseline information on wildlife and current traffic levels and the use of the Nass FSR, between 0-31 km during the winter months;
- Reiterated concerns about the status of the moose population; it is extremely depressed;
- The proposed Project will further impact Gitanyow Nation rights to harvest moose through additional pressures on already depressed moose through accidental

mortalities related to increased mine traffic along Nass FSR and Hwy 37, by keeping the Cranberry Connector open during the winter and creating a circle route through prime moose wintering habitat;

- Gitanyow Nation have noted on numerous occasions, the Nass FSR between 0-31 km is an extremely important overwintering area that requires protection, Proponent's proposed mitigation does not address moose mortality;
- Recommended that EAO recommend to the Ministers to either reject the proposed Project and not issue an EA Certificate, or impose conditions after proper consultation, mutually agree to accommodate Gitanyow Nation's concerns;
- Suggested solutions to mitigate impacts, such as locating pullouts at key Gitanyow Nation traditional land use areas, to access resources;
- In Gitanyow Nation's view, the Proponent fails to meaningfully address Gitanyow Nation's concerns and the lack of effective mitigation to protect Gitanyow Nation's rights and title; and,
- Requested a meeting with EAO.

EAO and CEA Agency met with representatives of Gitanyow Nation and GHCO on November 7, 2012, to discuss potential recommendations and findings on the proposed Project. Gitanyow Nation raised the following:

- Concerned with the impact on moose if the Cranberry Connector were used/open during the winter. Stated Gitanyow Nation would like to see the road closed between December and April;
- GHCO explained *wilp* Watakhayetsxw and *wilp* Gamlakyeltxw have established a strong *prima facie* claim for aboriginal title in this area and referenced several court cases and reference documents;
- Noted that the transportation route only crosses 3 km of *wilp* Luuxhon's territory and is north of the Nass River, therefore, their position should not be a factor in the decision to close the Nass FSR, 0-31 km during the winter, as proposed;
- Requested stronger commitments for spill responses and that there be trained spill response personnel on Hwy 37, having a team only at the mine site is inadequate; spill response proposed for the proposed Project is inadequate; condition should specify the locations of spill kits along the transportation corridor; and,
- Proponent's commitment to contribute \$150,000 per year for three years to Conservation Officers for enforcement is not enough to mitigate impact to moose; would like to see the Proponent make a significant contribution for the life of the proposed Project.

By email on November 9, 2012, GHCO wrote to EAO to respond to *wilp* Luuxhon's letter to EAO, dated October 29, 2012, to address the issues raised by *wilp* Luuxhon about impacts to the moose population, and to comment on *wilp* Luuxhon's position, that it

does not believe that closing the Cranberry Connector (Nass FSR) during the winter would mitigate the impacts of the proposed Project on the declining moose population.

Gitanyow Nation was provided with the opportunity to comment on the transportation section of EAO's draft Assessment Report on November 19, 2012. Gitanyow Nation participated in a meeting of the Transportation Working Group on November 27, 2012. Main comments included:

- Concerns about impact to moose population and conservation;
- Commented that Gitanyow Nation would be willing to forego the moose harvest if the need for extreme conservation is warranted, and a permitting system for harvesting of moose for Gitanyow Nation members has been in place since 2011, and are working with conservation officers to enforce laws relating to moose management;
- Gitanyow Nation does not agree with EAO's conclusions that there will be no adverse effects on moose from transportation related to the proposed Project; and,
- Asked how issues related to Hwy 37 will be addressed.

On November 26, 2012, GHCO wrote to EAO to express their disagreement with EAO's conclusion that the proposed Project would not likely result in significant adverse effects to wildlife, providing the Proponent commit to an annual contribution of \$15,000 for the life of the proposed Project to the fish and wildlife branch of the FLNR for moose conservation. Gitanyow Nation stated that it would prepare a report outlining their concerns and the lack of appropriate mitigation measures to address negative impacts on Gitanyow Nation rights and the asserted title of the four *wilp*. Gitanyow Nation also commented on EAO's practice of determining which documents related to the proposed Project get posted to EAO's website.

EAO met with Gitanyow Nation on November 28, 2012, to discuss the draft Transportation section of the Assessment Report and EAO's findings. The main comments received included concerns with how EAO had characterized Gitanyow Nation interests raised during the EA, as well as how EAO had characterized the interests of other participants. In addition, the main concerns expressed by Gitanyow Nation related to the Proponent's use of the Cranberry Connector (Nass FSR) in winter and the effectiveness of the mitigation being proposed by the Proponent.

On December 4, 2012, Gitanyow Nation was provided with the opportunity to comment on a draft of this Consultation Report and EAO requested comments by December 21, 2012. EAO extended the deadline to submit comments on the transportation section of EAO's draft Assessment Report, draft Table of Conditions and sections of the draft Certified Project Description related to transportation, from December 7, 2012, to December 21, 2012.

On December 21, 2012, Gitanyow Nation submitted comments on the transportation section of EAO's draft Assessment Report, draft Gitanyow Nation's Consultation Report, and draft Table of Conditions and sections of the Certified Project Description related to the transportation corridor of the proposed Project.

On February 1, 2013, EAO met with Gitanyow Nation and representatives of FLNR to discuss the condition in which the Proponent will provide \$100,000 annually to support recovery of the Nass moose population, and a Hwy 37 Assessment and Monitoring Trust. This condition addresses concerns raised by Gitanyow Nation about potential impacts to the Nass moose and cumulative effects.

On February 5, 2013, Gitanyow Nation wrote to EAO expressing Gitanyow Nation's continuing concerns related to the proposed Project, including impacts of the proposed Project on the exercise of Gitanyow Nation's aboriginal rights and title. In the letter, Gitanyow Nation noted that Gitanyow Nation met with Ministry of Aboriginal Relations and Reconciliation and FLNR on January 15, 2013, in an attempt to address some of the impacts of the proposed Project, specifically on moose. Gitanyow Nation also noted that based on a letter dated January 23, 2013 from FLNR which provides recommendations and email correspondence with EAO on February 1, 2013, regarding a condition to address potential impacts to moose, there seems to be confusion on who has the authority to protect moose. Gitanyow Nation raised concerns about the Proponent's commitment to annually provide \$100,000 to FLNR to support the recovery of the Nass moose population and the Hwy 37 Assessment and Monitoring Trust.

On February 8, 2013, EAO responded to Gitanyow Nation's comments on the transportation section of EAO's Assessment Report, Table of Conditions and Certified Project Description, and Consultation Report, and explained how EAO had considered and addressed Gitanyow Nation's comments.

***Wilp* Luuxhon**

Pre-Application Review

On September 1, 2010, EAO notified Gitanyow Nation, through *wilp* Wiitaxhayetwx, *wilp* Luuxhon, and GHCO that the EA for the proposed Project had begun.

On October 20, 2010, representatives of *wilp* Luuxhon met with EAO to discuss the proposed Project and the provincial EA process. *Wilp* Luuxhon raised the following;

- Potential impact of the proposed Project on bears, summer fishing grounds on the Nass River, and fall mushroom harvesters; and,
- Would like to be apprised of the proposed Project milestones, including an invitation to open houses to meet the Proponent and ask questions.

On March 10, 2011, EAO wrote to *wilp* Luuxhon to communicate that EAO proposes to consult with Gitanyow Nation only in relation to the potential impacts to the land

transportation route of the proposed Project. EAO indicated that would amend the section 11 Order under a section 13 Order to add references to *wilp* Luuxhon, and invited *wilp* Luuxhon to comment on the section 13 Order before EAO issued the Order.

On June 6, 2011, by letter to GHCO and the Hereditary Chiefs of five *huwilp*, including *wilp* Luuxhon, EAO provided the final section 13 Order and sought confirmation of EAO's analysis that the only potential impacts on Gitanyow Nation are related to the transportation route. EAO also advised that specific section of the AIR would consider impacts from the proposed Project site to Hwy 16 and a Transportation Working Group would be formed and invited *wilp* Luuxhon to participate in the Transportation Working Group.

During a meeting on July 21, 2011, with Gitanyow Nation, EAO, CEA Agency, representatives of Gitanyow Nation, GHCO and *wilp* Watakhayetsw, GHCO confirmed it administers funding to the *huwilp*, with the exception of *wilp* Luuxhon and that GHCO did not speak for *wilp* Luuxhon.

On September 13, 2011, EAO provided *wilp* Luuxhon separate capacity funding to participate in the pre-Application stage of the EA.

Prior to the Proponent submitting its Application to EAO for the 30-day screening in December 2011, representatives of Gitanyow Nation (both GHCO and *wilp* Luuxhon) through the Working Group, were invited to participate in the screening evaluation of the Proponent's Application, specifically, the RUEA. The Proponent submitted its Application on December 22, 2012 to members of the Working Group who confirmed they wish to participate in the evaluation, including representatives of Gitanyow Nation. Representatives of *wilp* Luuxhon did not comment on the evaluation of the Application.

On January 10, 2012, EAO provided *wilp* Luuxhon additional capacity funding to participate in the Application stage of the EA.

A Transportation technical Working Group meeting was held on January 26, 2012. Representatives of *wilp* Luuxhon attended and raised the following:

- Concern about the cumulative effects with the proposed Project and NTL Project;
- Map of Gitanyow Nation territories is inaccurate in the RUEA; and,
- Information on land use plans should be included in the EA.

On February 21, 2012, EAO wrote to *wilp* Luuxhon to advise that the Proponent's Application had been accepted for review, following a determination that it contained the information specified in the AIR.

Application Review

Representatives of *wilp* Luuxhon were notified through the Working Group that the Proponent submitted a revised Application on April 30, 2012, which triggered the

commencement of the 180-day Application review. EAO invited *wilp* Luuxhon, through the Transportation Working Group, to comment on the Application, specifically, related to the RUEA.

During the Application review stage of the EA, *wilp* Luuxhon was provided with the opportunity to comment on various key documents related to the proposed Project associated with the transportation routes. EAO did not receive written comments on these key documents.

Transportation Working Group meetings were held on June 5, 2012, July 10, 2012, and October 11, 2012, representatives of *wilp* Luuxhon did not attend.

On October 29, 2012, *wilp* Luuxhon wrote to inform EAO that *wilp* Luuxhon does not support FLNR's proposal to close the Cranberry Connector (Nass FSR) from December to April. *Wilp* Luuxhon commented that it shares the same concern about the status and decline of the Nass moose population, and instead of a short term solution, *wilp* Luuxhon would like to see the Province support long term solutions such as monitoring, enforcement and education. Further, closing the Cranberry Connector would be detrimental to *wilp* Luuxhon's current and future economic opportunities. *Wilp* Luuxhon supports a condition that the Proponent provide funding for monitoring, enforcement and education to mitigate and conserve the moose population.

On November 19, 2012, *wilp* Luuxhon was provided with the opportunity to comment on the transportation section of EAO's draft Assessment Report, draft Table of Conditions and sections of the draft Certified Project Description related to transportation. EAO requested comments by December 7, 2012.

Wilp Luuxhon attended the Working Group meeting on November 27, 2012. The main comment was an expression of support to allow the Proponent to use the Cranberry Connector (Nass FSR) in winter.

On December 4, 2012, *wilp* Luuxhon was provided with the opportunity to comment on a draft of this Consultation Report and EAO requested comments by December 21, 2012. EAO extended the deadline to submit comments on the transportation section of EAO's draft Assessment Report, draft Table of Conditions and sections of the draft Certified Project Description related to transportation, to December 21, 2012. *Wilp* Luuxhon did not submit comments.

On February 8, 2013, EAO provided *wilp* Luuxhon with the final version of EAO's Assessment Report, Gitanyow Nation Consultation Report, Table of Conditions, and the Certified Project Description, for information.

12.1.4.2 Gitanyow Nation involvement with Proponent

On June 3, 2011, a section 13 Order was issued to amend the section 11 Order, defining "First Nations" as the Metlakatla First Nation, Kitsumkalum and

Kitselas First Nations, Gitxsan Chiefs' Office (GCO), GHCO, *wilp* Luuxhon, *wilp* Watakhayetsxw, *wilp* Gamlaxyeltxw, *wilp* Gwass Hlaam and *wilp* Gwinuu.

On June 22, 2011, the Proponent wrote a letter to GHCO to provide an overview of the road use impact assessment study and the EA process. In the letter the Proponent expressed a desire to present: information about the proposed Project and that the Proponent is committed to high social and environmental standards; describe employment and business opportunities; and, to hear Gitanyow Nation's interests and concerns about the proposed Project.

In response, GHCO wrote to the Proponent on June 28, 2011, stating that GHCO had reviewed the Project Description and determined that the proposed Project has the potential to impact the rights of the four *wilps*, provided a preliminary description of potential effects on each of the four *wilps'* territories and identified studies which should be conducted to address the effects; questioned why Gitanyow Nation had not been provided with a copy of the work plan for the road use study; submitted a work plan and budget for review; and, provided a copy of Gitanyow Nation's planned Road Assessment.

On July 19, 2011, the Proponent and GHCO met to discuss the Gitanyow Nation work plan and budget; Kitsault Mine work plan and draft Transportation Study; and, the development of a Letter of Understanding between GHCO, including potential impacts and development of mitigation measures, training and development, and other topics as they arise during the EA process.

In response to GHCO's concerns regarding the impact of moose and winter access along the Cranberry Connector, the Proponent responded by letter on July 20, 2012.

On July 20, 2012, Gitanyow Nation and the Proponent drove the transportation route to identify and document where barriers or other protective measures should be installed along sensitive aquatic ecosystems. Gitanyow Nation provided the Proponent with a written report of the results of the survey on July 27, 2012.

On July 31, 2012, the Proponent responded to Gitanyow Nation's comments regarding the transportation component of the proposed Project, through a technical memorandum.

On September 3, 2012, Gitanyow Nation provided comments on the Proponent's memorandum, dated July 31, 2012. See section 12.1.4.1 of this Consultation Report for details.

On September 28, 2012, the Proponent responded to additional comments provided by Gitanyow Nation, including responses to Gitanyow Nation's comments on the transportation section of the draft Certified Project Description and Table of Conditions.

12.1.5 Potential Impacts to Gitanyow Nation Interests and Measures to Mitigate or Accommodate Impacts

Section 12.1.4.1 above describes EAO's understanding of the issues that have been identified by Gitanyow Nation during the EA for the proposed Project.

Responses to the full set of concerns are described in the Issues Tracking Table (Appendix 1). Further information on how concerns have been addressed, including mitigation and Proponent commitments, is provided in the relevant sections of the Assessment Report. The majority of Gitanyow Nation issues relate to transportation (section 10 of the Assessment Report). In terms of matching specific concerns with corresponding mitigation measures, the reader is directed to those documents. The following is intended only to be a summary of the major issues raised and accommodations of those issues:

Impact to wildlife, focus on impacts to moose

- Plowing of snow can trap moose on the transportation route and result in an increased risk of moose-vehicle collisions.
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include snow removal that will include pullouts for wildlife escape routes at key locations along the FSRs. The design, location and frequency of the pullouts will be set in consultation with FLNR and Gitanyow Nation and consider best available scientific research.
- Vegetation along road right-of-ways can hide animals foraging along road verges, decrease vehicle driver line of sight and driver ability to react to animals along the road. Suggestion that vegetation be cleared along the FSRs right-of-way in manner that ensures line-of-sight for vehicles to see wildlife and ensures limited wildlife attraction.
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include inspecting the FSRs for reduced visibility and in areas where line-of-sight need improvements, vegetation brushing will be implemented to improve wildlife visibility. Brushing widths, frequency, and riparian set-backs will be set in consultation with FLNR and Gitanyow Nation and will consider best available scientific research.
- High wildlife use areas require identification and increased mitigation measures to minimize potential collisions with vehicles.
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include development of a map of the transportation route of important environmental features and sensitive moose habitats with measures specific to reduce disturbance to these areas (for example reduced speed limits, increased signage,

increased vegetation brushing widths and snow plow escape routes). This map will be distributed to mine-related vehicle drivers through the Traffic Control Plan (a component of the Transportation Safety Plan).

- The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include placement of wildlife signage along the FSRs in areas of potential wildlife collisions with emphasis on high moose areas. The design and placement of signage will be set in consultation with FLNR and Gitanyow Nation.
- The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which will include identification of sections of the FSRs where areas of potential or realized large mammal-vehicle collisions occur and speed reductions of mine-related traffic adjusted accordingly (based on time of season, time of day and/or location).
- The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which would include development of protocols for reduced vehicle movement during dawn and dusk periods, and convoys (a component of the Traffic Control Plan).
- The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which would include a Large Mammal Monitoring and Reporting Program³⁷. Components of this plan will include:
 - Procedures for contractor initiation and training;
 - Protocols for a signed agreement with contractor companies, independent drivers, and mine employee drivers that includes successive levels of penalties or consequences for non-compliance;
 - Equipping identified mine-related vehicles with a GPS wildlife recording device;
 - Procedures for recording and reporting of large mammal-vehicle near miss, injury or mortality, and observations of dead large mammals;
 - Data reporting protocols and specific radio communication protocols for distributing information on large mammal observations and incidents;
 - Assessment and reporting of results to identify high potential areas (location, time of day, season) for large mammal-vehicle collisions; and,

³⁷ Large mammal means moose, bear, and goat.

- Compliance monitoring, including periodic audits for conformance and to assess the effectiveness of the program and identify opportunities for improvements.
- The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction which would include protocols and procedures for immediately reporting moose kills to Conservation Officers, FLNR, MOTI and First Nations, including Gitanyow Nation.

Proponent's use of Cranberry Connector

- Maintaining and plowing the Cranberry Connector during winter can allow hunter access to an area with high quality moose winter range along the road, increasing unregulated and illegal hunting and putting the moose population further at risk.
 - The Proponent committed to developing a Wildlife Corridor Management Plan before the start of construction. Parts of the Plan will include:
 - No hunting and fishing policy for all employees and contractors while working directly or indirectly for the proposed Project;
 - Observe/Record/Report Program developed in consultation with regional Conservation Officers;
 - Employee Education and Environmental Awareness Program, with emphasis on:
 - Transportation route use and operating protocols and wildlife concerns, which includes communication on areas of high moose risk, moose population and overharvesting concerns, and mitigation measures and strategies to minimize transportation effects on moose.
 - Wildlife observation and interaction reporting, including communication on the Large Mammal Monitoring and Reporting Program.
 - The Proponent has committed to provide \$100,000 annually, payable on April 1 of each year, to the Province of British Columbia, starting with the commencement of construction and ceasing with the commencement of closure. The EAC Holder must enter into a Contribution Agreement or a similar mechanism to the satisfaction of the Ministry of Forests, Lands and Natural Resource Operations which outlines terms of the annual contribution. The funding will be used to support the following two initiatives:
 - (a) Efforts to support recovery of the Nass moose population, including, but not limited to education and communication, inventory, monitoring, collection of

harvest data, signage and programs to increase knowledge of human interactions with moose; and,

- (b) The Northwest Assessment and Monitoring Trust, a Ministry of Forest, Lands and Natural Resource Operations initiative to provide a coordinated approach to managing and mitigating the potential cumulative effects to aquatic and wildlife populations along Highway 37.

Accidental Spills

- Gitanyow Nation expressed concerns about potential impacts to wildlife and fish from accidents and malfunctions, in particular spills of process chemicals and fuel into waterways and areas of environmental sensitivity.
 - The Proponent committed to the development of a Transportation Safety Plan, to be completed prior to construction, that would include the following elements:
 - Develop a site map of locations of areas of higher environmental risk in the case of an accident or spill. This map will be distributed to mine-related vehicle drivers through the Traffic Control Plan.
 - Undertake additional surveys to assess the transportation routes for heavy-haul traffic, including determination of the limiting dimensions and weight that may be transported along the routes, and effectiveness of existing roadside and bridge barriers along the FSRs.
 - Further consideration and assessment of high environmental risk areas where additional forms of barrier protection (such as rails, no-post barriers or wire rail type barriers) is needed along the FSRs and implement, to the approval of FLNR, in consultation with Gitanyow Nation.
 - Details on how the Proponent will ensure proper training, inspections, and record-keeping procedures for transportation of hazardous materials and wastes.
 - Mobile spill response unit and trained Emergency Response Team based at the mine site and outfitted with self-contained collection of spill response materials for rapid deployment to spill sites.
- Gitanyow Nation asked to see more coordination for training and operation of spill response stations located along transportation corridors in particular not just the mine site.
 - The Proponent committed to develop a Geographic Response Plan which describes how it will effectively coordinate and provide training and hazardous material spill response approaches with the MOE and those

community members with responsibility for hazardous material spill response activities along the transportation routes.

Cumulative Effects

- Gitanyow Nation expressed concerns about the cumulative risk of vehicle accidents involving wildlife and potential spills into water bodies along the transportation corridor and the potential to affect fish.
 - The Proponent would coordinate and communicate with other projects to exchange information on traffic schedules, volume, and composition, and wildlife and human accident data.
 - The Proponent would discuss and harmonise accident and spill mitigation with other projects anticipated in the areas to allow for adequate and coordinated responses during spill and accident scenarios.
 - The Proponent would cooperate and participate in future regional cumulative effects assessment and planning efforts related to traffic along Hwy 37 and 113.

12.1.6 Conclusions Regarding Gitanyow Nation

In view of the consultation that has taken place with Gitanyow Nation, including *wilp* Luuxhon, EAO concludes that:

- The process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns expressed by Gitanyow Nation;
- The process of consultation was appropriate and reasonable in the circumstances;
- EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Gitanyow Nation, including *wilp* Luuxhon, asserted aboriginal rights and title (and by way of both draft and final copies of this Report, it is communicating its findings to Gitanyow Nation); and,
- Measures that would effectively avoid and mitigate impacts to the potential impacts to Gitanyow Nation's asserted aboriginal rights to hunt and fish have been meaningfully discussed with Gitanyow Nation.

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Gitanyow Nation, including *wilp* Luuxhon, EAO concludes that the Crown's duty to consult and appropriately accommodate the potential impacts of the proposed Project on Gitanyow Nation's (including *wilp* Luuxhon) asserted aboriginal rights and title has been adequately fulfilled.

12.2 Gitxsan Nation

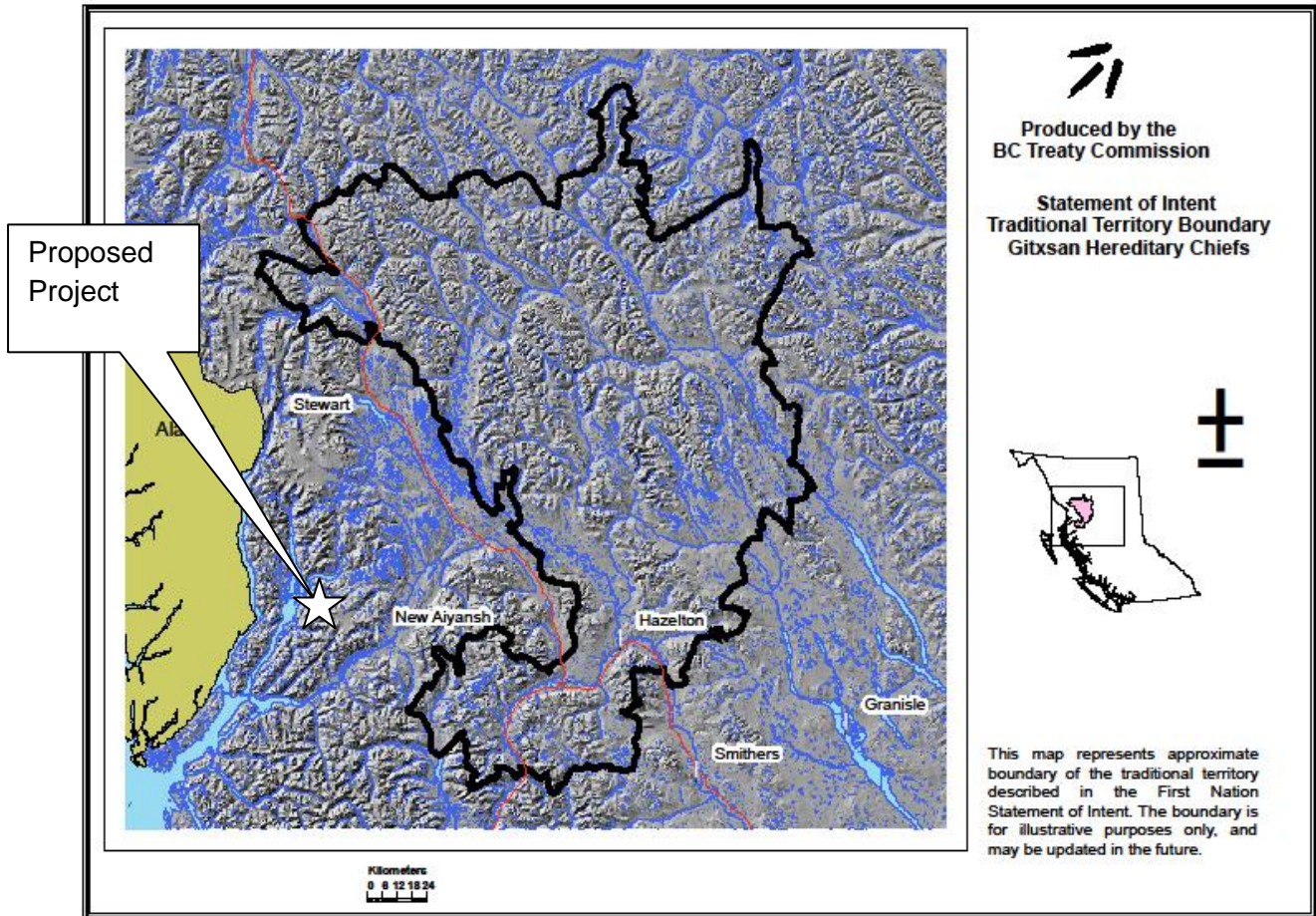
12.2.1 Gitxsan Nation Occupation and Use of Proposed Project Area

The Gitxsan Nation speak at least four dialects of the Gitxsan language within Gitxsan Territory. The term Gitxsan means “people of the Skeena River”. Gitxsan Nation’s asserted territory is situated on the Skeena River above the Kitselas Canyon, and in the watershed of the upper Skeena, Nass and Babine Rivers and their tributaries, totalling 33,000 sq km (Figure 23).

According to anthropologists, in the mid-19th century, Gitxsan Nation were organized into seven winter villages including: Kispiox, Kisgaga’as, Gitsegyukla (Kitsegukla), Gitwangak (Kitwanga), Gitanmaax (Kitanmaks), Galdo’o (Kuldo) and Kitwancool (Gitanyow Nation). The social unit of Gitxsan society was the *wilp* (house) and two or more *wilps* (from at least two clans) would share a winter village. Each *wilp* has a head chief and is associated with one of the four *pdek* (clans): Lax Gibuu (Wolf), Lax Se’el (Frog) Lax Ganeda (Raven), Gisk’aast (Fireweed/Killer Whale/Grizzly). Gitxsan Nation consider the *wilps* as the sole land and resource managing authority within their specific territory (*lax yip*), and that the house or *wilp* chief holds that authority on behalf of their *wilp* members.

In Gitxsan Nation, there are 62 huwilp (house groups) recognized by *ayookw* (law), and each *wilp* has a membership list of 50 to 250 persons. Today, the total membership of Gitxsan Nation is estimated to be more than 12,000.

Figure 23 Gitxsan Nation Asserted Traditional Territory



12.2.2 Gitxsan Nation Traditional Use of the Proposed Project Area

Approximately 26.5 km of the transportation route along Hwy 37 overlaps with Gitxsan Nation's traditional territory (Figure 24).

A review of the provincial ethnographic research, "Gitxsan Nation: A Preliminary Review of Ethnographic, Historical and Archaeological Resources" (April 6, 2010) does not indicate any historical use or occupancy of the area of the proposed Project mine site by Gitxsan Nation.

Considering the proximity of this portion of the road corridor to the Skeena and Kitwanga Rivers, Gitxsan Nation would have very likely utilized this area seasonally, harvesting moose, deer and other mammals, harvesting berries and plants and fishing in the rivers for salmon and other anadromous and non-anadromous fish.

12.2.3 Gitxsan Nation Aboriginal Rights (including title)

A consideration of Gitxsan Nation's asserted aboriginal rights that may be impacted by the proposed Project, and the transportation route in particular, was approached on the basis of information currently available to the Province, including information provided during consultation, and will be based on the guidance courts have provided regarding how such rights can be established.

The strength of the claim to aboriginal rights is assessed on the basis of information indicating where that First Nation engaged in an activity, practice, tradition or custom, in the area of the proposed government decision, which was integral to its distinctive culture prior to contact with Europeans. The strength of a First Nation's claim to Aboriginal title will be assessed on the basis of information regarding occupation of land at 1846.

According to ethnographers, most of the archaeological sites recorded were located along Skeena River, in Gitxsan territories, and were recorded as major fish camps and villages, used historically by Gitxsan Nation and still occupied by Gitxsan Nation today. In the early 19th century Gitxsan Nation were involved in trading with Tsimshian on the coast, in the exchange of eulachon oil, fish and other seafoods, for fur and berries, at the junction of the Skeena and Bulkley Rivers, on an annual basis.

There is no information reviewed to date indicating physical occupation or regular and intensive use of any specific sites along the proposed transportation route to support a claim to aboriginal title. It is acknowledged that in *Gitxsan First Nation v. British Columbia (Minister of Forests)*, 2002 BCSC 1701, Justice Tysoe stated the following:

On the basis of the direct evidence and oral histories, I am satisfied that each of the petitioning First Nations has a good *prima facie* claim of

aboriginal title and a strong *prima facie* claim of aboriginal rights with respect to at least part of the areas claimed by them and that these parts are included within the lands covered by Skeena's tree farm and forest licences (para. 72).

EAO has considered that there is a potential for the transportation component of the proposed Project to impact on hunting and fishing, and have assessed the degree of that impact on Gitxsan Nation's claims to aboriginal rights to hunt and fish in the area, to be low. On this basis, EAO determined that the scope of the duty to consult with Gitxsan Nation was at the low end of the *Haida* spectrum. In EAO's view, the consultation process with Gitxsan Nation, through engagement by the Proponent as well as directly by EAO, adequately fulfills the Crown's duty to consult in these circumstances.

12.2.4 Consultation with Gitxsan Nation

12.2.4.1 Gitxsan Nation involvement with EAO

EAO notified Gitxsan Nation through the Gitxsan Chiefs Office (GCO) by letter on September 28, 2010, that the EA for the proposed Project had begun. The letter explained the nature of the proposed Project and sought the Gitxsan Chiefs' opinion regarding Gitxsan Nation's interests in the proposed Project. EAO also explained its preliminary assessment on the potential impacts on Gitxsan Nation's asserted rights. The letter noted that the proposed Project mine site infrastructure would not overlap with Gitxsan Nation's asserted traditional territory but that a segment of the (then proposed) marine transportation route would traverse through a portion of Gitxsan Nation's asserted traditional territory.

On December 2, 2010, EAO met with the GCO to discuss EAO's preliminary assessment regarding the scope of the duty to consult with Gitxsan Nation on the proposed Project. GCO thought EAO's scope of the duty to consult should be higher on the *Haida* spectrum. GCO also raised the following concerns:

- Concerns regarding potential impacts to the Nass River and watersheds in Gitxsan territory due to the importance of fish and water to the Gitxsan;
- Range of potential impacts to the Gitxsan who rely on fish and animals for food and value those resources for cultural practices;
- Gitxsan would be impacted from the entire proposed Project and not just the truck transportation route as there is intermarriage between Gitxsan and Nisga'a; and,
- Impacts to the following watersheds from the proposed Project: Nass; Lower Skeena; Kitsequecla; Saskwa.

EAO wrote to GCO on January 6, 2011, providing further rationale for its preliminary assessment that consultation with Gitxsan Nation should occur on the low end of the *Haida* spectrum. EAO also noted the following:

- The Nisga'a Hwy is an existing and established provincial Hwy that already supports transport trucks and has been rated for this use through previous MOTI surveys;
- The roadway is governed by the same laws and emergency response units as any Hwy in BC; and,
- Proposed Project trucks would be required to abide by provincial regulations and expected to comply with such additional measures for dealing with accidents or malfunctions as may be identified through the EA.

