

KSM PROJECT ASSESSMENT REPORT

With Respect to
the Application by Seabridge Gold Inc.
for an Environmental Assessment Certificate
pursuant to the *Environmental Assessment Act*, S.B.C. 2002, c.43

Prepared by:

Environmental Assessment Office

June 2014



Preface

The Environmental Assessment Office (EAO) manages the assessment of proposed major projects in British Columbia (BC), as required by the *Environmental Assessment Act* (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 mine proposals, to the Minister of Energy and Mines. The Ministers may decide to certify a project, decline to certify a project, or require further assessment.

This Assessment Report considers the potential for the KSM Project (proposed Project) 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 are 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.
AADT:	Annual average daily traffic
AEMP:	Aquatic Effects Monitoring Plan
AIA:	Archaeological Impact Assessment
AIR:	Application Information Requirements
ARD:	Acid rock drainage
ARR:	British Columbia Ministry of Aboriginal Relations and Reconciliation
BAFA:	Boreal Altai Fescue Alpine
BC:	British Columbia
BCWQG:	British Columbia Water Quality Guidelines
BEC:	Biogeoclimatic Ecosystem Classification
BIR2:	Bell-Irving River (downstream of the confluence with Treaty Creek)
BSA:	Baseline Study Area
CCAR:	Coulter Creek Access Road
CCME:	Canadian Council of Ministers of the Environment
CDA:	Canadian Dam Association
CEA Agency:	Canadian Environmental Assessment Agency
CIL:	carbon-in-leach
CMA:	Coastal Mountain- Heather Alpine
COPC:	Contaminants/ chemicals of Potential Concern
COSEWIC:	Committee on the Status of Endangered Wildlife in Canada
CPD:	Certified Project Description
CWH:	Coastal Western Hemlock
DFO:	Department of Fisheries and Oceans Canada
DNA:	Deoxyribonucleic acid
EA:	Environmental Assessment
EAO:	British Columbia Environmental Assessment Office
EC:	Environment Canada
EMP:	Environmental Management Plan
ESCIA:	Environmental, Social and Cultural Impact Assessment
ESSF:	Engelmann Spruce-Subalpine Fir
FLNR:	British Columbia Ministry of Forests, Lands and Natural Resource Operations
FKH:	Forrest Kerr Hydro
GDP:	Gross Domestic Product
GHCO:	Gitanyow Hereditary Chief's Office
GLUP:	Gitanyow Lax'yip Land Use Plan
ha:	Hectare
HC:	Health Canada

HEP:	Hydroelectric power
Hwy:	Highway
ICH:	Interior Cedar Hemlock
km:	Kilometre
KSM:	Proposed Kerr-Sulphurets-Mitchell Copper/Gold Mine Project
kV:	Kilovolt
L/s:	Litres per second
LOU:	letter of understanding
LSA:	Local Study Area
m:	Metre(s)
MCH:	McLymont Creek Hydro
MDT:	Mitchell Diversion Tunnels
MEM:	British Columbia Ministry of Energy and Mines
MH:	Mountain Hemlock
ML:	Metal Leaching
MMER:	Metal Mining Effluent Regulations
MOE:	British Columbia Ministry of Environment
MOTI:	British Columbia Ministry of Transportation and Infrastructure
MTDT:	McTagg Twinned Diversion Tunnels
MTT:	Mitchell-Treaty Twinned Tunnels
NAG:	Non-acid generating
NFA:	Nisga'a Final Agreement
NLG:	Nisga'a Lisims Government
NTL:	Northwest Transmission Line
NTR2:	North Treaty Creek (just before confluence with Treaty Creek)
NWA:	Nass Wildlife Area
OGMA:	Old Growth Management Areas
OPC:	Mitchell Ore Preparation Complex
PAG:	Potentially acid-generating
PEM:	Predictive Ecosystem Mapping
pH:	measure of the acidity or basicity of an aqueous solution
PM _{2.5} :	Particulate matter less than 2.5 microns in diameter
PTMA:	Processing and Tailings Management Area
PY:	Person years
RSA:	Regional Study Area
RSF:	Rock Storage Facility
SARA:	<i>Species at Risk Act</i>
SC3:	Sulphurets Creek (downstream of the fish barrier, 1300 m upstream of the Unuk River)
SeMP:	Selenium Management Plan

SeTP:	Selenium Treatment Plant
SSWQO:	Site Specific Water Quality Objectives
STE3:	South Teigen Creek (just before confluence with Teigen Creek)
TCAR:	Treaty Creek Access Road
TCC:	Tahltan Central Council
TDI:	Tolerable daily intake
TEC2:	Teigen Creek (downstream of the confluence with South Teigen Creek)
TEM:	Terrestrial Ecosystem Mapping
THREAT:	Tahltan Heritage Resources Environmental Assessment Team
TMF:	Tailings Management Facility contained in the Processing and Tailings Management Area
TOC:	Table of Conditions
TRC2:	Treaty Creek (downstream of the confluence with North Treaty Creek and below the initial dilution zone)
UR1:	Unuk River (downstream of the confluence with Sulphurets Creek)
UR2:	Unuk River (just before United States border)
US:	United States
UWR:	Ungulate Winter Range
VC:	Valued Component(s)
WARS:	Wildlife Accident Reporting System
WHA:	Wildlife Habitat Area
WMP:	Water Management Plan
WSD:	Water Storage Dam
WSF:	Water Storage Facility
WTP:	Water Treatment Plant

SUMMARY OF THE ASSESSMENT REPORT

Overview of the Proposed Project

Seabridge Gold Inc. (Proponent) is proposing to develop a combined open pit and underground gold, copper, silver and molybdenum mine in the Sulphurets watershed located approximately 65 kilometres (km) northwest of Stewart, BC. The proposed Project would have an anticipated production of 130,000 tonnes per day over a mine life of up to 52 years.

The easterly components of the proposed Project footprint fall within the Nass Area as defined in the Nisga'a Final Agreement (NFA). With the exception of a short section of a temporary winter-only access route, all proposed Project components are located outside the Nass Wildlife Area (NWA) and Nisga'a Lands as defined in the NFA.

Part of the proposed Project footprint is also located within the claimed traditional territory of the Tahltan Nation and *wilp* Skii km Lax Ha of the Gitxsan Nation. The Gitanyow Nation and the Gitxsan Nation have identified potentially affected interests downstream of the proposed Project and along the proposed Project's transportation routes (Highways (Hwys) 37 and 37A).

Access to the proposed Project would be provided from Hwy 37 by two new resource roads. The proposed Mine Site will be accessed by the Coulter Creek access road (CCAR) connecting to the existing Eskay Creek mine road. The Processing and Tailings Management Area (PTMA) will be accessed by the Treaty Creek access road (TCAR) from Hwy 37.

Overview of the Environmental Assessment

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) considered a number of potential effects. This report focuses on the following potential effects:

- Surface Water Quality
- Surface Water Quantity
- Groundwater Quantity and Quality
- Fish and Aquatic Habitat
- Wetlands
- Terrestrial Ecosystems
- Geohazards
- Wildlife and Wildlife Habitat
- Economic
- Social
- Archaeological and Heritage
- Human Health
- Transportation

Surface water quality was one of the key issues discussed during the EA, and in particular, the effects of selenium on water quality. See section 5.1 and 5.2 for a complete description of the issue, proposed mitigation and EAO's conclusions.

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 is provided to the responsible Ministers for consideration in their decision of whether or not to issue an EA Certificate for the proposed Project.

PART A – INTRODUCTION AND BACKGROUND

1 Purpose of the Report

The purpose of this Report is to summarize the procedures and findings of the EA conducted on 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 Act. For mine projects, the deciding Ministers are the Minister of the Environment and the Minister of Energy and Mines.

This 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 conditions developed during the EA; and
- sets out conclusions based on the proposed Project's potential for significant adverse residual effects.

This Report does not replicate the content presented in the Application. The Application and supplemental information provided by the Proponent during the EA and the Working Group's responses to that information and the Working Group meeting summary notes are posted on EAO's website. These documents, together with the issues tracking tables appended to this Report, provide additional detail to support this Report and EAO's conclusions. EAO is satisfied with all of the Proponent responses provided in the issues tracking tables.

2 Project Overview

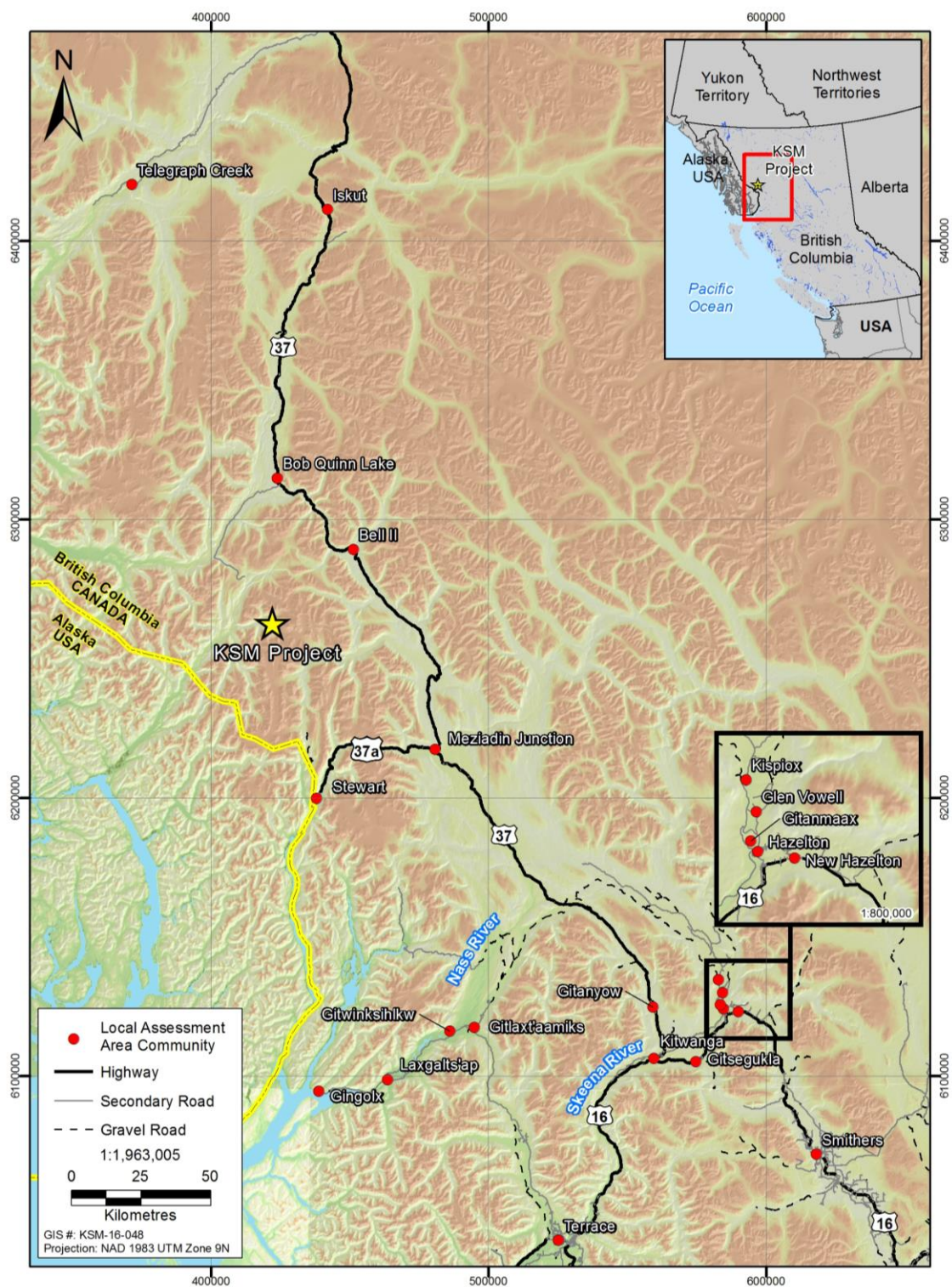
2.1 Proponent

The Proponent for the proposed Project is Seabridge Gold Inc., a publicly traded company, with common shares trading on the Toronto Stock Exchange in Canada and on the New York Stock Exchange in the United States (US).

2.2 Project Location

The proposed Project is located on Crown land approximately 65 km northwest of Stewart and 35 km northeast of the BC-Alaska border (Figure 1). The mine tenure includes approximately 60,000 hectares (ha).

Figure 2: Regional Map of the Proposed Project Location



2.3 Project Description

The Proponent is proposing a gold/copper/silver/molybdenum mine located approximately 65 km northwest of Stewart, BC. The proposed Project would produce up to 130,000 tonnes per day over a mine life of up to 52 years.

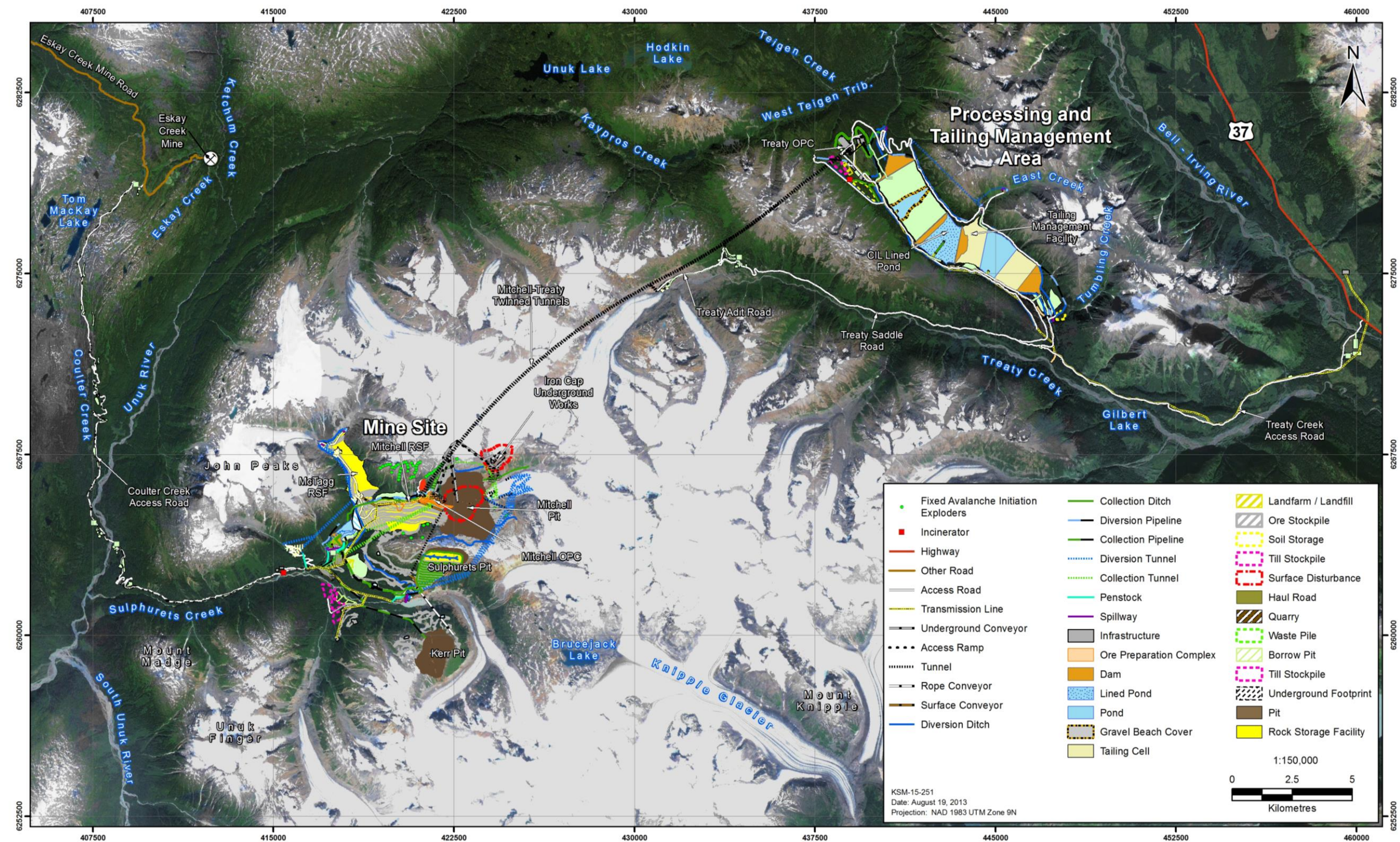
The proposed mine site (Mine Site) is located in the Sulphurets watershed and the PTMA is located in the Treaty and Teigen creek watersheds. Four deposits would be mined: Mitchell, Sulphurets, Kerr, and Iron Cap. The Sulphurets and Kerr deposits and portions of the Mitchell deposit would be mined using open pit mining methods. The Iron Cap and the remainder of the Mitchell deposit would be mined using underground mining methods.

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:

- underground and surface works (e.g., access ramps, ventilation tunnels, ore stockpiles, diversion ditches and tunnels, Mine Site roads, and primary crusher);
- storage of potentially acid-generating (PAG) and non-acid-generating (NAG) waste rock in the Mitchell and McTagg Rock Storage Facilities (RSFs), and as backfill in the Sulphurets Pit, including associated works (e.g., water diversion and collection systems);
- the 23-km long Mitchell Treaty Twinned Tunnels (MTT), to convey ore to the PTMA, bring power, communication cables and fuel to the Mine Site, and transport personnel and supplies between the Mine Site and the PTMA;
- the Treaty Process Plant at the PTMA, with grinding/flotation and carbon-in-leach (CIL) gold/silver recovery circuits, and with tailings slurry and return water pipelines between the Treaty Process Plant and the Tailings Management Facility (TMF), and the water discharge pipeline;
- a TMF comprising a North Cell, Centre Cell, and South Cell, including containment dams, seepage collection dams, spillways, discharge pipelines, diversion channels, and other associated works, in the upper tributaries of Teigen and Treaty Creeks in the PTMA;
- the Mitchell Diversion Tunnels (MDT) and Mitchell Pit north wall dewatering adits to divert Mitchell Glacier meltwater and Mitchell Creek away from the Mitchell Pit;
- McTagg Twinned Diversion Tunnels and associated works to conduct the flow of McTagg Creek away from the McTagg RSF;
- surface and underground water diversion and sediment control structures, including tunnels;

- the Mitchell Ore Preparation Complex (OPC), which includes facilities for rock crushing, ore storage, fuel storage and an electrical substation;
- a Water Storage Facility (WSF), both dam and reservoir, located on Mitchell Creek, with a Water Treatment Plant (WTP) situated downstream, to collect contact water from various water diversions, storage and treatment facilities;
- explosives manufacturing plants and storage facilities;
- CCAR connecting to the existing Eskay Creek mine road;
- TCAR from Hwy 37 to PTMA;
- temporary Frank Mackie Glacier access route from the existing Granduc Mine road to the Mine Site during early construction;
- ten construction camps, with associated works, and two operating camps, one each at the Mine Site and the PTMA, including administration facilities, maintenance facilities, and fuel and other materials storage, as well as domestic sewage treatment and disposal;
- the Upper Sulphurets and McTagg hydroelectric plants and associated penstocks, located in Sulphurets and Gingras Creeks;
- a 29-km long, 287- kilovolt (kV) transmission line from Hwy 37 along the TCAR to the PTMA, and continuing via the MTT to the Mine Site, with related substations, access roads, stream crossings and associated construction and maintenance activities;
- an ore concentrate storage facility and truck load-out at the PTMA, and trucking along Hwys 37 and 37A to the port of Stewart for offshore shipment;
- transport of ore processing reagents to the PTMA, and explosives and reagents to the Mine Site, via Hwys 37 and 37A and through the MTT; and
- other ancillary works or activities associated with the proposed Project.