On May 12, 2011, EAO sent a letter to introduce a new lead for the proposed Project and provide the final section 13 Order. In the letter, EAO asked for confirmation of EAO's analysis that only potential impacts on Gitxsan Nation are related to the transportation route. EAO advised that specific section of the AIR would look at impacts from the project site to Hwy16 and a Transportation Working Group would be formed.

On June 6, 2011, EAO wrote to GCO providing further details regarding consultation opportunities regarding potential impacts of the proposed transportation route of the proposed Project. These opportunities included an invitation to the Transportation Working Group to review and comment on the Proponent's assessment of potential impacts along the proposed transportation route.

On August 15, 2011, EAO met with GCO at their offices in Hazelton to review consultation opportunities regarding potential impacts on the proposed transportation route of the proposed Project. A number of other proposed Projects in northwest BC were also discussed.

Prior to the Proponent submitting its Application to EAO for the 30-day screening in December 2011, GCO invited to participate in the screening evaluation of the Proponent's Application, specifically, the RUEA. The Proponent submitted its Application on December 22, 2012, to members of the Working Group. A Transportation technical Working Group meeting was held on January 26, 2012, to discuss screening the Application. Representatives of Gitxsan Nation did not attend, nor did they provide comments on the evaluation of the Application.

On February 21, 2012, EAO wrote to GCO to advise that the Proponent's Application for an EA Certificate had been accepted for review, following a determination that it contained the information specified in the AIR.

The Proponent submitted a revised Application on April 30, 2012, which triggered the commencement of the 180-day Application review. EAO invited Gitxsan Nation, through the Transportation Working Group, to comment on the Application, specifically, sections

related to the transportation corridor. EAO did not receive written comments from Gitxsan Nation on the Application.

Transportation technical Working Group meetings were held on June 5, 2012, and July 10, 2012. Representatives of Gitxsan Nation did not attend these meetings; although, on August 14, 2012, a representative of Gitxsan Nation submitted comments on the proposed Project, including:

- Concerns over the overall impact of multiple proposed projects and actual numbers of additional transport vehicles going through the Gitxsan house territories; and,
- Concerns were expressed on the potential spread of 'alien' plants (invasive plant species) and impact on medicinal and sustenance plants.

A representative of Gitxsan Nation attended the October 11, 2012 Transportation Working Group meeting, and raised the following concerns:

- Impact if snow is ploughed in the Cranberry River area on steelhead if snow is pushed into the River;
- Cumulative impact of traffic along Hwy 37; and,
- Impact of increased traffic to deer, grizzly bear and other wildlife habitat, not just moose.

Gitxsan Nation representatives were invited to participate in the Transportation Working Group meeting held on November 27, 2012. They did not participate.

On November 19, 2012, representatives of Gitxsan Nation were provided with the opportunity to comment on the transportation section of EAO's draft Assessment Report, draft Table of Conditions and sections of the draft Certified Project Description related to transportation. EAO requested comments by December 7, 2012. EAO did not receive any comments.

On December 4, 2012, Gitxsan Nation was provided with the opportunity to comment on a draft of this Consultation Report and EAO requested comments by December 21, 2012. EAO extended the deadline to submit comments on the transportation section of EAO's draft Assessment Report, draft Table of Conditions and sections of the draft Certified Project Description related to transportation, from December 7, 2012, to December 21, 2012.

On December 12, 2012, Gitxsan Nation submitted comments on the draft Gitxsan Nation Consultation Report only.

On February 8, 2013, EAO provided a response to Gitxsan Nation's comments on this Consultation Report and how the comments had been addressed and/or incorporated. For information, EAO also provided Gitxsan Nation with the final version of EAO's

Assessment Report, Gitxsan Nation Consultation Report, Table of Conditions, and the Certified Project Description.

12.2.4.2 Gitxsan Nation involvement with Proponent

The Proponent had no obligations under the section 11 Order, issued on November 24, 2010, to consult with Gitxsan Nation.

On June 3, 2011, a section 13 Order was issued to amend the section 11 Order, defining “First Nations” as the Metlakatla First Nation, Kitsumkalum and Kitselas First Nations, GCO, GHCO, *wilp* Luuxhon, *wilp* Watakhayetsxw, *wilp* Gamlaxyeltxw, *wilp* Gwass Hlaam and *wilp* Gwinuu. Under this Order, the Proponent now had obligations to consult with GCO, on behalf of the Gitxsan Hereditary Chiefs, regarding the transportation corridor of the proposed Project.

During the EA, the Proponent did not meet directly with Gitxsan Nation. However, the Proponent did respond to the concerns raised by Gitxsan Nation through the transportation Working Group and technical memorandums. The issues raised by Gitxsan Nation are described in section 12.2.4.1 above. Gitxsan Nation expressed an interest in economic benefits and employment from the proposed Project. The Proponent is willing to talk with Gitxsan Chiefs regarding employment and economic development opportunities with the proposed Project.

12.2.5 Potential Impacts to Gitxsan Nation Interests and Measures to Mitigate or Accommodate Impacts

Section 12.2.4.1 above describes EAO’s understanding of the issues that have been identified by Gitxsan Nation during the EA for the proposed Project.

Responses to the full set of concerns are described in the Issues Tracking Table. Further information on how concerns have been addressed, including mitigation and Proponent commitments, is provided in the relevant sections of the Assessment Report. The majority of Gitxsan Nation issues relate to transportation (section 10 of the Assessment Report). In terms of matching specific concerns with corresponding mitigation measures, the reader is directed to those documents. The following is intended only to be a summary of the major issues raised and accommodations of those issues.

Impacts to Fish and Wildlife

- Gitxsan Nation expressed concerns about impacts to moose and fish along the Cranberry Connector from accidents and spills.
 - The Proponent committed to mitigation measures to minimize potential Kitsault Mine vehicle collisions with wildlife set in the Wildlife Corridor Plan.

- The Proponent's Transportation Safety Plan outlines measures to prevent and address spills and other potential impacts on water bodies along the Cranberry Connector, including the installation of barriers in environmentally sensitive areas.

Cumulative Effects of the proposed Project

- Gitxsan Nation raised concern for cumulative effects from the proposed Project, specifically related to vehicle traffic along Hwy 37.
 - In consideration of cumulative effects, the Proponent has committed to coordinate and communicate with other projects and communities to exchange information on vehicle traffic and wildlife accident data. As well as cooperate and participate in future regional cumulative effects assessments, management and planning efforts related to traffic along Hwy 37. These commitments are captured in the Table of Conditions.

Invasive Plants

- Gitxsan Nation expressed concern regarding mine-related vehicles bringing invasive species into the region through the transportation route.
 - EAO understands the Proponent will develop a Vegetation Management Plan for the proposed Project as part of *Mines Act* permitting. A component of the plan (as outlined in Section 11.2.8 of the Proponent's Application) is invasive species management on the mine site, and ensuring equipment and materials potentially exposed to invasive plants are cleaned prior to use and prior to leaving an infested site. Managing invasive species on the mine site will minimize the potential spread of invasive species from the mine site to the transportation route.

12.2.6 Conclusions Regarding Gitxsan Nation

In view of the consultation that has taken place with Gitxsan Nation, EAO concludes that:

- The process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns expressed by Gitxsan Nation;
- The process of consultation was appropriate and reasonable in the circumstances;
- EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Gitxsan Nation asserted aboriginal rights (and by way of both draft and final copies of this Report, it is communicating its findings to Gitxsan Nation); and,

- Measures that would effectively avoid and mitigate impacts to the potential impacts to the Gitxsan Nation's asserted aboriginal rights to hunt and fish, have been meaningfully discussed with Gitxsan Nation.

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Gitxsan Nation, EAO concludes that the Crown's duty to consult and appropriately accommodate the potential impacts of the proposed Project on Gitxsan Nation's asserted aboriginal rights has been adequately fulfilled.

12.3 Kitselas First Nation

12.3.1 Kitselas First Nation Occupation and Use of Proposed Project Area

Kitselas or "Gitselasu" First Nation asserted territory is located in the Skeena Valley and extends from the Kitselas Canyon westward to Terrace and Prince Rupert and approximately 55 km eastward to Lorne Creek, including mountains on both sides of the Skeena River (Berthiaume, 1999; Kitselas, n.d.).

Kitselas First Nation's asserted territory includes a total of ten *Indian Act* reserves. Currently, Kitselas First Nation members live in two interconnected sites east of Terrace on the Skeena River, which together comprise a single community referred to as Kitselas: Kulspai, which is essentially a part of Terrace, and the Gitaus subdivision, which is approximately 18 km east of Terrace. Several of the Kitselas reserves are adjacent to the existing Hwy corridor and situated along the Skeena River. Kitselas First Nation has a registered membership of around 530, with approximately 400 members living on the Kitselas reserves (primarily Kitselas Indian Reserve 1) and the rest living primarily in Terrace and the surrounding area.

According to current Statement of Intent maps submitted to the BC Treaty Commission, Kitselas First Nation's asserted territory lies well outside the area of the proposed Project mine site, although a small portion of the proposed Project transportation corridor along Hwy 113 overlaps with a portion the Kitselas First Nation's traditional territory near Terrace.

12.3.2 Kitselas First Nation's Traditional Use of the Proposed Project Area

EAO understands that a portion of transportation route for the proposed Project overlaps with the Kitselas First Nation traditionally territory along Hwy 113, near Terrace.

A review of provincial ethnographic research "Kitselas First Nation - Review of Anthropological and Historical Sources Relating to the Use and Occupation of Land" (February 2010), does not indicate historical use or occupation of the proposed Project mine site. However, it is likely that the Kitselas First Nations utilized areas near Terrace as part of their seasonal resource use patterns.

12.3.3 Kitselas First Nation's Aboriginal Rights (including title)

A consideration of Kitselas First Nation's asserted aboriginal rights that may be impacted by the proposed Project, and the transportation route in particular, was approached on the basis of information currently available to the Province, including information provided during consultation, and will be in based on the guidance courts have provided regarding how such rights can be established. The strength of the claim to aboriginal rights is assessed on the basis of information indicating where that First Nation engaged in an activity, practice, tradition or custom, in the area of the proposed government decision, which was integral to its distinctive culture prior to contact with Europeans. The strength of a First Nation's claim to aboriginal title will be assessed on the basis of information regarding definite tracts where that First Nation exclusively occupied the land (e.g. village sites, enclosed or cultivated fields) or where there were specific sites of regular and intensive use at 1846.

It is EAO's assessment, based on current information available, and having regard to the applicable legal test, the area adjacent to the transportation route, along Hwy 113, near Terrace, is an area Kitselas First Nation may have utilized the area seasonally. The information reviewed to date there is no information indicating physical occupation or regular and intensive use of any specific sites along the proposed transportation route to support a claim to aboriginal title.

EAO has considered that there is a potential for the transportation component of the proposed Project to impact on hunting and fishing, and have assessed the degree of that impact on Kitselas First Nation's claims to aboriginal rights to hunt and fish in the area, to be low. On this basis, EAO determined that the scope of the duty to consult with the Kitselas First Nation was at the low end of the *Haida* spectrum. In EAO's view, the consultation process with Kitselas First Nation, through engagement by the proponent as well as directly by EAO, adequately fulfills the Crown's duty to consult in these circumstances.

12.3.4 Consultation with Kitselas First Nation

12.3.4.1 Kitselas First Nation involvement with EAO

On September 1, 2010, EAO wrote to Kitselas First Nation to inform it that the EA for the proposed Project had begun, explaining the nature and location of the proposed Project. EAO's letter stated that it had reviewed the Proponent's Project Description and determined that no new mine infrastructure would be located within Kitselas First Nation's traditional territory but that the Proponent had identified that a component of the proposed Project might include the transportation of equipment and materials during construction by barge from the head of Alice Arm to the existing facility at the Port of Prince Rupert. In addition, the letter stated that the Proponent was proposing that concentrate would be transported from the proposed mine site to the Port of Prince Rupert and a portion of the transportation route would traverse through Kitselas First Nation's traditional territory along the existing Hwy corridor of Hwys 37 and 16. EAO informed Kitselas First Nation that the scope of the EA would likely include these proposed transportation routes.

EAO presented its preliminary assessment that no impacts on Kitselas First Nation's asserted aboriginal rights (including title) from the proposed barge transportation route were anticipated. In addition, EAO determined that it was unlikely that there would be any impacts on Kitselas First Nation's asserted aboriginal rights, including title, given that the proposed transportation route involves an existing Hwy corridor. However, since the proposed Project would increase the number of trucks along that corridor, EAO advised that it would like to consult with Kitselas First Nations regarding any concerns related to increased traffic. After presenting its preliminary assessment regarding potential impacts on Kitselas First Nation's asserted aboriginal rights (including title) from the proposed Project, EAO requested that Kitselas First Nation to provide any additional information that EAO should consider.

On October 26, 2010, EAO wrote a follow-up letter to Kitselas First Nation in order to provide updated information regarding the proposed Project, including the Proponent's new proposal to use barges to ship concentrate from the mine site to ports such as the Port of Prince Rupert. As a result of this change, the duration of barge operations would increase from two years during construction to 17 years, and EAO informed Kitselas First Nation that the scope of the EA for the proposed Project would now extend to the Port of Prince Rupert.

EAO explained that the formal scope, procedures, and methods for the EA would be set out in a procedural Order under section 11 of the Act, and provided Kitselas First Nation with a draft of that Order for review and comment. EAO had not received a response to

its September 1, 2010 letter, and advised Kitselas First Nation that if no response was received by November 15, 2012, EAO would remove Kitselas First Nation from the section 11 Order, thereby not requiring the Proponent to consult directly with Kitselas First Nation for the provincial EA of the proposed Project. EAO advised that regardless of whether a response was received by November 15, 2010, EAO would continue to keep Kitselas First Nation apprised of major milestones associated with the EA.

By letter, on November 24, 2010, EAO informed Kitselas First Nation that the section 11 Order for the provincial EA of the proposed Project had been issued and that EAO was prepared to offer \$5,000 to assist with costs associated with Kitselas First Nation's participation in the EA. EAO took this opportunity to reiterate its interest in meeting with Kitselas First Nation to discuss the EA of the proposed Project and the interests of Kitselas First Nation.

On March 10, 2011, EAO wrote to Kitselas First Nation to advise of changes to the scope of the proposed Project as described in the section 11 Order and EAO's intention to amend it under section 13 of the Act. EAO provided Kitselas First Nation with a draft of the section 13 Order for review and an opportunity to submit comments. No comments were received from Kitselas First Nation.

On June 6, 2011, EAO wrote to inform Kitselas First Nation that the section 13 Order had been issued. The section 13 Order added several First Nations (GCO, GHCO, and *wilps* Luuxhon, Watakhayetsxw, Gamlaxyeltxw, Hlaam and Gwinuu), and removed several others (Lax Kw'alaams First Nation and Gitxaala Nation) to the list of First Nations to be consulted during the EA of the proposed Project who may be potentially impacted by the transportation corridor. The section 13 Order also clarified that concentrate would be now be transported to Vancouver by truck as opposed to being barged to the Port of Prince Rupert. EAO took this opportunity to request confirmation of the analysis that any potential impacts on Kitselas First Nation's asserted aboriginal rights would only arise from the proposed transportation route, as communicated in EAO's letter of March 10, 2011.

EAO advised that the focus of its consultation with Kitselas First Nation would be on the transportation corridor, and that the Proponent would be directed to undertake a specific study to look at potential impacts of road use from the proposed Project site along Hwy 113 to the junction of Hwy 16. The study would examine the potential for impacts on any asserted aboriginal rights (including title) that Kitselas First Nation identified, as well as examine potential mitigation measures to eliminate or reduce any potential impacts. EAO also invited Kitselas First Nation to participate in Transportation technical Working Group to review and discuss the draft workplan, results of the study, and to discuss concerns raised by members of the Working Group.

Prior to the Proponent submitting its Application to EAO for the 30-day screening in December 2011, representatives of Kitselas First Nation, through the Working Group, were invited to participate in the screening evaluation of the Proponent's Application, specifically, the RUEA. The Proponent submitted its Application on December 22, 2012, to members of the Working Group who confirmed they wish to participate in the evaluation, including representatives of Kitselas First Nation. EAO did not receive comments from Kitselas First Nation on the evaluation of the Application.

A Transportation technical Working Group meeting was held on January 26, 2012. Representatives of Kitselas First Nation did not attend.

On February 21, 2012, EAO wrote to Kitselas First Nation to advise that the Proponent's Application for an EA Certificate had been accepted for review, following a determination that it contained the information specified in the AIR.

The Proponent submitted a revised Application on April 30, 2012, which triggered the commencement of the 180-day Application review. EAO invited Kitselas First Nation to comment on the Application, specifically, sections related to the transportation corridor. EAO did not receive any response or written comments from Kitselas First Nation.

Transportation technical Working Group meetings were held on June 5, 2012, July 10, 2012, and October 11, 2012. Representatives of Kitselas First Nation did not attend these meetings.

Throughout the remainder of the EA, EAO continued to keep Kitselas First Nation informed (mainly through the Working Group) of major milestones and offered opportunities to review key documents, and for consultation. EAO did not receive any response or written comments from Kitselas First Nation on the proposed Project, specifically, regarding the proposed transportation route.

On November 19, 2012, Kitselas First Nation was provided with the opportunity to comment on the transportation section of EAO's draft Assessment Report, draft Table of Conditions and sections of the draft Certified Project Description related to transportation, and EAO requested comments by December 7, 2012. EAO did not receive any comments.

Kitselas First Nation was invited to participate in the transportation Working Group on November 27, 2012. Representatives of Kitselas First Nation did not participate.

On December 4, 2012 Kitselas First Nation was provided with the opportunity to comment on a draft of this Consultation Report and EAO requested comments by December 21, 2012. EAO extended the deadline to submit comments on the transportation section of EAO's draft Assessment Report, draft Table of Conditions and sections of the draft Certified Project Description related to transportation, from December 7, 2012, to December 21, 2012. EAO did not receive any comments.

On February 8, 2013, EAO provided Kitselas First Nation with the final version of EAO's Assessment Report, Kitselas First Nation Consultation Report, Table of Conditions, and the Certified Project Description for information.

12.3.4.2 Kitselas First Nation involvement with Proponent

The Proponent was required to consult with Kitselas First Nation regarding the proposed Project as set out in the November 24, 2010, section 11 Order issued by EAO, and in the June 3, 2011, section 13 Order issued by EAO.

Since the transportation route associated with the proposed Project would pass through Kitselas First Nation's traditional territory, EAO required that the Proponent engage with the Kitselas First Nation to discuss the proposed Project and its potential impacts.

EAO directed the Proponent to undertake a specific study to assess the potential impacts of road use from the proposed Project site to Hwy 16. This study examined the potential for impacts on any asserted aboriginal rights that were identified as well as mitigation for those potential impacts and effects. The results of the study formed a separate section of the Application.

Pre-Application Stage

On November 19, 2010, the Proponent wrote a letter to Kitselas First Nation introducing the proposed Project and inviting them to contact the Proponent with any questions or comments.

On June 21, 2011, the Proponent followed up with a second letter to Kitselas First Nation with additional information regarding the Proponent and the proposed Project, as well as advising that proposed transportation route options may go through or near their traditional territory.

The Proponent did not receive any written comments from Kitselas First Nation regarding the proposed Project during the pre-Application stage of the EA.

Application Review Stage

The Kitselas First Nation did not provide feedback or raise concerns about the proposed Project during the Application review stage. The Proponent did not meet or correspond directly with the Kitselas First Nation during the Application review stage.

12.3.5 Potential Impacts to Kitselas First Nation's Interests and Measures to Mitigate or Accommodate Impacts

Kitselas First Nation did not submit any comments or identify any issues or potential impacts with respect to the proposed Project. No specific mitigation or accommodations were developed during EA Application Review specifically for Kitselas First Nation.

EAO understands that the package of transportation mitigation measures included in the Table of Conditions and Certified Project Description should offer an appropriate accommodation for any potential impacts to any aboriginal rights.

12.3.6 Conclusions Regarding Kitselas First Nation

In view of the consultation that has taken place with the Kitselas First Nation, EAO concludes that:

- the process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns, if expressed by Kitselas First Nation;
- the process of consultation was appropriate and reasonable in the circumstances; and,
- EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Kitselas First Nation asserted aboriginal rights (and by way of both draft and final copies of this Report, it is communicating its findings to Kitselas First Nation).

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Kitselas First Nation, EAO concludes that the Crown's duty to consult and appropriately accommodate the potential impacts of the proposed Project on Kitselas First Nation's asserted aboriginal rights has been adequately fulfilled.

12.4 Kitsumkalum First Nation

12.4.1 Kitsumkalum First Nation Occupation and Use of Proposed Project Area

Kitsumkalum First Nation belong to the Coast Tsimshian cultural linguistic group. Their territory included the Kitsumkalum and Zymagotitz watersheds and the Skeena River watershed along the river downstream of the Kitselas Canyon.

At the time of contact, Kitsumkalum First Nation lived in a large village, *Dalk Gyilakyaw*, situated at the canyon on the west bank of the lower Kitsumkalum River (at the location of IR 2). The village supported a productive salmon fishery and a number of fishing stations, trap sites and satellite settlements associated with the village, on the east and west banks of Kitsumkalum River. Another village, *Gitlaxts'ilaas*, located on the east bank, between Kitsumkalum River and Hwy 113, was a fishing village at which Kitsumkalum First Nation set salmon traps on the river below. Starting in the mid-1800's Kitsumkalum First Nation gradually abandoned *Dalk Gyilakyaw* to live wholly at *Kitsumkalum*, a sizeable fishing village, at the mouth of the Kitsumkalum River. However, while the old canyon sites had ceased to be permanent villages by the 1870's, they continued to be used as fishing camps into the 20th century. The *Kitsumkalum* village was used by Kitsumkalum until it was abandoned in the early

20th century. In addition to these sites, Kitsumkalum First Nation also used hunting, and berry harvesting grounds, and fishing stations at and around Kitsumkalum Lake, Erlandsen Creek, and the Upper Kalum and Zymagoitz Rivers.

Among the Coast Tsimshian tribes, territorial rights and access to resource areas were vested in closely related family groups regulated by chiefs or lineage heads.

Today, there are four reserves within the Kitsumkalum First Nation asserted territory (Figure 26). The main reserve, Kitsumkalum Indian Reserve 1, has a total area of about 450 ha and is located 5 km west of Terrace on the Skeena River at the mouth of the Kitsumkalum River. The other three reserves are Dalk-ka-gila-Quoeux, Zimagord and Port Essington. The proposed Project transportation corridor does not intersect any Indian reserve lands, though is within close proximity to Kitsumkalum Indian Reserve 1 and Dalk-ka-gila-Quoeux Indian Reserve 2, northwest of Terrace.

Kitsumkalum First Nation asserted territory (see Figure 26) extends north of Hwy 16 and Terrace, and occupies the area surrounding Kitsumkalum Lake and Kitsumkalum River north to Lava Lake. Kitsumkalum First Nation's asserted territory lies well outside the area of the proposed Project mine site, though, a portion of the Kitsumkalum First Nation's asserted territory overlaps with a section of the transportation corridor for the proposed Project along Hwy 113 (Figure 27). Kitsumkalum First Nation has asserted a larger territory, including a claim down the Skeena River inclusive of Prince Rupert Harbour (see Figure 28).

Figure 26 Kitsumkalum First Nation Asserted Traditional Territory

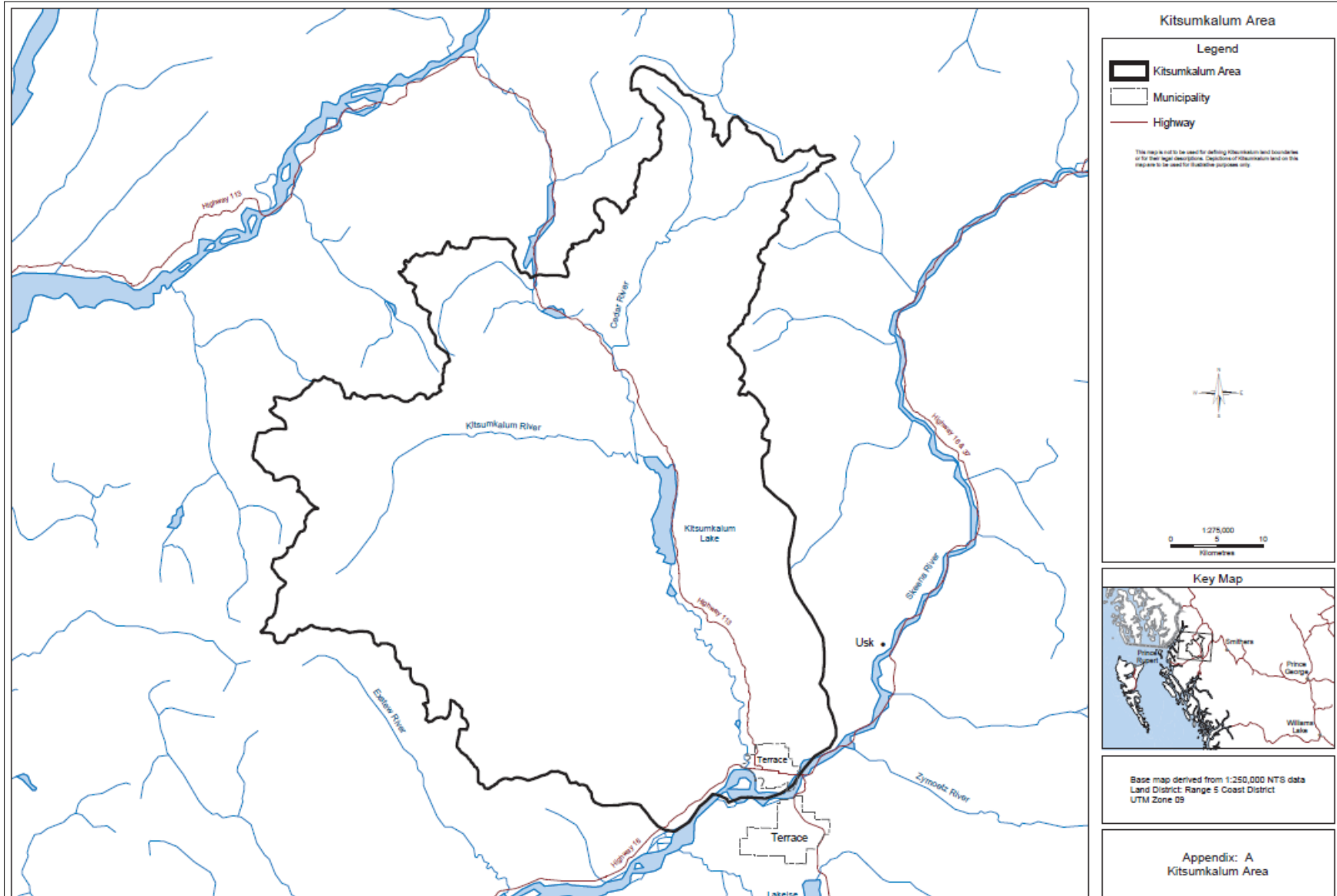


Figure 27 Kitsumkalum Territory Overlapping with the Kitsault Transportation Route

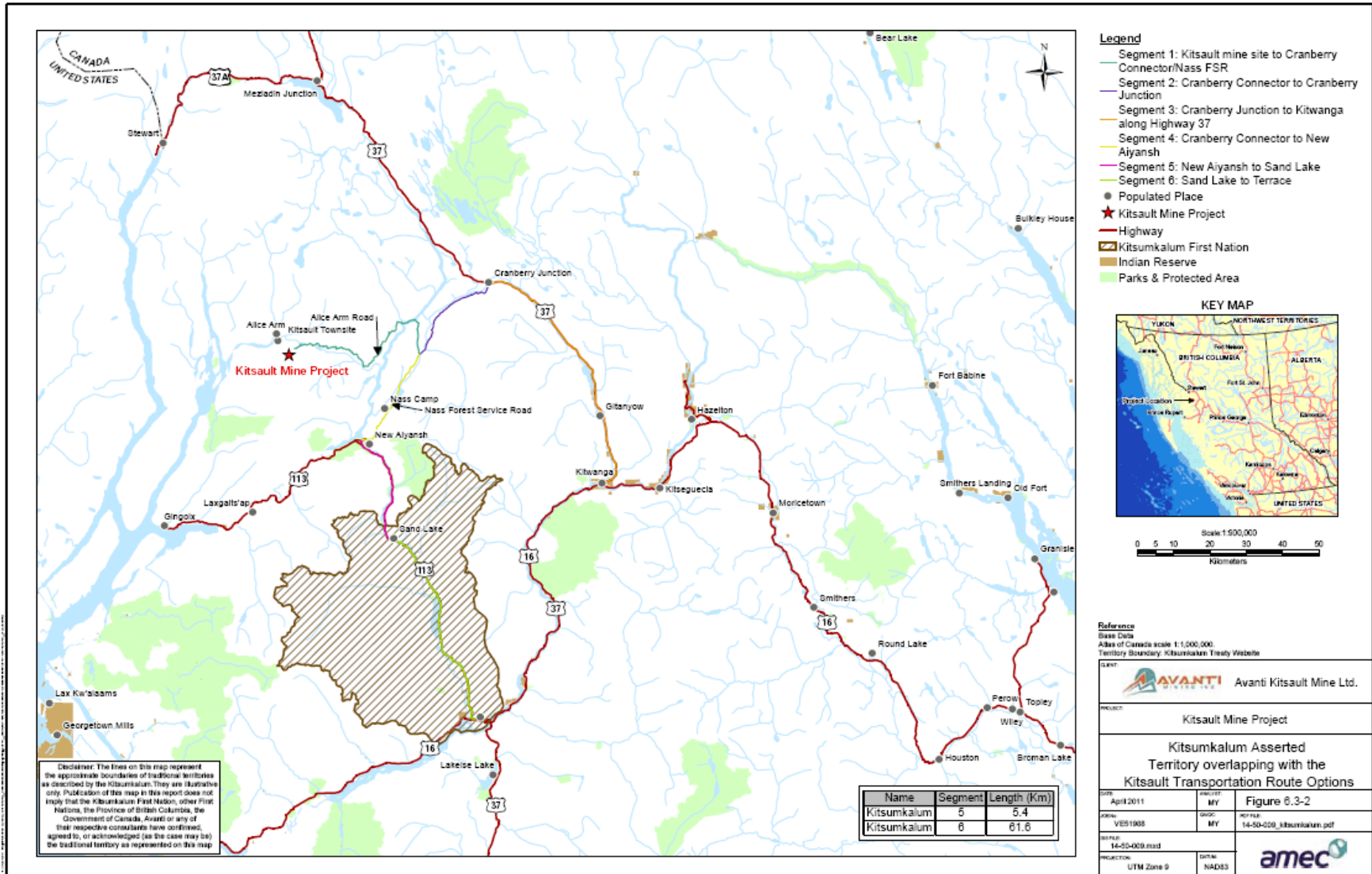
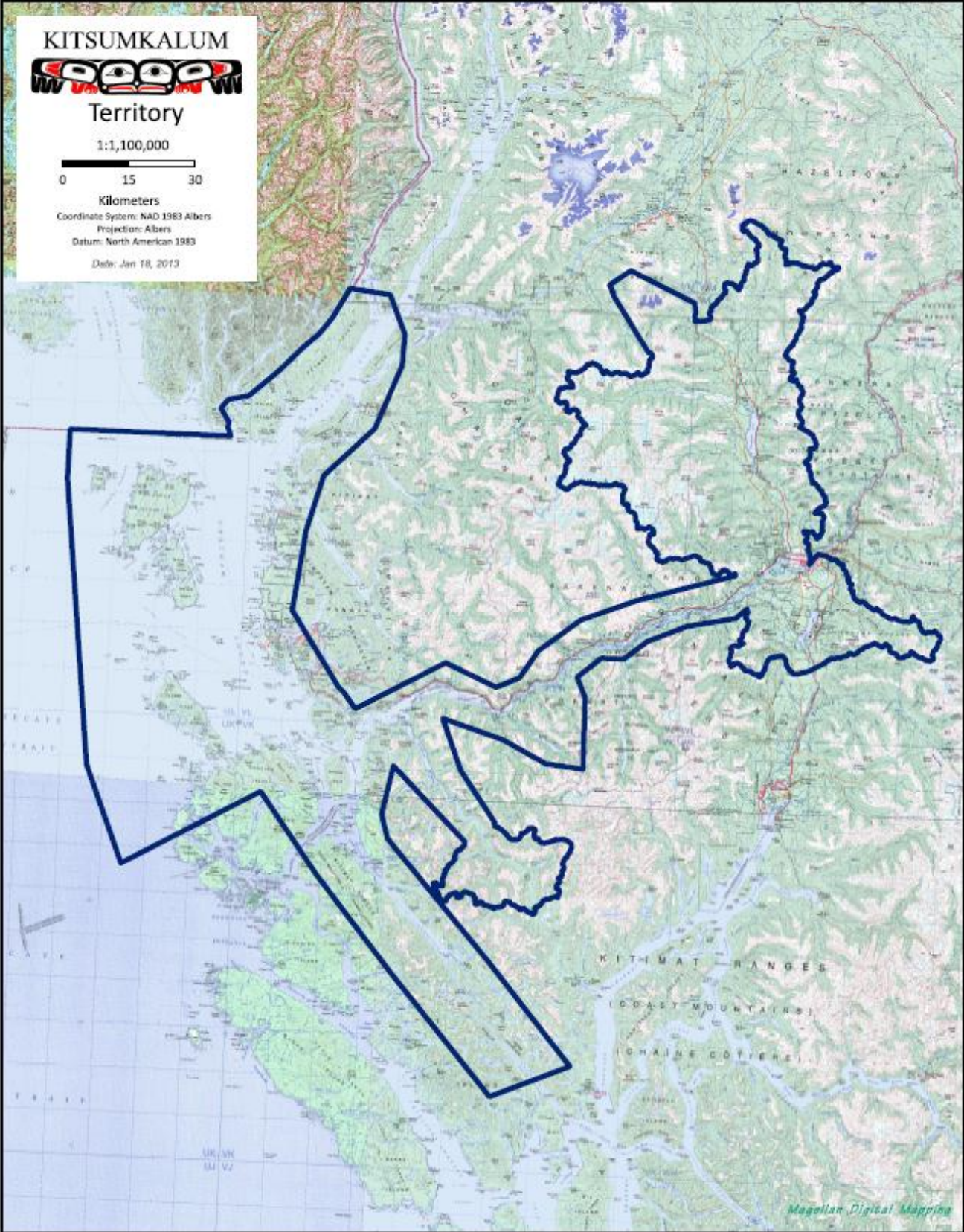


Figure 28 Kitsumkalum Territory Map



12.4.2 Kitsumkalum First Nation's Traditional Use of the Proposed Project Area

The transportation route for the proposed Project overlaps with approximately 67 km of Kitsumkalum First Nation's traditional territory along Hwy 113 (Figure 27).

A review of the provincial ethnographic research, "Kitsumkalum First Nation: Review of Anthropological and Historical Sources Relating to the Use and Occupation of Land" indicates historical use of the areas surrounding Kitsumkalum River and Kitsumkalum Lake (adjacent to the transportation corridor associated with the proposed Project) by the Kitsumkalum First Nation for fishing, hunting, and harvesting berries. Kitsumkalum First Nation informed EAO that Hwy 113, 0 to 60 km is the heart of the Kitsumkalum First Nation's territory and Kitsumkalum have selected lands for Treaty within Kitsumkalum territory, and portions of these lands overlap with the proposed transportation corridor for the proposed Project. An Agreement-in-Principle, which includes the selected lands, has been initialled by the provincial, federal governments and Kitsumkalum First Nation.

12.4.3 Kitsumkalum First Nation's Aboriginal Rights (including title)

A consideration of Kitsumkalum First Nation's asserted aboriginal rights that may be impacted by the proposed Project, and the transportation route in particular, was approached on the basis of information currently available to the Province, including information provided during consultation, and will be based on the guidance courts have provided regarding how such rights can be established. The strength of the claim to aboriginal rights is assessed on the basis of information indicating where that First Nation engaged in an activity, practice, tradition or custom, in the area of the proposed government decision, which was integral to its distinctive culture prior to contact with Europeans. The strength of a First Nation's claim to aboriginal title will be assessed on the basis of information regarding definite tracts where that First Nation occupied specific sites (e.g. village sites, enclosed or cultivated fields) or where there were specific sites of regular and intensive use at 1846, as described by the BC Court of Appeal in the *William* case.

It is EAO's assessment, based on current information available, and having regard to the applicable legal test, that the area adjacent to the proposed transportation route is an area Kitsumkalum First Nation traditionally used for hunting, fishing, and harvesting berries, and as such, would support a strong claim to an aboriginal right to hunt, fish and harvest berries, in this area. The information reviewed to date indicates that historically, there is information of occupation or regular and intensive use of specific sites near the proposed transportation route, including a village site on the east bank in close proximity to the route, and villages on the west bank in moderate proximity to the route, to support a moderate to strong claim to aboriginal title those particular portions of the route.

In approaching the assessment of potential impacts to Kitsumkalum First Nation's aboriginal rights and title claims, EAO has focused on the potential adverse effects flowing from the proposed Project. Although cumulative effects related to use of the road and the cumulative risk of vehicle accidents along the transportation corridor is considered, as will be further discussed, EAO did not seek to resolve any outstanding issues in relation to previous decisions related to the road. Given the previous existence of the road, EAO has considered that the transportation component of the proposed Project would have negligible impacts to Kitsumkalum First Nation's claim to aboriginal title. EAO has considered that there is a potential for the transportation component of the proposed Project to impact on hunting and fishing, and have assessed the degree of that impact on Kitsumkalum First Nation's strong claim to aboriginal rights to hunt, fish, and harvest berries, in the area, to be moderate. On this basis, EAO determined that the scope of the duty to consult with Kitsumkalum First Nation was in the middle portion of the *Haida* spectrum. In EAO's view, the consultation process with Kitsumkalum First Nation, through engagement by the proponent as well as directly by EAO, adequately fulfills the Crown's duty to consult in these circumstances.

12.4.4 Consultation with Kitsumkalum First Nation

12.4.4.1 Kitsumkalum First Nation's involvement with EAO

Pre-Application

On September 1, 2010, EAO wrote to Kitsumkalum First Nation to inform them that the EA for the proposed Project had begun, explaining the nature and location of the proposed Project. EAO's letter stated that it had reviewed the Proponent's Project Description and determined that no new mine infrastructure would be located within Kitsumkalum First Nation's traditional territory, the Proponent had identified that a component of the proposed Project might include the transportation of equipment and materials during construction by barge from the head of Alice Arm to the existing facility at the Port of Prince Rupert. In addition, the Proponent was proposing that during operations, that concentrate would be transported from the proposed mine site to the Port of Prince Rupert and a portion of the transportation route would traverse through Kitsumkalum First Nation's traditional territory along the existing Hwy corridor of Hwys 37 and 16. EAO informed Kitsumkalum First Nation that the scope of the EA would likely include these proposed transportation routes.

EAO presented its preliminary assessment that no impacts on Kitsumkalum First Nation's asserted aboriginal rights (including title) from the proposed barge transportation route were anticipated. In addition, EAO determined that it was unlikely that there would be any impacts on Kitsumkalum First Nation's asserted aboriginal rights, including title, given that the proposed transportation route involves an existing Hwy corridor. However, since the proposed Project would increase the number of trucks

along that corridor, EAO advised that it would consult with Kitsumkalum First Nation regarding any concerns related to increased traffic. After presenting its preliminary assessment regarding potential impacts on Kitsumkalum First Nation's asserted aboriginal rights (including title) from the proposed Project, EAO requested that Kitsumkalum First Nation to provide any additional information that EAO should consider.

EAO met with Kitsumkalum First Nation on October 20, 2010, to discuss the proposed Project and the provincial EA process. Kitsumkalum First Nation raised concerns about the proposed Project including increased traffic through their community, noise and vibration from vehicle traffic, potential spills of concentrate, potential impacts on fish and wildlife, and other resources.

On October 26, 2010, EAO wrote a follow-up letter to Kitsumkalum First Nation in order to provide updated information regarding the proposed Project, including the Proponent's new proposal to use barges to ship concentrate from the mine site to ports such as the Port of Prince Rupert. As a result of this change, the duration of barge operations would increase from two years during construction to 17 years, and EAO informed Kitsumkalum First Nation that the scope of the EA for the proposed Project would now extend to the Port of Prince Rupert.

EAO explained that the formal scope, procedures, and methods for the provincial EA would be set out in a procedural Order under section 11 of the Act, and provided the Kitsumkalum First Nation with a draft of the Order for review and comment. EAO had not received a response to its September 1, 2010 letter, and advised Kitsumkalum First Nation that if no response was received by November 15, 2012, EAO would remove Kitsumkalum First Nation from the section 11 Order, thereby not requiring the Proponent to consult directly with Kitsumkalum First Nation for the provincial EA of the proposed Project. EAO advised that regardless of whether a response was received by November 15, 2010, EAO would continue to keep Kitsumkalum First Nation apprised of major milestones associated with the EA.

By letter on November 24, 2010, EAO informed Kitsumkalum First Nation that the section 11 Order for the provincial EA of the proposed Project had been issued and that EAO was prepared to offer capacity funding to assist with costs associated with Kitsumkalum First Nation's participation in the EA. EAO took this opportunity to reiterate its interest in meeting with Kitsumkalum First Nation to discuss the EA of the proposed Project and the interests of Kitsumkalum First Nation.

On December 16, 2010, EAO provided \$5,000 in funding to Kitsumkalum First Nation to participate in the pre-Application stage of the EA.

On March 10, 2011, EAO wrote to Kitsumkalum First Nation to advise of changes to the scope of the proposed Project as described in the section 11 Order and EAO's intention

to amend it under section 13 of the Act. EAO acknowledged that the duty to consult continued to apply and provided Kitsumkalum First Nation with a draft of the section 13 Order for review and an opportunity to submit comments. No comments were received from Kitsumkalum First Nation.

On June 6, 2011, EAO wrote to inform Kitsumkalum First Nation that the section 13 Order had been issued. The section 13 Order added several First Nations (GHO, GHCO, and *wilps* Luuxhon, Watakhayetsxw, Gamlaxyeltxw, Hlaam and Gwinuu), and removed several others (Lax Kw'alaams First Nation and Gitxaala Nation), to the list of First Nations to be consulted during the EA of the proposed Project who may be potentially impacted by the transportation corridor. The section 13 Order also clarified that concentrate would be transported to Vancouver by truck as opposed to being barged to the Port of Prince Rupert. EAO took this opportunity to request confirmation of the analysis that any potential impacts on Kitsumkalum First Nation's asserted aboriginal rights would only arise from the proposed transportation route, as communicated in EAO's letter of March 10, 2011.

EAO advised that the focus of its consultation with Kitsumkalum First Nation would be on the transportation corridor, and that the Proponent would be directed to undertake a specific study to look at potential impacts of road use from the proposed Project site to Hwy 16. The study would examine the potential for impacts on any asserted aboriginal rights (including title) that Kitsumkalum First Nation identified, as well as examine potential mitigation measures to eliminate or reduce any potential impacts. EAO also invited Kitsumkalum First Nation to participate in a Transportation technical Working Group to review and discuss the draft workplan and results of the study.

The Proponent submitted its Application to EAO for the 30-day screening in on December 22, 2011. Representatives of Kitsumkalum First Nation, through the Working Group, were invited to participate in the screening evaluation of the Proponent's Application, specifically, the RUEA. EAO did not receive comments from Kitsumkalum First Nation on the evaluation of the Application. At that time, EAO also provided additional capacity funding for Kitsumkalum First Nation to participate in the Application review of the proposed Project.

EAO held a transportation Working Group meeting on January 26, 2012, to discuss the screening of the Application. A representative of Kitsumkalum First Nation attended.

On February 21, 2012, EAO wrote to Kitsumkalum First Nation to advise that the Proponent's Application for an EA Certificate had been accepted for review, following a determination that it contained the information specified in the AIR.

On April 12, 2012, representatives of Kitsumkalum First Nation were notified by email that the 180-day review would start on April 30, 2012.

Application Review

On April 30, 2012, the Proponent submitted copies of an updated version of the Application to EAO and members of the Working Group, triggering the start of the 180-day Application review. Also, EAO notified representatives of Kitsumkalum First Nation, through the Working Group, by email, about the start of the 180-day Application review, requested Kitsumkalum First Nation submit comments on the Proponent's Application by May 30, 2012, and informed Kitsumkalum First Nation of an upcoming Working Group meeting, public comment period and open houses. The Kitsumkalum First Nation did not submit written comments on the Application.

Transportation technical Working Group meetings were held on June 5, 2012, July 10, 2012, and October 11, 2012. A representative of Kitsumkalum First Nation attended these meetings. Kitsumkalum First Nation raised the following concerns:

- Concerns over impacts to Kitsumkalum Lake from accidents or malfunctions and any downstream effects, noting the importance of Chinook salmon in Kitsumkalum Lake. Kitsumkalum watershed has major fisheries value that would be compromised should a potential accident occur along the Hwy corridor;
- Concerns noted about downstream effects of a spill throughout the year, particularly during winter months as any spill cleanup would be challenging due to the lake being frozen and any recovery of materials and equipment would be difficult. Request was made for the Proponent to develop a spill response document for review by First Nations;
- Noted the sensitive sockeye spawning channels at the north east end of the lake along the road side;
- The Kitsumkalum River and Lake are a traditional food fishing and hunting area;
- Kitsumkalum Fishing and Hunting camps may not be able to use the water for personal use if impacted by spills;
- A response team and equipment should be located at the Kitsumkalum Community. Kitsumkalum First Nation members could be trained to respond and assist any First Responders to an accident or spill that may occur in Kitsumkalum First Nation traditional territory;
- Potential impact of the proposed Project on moose population along the road corridors;
- Any restriction of the use of the Cranberry Connector would increase use on the Nisga'a Hwy and the impact of increased traffic on residential areas; and,
- Concerns about timing for engaging Kitsumkalum First Nation in the development of a communication protocol.

On October 16, 2012, Kitsumkalum First Nation sent a letter to EAO, summarizing Kitsumkalum First Nation's comments on the Proponent's responses to transportation

issues raised by the Working Group, including First Nations and NLG, and the draft Table of Conditions and draft Certified Project Description (dated September 28, 2012) related to transportation. These comments included:

- Requested Kitsumkalum First Nation have input into the protocols and procedures for reporting moose kills to ensure Kitsumkalum First Nation can respond to moose kill report;
- Requested the Proponent engage Kitsumkalum First Nation in the development of the Emergency Response Plan, and consult with Kitsumkalum First Nation before it is approved by the MOE; and,
- The Proponent should install road side barrier protection, and requested a copy of assessment of high environmental risk areas along the transportation routes.

On November 19, 2012, Kitsumkalum First Nation was provided with the opportunity to comment on the transportation section of EAO's draft Assessment Report, draft Table of Conditions and sections of the draft Certified Project Description related to transportation. EAO requested comments by December 7, 2012.

Representatives of Kitsumkalum First Nation attended the Transportation Working Group on November 27, 2012. No comments were received during the meeting.

On December 4, 2012, Kitsumkalum First Nation was provided with an opportunity to comment on a draft of the Consultation Report, and EAO requested comments by December 21, 2012. EAO extended the deadline to submit comments on the transportation section of EAO's draft Assessment Report, draft Table of Conditions and sections of the draft Certified Project Description related to transportation, from December 7, 2012, to December 21, 2012.

On December 19, 2012, Kitsumkalum First Nation submitted comments on the transportation section of the draft Assessment Report and draft of Consultation Report.

On February 8, 2013, responded to, and informed Kitsumkalum First Nation how their comments had been addressed. For information, EAO provided Kitsumkalum First Nation with the final version of EAO's Assessment Report, Kitsumkalum First Nation Consultation Report, Table of Conditions, and the Certified Project Description.

12.4.4.2 Kitsumkalum First Nation's involvement with Proponent

The Proponent was required to consult with Kitsumkalum First Nation regarding the proposed Project as set out in the November 24, 2010, section 11 Order issued by EAO, and in the June 3, 2011 section 13 Order issued by EAO.

Since the transportation route associated with the proposed Project would pass through Kitsumkalum First Nation traditional territory, EAO required that the Proponent consult

with Kitsumkalum First Nation to discuss the proposed Project and its potential impacts on Kitsumkalum First Nation's asserted aboriginal rights (including title) and interests.

Pre-Application Stage

On November 19, 2010, the Proponent wrote a letter to Kitsumkalum First Nation introducing the proposed Project and inviting them to contact the Proponent with any questions or comments.

On June 21, 2011, the Proponent followed up with a second letter to Kitsumkalum First Nation with additional information regarding the Proponent and the proposed Project, as well as advising that proposed transportation route options may go through or near their traditional territory.

Application Review Stage

The Proponent did not meet or correspond directly with Kitsumkalum First Nation during the Application review stage. However, the Proponent did respond to comments from the Transportation Working Group, including Kitsumkalum First Nations, about the proposed Project associated with the transportation corridor, by way of technical memorandum, dated September 28, 2012.

12.4.5 Potential Impacts to Kitsumkalum First Nation's Interests and Measures to Mitigate or Accommodate Impacts

Section 12.4.4.1 above describes EAO's understanding of the issues that have been identified by Kitsumkalum First Nation during the EA for the proposed Project.

Responses to the full set of concerns are described in the Issues Tracking Table (Appendix 1). Further information on how concerns have been addressed, including mitigation and Proponent commitments, is provided in the relevant sections of this Report. The issues raised by Kitsumkalum First Nation relate to transportation (section 10 of the Assessment Report). In terms of matching specific concerns with corresponding mitigation measures, the reader is directed to those documents. The following is intended only to be a summary of the major issues raised and accommodations of those issues.

Accidental spills

- Kitsumkalum First Nation requested a response team and equipment located at the Kitsumkalum Community for responding and assisting any accident or spill that may occur in Kitsumkalum Traditional Territory.
 - In response, the Proponent committed to provide spill response equipment at five strategic locations, in consultation with First Nations, including Kitsumkalum First Nation. In addition, the Proponent committed to develop a plan on how to effectively coordinate and provide training and spill response approaches with MOE and First Nation communities along the

transportation route. This is captured in Table of Conditions, Condition #17.

- Kitsumkalum First Nation expressed concerns about restricting winter use of the Cranberry Connector, which would increase traffic through their communities.
 - EAO recommendations do not contemplate restricting Proponent use of the Cranberry Connector.
- Kitsumkalum First Nation expressed concerns about monitoring moose fatalities.
 - The Proponent has committed, in its Wildlife Corridor Management Plan, to address monitoring of large mammals including moose, bear and goat fatalities. A communication protocol would be a component of the Plan.
- Kitsumkalum First Nation expressed concerns about potential impacts to wildlife and fish from accidents and malfunctions, in particular spills of process chemicals and fuel into waterways and areas of environmental sensitivity. They noted particularly sensitivity near Kitsumkalum Lake, which has high fisheries value, including Chinook and Sockeye spawning. Kitsumkalum River and Lake are a traditional food fishing and hunting area. They also noted concerns about the installation of new forms of barriers around environmentally sensitive areas.
 - The Proponent committed to the development of a Transportation Safety Plan, to be completed prior to construction, that would include the following elements:
 - Develop a site map of locations of areas of higher environmental risk in the case of an accident or spill. This map will be distributed to mine-related vehicle drivers through the Traffic Control Plan.
 - Undertake additional survey to assess the transportation routes for heavy-haul traffic, including determination of the limiting dimensions and weight that may be transported along the routes, and effectiveness of existing roadside and bridge barriers along the FSRs.
 - Further consideration and assessment of high environmental risk areas where additional forms of barrier protection (such as rails, no-post barriers or wire rail type barriers) is needed along the FSRs and implement, to the approval of FLNR, in consultation with Nisga'a Nation, Gitanyow Nation and Kitsumkalum First Nation, forms of barrier protection.
 - Details on how the Proponent will ensure proper training, inspections, and record-keeping procedures for transportation of hazardous materials and wastes.
 - Mobile spill response unit and trained Emergency Response Team based at the mine site and outfitted with self-contained collection of spill response materials for rapid deployment to spill sites.

12.4.6 Conclusions Regarding Kitsumkalum First Nation

In view of the consultation that has taken place with Kitsumkalum First Nation, EAO concludes that:

- The process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns expressed by Kitsumkalum First Nation;
- The process of consultation was appropriate and reasonable in the circumstances;
- EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Kitsumkalum First Nation's asserted aboriginal rights and title (and by way of both draft and final copies of this Report, it is communicating its findings to Kitsumkalum First Nation); and,
- Measures that would effectively avoid and mitigate impacts to the potential impacts to the Kitsumkalum First Nation's asserted aboriginal rights to hunt, fish and harvest plants, have been meaningfully discussed with Kitsumkalum First Nation.

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Kitsumkalum First Nation, EAO concludes that the Crown's duty to consult and appropriately accommodate the potential impacts of the proposed Project on Kitsumkalum First Nation's asserted aboriginal rights and title has been adequately fulfilled.

12.5 Metlakatla First Nation

12.5.1 Metlakatla First Nation Occupation and Use of Proposed Project Area

The proposed Project area is near the northeast boundary of Metlakatla First Nation's asserted traditional territory.

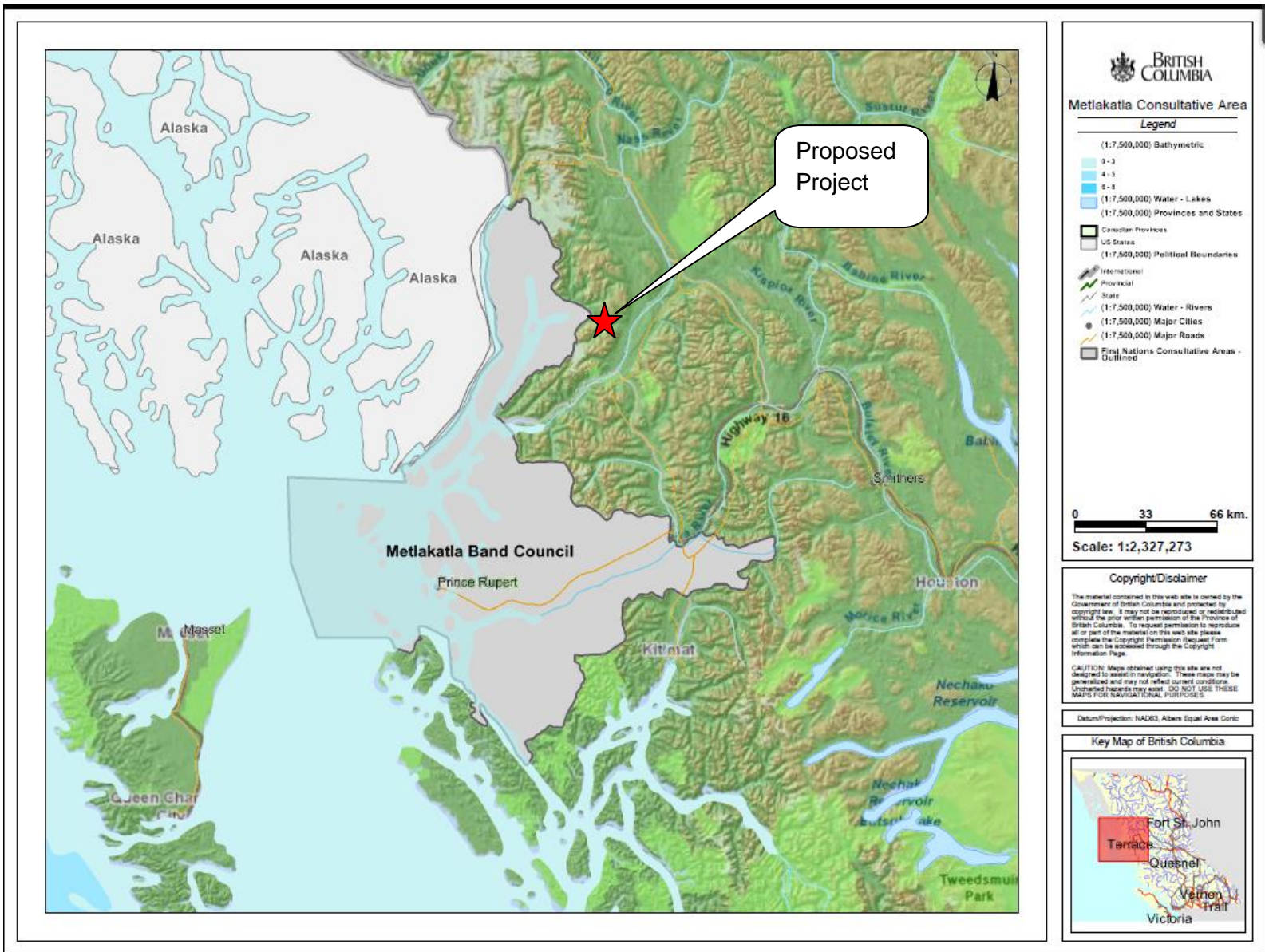
The Metlakatla First Nation is a post-contact entity with members from the nine original Tsimshian tribes. Metlakatla First Nation occupies 16 reserves, the largest situated at the southern end of the Tsimshian Peninsula near Prince Rupert. Other reserves are shared with the Lax Kw'alaams First Nation. The Metlakatla First Nation's asserted traditional territory is largely within the traditional ethnographic territory of the Coast Tsimshian and shares the territories of other Tsimshian bands including the Lax Kw'alaams, Kitkatala and Gitga'at First Nations, as well as the Nisga'a Nation.

The Tsimshian utilized a pattern of seasonal resource extraction with strong links to oolichan, salmon and other fish as well as land and sea mammals. This cycle likely started in the spring with movement towards the mouth of the Nass River to engage in trade for furs and other goods, social events and the significant annual oolichan harvest. Following the harvest and processing of oolichan in the late spring, Tsimshian people would begin to disperse to their tribal territories and salmon fishing grounds and other

seasonal resource harvesting activities for the summer harvest. In the fall, the Tsimshian would begin to return to winter village sites around the Tsimshian Peninsula at Fort Simpson, Metlakatla and other sites.

Metlakatla people have historically been affiliated with the Coast Tsimshian, although in the 1860s a number of Coast Tsimshian people founded a new village at the main Tsimshian winter village site of Metlakatla. After smallpox struck a number of other villages, the new community at Metlakatla grew in size and was influenced by an Anglican lay minister named William Duncan. Duncan set out developing a model community with a focus on economic development and advocated for land to be set aside for members of the community. In the 1880s, at the request of Duncan, a number of reserves were set aside to be shared by the Tsimshian people at Fort Simpson and Metlakatla. The reserves were later split between the two groups, who chose different governance models and visions for their communities. The Tsimshian at Fort Simpson later became known as the Lax Kw'alaams First Nation and those at Metlakatla became the Metlakatla First Nation.

Figure 29 Metlakatla First Nation Asserted Traditional Territory



12.5.2 Metlakatla First Nation's Traditional Use of the Proposed Project Area

A review of the existing ethnographic research does not indicate any historical use or occupancy of the area of the proposed Project by Metlakatla First Nation.

12.5.3 Metlakatla First Nation's Aboriginal Rights (including title)

EAO was unable to identify any information sources which describe a connection between Metlakatla First Nation's ancestral community and the proposed Project area. As a result of this analysis, EAO initially determined that the scope of the duty to consult with the Metlakatla First Nation regarding the proposed Project was low end of the *Haida* spectrum. EAO advised Metlakatla First Nation that this assessment would be reconsidered if new information was made available to EAO.

On November 15, 2011, Metlakatla First Nation provided EAO with a report by Martindale and Marsden entitled *Analysis of territorial claims made in "Lax Kw'alaams: Review of Historical and Ethnographic Sources" and "Metlakatla: Review of Historical and Ethnographic Sources" documents prepared by the Aboriginal Research Division of the British Columbia Ministry of Attorney General Legal Services Branch* (October 18, 2011). The Martindale and Marsden report made no reference to the Kitsault area, despite providing extensive information and evidence on other areas in Metlakatla territory. It was EAO's view that the report supported EAO's preliminary strength of claim assessment.

In July 2012 the Metlakatla First Nation provided an additional report entitled "*Kitsault Mine Report*" by Dr. George MacDonald and Joanna MacDonald (July 4, 2012). It was also EAO's view that the report did not provide any specific information on Metlakatla First Nation rights or title in the Kitsault area.

Following the review of these reports, EAO commissioned a report by the Ministry of Justice and Attorney General (JAG) entitled "*Kitsault Mine: A Review of Ethnographic Sources, September 2012*". The results of this report confirmed EAO's preliminary assessment that Metlakatla strength of claim for the proposed Project was weak and that that appropriate duty to consult has been on the low end of the *Haida* spectrum.

In EAO's view, the engagement process with Metlakatla First Nation, through its designated representatives and directly, has exceeded what would be expected from consultation at the low end of the *Haida* spectrum.

With respect to aboriginal rights, EAO has considered information regarding whether the Coast Tsimshian engaged in a pre-contact activity, practice, tradition or custom, in the area of the proposed Project, which was integral to its distinctive culture. No evidence was found to indicate that Alice Arm or Observatory Inlet were ever part of Coast Tsimshian territory, nor even any evidence of their occasional presence in these areas. On the contrary, Coast Tsimshian activity in Portland Inlet seems to have been

limited to locations along the passage between Lax Kw'alaams and the mouth of the Nass.

During the consultation process to date, Metlakatla First Nation has not yet articulated what aboriginal rights it is claiming in the area of the proposed Project, nor outlined the scope and nature of such rights. However, based on case law regarding the factors relevant to assessing aboriginal rights, and the information reviewed to date, there is no information to support to a *prima facie* claim to any aboriginal rights by the Metlakatla First Nation to the area of the proposed Project.

Based on current case law and the information reviewed to date, there is no support for a *prima facie* claim to aboriginal title to the area of the proposed Project.

12.5.4 Consultation with Metlakatla First Nation

12.5.4.1 Metlakatla First Nation's involvement with EAO

Pre-Application Review

On September 1, 2010, EAO wrote to Metlakatla First Nation to inform it that the EA for the proposed Project had begun. The letter explained the nature of the proposed Project and sought opinion regarding Metlakatla First Nation's interests in the proposed Project. The letter noted that the proposed Project mine site infrastructure would not overlap with Metlakatla First Nation's asserted traditional territory but that a segment of the (then proposed) marine transportation route would traverse through a portion of Metlakatla First Nation's asserted traditional territory.

On October 26, 2010, EAO wrote a follow-up letter to Metlakatla First Nation in order to provide updated information regarding the proposed Project, including the Proponent's new proposal to use barges to ship concentrate from the mine site to ports such as the Port of Prince Rupert. The Proponent's change would have extended barge operations from 2 years to 17 years. In the letter, EAO informed Metlakatla First Nation that the scope of the EA for the proposed Project would extend to the Port of Prince Rupert. EAO included a draft section 11 Order with the letter and invited Metlakatla First Nation to comment on the draft Order. EAO also offered a meeting with the Metlakatla First Nation in order to discuss Metlakatla First Nation's interests in the proposed Project area and potential participation in the EA.

On October 26, 2010, Metlakatla First Nation responded to EAO, seeking a copy of the document "*Metlakatla Review of Historical and Ethnographic Sources*" referenced in EAO letter dated September 1, 2010, and seeking clarification on EAO's preliminary assessment that the proposed Project was unlikely to have potential impacts to aboriginal rights. Metlakatla First Nation provided EAO with a map of their traditional territory, indicating that the proposed Project was within their traditional territory.

On November 9, 2010, EAO wrote to Metlakatla First Nation reminding them of the opportunity to comment on the draft section 11 Order and offering to meet with EAO to discuss Metlakatla First Nation's interest in the proposed Project area. EAO also provided the requested ethnographic report.

On November 24, 2010, EAO transmitted the approved section 11 Order and offered Metlakatla First Nation capacity funding to participate in the pre-Application phase of the EA. The capacity funding was provided in December 2010.

On January 11, 2011, EAO wrote to Metlakatla First Nation saying that a review of the ethnographic information did not indicate any historic use of the actual site of the proposed Project. On this basis, EAO stated that EAO would only be consulting with the Metlakatla First Nation regarding the proposed marine transportation route and not the mite site itself. EAO asked Metlakatla First Nation to provide any additional information on its asserted aboriginal rights in the proposed Project area.