Figure 3: Proposed Project Layout at the End of Operation



2.3.1 Key Changes to the Design of the Proposed Project due to the EA Process

Changes during the Pre-Application Stage

Based on comments provided by the Working Group and the public during the pre-Application stage, the Proponent made several changes to the proposed Project design to minimize or avoid potential adverse effects on the environment and Nisga'a Nation and First Nations interests. These changes were incorporated into the proposed Project design presented in the Application. Table 1 summarizes these changes.

Table 1: Summary of Changes to the Proposed Project during the Pre-Application Stage

Proposed Project Design Change	Environmental Benefit
Changed access from Hwy 37 to PTMA to follow the Treaty Creek Valley instead of the Teigen Creek Valley	Reduce effects on fish and fish habitat, western toad, wildlife, wetlands and heritage resources
Changed transmission line alignment in PTMA to follow the Treaty Creek access road	Reduce effects on wetlands, fish and fish habitat
Changed location of TMF discharge to Treaty Creek	Reduce effects on Teigen Creek salmonid values
Incorporated lined centre cell in TMF to store sulphide-rich tailings	Reduce leachate seepage and effects on the receiving environment
MTT saddle portal cut and cover design changed to be underground (aside from opening for access and ventilation)	Reduce wildlife effects by minimizing surface disturbance
Elimination of temporary Sulphurets RSF	Reduce metal loading to Sulphurets Creek by removing a source of acid rock drainage
Backfilled Kerr waste rock into mined out Sulphurets pit	Reduce selenium loadings in WSF
Use a combination of underground and open pit mining	Reduce waste rock volumes and size of RSFs
Ion-exchange selenium treatment plant	Minimize selenium loadings in the receiving environment

Proposed Project Design Change	Environmental Benefit
Construction of seepage recovery system at the base of the Mitchell/McTagg RSF	Selectively treat water from the base of the RSFs and minimize selenium loading in WSF
Increase WTP throughput from 3.3 metres (m) ³ /s to a maximum of 7.5m ³ /s	Increase throughput to minimize water quantity and quality effects downstream of the Mine Site
Staging of TMF discharge to mimic stream flow rates	Minimize water quantity and quality effects downstream of the Mine Site
Increase capacity of seepage collection pipeline from the Kerr Pit	Minimize water quality effects on upper Sulphurets Creek

Alternatives Assessment for the Tailings Management Facility

To address potential environmental, Nisga'a Nation, First Nations and social concerns regarding the location of the TMF, the Proponent initiated an assessment of alternatives for siting the TMF two years prior to submitting the Application. The assessment followed Environment Canada's (EC) Guidelines for the Assessment of Mine Waste Disposal (2011).

The TMF alternatives assessment included an initial screening of potential sites within a 50 by 50 km area surrounding the Mine Site. The screening identified 14 potential sites for evaluation and further use of a fatal flaw technical analysis eliminated all but five of these sites. In order to achieve sufficient storage for life of mine tailings, four alternatives were identified. Environmental, technical, economic and social criteria were applied to each of the four short-listed alternatives to allow the alternatives to be weighted and ranked against each other. Criteria considered included Nisga'a Nation and First Nations interests, downstream fisheries, groundwater quality and quantity, surface water chemistry, water management, foundation conditions, geohazards, terrestrial and aquatic habitat loss, employment and estimated costs. Multiple sensitivity analyses were also performed to evaluate how bias would affect the final rankings.

The outcome of the analysis was that the Upper Teigen/Treaty Creek TMF site was identified as the preferred option; the EA is based on this option.

Nisga'a Nation and First Nations commented that their preference is to site the TMF in the Unuk River watershed; however, there is not a site large enough to accommodate all of the tailings or to safely operate and construct the TMF. The TMF Alternatives Assessment report can be found in [Appendix 33-B of the Application](#).

Application Review Stage Supplemental Information and Design Changes

To respond to comments raised by the Working Group during the review of the Application, the Proponent prepared a number of supplementation technical memorandums and reports. The memorandums focused largely on comments related to surface water and groundwater quality and quantity, and transportation effects on wildlife, fish and aquatic resources. The Proponent also prepared a report to assess the potential effects of a dam failure and a report summarizing the results of rare plant surveys. The supplemental technical memorandums and reports provided by the Proponent during the Application review are posted on [EAO's website](#).

Based on the comments received during the Application review stage, design changes include a Selenium Treatment Plant (SeTP) to be commissioned by the fifth year of operation rather than Year 27 of operation, the installation of the seepage recovery facility at the base of the Mitchell/McTagg RSF, and an increase in the capacity of the Kerr Pit water management systems.

3 Assessment Process

3.1 Provincial EA Process – Major Milestones

- The EA process started on April 25, 2008, 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_322_26122.html)
- On November 6, 2009, EAO issued an Order under section 11 of the Act which defined the scope of the proposed Project, as well as the procedures and methods for conducting the review.
(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_31718.html)
- On September 29, 2011 and November 30, 2012, EAO issued Orders under section 13 of the Act which changed the scope of the proposed Project, added additional First Nations to be consulted, and modified the timeline requirements for concurrent review.
(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_33717.html)
(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35237.html)
- On January 31, 2011, EAO approved and issued the final Application Information Requirements (AIR) to the Proponent.
(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_322_p_tor.html)
- On January 30, 2013, in advance of the Proponent submitting their Application for evaluation, EAO extended the time limit for the evaluation by 15 days, under section 24(4) of the Act. This change was at the request of the Proponent to allow reviewers additional time to screen the Application against the AIR.
(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35308.html)

- On March 28, 2013, the Proponent submitted their initial Application for evaluation.
- On May 13, 2013, EAO extended the time limit for the evaluation of the Application, by 21 days under section 24(4) of the Act. This change was at the request of the Proponent to allow reviewers additional time to screen the Application against the AIR.
(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35580.html)
- On June 3, 2013, EAO determined that the Application contained the information required by the AIR. EAO indicated that the Application review period would commence when the Proponent provided the required copies of the Application.
(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35670.html)
- On August 12, 2013, the Proponent submitted the required copies of the Application for distribution to Working Group members, and the Application review began.
(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_322_r_com.html)
- On December 20, 2013, the Proponent requested a 30-day extension to the Application review period, which EAO granted under section 24(4) of the Act.
(http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_36793.html) In March 2014, EAO granted the Proponent's request for a 45-day extension to the Application review period under section 24(4) of the Act.
(http://a100.gov.bc.ca/appsdata/epic/documents/p322/1393517077765_c5f2516f2ec_c8e7abfb3adf6d1ac893d01de38d7c0a30d4f1cfca6513acdb124.pdf and http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_37358.html)
- On April 25, 2014, EAO extended the time limit for the Application review by 49 days under section 24(4) of the Act.
(http://a100.gov.bc.ca/appsdata/epic/documents/p322/1398812740966_87bca46469be339bff095126033203932b3affe29adda2896c6229837cfc9cb2.pdf)
- On June 20, 2014, EAO extended the time limit for the Application review by eight days under section 24(4) of the Act.
- On June 20, 2014, EAO referred the proposed Project to Ministers for decision.

3.2 Public Consultation

EAO invited public comments on the draft AIR for the proposed Project from June 25, 2010, to July 26, 2010, and held open houses in Terrace, Smithers, Stewart and Dease Lake, BC, which were attended by a total of 41 people. The key issues raised by the public during these open houses and through the online public comment period included:

- effects of the proposed Project on water quality and quantity;
- effects on wildlife and wildlife habitat and fish and fish habitat;
- concerns about accidents and malfunctions and reclamation; and

- support for the proposed Project, including the associated economic and employment benefits.

Stakeholder concerns raised included: concerns with socio-economic baseline data, interest in local training programs, and socio-economic effects of the proposed Project.

EAO received two comments on the draft AIR, stating support for the proposed Project due to the economic and employment benefits.

At the commencement of Application review, the Application was posted on EAO's website at

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_322_r_app.html.

The Application was made available to the public in local libraries in Smithers, Terrace, Stewart, Dease Lake and Hazelton, BC.

A 45-day public comment period on the Application was held from September 6, 2013 to October 21, 2013. The public comment period and open house were advertised in four local newspapers in the week prior to the open house.

Table 2 shows the open houses held by EAO during the Application review period and the number of attendees. The open houses provided information about the provincial and federal EA processes and the proposed Project.

Table 2: EAO Application Review Open Houses

Community	Iskut	Telegraph Creek	Terrace	Smithers	Stewart
Date	September 25, 2013	September 26, 2013	October 1, 2013	October 2, 2013	October 9, 2013
Attendees	5	10	9	33	24

The main issues raised during the open houses and through the online public comment period included:

- support for the proposed Project, specifically related to job creation and support for regional economies;
- concerns regarding water quality, specifically focused on impacts downstream on the Unuk River, impacting fish and water quality in the US; and
- concerns regarding impacts on wildlife and wildlife habitat.

A total of 94 comments were received during the public comment period. The comments and the Proponent's responses are contained in the public issues tracking table in the [Proponent's Public Consultation Report](#).

Late in the Application review stage, concerns were raised by Alaskan commercial and sport fishing groups, businesses, communities, tribes, conservation groups and individuals. Concerns were centered around potential effects to salmon and the significant commercial, sport and customary and traditional fisheries the Unuk River supports, as well as potential impacts to Alaskan seafood and tourism marketing efforts. State of Alaska and federal US representatives participated in the EA as members of the Working Group.

3.3 First Nations Consultation

Part of the proposed Project footprint is located within the claimed traditional territory of the Tahltan Nation and *wilp* Skii km Lax Ha of the Gitxsan Nation. Gitanyow Nation and Gitxsan Nation have identified potentially affected interests downstream of the proposed Project and along the proposed Project's transportation routes on Hwys 37 and 37A.

Tahltan Nation, *wilp* Skii km Lax Ha, Gitxsan Nation and Gitanyow Nation participated in the appropriate technical Working Groups, were kept fully informed of progress of the EA, and were provided with all information that was sent to the Working Group.

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

3.4 Nisga'a Nation Consultation

The easterly components of the proposed Project fall within the Nass Area as defined in the NFA. With the exception of a short section of a temporary winter-only access route and the transportation corridors, all proposed Project components are located outside the NWA and Nisga'a Lands as defined in the NFA. Nisga'a Nation, (as represented by Nisga'a Lisims Government (NLG)) participated in the technical Working Group and Transportation Working Group¹. NLG was kept fully informed of the progress of the EA and was 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 located in [Part D](#) of this document.

¹ EAO initially established a Transportation Working Group specific to the proposed Project. However, in response to concerns expressed by First Nations and others, EAO established a Hwy 37 Advisory Group to examine the effects of multiple projects. The Advisory Group was initially co-chaired by EAO and the BC Ministry of Transportation and Infrastructure (MOTI) and later by EAO and the BC Ministry of Forests, Lands and Natural Resource Operations (FLNR) under a new title, the Northwest Wildlife and Environmental Management Advisory Group.

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 as a summary of the methodology followed by EAO (see EAO's Valued Component (VC) Guidelines for further information

(http://www.eao.gov.bc.ca/pdf/EAO_Valued_Components_Guideline_2013_09_09.pdf)²

To determine what may constitute a “significant” residual cumulative effect, EAO uses the following definitions³:

Context refers primarily to the current and future sensitivity and resilience of the VC to change caused by the project. Consideration of context draws heavily on the description of existing conditions of the VC, which reflect cumulative effects of other projects and activities that have been carried out, and especially information about the impact of natural and human-caused trends in the condition of the VC.

Magnitude refers to the expected size or severity of the residual effect. When evaluating magnitude of residual effects, the proportion of the VC affected within the spatial boundaries is considered and the relative effect (e.g., relative to natural annual variation in the magnitude of the VC or other relevant characteristic).

Extent refers to the spatial scale over which the residual effect is expected to occur.

Duration refers to the length of time the residual effect persists (which may be longer than the duration of the physical work or activity that gave rise to the residual effect).

Reversibility pertains to whether or not the residual effect on the VC can be reversed once the physical work or activity causing the disturbance ceases.

² Note that this methodology differs from the methodology described in the AIR for the proposed Project.

³ This is generally consistent with the analysis used in federal EAs under the *Canadian Environmental Assessment Act*, although EAO has added the factor of “likelihood”.

Frequency refers to how often the residual effect occurs and is usually closely related to the frequency of the physical work or activity causing the residual effect.

Likelihood refers to whether or not a residual effect is likely to occur. This may be influenced by a variety of factors, such as the likelihood of a causal disturbance occurring or the likelihood of mitigation being successful.

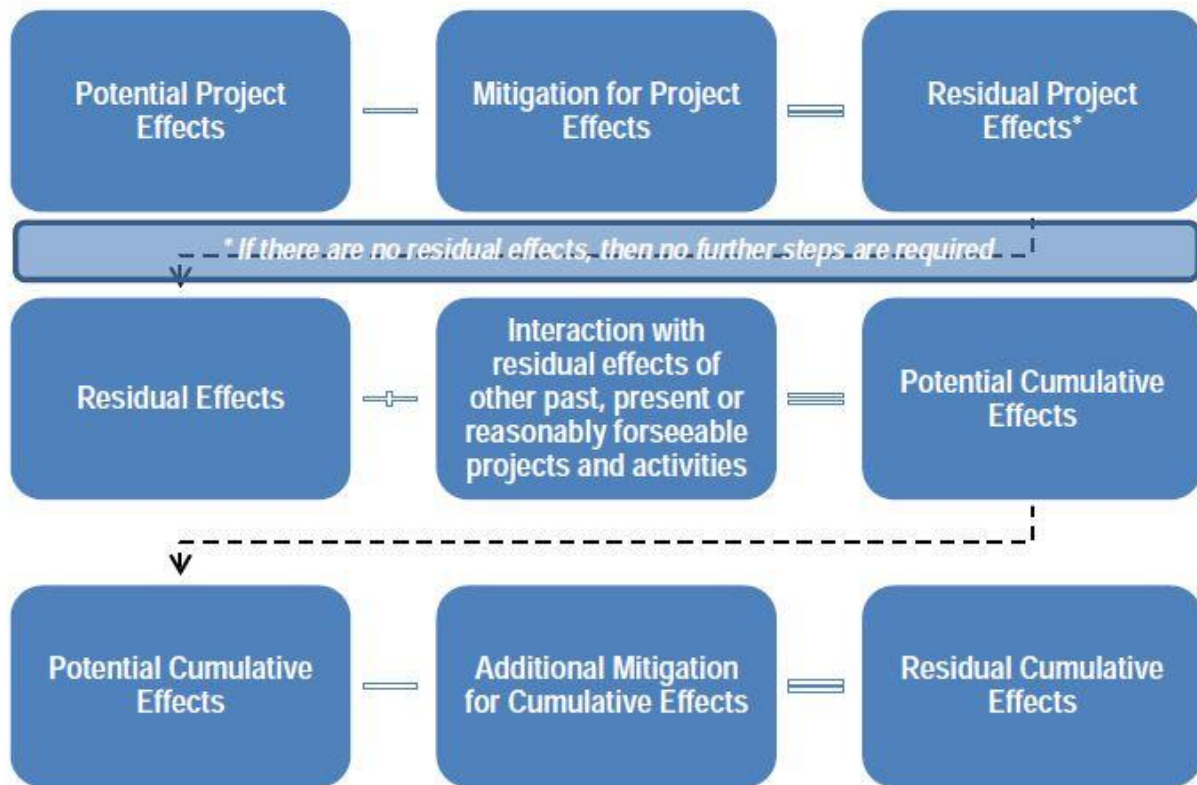
Significance is determined for both the residual effects of the project and the cumulative effects. Once the residual effect prediction has been described in terms of significance and likelihood, the level of confidence is explained in each prediction. The level of confidence is typically based on expert judgment, and should characterize the level of uncertainty associated with both the significance and likelihood determinations.

4.1.2 Cumulative Effects

If any residual adverse effects are predicted, the need for a cumulative effects assessment must be considered (see figure 3).

An evaluation of the predicted residual effects of the project is required to determine whether any cumulative interaction with the residual effects of other projects and activities is considered likely to occur. If no cumulative interaction is considered likely, those residual effects need not be carried forward into a cumulative effects assessment.

Figure 4: Steps to Determine Residual Effects and Cumulative Effects



Where a cumulative effects assessment was determined to be required, that assessment considers past, present, and reasonably foreseeable projects and activities, including:

- any other project or activity that is likely to affect the VC, even if that other project or activity is located outside the direct zone of influence of the proposed Project;
- effects of past and present projects and activities that are expected to continue into the future (e.g., beyond the effects reflected in the existing conditions of the VC); and,
- activities not limited to other reviewable projects, if those activities are likely to affect the VC cumulatively (e.g., forestry, agriculture, recreational activity).

The Application contains maps and a list and description of all projects and activities considered in the cumulative effects assessment. These projects and activities are discussed where relevant under each VC cumulative effects section in this Report.

4.1.3 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.

4.1.4 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. In addition to specific treaty interests, there is also considerable overlap between the Nisga'a Nation interests and the assessment of environmental, economic, social, heritage and health effects. As a result, Nisga'a Nation comments and interests in terms of consultation are specifically addressed in EAO's Nisga'a Nation Consultation Report in [Part D](#). The NFA can be found at <http://www.nnkn.ca/files/u28/nis-eng.pdf>.

4.1.5 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. Spatial boundaries are identified under each VC in this Report.

4.1.6 Temporal Boundaries

Temporal boundaries are the time periods considered in the effects assessment, which take into account the phases of the proposed Project and the timelines of human actions. 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 (years)	Description
Construction	5 years	Early construction activities would focus on access and water management. The tunnels are an important critical path activity during construction. As access is completed, construction would commence on Mine Site infrastructure. Once diversions are in place, the starter dams would be established and tailings distribution and reclaim water pipelines would be installed.
Operations	52 years	Mining, processing, operation of water management facilities, SeTP (by year 27 ⁴), ongoing establishment of the TMF, and transportation of concentrate, supplies and personnel.
Closure	3 years	Site decommissioning and reclamation. The TMF impoundments would be covered. Structures not required for post-closure would be dismantled and removed. Access roads and site roads not required for post-closure would be deactivated. The Mitchell Pit closure dam would be constructed and the pit allowed to flood.
Post-closure	>250 years	Operation of Mine Site WTP and SeTP as long as discharge waters require treatment. Maintenance of TMF dams, WSF, water management structures and hydroelectric facilities. TCAR and MTT would be maintained to provide access for operation of the WTP and inspection and maintenance of remaining facilities. Ongoing monitoring as per permit requirements and applicable regulations.

⁴ Later during Application review, the Proponent committed to commissioning and operating an SeTP by Year 5 of operations.

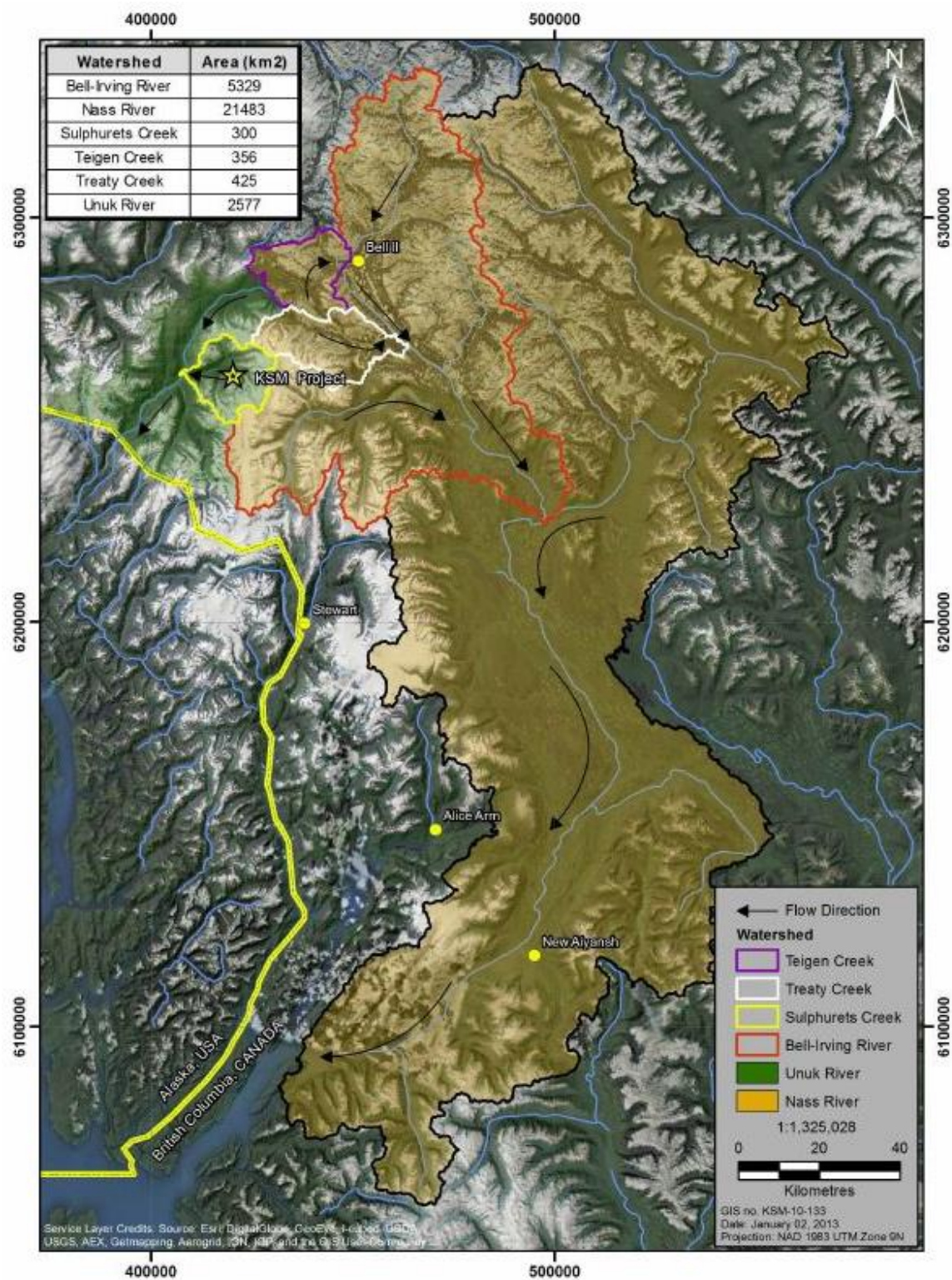
5 Assessment of Potential Environmental Effects

5.1 Overview of the Water Setting in the Proposed Project Area

Water was one of the key issues discussed in the EA for the proposed Project. While water is clearly linked and connected to a variety of VCs (e.g., fish and aquatic habitat, wildlife, and human health), for the purposes of the EA these VCs are discussed separately. In particular, this Report breaks water down into its separate components of quality and quantity of both surface water and groundwater at the Mine Site and the PTMA. The reason for this is because these proposed Project components occupy different drainages (the PTMA is in the Bell Irving/Nass and the Mine Site is located in the Unuk watershed, which drains into Alaska) and the potential and type of effects are different.

This section of the Report provides background information on the proposed Project components and water management at the Mine Site and PTMA and highlights some of the key factors discussed and referenced throughout this report. Water is discussed as surface water quality and quantity and groundwater quantity and quality for both the Mine Site and the PTMA. Figure 4 identifies the watersheds and direction of water flows in the region of the proposed Project.

Figure 5: Watersheds in the Region of the Proposed Project



5.1.1 Mine Site

The Mine Site is centered around the mining of four deposits (Kerr, Sulphurets, Mitchell and Iron Cap). It is located within the valleys of Mitchell Creek, McTagg Creek and Sulphurets Creek. Sulphurets Creek is a main tributary of the Unuk River, which flows to the Pacific Ocean via Alaska.

Mine Site Water Management Facilities

Mine Site water management facilities would be constructed and maintained throughout the life of the proposed Project to divert non-contact water away from disturbed areas and to collect contact water for treatment before release into the environment (figure 5).

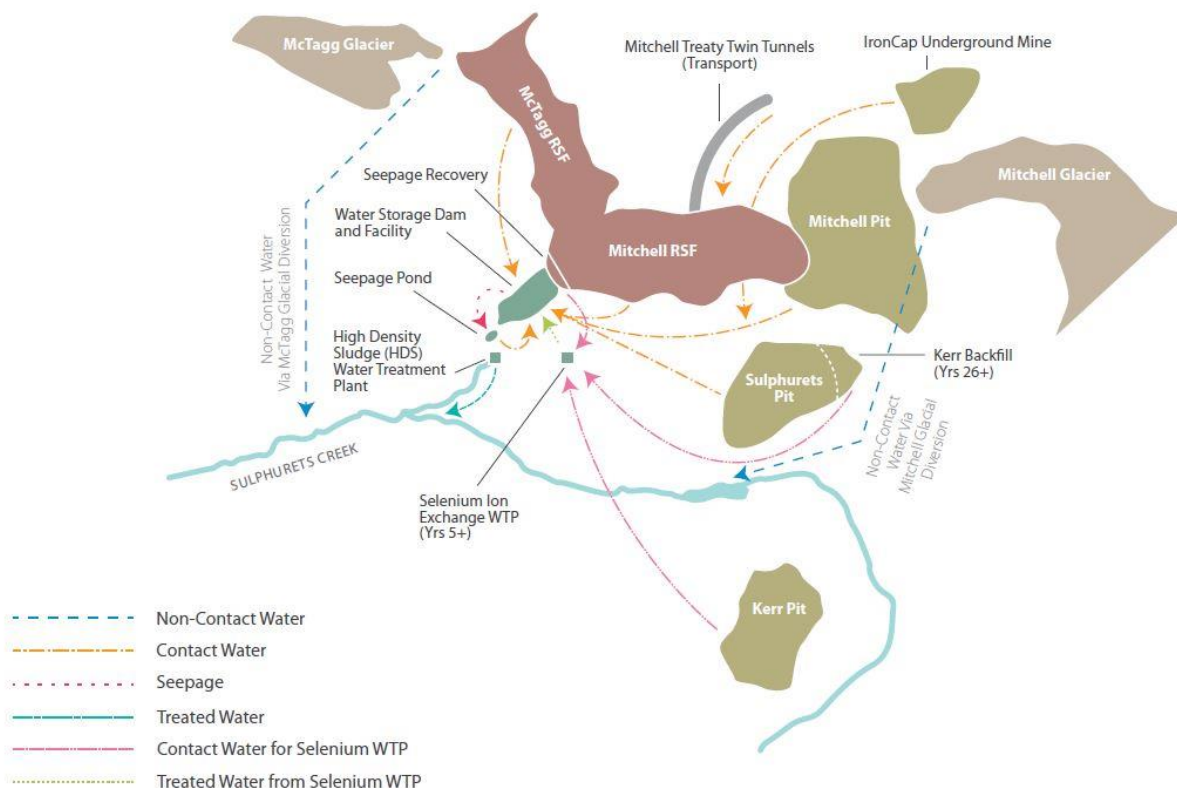
In the Mine Site, the McTagg and Mitchell diversion tunnels would route a majority of the non-contact runoff and glacial meltwater around the Mine Site and RSF to Gingras Creek and Sulphurets Creek, respectively. Contact water would be stored in the WSF, treated and then released to Mitchell Creek, which drains into Sulphurets Creek. The proposed Project is expected to reduce average annual streamflows in Sulphurets Creek (SC3) by 8% during the five-year closure period, and by less than 1% during all other phases of the proposed Project.

Proposed Mine Site water management facilities include:

- WSF contained by a Water Storage Dam (WSD);
- WTP (high density sludge and SeTP) to treat contact water;
- MDT to divert non-contact sub-glacial water flows from the Mitchell Glacier upstream of the Mitchell Pit and Mitchell Block Cave Mine to the Sulphurets Creek drainage;
- McTagg Twinned Diversion Tunnels (MTDT) and related dams to divert non-contact water flows from the McTagg Creek Valley away from the McTagg RSF and downstream mine facilities;
- Mitchell Pit north wall dewatering adits to conduct surface contact water from the vicinity of the Mitchell Glacier around the Mitchell Pit;
- Mitchell Valley Drainage Tunnel to route water from the Mitchell Pit north wall dewatering adit under the Mitchell Creek Valley to the WSF;
- Mitchell underground drainage tunnel to route water from the lowest reaches of the Mitchell Block Cave Mine to a point about 300 m below the WTP where it would be pumped to surface;
- Secondary diversion ditches and pipelines to reduce contact water volumes and to direct open pit contact water and discharge from pit dewatering wells to the WSF; and

- Sulphurets and Kerr Pit pipeline and Kerr backfill collection ditches to convey contact water for treatment and prevent discharge to Sulphurets Creek.

Figure 6: Proposed Mine Site Water Management



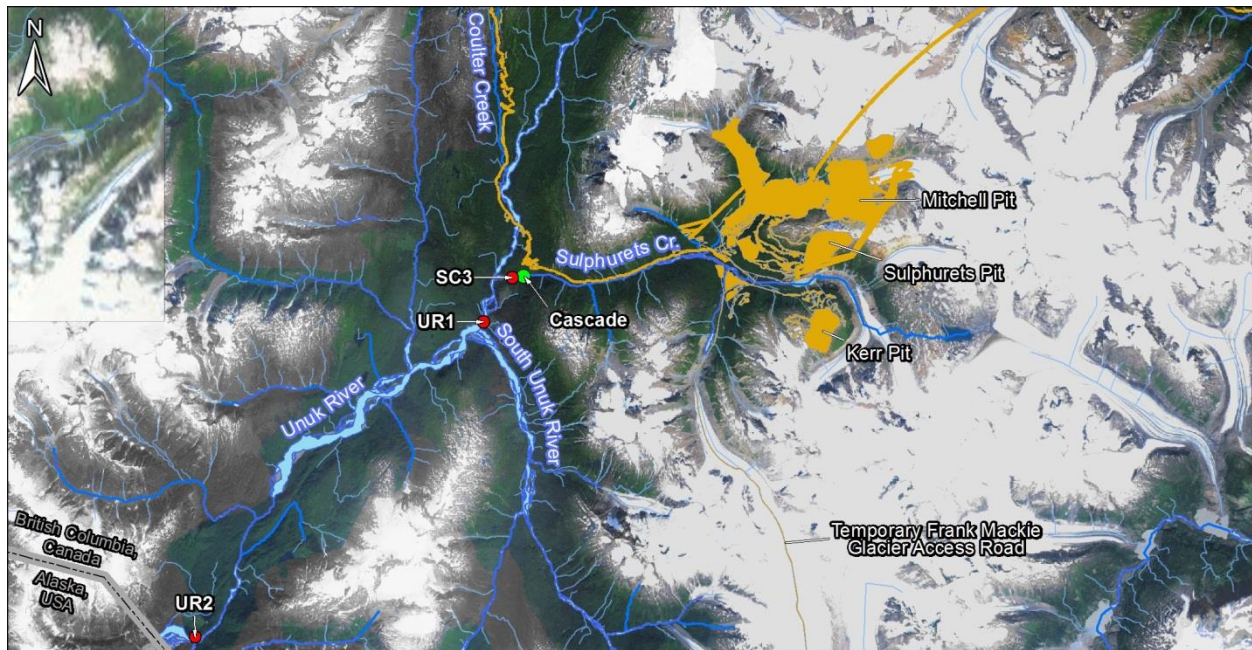
Mine Site Surface Water Assessment Points

The Proponent used five assessment points downstream of the major mine components in order to assess the potential effects of the proposed Project on surface water quantity and quality. Table 4 below identifies the key assessment points that EAO has used to describe water effects in this Report. Figure 6 shows the location of these points in relation to the proposed mine infrastructure.

Table 4: Description of Mine Site Surface Water Assessment Points

Assessment Point	Watershed	Description
SC3	Sulphurets Creek	Sulphurets Creek, downstream of the fish barrier, 1300 m upstream of the Unuk River
UR1	Unuk River	Unuk River, downstream of the confluence with Sulphurets Creek
UR2	Unuk River	Unuk River, just before US border

Figure 7: Surface Water Assessment Points for the Proposed Mine Site



5.1.2 PTMA

The proposed PTMA is located within the headwaters of tributaries to the Teigen and Treaty Creeks. Both of these creeks are tributaries of the Bell-Irving River, which flows to the Nass River and on to the Pacific Ocean.

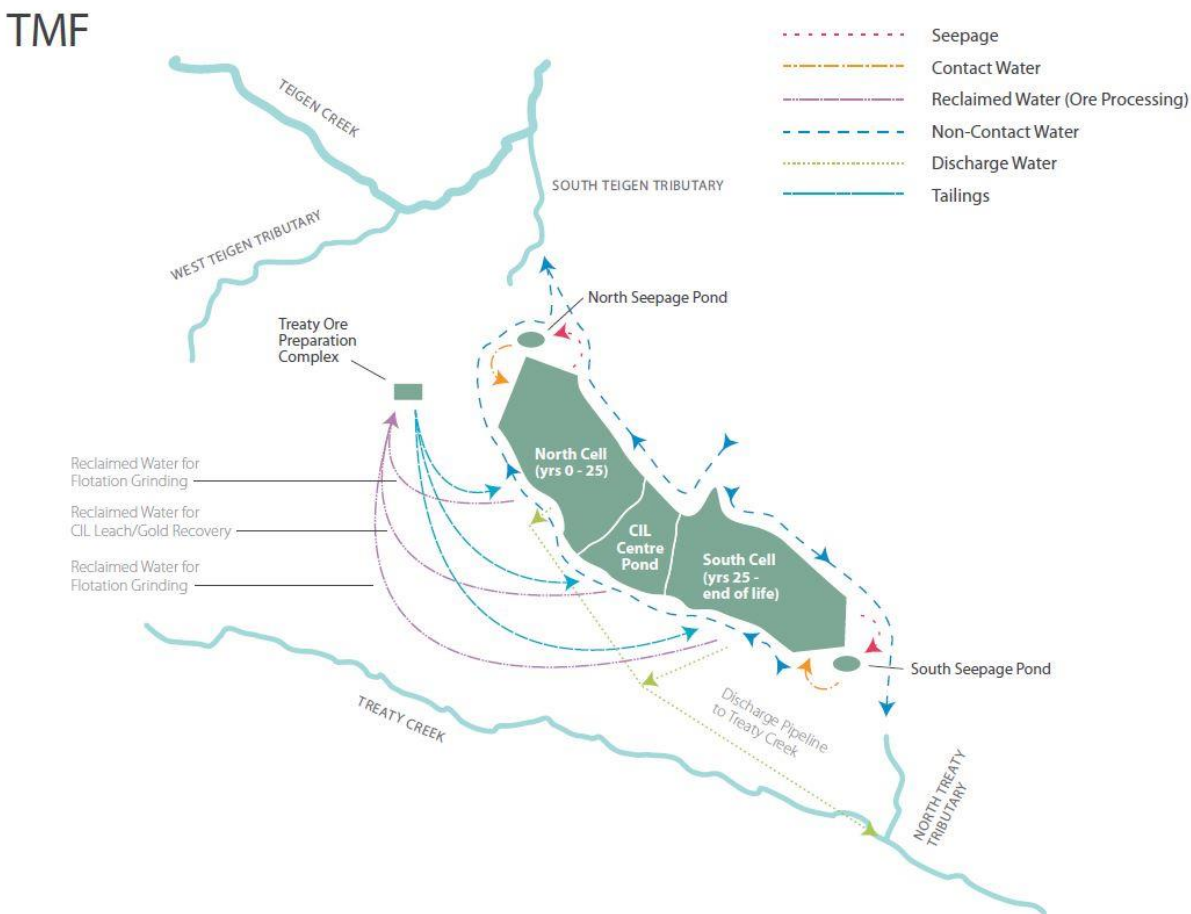
The PTMA is where the processing to extract the minerals from the ore would occur and where the mine tailings would be stored. The MTT connects the PTMA to the mine site. The Treaty OPC, Treaty Process Plant, TMF and related diversions would be located in the PTMA. The TCAR would provide access to the PTMA from Hwy 37.

The Treaty Process Plant contains several water treatment processes to control cyanide and dissolved metals.

The TMF would be located southeast of the Treaty Process Plant, within the upper reaches of Teigen and Treaty Creeks. The TMF also includes seepage ponds to collect water that seeps through the dams. Two main diversion channels, the Northeast Diversion and the South Diversion would divert non-contact runoff around the TMF and into Treaty and Teigen Creeks. These diversions would be moved over time as the TMF is expanded. Figure 7 below shows the proposed water management at the PTMA.

[Section 4 of the Application](#) describes the proposed Project components in greater detail, including the proposed water management facilities.