By email, on January 11, 2011, Metlakatla First Nation's consultant informed EAO the proposed Project was within the Metlakatla First Nation's territorial boundaries and asked that EAO direct the Proponent to consult on all the components of the proposed Project, not just marine transportation.

On March 10, 2011, EAO wrote to advise Metlakatla First Nation that the Proponent had made changes to proposed Project which involved moving ore by truck, not barge. EAO advised Metlakatla First Nation of its intention to revise the section 11 Order to remove marine transportation from the scope of the proposed Project and also remove the requirement for both EAO and the Proponent to consult with Metlakatla First Nation. EAO sought Metlakatla First Nation's concerns with this potential amendment.

In response to EAO's letter, Mandell Pinder, LLP, Barristers and Solicitors (Mandell Pinder), on behalf of Metlakatla First Nation wrote to EAO on March 28, 2012, informing EAO that the proposed Project is within Metlakatla First Nation's territory and advising EAO that Metlakatla First Nation did not wish to be removed from the section 11 Order. The letter referenced the December 10, 2009, Reconciliation Protocol between Metlakatla First Nation and the Province.

In a follow up letter dated April 1, 2011, on behalf of EAO, JAG wrote to Mandell Pinder outlining consultation efforts to date and requesting that Mandell Pinder address future correspondence to JAG.

On June 6, 2011, EAO sent a letter advising Metlakatla First Nation that it would not remove Metlakatla First Nation from the section 11 Order. The letter also provided a preliminary strength of claim assessment which said that, in relation to the EA of the proposed Project, the appropriate scope of the duty to consult with, and if appropriate, accommodate Metlakatla First Nation towards the low end of the *Haida* spectrum. The letter reiterated earlier requests and asked for any information Metlakatla First Nation

could provide which would expand on the nature of Metlakatla First Nation's asserted rights to the proposed Project area and offered to change the *Haida* analysis should new information be provided. EAO also outlined the opportunities for consultation, which it noted would normally exceed what could be expected from the low end of the *Haida* spectrum. The opportunities outlined in the letter included:

- Metlakatla First Nation was invited to participate in the Working Group;
- EAO would direct the Proponent to engage with Metlakatla First Nation to discuss Metlakatla First Nation's asserted rights and report the results to EAO, as consistent with the section 11 Order;
- Prior to submitting the Application, the Proponent will submit to EAO a record of its consultations and its plan to engage Metlakatla First Nation;
- EAO would invite comments from Metlakatla First Nation during the 30 day evaluation period to determine if the information specified in the AIR is in the Application;
- During the Application review stage EAO would continue to consult with Metlakatla First Nation on how the proposed Project may impact Metlakatla First Nation's asserted aboriginal rights;
- EAO would offer Metlakatla First Nation with the opportunity to provide comments to the Proponent and EAO would determine the adequacy Proponent's responses;
- EAO would provide Metlakatla First Nation with an opportunity to review EAO's Assessment Report, which would outline the details of what EAO heard from Metlakatla First Nation and what was learned about the Metlakatla First Nation asserted aboriginal rights over the course of the EA and which identifies those measures that are to be put in place in order to accommodate the rights; and,
- EAO would provide Metlakatla First Nation with an opportunity to have its views on EAO's draft Assessment Report to be included in the package of material sent to responsible Ministers if a proposed Project is referred for decision.

On October 20, 2011, EAO met with Chief Leighton of the Metlakatla First Nation, their legal counsel and consultants, and the CEA Agency to discuss consultation opportunities, the EA review and strength of claim assessments.

On October 25, 2011, Mandell Pinder, on behalf of Metlakatla First Nation, wrote to inform EAO acknowledging the Province recognized the proposed Project is within the Metlakatla First Nation's asserted traditional territory. Mandell Pinder noted dissatisfaction with the Province's assessment that its duty to consult is at the low end of the *Haida* spectrum. The letter mentioned that Metlakatla First Nation intended to provide further evidence of their title rights and potential impacts of the proposed Project on Metlakatla First Nations to EAO, within the next few months and wished to consult with EAO on this information. Metlakatla First Nation asked that no regulatory decision

be made until EAO has been provided with the opportunity to review these reports, and address the appropriate level of accommodations.

Mandell Pinder provided a report to EAO on November 15, 2011, entitled “*Analysis of territorial claims made in “Lax Kw’alaams: Review of Historical and Ethnographic Sources” and “Metlakatla: Review of Historical and Ethnographic Sources” documents prepared by the Aboriginal Research Division of the British Columbia Ministry of Attorney General Legal Services Branch*” (October 18, 2011) to EAO. In their transmittal letter, Mandell Pinder asked that once EAO has reviewed the report that EAO advise Metlakatla First Nation on the Province’s revised assessment. Mandell Pinder stated that the report made it clear that the Crown’s duty to consult and accommodate at the high end of the *Haida* spectrum.

In preparation for submitting an Application, the Proponent provided a copy of their Consultation Record and Plan to the Metlakatla First Nation on October 6, 2011. On December 6, 2011, Metlakatla First Nation indicated to EAO that the Proponent had completed little consultation to date and that they did not recognize the Metlakatla First Nation’s claim as being legitimate. Legal counsel for the Proponent responded to this on December 20, 2011, to EAO, clarifying that they had been engaging in good faith and had been waiting for additional direction from EAO. In turn, Mandell Pinder responded on January 6, 2012, acknowledging the Proponent was responsive to their concerns.

Prior to the Proponent submitting its Application to EAO for the 30 day screening in December 2011, representatives of Metlakatla First Nation, through the Working Group, were invited to participate in the screening evaluation of the Proponent’s Application. The Proponent submitted its Application on December 22, 2011, to members of the Working Group who confirmed they wish to participate in the evaluation, including representatives of Metlakatla First Nation. Metlakatla First Nation participated in the evaluation and EAO considered their comments.

On behalf of Metlakatla First Nation, on January 6, 2012, Mandell Pinder wrote to inform EAO that Metlakatla First Nation is encouraged that that the Federal Authorities have concluded their duty to consult with Metlakatla First Nation lies at the high end of *Haida* spectrum, and advised EAO to do the same.

On January 10, 2012, EAO provided Metlakatla First Nation with additional capacity funding to participate in the review of the Application for the proposed Project.

On January 23, 2012, Mandell Pinder wrote to EAO requesting additional funding to complete further research regarding Metlakatla First Nation’ asserted rights in the proposed Project area. EAO declined the request.

On February 10, 2012, a representative of Metlakatla First Nation provided comments on Metlakatla First Nation’s evaluation of the Proponent’s Application. Their comments were in two main themes:

- The proposed Project is within the boundaries of Metlakatla First Nation's territory and has the potential to infringe Metlakatla First Nation's title and rights and impact Metlakatla First Nation's interests; and,
- A more detailed section-by-section review of the Proponent's Application noting which sections were adequate, which sections were not found, incomplete or inadequate, and drawing attention to those sections which require more attention. The memorandum stated that Metlakatla First Nation intended to comment in more details during the 180 day review period.

On February 22, 2012, EAO wrote to Metlakatla First Nation advising that the Proponent's Application for an EA Certificate had been accepted for review, following a determination that it contained the information specified in the AIR. In the same letter EAO commented on the Martindale and Marden report, saying that it provided no reference the Kitsault area, despite providing extensive information and evidence on other areas in the Metlakatla First Nation asserted traditional territory. EAO noted that the report would appear to support EAO's earlier preliminary strength of claim assessment.

Application Review

On April 30, 2012, the Proponent submitted copies of updated version of the Application to EAO and members of the Working Group, triggering the start of the 180-day Application review. Also, EAO notified representatives of Metlakatla First Nation, through the Working Group, by email, about the start of the 180-day Application review, requested Metlakatla First Nation submit comments on the Proponent's Application by May 30, 2012, and informed Metlakatla First Nation of an upcoming Working Group meeting, public comment period, and open houses.

By email, on May 30, 2012, Metlakatla First Nation wrote to EAO to submit comments on the Proponent's Application to EAO, highlighting the following concerns:

- The conclusions made regarding project impacts to Metlakatla First Nation's interests are based on inaccurate data, do not adequately reflect the potential long term and cumulative impacts that mine development and operation could have on Metlakatla First Nation's territory and resources;
- Water quality models are lacking scientific rigour and merit, yet outputs relied upon to support conclusions;
- Summary of impacts to Metlakatla First Nation are based on assessment which are inaccurate, given the inconsistencies in the water quality chapters, and therefore, Metlakatla First Nation does not agree with the conclusions of no significant impacts; and,
- The immediate, long term and cumulative impacts of the proposed Project on the surrounding environment and Metlakatla First Nation's resources.

In the May 30, 2012 correspondence, Metlakatla First Nation stated that further work is required to ensure impacts are appropriately identified and mitigated, and Metlakatla First Nation's concerns are addressed. A table which identified a full list of Metlakatla First Nation's concerns with the Proponent's Application was included in the correspondence.

Metlakatla First Nation representatives attended Working Group meetings on June 6, July 11, and August 13, 2012. Metlakatla First Nation raised the following key concerns:

- Impact of the proposed Project on water quality; and,
- Requirement for a cumulative impact assessment due to the historic issues at the proposed Project site, specifically, human health impacts from the consumption of shellfish, and other marine organisms.

By email on July 5, 2012, Mandell Pinder provided EAO with a copy of Dr. George MacDonald's and Joanne MacDonald's, "*Kitsault Mine Report*", which provided additional information on Metlakatla First Nation aboriginal rights and title in relation to the proposed Project area.

During the Application review, Metlakatla First Nation was invited to comment on the supplemental information, including technical memorandums and key draft referral documents provided by the Proponent, on July 31, 2012, August 16, 2012, and September 28, 2012. On August 24, 2012, Metlakatla First Nation submitted comments on the Proponent's draft Certified Project Description for the proposed Project and technical memorandums. Metlakatla First Nation provided a summary of the most pertinent issues and concerns. These included:

- Potential impact to marine water quality and marine organisms, impacting Metlakatla First Nation's right to access and harvest marine resource in their territory;
- The Proponent should complete further study to determine the extent and severity of the contamination of marine organisms and outcomes for harvesters;
- Further consultation with First Nations is required on the marine monitoring program design, and a more detailed list of commitments before an EA approval;
- Marine water quality extending to aquatic water quality in Lime, Clary and Patsy Creeks; the elevated levels of metals in the aquatic environment naturally occurring combined with historical mining activities resulting in a cumulative effects;
- Establishment of conservative water quality standards with buffers for protecting aquatic life where uncertainty of acceptable levels exist;

- The Table of Conditions should include commitments for actions, communications and associated timeline should unfavorable monitoring results arise, and give assurance that issues arising from water quality monitoring be addressed;
- Assessments committed to in the Species at Risk and Wetland memorandum, and any recommended follow up should be conducted finalized prior to EA;
- A conceptual wetland compensation plan be developed before EA is finalized and First Nations should be involved in the development and implementation of the plan;
- Table of Conditions should include:
 - a more detailed account of the range of mitigation measures;
 - commitment to address First Nations socio-economic interests through project development, approvals and operations;
 - commitment to marine monitoring program which specifies objectives, timelines and adaptive management; and,
 - a list of EMPs that will be implemented for the proposed Project and be reiterated in the Certified Project Description. First Nations should have the opportunity to review and comment on the plans once fully developed.
- More discussion and the development of commitments on the process of environmental monitoring, with specific information on what will occur during all phases of the proposed Project. This information was requested prior to an EA being approved.

On October 2, 2012, EAO wrote to Mandell Pinder to respond to the July 4, 2012, “*Kitsault Mine Report*” by Dr. George MacDonald and Joanna MacDonald. EAO provided its own report for the proposed Project called “*Kitsault Mine: Review of Ethnographic and Historical Sources*”, September 26, 2012. In the transmittal letter, EAO reiterated its earlier preliminary strength of claim assessment for Metlakatla First Nation for the area around the proposed Project area, and summarized EAO’s record of correspondence and consultations, including restating that the appropriate scope of the EAO’s duty to consult being on the low end of the *Haida* spectrum.

A representative of Metlakatla First Nation attended the Working Group meeting on October 10 and 11, 2012, and commented on the draft Table of Conditions and draft Certified Project Description. Metlakatla First Nation requested that the Table of Conditions provide direction for the Proponent to communicate and consult with Metlakatla First Nation on the development and implementation of management plans and for the proposed Project.

On October 22, 2012, the Metlakatla First Nation submitted additional comments on the Proponent's draft Certified Project Description, including:

- As stated in previous comments, regarding the marine monitoring program and contamination testing, Metlakatla First Nation requested that a wider variety of marine species be sampled, specifically, species harvested and consumed by First Nations, and that Metlakatla First Nation be included in the discussion with the Proponent on the selection of such species;
- The marine monitoring program should be designed to be inclusive of First Nations interests; cumulative effects, including historical impacts should be considered; and, monitoring changes in contamination that are significant or negatively impact health of the species or exceed health standards for consumption;
- Involving Metlakatla First Nation in the design, implementation, and reporting of the findings of the aquatic monitoring program, including the AEMP and EMP;
- Full list of EMPs and commitments associated with EMPs that are not required for permitting be provided and be committed to by the Proponent;
- Including Metlakatla First Nation in the development of fish habitat and wetland compensation plans, and wildlife plans;
- Proponent to include a description of the Proponent's general approach to environmental monitoring during construction and operation;
- Proponent to include a commitment to develop a mutually acceptable communications plan, including project development, monitoring, opportunities for participation, and emergency response, with Metlakatla First Nation; and,
- Proponent to include a commitment to work with Metlakatla First Nation to address socio-economic impacts and opportunities associated with the proposed Project, and an Impact Benefit Agreement (IBA) or other agreement.

Mandell Pinder, on behalf of Metlakatla First Nation wrote to EAO on November 2, 2012, in response to EAO's letter of October 2, 2012, and raised concerns about the consultation which has taken place to date regarding the proposed Project. They also requested a meeting with EAO before the draft Assessment Report was complete in order to discuss accommodation measures for environmental protection and economics. Mandell Pinder sent a second letter to EAO on November 2, 2012, regarding the report: "*Kitsault Mine: Review of Ethnographic and Historical Sources*", dated September 26, 2012. Mandell Pinder asked that EAO not approve the proposed Project until EAO consider Metlakatla First Nation's response to this report. Further, Metlakatla First Nation raised concern about the lack of consultation with Proponent, regarding how the proposed Project may impact Metlakatla First Nation's rights and title or how their concerns will be addressed.

In response to the two letters, dated November 2, 2012, from Mandell Pinder, EAO wrote to Metlakatla First Nation on November 20, 2012, regarding consultation, accommodation, and provided a response to EAO's review of ethnographic and historical resource as they relate to the proposed Project. EAO informed Metlakatla First Nation that EAO would be providing its draft Assessment Report and draft First Nations Consultation Report for review and comment in the coming weeks, and the next steps of the EA, including a Working Group on November 27, 2012.

On November 30, 2012, Metlakatla First Nation was provided with the opportunity to comment on EAO's draft Assessment Report, draft Table of Conditions, draft Certified Project Description, and a draft of Consultation Report. EAO requested comments by December 21, 2012.

A representative of Metlakatla First Nation participated in a Working Group on December 14, 2012.

On December 21, 2012, Metlakatla First Nation submitted comments on EAO's draft Assessment Report, draft Table of Conditions, and the draft Certified Project Description.

On January 7, 2013, by email, Metlakatla submitted comments on the draft Metlakatla First Nation Consultation Report, and included Metlakatla First Nation's response, (prepared by Dr. MacDonald) dated November 22, 2012, to the Province's report: "*Kitsault Mine: Review of Ethnographic and Historical Resources*", prepared by JAG, Aboriginal Research Division, dated September 26, 2012. In the submission, Metlakatla First Nation raised the following concerns:

- The design of the BC EA process, including the lack of a clear legislative mandate and flexibility essential to meaningful consultation, rigid timelines impossible to meet, and approving projects based on Proponent's commitment to take future steps to address impacts rather than enforceable measures to ensure impacts are mitigated;
- The Crown (EAO) delegating "procedural aspects" of its consultation duties to the Proponent, yet the Proponent has not taken steps to consult with Metlakatla First Nation; and,
- How EAO has identified and characterized Metlakatla First Nation's interests in the proposed Project area; and Metlakatla First Nation does not agree with EAO's assessment of, or conclusions regarding Metlakatla First Nation aboriginal title and rights.

On January 21, 2013, EAO and Metlakatla First Nation discussed issues related to the content of a number of research reports written by Drs. Martindale, Marsden, McDonald and JAG, exchanged between EAO and Metlakatla First Nation.

On February 8, 2013, EAO responded to, and informed Metlakatla First Nation how their comments had been addressed, and provided a memorandum (prepared by JAG, Aboriginal Research Division) in response to EAO's discussions with Metlakatla First Nation on January 21, 2013.

12.5.4.2 Metlakatla First Nation's involvement with Proponent

EAO directed the Proponent to engage with Metlakatla First Nation to discuss Metlakatla First Nation's asserted aboriginal rights and report the results of those conversations back to EAO, consistent with the section 11 Order.

Based on the Proponent's consultation report provided to EAO on consultations which occurred during the Application review, the Proponent appeared to rely on Metlakatla First Nation's participation in the technical Working Group for their main interactions. EAO understands that to date, the Proponent has not met with Metlakatla First Nation regarding the proposed Project. However, the Proponent has responded to Metlakatla First Nations concerns regarding the freshwater and marine environment, through technical memorandums provided through the Working Group. The Proponent has developed the framework of a water management plan, water treatment and aquatic environment monitoring plan, and marine environment monitoring plan. Metlakatla First Nation was provided with the opportunity to review the frameworks of these plans.

On October 31, 2012, Metlakatla First Nation sent a letter to the Proponent to express its disappointment in the manner in which the Proponent has dealt with the Metlakatla First Nation during the EA of the proposed Project. The letter outlines the several attempts made by Metlakatla First Nations to engage the Proponent over the course of several months, with no success, and a request to meet with Metlakatla First Nation as soon as possible.

EAO is not aware if Metlakatla First Nation has met or has scheduled a meeting with the Proponent regarding the proposed Project.

12.5.5 Potential Impacts to Metlakatla First Nation Interests and Measures to Mitigate or Accommodate Impacts

Section 12.5.4.1 above describes EAO's understanding of the issues that have been identified by the Metlakatla First Nation during the EA for the proposed Project.

Responses to the full set of concerns are described in the Issues Tracking Table (Appendix 1). Further information on how concerns have been addressed, including mitigation and Proponent commitments, is provided in the relevant sections of the Assessment Report. The majority of the issues raised by Metlakatla First Nation relate

to water quality (section 5.1) aquatic resources (sections 5.4 and 5.5), and wildlife (sections 5.8) and are summarized in Assessment Report. In terms of matching specific concerns with corresponding mitigation measures, the reader is directed to those documents. The following is intended only to be a summary of the major themes raised and accommodations of those issues.

Consultation and Accommodation

- Metlakatla First Nation expressed concerns that EAO has not acknowledged a strong *prima facie* strength of claim for the proposed Project area and has not met with Metlakatla First Nation to discuss the proposed Project.
 - EAO has provided capacity funding and has included a range of consultation opportunities more normally associated with “deep” consultation.
 - EAO completed its own Kitsault ethnographic report for Metlakatla First Nation and communicated that report in order to ensure the preliminary assessment was correct and reasonable. EAO has also expressed a willingness to reconsider its initial preliminary strength of claim assessment and has responded to all information provided by Metlakatla First Nation.
 - EAO has met with Metlakatla First Nation once and expressed a willingness to meet at any time to discuss the draft Assessment Report and First Nation Consultation Report.
- Metlakatla First Nation asked the Proponent to include a commitment to work with them to address socio-economic impacts and opportunities associated with the proposed Project, including an IBA.
 - EAO acknowledged this request; however, to date no information has been presented by Metlakatla First Nation that would substantiate what rights would be impacted or what social or economic interests could be affected by the proposed Project.
 - EAO does not take any position on IBAs. Proponents and First Nations are free to discuss such agreement outside the EA process.
- Metlakatla First Nation has asked the Proponent to include a commitment to develop a mutually acceptable communications plan, including project development, monitoring, opportunities for participation, and emergency response, with Metlakatla First Nation.
 - The Proponent has committed to consult with the Metlakatla First Nation on permitting as well as the development of monitoring plans implementation.
- The Table of Conditions should include commitments for actions, communications and associated timeline should unfavorable monitoring results arise, and give assurance that issues arising from water quality monitoring be addressed.

- EAO concurs. These “action plans” built into monitoring plan frameworks.
- Metlakatla First Nation has asked that they have the opportunity to review and comment on the EMPs once they are fully developed.
 - Plans included in the Table of Conditions will include the involvement of the Metlakatla First Nation.
 - Permitting agencies will consult with the Metlakatla First Nation on appropriate statutory decisions.

Water Quality

- Metlakatla First Nation raised questions regarding the water quality models and scientific rigour of assumptions, and in particular, relying on models to conclude there are no adverse effects.
 - In their Application, the Proponent initially provided a series of water management and water treatment “scenarios” and approaches which they committed to consider, if required, at permitting. When this approach was not supported by EAO, the Proponent undertook further assessment and modelling and committed to a number of new water treatment options, including an in-mill treatment and filtration system, conventional HDS treatment with sulphide addition in post-closure, and a new water management system which significantly improves water quality in the Lime Creek and Clary Creek watersheds.
 - The Proponent has also committed to meet BCWQG, Site Specific WQO approved by the MOE or other water quality targets approved under the *Environmental Management Act*.
- Concerns were expressed by Metlakatla First Nation about elevated levels of naturally occurring metals in the aquatic environment combining with historical mining activities and how this may create a cumulative effect.
 - In order to analyze the impact of naturally occurring, the Proponent took measurements of the natural water quality in Lime Creek and Patsy Creek upstream of historic mining and synthesized an artificial “natural” water quality in order to predict “pre-mine” conditions in Lime Creek. Water quality comparisons were made against both current water quality and this “natural” water quality. This data was used on graphs and tables for comparison of modeled data to baseline, to provide context to the actual change from background conditions.
 - The Proponent has also WQO approved by the MOE.

Fish and wildlife

- Metlakatla First Nation wishes to be included in the development of fish habitat and wetland compensation plans, and wildlife plans;
 - Permitting agencies will consult with Metlakatla First Nation on the appropriate statutory decisions.

- Metlakatla First Nation would like to see compensation plans completed prior to EA finalization.
 - The Table of Conditions refers to “frameworks” for a number of plans (e.g. Marine Environmental Effects Monitoring) with appropriate timing for their completion. Metlakatla First Nation will be consulted on those plans.

Monitoring and Management Plans

- Metlakatla First Nation wanted to ensure a very robust marine environmental effects monitoring program would be put in place to ensure that there would be no effects and if there were, how would they be detected, results communicated and negative effects mitigated.
 - The Proponent committed to developing a Marine Environment Effects Monitoring Program to the approval of the MOE, in consultation with the Nisga’a Nation and Metlakatla First Nation. A framework, setting out the objectives and core elements of the MEMP are included in the Certified Project Description. The MEMP would be designed to: “Determine whether the mining operations of the Project result in a statistically significant change in project-related metal concentrations in shellfish from current reference conditions in Alice Arm.”
 - The Proponent committed to use the results of the MEMP as a feedback mechanism to determine the effectiveness of the mine’s management practices in mitigating effects on marine water uses and to determine if additional management actions are warranted to prevent or address potential impacts.
 - The Proponent committed to work with Federal, Provincial and NLG and the Metlakatla First Nation during all stages of the MEMP and will share the collected data with those parties involved with the MEMP.
 - The Proponent committed to complete the baseline components of the MEMP prior the commencement of mine operations.
 - The Proponent also committed to additional water treatment and water management during operations, closure and post-closure, which result in a significant improvement in water quality over the predictions provided in the Proponent’s original EA Application.
- Metlakatla First Nation wanted to be included in discussion with the Proponent on the selection of species monitored and overall design of monitoring studies and wanted to ensure that marine monitoring is representative of First Nations’ interests, including historical impacts and effects to health.
 - The Proponent committed to include Metlakatla First Nation in the development of these monitoring plans.

12.5.6 Conclusions Regarding Metlakatla First Nation

In view of the consultation that has taken place with the Metlakatla First Nation, EAO

concludes that:

- The process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns expressed by Metlakatla First Nation;
- The process of consultation was appropriate and reasonable in the circumstances; and,
- EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Metlakatla First Nation asserted aboriginal rights (and by way of both draft and final copies of this Report, it is communicating its findings to Metlakatla First Nation).

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Metlakatla First Nation, EAO concludes that the risk of adverse effects to lands and resources associated with the exercise of Metlakatla First Nation's asserted aboriginal rights has been appropriately avoided or mitigated to the extent necessary to maintain the honour of the Crown.

13 PART D - NISGA'A NATION

13.1 Introduction and Purpose

Chapter 10 of the NFA applies to the EA of the proposed Project as it falls within the Nass Area³⁸, as defined in the NFA. This purpose of this Report is to comply with Chapter 10, paragraph 8(e) and 8 (f) of the NFA.

The basis of this assessment was informed by the Proponent's Application for an EA Certificate, including supplemental materials, plus the Proponent's ESCIA and related documents as well as issues raised in tripartite government meetings with the Proponent during review of the proposed Project's Application for and EA Certificate.

Section 13.2 of this Report assesses whether the proposed Project can reasonably be expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests and, where appropriate, make recommendation to prevent or mitigate those effects, pursuant to Chapter 10, paragraph 8 (e) of the NFA. This section also provides the EAO's analysis and conclusions of the Proponent's proposed mitigation measures to address concerns raised by the NLG during the EA Application Review.

Section 13.3 of this Report assesses the effects of the proposed Project on the existing and future economic, social and cultural well-being of Nisga'a citizens who may be affected by the proposed Project pursuant to Chapter 10, paragraphs 8(f) of the NFA. This assessment was completed using materials produced by the Proponent which were identified in the July 2011 "*Project Work Plan for Assessment of Nisga'a Economic, Social, and Cultural Impacts*". That workplan was developed jointly by the NLG, EAO and CEA Agency in order to provide the Proponent guidance on the type of information the Proponent would be required to collect in order to assess the effect of the proposed Project on the existing and future economic, social and cultural well-being of Nisga'a citizens who may be affected by the proposed Project.

This Report is not intended to duplicate or reproduce the analysis of the proposed Project EA Application prepared pursuant to the provincial or federal EA processes, or the EAO's Assessment Report and CEA Agency Comprehensive Study Report.

As further described in the EAO's Assessment Report, the analysis and conclusion of potential effects of the proposed Project includes consideration of the Proponent's

³⁸ For the purposes of clarity, the term "Nass Area" will be used throughout, unless the circumstances require that reference be made to the "Nass Wildlife Area" or "Nisga'a Lands" as both those areas are included in the Nass Area.

mitigation commitments which, as defined in the Certified Project Description and Table of Conditions, would become legally binding conditions of an EA Certificate should one be issued.

13.2 Nisga'a 8e Assessment

13.2.1 Lands

The NFA comprehensively deals with Nisga'a section 35 rights, including land based rights and authority to make laws in various areas, sets out various interests of the Nisga'a Nation and addresses many other topics.

Chapter 3 of the NFA defines the extent of Nisga'a Lands (1,992 km²) and sets out the nature of Nisga'a Nation's ownership of Nisga'a Lands and Nisga'a Fee Simple Lands (Category A Lands and Category B Lands) which are situated outside of Nisga'a Lands, as well as other interests of the Nisga'a Nation including a commercial recreation tenure, heritage sites, and key geographic features.

The Nisga'a Nation owns Nisga'a Lands in fee simple including the mineral resources on or under Nisga'a Lands as well as all forest resources on Nisga'a Lands (NFA Chapter 5 paragraph 3). BC owns submerged lands within Nisga'a Lands. Chapter 3 identifies interests that apply to Nisga'a Lands. While Nisga'a Memorial Lava Bed Park (the "Park") and Gingeitl Creek Ecological Reserve (the "Ecological Reserve") are not included in Nisga'a Lands, Nisga'a citizens have the right to traditional uses of lands and resources within those areas. The Nisga'a Nation has the right to participate in the planning, management and development of the Park and Ecological Reserve as set out in the NFA.

Nisga'a Lands form part of the NWA (the area in which Nisga'a citizens have the right to harvest wildlife as set out in the NFA), and the NWA is in turn part of the Nass Area (NFA Appendix I-1).

The proposed Project is situated within the Nass Area, but is 25 km east of the boundary of Nisga'a Lands. A good portion of the transportation corridors that will be utilized in connection with the proposed Project are within the Nass Area; and parts of the Alice Arm Road (10 km) intersect Nisga'a Lands as does approximately 25 km of the Nisga'a Hwy to Terrace. The Nisga'a Hwy is not part of Nisga'a Lands, but is situated within Nisga'a Lands. The other transportation corridors are secondary provincial roads as defined in the NFA and the Nisga'a Nation has granted the Province rights of way to the secondary provincial roads pursuant to the NFA Chapter 7 paragraph 17.

The proposed Project is also located 5 km southeast of one of the Nisga'a Fee Simple Category A Lands, namely the Gits'oohl parcel. In addition, one of the areas included in the Nisga'a commercial recreation tenure is adjacent to that parcel. The Nisga'a Hwy crosses Nisga'a Memorial Lava Bed Park.

Potential Effects of the Proposed Project

For the purposes of public safety the Proponent will maintain a 500 m buffer around the mine site, which will prohibit various activities, including the exercise of Nisga'a section 35 rights by Nisga'a citizens or activities that would otherwise be carried out pursuant to Nisga'a interests as set out in the NFA. With the mine footprint and buffer covering a total area of 1,980 ha and the NWA and the Nass Area spanning 1,610,100 ha and 2,700,000 ha, respectively, this area is a very small portion (0.12%) of the NWA and 0.07% of the Nass Area.

Mitigation Measures

For this analysis, EAO assumes that there are no mitigations which could avoid or reduce the potential effect of the loss of access to the mine site during active mining for safety purposes. The Proponent notes that it will work with the NLG in order to address any site specific issues that could arise from the inability of Nisga'a citizens to exercise Nisga'a section 35 rights or carry out activities pursuant to Nisga'a interests as set out in the NFA in this area.

EAO's Preliminary Conclusions on Lands Interests

EAO concludes that the very small area (0.07% of the Nass Area and 0.12% of the NWA) that will be unavailable for access by Nisga'a citizens from the proposed Project would not reasonably be expected to result in any adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests as set out in the NFA.

13.2.2 Access

NFA Chapter 6, Access, in general, defines the rights, obligations, and limitations regarding public and Crown access to Nisga'a Lands, as well as Nisga'a access to Crown lands. NLG has the authority to make laws in respect of access to Nisga'a Public Lands as set out in the chapter.

NFA, Chapter 7, Roads and Rights of Way, describes ownership, responsibilities, and obligations for roads and rights of way (including utility rights of way) within Nisga'a Lands, including the Nisga'a Hwy and secondary provincial roads such as the Nass FSR, and the Alice Arm Road, and Nisga'a Roads. Nisga'a laws apply to various rights of way areas (including secondary provincial road rights of way) as set out in Chapter 7 paragraph 6.

Potential Effects of the Proposed Project

The Proponent predicts that year-round maintenance activities associated with the proposed transport corridors, particularly the network of FSR including the Nass, Nass-Kinskuch, Nass-Kwinatahl, and Alice Arm FSRs, which have the potential to cause adverse environmental effects to fish and to wildlife. Those effects are discussed in those respective sections of this Report. As the holder of the SUP for the roads from the mine site to the Nass FSR at Hwy 113, the Proponent would be responsible for maintaining these roads during the winter and spring.

Nisga'a citizens are known to use the network of the FSR to access areas for pine mushroom picking, hunting, snowmobiling, fishing, and trapping. Furthermore, the location of the mine site is not predicted to hinder land-based access to Alice Arm. Nisga'a access to different land use sites along the Nass FSR and Hwy 113 could be impeded in the short term as a result of vehicular accidents over the life of the proposed Project.

EAO notes that, during the review, the NLG expressed a concern that restricting the Proponent's winter access to the "Cranberry Connector" would impact the ability of Nisga'a citizens to access portions of the Nass Area closer to Hwy 37 as well as potentially increasing traffic along the Nisga'a Hwy.