Figure 8: Proposed Water Management at the PTMA



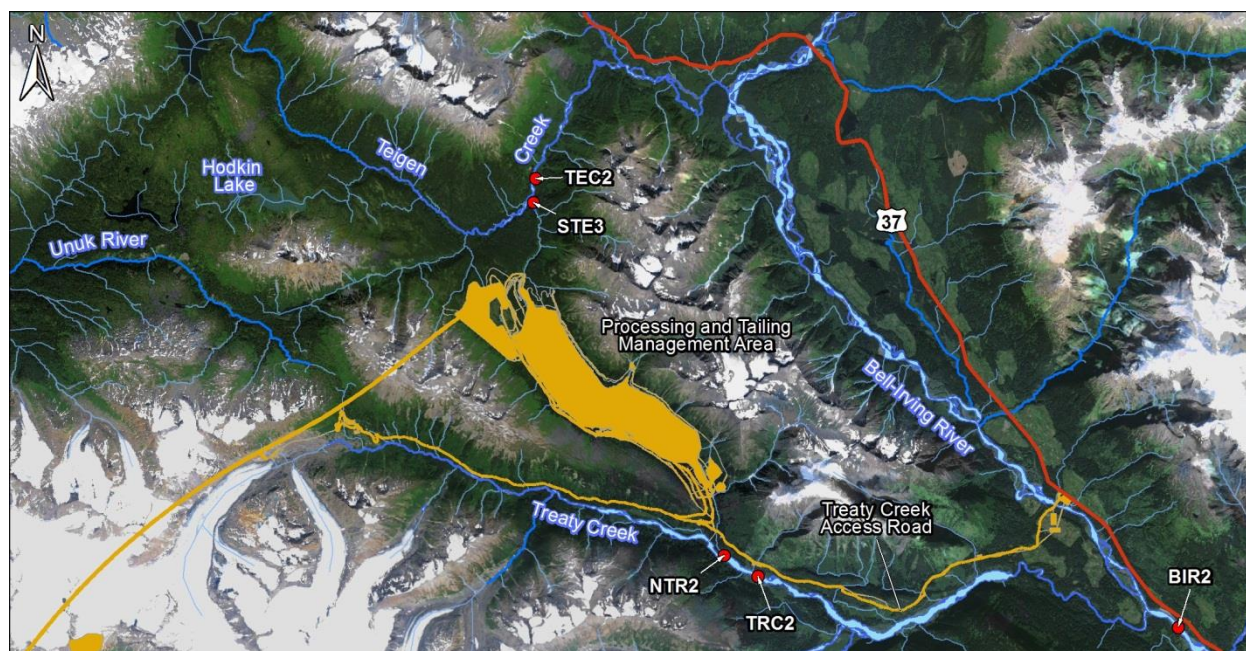
PTMA Surface Water Assessment Points

The Proponent used eight assessment points downstream of the major mine components in order to assess the potential effects of the proposed Project on surface water quantity and quality. Table 5 below identifies the key assessment points that EAO has used to describe water effects in this Report and the assessment points are shown in Figure 8.

Table 5: Description of PTMA Surface Water Assessment Points

Assessment Point	Watershed	Description
NTR2	North Treaty Creek	North Treaty Creek, just before confluence with Treaty Creek
TRC2	Treaty Creek	Treaty Creek, downstream of the confluence with North Treaty Creek and below the initial dilution zone
STE3	South Teigen Creek	South Teigen Creek, just before confluence with Teigen Creek
TEC2	Teigen Creek	Teigen Creek, downstream of the confluence with South Teigen Creek
BIR2	Bell-Irving River	Bell-Irving River, downstream of the confluence with Treaty Creek

Figure 9: Spatial boundaries of the Surface Water Effects Assessment for the PTMA



5.2 Surface Water Quality

5.2.1 Background Information

The Local Study Area (LSA) for surface water covers 108,100 ha and includes the Sulphurets, Teigen and Treaty Creek watersheds. It was based on the footprint of the proposed Project and associated activities that could cause downstream effects.

The Regional Study Area (RSA) covers 386,612 ha and includes those watersheds that could potentially be affected by the proposed Project, including the Mitchell-Sulphurets-Unuk system, Teigen-Snowbank-Bell-Irving system and Treaty-Bell-Irving system.

Water quality baseline data from 2007 to 2012 was included in the Application to characterize the natural variation in streams and rivers in the baseline study area and to examine the areas potentially affected by the proposed Project. The Proponent analyzed water quality samples for a number of parameters (e.g., pH, hardness and turbidity), nutrients, cyanides, total organic carbon, and total and dissolved metals, using the best available detection limits. As part of the water quality studies, the Proponent conducted selenium speciation analysis⁵ and toxicity tests.

The Proponent's water quality model was used to predict the concentrations and transport of chemicals and metals both within the proposed Project footprint and in downstream surface waters that would receive direct effluent discharge and/ or seepage from proposed Project components. Background laboratory investigations and pilot plant studies were used to estimate future water quality.

The Proponent developed water balances for the "base case" (or average year) and for a "variable case" that incorporated extreme events including up to a 1-in-100-year dry event and a 1-in-200-year wet event. The two geochemical loading scenarios that were considered are the "expected case," which was represented by the average of the particular geochemical source term, and the "upper case," which was represented by the 95th percentile⁶ of the particular geochemical source term.

⁵ Selenium is an essential nutrient required by healthy organisms and occurs within nature in many forms. Exposure to too much selenium can result in potential biological effects, which may affect the viability of individual organisms. Speciation analysis is required to identify baseline conditions and to differentiate between those forms of selenium present in simulated feed water in pilot water treatment tests which can be removed through conventional water treatment systems (e.g. selenite can be removed during high-density sludge water treatment) and those which require more complex treatment systems (e.g. selenate is not removed by high density sludge water treatment).

⁶ The 95th percentile is the value (or score) below which 95 percent of the observations may be found.

The Proponent identified potential residual effects on water quality through toxicity testing of effluent and by calculating hazard quotients for predicted water quality parameters. Calculation of hazard quotients was used to determine the potential for a chemical to cause toxicity in receiving environment receptors (such as aquatic life, or fish or wildlife species). Hazard quotients were calculated as the ratio of the predicted concentration of a chemical to the relevant guideline or background value. The Application states that a hazard quotient of greater than 1.0 relative to both guideline limits and baseline concentrations may indicate a potential for toxic effects in receptors, while a hazard quotient of less than 1.0 relative to either guideline limits or baseline concentrations is not considered to pose additional toxic risk to receptors.

Mine Site Current Water Quality

The Application states that Mitchell and Sulphurets Creeks have total and dissolved metal concentrations that are frequently higher than levels set in BC Water Quality Guidelines (BCWQG) for the protection of freshwater aquatic life. This is due to high suspended sediment loads due to glacier-fed streams and acid and metal leaching from naturally-occurring minerals in the bedrock associated with the ore deposit.

The Proponent's studies identified several forms of selenium in the Mine Site LSA. Of particular note was that selenium in its most oxidized form, selenate, was predominantly present in seeps at the Kerr deposit, while some seeps in the Mitchell Valley predominantly contained selenium as selenite. Selenium in the receiving environment was typically in the form of selenate including in Mitchell, Sulphurets, and Gingras Creeks and in the Unuk River.

PTMA Current Water Quality

In the PTMA LSA the Proponent observed guideline exceedances in the Snowbank/Teigen watershed for total and dissolved aluminum, total cadmium and total chromium. In the Treaty/Bell-Irving watershed the Proponent observed guideline exceedances for dissolved aluminum, total cadmium, total chromium, total copper, total iron and total zinc. Low selenium concentrations (frequently below BCWQG) were observed at the PTMA.

A full discussion on surface water quality can be found in Chapter 14 of the Proponent's Application posted on EAO's website at:

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35959.html.

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

Mine Site and PTMA

The Proponent identified the following sources of key potential water quality effects:

Metal Leaching (ML)/Acid Rock Drainage (ARD) — ML/ARD has the potential to degrade surface water quality through oxidation and leaching processes of disturbances associated with construction activities (including camps, access roads, diversion structures, tunnels, borrow areas and quarries) and mining operations (including open pits, underground block caves, waste rock and tailings). Disturbances that are not adequately reclaimed may impact water quality during closure and post-closure.

Effluent discharge — Effluent discharges from nine proposed temporary water treatment plants (six at the Mine Site and three at the PTMA) and the main Mine Site WTP have the potential to change surface water quality, with improved conditions for some water quality parameters and the potential for increased concentrations for parameters not treated by the high-density sludge process (such as selenium).

Seepage — Despite the installation of seepage collection dams and ponds, seepage may escape downstream from the WSF and TMF. Seepage may also occur from water treatment sludge management facilities on the McTagg RSF.

Other Potential Effects

Leaching of blasting residues — Nitrogen loading to watercourses from blasting residues used outside the catchments of the WSF and the TMF has the potential to affect surface water quality during construction, operations and for some period of time after closure. The Application states baseline total nitrogen concentrations are low in streams in the proposed Project area. Nitrogen loading may increase the potential for eutrophication in nitrogen-limited aquatic systems if the supply of phosphorus and other micronutrients is sufficient for primary production.

Sedimentation and erosion — Surface disturbance at the Mine Site and the PTMA would increase sedimentation and erosion of soils. Recovery from sedimentation would be more rapid in high velocity streams than in wetlands or lakes. The Application reports that many streams and rivers in the proposed Project area have naturally high sediment loads of glacial origin, and would not be as affected as clear, low-velocity streams. There is potential for sedimentation and erosion during all phases of mining.

Sewage — Sewage discharge to the receiving environment from personnel camps has the potential to affect water quality during both construction and operation, primarily through nutrient loading. Twelve construction camps would be equipped with sewage treatment facilities that include secondary treatment, with effluent discharged either to surface water or other approved ground locations. The Application reports that the camp

sewage treatment plants are designed to produce effluent quality that is consistent with reclaimed water.

Accidental spills — Spills of hazardous materials such as petroleum products, reagents or concentrate could occur at all proposed Project phases, linked to unplanned events or accidents.

Atmospheric deposition — Dust deposition from blasting and other mining activities has the potential to affect surface water quality during all proposed Project phases. The Proponent's air quality modeling results were used to assess the effect of dust deposition on surface water quality.

Predicted Water Quality in the Mine Site

Tables 6, 7, and 8 show a number of baseline and predicted concentrations, including selenium, at three assessment points at the Mine Site. The predicted concentrations include additional mitigation commitments and model refinements as a result of the Application review. The first assessment point is Sulphurets Creek below the fish barrier, 1300 m upstream of the Unuk River (SC3), the second is the Unuk River downstream of the confluence with Sulphurets Creek (UR1) and the third is the Unuk River just before the US border (UR2). The tables show predicted water quality for four points in time over the life of the proposed Project. Predictions are compared to current water quality (minimum, average, and maximum values) as well as to BCWQG. Predictions for those parameters in the red boxes exceed BCWQG, values highlighted in yellow meet BCWQG but are within 10% of the BCWQG, and those in green boxes are less than guidelines.

The photograph below shows the confluence with the Unuk River and Sulphurets Creek, and highlights the influence of the current natural water quality in the Sulphurets watershed on the Unuk River. It also illustrates that surface water quality effects are noticeable downstream of SC3 until sufficient dilution occurs with the mixing of water in the Unuk River.

Figure 10: Confluence of the Sulphurets Creek and the Unuk River



Sulphurets Creek (SC3)

Table 6 shows predictions for Sulphurets Creek below the fish barrier (SC3). The graphs show that some predicted metal concentrations are likely to improve (e.g. copper, cadmium and zinc) and several remain largely unchanged (e.g. sulphate, aluminum, lead and chromium). It is also noteworthy that a number of metal baseline levels (aluminum, cadmium, chromium, copper, selenium and zinc) currently exceed BCWQG.

The only element that shows a notable increase (e.g. an increase above both background and guideline) at SC3 is selenium, which exceeds BCWQG during most proposed Project phases.

Table 6: Predicted Average Water Quality in Sulphurets Creek Compared with BCWQG and Current Water Quality at SC3

	BCWQG	Current (Baseline)			Operations (Year 4)			Operations (Year 35)		
		Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum
Sulphate (mg/L)	309	28	88	134	40	94	136	87	125	179
Aluminum (Dissolved) (mg/L)	0.05	0.03	0.05	0.07	0.03	0.06	0.08	0.04	0.06	0.08
Cadmium (mg/L)	0.0002	0.0007	0.001	0.002	0.0005	0.0004	0.001	0.0005	0.0004	0.001
Chromium (mg/L)	0.001	0.0002	0.0002	0.0009	0.0004	0.0002	0.0008	0.0003	0.0002	0.0009
Copper (mg/L)	0.0053	0.04	0.1	0.3	0.03	0.03	0.1	0.03	0.03	0.1
Lead (mg/L)	0.00789	0.005	0.003	0.008	0.003	0.002	0.006	0.003	0.002	0.006
Selenium (mg/L)	0.0020	0.0007	0.0018	0.0026	0.0019	0.0029	0.0040	0.0019	0.0029	0.0040
Zinc (mg/L)	0.0398	0.06	0.1	0.2	0.02	0.03	0.09	0.02	0.03	0.09

	BCW QG	Operations (Year 50)			Closure (Year 55)			Post-Closure (Year 99)		
		Mini mu m	Ann ual Aver age	Maxi mu m	Mini mu m	An nua l Ave rag e	Maxi mu m	Mini mu m	Ann ual Ave rage	Max imu m
Sulphate (mg/L)	309	81	118	161	71	123	178	71	119	155
Aluminum (Dissolved) (mg/L)	0.05	0.04	0.06	0.08	0.04	0.05	0.08	0.04	0.05	0.08
Cadmium (mg/L)	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00
Chromium (mg/L)	0.02	0.005	0.04	0.1	0.005	0.04	0.1	0.005	0.04	0.1
Copper (mg/L)	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00
Lead (mg/L)	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00
Selenium (mg/L)	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00
Zinc (mg/L)	0.03	0.00	0.03	0.09	0.00	0.0	0.1	0.00	0.03	0.1

Hardness-dependent guidelines calculated using median baseline hardness for the site (133 mg/L).

Concentration below
calculated BCWQG

Concentration approaching
calculated BCWQG

Concentration exceeding
calculated BCWQG

Unuk River (UR1)

Table 7 shows predictions for the Unuk River, approximately two km downstream of the confluence with Sulphurets Creek (UR1) as shown in figure 9 above. As with SC3, the graphs show that some predicted metal concentrations are likely to improve (e.g. copper, cadmium, zinc and lead) and several remain largely

unchanged (e.g. sulphate, aluminum and chromium). As with SC3, it is also noteworthy that a number of metal baseline levels (aluminum, cadmium, chromium, copper, and zinc) currently exceed BCWQG.

The only element that shows an increase above both background concentrations and BCWQG at UR1 is selenium, which exceeds BCWQG during most proposed Project phases for the maximum predicted water quality, but annual average values are predicted to meet BCWQG.

Table 7: Predicted Average Water Quality Compared with BCWQG and Current Water Quality at UR1

	BCWQG	Current (Baseline)			Operations (Year 4)			Operations (Year 35)		
		Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum
Sulphate (mg/L)	309	21	49	75	28	51	78	456	64	84
Aluminum (Dissolved) (mg/L)	0.05	0.03	0.05	0.1	0.03	0.06	0.1	0.03	0.06	0.1
Cadmium (mg/L)	0.00015	0.0004	0.0007	0.0001	0.000005	0.0002	0.0007	0.000005	0.0002	0.0007
Chromium (mg/L)	0.001	0.0001	0.003	0.02	0.0003	0.003	0.02	0.0002	0.003	0.02
Copper (mg/L)	0.0038	0.02	0.06	0.1	0.0003	0.02	0.08	0.0003	0.02	0.08
Lead (mg/L)	0.00625	0.0003	0.002	0.009	0.00003	0.002	0.008	0.00003	0.002	0.008
Selenium (mg/L)	0.0020	0.0006	0.0011	0.0014	0.0012	0.0017	0.0021	0.0011	0.0015	0.0021
Zinc (mg/L)	0.0104	0.03	0.05	0.08	0.002	0.02	0.06	0.002	0.02	0.06

	BCWQG	Operations (Year 50)			Closure (Year 55)			Post-Closure (Year 99)		
		Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum
Sulphate (mg/L)	309	44	61	83	39	62	85	39	61	79
Aluminum (Dissolved) (mg/L)	0.05	0.03	0.06	0.1	0.03	0.06	0.1	0.03	0.06	0.1
Cadmium (mg/L)	0.00015	0.000005	0.0002	0.0007	0.000005	0.0002	0.0007	0.000005	0.0002	0.0007
Chromium (mg/L)	0.001	0.0002	0.003	0.02	0.0002	0.003	0.02	0.0002	0.003	0.02
Copper (mg/L)	0.0038	0.0003	0.02	0.08	0.0003	0.02	0.08	0.0003	0.02	0.08
Lead (mg/L)	0.00625	0.00003	0.002	0.008	0.00003	0.002	0.008	0.00003	0.002	0.008
Selenium (mg/L)	0.0020	0.0011	0.0015	0.0020	0.0011	0.0016	0.0021	0.0011	0.0015	0.0018
Zinc (mg/L)	0.0104	0.002	0.02	0.06	0.002	0.02	0.06	0.002	0.02	0.06

Hardness-dependent guidelines calculated using median baseline hardness for the site (93.8 mg/L).

Concentration below calculated BCWQG

Concentration approaching calculated BCWQG

Concentration exceeding calculated BCWQG

Unuk River (UR2)

Table 8 shows predictions for the Unuk River at the BC-Alaska border (UR2). As with SC3 and UR1, the graphs show that some predicted metal concentrations are likely to improve (e.g. copper, cadmium and zinc) and several remain largely unchanged (e.g. sulphate, aluminum, chromium and lead). As with SC3, it is also noteworthy that a number of metal baseline levels (aluminum, cadmium, chromium, copper, lead and zinc) currently exceed BCWQG.

Unlike SC3 and UR1, maximum selenium levels at UR2 are predicted to meet BCWQG during all proposed Project phases.

Table 8: Predicted Average Water Quality in Unuk River Compared with BCWQG and Current Water Quality at UR2

	BCWQG	Current (Baseline)			Operations (Year 4)			Operations (Year 35)		
		Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum
Sulphate (mg/L)	218	14	30	46	17	31	48	30	37	47
Aluminum (Dissolved) (mg/L)	0.05	0.02	0.06	0.2	0.02	0.06	0.2	0.02	0.06	0.2
Cadmium (mg/L)	0.00009	0.0002	0.0002	0.0004	0.000005	0.00006	0.0002	0.000005	0.00006	0.0002
Chromium (mg/L)	0.001	0.0002	0.002	0.01	0.0002	0.002	0.01	0.0002	0.002	0.01
Copper (mg/L)	0.0021	0.01	0.02	0.05	0.0003	0.008	0.03	0.0003	0.008	0.03
Lead (mg/L)	0.00468	0.0002	0.002	0.006	0.00003	0.001	0.005	0.00003	0.001	0.005
Selenium (mg/L)	0.0020	0.0004	0.0007	0.0008	0.0007	0.0009	0.0012	0.0006	0.0009	0.0011
Zinc (mg/L)	0.0075	0.01	0.02	0.04	0.002	0.009	0.03	0.002	0.009	0.03

	BCWQG	Operations (Year 50)			Closure (Year 55)			Post-Closure (Year 99)		
		Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum
Sulphate (mg/L)	218	27	35	46	20	36	50	25	35	48
Aluminum (Dissolved) (mg/L)	0.05	0.02	0.06	0.2	0.02	0.06	0.2	0.02	0.06	0.2
Cadmium (mg/L)	0.00009	0.000005	0.00006	0.0002	0.000005	0.000060	0.0002	0.000005	0.00006	0.0002
Chromium (mg/L)	0.001	0.0002	0.002	0.01	0.0002	0.002	0.01	0.0002	0.002	0.01
Copper (mg/L)	0.0021	0.0003	0.008	0.03	0.0003	0.008	0.03	0.0003	0.008	0.03
Lead (mg/L)	0.00468	0.00003	0.001	0.005	0.00003	0.001	0.005	0.00003	0.001	0.005
Selenium (mg/L)	0.0020	0.0006	0.0009	0.001	0.0006	0.0009	0.0012	0.0007	0.0008	0.0010
Zinc (mg/L)	0.0075	0.002	0.009	0.03	0.002	0.009	0.03	0.002	0.009	0.03

Hardness-dependent guidelines calculated using median baseline hardness for the site (51.6 mg/L).

Concentration below calculated BCWQG

Concentration approaching calculated BCWQG

Concentration exceeding calculated BCWQG

Predicted Water Quality in the TMF

The Proponent used a water quality model to generate predictions of TMF water quality for all proposed Project phases. The North and South Cell ponds would store the cumulative geochemical load from the PTMA prior to discharge. Each cell, when active, is designed to store tailings water from the tailings stream plus surplus water from the lined Centre Cell prior to discharge to the receiving environment.

The Application predicts that during closure and post-closure, concentrations of parameters of concern would decrease substantially in the TMF cells, due to dilution from surface runoff and precipitation. The Application states that improved water quality in the North Cell by Year 30 (approximately five years after its decommissioning) would allow discharge to North Treaty Creek by pipeline year-round and improved water quality in the South Cell would allow discharge to North Treaty Creek year-round by Year 57.

Tables 9, 10 and 11 show metal concentrations at three assessment points downstream of the PTMA: the first is Treaty Creek (TRC2), downstream of the confluence with North Treaty Creek and below an initial dilution zone where effluent from the TMF is discharged into Treaty Creek and is considered to be fully mixed; the second is Teigen Creek (TEC2), downstream of the confluence of South Teigen Creek; and the third is BIR2, a point downstream of the confluence of Treaty Creek and the Bell Irving River. BIR2 was picked to capture the influence of any discharged effluent from the proposed Project on the Bell Irving and Nass Rivers.

The tables show predicted water quality for five time points over the life of the proposed Project. The predicted concentrations include model refinements added during the Application review. Predictions are compared to current water quality (annual minimum, average, and maximum values), as well as to BCWQG. Predictions for those parameters in the red boxes exceed BCWQG, values highlighted yellow meet BCWQG but are within 10% of the BCWQG, and those in green boxes are less than guidelines.

Treaty Creek (TRC2)

Table 9 shows water quality predictions for Treaty Creek (TRC2). The table shows that water quality predictions are, for the most part, unchanged as a result of the TMF for all proposed Project phases. A number of parameters currently exceed BCWQG, cadmium being of particular note.

Table 9: Predicted Average Water Quality in Treaty Creek Compared with BCWQG and Current Water Quality at TRC2

	BCWQG	Current (Baseline)			Operations (Year 4)			Operations (Year 35)		
		Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum
Sulphate (mg/L)	309	23	57	99	26	61	98	23	58	98
Aluminum (Dissolved) (mg/L)	0.05	0.001	0.03	0.1	0.002	0.04	0.1	0.002	0.03	0.1
Cadmium (mg/L)	0.00003	0.00003	0.0002	0.0008	0.00003	0.0002	0.0008	0.00003	0.0002	0.0008
Chromium (mg/L)	0.001	0.0003	0.005	0.02	0.0002	0.005	0.02	0.0002	0.005	0.02
Copper (mg/L)	0.0033	0.001	0.009	0.02	0.001	0.009	0.02	0.001	0.009	0.02
Lead (mg/L)	0.0058	0.0001	0.003	0.01	0.0001	0.003	0.01	0.0001	0.003	0.01
Selenium (mg/L)	0.0020	0.0007	0.0009	0.0017	0.0007	0.0011	0.0017	0.0007	0.0010	0.0017
Zinc (mg/L)	0.0075	0.002	0.03	0.09	0.002	0.03	0.09	0.002	0.03	0.09

	BCWQG	Operations (Year 50)			Closure (Year 55)			Post-Closure (Year 99)		
		Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum
Sulphate (mg/L)	309	23	58	100	25	59	101	23	57	99
Aluminum (Dissolved) (mg/L)	0.05	0.002	0.03	0.1	0.002	0.03	0.1	0.002	0.03	0.1
Cadmium (mg/L)	0.00003	0.00003	0.0002	0.0008	0.00003	0.0002	0.0008	0.00003	0.0002	0.0008
Chromium (mg/L)	0.001	0.0002	0.005	0.02	0.0002	0.005	0.02	0.0002	0.005	0.02
Copper (mg/L)	0.0033	0.001	0.009	0.02	0.001	0.009	0.02	0.001	0.009	0.02
Lead (mg/L)	0.0058	0.0001	0.003	0.01	0.0001	0.003	0.01	0.0001	0.003	0.01
Selenium (mg/L)	0.0020	0.0007	0.0010	0.0017	0.0007	0.0010	0.0017	0.0007	0.0009	0.0017
Zinc (mg/L)	0.0075	0.002	0.03	0.09	0.002	0.03	0.09	0.002	0.03	0.09

Hardness-dependent guidelines calculated using median baseline hardness for the site (51.6 mg/L).

Concentration below calculated BCWQG

Concentration approaching calculated BCWQG

Concentration exceeding calculated BCWQG

Teigen Creek (TEC2)

Table 10 shows water quality predictions for Teigen Creek (TEC2). The table shows that current water quality in Teigen Creek downstream of the TMF meets most BCWQG parameters. Water quality is predicted to, for the most part, remain unchanged as a result of the TMF for all proposed Project phases.

Table 10: Predicted Average Water Quality in Teigen Creek Compared with BCWQG and Current Water Quality at TEC2

	BCWQG	Current (Baseline)			Operations (Year 4)			Operations (Year 35)		
		Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum
Sulphate (mg/L)	218	13	27	34	11	22	27	11	22	27
Aluminum (Dissolved) (mg/L)	0.05	0.004	0.02	0.04	0.003	0.02	0.04	0.003	0.02	0.04
Cadmium (mg/L)	0.000020	0.000006	0.00001	0.00002	0.000005	0.000009	0.00002	0.000005	0.000009	0.00002
Chromium (mg/L)	0.001	0.0002	0.001	0.004	0.0002	0.0009	0.004	0.0002	0.0009	0.004
Copper (mg/L)	0.0022	0.0004	0.001	0.002	0.0004	0.0009	0.002	0.0004	0.0009	0.002
Lead (mg/L)	0.0048	0.00003	0.0001	0.0003	0.00003	0.00008	0.0003	0.00003	0.00008	0.0003
Selenium (mg/L)	0.0020	0.0002	0.0004	0.0005	0.0002	0.0004	0.0005	0.0002	0.0004	0.0005
Zinc (mg/L)	0.0075	0.0007	0.002	0.005	0.002	0.002	0.004	0.002	0.002	0.004

	BCWQG	Operations (Year 50)			Closure (Year 55)			Post-Closure (Year 99)		
		Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum	Minimum	Annual Average	Maximum
Sulphate (mg/L)	218	12	22	27	12	22	27	13	24	30
Aluminum (Dissolved) (mg/L)	0.05	0.004	0.02	0.04	0.004	0.02	0.04	0.005	0.02	0.04
Cadmium (mg/L)	0.000020	0.000005	0.000009	0.00002	0.000005	0.000009	0.00002	0.000005	0.000009	0.00002
Chromium (mg/L)	0.001	0.0002	0.0009	0.004	0.0002	0.0009	0.004	0.0002	0.0009	0.004
Copper (mg/L)	0.0022	0.0004	0.0009	0.002	0.0004	0.0009	0.002	0.0004	0.0009	0.002
Lead (mg/L)	0.0048	0.00003	0.00008	0.0003	0.00003	0.00008	0.0003	0.00003	0.00009	0.0003
Selenium (mg/L)	0.0020	0.0002	0.0004	0.0005	0.0002	0.0004	0.0005	0.0002	0.0004	0.0005
Zinc (mg/L)	0.0075	0.002	0.002	0.004	0.002	0.002	0.004	0.002	0.002	0.004

Hardness-dependent guidelines calculated using median baseline hardness for the site (55 mg/L).

Concentration below calculated BCWQG

Concentration approaching calculated BCWQG

Concentration exceeding calculated BCWQG

Bell Irving (BIR2)

Table 11 shows current water quality in the Bell Irving River below the confluence with Treaty Creek. As the Proponent did not predict any changes to water quality, the table only shows baseline current water quality.

Table 11: Current Water Quality at BIR2 Compared with BCWQG

	BCWQG	Current (Baseline)		
		Minimum	Annual Average	Maximum
Sulphate (mg/L)	218	15	29	57
Aluminum (Dissolved) (mg/L)	0.05	0.003	0.1	1.8
Cadmium (mg/L)	0.00009	0.00001	0.0001	0.001
Chromium (mg/L)	0.001	0.0003	0.005	0.03
Copper (mg/L)	0.0032	0.0003	0.005	0.04
Lead (mg/L)	0.00567	0.00003	0.001	0.02
Selenium (mg/L)	0.0020	0.0005	0.0007	0.0015
Zinc (mg/L)	0.0075	0.0005	0.01	0.2

Hardness-dependent guidelines calculated using median baseline hardness for the site (79 mg/L).

Concentration below calculated BCWQG

Concentration approaching calculated BCWQG

Concentration exceeding calculated BCWQG

Note: Concentrations were not predicted for BIR2; however no increases above baseline are expected based on predictions for Treaty and Teigen.

Summary of Mitigation Proposed in the Application**Mine Site***ML/ARD*

The Proponent's ML/ARD Management Plan details the actions to avoid, control, and mitigate ML/ARD at all proposed Project phases. Most PAG geological materials would be stored in an engineered RSF, backfilled into Sulphurets Pit, or stored on lined pads for early construction activities. As part of the ML/ARD Management Plan, a geochemical inventory of waste rock, tailings, and non-deposit material would be maintained which would allow for adaptive ML/ARD management.

The Proponent has proposed monitoring plans to monitor for adverse effects to water quality as a result of discharge of ML/ARD treatment effluents including the Aquatic Effects Monitoring Plan (AEMP) and the Water Management Plan (WMP).

The objectives of the WMP are to divert non-contact water around the proposed Project and to collect and treat contact water from the proposed Project. A variety of diversion, collection and water treatment structures would be required to manage surface water.

Selenium Management

Mitigation to address potentially elevated selenium levels in effluent includes segregation of Kerr waste rock⁷, which has the potential to leach selenium, as backfill in the mined out Sulphurets Pit, as well as a SeTP to treat drainage from the Kerr waste rock. Waste rock from the Kerr Pit would be backfilled into the mined out Sulphurets Pit between Years 27 and 50 and the backfilled Sulphurets Pit would be lined, dewatered and the water routed by pipeline to the SeTP.

The Application and [additional response memo](#) describes the details of the Proponent's selenium management strategies which are summarized here. It is important to note that the selenium treatment proposed in the Application is conceptual and has not been proven at a large scale. In the Application, the Proponent proposed to commission a SeTP at year 27 of operations. Later during the Application review stage, the Proponent committed to commission a SeTP at the Mitchell WSF by the fifth year of operations. Further discussion of the effectiveness and reliability of the proposed selenium treatment is discussed in section 5.2.3.

At the SeTP the treated effluent would then be routed to the WSF for further treatment. The Application reports that ion exchange selenium treatment is considered the most technically feasible option, primarily due to the high water volumes that must be treated, the terrain and climatic constraints at the Mine Site, the high removal efficiency rates (treatment to 1 µg/L), and the relatively small sludge volumes achieved by this technology.

The Application reports that even with these mitigation measures, total selenium concentrations are predicted to be higher than both baseline concentrations and BCWQG (0.002 mg/L) during all proposed Project phases in Sulphurets Creek. In the Application, total selenium concentrations at SC3 are predicted to increase throughout the operation phase, and to range from 0.0016 to 0.0076 mg/L. These predictions do not consider additional mitigations proposed during the EA review and further discussed in sections below.

The Proponent's AEMP provides for monitoring of selenium concentrations and adaptive management if effects on aquatic life are identified.

⁷ Selenium in the Kerr waste rock was a key issue during the EA because, in order to transport waste rock from the Kerr Pit via conveyor, the rock has to be crushed to a smaller size than other waste rock, resulting in more area of the rock being exposed to oxidation and therefore increased potential for mobilization of selenium.

Seepage

The Proponent proposes seepage collection measures to mitigate potential effects on surface water quality due to seepage below and through dams at all proposed Project phases.

At the Mine Site, a 25-m high lined rockfill seepage dam would be installed downstream of the WSD to collect seepage from the WSF. Four seepage interception tunnels within the abutments of the WSD would route seepage to the seepage collection dam. Two seepage collection tunnels would be located immediately upstream of the seepage dam grout curtain. Seepage collected in this dam would be routed directly to the WTP or the WSF.

PTMA

The Application states seepage from the TMF would be contained by the steep hydraulic gradients on the valley slopes. Seepage and runoff water from each tailings dam would be collected at downstream seepage collection dams and pumped back to the TMF. Collection sumps located upstream of the seepage dams would settle solids transported by runoff or produced by dam construction activities. These sediments would be transported back into the TMF.

The Application reports that the hydrogeological modeling demonstrates that the North, Southeast, and Saddle seepage collection dams would be effective at minimizing the seepage of contact groundwater into the receiving environment.

Mine Site and PTMA

Effluent Discharge and Monitoring

The Application states that mitigation of potential surface water quality effects linked to effluent quality would be achieved through water treatment and scheduling discharge to mimic the stream flow rates at all proposed Project phases. Proposed water treatment includes temporary construction-phase water treatment plants, the Mine Site WTP, a SeTP and reduction of metal concentrations by pH-adjustment in the Treaty Process Plant.

The WTP would use a high-density sludge lime water treatment process. The water treatment infrastructure includes the WTP building, lime silos, a sludge winter storage building and a secure sludge landfill area. During construction the sludge would be stored in the secure landfill and a winter sludge storage building. During operations, the sludge would be dewatered, trucked to the Mitchell OPC, and transported via the MTT to the Process Plant and eventually buried with the tailings in the TMF. After mine closure, the sludge would be trucked to the RSFs where it would be permanently stored in cells constructed on the RSFs surface.

The Application reports that staging discharge to mimic the stream flow rates in

Sulphurets and Treaty Creeks takes advantage of natural dilution capacity, and avoids or minimizes changes to water quality during the low-flow winter and early spring periods.

The Proponent has committed to effluent quality monitoring as described in the AEMP.

Proponent Identification of Residual Effects on Surface Water Quality

The Proponent identified the following residual effects on surface water quality due to ML/ARD, leaching of blasting residues, and sedimentation and erosion, taking into account proposed mitigation measures. Below is further discussion of selenium effects at the Mine Site and PTMA.

Mine Site

- Total selenium concentrations in Sulphurets Creek are predicted to be higher than both baseline concentrations and BCWQG (0.002 mg/L) at all proposed Project phases.
- Selenium concentrations in the Unuk River are predicted to increase throughout the operations phase, and range from 0.001 to 0.0021 mg/L at assessment point UR1 and 0.001 to 0.0012 mg/L at site UR2. Maximum predicted selenium concentrations at site UR1 are predicted to exceed BCWQG during most proposed Project phases but annual averages are predicted to meet BCWQG.

PTMA

- Negligible increases in selenium concentrations in South Teigen Creek over background were predicted during operations, closure and post-closure.

5.2.3 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 (CPD) and Table of Conditions (TOC) (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued.

The main themes of the issues raised included:

- concerns that the conceptual WMP 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 RSFs;
- 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 water quality effects over the life of the proposed Project;

- concerns with the level of conservatism in the source terms used in water quality modelling and potential for water quality to be worse than predicted, thus requiring additional and/or earlier treatment;
- concerns relating to the SeTP, uncertainty of predictions and long-term effects of selenium in the environment; and
- concerns related to the scale of the proposed Project, the natural constraints of the topography and climatic setting, and the potential water quality effects due to failure of designed facilities for waste rock storage and water storage, management and treatment.

Examples of specific concerns are outlined below.

Mine Site

Selenium

- A number of Working Group members raised concerns about the feasibility and resulting uncertainty related to the proposed selenium treatment method, noting the proposed selenium treatment systems are not currently proven at the scale required for the proposed Project and are presented as largely conceptual systems. BC Ministry of Energy and Mines (MEM) required detailed information from the Proponent on the design of the system to demonstrate treatment can be effectively, reliably and economically achieved for the proposed Project.
 - In response, the Proponent provided additional details regarding the selenium treatment method and pilot tests. They noted that initial research work has been completed and that a full-scale pilot plant was in the process of being constructed for a southeast coal project. The Proponent asserts that ion exchange is proven technology for removal of selenium.
 - The Proponent submitted a draft Selenium Management Plan (SeMP) with the goal of better understanding potential risks that selenium may pose to the aquatic receiving environment. It was prepared as a proactive approach to identifying selenium as a potential concern, and to address specific comments received during the EA.

NLG provided numerous comments on the draft SeMP, including the statement that substantially more work is required to demonstrate that releases of selenium from the proposed Project will not have residual effects.

- The Proponent committed to the implementation of a comprehensive monitoring program (water, sediment, tissue metals) in the receiving environment downstream of the TMF and the development of a food chain

model in order to better understand the movement and uptake of selenium by biota in the aquatic environment.

MEM stated that the ion exchange selenium treatment system remains unproven. MEM requires a preliminary engineering design of the system to assess its technical and economic feasibility. To complete this preliminary engineering, performance data from a pilot study or similar full-scale operations were considered necessary.

Proponent Response to Selenium Concerns

During the latter stage of the EA, the Proponent proposed specific new conditions to address selenium treatment concerns, which included:

- the Proponent will operate and complete a pilot plant evaluation of the selenium treatment approach using local Mitchell Creek water modified to represent expected conditions for the Mitchell/McTagg RSF seepage within one year of the issuance of an EA Certificate. A report describing the results of the pilot evaluation must be submitted to MEM, EAO and the BC Ministry of Environment (MOE) within 12 months of completion of the evaluation;
- the Proponent must construct a seepage water collection system at the base of the McTagg/Mitchell RSF;
- the Proponent must, by the fifth year of operations, construct and commission a SeTP at the Mitchell WSF. The plant must have a capacity of 500 litres per second (L/s) and be capable of treating water collected from both the McTagg/Mitchell RSF and from Sulphurets and Kerr pits as a contingency to manage selenium levels that might be higher than expected; and
- The Proponent will pay the University of British Columbia at least \$36,500, on March 1 of each year during the 2015-2017 years, to support a research program at the University of British Columbia to investigate potential methods to treat selenium using conventional high-density sludge technology.

The Proponent provided new water quality models for selenium at SC3, UR1 and UR2 with the additional selenium treatment in year five of operations (as represented by 500 L/s in the table below) and compared these values against the baseline and expected case, as provided in the Application. The tables show that with additional selenium mitigation, predicted selenium concentrations would exceed BCWQG at SC3 and meet BCWQG at UR1 and UR2 during operations, closure and post-closure.