Mitigation Measures

The plowing of otherwise inaccessible roads in the winter and the grading and management of vegetation along the road right-of-ways in the spring are expected to provide Nisga'a citizens with improved access to land use and cultural sites in the Nass Area.

EAO's Preliminary Conclusions on Access Interests

EAO concludes that the Proponent's proposed use of an existing network of FSR and Provincial Hwys, including the all-season upgrade of the Nass FSR through to Hwy 37, is not reasonably expected to have any adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands or Nisga'a interests as set out in the NFA.

Water

Chapter 3 of the NFA provides the Nisga'a Nation with a water reservation of 300,000 decameters (dam) per year from the Nass River and other streams for domestic, industrial, and agricultural uses. There are provisions relating to the Nisga'a water licences, which would be applied against the Nisga'a water reservations.

There are other related provisions including clarification of the priority of historic water licences relative to Nisga'a water entitlements; and permitting the Nisga'a to appoint a water bailiff under the *Water Act* for that portion of the Nass River within Nisga'a Lands and other streams wholly or partially within Nisga'a Lands. The Nisga'a Nation, under its Hydro Power Reservation, has the opportunity to investigate the hydroelectric potential of all unrecorded waters of all streams, other than the Nass River, within Nisga'a Lands.

The Proponent identified three rivers – the Kwinatahl, Tchitin, and Kshadin Rivers – as being either close to the proposed Project or the access road with the Kwinatahl River flowing closest to the mine site (2 km away). These rivers are specified in Chapter 3 of the NFA with percentages of total stream volume that may be used toward the Nisga'a water reservation. However, there are no project related interactions or effects expected on these rivers. There are also no direct interactions or effects expected on the Nass River, the Kitsault River or any other watersheds within Nisga'a Lands. However, EAO notes that Chapter 10 of the Assessment Report discusses risk associated with spills along the transportation route and that the transportation route does traverse Nisga'a Lands and cross the Nass River.

Watersheds affected within the proposed Project footprint and downstream receiving environment include the Lime/Patsy Creek, Clary Creek and Illiance River Watersheds, which all drain directly into Alice Arm, are all situated within the Nass Area, but are outside of Nisga'a Lands. As these watersheds drain directly into Alice Arm they do not influence stream flow or water quality in the Nass River or Kitsault River.

Maintaining stream flow and water quality in waterbodies within the Nass Area is important to the protection of freshwater and marine ecosystem values including fish stocks and aquatic plants in Alice Arm, as well as terrestrial vegetation and wildlife values, all of which are important to the Nisga'a Nation. Changes to stream flow and water quality can have potential adverse effects on ecosystem health which, in turn, could have implications on human health from consumption of fish and wildlife harvested by Nisga'a citizens.

Potential Effects of the Proposed Project

Nass River and other Waterbodies defined in Chapter 3 of the NFA

There are no potential adverse environmental effects expected from the proposed Project to stream flows, water quality or aquatic resources in the Nass River, its tributaries, or the Kitsault River or any other watersheds identified in Chapter 3 of the NFA. The proposed Project's mining activities do not have any interactions or effects with any other watersheds beyond the LSA and RSA (Lime/Patsy Creek and Clary Creek/Illiance River Watersheds) as identified in the Proponent's EA Application for potential effects to hydrology, water quality and aquatic resource VCs. EAO notes that

Chapter 10 of the Assessment Report discusses the possibility of effects to waterways from accidents and/or spills along the transportation route.

Mine-related activities are not expected to extend to the Nass River and as such, no changes are expected in the Nass River or the Kwinatahl River.

Mitigation Measures

No direct effects on water interests as defined in the NFA were identified and therefore no mitigation was proposed. However, as Chapter 10 of the Assessment Report notes, there is a possibility of an effect to water caused by accidents or spills along the transportation route. Accordingly the Proponent developed a number of mitigations related to the transportation corridors. Details on these are mitigations are provided in Chapter 10. Some of the key mitigations include:

- The Proponent committed to the development of a Transportation Safety Plan, to be completed prior to construction, that would include the following elements:
 - Develop a site map of locations of areas of higher environmental risk in the case of an accident or spill. This map will be distributed to mine-related vehicle drivers through the Traffic Control Plan.
 - Undertake additional survey to assess the transportation routes for heavy-haul traffic, including determination of the limiting dimensions and weight that may be transported along the routes, and effectiveness of existing roadside and bridge barriers along the FSRs.
 - Details on how the Proponent will ensure proper training, inspections, and record-keeping procedures for transportation of hazardous materials and wastes.
 - Mobile spill response unit and trained Emergency Response Team based at the mine site and outfitted with self-contained collection of spill response materials for rapid deployment to spill sites.
 - Based on the assessment of high environmental risk areas where additional forms of barrier protection (such as rails, no-post barriers or wire rail type barriers) is needed along the FSRs, the Proponent commits to implement forms of barrier protection.
 - Development of a Traffic Control Plan to ensure all traffic movements along the transportation route conform to a standard set of rules and guidelines.

EAO's Preliminary Conclusions on Water Interests

EAO concludes that the proposed Project does not affect any of the designated streams outlined in the NFA. However, EAO notes that the EA discussed the potential for effects to water related to accidents and malfunctions. EAO concludes that, having considered

the Proponent's commitments, the proposed Project is not reasonably expected to have any adverse environmental effects on water interests described in the NFA. However, EAO understands water is also critical to a number of other interests in the NFA, including fisheries and wildlife interests. Potential effects to those treaty interests are described in the relevant sections below.

13.2.3 Fisheries

Chapter 8 of the NFA comprehensively deals with the Nisga'a right to fish as well as fish harvest allocation entitlements held by the Nisga'a Nation. Nisga'a citizens have the right to harvest fish and aquatic plants in accordance with the NFA, subject to measures necessary for conservation and legislation enacted for public health or public safety.

Chapter 1 of the NFA defines fish as:

- a. fish, including anadromous fish,
- b. shellfish, crustaceans, and marine animals,
- c. the parts of fish, shellfish, crustaceans, and marine animals, and
- d. the eggs, sperm, spawn, larvae, spat, juvenile stages and adult stages of fish, shellfish, crustaceans and marine animals but not "wildlife fish."

The Nisga'a are entitled to harvest wildlife fish pursuant to their right to harvest wildlife as specified in Chapter 9 of the NFA. Chapter 1 defines wildlife fish as:

- a. lampreys, crustaceans, mollusks, and non-anadromous fish, from or in non-tidal waters,
- b. the part of lampreys, crustaceans, mollusks, and non-anadromous fish, from or in non-tidal waters, and
- c. the eggs, sperm spawn, larvae, spat, juvenile stages and adult stages of lampreys, crustaceans, mollusks and non anadromous fish, from or in non-tidal waters.

Aquatic plants are defined to include kelp, marine flowering plants, benthic and detached algae, brown algae, red algae, green algae and phytoplankton.

Under Chapter 8 paragraph 64, Nisga'a citizens also have the right to harvest intertidal bivalves for domestic purposes within those portions of the Nass Area set out in Appendix I of the NFA. Intertidal bivalves are defined in Chapter 1 as littleneck clams, butter clams, horse clams, cockles, mussels and manila clams. This represents the Nisga'a fish allocation for intertidal bivalves.

The boundary of the intertidal bivalve harvest area identified in Appendix I of the NFA is located approximately 15 km southwest of the proposed Project near the entrance to Alice Arm from Observatory Inlet. There are no intertidal bivalve harvest areas identified

in Appendix I of the NFA within the near vicinity of the proposed Project's marine receiving environment in Alice Arm near the Lime Creek estuary, or near the Kitsault and Illiance River estuaries at the head of Alice Arm³⁹.

Potential Effects of the Proposed Project

EAO's Assessment Report includes an evaluation of a number of VCs for both the freshwater aquatic environment and the marine aquatic environment. The evaluation of these VCs is used to analyze potential effects to "wildlife fish" in the freshwater aquatic environment as well as "fish" in the saltwater environment. EAO's complete and detailed analysis of effects to water quality, water quantity and aquatic resources is provided in sections 5.1, 5.2, 5.3, 5.4 and 5.5 and 10 of the Assessment Report. For the purposes of this Report, potential effects to both wildlife fish and fish are assumed to have a direct correlation to the effects discussed in those chapters, primarily water quality and quantity, physical habitat loss and monitoring as well as potential effects arising from accidents and malfunctions occurring along the transportation routes.

Effects from the proposed Project – Lime Creek Watershed, Wildlife Fish

Most mine facilities are located in the headwaters of the Patsy Creek drainage, which also drains into Lime Creek and then Alice Arm. The major mine components would include the TMF, the WRMF, the Kitsault Pit, the south diversion channel, and the Patsy Creek diversion.

Stream flow changes in Lime/Patsy Creek Watershed are predicted during construction and operations from diverting and storing upstream catchment area run-off in the TMF for start-up processing requirements and management of mine tailings, diversion of streams, annual discharge of excess accumulated run-off in the TMF; and filling of the Kitsault Pit at closure. Throughout operations, surplus water from the TMF would be discharged as per permit requirements, with the purpose of maintaining flows and water quality in Lime Creek for the protection of aquatic life.

During decommissioning, reclamation and closure, the Kitsault Pit would be filled with surplus water from the TMF and diversion of upstream drainage from the Patsy Creek watershed. The filling of the Kitsault Pit has the potential to reduce flows in Lime Creek, since water that was previously discharged to Lime Creek from Patsy Creek would be diverted to the pit. Diversion of water to fill the Kitsault pit is not anticipated to occur until Year 15 at the end of mine operations, and is estimated to extend through decommissioning up to 10 years into the closure phase.

³⁹ EAO notes that it has been advised that Nisga'a citizens harvest intertidal bivalves in Alice Arm.

While the pit is filling, the Proponent predicts a reduction in the annual average flows in Lime Creek watershed, the majority of which would be localized to Patsy Creek. After the Kitsault pit is filled, flows would increase slightly over current baselines.

Key water quality concerns associated with the proposed discharge of mine effluent from the TMF to Lime Creek include elevated levels of cadmium and other metals which could exceed BCWQG for protection of aquatic life. Baseline water quality in lower Lime Creek currently exceeds guidelines for a number of parameters. With the proposed water management and water treatment mitigation measures to protect aquatic life, the Proponent's water quality modelling results indicate water quality in lower Lime Creek⁴⁰ meets BCWQG for all parameters during all phases of the proposed Project with the exception of cadmium and sulphate as described below:

- Cadmium concentrations during Operations Year 13 (0.08 µg/L), Closure Year 14 (0.04 µg/L) through to Post-Closure Year 31 (0.06 µg/L) are predicted to be above the hardness dependant BCWQG (0.03 µg/L), however significantly lower than current average concentrations (0.22 µg/L) during all phases of the proposed Project.
- Sulphate is predicted to exceed the guideline (100 µg/L) at Post-Closure Year 2 (138.65 µg/L); however, remains below the guideline throughout Operations and Closure, and falls back below the guideline in Post-Closure Year 31.

Cadmium and sulphate are known to cause toxic effects to fish at elevated concentrations; however, despite the current baseline water quality in lower Lime Creek, with cadmium exceeding up to 18 times the BCWQG, in combination with sulphate and several other parameters exceeding guidelines, populations of Dolly Varden and coho salmon parr exist in lower Lime Creek.

The lower section of Lime Creek, extending 1.8 km upstream from the estuary in Alice Arm to a 8 m high waterfall (barrier to fish migration), provides marginal fish habitat for Dolly Varden char and coho salmon parr. Dolly Varden utilize the whole area of lower Lime Creek while coho salmon parr were found only in the lower 0.25 km section of Lime Creek downstream of a 3 m cascade. No spawning adult coho were observed in Lime Creek and the Proponent concluded that there was no evidence to support a coho salmon spawning run in Lime Creek, either recent or historically, and the parr utilizing lower Lime Creek for seasonal rearing habitat likely originate from other creeks or rivers in Alice Arm.

⁴⁰ At LC1, a water quality monitoring station located near where Lime Creek enters Alice Arm. This location is described and shown on maps in the Certified Project Description.

There are no fish present above the barrier and the lower 1.8 km fish bearing section of Lime Creek is located approximately 6 km downstream of the proposed mine site effluent discharge to Lime Creek.

Potential adverse environmental effects in the downstream receiving environment in Lime Creek during all phases of the proposed Project include changes in stream flow, water quality, sediment loading, stream temperature and changes to the benthic macro invertebrate invertebrate (BMI) community which are used by fish in the lower 1.8 km section of Lime Creek, as well as the Lime Creek estuary in Alice Arm. Potential effects to Dolly Varden and coho include mortality of fish and eggs caused by potential changes to surface water quality, stream flow, water temperatures in Lime Creek and reduced food availability from changes in the BMI community in lower Lime Creek as well as reduced benthic invertebrate drift from upstream areas affected within the footprint of the proposed Project.

Based on the predicted level of exceedances for cadmium and sulphate, with all other parameters predicted to meet BCWQG during all phases of the proposed Project, and in consideration of improvements compared to current water quality as well as new conditions developed in collaboration with NLG, specifically Condition 4, which requires the Proponent to meet BCWQG or Site Specific WQO at points on Lime Creek as well as in Lake 901, plus descriptions of how the proposed Project will be designed as described in the Certified Project Description, EAO concluded the proposed Project is not likely to result in significant adverse effects to stream flow, water quality or aquatic life in lower Lime Creek.

Further details on the assessment of proposed Project-related effects on Dolly Varden, coho salmon and BMI in the Lime Creek watershed are provided in section 5.4 of the Assessment Report.

Effects of the proposed Project – Clary Creek Watershed, Wildlife Fish

Only a small portion of the Clary Creek watershed would be directly affected by proposed mine infrastructure. The potential effects are limited to the reach of Clary Creek upstream of a very large impassable barrier (i.e., waterfalls), which is located approximately 250 m upstream from the confluence of Clary Creek and the Illiance River.

The proposed Project has the potential to result in mortality of fish and eggs impinged or entrained in pumps placed in Clary Lake (for potable water supply), increased fishing pressure from mine work force, alterations to fish passage at road crossings, and direct loss of fish habitat due to the TMF. In addition, Rainbow trout in the Clary Watershed could be indirectly affected by changes to water quality due to tailings seepage, water levels from water withdrawals and altered upstream catchment areas, stream flow

caused by water diversions and changes to benthic macro invertebrate populations. However, EAO notes that the addition of Lake 901 to Condition 4 would ensure that water in the Clary Creek watershed is protective of all aquatic life.

Construction and operation of the proposed Project would result in the harmful alteration, disruption, or destruction (HADD) of 5,268 m² of rainbow trout habitat in a portion of the Clary Creek watershed within the footprint of the TMF Northeast Embankment affecting two inlet tributary streams to Lake 901. These inlet tributary streams within the proposed Project footprint provide spawning habitat supporting a naturalized population of rainbow trout historically stocked into Lake 901. The spawning habitat area to be permanently altered in the inlet tributaries to Lake 901 represents the only known productive spawning areas in Lake 901 and is important to sustaining the lakes rainbow trout population.

The lower section of Clary Creek and Illiance River downstream of the Clary Creek confluence provides habitat for steelhead (anadromous rainbow trout), coho salmon, Dolly Varden and other fish species of interest to the Nisga'a Nation. No effects are expected to areas downstream of Clary Lake.

Potential effects of the proposed Project – Fish (Marine)

Potential marine environmental effects of the proposed Project are described in section 5.5 of the EAO's Assessment Report. Changes in marine water quality have the potential to affect all type of marine biota in Alice Arm, including planktonic organisms, benthic invertebrates, marine fish, and marine mammals. The Proponent noted that, although no project activities will take place directly in the marine environment in Alice Arm, potential alteration in the water quality in Lime Creek to Alice Arm during operations has the potential to affect marine water quality near the mouth of the creek (e.g. in the Lime Creek estuary). Changes in marine water quality and sediment quality could affect the species composition and metal concentrations of benthic organisms near the Lime Creek estuary that in turn could affect other marine biota due to ecosystem food web interactions.

Potential effects to the marine environment from changes to stream flow and water quality in Lime Creek discharging to Alice Arm include indirect effects to marine water quality, sediment quality and aquatic life (e.g. shellfish, sculpins, and other marine fish species) primarily within the Lime Creek estuary.

Potential marine environmental effects include increased concentrations of metals in sediment, benthic organisms and fish tissue in Alice Arm. Marine sediment and shellfish tissue in Alice Arm currently exhibit elevated metal concentrations, likely due to historical tailings deposition from previous mining operations in the area, including past

operations of the Kitsault mine and mining in the upper Kitsault River from the historic Dolly Varden silver mine.

However, with effective implementation of mitigation measures, in particular water management and water treatment and the addition of Condition 4 which will ensure water quality in Lime Creek is protective of aquatic resources, EAO has concluded that the probability of direct and indirect effects to marine environment VCs is low. Based on water quality modeling results, treated mine water discharge to Lime Creek will meet most guidelines for the protection of freshwater aquatic life at LC1 and will have minimal to no effect in the marine receiving environment, particularly in light of the substantial dilution capacity of Alice Arm.

The Proponent's MEMP is expected to have a high probability of detecting potential project related effects to the marine environment and EAO is confident that adaptive management monitoring responses will ensure impacts to the marine environment are mitigated. If effects are detected in the monitoring program, the adaptive management response will be to implement additional mitigation measures to ensure the project related effects do not result in significant adverse environmental effects.

The probability that potential residual effects from the proposed Project on the marine environment will cause a cumulative effect is rated as very low. Potential cumulative effects, such as increasing in metals loading and shellfish tissue metal concentrations in Alice Arm, are unlikely to be caused from the proposed Project, considering the Proponent's commitments to water management and treatment.

Although sediment quality and shellfish tissue metal concentrations in Alice Arm have been impacted from historical tailings discharge, considering the improvement in water quality should the mine be developed, there is a high probability that water quality in Alice Arm will be improved and not result in any incremental impact or cumulative effect to marine sediment quality or metal concentrations in marine biota.

Potential effects of the proposed Project – transportation route

The Proponent's Application describes potential direct effects to water quality as potentially occurring during accidents or malfunctions along the Kitsault transportation route. Indirect transportation-related effects on environmental health (including humans, mammals, birds, fish, amphibians, and invertebrates) may occur during accidents and spills near or into major waterbodies and tributaries along the Nass FSR, Hwy 37, and Hwy 113. The four major types of accidents and malfunctions from transportation noted are:

- Motor vehicle accidents - injury or loss of life, spills of hazardous or non-hazardous substances to land or water, fires;

- Hazardous substance spills - health hazard, injury, contaminated soil, contaminated water, impacts to aquatic organisms;
- Chronic dust - dust generation, inhalable and respirable suspended particulate; and,
- Chronic vehicle emissions - exhaust gases (e.g. CO and CO₂, nitrogen oxides, sulphur oxides).

The Proponent undertook a risk assessment based on the probability and consequences of accidents or malfunctions along the transportation route. The assessment concluded that spills of chemicals and/or fuel from transport trucks along the transportation route near waterbodies could affect aquatic organisms and thus fish. It notes that process chemicals required for the proposed Project are relatively low in toxicity when diluted, resulting in short-term effects to waterbodies, where spills to land would be cleaned up immediately. The assessment predicted low likelihood of spills from transportation accidents; however, if they do occur, the environmental damage and safety hazards may be moderate to high depending on the size of the spill and the waterbody.

Mitigation Measures for Fish and Wildlife Fish

During Application Review, the Proponent proposed a number of mitigation measures to address potential adverse environmental effects to marine and aquatic resources (fish and wildlife fish). These mitigations can generally be seen to fall within four categories: water quality/quantity, habitat compensation, monitoring, and transportation corridor safety.

Water quality/quantity

A complete discussion of the Proponent's water quality/quantity commitments and mitigations is discussed in section 5.1 and 5.2 of EAO's Assessment Report and set out in the Table of Conditions and Certified Project Description (Appendix 2).

During the proposed Project construction and operations, upstream drainage from the upper Lime/Patsy Creek watershed will be diverted around the mine site to minimize the volume of mine contact water and minimize effects to stream flows in lower Lime Creek. Mine contact water (runoff and seepage) within the proposed Project footprint will be diverted and stored within the TMF. Surplus water from the TMF would be treated and discharged as per permit requirements, with the purpose of maintaining flows and water quality in Lime Creek to be protective of aquatic life.

The Proponent's Water Management Plan described in the Application included the following mitigation measures:

- Separation of contact and non-contact water, storage of contact water in a tailings facility, collection of seepage to the tailings impoundment and a commitment to treat water when and if necessary;
- Measures to minimise erosion in disturbed areas, prevent release of sediment-laden water to receiving environments;
- Re-using the water present within the proposed Project footprint to the extent practicable by collecting and managing site runoff from disturbed areas, maximizing the recycle of process water, and storing surplus water within the TMF until discharge is required; and,
- A range of water diversion, collection and control structures, groundwater monitoring and erosion control measures.

The original Application proposed active water treatment as a mitigation method for managing ARD from the WRMF only during the post-closure phase of the proposed Project, with the onset of acidic conditions. However, during the review of the Application, numerous questions were raised concerning the need for water treatment through the operations, closure and post-closure, prior to the onset of acidic conditions. To address these concerns, the Proponent committed to water treatment as a way to mitigate water quality effects during all mine phases. In summary, the Proponent's water treatment mitigation measures include:

- In-mill water treatment during operational and closure phases;
- in-pit water treatment during the last year of the closure phase; and,
- Active water treatment during the post-closure phase.

As stated in Condition 4 in the Table of Conditions:

- 4(1) The EAC Holder must ensure that, during the operations, closure and post-closure phases of the Project, water quality at LC2, LC1 and Lake 901 meets British Columbia Water Quality Guidelines⁴¹, unless the Ministry of Environment has approved Site Specific WQO for specific contaminants in accordance with 4(3) below, in which event the Site Specific WQO for the contaminant will supersede and replace the British Columbia Water Quality Guidelines level for the purposes of this Condition 4.

⁴¹ Includes: BC MOE 2013. Water Quality Guidelines (Criteria) Reports [Internet]. Victoria, BC. Accessed on-line at: http://www.env.gov.bc.ca/wat/wq/wq_guidelines.html and, *A Compendium of Working Water Quality Guidelines for British Columbia*. N. K. Nagpal, L. W. Pommen, L. G. Swain, 2006; or in a provincially published superseding document.

- (2) Despite Condition 4(1), if at any time there is an exceedance of either a British Columbia Water Quality Guideline or Site Specific Water Quality Objective, as applicable, (exceedance), then the EAC Holder will not be out of compliance with Condition 4(1) if, immediately upon becoming aware of such exceedance, the EAC Holder:
 - (c) notifies the Ministry of Environment and the Nisga'a Lisims Government of the exceedance; and,
 - (d) after making reasonable efforts to consult with the Nisga'a Lisims Government, and as directed by the Ministry of Environment:
 - (iii) takes such corrective measures as are necessary in order to meet Condition 4(1) as soon as reasonably possible in the circumstances; and,
 - (iv) mitigates, where possible, measurable effects of the exceedance, as directed by the Ministry of Environment, using methods approved by the Ministry of Environment.
- (3) If required under 4(1) the EAC Holder must develop, after making reasonable efforts to consult Nisga'a Lisims Government, Site Specific WQO for mine related contaminants occurring at LC1, LC2 and Lake 901;
 - (a) prior to commencing the operations phase of the Project; and,
 - (b) in accordance with "Methods for Deriving Site-Specific Water Quality Objectives in B.C. and Yukon (BCMOE 1997)" or a provincially published superseding document.

Following successful implementation of water management and water treatment mitigation measures (as defined in the Certified Project Description and Table of Conditions), the water quality in lower Lime Creek is expected to be protective of aquatic life throughout the life of the proposed Project and generally represents an improvement compared to current baseline water quality.

Habitat Compensation

The proposed Project is likely to result in residual impacts to fish habitat in the inlet tributaries of Lake 901. These impacts appear unavoidable and will require a FHCP to offset losses of fish bearing habitat. The Proponent's FHCP, to be finalized during permitting and in consultation with the Nisga'a Nation, is expected to provide no net loss or a net gain of the productive capacity of fish habitat affected by the proposed Project, as required by DFO prior to the issuance of an Authorization under section 35 of the *Fisheries Act*. The Proponent's draft habitat compensation plan, subject to review and final approval by DFO, includes concepts and potential sites recommended by the Nisga'a Nation including construction and enhancement of side channels in the Kitsault.

The Proponent's Application Section 6.7 (Freshwater Aquatic Resources) references the potential for a separate FHCP which may be required in accordance with the MMER under section 36 of the *Fisheries Act*, to be determined by EC.

Monitoring

The Proponent has also committed to implementing an AEMP and MEMP, including collection of two years of additional marine baseline information prior to proposed Project operations. A conceptual framework for the AEMP and MEMP has been developed in collaboration with provincial and federal agencies, and the Nisga'a Nation. The monitoring program frameworks are provided in the Certified Project Description and Table of Conditions. Final details of the monitoring programs will be developed during permitting in consultation with permitting agencies and the Nisga'a Nation.

EAO has concluded that these monitoring programs are expected to have a high probability of detecting potential project related effects to the marine environment, and include adaptive management monitoring responses to ensure impacts to the freshwater and marine environment are mitigated. If effects are detected in the monitoring program, the adaptive management response will be to implement additional mitigation measures to ensure the proposed Project related effects do not result in adverse environmental effects.

Transportation Corridor Safety

In response to potential impacts to fish from accidents and malfunctions along the transportation corridor, and in particular spills of process chemicals and fuel into waterways, the Proponent committed to the development of a Transportation Safety Plan, to be completed prior to construction, that would include the following elements:

- Developing a map of locations of areas of higher environmental risk in the case of an accident or spill. This map will be distributed to mine-related vehicle drivers through the Traffic Control Plan.
- Undertake additional survey to assess the transportation routes for heavy-haul traffic, including determination of the limiting dimensions and weight that may be transported along the routes, and effectiveness of existing roadside and bridge barriers along the FSRs.
- Details on how the Proponent will ensure proper training, inspections, and record-keeping procedures for transportation of hazardous materials and wastes.

- Mobile spill response unit and trained Emergency Response Team based at the mine site and outfitted with self-contained collection of spill response materials for rapid deployment to spill sites.
- Based on the assessment of high environmental risk areas where additional forms of barrier protection (such as rails, no-post barriers or wire rail type barriers) is needed along the FSRs, the Proponent commits to implement, to the approval of FLNR, in consultation with Nisga'a Nation, forms of barrier protection.

In addition, and in response to concerns about the need for more coordination for training and operation of spill response stations located along transportation corridors, the Proponent committed to developing a Geographic Response Plan which describes how they will effectively coordinate and provide training and spill response approaches with the MOE and those community members with responsibility for spill response activities. As part of this plan, the Proponent committed to provide remote emergency spill kits at five strategic locations along the transportation route in consultation with the MOE, FLNR, Nisga'a Nation, Gitanyow Nation and Kitsumkalum First Nation.

EAO's Preliminary Conclusions on Fisheries Interests

The EAO's Assessment Report concluded that the predicted changes to stream flow and water quality from mine water management and discharges to Lime Creek, in consideration of the proposed water management and treatment mitigation measures, would be protective of aquatic life and would not likely result in significant adverse effects to fish in lower Lime Creek, or the Clary Creek Watershed and the Illiance River downstream of the Clary Creek confluence.

EAO also concluded that the proposed Project is not likely to result in significant adverse effects to water quality, stream flows or aquatic life in lower Lime Creek and as a result, will also not result in any significant adverse effects to the marine environment in Alice Arm.

Further, EAO has concluded that the Proponent's AEMP and MEMP frameworks are sufficiently described in the Certified Project Description and Table of Conditions, and that the monitoring programs will be further developed during permitting in consultation with the Nisga'a Nation.

- With respect to potential impacts on fisheries interests from potential transportation related effects, EAO notes that the transportation corridor passes through numerous areas of sensitive fish habitat and along important riparian areas. The transportation route also traverses the Nass River, one of the most important fish-bearing rivers in the Province, which makes its health critical to the treaty rights of the Nisga'a Nation. EAO concluded that the

proposed Project is not likely to have significant adverse effects on water quality from transportation related effects, although EAO does note that a very rare spill with cascading events could result in a catastrophic effect (e.g. a very large spill which occurs in a very sensitive area at a critical time of year, which impacts a small, sensitive and important population of fish e.g. salmon and steelhead) could have effects which will take a long period of time to recover to baseline levels.

EAO concludes that the proposed Project could reasonably be expected to have adverse environmental effects on particularly Nisga'a right to harvest fish and wildlife fish. Through consultation with Nisga'a Nation and other members of the Working Group, mitigation measures have been recommended that would appropriately prevent and mitigate those effects, which will be a component of any Certified Project Description and Table of Conditions that is issued.

13.2.4 Wildlife and Migratory Birds

Chapter 9 of the NFA comprehensively deals with the Nisga'a right to harvest wildlife in the NWA and migratory birds within the Nass Area. Nisga'a wildlife entitlements are held by the Nisga'a Nation. Nisga'a citizens have the right to harvest wildlife in accordance with the NFA, subject to measures necessary for conservation and legislation enacted for public health or public safety. Nisga'a citizens have the right to trade or barter wildlife and wildlife parts and migratory birds amongst themselves or with other First Nations. Subject to certain provisions, Nisga'a wildlife entitlements are for domestic purposes.

The harvesting of wildlife must be consistent with the communal nature of the Nisga'a harvest for domestic purposes and traditional harvest seasons, and must not interfere with other authorized uses of Crown land. The Crown may authorize uses or dispose of Crown land that may affect Nisga'a harvesting rights, provided that the Crown ensures that those uses or dispositions do not deny Nisga'a citizens a reasonable opportunity to harvest Nisga'a wildlife entitlements or reduce Nisga'a wildlife allocations.

Chapter 9 establishes Nisga'a wildlife allocations for initial designated species, being moose, grizzly bear, and mountain goat. There is also a process for the designation of other wildlife species. A Nisga'a wildlife allocation that is set out as a percentage of the total allowable harvest has the same priority as the recreational and commercial harvest of the total allowable harvest of that species.

Chapter 9 sets out provisions concerning the management of wildlife in the NWA, Nisga'a' law making authority in respect of Nisga'a harvesting of wildlife pursuant to the NFA, and establishes a "Wildlife Committee". There are also provisions dealing with trap

lines and guiding; and the issuance to the Nisga'a Nation of certain angling guide licences for watercourses outside of Nisga'a Lands.

The NFA also establishes Nisga'a Nation traplines outside of Nisga'a Lands. Four trap lines fall within the area studied by the Proponent, but do not overlap with any mine infrastructure. Nisga'a citizens have identified Nisga'a Nation hunting and fishing cabins close to the proposed Project. The issuance of hunting licenses by the NLG in the NWA varies each year.

Potential Effects of the Proposed Project⁴²

Moose

Moose and moose habitat are expected to be affected by the proposed Project as a result of increased mortality from vehicle collisions, the loss of vegetation and wetland habitat, increased poaching and increased unregulated (i.e. non-Nisga'a) First Nation harvesting due to improved winter access to moose winter habitat.

Vehicle collisions with moose tend to occur more often during the winter. Moose converge at low elevation in winter months where there is high quality shelter, adequate browse, warmer temperatures, and lower snow levels. Moose winter range habitat overlaps with stretches of Hwy 113, the Nass FSR, and Hwy 37 from Cranberry Junction. Areas adjacent to a section of the Nass FSR known as the Cranberry Connector, in particular, provides high value winter habitat for moose. The Proponent notes that the existing network of FSRs from the mine site to Hwy 37 (at Cranberry Junction) has not been accessible during recent winters⁴³ and has endured limited traffic relative to Hwy 37 and Hwy 113 during the remaining months of the year.

Higher risks of moose mortality are expected to occur as traffic volumes increase near or adjacent to moose winter range. Moose tend to move toward cleared road right-of-ways for easier movement and to access other attractants (e.g., salt), and therefore become susceptible to vehicle collisions. With high quality moose winter habitat through the Cranberry Connector, snow plowing along this stretch to allow vehicle traffic is expected to increase the potential risk of moose mortality from vehicle collisions.

The Proponent also indicates that snow clearing during winter along the network of FSRs from the mine site to Cranberry Junction would open these existing roads year-round and in turn, increase the use of the area for unregulated hunting and poaching.

⁴² EAO notes the NFA provides harvesting rights to species beyond initially designated species. A full assessment of a range of wildlife VCs is included in EAO's Assessment Report.

⁴³ EAO notes that, the "Cranberry Connector" is currently being utilized for construction of the NTL and it is expected that this road will be plowed during the winter of 2012/2013.

In addition to the risks of collisions with moose and increased access, the Proponent notes that habitat loss causing moose displacement is expected to occur during construction and operations at the mine site itself. The proposed Project is expected to remove about 113 ha of wetland habitat and 31 ha of potentially suitable winter habitat for moose in the LSA. Considering the remote location of the proposed Project, displacement of moose further away from Nisga'a Lands could pose access issues for Nisga'a Nation harvesting of moose. Section 5.8 of the Assessment Report provides additional information on EAO's assessment of impacts to moose. Section 10 also provides additional analysis on the potential impacts of increased traffic on Hwy 113, Hwy 37 and the network of FSRs being proposed for the proposed Project.

Grizzly Bears

The potential effects of the proposed Project on grizzly bear include mortality through interactions with vehicles and humans, habitat loss resulting from foraging habitat removal, and disturbance from attractants.

Based on existing data, bear accidents tend to occur more frequently from August to September, when bears are found at low elevation along roadsides seeking out berries and near salmon spawning streams. The Proponent notes that bear accidents with mine traffic along the network of access roads, Hwy 37, and Hwy 113 is likely to be concentrated in the active bear season between the months of April to October. Grizzly bear mortality risk will be a function of the habitat suitability adjacent to the road, the speed limit on the road (e.g., higher for Hwys), and adequate visibility (e.g., blind turns, whiteout conditions). Project-related maintenance and clearing of the network of FSRs could lead to greater use of the area for hunting, which may increase in hunting pressure or illegal poaching in the vicinity of the mine site and along the transport corridors.

The Proponent indicates that the proposed Project is likely to displace grizzly bear from the immediate area and disrupt movement to habitat areas near the mine site. However, any habitat alteration would comprise a limited area of a grizzly bear's very large home range.

Human interactions with bears can also contribute to bear mortality and at the same time, pose safety risks to humans. Bears could be attracted to waste and garbage at the mine site and may need to be destroyed to protect human safety or relocated elsewhere either with other bears or with relatively less suitable habitat.

Mountain Goat

The potential effects of the proposed Project on mountain goats include mortality from vehicle traffic, attraction to salt used along the access roads, and displacement from noise activity associated with the proposed Project.

Aerial surveys did not identify mountain goats close to the mine site. The RSA area does not provide suitable terrain to support mountain goats and the existing access roads do not cross suitable mountain goat habitat, including low elevation canyons that are used by mountain goats during the summer.

Mountain goats were found to use lower elevation conifer forest habitat further away from the proposed Project (i.e., >5 km). While using this habitat, there is the potential that mountain goats could stray beyond their range and cross existing access roads, resulting in collisions with vehicles. The increase in traffic volume related to the proposed Project could increase the risk of mountain goat mortality at lower elevations.

Improved road conditions due to snow maintenance and year-round access along the existing network of FSRs could lead to greater use of the area for hunting thereby increasing hunting pressure or illegal poaching of mountain goats. The use of salt on ploughed access roads could also potentially attract mountain goats wintering near the roads; however, salt is likely not limiting in the area due to the proposed Project's close proximity to the ocean.

Mitigation Measures

The Proponent has committed to developing a series of management plans and commitments to address potential residual adverse effects of the proposed Project, including the effects of road use, on wildlife including moose, grizzly bears, mountain goats, and American marten as well as migratory birds. Highlights of these plans will include:

- Wildlife Corridor Management Plan with components for mapping sensitive habitats, reduction of speed limits, increased brushing and vegetation reduction near roads, snow escape routes for moose, use of GPS to monitor speeds, no hunting/fishing policy for mine employees, equipping vehicles with wildlife-recording devices, procedures for tracking near miss, injury or mortality, immediate reporting of fatalities and compliance and reporting audits as well as opportunities for improvements in the plan.
- EAO will also recommend that, the EAC Holder must provide \$100,000 annually, with the commencement of construction and ceasing with the commencement of closure, to FLNR to support the following two initiatives:

- Efforts to support recovery of the Nass moose population, including, but not limited to education and communication, inventory, monitoring, collection of harvest data, signage and programs to increase knowledge of human interactions with moose; and,
- The Hwy 37 Assessment and Monitoring Trust, a FLNR initiative to provide a coordinated approach to managing and mitigating the potential cumulative effects to aquatic and wildlife populations along Hwy 37.
- The Proponent will also be required to participate in any cross-industry or government initiatives around the use of the Cranberry Connector and the Hwy 37 corridor, which are important winter range habitat areas for moose.

In response to potential impacts to grizzly bears on the mine site itself, the Proponent committed to develop a Bear Interaction Management Plan, a component of the Mine Site Wildlife Management Plan, that includes measures to reduce bear-human conflicts and considers exclusion fencing of areas of increased risk to wildlife and human safety to the approval of MOE and FLNR, and in consultation with NLG. More details on the proposed wildlife and wildlife habitat mitigation measures are provided in sections 5.7 and 5.8 of the Assessment Report. Details on the Wildlife Corridor Management Plan and the Transportation Safety Plan are provided in Section 10 of the Assessment Report and in the Certified Project Description.

EAO's Conclusions on Wildlife and Migratory Bird Interests

The EAO's Assessment Report concluded that wildlife values found in the proposed Project footprint are common throughout the region, widely distributed in the surrounding study areas and that the proposed Project would have a minimal direct impact on habitat due to the brownfield nature of the proposal. Local and regional populations of most species are healthy in this area of BC, although regional moose populations have declined over the last decade.

With respect to the issue of moose impact from vehicles, EAO notes that, should the proposed Project receive an EA Certificate, there would likely be some individual moose mortality which may in turn result in impacts to subregional moose populations which could mean that recovery would take an extended period of time and make moose populations more difficult to fully recover. However, EAO notes that many of the issues relating to the regional decline in moose population are complicated and stem from a number of issues, including illegal and unregulated hunting from other First Nations. As such, the long term recovery of Nass moose populations is more appropriately addressed through planning partnerships involving government, First Nations, the Nisga'a Nation and a range of industry partners and are beyond the scope of a single industrial road user to address.

EAO concluded that the proposed Project is not likely to result in significant adverse effects to wildlife, including migratory birds.

EAO concludes that the proposed Project, constructed in accordance with the Certified Project Description and Table of Conditions, will not deny Nisga'a citizens a reasonable opportunity to harvest Nisga'a wildlife entitlements or reduce Nisga'a wildlife allocations. Through consultation with Nisga'a Nation and other members of the Working Group, mitigation measures have been recommended that would appropriately prevent and mitigate any adverse environmental effects, which will be a component of any Certified Project Description and Table of Conditions that is issued.

13.2.5 Vegetation Resources

Chapter 5 of the NFA deals with forest resources. All forest resources (both timber resources and non-timber forest resources) on Nisga'a Lands are owned by the Nisga'a Nation. The Nisga'a Nation are required to make laws in respect of timber resources. There are provisions which deal with harvesting activities and the management of forestry activities on Nisga'a Lands, including forest health and fire suppression. Provisions in Chapter 5 also establish timber harvesting rates on Nisga'a Lands and a process for the Nisga'a Nation to acquire forest tenures having an aggregate annual allowable cut of up to 150,000 m³.

One Tree Farm License owned and operated by Coast Tsimshian Ltd., intersects the northern part of Nisga'a Lands, 25 km east of the mine site.

The Department of Forest Resources of the NLG manages and regulates harvest of botanical forest products, including pine mushrooms and 10 other mushroom species and fiddleheads, within Nisga'a Lands. All Nisga'a Nation and non-Nisga'a Nation harvesters and buyers must apply for a permit for an area-based harvest of pine mushroom. Cultural plants identified by Nisga'a Nation as having economic and cultural importance to the Nisga'a Nation include large cedar trees, pine mushroom, medicinal plants, and edible berry-producing plants.

Potential Effects of the Proposed Project

A summary of the potential adverse environmental effects of the proposed Project to cultural plants is described below. EAO's full analysis of impacts to vegetation is provided in section 5.7 of the EAO's Assessment Report.

Cultural plants include plant species used for medicine, dietary and spiritual religious purposes, and utensils and dyes. The Proponent's cultural plant assessment focussed on the presence of large cedar trees, pine mushroom habitat, cultural plant potential and edible berry-producing plant species. Pine mushrooms were evaluated separately

from food plants, because, in addition to their importance as food, they are of economic importance in the region.

The Application predicted that 35 ha, or 2% of ecosystems in the LSA that could potentially support large cedar trees, would be removed. This represents about 15% of the baseline inventory of ecosystems suitable for cedar growth within the LSA. This loss would not be reduced through reclamation.

With respect to pine mushrooms, the Proponent assessed the coastal western hemlock-lodge pole pine-feathermoss unit as having the most potential for producing pine mushrooms, with pine mushroom habitat covering 2% of the unit. The proposed Project activity is expected to clear <1 ha of this mushroom habitat, representing a 1% loss of the available pine mushroom habitat in the LSA. This loss would not be reduced through reclamation.

The proposed Project development would result in the loss of 369 ha or 31% of ecosystems with high or medium potential to support cultural plants. Following reclamation, it is estimated that this loss would be reduced to 193 ha or 16% of ecosystems with high or medium potential to support cultural plants. 96 ha, representing 13% of ecosystems with a high or medium potential to support berry-producing species, would be lost. All of these figures relate to the LSA.

Mitigation Measures

The Proponent's approach to mitigating potential effects to vegetation resources was to minimize the overall effects on vegetation resources and ecosystem composition. As an existing brownfield site, the use of previous disturbed areas would be maximised wherever possible to help maintain a compact the proposed Project footprint. Specific key measures incorporated into the proposed Project include:

- Minimise the proposed Project footprint, confining as much activity as possible to previously disturbed areas and preserving the existing on-site hydrological regime to the extent possible;
- Measures to prevent the introduction of invasive species including vehicle washing and site reclamation using native species;
- Salvage and stockpiling of topsoil and peat soils for use in reclamation;
- Plant transplanting and seed collection; and,
- Site reclamation and re-vegetation when operations cease (with native species, including species used by members of Nisga'a Nation).

The Proponent also committed to develop a Wetland Habitat Compensation Plan prior to the issuance of the federal authorization, to the satisfaction of EC, to address residual

effects to red- and blue-listed ecological wetland communities and their functions resulting from the issuance of the federal authorization.

EAO's Conclusions on Vegetation Resources Interests

The EAO's Assessment Report concluded that the primary effect on cultural plants would be from the loss of large cedar trees and berry-producing and cultural species during construction and operations. EAO also concluded that many of the ecosystems affected by the proposed Project occur commonly in the surrounding area and that the proposed Project would have a relatively small, albeit permanent impact on these ecosystems. Adverse vegetation effects would be largely localised to the LSA area and would be time-limited, except for some permanent changes in wetland ecosystems within the proposed Project footprint and the removal of some old growth forest.

EAO concluded that the proposed Project is not likely to result in significant adverse effects to vegetation resources.

EAO concludes that the proposed Project, constructed in accordance with the Certified Project Description and Table of Conditions, is reasonably expected to have minimal adverse environmental effects on the residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests set out in the NFA. Through consultation with Nisga'a Nation and other members of the Working Group, mitigation measures have been recommended that would appropriately prevent and mitigate any such adverse effects, which will be a component of any Certified Project Description and Table of Conditions that is issued.

13.2.6 Archaeological and Cultural Heritage

Chapter 17 of the NFA acknowledges the important role of Nisga'a artifacts in Nisga'a culture. There are provisions which deal with collections of Nisga'a artifacts held by Canada and BC, and the transfer of some of those artifacts to the Nisga'a Nation; and there are provisions that deal with other Nisga'a artifacts that are discovered on or off Nisga'a Lands.

There are provisions in Chapter 17 that deal with the protection of heritage sites on Nisga'a Lands. There are provisions in Chapter 3 of the NFA which require BC to designate sites of cultural and historic significance to the Nisga'a Nation outside of Nisga'a Lands (those set out in Appendix F-1) as provincial heritage sites.

The NFA Appendix F-1 identifies five sites of cultural and historic significance to the Nisga'a Nation, one of which (the Grease Trail at the Cranberry River) is located two km from a transport corridor. Other sites that could be of interest to the Nisga'a, including old village sites, trails, grave sites, house sites, oral history landmarks and culturally-modified trees, have not been identified in the LSA.

Potential Effects of the Proposed Project

During archaeological surveys, the Proponent did not identify archaeological or heritage sites within the LSA, but recorded seven historic features linked to early mineral exploration - blazed trees as trail markers, partially buried wooden board, nails, and wire of a drill pad and section of a telegraph line. These features postdate 1846 and are not protected under provincial legislation.

The nearest archaeological site is located northwest of the proposed Project at the mouth of the Kitsault River. Most archaeological sites are found along the Nass River Valley. It is predicted that these sites may date as early as 10,000 Before Present, placing them within the North Coast Microblade Tradition. A historic fishing camp at Gitzault, approximately 15 km north at the head of Alice Arm, was identified as the closest heritage site.

Land clearing and excavation activities, including re-vegetation and remediation of lands, during all phases of the proposed Project could have the potential to affect the integrity of archaeological and cultural heritage sites which have not been identified. Indirect disturbance could also occur as a result of increased human presence during the life of the proposed Project as sites could draw nearer to facilities or access corridors.

Effects to archaeological and heritage sites identified beyond the LSA are not anticipated; however, there is a potential that unidentified sites could be discovered as the proposed Project is constructed.

Mitigation Measures

Consulting with the Nisga'a Nation, the Proponent will design and implement an archaeological and cultural heritage resources management plan. The plan will establish protocols to protect existing archaeological and cultural heritage resources within the Project footprint and to identify, record, communicate, and manage any resources that are discovered during construction and operations. Consultation with the Nisga'a Nation will inform the options for mitigating potential effects to archaeological and heritage sites.

EAO's Conclusions on Archaeology and Cultural Heritage Interests

In an earlier part of this Report, EAO concluded that the proposed Project would have no residual adverse effects on archaeological and heritage resources. As such, EAO concludes that the proposed Project will not reasonably be expected to have adverse environmental effects on the residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests set out in the NFA. EAO notes that, should archaeology resources be

uncovered during construction, the management of such resources will be guided by relevant Provincial legislation, which would adequately mitigate any potential adverse effects in such circumstances.

13.2.7 EAO's Conclusions on 8e Assessment

Based on the information in this Report and the Assessment Report, EAO concludes that the EA for the proposed Project has adequately met the requirements under Chapter 10, paragraph 8 (e) of the NFA to “*assess 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 this Agreement and, where appropriate, make recommendations to prevent or mitigate those effects.*”

The mitigation commitments, as defined in the Certified Project Description and Table of Conditions, including specific mitigation measures to address the Nisga'a Nation concerns, are considered appropriate to prevent or mitigate potential effects and will be recommended by EAO and included in the referral to the Minister's to decide if an EA Certificate is issued for the proposed Project. With successful implementation of the mitigation commitments, EAO has determined the proposed Project is not likely to result in significant adverse environmental effects.

Based on the above determination and assessment contained in this [Part D](#), EAO therefore concludes the proposed Project is not reasonably expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands or Nisga'a interests set out in the NFA.

13.3 Nisga'a 8f Assessment

Chapter 10, paragraph 8(f) of the NFA requires that all EA processes, as defined in the NFA, “assess the effects of the project on the existing and future economic, social, and cultural well-being of Nisga'a citizens who may be affected by the project.”

In November of 2010, NLG circulated its *Nisga'a Economic, Social, and Cultural Impact Assessment (ESCIA) Guidelines* (“ESCIA Guidelines”) to the CEA Agency and EAO to provide NLG's perspective on how the 8(f) requirement under the NFA should be addressed for both the proposed Project and KSM EAs. The ESCIA Guidelines established the NLG's perspective on a comprehensive approach to evaluating specific economic, social, and cultural effects of a project on the well-being of Nisga'a citizens, including those residing in the Nisga'a Villages (i.e., Gingolx, Laxgalts'ap, Gitwinksihlkw, and Gitlaxt'aamiks) as well as Terrace, Prince Rupert, and other parts of BC. EAO notes that the ESCIA Guidelines were received by BC but have no formal status as guiding documents.

The potential economic, social, and cultural effects identified in the ESCIA Guidelines included:

Economic Effects

- Nisga'a employment and income;
- Nisga'a business activity, earnings, and investment activity;
- Nisga'a natural resource activity and related earnings or values;
- Nisga'a Government revenues and expenditures; and,
- Future Nisga'a Nation economic opportunities and economic development.

Social Effects

- Migration and population effects;
- Impacts on infrastructure and services;
- Occupational and non-occupational health risks;
- Occupational and non-occupational accident risks; and,
- Family and community well-being.

Cultural Effects

- Effects on cultural activities and practices including:
 - Effect of changing work patterns and incomes practices.
- Effects on Nisga'a language.

The ESCIA Guidelines also included consideration of cumulative and incremental impacts of a project in the context of projects that have already taken place or are expected to take place over the same timeframe as the proposed Project.

The approved AIR for the proposed Project included direction which required the Proponent to develop and submit a workplan that outlined how it would collect and analyze the necessary information to address the ESCIA Guidelines as they may apply to the proposed Project (see section 13.1 for reference to approved workplan). With guidance from the NLG, CEA Agency, and EAO the Proponent developed a study methodology for data collection and analysis that included a combination of surveys, formal interviews, focus groups, and informal discussions with Nisga'a citizens and representatives, Nisga'a literature research and review, and information from relevant sections of the Proponent's Application. The study focused on Nisga'a citizens residing in the four Nisga'a Villages, the Nass Area, and in other areas outside Nisga'a Lands including Terrace, Prince Rupert, and other communities in BC.

Results of the data analyses, which were based on an estimated mine life of 16 to 17 years, were incorporated in the Proponent's ESCIA report that was used to assist the federal and provincial governments in completing their 8(f) assessments under the NFA.

Based on the information contained in the Proponent's ESCIA report, this document provides an overview of the effects of the proposed Project on the economic, social, and cultural well-being on Nisga'a citizens who may be affected by the proposed Project.

While a section requiring mitigation of all negative effects or enhancing any positive effects was not specifically included in the approved workplan, as discussed below, the Proponent has, in each instance of a potential negative or positive effect, proposed measures to mitigate or enhance such effects. EAO has considered such measures in determining the overall effect of the proposed Project on the economic, social, and cultural well-being of Nisga'a citizens.

13.3.1 Economic Well-being

The Proponent's workplan noted that the other projects, developments and activities unrelated to the proposed Project being assessed may take place in the region that will affect economic issues such as employment, migration, and business opportunities. The proposed Project-related effects were therefore evaluated by the Proponent within the broader context of regional change and development.

The Proponent, with advice from the NLG, CEA Agency and federal departments, and EAO, created low, medium and high scenarios to estimate potential employment and business activities relative to the level of development (i.e., number and types of projects) predicted to occur in the region. The Proponent used data from other proposed or planned projects in the region as a basis to derive the different scenarios.

The scenarios which were evaluated were the following:

- a. Low Regional Development Scenario – this scenario included the proposed Project, the NTL, Forrest Kerr Hydro (FKH), and McLymont Creek Hydro (MCH). NTL and FKH received EA Certificates and are currently being constructed. MCH received an EA Certificate in 2012 and has not yet commenced construction.
- b. Medium Regional Development Scenario – includes all the projects in the Low Regional Development Scenario, plus the proposed KSM Project.
- c. High Regional Development Scenario – includes all the projects in the Medium Regional Development Scenario, plus the Galore Creek, Shaft Creek and Red Chris Mine Projects.

Economic Well-Being Background

Nisga'a Employment and Income

To examine the potential positive and negative effects of the proposed Project on Nisga'a employment and income, the Proponent analyzed the potential demand for workers in the region and compared that demand against the Nisga'a employable labour supply to meet this potential demand.

Based on estimations of labour demand projections, the total number of jobs in the region is expected to grow within the next decade as projects, both existing and planned, are constructed and operated.

The Proponent provided estimates of labour demand based on the three scenarios described above. Under the lowest scenario, available jobs for all projects peaked at 1,145 PYs in 2012 (during construction of the proposed Project) and declined to 308 for the next 16 years, further dropping to only 11 PYs by 2052 after most projects have ceased operations. Under the highest development scenario, available jobs would peak at 3,275 PYs in 2016 and would continue at those very significant numbers during the life of the proposed Project and the proposed KSM Project.

The proposed Project would add to this regional labour demand with up to 720 jobs during construction, 300 jobs during operations, and 51 positions during decommissioning and closure. No direct employment is expected during post-closure. Assuming all existing and planned projects are constructed and operating, the total regional labour demand is forecasted to peak at 3,275 jobs in 2016.

In order to compare these labour opportunities with potential labour supply, the Proponent estimated the current employable Nisga'a labour supply as consisting of Nisga'a citizens who:

- are employed (part time or full time) or unemployed looking for work, 15 years or older;
- have expressed an interest in working at the mine or are willing to work under mine conditions; and,
- have the minimum skills required to work at the mine.

Based on its survey work, the Proponent determined that there the current employable Nisga'a labour supply is 1,140 Nisga'a citizens⁴⁴. Of those, 370 reside on Nisga'a Lands

⁴⁴ This number was derived from survey results which excluded those respondents who were not actively seeking work due to disabilities, family responsibilities or other obligations.

and 775 live off Nisga'a Lands. By 2051, this labour force is predicted to reach approximately 1,480 Nisga'a members.

The ESCIA noted that median incomes earned by Nisga'a' citizens currently range between \$17,200 for all workers and \$43,700 for those working full time. For some Nisga'a citizens, some or all of their income is derived from government assistance.

Nisga'a Nation Business, Earnings, and Investment Activity

As part of their ESCIA, the Proponent conducted a survey of existing Nisga'a businesses to understand the sectors that they serve, the goods and services they provide, and the potential business opportunities and effects associated with the proposed Project. The ESCIA noted that Nisga'a businesses provide goods and services to a wide range of sectors such as tourism and food services, retail and wholesale sales, culture and recreation, and business and other support services. The majority of these businesses are small, having five employees or less, while only one business comprises more than 100 employees. Key clients for most Nisga'a businesses include the NLG or Nisga'a Village governments, social or education agencies, and provincial and federal governments.

The business survey indicated that about 20% of businesses have worked in the mining sector, with about the same amount working in construction and forestry, relevant sectors for considering potential work at the proposed Project.

Nisga'a Natural Resource Activity

Nisga'a citizens depend on the natural resources within the Nass Area to practice and pursue their traditional, cultural, and commercial activities. They use the landscape for hunting, trapping, gathering, fishing, country foods, medicines, materials, and other culturally-important resources. There are also Nisga'a commercial harvesting activities including fishing and forestry operations.

NLG Revenues Expenditure

The ESCIA indicated the NLG collects approximately \$73 million in revenue annually with \$6 million excess revenue (i.e., adjusted for expenses) in 2011. Most of the NLG finances are channeled towards supporting the operations and administration of NLG including transfers to the Nisga'a Village Governments, Nisga'a Valley Health Authority, and the Nisga'a School Board. Operating surpluses from commercial entities such as Nisga'a Fisheries, Lisims Forest Resources, enTel Communications also contribute to the NLG revenue stream.

Types of Potential Effects of the Proposed Project

Nisga'a Employment and Income

The Proponent's original Application provided an estimate of a maximum of 60 jobs for Nisga'a citizens during construction (35 jobs in the first year and 25 jobs in the second year of construction), 36 jobs annually during the 16 years of operations and 24 jobs during closure. These numbers were based on a calculation of available jobs compared with those Nisga'a citizens who responded that they were interested in employment with the proposed Project. For this analysis, this should be considered on the low end of the potential job creation "spectrum".

However, for the ESCIA, the Proponent used a different methodology than the more generic BC Input/Output Model used in the Application. The ESCIA provided a more detailed analysis of labour supply and demand specific to Nisga'a communities – informed by labour pool estimates derived from SERC survey data – and estimates of demand from other development projects taking place in the region.

As a result of their new modeling and the assumption of implementation of a high level of commitment to intensive training and a commitment to local hiring, the Proponent updated their employment figures to provide more aggressive estimates. At the high end of the employment spectrum, and assuming successful implementation of strategies to be developed within its management plans, the Proponent estimates that there is a maximum of 144 PYs of employment during construction and up to 90 jobs (PYs) per year during the 16 years of operations, up to 21 jobs during decommissioning and up to 3 during closure and post-closure.

With respect to incremental income, the ESCIA references the average job at the mine earning about \$62,600⁴⁵ per year, inclusive of wages and benefits. They note that the median wage for aboriginal workers is \$17,200 for all workers and \$43,700 for full time workers. Considering this base wage as the existing income, the incremental net income for Nisga'a workers that may be employed at the mine was calculated to be \$36,000 per year.⁴⁶

⁴⁵ The Proponent excluded higher paying positions when developing this average in order to eliminate bias associated with those jobs Nisga'a citizens would not normally initially be expected to fill. They note the figure provided is conservative and may be too low as Nisga'a citizens fill more senior positions over time.

⁴⁶ NLG comments noted the opportunity cost of Nisga'a citizens losing access to country foods. Statistics Canada reports that approximately 10% of family income in Canada is spent on food. Being very conservative, one could subtract 10% of this incremental income, recognizing that Nisga'a citizens employed at the mine would need to purchase more foodstuffs at stores. Incremental income could be reduced from \$36,000 to \$32,400.

Using the \$36,000 figure, the Proponent calculated in the ESCIA that the overall Nisga'a income effect from the proposed Project would range from \$5.2 million during the two years of construction to \$3.2 million a year during operations, assuming maximum employment is achieved. EAO notes that these figures all assume the most optimistic job creation scenarios. Applying the low end of the potential creations scenario, incremental income could be \$2.2 million during the two years of construction and \$1.3 million a year during the 16 years of operations.

The ESCIA notes that this analysis is silent on indirect and induced regional and provincial employment effect estimates, although they are reported in the Proponent's Application. The ESCIA says "Reliable estimation of indirect and induced employment and income effects on Nisga'a citizens due to the projects, both cumulatively and incrementally, would require detailed design information for each project and involve economic impact modeling that is beyond the scope of this study."

Nisga'a Nation Business, Earnings, and Investment Activity

The Proponent's ESCIA showed that potential revenue to Nisga'a businesses is expected to vary depending on the extent of industrial development in the region and the involvement of these businesses in providing goods and services to the mining industry. The Proponent used an average of 5% of regional project expenditures directed to Nisga'a business, a conservative figure based on research on similar mines elsewhere in Canada. Under the low regional development scenario, total business revenue is predicted to peak at \$7.9 million in 2013, while under the high development scenario, Nisga'a businesses could expect a peak revenue of \$16 million by 2014, recognizing they would be supplying to a range of mine developments and other projects across the region and would be diversifying beyond the proposed Project.

For all scenarios, the incremental net income from the proposed Project over the first two years of construction is forecasted to reach \$500,000 and \$700,000, respectively, after which net income declines and remains at \$200,000.

The ESCIA noted that most Nisga'a businesses expect their operations to grow over the next 10 years (irrespective of the proposed Project) and have some interest in becoming suppliers to the proposed Project regardless of their experience in the mining sector. The two main factors that were identified as limiting business growth were capital and finances and existing plant/equipment capacity.

Opportunities during operations are expected to be of most benefit for Nisga'a businesses as local suppliers may find it difficult to competitively respond to procurement requests for specialized supply requirements that are needed for construction within a short period of time. In contrast, local businesses have more time during operations to better understand the supply needs and requirements of the

proposed Project and foster meaningful working relationships with the Proponent. Some of the potential goods and services that are needed for operations include road maintenance, bus services, camp catering, concentrate haulage, and winter gravel.

The largest barriers to benefits to local Nisga'a businesses, as reported in the ESCIA, include access to capital and financing and the costs of running and maintaining infrastructure and equipment. As well, business policies such as the requirement for health and safety plans could be a challenge, as many Nisga'a businesses did not have these measures in place.

The most recommended measure to improve business opportunities identified during the surveys was direct negotiations as opposed to competitive bids, as well early payment options, as well as smaller contracts, which would enable businesses to benefit without additional capital investments.

The ESCIA reported that, based on secondary research on other mines in Canada, share of project expenditures for aboriginal businesses ranged from 14% to 50%, although many factors influenced those success rates.

Finally, the ESCIA found that over 90% of Nisga'a business respondents expressed an interest in becoming suppliers to the proposed Project.

Nisga'a activities related to natural resources

The ESCIA reports that the proposed Project has the potential to affect the Nisga'a Nation's traditional, cultural, and commercial natural resource activities. These activities are an important part of the Nisga'a culture, but also make an economic contribution to households. Changes to these activities could come from socio-economic changes both from environmental impacts of the mine as well as changes in employment patterns.

Full details on the potential impacts to environmental VCs can be found in section 5 of this Report, and a discussion of adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands and Nisga'a interests set out in the NFA ("8e") can be found earlier in this Report. EAO concluded the proposed Project is not reasonably expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands or Nisga'a interests set out in the NFA.

With respect to impacts on Nisga'a harvesting pursuant to Nisga'a section 35 rights as defined in the NFA from the proposed Project, the ESCIA did not identify any clear trends or findings. However, EAO notes that the lack of clarity may actually mean there is an effect. Almost 40% of those living off Nisga'a Lands indicated there would be an effect on harvesting activities, while 60% of those living off Nisga'a Lands indicated

there would be no effect. For those living on Nisga'a Lands, the trend is reversed, with 56% saying there would be an effect and 44% saying there would not be an effect on harvesting.

EAO is also aware that in Nisga'a communities, as with most aboriginal communities, there is some specialization of labour, with some individuals hunting or fishing for other community members. As a result, it is not possible, given these numbers and the follow-up questions asked how much harvesting is done by those who indicated that harvesting would be affected. As a result, it would appear that a significant number of Nisga'a citizens indicate changes to harvesting activities. With respect to the economic component of this and how it would affect well-being, this is addressed in footnote 46, although EAO is aware that there are both social and cultural components to harvesting as well.

Those who thought effects would occur mostly noted they were related to having less time due to employment and that those effects would likely be seasonal.

The ESCIA also notes that, with increased wage pressure from new mining and industrial activities in the Northwest, there may be increased pressure on Nisga'a businesses to explore increased productivity and competitiveness in the labour market if existing employees are to be retained. A detailed analysis is not possible given the information collected.

NLG Revenues Expenditure

The Proponent's ESCIA looked at a number of components of revenue to the NLG, although they note that much of the information required for this analysis is more appropriately collected and provided by the NLG themselves. The ESCIA reports annual revenues of about \$73 million, with an excess of revenue over expenses of \$6 million in 2011 and an accumulated surplus of \$186 million.

The ESCIA focused on the following components of NLG revenue:

- Revenue from Nisga'a businesses within which NLG may have invested or have a business interest:
 - The Proponent noted without detailed financial information, this is not possible to assess, although they assume that increased economic activities would have a positive benefit.
- Review and monitoring costs associated with the proposed Project:
 - The workplan said that, with respect to NLG Revenues and Expenditures (section 3.4) that "The NLG will provide an estimate of their costs of participating in the pre-approval review of the Project. Cost impacts will

include the construction and operations phase, including issues such as monitoring, project related education and training or other economic development strategies, mitigation of social impacts or other such effects". No cost estimates have been received, as the NLG advised EAO that they have not been provided with information sufficiently detailed to generate these estimates.

- Cost implications to community infrastructure:
 - There will be no direct costs for infrastructure and all road improvements/maintenance will be paid for by the Proponent;
 - Incremental migration to Nisga'a communities may have a cost to the NLG with the provision of additional services associated with housing, education, recreation and water and sewer. The Proponent notes that community infrastructure can likely absorb relatively high levels of in-migration, with the exception of housing. The exact magnitude of this cost to NLG is uncertain; and,
 - The Proponent assumed that, in each of the three development scenarios, in-migration would result in additional housing needs. In the low development scenario, 3 houses a year for a total cost of \$700,000 was estimated. For the high development scenario, 6-8 houses per year at a cost of \$1.5-\$1.8 million a year was estimated. The ESCIA notes these are conservative estimates, and another likely scenario is that Nisga'a citizens may choose to live in Terrace and note require additional housing in the four Nisga'a communities.
- Provincial royalties:
 - The Province has presented an offer to negotiate an agreement on mineral tax revenue-sharing with the Nisga'a Nation.
 - The Nisga'a Nation has indicated that notwithstanding their significant concerns with the Province's offer, they are prepared to meet with Provincial representatives to pursue the matter further.