Table 12: Predicted Selenium Concentrations with Additional Selenium Mitigation at Sulphurets Creek (SC3)

Site	SC3					
	Baseline		Expected Case		500 L/s	
	Mean	Max.	Mean	Max.	Mean	Max.
Year 0-4 (Operation)	0.0018	0.0026	0.0027	0.004	0.0027	0.004
Year 5-51.5 (Operation)	0.0018	0.0026	0.0037	0.0068	0.0026	0.0043
Year 51.5-55 (Closure)	0.0018	0.0026	0.0042	0.0081	0.003	0.0047
Year 56-100 (Post-Closure)	0.0018	0.0026	0.0037	0.0078	0.0028	0.0045

Table 13: Predicted Selenium Concentrations with Additional Selenium Mitigation at Unuk River (UR1)

Site	UR1					
	Baseline		Expected Case		500 L/s	
	Mean	Max.	Mean	Max.	Mean	Max.
Year 0-4 (Operation)	0.0011	0.0014	0.0015	0.0021	0.0015	0.0021
Year 5-51.5 (Operation)	0.0011	0.0014	0.0019	0.0029	0.0014	0.002
Year 51.5-55 (Closure)	0.0011	0.0014	0.0021	0.0034	0.0016	0.002
Year 56-100 (Post-Closure)	0.0011	0.0014	0.0019	0.0033	0.0015	0.002

Table 14: Predicted Selenium Concentrations with Additional Selenium Mitigation at Unuk River (UR2)

Site	UR2					
	Baseline		Expected Case		500 L/s	
	Mean	Max.	Mean	Max.	Mean	Max.
Year 0-4 (Operation)	0.0007	0.0008	0.0008	0.0011	0.0008	0.0011
Year 5-51.5 (Operation)	0.0007	0.0008	0.001	0.0016	0.0008	0.0011
Year 51.5-55 (Closure)	0.0007	0.0008	0.0011	0.0018	0.0009	0.0012
Year 56-100 (Post-Closure)	0.0007	0.0008	0.001	0.0017	0.0009	0.0012

Note: All values are total selenium concentrations in mg/L.

Grey highlighted values exceed MOE chronic water quality guidelines for total selenium (0.002 mg/L).

Additional conditions relating to selenium include:

- Water quality must meet either BCWQG or Site Specific Water Quality Objectives (SSWQO) at a point 400 m downstream of the discharge point of any temporary water treatment plants operating in Upper Treaty Creek or South Teigen Creek while these plants are in operation, 100 m downstream of the effluent discharge point of the TMF pipeline into Treaty Creek, and 100 m downstream of the North seepage dam in South Teigen Creek during the operations, closure and post-closure phases of the proposed Project.
- Prior to the start of the construction of the proposed Project, the Proponent must develop a SeMP as described in the CPD.

Water Quality Model

- MEM raised concerns with the Proponent's assumption that all mine related water quality effects came from either WTP discharge or seepage that bypasses the WSD and/or the Seepage Recovery Pond. MEM noted that other potential sources of contamination including seepage bypass from the Kerr waste rock stored in the Sulphurets Pit was not discussed. MEM requested an updated assessment.
 - In response, the Proponent stated that they conservatively assumed that any water that appeared below the WSF seepage collection dams would have a concentration of 5% of the WSF reservoir concentrations as predicted in the worst case of groundwater modeling and that seepage volumes and concentrations applied in the surface water quality modeling are conservative.

- As discussed in section 5.4.3, the Proponent also submitted an additional memo regarding the [WSF Seepage Management and Monitoring Plan](#). The memo provides a more expansive list of the potential seepage mitigation measures which could be used to further reduce seepage from the water storage facility.
- The Proponent indicated that seepage bypass from the Sulphurets Pit Backfill (above the treatment capacity of the SeTP proposed in the Application) was included in the expected case water quality model.

After reviewing the Proponent's response, MEM noted that the predicted seepage quantity from the WSF are at the limit of the groundwater flow model's precision. Since this aspect of the water quality modelling is so critical to the overall assessment of downstream water quality effects, MEM requested a technical memo which explained the rationale used for the WSF seepage water quality model. MEM also requested an updated sensitivity analysis on seepage rates from the WSF and the predicted concentrations at SC3 and downstream in the Unuk River if seepage was higher than predicted.

- The Proponent conducted the requested additional sensitivity analysis which showed that potential effects to the downstream environment do not substantively change from conclusions derived from the expected case model in the Application.
- MEM and MOE were concerned that the Proponent's assumptions regarding seepage collection at the base of the Mitchell and McTagg RSFs were optimistic.
 - In response, the Proponent conducted a Selenium Seepage Concept Study that showed that seepage collection at the base of the RSFs is possible.

MEM stated that the design is highly conceptual and additional information would be required to evaluate the feasibility of this concept. MEM is prepared to defer this issue to permitting. However, MEM stated that the successful construction and long-term operation of the seepage collection system is key to the conclusions of the effects assessment.

MOE stated concerns with the proposed potential selenium treatment rates being able to handle the estimated infiltration through the RSFs during the winter low-flow months that would need to be addressed during permitting.

- MEM and MOE were concerned about the Proponent's assumption that water to be diverted from under the Mitchell glacier, which was simulated using a mixture of McTagg (without significant mineralization) and mineralized Mitchell Valley seeps, would not be representative. Higher concentrations in diverted water could lead to degradation of water quality in Sulphurets Creek. The Proponent proposes to divert

non-contact water from under the Mitchell Glacier and surrounding areas located upstream of the proposed Mitchell Open Pit and Block Cave Mine into Sulphurets Creek via a tunnel.

- In response to this concern, EAO added a condition that the Proponent must determine, and MOE and MEM must approve the sub-glacial water quality of the Mitchell glacier before construction.
- Reviewers raised concerns with the hazard quotient approach used by the Proponent, specifically the methodology used to “screen” and therefore not assess certain parameters.
 - In response the Proponent submitted a detailed memorandum regarding the derivation and application of hazard quotients for predicted water quality parameters for the proposed Project and model uncertainties. In order to address comments requesting comparison of like terms (i.e. mean to mean, or maximum to maximum), the Proponent used an alternative screening process that considered both BCWQG and existing baseline water quality conditions. The Proponent found that the conclusions made in the Application remained unchanged despite this alternative screening process.

After reviewing the memorandum, NLG raised concerns over the benchmarks used to calculate hazard quotients used by the Proponent, stating the definition of baseline was not conservative.

- In response, the Proponent recalculated the benchmarks using the approach recommended by NLG (i.e. use of 95% upper confidence of the mean) and found that the approach used by the Proponent in the memo was more conservative; the approach recommended by NLG would not have changed the screening results.

MOE reviewed the concerns expressed by other reviewers as well as the Proponent response and questioned the Proponent’s use of the chosen screening process, stating that it is not intended for an EA Contaminants/chemicals of Potential Concern (COPC) screening tool.

EC commented that the methods used to assess sub-lethal toxicity to salmonids, along with the results presented in the Application, are acceptable and consistent with expectations set out in the AIR.

- EAO re-reviewed the information presented in the Application, the subsequent December 19, 2013 memo from the Proponent on hazard quotient methods, additional information from the Proponent on the baseline and predicted concentrations of COPCs which were screened out using the alternative screening method, and Working Group comments. As a result of

this re-review, [EAO concluded](#) that the Proponent's decision to not carry these COPCs into the effects assessment was appropriate at the EA level. EAO recognizes that additional information may be required by MOE at the *Environmental Management Act* permitting stage with respect to this issue should an EA Certificate be issued for the proposed Project.

- A number of reviewers raised concerns with both the assumptions and source terms⁸ used in the Proponent's water quality model. Specifically they were concerned about implications for long-term water treatment and increased uncertainties related to water quality effects. More specifically:
 - MEM was concerned with the Proponent's relatively small data set used to characterize the geochemical properties of very large volumes of mine waste rock. MEM required the Proponent to conduct additional sampling in the portions of the mine where significant quantities of undefined waste rock occur due to limited drilling samples. In the absence of this, MEM requested additional sensitivity analysis for water quality effects.
 - MEM noted concerns that geochemical loading from the Mitchell Pit walls was not included as a source of loading to the water storage facility. This may have resulted in lower predicted concentrations for the pit lake water than included in the water quality model.
 - MEM was concerned that nitrogen loadings from blasting materials predicted by the water quality model are not considered conservative and loads would be expected to be up to a factor of two times greater than predicted by the current model. MEM asked that the water quality model be re-run with more appropriate nitrogen source terms.
 - MOE and MEM also raised concerns about the assumptions the Proponent made regarding the internal temperature of the waste RSF and the resulting effects to seepage water quality. Both agencies felt the numbers were not conservative enough and that these uncertainties have implications for water treatment. If the waste rock temperatures were elevated, resulting in higher than predicted levels of acidity or the selenium was underestimated in the source terms, water quality could be worse than predicted, which could result in selenium treatment being required sooner than year 27 and/or additional conventional water treatment facilities being constructed.

⁸ "Source terms" represent the amount and rate of a contaminant released to the environment from a specific proposed Project component over a specific period of time.

- In response to the above noted concerns raised by MOE and MEM, the Proponent responded with sensitivity analyses of the following water quality model assumptions:
 - increased source terms for Mitchell waste rock units MEM identified as needing further characterization;
 - addition of Mitchell Pit walls at closure (Mitchell Pit walls during operation were already included in the expected case water quality model); and
 - increased nitrogen source terms.
- The results of the sensitivity analyses did not change the conclusions of the water quality effects assessment at stations downstream of the WSF.
- The Proponent responded to MOE with a sensitivity analysis of three internal RSF temperatures used in the water quality model to determine downstream effects. The higher temperatures meant increased concentrations of elements in the WSF but they noted that the proposed water treatment plant controls the concentrations of most elements prior to discharge to the receiving environment.

MEM and MOE requested additional sensitivity analysis to assess the risk to downstream water quality from uncertainty associated with the predicted source terms and scaling factors.

- The Proponent completed additional analysis for MEM using an RSF internal temperature of 25°C and 35°C. They noted the results showed little variation in the predicted water quality in the downstream environment with varying temperature. The Proponent's additional analysis showed the potential effects to the downstream environment do not substantively change from conclusions derived from the expected case model in the Application and other sensitivity analysis completed during the EA. This highlighted the importance of maximum concentration solubility controls used in the water quality modeling.
- MEM raised concerns with the potential for nitrogen loading from waste rock to affect water quality, stating that the Proponent did not use appropriate nitrogen source terms in their water quality model.
 - In response, the Proponent conducted additional sensitivity analysis that showed that increasing nitrate loading from waste rock by a factor of two increases predicted maximum nitrate concentrations and nitrogen loadings to the WSF by a factor of two. Based on the updated water quality predictions, mean nitrate concentrations are expected to be below the

chronic 30-day BCWQG at SC3 and maximum predicted nitrate concentrations are expected to be below the acute maximum BCWQG at SC3.

MEM concluded that careful management of explosives and a nitrate management plan (required through a *Mines Act* permit and EA condition) will be needed during operations to minimize nitrate release.

- Some reviewers raised concerns with the Proponent's assumption of optimal operations of all mitigation measures, noting that the Proponent did not conduct an analysis of upset conditions. MOE asked for a model scenario showing an upset condition (e.g. surface diversion failure during a 1:200 wet year) for the WSF and related water treatment systems.
 - The Proponent submitted a memorandum providing an example of an upset condition and water quality predictions. The Proponent notes that when considering the mitigation and management measures that would be in place during the various phases of the proposed Project, it is unlikely that this upset condition would occur. The result of this scenario showed that the maximum modelled copper and selenium concentrations would exceed BCWQG at SC3, UR1 and UR2.
- Reviewers also noted concerns about the effectiveness of water management structures that would move water from the Sulphurets Creek valley to the WSF. The concerns centered on the effects of a worst case scenario event involving the spill of untreated water. They noted that the Proponent's model assumes that water collection structures are 100% effective.
 - The Proponent stated that the model included efficiencies less than 100% for water diversion structures.
 - The Proponent also increased the size of the pipeline which moves water collected from the mined-out Kerr open pit to the WSF to withstand and operate during a 1-in-200 year peak flow event during the operations, closure and post closure phases of the proposed Project. EAO added this as a condition in the CPD.

Long-Term Risks

- A number of reviewers raised concerns with the long-term water management aspects of the proposed Project. Gitanyow raised concerns with the potential for long-term risks due to the cost of, and the operation and maintenance of, the water treatment systems in perpetuity. Gitanyow was particularly concerned about the adequacy of security funds and bonding to implement the closure and post-closure requirements.

- The Proponent responded that it is the responsibility of the Chief Inspector of Mines at MEM to set the amount and form of the security for mine reclamation, and to provide protection of, and mitigation of damage to, watercourses and cultural heritage resources affected by the mine. The security would be based on the activities required post-closure and will include the operation of the water treatment plant and monitoring.
- The Proponent also stated that the WTP would have seven stand alone, parallel plants that would be available if there is a failure in one of them and the WTP design includes redundancies so it is unlikely that all systems would be compromised long-term. There is also buffer capacity in the WSF in the event that the WTP has to be stopped momentarily.

MEM recognized that the scale of the proposed Project's long-term water treatment liabilities is large and would be considered when bonding requirements are established at permitting.

PTMA

Water Quality

- MEM, NLG and Tahltan raised concerns with the Proponent's estimates of chemical loading to South Teigen Creek. NLG was concerned that the Proponent's water quality model did not account for some of the source load that leaves the TMF.

Tahltan and MOE also raised concerns with potential selenium loadings to Treaty Creek and impacts to water and sediment quality in Treaty Creek and Bell-Irving River.

- In response, the Proponent presented a model showing groundwater flow pathways and plumes from the TMF area groundwater model built for the EA. The modeling results indicate that the seepage from all the tailings cells will be physically and hydraulically contained in the west and the east by the steep valley slopes. In the north, however, the transport modeling results indicate that some contact groundwater (as diluted seepage) in low concentrations (0.1-4% of the flotation tailings) could potentially discharge into South Teigen Creek within about 50 m beyond the north seepage collection dam.
- EAO added the following two conditions to address this concern:
 - water quality must meet either BCWQG or SSWQO at a point 100 m downstream of the effluent discharge point on Treaty Creek and 100 m downstream of the last point of control on South Teigen Creek; and

- the proposed Project must be designed to enable the addition of collection infrastructure and treatment facilities that could be used to treat discharge from the TMF including seepage if monitoring indicates that additional measures are required to meet the above condition or the requirements set out in the *Environmental Management Act* or *Mines Act* permits.
- NLG raised concerns about the proposed 800 m long mixing zone in Treaty Creek downstream from the point of tailings pond discharge and the potential effect of concentrated discharge water in localized areas along the mixing zone. NLG suggested treatment of tailings pond water prior to discharge to Treaty Creek as a mitigation option.

MOE also raised concerns with the proposed 800 m long mixing zone in Treaty Creek. MOE policy for initial dilution zone characterization indicates that the location of guideline or objective attainment may extend up to 100 m from the source of effluent discharge. Acute toxicity to aquatic organisms must not occur within the initial dilution zone and chronic toxicity to aquatic organisms cannot occur at the edge of the initial dilution zone.

- In response the Proponent committed to an engineered solution to shorten the distance of the mixing zone to a maximum length of 100 m.
- In addition, the Proponent committed to, and EAO required through a new condition, that water quality must meet either BCWQG or SSWQO at a point 400 m downstream of the discharge point of any temporary water treatment plants operating in Upper Treaty Creek or South Teigen Creek, while these plants are in operation, 100 m downstream of the effluent discharge point of the TMF pipeline into Treaty Creek and 100 m downstream of the North seepage dam in South Teigen Creek during the operations, closure and post-closure phases of the proposed Project.

MOE raised concerns with the condition to meet BCWQG or SSWQO within 100 m downstream, stating that the condition will likely be difficult to meet. The requirement for a 100 m initial dilution zone could require extensive engineering of the stream channels to meet the objective, which could in turn, potentially have unforeseen impacts on fish habitat. MOE stated that the issue of identifying the end of initial dilution zones is generally determined during permitting on a case by case basis. MOE stated that there are other elements of this condition that are not consistent with MOE policy regarding the use of SSWQO. SSWQO are not likely the best tool to use, rather Science Based Environmental Benchmarks are the preferred method.

- MEM raised concerns with the uncertainty associated with the predicted rate of

seepage from the TMF and the assumption that all seepage is captured by the seepage dams. MEM requested that a sensitivity analysis be conducted on downstream water quality effects and mitigation planning be updated where required.

- The Proponent's conducted the sensitivity analysis which showed that the potential effects to the downstream environment do not substantively change from conclusions derived from the expected case model in the Application.

In response to concerns about seepage and water discharged from the TMF, NLG recommended the following condition for the EA Certificate, which EAO included:

- water quality must meet either BCWQG or SSWQO at a point 400 m downstream of the discharge point of any temporary water treatment plants operating in Upper Treaty Creek or South Teigen Creek, while these plants are in operation, and 100 m downstream of the effluent discharge point of the TMF pipeline into Treaty Creek and 100 m downstream of the North seepage dam in South Teigen Creek during the operations, closure and post-closure phases of the proposed Project.
- MEM was concerned that the Proponent did not assess the potential effects of tailings porewater⁹ on seepage. MEM noted that tailings porewater can be a major contributor to TMF seepage.

NLG was also concerned that the potential effect of WTP sludge on tailings porewater concentrations was not incorporated into the PTMA water quality model.

- In response the Proponent responded that tailings porewater was modelled as equivalent to the overlying pondwater.
- The Proponent's additional analysis results indicate that an appropriate source term was included in the water quality model and that the potential effects to the receiving environment are not substantively sensitive to the seepage rate under the North Main Dam or the porewater source terms.

NLG was not satisfied with the Proponent's additional analysis and recommended that more conservative source concentrations be used in the modelling. NLG recommended that the seepage water quality be the greater of the process water, tailings pond water quality and the saturated column leachate water quality for each COPC.

⁹ the water occupying the spaces between tailings particles

- In response, the Proponent conducted additional sensitivity analyses for seepage bypassing the North seepage recovery dam. In these sensitivities, the concentration of the bypass seepage water was modelled as 100% of the maximum concentration observed in the rougher tailings subaqueous columns. These additional model runs indicate that the water quality in South Teigen Creek is not substantially sensitive to the tailings porewater concentration or the flow rates.