Mitigation Measures

With input from the Nisga'a, EAO, the CEA Agency, and federal departments, the Proponent developed five plan "frameworks" which are included in the Certified Project Description and Condition 34 to an EA Certificate if Ministers issue one for the proposed Project. These frameworks were developed with the intention to maximize the employment and income opportunities for Nisga'a citizens and to enhance the retention of Nisga'a workers. Successful implementation of the plans assumes close collaboration with the NLG. The Proponent assumes that successfully plans will build capacity and augment the skills base of the Nisga'a Nation.

The plan frameworks include a Social and Cultural Management Plan; Business Capacity Plan; Communications Plan; Economic Closure Plan; and a Recruitment, Training and Employment Plan. The Business Capacity Plan and Training and Employment Plan are most relevant to an assessment of economic well-being.

It should be noted that, at this time, the management plans are frameworks and details of the types of mitigations and the success of those mitigations are at this point an uncertainty.

All plan frameworks are provided in section 8 of the Certified Project Description (Appendix 2).

As per Condition 34 in the Table of Conditions: within six months of the issuance of the EA Certificate, the Environmental Assessment Certificate Holder (EAC Holder) must complete, to the approval of EAO and the Ministry of Aboriginal Relations and Reconciliation, the following management and mitigation plans consistent with the frameworks described in Section 8 of the Certified Project Description:

- Social and Cultural Management Plan (Section 8.1);
- Recruitment, Training, and Employment Plan (Section 8.2);
- Business Capacity Plan (Section 8.3);
- Economic Closure Plan (Section 8.4); and,
- Communications Plan (Section 8.5).

Prior to submitting the Plans the EAC Holder must take reasonable efforts to consult the NLG. The Plans, along with a description of the efforts taken and results of consultations with the NLG, must be provided to EAO and the Ministry of Aboriginal Relations and Reconciliation. The EAC Holder must obtain the approval of EAO and the Ministry of Aboriginal Relations and Reconciliation for the Plans. The actions described in the Plans must be implemented.

EAO's Conclusions on Economic Well-being

EAO concludes that the proposed Project is likely to provide employment to Nisga'a citizens throughout all phases of the proposed Project. At the high end of the job creation spectrum and assuming full and successful implementation of the Proponent's management and mitigation plans, the Proponent estimates a maximum of 144 jobs during the 2 years of construction as well as a maximum of 90 jobs through the 16 years of operations and a maximum of 24 jobs through the closure period. In the absence of successful implementation of those management and mitigation plans, the Proponent estimates approximately 60 jobs over the 2 years of construction, 36 jobs through operations and 24 jobs during closure.

As well, considering the incremental increase in wages (taking into account the opportunity cost of existing positions) overall net income effects from the proposed Project could be as high as \$5.2-\$3.2 million during construction and operations or as low as \$2.2-\$1.2 million during construction and operations. Should other proposed projects also be developed in the region, incremental income from all projects could be as high as \$13.8 million a year. EAO also notes that there could be an opportunity cost of missed harvesting of country foods that could be as high as \$3,600 per employee, reducing that incremental income.

The exact number of jobs and the nature of the jobs which will be available to Nisga'a citizens is dependent upon a range of factors, including uptake and quality of training, job opportunities elsewhere in the Nass and in BC, the range of salaries and working conditions at the mine site, economic conditions in BC and the Proponent's relationship with the Nisga'a community. The Proponent's review of the experiences of EKATI, Voisey's Bay, and Diavik illustrates that the share of project expenditures that go to Aboriginal businesses in Canada can vary widely. The success of Aboriginal owned businesses in securing supply and service contracts for the mining sector hinge on business fundamentals such as the quality and experience of staff; the quality, efficiency and capacity of equipment; experience and expertise – especially at the management level; and the ability/capacity of the business to meet or adhere to operational policies and programmes, such as health and safety requirements, as set out by the company. The Proponent concluded that these factors are likely to be relevant to Nisga'a businesses as well in their attempts to secure contracts with projects in northwest BC. The ESCIA report (section 3.3, pages 3-16 through 3-23) elaborates on these and other factors that Nisga'a businesses themselves see as potentially limiting factors in their own development and growth (as identified in the Nisga'a Business Survey).

EAO concludes that the Proponent's five plan "frameworks" would likely contribute to addressing the training and capacity gaps which exist within Nisga'a community and

enhancing employment opportunities, although we note that, given the information provided, it is impossible to determine if jobs provided will be closer to the low end of the spectrum provided or the more optimistic numbers assumed by the Proponent.

EAO concludes that the proposed Project is likely to provide modest increases in business opportunities for Nisga'a communities. As with the other management plans, EAO concludes that the Proponent's mitigation plans will likely be at least somewhat successful, particularly the Business Capacity Plan, would likely support addressing some of the challenges faced by Nisga'a businesses when seeking contracts with the proposed Project, although we note that, given the information provided, it is impossible to determine if business opportunities provided will be as high as what has been described in the Proponent's assessment.

There are currently costs associated with ongoing participation of the NLG in the development of management and mitigation plans, as well as permitting, environmental monitoring and community well-being monitoring. As well, there may be additional costs to the NLG related to the potential provision of community services and social programs, housing in particular. The magnitude of the impact is not possible to assess with the information provided in the Proponents Application or ESCIA report. EAO notes NLG's concerns regarding whether it will have the financial resources for its future participation costs. The Proponent has also advised EAO that benefit agreement discussions between the proponent and Nisga'a were initiated over two years ago, and to date there is not benefits agreement in place between the Proponent and the Nisga'a Nation.

EAO is aware that BC has presented an offer to negotiate an agreement on mineral tax revenue sharing with the Nisga'a Nation; and that the Nisga'a Nation is willing to enter into discussions on mineral tax sharing with BC.

Despite the outstanding uncertainty regarding costs and in consideration of all the factors related to economic well-being of Nisga'a citizens who may be affected by the proposed Project, EAO concludes that is likely that the proposed Project may result in a modest improvement in the economic well-being of Nisga'a citizens.

13.3.2 Social Well-being

Social Well-Being Background

Migration and Population

In their ESCIA, the Proponent provided an analysis of the potential for migration to the Nisga'a communities as well as growth the communities. The analysis, which was based on a BC Stats model, was used to inform a population growth scenario. The

information shows that, for the 20 years from 2006-2026, population is predicted to grow, but will, for the ten years from 2026-2036, slowly decline. This would result in a net increase of 1.8% of population, to population of 2,080, representing 35 additional individuals, which overall results in a limited or no net in-migration scenario.

Community Infrastructure and Services

Based on census information, the ESCIA noted that in 2006, there were 531 occupied private homes in the Nisga'a Villages of which 25.3% were rented and 74.7% were owned. Many of the dwellings were constructed prior to 1986 and about 40% were identified as needing major repair. Each household had an average of three people.

Recent information in the ESCIA estimated approximately 473 homes in three Nisga'a Villages with nearly 70 people on waitlists for new homes. Depending on the community, different approaches have been used to manage the housing demand including building new houses on available lots, redeveloping existing housing lots, and/or acquiring funding for home renovations. Temporary accommodations in New Aiyansh and Gitwinksihlkw (e.g., hotels, motels, bed and breakfast, and RV campground) have a capacity of 272 units.

Community utilities within Nisga'a Lands such as water, sewer, garbage collection, and landfill services are operated by NLG and the Nisga'a Village governments. The community landfill, which is funded by the Regional District of Kitimat-Stikine, is located near Gitlaxt'aamiks and services the Nisga'a communities and surrounding area. The ESCIA noted that all of the water systems in Nisga'a Villages have been or are in the process of being upgraded. The majority of the community sewer systems are in good working order with only one system needing a recent upgrade (2011). High-speed internet services are provided to all Nisga'a Villages by enTel, a company that is part of the Nisga'a Commercial Group.

Each Nisga'a Village operates a recreation centre that houses community-based recreation programs funded by Nisga'a Child and Family Services. In addition, the Nisga'a Memorial Lava Bed Provincial Park provides the setting and facilities for a variety of recreational activities.

The Nisga'a Nation School District No. 92 administers education services to the Nisga'a Villages and employs a staff of 32 teachers as of 2011/2012. New proposals are being considered by the district that focuses on re-organization of the school system in the Nass Valley and the development of a trades program. The *wilp* Wilxo'oskwhl Nisga'a Institute also provides post-secondary education opportunities in different academic and vocational sectors.

The Gitlaxt'aamiks Volunteer Fire department and RCMP Lisims/Nass Valley police detachment provide emergency services in Nisga'a communities with ambulance services provided by the BC Ambulance Service for the northern region. Healthcare services (e.g., physician services, public health, and dental/mental health) in the Nisga'a Villages is delivered through and managed by the Nisga'a Valley Health Authority. Each Nisga'a Village government provides social services in their respective communities while the Nisga'a Child and Family Services coordinates services to ensure the protection and well-being of Nisga'a children and youth.

Social Risks to Family and Community Well-being

In their ESCIA, the Proponent collected provincial information on different socio-economic indicators was used to examine the current well-being in Nisga'a communities. For most indicators, including children at risk, youth at risk, human economic hardship, crime, health, and education, the rates in Nisga'a communities were found to be double or triple above the relevant provincial average.

The ESCIA report says "It may appear the community well-being in the Nisga'a Villages is, in a statistical sense, below that of other communities or is lower than the provincial average ... numbers likely to the important context or details of local perceptions and understandings of well-being."

Types of Potential Effects of the Proposed Project

Migration and Population

The ESCIA provided three different scenarios of possible changes to migration over the projected status quo of limited in-migration.

In what is called the "High Net Migration" scenario the ESCIA says that net in-migration to the Nass Area is predicted to be 52 people (based on a number of 65 people+family = 113 people – those who choose to live in Terrace or Prince Rupert and commute) within the first several years of the proposed Project being constructed. The model also suggests that 26 people will leave the Nass Area due the proposed Project, leaving a net increase of 26 people. The model then suggests annual in-migration would decline by one person per year, leaving a steady in-migration in the Nass Area population to about 1,800 people by 2022. By the end of the life of the proposed Project in 2030, populations would have increased by one-third to 2,025, an annual increase of 3.4% and well ahead of natural population growth rates.

In what is called the "Low Net Migration Scenario" the ESCIA suggests in-migration is the same, but out-migration rates would be higher than the 26 predicted. In this model, a more modest population increase of 1,676 people by 2022 would occur, which is an

11% increase. By end of the proposed Project in 2030, population could be 1,800 people, representing an annual increase of 1.06%, about double the natural annual population growth rate.

The population change scenarios modelled in the ESCIA have the potential to both positively and adversely affect Nisga'a communities. The report notes that, despite the models which show linear growth rates, both in and out-migration will likely fluctuate depending on the stage of the proposed Project and the influence of other development expected to occur in the region, along with other broader social and economic factors (e.g. a recession, global changes in commodity prices etc.).

The reasons why individuals might decide to move away, move to or move back to the Nass Area were also explored in the ESCIA report. Mining experiences in BC have shown that people moving into the northwest region are more likely to move to larger centres such as Terrace or Smithers because of the diversity of services that are not found in smaller communities like the Nisga'a Villages. Those who do decide to move to the Nisga'a Villages from outside the region or from the large regional centres are likely to have social connections in those villages and/or actively seek available employment opportunities.

Other Nisga'a citizens, however, have expressed the intention to move away from the Nass Area if the proposed Project was to proceed. The ESCIA revealed that some citizens were likely to leave because of environmental concerns associated with proposed Project's mining activity while others return to take advantage of economic opportunities and enhances social and community networks.

Compared to the proposed Project's operations phase, the construction phase is likely to have less influence on people's decisions to (or not to) move (or move back to) the Nass Area because of the temporary nature of construction work. The ESCIA noted that there could be exceptions to this trend particularly for those individuals who have some other reason to move (or back to) the Nass Area or who seek the opportunity to make a first impression with the Proponent to secure future work during operations (e.g., young, single workers). With Nisga'a citizens showing a moderate interest to work at the proposed Project, it is expected that the long-term employment associated with the operations phase and the close proximity of the proposed Project to Nisga'a communities are expected to influence decisions to permanently move to (back to) the Nass Area.

Community Infrastructure and Services

The net impact of potential mine related migration to housing and infrastructure within the Nisga'a Villages is a function of the quality and quantity of existing housing, current occupancy, and degree to which expected migration might exceed the combined stock

of housing and infrastructure, including consideration of any upgrades or additions that may be proposed.

The ESCIA indicated that overcrowded residences continue to be an issue in Nisga'a communities as housing is close to or at capacity. For Nisga'a citizens living outside of the Nisga'a Villages, the lack of adequate housing represents a key deterrent to moving back to the Nass Area. The ESCIA notes that, should the High Net Migration scenario occur (i.e. 26 people per year), the following effects could occur:

- If more people come to the Nisga'a Villages, there is likely to be a short-term increase in over-crowded households;
- Additional overcrowded housing will deter those deciding whether to move to (back to) the Nass Area for jobs, especially those living in relatively close communities such as Terrace; and,
- Employment, businesses, and revenues generated by the proposed Project may prompt investment to upgrade and augment local housing in some or all of the Nisga'a Villages.

It is predicted that until additional housing become available in the medium to long term, Nisga'a Villages are likely to face negative social impacts due to overcrowded and shortage of housing.

The potential influx of people in the Nisga'a Villages is also expected to increase usage and demand on community infrastructure. For most necessities such as electricity and communications, the existing community infrastructure would be able to absorb the additional demand. Similarly, water and sewer facilities in each Nisga'a Village either have ample capacity to service a larger population or are in the process of being upgraded.

Recreation facilities, however, have been identified by Nisga'a citizens as an element of community infrastructure that would require upgrades in order to accommodate more people. Improving these facilities is considered necessary to not only attract people to (back to) the Nisga'a Villages, but also provide incentive to keep those considering a move, in the community. Local schools have the classroom space to take in more students, but would likely need to hire additional teachers.

The ESCIA highlights the fact that an increase of people to the Nisga'a Villages and to a lesser extent, individual behaviour and choices (e.g., higher income leading to substance abuse, domestic disturbance, etc.) have the potential to affect the delivery of services (e.g., education, emergency, and transportation). An increase in students is not likely to strain education services as schools are facing the challenges of managing declining school enrolment. During the SERC survey, Nisga'a citizens note a review of

the education system and services in Nisga'a communities is ongoing to address issues such as the teacher staffing levels and facility conditions.

With an anticipated increase in the proposed Project-related traffic on the Nisga'a Hwy and roads (i.e., 6,206 vehicle trips during construction; 6,724 per year during operations), there is an expected increase in the number of accidents and depending on where these accidents occur, a greater demand on existing police and ambulance services. Responding to these additional incidences will draw Nisga'a emergency resources – Nisga'a Lisims RCMP and/or Nisga'a volunteer fire department – away from other emergency needs in the community for periods of time. Road blockage caused in the event of an accident could also prevent or delay Nisga'a citizens from reaching their destination, leading to some level of inconvenience for travellers.

Nisga'a emergency services may also have to contend with the potential increase in public and domestic disturbances that are associated with higher disposable incomes in communities. It has been noted that to some extent, mine related employment and incomes could lead to increased incidents of alcohol and drug abuse and necessitate the need for more community policing, placing a strain on existing police/medical/ambulance services. The ESCIA notes that some survey respondents suggested a direct link between mine-related employment and the need for more police in the communities.

Potential effects to transportation services and infrastructure include issues of pollution and other environmental impacts resulting from road related accidents and spills, as well as risks to wildlife and humans from higher levels of industrial traffic. Improved access caused by snow ploughing and regular maintenance along the FSRs could attract non-resident parties to the area and lead to increased land use activities by "outsiders". These activities and those that are deemed illegal (i.e., unauthorized hunting and poaching), could impose additional pressure on natural resources and elevate the risk of accidents. Unintended access could also increase the risk of damage to culturally important sites due to more traffic and/or vandalism.

Occupational and non-occupational health risks

The potential risks of environmental exposures on Nisga'a communities are expected to be localized to the mine site. The Proponent conducted a human health risk assessment, which identified arsenic and molybdenum as chemicals of potential concern that could affect humans consuming untreated mine contact water, soil, and plants. The assessment noted that the likelihood of health effects from these chemicals is low based on conservative exposure scenarios. Surface drinking water sources for the proposed Project are limited to the Clary Creek Watershed with no potential pathways of exposure to Nisga'a communities. More information regarding the

proposed Project-related effects on human health, including proposed mitigation measures, can be found in section 9 of the EAO's Assessment Report. EAO also notes its findings of no significant adverse effects on Human Health.

Occupational and non-occupational accident risks

As part of the EIS, the Proponent conducted an assessment to identify the different occupations associated with the proposed Project that would be considered high risk. Using Worksafe BC statistics, the potential risk of injury and/or death caused by job site accidents was estimated and the results forecasted 35 injuries per year during construction and six per year during operations. For decommissioning and post-closure, 0.1 injuries per year are expected. These numbers provide a general indication of the level of accident risk that could occur at the proposed Project with Nisga'a citizens with no greater or lesser risk of job site injury or death than the broader population.

In terms of non-occupational accident risk, mine-related traffic, including buses, heavy trucks and equipment, and other industrial transport vehicles, on Nisga'a roadways is expected to pose some risk to Nisga'a citizens whether as drivers or bystanders although those would be mitigated through the measures discussed in section 10 of EAO's Assessment Report on Transportation Effects. The ESCIA notes that, while the statistical risk of accidents is quite low, those risks would not occur in the absence of the proposed Project.

Social Risks to Family and Community Well-being

The Proponent's Application says that the inflow of transient workers in the Nisga'a communities not only has the potential to change people's behaviours, social conditions, and community dynamics, but can also increase demand on existing community services, infrastructure, housing, and traditional culture. Workers that engage in disruptive and/or illegal activities could also cause adverse effects in the community including crime, alcohol abuse, and family dysfunction.

Increased income associated with proposed Project employment can have both positive and negative effects on communities. It can improve the standard of living in which individual and family decisions can be made to improve housing, seek higher education, practice cultural activities, or invest and save for the future. The ESCIA indicated that Nisga'a citizens, although working away from their families for periods of time, would feel better knowing that they could provide a better life for their children with increased income. Higher incomes have also been noted to improve people's health, self-esteem, and choices, particularly for young children.

Conversely, increased incomes can also exacerbate negative behaviours such as alcohol and substance abuse, in communities that are already fraught with social

issues. These behaviours can, in turn, lead to other family-related problems including child neglect and domestic violence. Substance and alcohol abuse, which are the most common issues raised with respect to increased income associated with the development of mines and higher incomes, itself can contribute to suicides, overdoses, and death. Poor spending decisions can dually reduce the well-being of the individual and the well-being of the wider community that is affected by the negative behaviour.

As mentioned in previous sections, Nisga'a Villages are already experiencing overcrowded residences and a shortage in housing such that trying to accommodate new families would be difficult. To partially address these issues, two of the Nisga'a communities have developed portions of land for new housing. During the proposed Project decommissioning and closure phases, there will be loss of jobs and income, which could lead to an outward migration and negative effects to the community.

Schedules related to shift work can strain family and community dynamics as workers are separated from their families for periods of time. The potential effects on the worker include feelings of loneliness and separation and the temptation to engage in substance and alcohol abuse. For the spouse at home, an absent partner can mean managing a busier household workload, making more independent decisions, and feeling more anxiety for the partner. The ESCIA noted that the stress caused by a rotational schedule can increase family fragmentation, family break-ups and violence, and altered behaviour in children. In addition, time away from the community can reduce a worker's community involvement and ability to fully participate in subsistence and traditional activities. Removal of workers from the community has the potential to remove the most skilled and employable workers from the community (i.e., brain drain) and redirect spending away from local businesses to larger centres such as Terrace.

The ESCIA reported that resource harvesting and activities are strongly internalized for most Nisga'a citizens. Workers living away from the community might have less time for or lose the opportunity to participate in resource harvesting, whether for subsistence or community cultural purposes. Instead of harvesting country foods, workers on shift work may rely more on store bought foods, which have been linked to health problems in northern communities. At the same time, with higher incomes, workers are able to purchase the necessary equipment to efficiently partake in resource harvesting activities.

Mitigation Measures

The Proponent has committed to implement policies that guide the movement of workers and contractors to and from the mine site, including:

- Housing external contractors and their workers in camp at site;

- Prohibiting private vehicles from driving to and from site from regional communities and other parts of BC;
- Transporting workers and contractors by bus to and from the mine site from Terrace; and,
- Prescribing work rotation schedules and providing on-site accommodation camps.

EAO notes that these policies are intended to reduce the need for people outside the Nass Valley to move (back to) to the region in order to work at the mine. They have the potential to lessen in-migration to Nisga'a communities and temper any additional demand on existing community infrastructure and services.

Beyond the transportation and accommodation policies, the Proponent would be required, as per Condition 34 should an EA Certificate be issued, to develop and implement the five management plans referenced in the frameworks included in Appendix 2 of this Report, and the Certified Project Description. These plans all contain elements which are intended to address many of the issues raised in the social well-being assessment. The plans are intended to provide, among other things, monitoring and other information which could contribute to identifying, if and when they happen, potential social and cultural effects associated with in-migration on infrastructure and services, new work patterns and income levels on family/community well-being and cultural activities, and road accidents due to increased traffic. Effects will be identified and addressed through a suite of activities outlined in the plan frameworks, including:

- Supporting the NLG and using existing NLG-led processes and tools to monitor social and cultural indicators both in Nisga'a communities and at the mine site;
- Development and implementation of a cultural and social needs assessment survey to solicit input from Nisga'a employees about different facets of their employment at the mine site;
- Implementation of human resources policies that are culturally-sensitive to Nisga'a employees and fair to other employees at the mine site; and,
- Implementation of a communications plan to facilitate regular communication with the NLG during all phases of the proposed Project.

The Proponent proposes that monitoring indicators and triggers will be developed in collaboration with the NLG. EAO notes that the NLG has been very clear that consultation with Nisga'a citizens will be led by the NLG and that the Proponent should not set up new consultation processes with individual villages. The Proponent has suggested that possible indicators to be considered could be related to population and housing, school enrolment, individual and family dysfunction (e.g., children in care, serious crime rates, etc.), participation rates in harvesting and cultural activities, and mine-related traffic volumes and accidents along the Nass FSR. Where monitoring results exceed the specified triggers, the Proponent has proposed that they, and the

NLG, will take action to investigate the underlying issues, develop appropriate action plans, and take action to address the issues. No specific actions have been proposed by the Proponent should issues arise and no specific thresholds or triggers are provided in the framework plans.

The human resources policies the Proponent has described include a policy that prohibit drug and alcohol use at the mine, even before and during shift work, and will provide leave with pay for those workers willing to address substance abuse issues. The Proponent will also provide Nisga'a workers with scheduling options that suit their needs for participating in cultural and harvesting activities.

Issues related to potential accidents associated with the proposed Project will be managed through the Proponent's Occupational Health and Safety Plan, which will be developed prior to mining and processing operations and will be subject to the approval of the Ministry of Energy, Mines and Natural Gas. The plan will be designed to protect the health, safety, and well-being of all workers at the proposed Project and will include inspections and measures to address unsafe work places, accidents and worker health.

EAO's Conclusions on Social Well-being

The effects on the social well-being of Nisga'a citizens from the proposed Project appear to be driven primarily by two main factors. The first factor is how many Nisga'a citizens either move to/move back to the Nisga'a Villages as well as how many leave because of the proposed Project, either because they do not like the proposed Project or because they are seeking better living arrangements due to increased incomes. The higher the magnitude of these changes, the more likely impacts to well-being are likely to happen, both positive and negative, due to changes in the pattern of community service use, pressures on infrastructure and changes in the patterns of resource use in the Nass Area.

With respect to the issue of migration, with the exception of housing and perhaps police services, there appears to be enough community infrastructure in the Nisga'a Villages to absorb the relatively modest potential changes in population that will likely result from the proposed Project. Social well-being associated with increased pressure on housing in the short and perhaps moderate-term will likely have a negative effect, although increased incomes and revenues could improve housing inventory in the medium to long term. There is not a particularly effective suite of mitigations the Proponent can undertake to mitigate in or out migration as a result of the proposed Project, with the exception of providing transportation options which would allow Nisga'a employees to commute and creating flexible schedules to accommodate this. EAO notes the Proponent has committed to these mitigation options.

With respect to policing, the proposed Project may put pressure on limited police services, resulting in some negative social well-being as police potentially respond to additional project related effects (e.g. increased domestic violence, traffic accidents, incidents at the mine site). There is also little the Proponent can do to directly mitigate effects from additional pressures on policing resources.

The second factor appears to be how individual citizens make choices around increased incomes. Predicting effects to social well-being as the result of increased income is complex and is dependent upon numerous factors beyond the ability of a single Proponent to address. Again, some effects will be positive, such as increased resources for education, housing, recreations and other “healthy” choices, but negative effects, such as substance abuse, are also possible. Mine work schedules with significant times in-camp can create challenges to family cohesion which can exacerbate the negative effects.

The Proponent has committed to developing a number of detailed management plans which would outline how it intends to work with NLG to develop indicator and monitor social well-being. The plans describe, at a broad level, an intention to collaborate with NLG to engage communities in proactively identifying solutions to problems as they arise, a social and cultural needs assessment to ensure camp life is “Nisga’a friendly”, human resource policies which include drug and alcohol programs, equal opportunity and anti-discrimination programs, flexible work schedule options and policies around bereavement leave.

In the absence of the more detailed plans – to be developed during permitting - which would describe potential thresholds for taking specific action and a better understanding of what those actions would be, it is difficult to conclude how effective those plans would be in mitigating the potential negative social effects or enhancing the positive social effects described in this chapter. However, EAO notes that, as a condition of an EA Certificate, the plans would be developed in consultation with the NLG and the plans would be subject to approval by EAO. In light of this, EAO can conclude that the actions in those plans will be likely to contribute to mitigating adverse effects and enhancing positive effects associated with the development of the mine. However, given the broad uncertainty associated with human choices around in-migration and out-migration, spending patterns, reaction to increased wages and social interactions, it is extremely difficult to determine the magnitude of such effects or to predict the success of mitigations which have yet to be developed.

While EAO recognizes there is still broad uncertainty around the magnitude and social effects, we recognize that the plans committed to by the Proponent are likely to make a contribution to addressing at least some elements of the social effects of the proposed Project. In addition, increased income and financial well-being are likely to have a

slightly positive effect on overall well-being; although, we also note uncertainty relating to the magnitude of that increase. The Proponent's plans, however, are unlikely to be able to mitigate short and medium term negative effects to social well-being resulting from housing shortages and crowding. EAO concludes that overall social well-being of Nisga'a citizens may improve somewhat due to the Project.

13.3.3 Cultural Well-being

Cultural Well-Being Background

Culture practices and activities

Chapter 2 of the NFA 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 this Agreement".

The ESCIA notes that, through the surveys with Nisga'a citizens, an important message was that knowledge of the treaty right and ability to use the land is equally important as the actual pursuit of cultural practices and activities. Nisga'a Nation cultural practices and activities are connected to the land and aquatic resources in the environment. Cultural practices described in the ESCIA include hunting, trapping and fishing, mushroom picking, and the harvest of country food and medicinal plants. Survey participants talked about Nisga'a as stewards of the land with the responsibility for protection that land for future generations.

The ESCIA reported that survey respondents felt that cultural practices and activities went beyond the boundaries of traditional resource harvesting practices in a way where the integrity of the environment is essential to the Nisga'a culture and Nisga'a economy. The ESCIA notes the examples of Nisga'a businesses offering eco-tourism and wilderness activities showing the relationship between the Nass Area environment and Nisga'a cultural values.

In terms of cultural activities, the ESCIA revealed that most Nisga'a citizens, both on and off Nisga'a Lands, consume wild fish on a weekly basis while some Nisga'a citizens consume wild meat and wild berries/plants on a weekly basis. It was noted that wild food consumption among Nisga'a citizens who live on Nisga'a Lands is consistently higher for all types of foods compared to those citizens who live off Nisga'a Lands.

Work Patterns and Incomes

The ESCIA noted that Nisga'a citizens have had some previous experience with shift work and the potential interruptions to their land use activities. While there is a understanding that mine employment can affect resource harvesting and community activities, there is also a recognition among Nisga'a citizens that people are already

moving away from Nisga'a Villages for seasonal work or other employment, which is not any different from the work patterns for mine.

Nisga'a Language

Census data from 2006 showed that Nisga'a citizens use and are more fluent in the Nisga'a language compared to the provincial average among other aboriginal communities. More recent information in the ESCIA; however, showed that the comprehension of and the ability to read and write the Nisga'a language is limited to a small portion of Nisga'a citizens. In a survey of 405 Nisga'a citizens living in the Nisga'a Villages, Terrace, Prince Rupert, and Vancouver, 72 (17.8%) understood the Nisga'a language completely while 42 (10.4%) could speak the language, and 28 (6.9%) could read and write the language.

The survey's results coincide with the general recognition among Nisga'a citizens that most people in Nisga'a communities no longer speak the Nisga'a language regularly. Teaching the Nisga'a language is often challenging because youth are uninterested to learn and because of the limited opportunities for citizens to learn the Nisga'a language in urban centres.

There are current efforts to revitalize the Nisga'a language through immersion classes in schools and through increased awareness of significance of the language to the Nisga'a culture. Part of the revitalization includes using new ways to connect with youth (e.g., mobile app) about the Nisga'a language.

Types of Potential Effects of the Proposed Project

Direct Project-related Environmental Impacts on Culture

The proposed Project has the potential, without mitigation, to adversely affect resource harvesting activities such as fishing, hunting, trapping, and gathering that are at the core of Nisga'a Nation culture and cultural practices.

The "8e" analysis undertaken by EAO concluded that the proposed Project is not reasonably expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands or Nisga'a interests set out in the NFA.

Impacts of Changing Work Patterns and Income

Mine employment schedules can affect the cultural pursuits of Nisga'a citizens by making it difficult to maintain cultural lifestyle, alter family dynamics, and change the traditional diet at the mine site.

The ESCIA described the concerns with respect to the limited time that those employed at the mine will have to participate in cultural activities, including resource harvesting.

For young, working-aged men, less time on the land practicing culturally-related activities may diminish their opportunities to learn traditional skills and knowledge from their family and elders. This situation is considered essential to facilitate the transfer of cultural knowledge between generations. Missing the opportunity to process fish, hunt and gather plants/berries was identified as another consequence of shift work associated with the proposed Project. Well over half of all survey respondents noted that they assumed that people who worked at the proposed Project would affect their participation in cultural activities.

Mine-related work schedules may also hinder Nisga'a workers from attending cultural (i.e., cultural, family, community) events such as wedding, ceremonies, funerals, feasts and other events. For the Nisga'a Nation, being able to participate in these events is important because of the value and significance of certain ceremonies and the specific roles of key community members. The ESCIA noted that Nisga'a citizens expressed the need to allow employees to return to the community for cultural and family events, especially for Nisga'a funeral ceremonies and in particular for the role of the undertaker at Nisga'a funeral ceremonies.

The ESCIA speaks about the shift from the more traditional "collective" nature of Nisga'a society to a more individualist culture associated with corporate organizations. "High context" communication and group decision-making can be replaced with hierarchical thinking and performance based wage labour.

Shift work can also strain family dynamics if one or both parents work at the mine. It was also noted that family and community cohesion can be strengthened when workers have extended time to bond with family and friends, and can participate in cultural and community events that foster community cultural well-being. Uncles, aunts and extended family can take care of kids when parents are doing shift work, enhancing the extended family relationship.

While working at the mine site, Nisga'a workers will have less opportunity to consume traditional foods such as wild meat, fish and plants/berries because of the Western diet accommodated in camp. The difference between the diet in camp and Nisga'a consumption of culturally-relevant food is likely to affect the cultural values and lifestyle of Nisga'a workers at the mine site. Survey respondents wanted to know if the mining camp would be sensitive to these needs.

Higher disposable incomes that benefit certain individuals over others have the potential to weaken cultural cohesion and resilience in communities. The disparity in income can lead to an increase in spending on oneself, a greater interest in generating wealth, and a diminished interest in partaking in cultural activities together with family and friends. Based on experiences from other northern mines, these effects tend to be more

prominent for certain groups in the community. For example, young, single males lacking money management skills and responsibilities to support a family are more likely to spend their income on alcohol and/or substances for themselves and others. However, it is also recognized that generating more wealth can have positive results such as improving self-worth through increased responsibility, creating more opportunities to participate in resource harvesting activities, and contributing to community well-being. The prospect of having Nisga'a women work at the mine and earn a good income would have also have an overall positive impact at the family and community levels.

Effects on Nisga'a Language

The ESCIA provided information from the survey respondents who, for the most part felt mine employment would not change Nisga'a language, although they noted it would be nice if the mine offered Nisga'a language training. Other respondents noted the possibility of causing overall cultural assimilation and discrimination. The report does not the following potential pathway for effects on language:

- Working environment is predominantly English;
- Nisga'a workers do not use Nisga'a language during their shift at site (i.e. weeks);
- Enforcement of "English-only" policies to ensure clarity and consistency among employees;
- Influx non-Nisga'a workers to the Nass Valley necessitates the use of English at the mine site and in communities; and,
- Continued use of English at home and in the community.

It is recognized that the use of English at the mine could hamper the Nisga'a Nation's ongoing efforts to revive the traditional language. However, providing Nisga'a workers with the ability to spend more time participating in cultural activities with family members during off shifts may help reverse language loss and the effects to Nisga'a culture. Teaching non-Nisga'a people the Nisga'a language has also been identified as another measure to strengthen the culture and increase language use.

Mitigation Measures

Measures to address the potential effects of the proposed Project on the terrestrial and aquatic resources that Nisga'a citizens have the right to harvest as defined in the NFA, are provided in section 5 of this Report and EAO's 8e analysis noted that, with the mitigation described in the Table of Conditions and Certified Project Description, the proposed Project is not reasonably expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands or Nisga'a interests set out in the NFA.

Many of the mitigations described in the Proponent's management plan frameworks to minimize negative effects on social well-being could also contribute to minimizing effects to cultural well-being. The Proponent's Social and Cultural Management Plan will include human resources policies that establish work schedule options and specialized cultural programs for Nisga'a workers. The Proponent suggests that these programs could include offering Nisga'a food service and Nisga'a language options at the mine site during off-shift hours. Nisga'a workers could also be provided scheduling options that align best with their cultural activity commitments as well as bereavement leave should an immediate family member pass away. Work schedule flexibility is an important consideration as the ESCIA noted that Nisga'a citizens prefer to work one to two week cycles with the ability to communicate from site both by telephone and by internet. EAO notes however, that the final details of these management plans are to be defined through subsequent discussions with NLG and are subject to approval by EAO. As a result there is uncertainty related to conclusions on the overall effectiveness of the components of the plans, as there are no specific triggers or thresholds and no specific actions outlined should increased cultural effects be detected through monitoring efforts.

Cultural effects associated with higher incomes in Nisga'a communities are also difficult to predict as spending decisions are based on individual preferences.

EAO's Conclusions on Cultural Well-being

The potential effects on the cultural well-being of Nisga'a citizens from the proposed Project appear to primarily result from the nature of shift work, and in particular the loss of the opportunities for working individuals to participate in Nisga'a culture, as well as the loss to the community of individuals or group of individuals when they are working. Potentially missing hunting and fishing opportunities, visiting with relatives and missing ceremonies and cultural activities all have the potential to impact Nisga'a culture, especially with a potentially large Nisga'a workforce at the proposed Project. However, there is relationship and an additional uncertainty between economic well-being and cultural well-being. Paradoxically, a smaller number of Nisga'a workers employed at the mine, which would reduce the incremental economic benefits from the proposed Project, would likely have a smaller cultural well-being effect, as the majority of potential cultural effects appear to relate to removing people from their regular family life and inserting them into shift work where they are absent from the community. Likewise, a larger impact on economic well-being may also result in a larger impact on cultural-well-being as more people participate in wage labour away from their families.

The Proponent's mitigation as described in the framework plans included in the Certified Project Description (Appendix 2), and in particular the commitment to a social and cultural needs assessment at the mine camp to ensure the camp life is "Nisga'a friendly" as well as human resource policies which include drug and alcohol

programs, equal opportunity and anti-discrimination programs, flexible work schedule options and policies around bereavement leave (which EAO notes is of particular importance to those Nisga'a citizens who participated in the surveys) may prove effective in addressing at least some of the negative cultural effects associated with Nisga'a citizens being away from their communities and families. However, EAO notes that the framework plans do not include any thresholds or triggers or specific actions should effects be detected.

Along with this camp-specific focus, EAO notes the Proponent's commitment to working with the NLG using existing programs and mechanisms monitor potential effects on cultural well-being. The Proponent has also discussed such components as shift scheduling for participation in traditional harvesting activities and cultural events should prove effective in mitigating potentially negative cultural effects. Again, though without these specific commitments included in approved plans, there is an element of uncertainty in making any conclusions on cultural well-being. However, EAO notes that, unlike social well-being, the Proponent has more ability to control aspects of employee well-being such as shift scheduling, anti-discrimination programs, bereavement policies, substance abuse programs and other human resource policies.

In consideration of these factors and being aware of the uncertainties due to the lack of detail in the Proponent's plan frameworks, EAO concludes that overall cultural well-being is unlikely to be impacted as a result of the proposed Project.

13.4 Summary of Consultation with NLG for Kitsault Mine Project Application for an EA Certificate

This Report provides a summary of consultation with the NLG and the Nisga'a Nation's involvement with EAO during review of the Kitsault Mine Project Application for an EA Certificate.

Pre-Application Review – June 24, 2010 to April 30, 2012

On June 24, 2010, EAO wrote a letter to notify NLG that the EA for the proposed Project had been initiated and provide information on the proposed Project and the BC EA process.

On September 15, 2010, EAO wrote to NLG and provided the draft section 11 Order and the opportunity for NLG to provide comments on the draft section 11 Order prior to EAO issuing it to the Proponent.

On November 24, 2010, EAO wrote to NLG, thanked them for submitting comments on the draft section 11 Order, provided NLG with a copy of the section 11 Order which was issued to the Proponent on this day, and offered NLG capacity funding for them to

participate in the pre-Application stage. On December 15, 2010, NLG confirmed its interest in receiving capacity funding from EAO.

On December 16, 2010, EAO provided NLG with \$5,000 to participate in the pre-Application stage of the EA.

On December 17, 2010, EAO, Federal agencies, the Proponent and NLG met to discuss the Proponent's Work Plan for the Assessment of Nisga'a Economic, Social and Cultural Impacts (Work Plan); to seek feedback from the three governments (NLG, Canada and BC) on the SEC Work plan; and to determine the next steps and a process for continuing to work collaboratively with the governments and the Proponent. NLG requested that the Proponent provide the scope of its survey or questionnaires for collecting baseline information for the Proponent's Nisga'a ESCIA, with NLG for review, prior to finalizing.

By way of email, on January 4, 2011, NLG provided comments to EAO on the draft AIR (dated December 2010) and the revised Project Description (dated December 2010). NLG commented that the draft AIR should include:

- Reference to the NFA rather than the Treaty;
- A commitment to cumulative effects assessment;
- Clarification on the process for the review of concurrent permitting;
- More detail on water management during the construction phase, including water balance of the process plant and TMF, water flow, chemistry and storage, and, flood management;
- The transportation of concentrate, during operations phase;
- Evaluation of the water and mass balance of TMF dry to extreme wet conditions, and a range of seepage volume and water quality throughout the duration of the proposed Project;
- Consideration of the long term stability and post-closure monitoring of the TMF;
- More detail on the assessment methodology;
- A statement that an assessment of the potential effects on drinking water should be included in the Application;
- Identification of watersheds;
- Riparian areas;
- Referencing Nisga'a Nation separately from First Nations;
- A statement that the Proponent will consult with Nisga'a Nation on matters relevant to Nisga'a interests;
- Which species at risk and ecosystems at risk are being considered;

- Size, in hectares, of the LSA and RSA;
- More discussion on the studies of vegetation and plant communities, and strategies that will be employed when rare plant or community are found;
- Clarification on VCs selected;
- Assessment of potential effects on land and resource uses for which Nisga'a have treaty rights;
- References to fish and wildlife interests and other interests as defined in the NFA, and the joint Fisheries Management Committee and Nass Wildlife Committee and the objectives of these two bodies;
- Mention of an Access Management Plan; and,
- References to all relevant sections of the NFA.

The comments NLG provided on the Proponent's revised Project Description considered the development of the mine, mine waste and water management, and closure, including:

- Clarification on the design of the south embankment;
- The location of the spillway;
- Details on the Proponent's plan to reroute seepage that is not captured by natural drainage;
- Whether the tailings will be acid generated and if the tailings will be tested;
- How will lead from the leach circuit be stabilized before entering the environment;
- More detail on the waste management plan;
- What is the scope of delineation and testing for PAG waste rock; and,
- More information on the TMF, waste rock and pit closure plans, and the production schedule for processing ore.

On January 10, 2011, NLG provided further comments on the draft AIR, requiring additional detail and clarity regarding the consultation requirements and the provisions of the NFA be included in the draft AIR. The Proponent responded to these comments and those provided on January 4, 2011, and how these comments were addressed, by way of a tracking table which was provided to NLG.

EAO met with CEA Agency and NLG on January 20, 2011, to further discuss the Proponent's Work Plan and the development of the ESCIA. NLG stated that its key priorities are to ensure the economic, social and culture baseline information collected by the Proponent be statistically valid and be of high quality and that the Proponent work with NLG to build capacity and complete an information base that could be accessible to other Proponents.

On March 10, 2011, by letter, EAO advised NLG of the changes to the scope of the proposed Project, as described in the section 11 Order, dated November 24, 2010. EAO notified NLG that by the way of a section 13 Order, EAO will amend the section 11 Order to reflect the following changes:

- Construction and equipment and materials will now be transported by truck and no longer transported by barge;
- The Proponent is considering two routes to transport molybdenum concentrate by truck, from the mine site to the Port of Vancouver; and,
- The Proponent now proposes a milling rate of 40,000 to 50,000 tonnes per day and estimates three concentrate trucks would leave the mine site each day during operations.

EAO sought NLG's comments on the draft section 13 Order, and advised NLG that if EAO did not receive comments from NLG by March 31, 2011, then EAO would issue the section 13 Order to the Proponent.

On June 6, 2011, EAO wrote a letter informing NLG that EAO issued a section 13 Order and enclosed a copy for NLG's information. EAO notified NLG that because of the changes to the proposed Project, the list of First Nations who will be consulted on the proposed Project, in the section 13 Order, was revised. EAO informed NLG that a Transportation technical Working Group will be formed by EAO to engage the First Nations who may be potentially impacted along the transportation route and invited NLG to participate. EAO stated in the letter, given the changes to the proposed Project, EAO will make an addition to the draft AIR that directs the Proponent to undertake a specific study that considers the potential impacts of road use from the proposed Project site to Hwy 16. EAO also stated that the Proponent will complete a work plan which outlines how the study will be conducted, and prior to approving the work plan, EAO will consult with the affected First Nations.

EAO met with CEA Agency, NLG and the Proponent on May 13, 2011, and June 9, 2011, prior to the Proponent submitting the finalized Work Plan for, and the scope of the Nisga'a Social, Economic, Resource Use, and Cultural Survey, dated July 27, 2011.

NLG were provided several opportunities to comment on the various versions of the draft AIR. On June 15, 2011, NLG provided technical comments on the draft AIR (version 4, dated May 2011) to EAO. These included requests for clarification on the content of the draft AIR, regarding the inclusion of specific VC, or questions on the comments NLG submitted previously. EAO directed the Proponent to respond to these comments and documented how the Proponent addressed NLG's comments, by way of a tracking table, which was provided to the Working Group, including NLG.

NLG were invited to comment on the draft Road Use Impact Study (RUIA) (dated June 10, 2011). On June 24, 2011, NLG provided comments to EAO. Some of these included:

- NLG has significant concerns with the proposed approach and the content of the RUIA Study outline;
- Questioned the rationale for producing a stand-alone RUIA, separate from the Application;
- The RUIA must meet the requirements of paragraph 8 of Chapter 10 of the NFA; and,
- Assessment methodology does not indicate estimates of impacts on the number of severity of transportation accidents.

NLG were provided with another opportunity to comment on the draft AIR, prior to it being approved by EAO. NLG submitted additional technical comments on the draft AIR (version dated August 2011) on September 7, 2011, and non-technical comments, those relevant to the NFA, on September 9, 2011, including requests for further clarifications or questions on the comments NLG submitted in June 2011. As with previous versions of the draft AIR, EAO directed the Proponent to respond to these comments and documented how the Proponent addressed NLG's comments, by way of a revised tracking table.

On October 5, 2011, NLG wrote to EAO requesting an opportunity to review the Proponent's responses to NLG's comments on the draft AIR and EAO's evaluation of the Proponent's responses.

On October 6, 2011, EAO wrote to notify NLG that EAO issued the final AIR and has posted the approved AIR to EAO's website. Further, that the Proponent has responded to the comments received on the draft AIR in the form of a tracking table, and EAO assessed the adequacy or acceptability of the responses. This tracking table was also posted to EAO's website.

On November 21, 2011, NLG wrote to EAO, concerned that the Proponent proposes to submit an Application/EIS for acceptance without including the full Nisga'a ESCIA required under paragraph 8(f) of Chapter 10 of the NFA. NLG stated that without this information, the Proponent fails to meet the requirements of the NFA, the section 11 Order, and the AIR; and NLG ability to continue to meaningfully participate in the EA. In NLG's view, if the Proponent submits an incomplete Application that does not include all the full paragraph 8(f) information, then, the Application must be rejected and resubmitted after the deficiencies have been corrected.

EAO met with NLG, CEA Agency and the Proponent on December 16, 2011, to discuss the Proponent's and Seabridge Gold Inc.'s proposed scenarios for the assessment

required by paragraph 8(f) of Chapter 10 of the NFA for the proposed Project and proposed KSM Project.

NLG was invited to participate in the 30 day evaluation period of the Proponent's Application, from December 22, 2011, to January 22, 2012, with the possibility of a 15 day extension. EAO invited representatives of NLG to participate in a Working Group meeting to discuss the results of Application evaluation and whether the Application contains the information contained in the AIR.

On December 22, 2011, NLG notified EAO that it received a copy of the Application from the Proponent, which was provided to EAO and CEA Agency for the 30 day evaluation period, and received EAO's email notifying the Working Group, including NLG, that the Proponent requested a 15 day extension to the screening period. NLG stated that it supports the 15 day extension. EAO also notified NLG of the upcoming Working Group meeting on January 20, 2012, and invited NLG to participate.

On January 10, 2012, NLG wrote to EAO and CEA Agency to comment on the scenarios proposed by the Proponent for the assessment required by paragraph 8(f) of Chapter 10 of the NFA for the proposed Project, including an assessment of cumulative impacts. NLG commented that the assessment of cumulative impacts is not well defined for the assessment of incremental impacts as required by the Nisga'a Nation ESCIA Guidelines. NLG noted, as set out by EAO during the December 16, 2011 meeting with EAO, CEA Agency and the Proponent, there is still a substantial amount of information that needs to be collected and further work that needs to be done (further data on business survey, focus groups, interviews, secondary research, preparation of methodology for the assessment, interpretation and analysis of the data and the assessment).

Representatives of NLG participated in the January 20, 2012 Working Group meeting, and had the opportunity to comment on the results of Application evaluation and ask questions about the Proponent's key issues document.

On January 20, 2012, EAO provided NLG with \$10,000 to participate in the Application stage of the EA.

On February 10, 2012, by letter to EAO, NLG provided comments on the screening/evaluation of the Proponent's Application for the proposed Project. NLG commented that there are a number of material gaps or deficiencies, and the Application lacks sufficient information and detail with respect to:

- Content, objectives of most of the "Mitigation Plans" (EMPs) and the timeframe in which the EMPs will be available for review and assessment; and,

- The Proponent's economic, social and cultural impact assessment required by paragraph 8(f) of Chapter 10 of the NFA.

On February 20, 2012, by letter, EAO responded to NLG's comments on the screening/evaluation of the Proponent's Application, and explained how these comments will be addressed.

On April 26, 2012, EAO wrote to advise NLG that the Application had been accepted and the 180 day review is expected to commence at the end of April. EAO informed NLG that EAO was not intending to invite the public to comment on the Proponent's study of the economic, social and cultural well-being of Nisga'a citizens. In the letter, EAO was also seeking feedback as to whether NLG would like EAO to seek comments from the public and how EAO would be involved in community consultation on the study. EAO extended the offer to participate in Nisga'a community open houses on the study.

Application Review – April 30, 2012 to referral

The 180-day Application review was initiated on April 30, 2012, when EAO received the Proponent's complete Application.

In response to EAO's April 26, 2012 letter, NLG wrote to EAO on May 4, 2012, to provide feedback on open houses in Nisga'a communities and informed EAO that NLG is not able to schedule community meetings to coincide with the public meeting scheduled in Terrace on May 23, 2012, in Terrace (during the Application public comment period, May 11 to June 11, 2012). NLG confirmed that NLG does not want EAO to seek comments from the public on the Proponent's study on the economic, social and cultural well-being of Nisga'a citizens. NLG also confirmed that in NLG's opinion it is important that EAO participate in open houses in Nisga'a communities and looks forward to working with EAO to develop an approach for the community meetings and to engage Nisga'a citizens.

EAO responded to NLG letter of May 4, 2012, on May 8, 2012, seeking feedback on the timing and location of open houses in the Nisga'a communities.

On June 15, 2012, EAO, CEA Agency and NLG met to discuss NLG concerns related to the proposed Project, and next steps of the EA. NLG raised the following:

- Concerned about impacts to water quality, downstream of Line Creek and the marine environment;
- Concerned about high level of metals found in marine animals;
- In NLG's view, the Proponent's Application does not provide sufficient information to assess water quality impacts, and there lacks solutions or measures to mitigate the impacts;

- Interest in meeting as a small group, with NLG's technical experts and the Proponent, to focus discussions on water quality modelling and predictions;
- Proposed to hold community meetings in the four Nisga'a communities for the Proponent to present the results of the Nisga'a ESCIA before mid July and for CEA Agency and EAO to work with NLG on dates and the agenda for these meetings;
- Questions about what is required at EA versus permitting; and,
- Interested in the Cranberry Connector being upgraded to a two lane Hwy and remaining open during the winter months.

In response to the concerns raised by NLG, EAO supported NLG's interest in a meeting focused on water quality with technical experts (agencies, First Nations and NLG) and the Proponent, and suggested it be arranged prior to the next Working Group. EAO stated its willingness to work with NLG to develop the agenda for the community meetings. EAO advised that given that the meetings are to be held in the Nisga'a communities, Nisga'a should chair the meetings, and suggested the meetings be held by the third week in July. EAO informed NLG EAO will advise the Proponent to develop a shellfish monitoring plan to the satisfaction of agencies, First Nations and NLG. Further, EAO will advise the Proponent to consider constructing a water treatment plan or other measures to manage and treat water.

Representatives of NLG attended the Transportation Working Group meeting July 10, 2012, and the Working Group on July 11, 2012. During the Transportation Working Group meeting, NLG raised the following:

- Acknowledged there has been a decline in moose populations between 2001 and 2011, and have considered not hunting because of the risk to moose populations, and noted that the moose hunting season is limited for a week and only 25 permits are available for the opportunity to hunt one moose, per permit;
- Concern that ploughing snow along the Cranberry Connector/Nass FSR would open up access to hunters and poachers;
- Interest in the Cranberry Connector/Nass FSR being paved/upgraded;
- Commented that if a portion of the Cranberry Connector is closed then this reduces access to the area, though this is not a reliable measure to reduce impacts to the moose populations;
- Advised the Proponent to work with Conservation Officers to increase their presence along the access roads, specifically, the Cranberry Connector;
- The Proponent consider convoys and limiting travel to certain times of the day, such as avoiding travelling at dusk and dawn, when transporting equipment, materials, reagents, and ore to and from the site;
- Further discussion is required on how the Proponent will deal with spill response;

- Suggested the Proponent commit to locating spill response kits at stations along the transportation route and other mitigation measures to reduce spills such as reducing speeds along sections of the route close to water sources;
- Question whether the Proponent is proposing an adaptive management plan; and,
- Commented that the RUEA did not identify why the Cranberry Connector is such an important area for fishing for NLG and First Nations.

In response, EAO advised the Transportation Working Group, including NLG, to submit comments on the RUEA as soon as possible to enable the Proponent to respond to comments. EAO advised the Proponent to respond to comments, through memorandums and issues tracking tables, and a Certified Project Description and Conditions, including management plan frameworks, related to the transportation route, by the end of July, 2012.

During the Working Group meeting, NLG raised the following:

- Questions about how water will be collected, and seepage water will be managed;
- Concern that exceedances of metals in water discharged into the receiving environment could be detrimental to marine life, and at what volume of shellfish consumed would become a health risk to Nisga'a citizens;
- Concern regarding the storage of water for a year, then releasing the water;
- Interest in the Proponent establishing WQMTs as part of the EA, and not deferring to permitting; and,
- Interest in the Proponent constructing a water treatment plant to treat water earlier than at post-closure, or propose other options to manage and treat water.

In response, EAO directed the Proponent to provide responses to comments and issues raised by the Working Group, including NLG, through memorandums and an issues tracking table, and to provide a draft Certified Project Description as it relates to water quality, including mitigations and commitments, by the end of July, 2012.

On July 13, 2012, EAO and CEA Agency meet with NLG to discuss the Proponent's findings of the Nisga'a ESCIA Report, and each government's reaction to the ESCIA Report. NLG stated that the ESCIA Report does not contain enough information to make an assessment on Chapter 10, paragraph 8(f). In NLG's view, the ESCIA Report does not provide justification or an analysis of how the Proponent came to its conclusions on whether the proposed Project would have adverse effects on the existing and future economic, social or cultural-welling of Nisga'a citizens. Further, NLG commented that these impacts are not clear, and the Proponent did not provide an explanation of how these impacts would be mitigated. Lastly, NLG commented that

although the Proponent has proposed a number of plans, the Proponent has not provided the details of the plans and the effectiveness of the plans once implemented. In the afternoon, of July 13, 2012, EAO, CEA Agency and NLG met with the Proponent. EAO instructed the Proponent to provide the details of the plans, and the monitoring and training programs proposed and include measures to mitigate the predicted impacts to the existing and future economic, social or cultural-welling of Nisga'a citizens.

On July 9, 2010, and July 16-17, 2012, EAO attended Nisga'a community meetings in the Nisga'a Villages of Laxgalts'ap, Gitlaxt'aamiks, Gingolx, and Gitwinksihlkw. EAO and CEA Agency presented an overview of the coordinated BC and federal EA processes for the proposed Project and answered questions on the BC EA process. Nisga'a citizens raised the following:

- Concern about long term impacts to marine animals from the historical and the proposed mine, and the health risk associated with the consumption of contaminated (high levels of metals) shellfish, clams, and crab, etc.;
- Question about how frequently water quality will be monitored and or tested/sampled at the mine site;
- Question of how the Proponent would respond to an emergency or vehicle accident;
- The Proponent provide an explanation of what the Proponent means by a no hunting policy for workers, and does this mean the Proponent is limiting the Nisga'a treaty right to hunt moose;
- Question whether there will be counselling services on site for younger workforce to assist them with managing and spending their earnings responsibly;
- Question whether the designation of the Nass FSR will change because of the proposed Project; and,
- Commented that if the mine goes ahead, Nisga'a workers will require training, prior to construction.

On July 25, 2012, NLG submitted a letter to EAO, stating that in NLG's view, that the Proponent has not provided sufficient information to enable NLG, EAO or CEA Agency to assess the effects of the proposed Project, as set out in the NFA, Paragraph 8, Chapter 10; and the Proponent has not addressed the critical gaps and deficiencies identified in previous correspondence.

On August 22, 2012, NLG wrote to EAO, commenting on the quality of the supplemental information provided by the Proponent on July 31, 2012, requesting a suspension for submitting comments on the Proponent's supplemental materials, and enquiring if the EA will be suspended.

August 30, 2012, NLG wrote to EAO to provide comments on the supplemental information provided by the Proponent on July 31, 2012.

On September 13, 2012, EAO responded to NLG's letters, dated July 25, August 22 and August 30, 2012, regarding the EA of the proposed Project and concerns raised by NLG on the July 31, 2012 supplemental information and memorandums, draft Certified Project Description and draft Table of Conditions, submitted by the Proponent. EAO informed NLG that the Proponent would be providing additional information and requesting a suspension to the 180 day review to allow additional time for reviewers, including NLG to evaluate the new package of information. Though, at this time, EAO had not made a decision on whether EAO would be issuing a suspension to the timeline.

On October 1, 2012, EAO suspended the EA for three weeks, until October 22, 2012, at the Proponent's request to enable the Working Group, including NLG, time to complete the review of the additional supplemental information provided by the Proponent on September 28, 2012.

On October 10, 2012, NLG wrote to inform EAO that NLG strongly opposes the proposal to close the Cranberry Connector between December and April, as set out in FLNR's letter, dated, October 3, 2012 from FLNR to EAO, as a measure to mitigate potential impacts of the proposed Project on the moose population in the Nass Area.

On October 19, 2012, NLG wrote to EAO requesting an extension to the timeline to submit comments on the Proponent's supplemental information, dated September 28, 2012, to enable the Proponent time to respond to NLG request for additional information provided on October 11, 2012, prior to NLG commenting on the Proponent's supplemental information. NLG requested an extension to submit comments until November 7, 2012.

On November 9, 2012, NLG submitted a letter to EAO, stating that in NLG's view, the Proponent's Application was fatally flawed and the Proponent has not provided sufficient information to enable NLG, EAO or CEA Agency to adequately assess the effects of the proposed Project, as set out in the NFA, paragraph 8, Chapter 10. Furthermore, the NLG indicated the Proponent has not addressed the critical gaps and deficiencies identified in the NLG's previous correspondence and request for additional information.

On November 22, 2012, NLG and its representatives attended a meeting in Vancouver, BC, with EAO, MOE, and the Proponent and the Proponent's consultants to review the following key concerns identified by the NLG:

- MEMP framework;

- Water Quality Mass Balance Model review. Proponent committed to NLG's recommendations to re-run the model including a sensitivity analysis of non-detection limits and variable water treatment effectiveness for water quality predictions in lower Lime Creek compared to BCWQG for protection of aquatic life;
- Water quality discharge limit setting method to be used by MOE for waste discharge permit. Reviewed and revised Table of Condition regarding Water Quality in the Receiving Environment as follows:
 - The Environmental Assessment Certificate holder must ensure water quality at LC2 (see Figure 2.1-1 in Schedule A) or an alternate location between LC2 and LC1 (see Figure 2.1-1 in Schedule A) as defined by the Ministry of Environment through an *Environmental Management Act* Permit, consistent with ministry policy and in consultation with Nisga'a Lisims Government, meets:
 - (a) British Columbia Water Quality Guidelines, or
 - (b) Site Specific Water Quality Objectives; or
 - (c) A combination of a, b, and/or alternative requirements, following, at minimum, the principles of the Methods for Deriving Site Specific Water Quality Objectives in BC and Yukon (BCMOE 1997) allowing consideration of toxicity data generated since the most recent water quality guidelines have been developed in the recalculation approach, in consultation with the Nisga'a Lisims Government, and incorporated into an *Environmental Management Act* Permit.

In response to NLG's letter to dated November 9, 2012, EAO provided NLG with a letter on November 30, 2012 in regards to the Nisga'a Nations outstanding concerns.

On November 30, 2012, EAO provided NLG and the EA Working Group with a draft copy of the EAO's Assessment Report, Table of Conditions, Certified Project Description and the Proponent's Issues Tracking Table.

On December 18, 2012, EAO provided NLG with a copy of 8e/8f Report.

During the week of January 7 and January 14, 2013, EAO staff met with representatives of the NLG, Ministry of Aboriginal Relations and Reconciliation and JAG to discuss detailed NLG comments on the draft Assessment Report, Table of Conditions, Certified Project Description and 8e/8f Report.

Each comment was reviewed and discussed by the team and EAO provided responses for each comment. In some instances, NLG provided new drafts of conditions for EAO's consideration, with considerable effort focused on Condition 4, with each party exchanging drafts and attempting to meet shared interests.

On February 5, 2013, final versions of the Table of Conditions and Certified Project Description, along with supporting documents, were provided to NLG for their information.

On February 8, 2013, final versions of these documents, along with supporting documents, were provided to NLG for their information. EAO provided until February 20, 2013, for NLG to review the changes and to provide EAO with their final views on the assessment materials.

NLG's views were provided to Minister for their consideration, consistence with section 26 of the section 11 Order.

14 PART E – CONCLUSIONS

Based on:

- information contained in the Application;
- the Proponent's and EAO's efforts at consultation with First Nations (Metlakatla First Nation, Kitsumkalum First Nation, Kitselas First Nation, Gitanyow Nation and Gitxsan Nation), government agencies, including local governments, and the public, and its commitment to ongoing consultation;
- the Proponent's efforts at engagement with Nisga'a Nation, and its commitment to ongoing engagement;
- the EAO's efforts to meet its obligations under the NFA, and its commitment to continue to do so;
- comments on the proposed Project made by First Nations, and government agencies, including local governments, as members of EAO's Working Group, and the Proponent's and EAO's responses to these comments;
- comments on the proposed Project made by, Nisga'a Nation, and the Proponent's and EAO's responses to these comments;
- comments on the proposed Project received during the public comment period, and the Proponent's responses to these comments;
- issues raised by First Nations regarding potential impacts of the proposed Project and the Proponent's responses and best efforts to address these issues;
- issues raised by Nisga'a Nation, regarding potential impacts of the proposed Project and the Proponent's responses and best efforts to address these issues;
- mitigation measures identified as Conditions in Schedule B of the EA Certificate to be undertaken by the Proponent during the construction, operation, and decommissioning of the proposed Project; and,
- the design of the proposed Project as specified in Schedule A of the EA Certificate to be implemented by the Proponent during the construction, operation, and decommissioning of the proposed Project.

EAO is satisfied that:

- the EA process has adequately identified and assessed the potential significant adverse environmental, economic, social, heritage and health effects of the proposed Project;
- consultation with First Nations, government agencies, and the public, and the distribution of information about the proposed Project have been adequately carried out by the Proponent and that efforts to consult with First Nations will continue on an ongoing basis;

- engagement with the Nisga'a Nation and the provision of information or studies, as appropriate, about the proposed Project and its potential environmental effects and the measures that can be taken to prevent or mitigate those effects have been adequately carried out by the Proponent, and that efforts to engage the Nisga'a Nation will continue on an ongoing basis;
- issues identified by First Nations, government agencies and the public, which were within the scope of the EA, were adequately and reasonably addressed by the Proponent during the review of the Application;
- issues identified by Nisga'a Nation which were within the scope of the EA, were adequately and reasonably addressed by the Proponent during the review of the Application;
- practical means have been identified to prevent or reduce any potential negative environmental, social, economic, heritage or health impacts of the proposed Project such that no direct or indirect significant adverse effect is predicted or expected;
- the potential for adverse effects on the aboriginal rights of First Nations has been avoided, minimized or otherwise accommodated to an acceptable level;
- the provincial Crown has met its obligations under Chapter 10 of the NFA, including adequately assessing whether the proposed Project can be reasonably expected to have adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests set out in the NFA and as appropriate, making recommendations to prevent or mitigate those effects, as well as adequately assessing the effects of the proposed Project on the existing and future economic, social and cultural well-being of Nisga'a citizens who may be affected by the proposed Project; and,
- the provincial Crown has fulfilled its obligations for consultation and accommodation to First Nations relating to the issuance of an EA Certificate for the proposed Project.

The provincial Minister of Environment and the Minister of Energy, Mines and Natural Gas will consider this Assessment Report and other accompanying materials in making their decision on the issuance of an EA Certificate to the Proponent under the Act.