Mine Site and PTMA

Dam Breach or Failure

- Working Group members including MEM, NLG, Tahltan First Nation and Gitanyow Nation raised concerns about the potential effects of a catastrophic failure including a dam breach or failure and the significant environmental impacts to water quality and fish habitat and the persistence of these effects.
 - In response, the Proponent submitted a detailed report entitled, [Dam Failures Effects Assessment](#). The report reviewed the types of effects on key VCs in the event of a dam failure. Two dam failure modes (a “rainy-day” event which assumed water going over the top of the dam and a “sunny-day” event which assumed a slump) and ten scenarios (e.g. August, December, low flow, high flow) were examined for effects on flow and inundation, water quality, sedimentation, fish and aquatic habitat, and indirect effects on the current use of lands and resources for traditional purposes. Four dams (i.e. the North, Splitter, Saddle, and Southeast dams) in the TMF of the PTMA, and the WSD for the WSF in the Mine Site were investigated. Dam failures scenarios were conducted in accordance with industry standard methods as identified in the Canadian Dam Association (CDA) Dam Safety Guidelines (the Guidelines; CDA 2007) for dam failure and inundation studies.
 - The Proponent states that in view of the mitigations and design processes presented in the Dam Failures Effects Assessment Report that show the extremely low likelihood of failure, it can be seen that the hypothetical failure scenarios examined in the dam failure effects assessments of piping and flood overtopping dam failures do not correspond to reasonably conceivable events.
 - Although unlikely, the Proponent reviewed the types of effects on key VCs in the event of dam failure. Potential dam failure scenarios in the PTMA would result in rapid transport of water and tailings to downstream reaches. The release would follow existing stream transport and deposition mechanisms and be catastrophic due to the volume and rapid timeframe of the release. A failure of the WSD would involve the flooding and inundation of Mitchell

Creek, Sulphurets Creek, and Unuk River with untreated water. Short-term exceedances of water quality guidelines were predicted in the Bell-Irving, Nass, and Unuk rivers.

- Changes in sediment quality could lead to changes in the suitability of the aquatic habitat for fish and other organisms, and could affect the health of organisms that live in close association to the sediment (e.g. benthic fish or invertebrates).
- Generally, the deposition or slumping of tailings would not lead to substantial changes in the concentration of most metals in sediments downstream of the North Dam or Southeast Dam. Degradation of water quality would not persist for long after the initial flood event. Any long-term effects following a failure of the North Dam or Southeast Dam would be more likely linked to loss or alteration of habitat rather than metal toxicity in aquatic organisms.
- It is likely that some mortality of fish or other aquatic life may occur due to acute toxicity if the Saddle Dam were to fail, although this would be tempered somewhat by the relatively short exposure duration of the tailings water.
- The Proponent predicts that it is unlikely that human health would be affected from effects to drinking water in the event of a dam failure. Any effects would be short-term and reversible.

5.2.4 Residual Effects and Significance Analysis

Mine Site

Residual surface water quality effects are predicted from the following sources:

- effluent discharge from the WTP;
- seepage of untreated water from the WSF;
- leaching of blasting residues (e.g. pre-production ore stockpiles, waste rock, Sulphurets Pit) causing nitrogen loading;
- sedimentation and erosion of soils and overburden materials;
- leaching of blasting residues along the CCAR causing nitrogen loading; and
- ML/ARD along the CCAR and areas outside of the WSF catchment.

The proposed Mine Site has the potential to change surface water quality in Sulphurets Creek, which drains into the Unuk River. For some parameters, water quality is predicted to improve as a result of water treatment (e.g. cadmium, copper and zinc) or

remain similar to baseline (e.g. dissolved aluminum), but other parameters are predicted to increase in concentration (e.g. selenium). Residual effects are from effluent discharge from the Mine Site WTP with predicted selenium concentrations at SC3 above BCWQG during the operation, closure and post-closure phases of the proposed Project.

Total selenium concentrations at assessment point SC3 are predicted to be higher than both baseline concentrations and BCWQG (0.002 mg/L) at all proposed Project phases.

Selenium concentrations at assessment point UR2 were predicted to stay below BCWQG throughout all proposed Project phases, and no residual effects are predicted for water quality in the Unuk River in Alaska.

The residual effects along the CCAR are represented below in the significance analysis along with the residual effects along the TCAR as the effects are the same along the access roads. These effects include sedimentation and erosion, leaching of blasting residues causing nitrogen loading and ML/ARD.

PTMA

The proposed PTMA has the potential to degrade water quality in North Treaty, South Teigen, Treaty, and Teigen Creeks, which drain into the Bell-Irving River.

Residual surface water quality effects are predicted linked to:

- effluent discharge from the TMF;
- sedimentation and erosion of soils and overburden materials;
- leaching of blasting residues along the TCAR causing nitrogen loading; and
- ML/ARD along the TCAR and areas outside of the TMF catchment.

While selenium concentrations were occasionally greater than baseline concentrations during operation, closure and post-closure, no concentrations were predicted that would exceed BCWQG in North Treaty, Treaty and South Teigen Creeks.

EAO added a condition requiring water quality to meet either BCWQG or SSWQO at a point 100 m downstream of the effluent discharge point on Treaty Creek and 100 m downstream of the last point of control on South Teigen Creek. The Proponent's water quality models for both Teigen and Treaty Creeks show this condition can be met. EAO notes that predicted water quality at those points meets BCWQG and, for most parameters, is within the natural range of variability (i.e. less than the 95th percentile of baseline conditions). Considering both of these points are more than 10 km upstream of their confluence with the Bell-Irving River, and there is significant dilution in both Treaty and Teigen Creeks, there would be no residual effect on surface water quality in the Bell-Irving River.

The residual effects of the TCAR and CCAR are represented below in the significance analysis, as the effects are the same for both access roads. These effects include sedimentation and erosion, leaching of blasting residues causing nitrogen loading and ML/ARD.

EAO has undertaken the following significance analysis on the residual adverse effects on surface water quality.

Table 15: EAO's Significance Analysis for Surface Water Quality

Factor	Rationale
Context	<p><u>Mine Site</u></p> <p>At (and downstream of) the Mine Site, metal leaching due to current naturally-occurring ARD has led to total and dissolved metal concentrations in Mitchell and Sulphurets Creeks that are frequently higher than levels set in BCWQG for the protection of freshwater aquatic life. These streams have a poor productive capacity.</p> <p>No fish are located in Mitchell or Sulphurets Creeks upstream of the cascades on Sulphurets Creek. A small section of Sulphurets Creek between the cascade and the Unuk River has some resident Dolly Varden.</p> <p>The Unuk River crosses the BC-Alaska Border 35 km downstream of the proposed Mine Site. The Unuk River supports all five Pacific salmon species and oolichan making it an important sustenance and commercial fishery river to BC First Nations and federally recognized Tribes in Alaska.</p> <p><u>PTMA</u></p> <p>Treaty Creek water quality reflects sediment loading from glacial melt and mineralization in the upper reaches. Cadmium, chromium, copper, iron and zinc frequently exceed BCWQG in Treaty Creek.</p> <p>Streams located adjacent to the PTMA generally have higher productive capacity than those at the Mine Site. Whereas Sulphurets Creek has poor existing water quality and a significant fish barrier located far downstream from the Mine Site, Treaty and Teigen Creeks have populations of a number of salmon species and resident Dolly Varden. North Treaty and South Teigen fish populations are limited to Dolly Varden. These creeks in turn drain</p>

	<p>into the Bell-Irving River, which in turn drains into the Nass River.</p> <p>The Nass and Bell-Irving Rivers support extremely important populations of oolichan (located primarily close to the mouth of the River and not significantly upstream of Fishery Bay), all five species of Pacific salmon and other salmonids, such as steelhead and trout. Access to healthy populations of these fish are a treaty right of Nisga'a Nation and support aboriginal rights fisheries for other First Nations such as the Tahltan, Gitksan and Gitanyow Nations. These fish also contribute to valuable commercial fisheries.</p>
Magnitude	<p><u>Mine Site</u></p> <p>Selenium</p> <p>Modeled selenium concentrations would exceed BCWQG for the protection of freshwater aquatic life in lower Sulphurets Creek, but would meet BCWQG at UR1. These effects are predicted to occur during the operation, closure and post-closure phases. This residual effect is of moderate magnitude, since selenium levels in the lower Sulphurets and in a small portion of the Unuk would exceed both baseline levels and guideline levels. The change in this area is also beyond the range of natural variation.</p> <p>Selenium levels are predicted to meet BCWQG in the Unuk River and at the BC-Alaska Border, 35 km downstream of the proposed Mine Site, hence the magnitude is rated low at this point.</p> <p>Other Metals</p> <p>Other metals, such as copper, lead, cadmium and zinc are predicted to improve in Sulphurets Creek and the Unuk River due to proposed water treatment and the elevated baseline metal levels.</p> <p><u>PTMA</u></p> <p>With the condition that water quality must meet either BCWQG or SSWQO at a point 400 m downstream of the discharge point of any temporary water treatment plants operating in Upper Treaty Creek or South Teigen Creek, while these plants are in operation, and 100 m downstream of the effluent discharge point of the TMF pipeline into Treaty Creek, and 100 m downstream of the North seepage dam in South Teigen Creek during the operations, closure</p>

	<p>and post closure phases of the proposed Project, the magnitude of the surface water quality effect in these creeks is considered low. The low magnitude rating takes into account that while there are some minor changes in water quality relative to baseline, the predicted water quality is below BCWQG which would, by definition, be protective of the aquatic environment.</p> <p>Any effects on the Bell-Irving River or Nass River are predicted to be negligible.</p> <p><u>Effects along Access Road Corridors</u></p> <p>The magnitude of residual sedimentation effects is rated moderate, since total suspended solids levels are likely to exceed water quality guidelines as well as the range of natural variation during periods of construction.</p> <p>The magnitude of ML/ARD and blasting residual effects is rated low to moderate depending on the drainage, because, while detectable relative to baseline conditions, these effects are likely to be within the range of natural variation and/or be below water quality guidelines. No concentrations that exceed baseline or guideline levels are predicted for the receiving environment downstream of the proposed PTMA.</p>
Extent	<p><u>Mine Site</u></p> <p>The geographic extent of residual effects of changes to water quality is landscape, although there are some minimal effects detectable downstream of LSA boundaries. In particular, maximum selenium levels in the Unuk River at the BC-Alaska border, 35 km from the Mine Site are predicted to meet BCWQG during all proposed Project phases.</p> <p><u>PTMA</u></p> <p>The extent of the effect is landscape because it will be confined to the LSA and effects are not expected to occur downstream in Teigen and Treaty Creeks and in the Bell-Irving and Nass Rivers.</p> <p><u>Effects along Access Road Corridors</u></p> <p>The extent of sedimentation effects is landscape as increased total</p>

	<p>suspended solids is likely to be confined to the LSA.</p> <p>All other residual water quality effects along road corridors are rated of landscape extent. Nitrogen loading along access road corridors will be confined to the LSA.</p>
Duration	<p><u>Mine Site</u></p> <p>The duration of water quality effects is far future (i.e. in perpetuity) as effluent discharge from the Mine Site is proposed from the construction phase into the post-closure phase. The effects come with both initial release of metal and non-metal water quality parameters and with the longer term onset of ML/ARD. These effects would require long-term water treatment as a key mitigation.</p> <p><u>PTMA</u></p> <p>The duration of the effect is long-term, slowly improving after mining operations cease until such time (the prediction is within a decade) that water from the TMF meets water quality discharge requirements and can be discharged without treatment.</p> <p><u>Effects along Access Road Corridors</u></p> <p>Sedimentation effects and water quality effects along access road corridors are rated of short duration. These effects are expected to occur primarily during construction.</p>
Reversibility	<p><u>Mine Site</u></p> <p>Water quality effects are expected to occur into the far future. EAO notes that natural ML and ARD processes do account for a significant portion of the elevated metals and elements in areas around the Mine Site.</p> <p>Discharges from both conventional high density sludge water treatment and selenium treatment are expected to be required into the far future. Given the time frames involved and the scale of disturbance, effects on the mine side should be considered irreversible.</p> <p><u>PTMA</u></p> <p>Any water quality effects of TMF discharge would begin to diminish</p>

	<p>within several decades after the end of mining and milling operations and are expected to stabilize at some point in the future due to increased dilution from precipitation and removal of diversion structures in the TMF.</p> <p>Diminished water quality would still be present from TMF seepage and water management may be required over the long-term to ensure water quality in the receiving environment is not affected.</p> <p>Water quality effects are considered reversible in the long term.</p> <p><u>Effects along Access Road Corridors</u></p> <p>Sedimentation effects and water quality effects along access road corridors are considered reversible in the short term through the implementation of the Proponent's sediment control measures.</p>
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Frequency	<p><u>Mine Site</u></p> <p>Water quality effects would be generated from the WTP effluent being discharged into the Mitchell Creek, which drains into Sulphurets Creek. Water quality effects downstream of the proposed Mine Site would be continuous lasting through post-closure.</p> <p><u>PTMA</u></p> <p>The frequency is continuous within the initial dilution zone in Treaty Creek, but water is expected to be sufficiently diluted that effects beyond that point are negligible. Water quality effects from any seepage which bypasses seepage collection facilities would also be continuous, as this seepage is expected to be diluted by groundwater. This is expected to be the case throughout operations, closure and post closure.</p> <p><u>Effects along Access Road Corridors</u></p> <p>Effects along access road corridors due to sedimentation are sporadic and intermittent and would primarily be related to high precipitation events and periods of peak disturbance.</p>
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Likelihood

Mine Site

Likelihood is rated high for water quality degradation effects. However, given that predicted water concentrations are close to BCWQG and in recognition that further work will be required during the joint *Environmental Management Act* and *Mines Act* permitting process, as well as the Proponent's commitment to implement a comprehensive AEMP, a SeMP and water treatment, EAO considers the likelihood of water quality degradation downstream of the Mine Site WTP to be low to moderate at all proposed Project phases.

The only exception is the high likelihood of water quality degradation within lower Sulphurets Creek as modeled selenium concentrations would exceed both baseline concentrations and BCWQG for the protection of freshwater aquatic life.

Water quality effects related to catastrophic failure of the water storage facility dam are considered very unlikely.

PTMA

Likelihood is rated low for water quality degradation effects downstream of the TMF during all phases, since metal and non-metal concentrations in effluent must meet BCWQG or SSWQO and are predicted to be very similar to baseline concentrations.

5.2.5 Significance Determination

Mine Site

EAO has considered the values in the receiving environment, and in particular the fact that water from the proposed Project eventually flows into the US. In addition to the potential for landscape effects and some minimal effects detectable downstream of LSA boundaries, EAO notes current water quality in Sulphurets Creek and Unuk River currently contains elevated levels of numerous metals and elements due to naturally occurring processes and the significant mineralization of the area. EAO has also considered the moderate magnitude of the predicted water quality effects as well as the far future duration and continual nature of effects.

These conclusions have been informed by water quality and treatment commitments developed by the Proponent and added to the TOC by EAO. In particular, EAO considered effects related to selenium and the challenges posed by emerging selenium treatment technology. The condition that requires the Proponent to have a fully operational SeTP (500 L/s capacity) by year five of the operation phase was a key consideration in developing conclusions.

EAO also notes that the Proponent has committed to implementing a comprehensive AEMP as well as a SeMP. EAO recognizes the details of these programs will be considered in greater depth during the joint *Environmental Management Act* and *Mines Act* permitting process.

Considering the above analysis and having regard to the conditions for mitigation of water quality impacts including mine water management and water treatment identified in the TOC and the CPD (which would become legally binding as part of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on water quality downstream of Sulphurets Creek (SC3) once sufficient dilution has occurred at the Mine Site. This significance conclusion is qualified in the certainty section.

PTMA

EAO has considered the values in the receiving environment in Treaty and Teigen

Creeks, and the fact that water from the proposed TMF drains into the Bell-Irving and Nass Rivers with high fish values. In addition to the landscape level of effects, EAO notes current water quality in both Treaty and Teigen Creeks frequently has elevated levels of metals and elements due to natural mineralization in the area. EAO has also considered the low magnitude of the predicted water quality effects as well as the long-term and continual nature of effects. EAO notes that any water quality effects of TMF discharge would stabilize and diminish in the future due to increased dilution from precipitation.

The conditions for effective water treatment and water management, specifically meeting BCWQG and/or SSWQO during the operations, closure and post-closure phases of the proposed Project, are very important to ensuring the proposed Project will not cause significant adverse residual effects and are central to EAO's conclusions. EAO also notes that modeled information presented during the EA indicates these objectives can be met.

EAO also notes that the Proponent has committed to implementing a comprehensive AEMP as well as a SeMP. EAO recognizes the details of these programs will be considered in greater depth during the joint *Environmental Management Act* and *Mines Act* permitting process.

Considering the above analysis and having regard to the conditions for mitigation of water quality impacts identified in the TOC and the CPD (which would become legally binding as part of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on water quality at and downstream of the PTMA. This significance conclusion is qualified in the certainty section.

Effects along Access Road Corridors

EAO considered the moderate magnitude effects of sedimentation and low magnitude effects of ML/ARD and increased nitrogen loading along the access road corridors. EAO considered the landscape extent, short duration, sporadic and intermittent frequency and high likelihood of the effects. EAO considered the Proponent's sediment and erosion control mitigation and adaptive management measures. Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (which would become legally binding as part of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on water quality along the access road corridors.

5.2.6 Cumulative Effects

EAO considered cumulative surface water quality effects of the proposed Project with those of the past Eskay Creek and Sulphurets Projects, as well as the proposed

Brucejack Mine Project. Any currently detectable residual surface water effects of the Eskay and Sulphurets Projects would be reflected in the baseline data for the proposed Project.

The Brucejack Mine Project layout and WMP are not yet defined in sufficient detail to form a reliable basis for assessing cumulative surface water quality effects. The Brucejack Mine Project is predicted to result in local, low-magnitude direct surface water quality effects in the Sulphurets/Unuk drainages. The Application reports that some additional selenium may be contributed by the Brucejack Mine Project. However, predicted cumulative effects on surface water quality would not alter the significance descriptor ratings assigned to predict residual direct proposed Project effects. Cumulative selenium concentrations in the Sulphurets/Unuk watershed are not expected to exceed proposed Project-specific predictions. No residual cumulative surface water quality effects are predicted.

5.2.7 Certainty

Mine Site

Reviewers raised concerns with uncertainties in the Proponent's predicted water quality effects, focusing on a number of topics which are discussed below. The common theme in reviewers' comments relate to the scale of the proposed Project, the topography, the collect-and-treat design and the reliance on water treatment in perpetuity.

To address these uncertainties, the Proponent modeled a range of scenarios in order to consider variations in geochemistry combined with both the average water balance based on five years of baseline data plus a variety of extreme dry and wet year scenarios. The Proponent has stated that this sensitivity analysis confirmed that base case predictions are reasonably reliable.

EAO notes that the conclusions in the effects assessment rely on the mitigations being effective in perpetuity.

Viability of the Selenium Treatment

While there are a number of pilot projects underway and full scale SeTPs are currently being planned, the type of selenium treatment systems proposed by the Proponent are not currently proven. As such they are considered largely conceptual systems which have not been demonstrated to work on a scale proposed by the Proponent. As a result, the viability of large scale ion-exchange selenium treatment systems should be considered an uncertainty with the proposed Project, especially given the reliance on these treatment systems to meet downstream water quality targets.

EAO recognizes that the Proponent has committed to having a fully operable, full-scale

SeTP in place by year five of operations; should an EA Certificate be issued, this would be a legally binding condition. EAO also notes that this condition could possibly be met using other treatment systems as opposed to ion exchange technology. However, any treatment system would have to be piloted and proven to be feasible to meet the treatment target of 1 µg/L.

There is also uncertainty related to the effectiveness of the Mitchell/McTagg RSF seepage collection system for selenium treatment. Additional information would be required at permitting to demonstrate feasibility of the upper drain system.

Baseline Water Quality under Mitchell Glacier

The Proponent proposes to divert fresh, non-contact water from under the Mitchell Glacier and surrounding areas and move it via a tunnel into Sulphurets Creek. This significant volume of water would be required to sufficiently dilute water in Sulphurets Creek in order to meet downstream water quality targets. Testing water from under a glacier is challenging and the Proponent has used a mixture of water from McTagg Creek (also glacier-fed) and mineralized seeps in the Mitchell Valley. There is some uncertainty around this assumption, and, should water quality be worse than what has been modeled, there may be an underestimation of selenium concentrations and other loadings.

To address this uncertainty, EAO has added a condition that, should an EA Certificate be issued, the Proponent must collect and test the water under the Mitchell Glacier and confirm water quality model assumptions with MOE within two years of an EA Certificate being issued.

Waste Rock Source Terms and Implications for Water Treatment

In some areas of the Mine Site, the Proponent used relatively small data sets to estimate the geochemical properties of large volumes of rock. As a result, there is uncertainty around the metal leaching potential of some waste rock materials.

Reviewers noted uncertainty associated with the assumptions the Proponent used to model the internal temperatures of the waste rock dump. A greater internal temperature could result in waste rock becoming acidic more quickly than predicted and reacting with more materials. This creates greater uncertainty around the quality of the water seeping from under the waste rock, with selenium being of particular concern.

EAO notes that these issues create uncertainty regarding downstream water quality predictions. EAO also notes that, towards the end of the review period and in response to these uncertainties, the Proponent committed to collecting seepage from the waste RSF and moving this water through a large selenium treatment facility if required. This

commitment would become a legally enforceable condition should an EA Certificate be issued. EAO has discussed the uncertainties regarding large scale selenium treatment above.

Water Storage Facility

The Proponent proposes to construct a large WSD in the Mitchell Valley to collect runoff and contact water from mining operations. Water stored behind the dam would be of poor quality and would be directed through a high-density sludge water treatment plant prior to being discharged into Mitchell Creek below the dam. The Proponent's water quality predictions rely on very low seepage rates through the WSD and an effective seepage collection and pump back system that would operate into the far future. While the Proponent has presented designs for a highly engineered dam as well as a series of additional mitigation options, reviewers have commented that the seepage rate of 1 L/s appears optimistic and noted uncertainties with the predictions as well as the fact that downstream water quality is dependent upon the facilities operating as planned.

Sublethal Effects

BCWQG are developed to address the most sensitive species within the aquatic receiving environment. However EAO recognizes there is not perfect knowledge of all species and the type of effects that could occur from long-term exposure to an increase in metals (such as selenium in the case of the Sulphurets/Unuk drainages) or other elements over baseline levels or to exposure to multiple metals and elements in combination. Notwithstanding this uncertainty, EAO accepts these guidelines as the best technical information on effects which is currently available to decision makers.

Dam Failures Effects

Considering the mitigations and design processes developed for the WSD, there is very low likelihood of a catastrophic failure including a dam breach and the associated significant environmental impacts to water quality. The certainty is high that the rigorous design standards and oversight associated with dam construction, operation, monitoring and surveillance will result in a very low likelihood of catastrophic dam failure.

PTMA

TMF Seepage

The Proponent's groundwater models predict that much of the seepage from TMF will "daylight" and be captured in seepage collection ponds below the north and south dams as opposed to moving into the regional groundwater environment. This is based on an understanding that there is a strong physical and hydraulic containment of the TMF due to the local topography with steep valley slopes. This natural containment is central to the Proponent's predictions that water quality in both Teigen and Treaty Creeks will not substantially change and will not have significant adverse effects on VCs. While EAO notes there is inherent uncertainty in any predictive water quality model, EAO also notes the Proponent has very robust baseline data for the area around the TMF and that there are a range of engineering solutions to address seepage in excess of those predicted; as a result, there is a moderate to high degree of certainty around seepage predictions.

TMF Water Quality

The Proponent's predictions show that based on dilution from precipitation and decommissioning of diversion structures, the supernatant water in the TMF should be suitable to discharge to the receiving environment within approximately ten years of closure. This prediction is based on a number of assumptions, such as dilution, source term information, an understanding of the geochemistry of the ore from the Mine Site, as well as the ability of the TMF to store excess water that can be held and only discharged during appropriate flow periods. There is a moderate degree of certainty regarding the ability to discharge suitable water within the predicted timeframes in the Application. EAO also notes that, to address uncertainties, the Proponent has committed to, and EAO has added, a condition that, should an EA Certificate be issued, water quality at a point 100 m downstream of the effluent discharge point on Treaty Creek and 100 m downstream of the last point of control on South Teigen Creek, and 400 m downstream of the discharge point of any temporary water treatment plants operating in Upper Treaty Creek or South Teigen Creek will meet BCWQG or SSWQO. MOE has raised concerns with the ability of the Proponent to meet BCWQG or SSWQO within such a short initial dilution zone. MOE also stated that they prefer to use SSWQO for larger water bodies rather than single source streams. The Proponent has also indicated that, should water not be suitable for discharge, they can use the existing mill infrastructure to treat water prior to discharge into Treaty Creek. EAO has added a condition which would require the proposed Project to be constructed in a way to enable the addition of a water treatment plant to treat water prior to it entering Treaty Creek.

Sublethal Effects

BCWQG are developed to address the most sensitive species within the aquatic receiving environment. However EAO recognizes there is not perfect knowledge of all species and the type of effects that could occur from long term exposure to an increase in metals or other elements over baseline levels or to exposure to multiple metals and elements in combination. Notwithstanding this uncertainty, EAO accepts these guidelines as the best technical information on effects which is currently available to decision makers.

Dam Failures Effects

Considering the mitigations and design processes developed for the TMF, there is a very low likelihood of a catastrophic failure including a dam breach and the associated significant environmental impacts to water quality. The certainty is high that the rigorous design standards and oversight associated with dam construction, operation, monitoring and surveillance will result in a very low likelihood of catastrophic dam failure.

5.2.8 Conclusion

Mine Site

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 surface water quality downstream of Sulphurets Creek (SC3) at the Mine Site.

PTMA

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 surface water quality at and downstream of the PTMA.

5.3 Surface Water Quantity

5.3.1 Background Information

The following VCs were selected for surface water quantity:

- streamflows within the PTMA — intended to represent surface water quantity at the LSA scale;
- streamflows within the Mine Site — intended to represent surface water quantity at the LSA scale;

- streamflows within the Bell-Irving River — intended to represent surface water quantity at the RSA scale; and,
- streamflows within the Unuk River (including at the BC-Alaska border) — intended to represent surface water quantity at the RSA scale.

The LSA and RSA for surface water quantity is the same as for surface water quality. The Proponent conducted separate surface water quantity assessments for the Mine Site and PTMA components of the LSA.

The Proponent's surface water quantity baseline program comprised two components: a surface water hydrology program and a glacier monitoring program. The baseline surface water quantity program focused on creeks that could potentially be affected by the proposed Project development. The glacier monitoring program provided information on the rates of down-wasting¹⁰ and terminus retreat¹¹ of the Mitchell Glacier, as well as seasonal and annual mass balance estimates and flow velocities.

The Proponent utilized data collected from specially installed on-site hydrometric stations in conjunction with a regional analysis prepared for long-term hydrometric data from Water Survey of Canada hydrometric stations to determine water quantity characteristics. The Proponent established eleven hydrological monitoring sites within the Unuk River and Sulphurets Creek (Unuk-Sulphurets) watersheds to obtain baseline hydrologic information on watersheds potentially affected by the Mine Site. Likewise, nine hydrometric stations were installed within the Treaty Creek and Teigen Creek watersheds to collect baseline hydrologic data on potentially affected watersheds in the PTMA.

The Proponent used regional data analysis as the primary basis for assessing effects on the magnitude of peak and low flows.

The Proponent developed a water balance model to simulate water quantity conditions within the LSA and RSA, and to provide a framework for decision and risk analysis. The results from the model were used to estimate infrastructure parameters such as flows, pond volumes and pond surface elevations, as well as the effects of the proposed Projects on annual flow volumes and monthly flow distributions.

¹⁰ The thinning of a glacier due to the melting of ice.

¹¹ A decrease in the length of a glacier compared to a previous point in time. As ice in a glacier is always moving forward, its terminus retreats when more ice is lost at the terminus to melting and/or calving than reaches the terminus. During retreat, ice in a glacier does not move back up the valley.

Mine Site

The Proponent used a number of assessment points downstream of the major mine components in order to assess the potential effects of the proposed Project on surface water quantity and quality. Table 4 and figure 6 in section 5.1.1 identifies the key assessment points that EAO has used to describe water effects in this report and the location of these points in relation to the proposed mine infrastructure.

PTMA

The Proponent used a number of assessment points downstream of the major PTMA components in order to assess the potential effects of the proposed Project on surface water quantity and quality. Table 5 and figure 8 in section 5.1.2 identifies the key assessment points that EAO has used to describe water effects in this Report.

A full discussion on surface water quantity can be found in the Proponent's Application section 13 posted on EAO's website at:

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35959.html

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

Key surface water quantity issues discussed in the Proponent's Application included potential impacts at all proposed Project phases on annual flow volumes, monthly flow distribution, peak flow and low flows. During each proposed Project phase, water from different sub-catchments of the Mine Site and the PTMA would be stored in large reservoirs, or collected and diverted through ditches, diversion channels and tunnels.

The Application states the following effects from the water management system:

- change of flow pathways and alteration of catchment areas in the LSA; and
- change of flow volumes in sub-catchments, specifically affecting annual, monthly, peak and low flows.

Mine Site

At the Mine Site, contact water from the open pits, block caves and RSFs would be collected and routed to the WSF, for eventual treatment in the WTP. The MDT and MTDt will route most of the non-contact runoff and glacial meltwater around the open pits, block caves and RSFs. During the first 30 years of operation, while the Mitchell deposit is being mined as an open pit, the MDT will also divert Mitchell Glacier meltwater to Gingras Creek that drains into Sulphurets Creek. This diversion and collection of water would cause changes in annual, monthly, peak and low flows particularly in on-site catchments, as described below and represented in the hydrographs of SC3 and UR2 in figures 10 and 11.

Changes in Annual Flows

There are changes in flows in the creeks around the proposed mine infrastructure. The proposed Project design requires diversion of water via a tunnel from below the Mitchell Glacier into upper Sulphurets Creek and diversion of water via a tunnel from McTagg Creek into Gingras Creek, which flows into Mitchell Creek downstream of the WSF. While these movements are significant in the upper watershed around the proposed physical mine infrastructure, they are negligible in the mainstem of Sulphurets Creek. Flow volume changes in Sulphurets Creek (SC3) are predicted to be less than 1% during operation and post-closure, although flow volume changes would be more substantial during closure, when flows are diverted to fill the Mitchell Pit (i.e. between Year 51.5 and Year 56). The anticipated decreases in annual flow volumes during this period are 8% at assessment point SC3.

Predicted effects of the proposed Project on annual flow volumes in the Unuk River are substantially less than those predicted within the Mine Site LSA. During closure, the Proponent predicts decreases of 3.5% and 1.7% respectively at assessment points UR1 and UR2 (the BC-Alaska border). The predicted residual effects during other proposed Project phases are negligible in the Mine Site RSA, never exceeding a 0.3% change at assessment point UR1, or 0.2% at assessment point UR2.

Changes in Monthly Distribution of Flows

Predictions for the Mine Site LSA indicated altered monthly distribution of flow locally on Mitchell Creek during operation and post-closure, with increased fraction of annual runoff during May to July, and decreased fraction of annual runoff in other months. However, changes in monthly flow distributions are very minor at other assessment points, including points in the Unuk River, due to the efficiencies of diversion ditches and tunnels.

Changes in Peak Flows

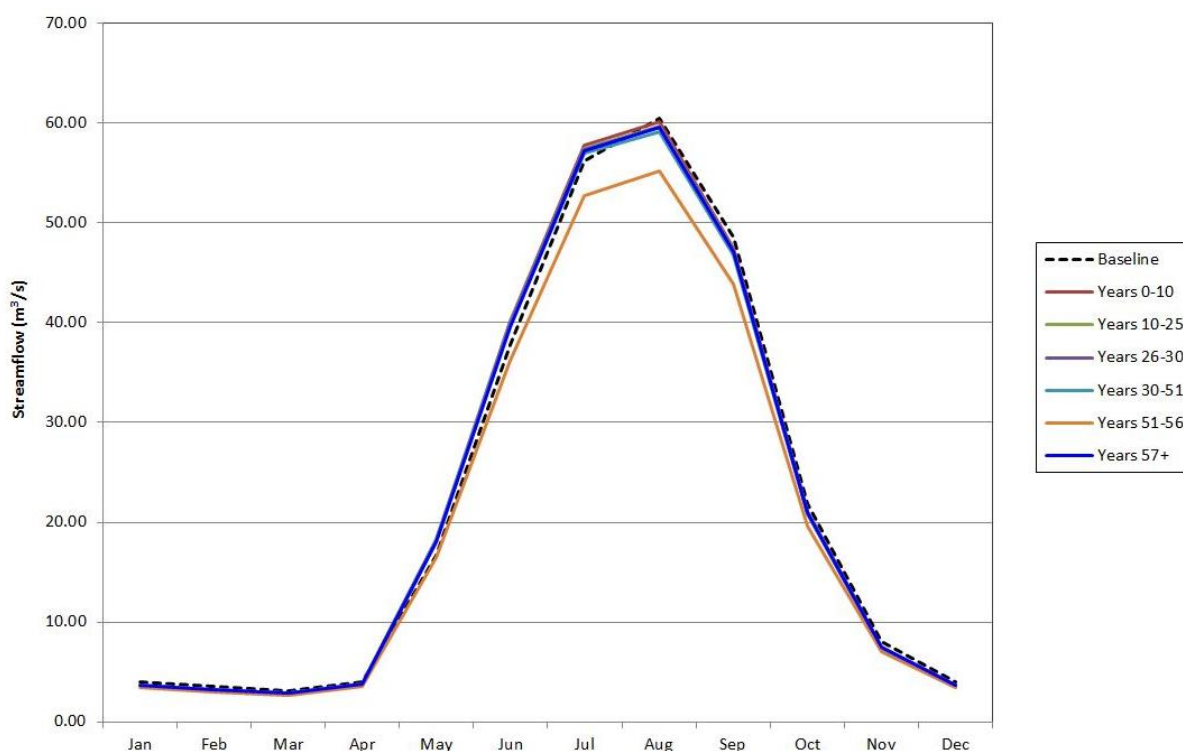
The diversion of non-contact water from Mitchell Creek subcatchment to either Gingras Creek or Sulphurets Creek would cause a decrease in peak flows in Mitchell Creek and increased peak flows in Gingras Creek and Sulphurets Creek. The Proponent predicts a reduction of 75% in expected peak flows in Mitchell Creek at post-closure and increased rates of up to 200% in Gingras Creek and 25% in upper Sulphurets Creek. These effects would diminish downstream with expected peak flow reduction rates of 6% in Sulphurets Creek (SC3) and 2% in Unuk River (UR2).

Changes in Low Flows

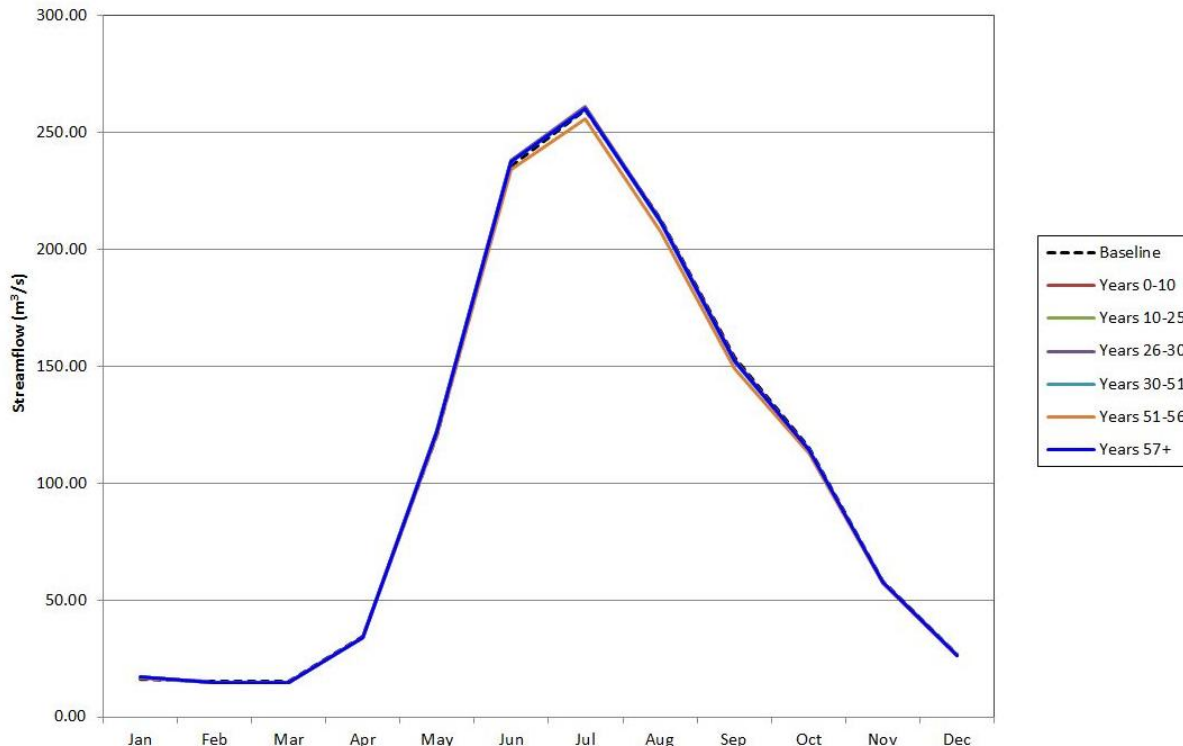
Alteration of subcatchment areas considerably decreases the low flows in Mitchell Creek and increase these flows at Gingras Creek and Sulphurets Creek. These effects are less substantial at other assessment points. These effects are the same as those of

annual flow volumes and peak flows. The Proponent predicts a reduction in expected annual 7-day low flows¹² of 56% in Mitchell Creek at post closure and increased rates of 275% in Gingras Creek diminishing downstream to 4% at Sulphurets Creek (SC3). The annual 7-day low flow reduction at Unuk River (UR2) is predicted to be less than 1% with conservative assumptions.

Figure 11: Hydrograph of Average Monthly Flows at Sulphurets Creek (SC3)



¹² The 7-day low flow represents the minimum seven-day-averaged flow over a specified period, such as a year, thus representing a worst case scenario.

Figure 12: Hydrograph of Average Monthly Flows at Unuk River (UR2)

Mitchell Glacier

The Application notes that the proposed Project has the potential to affect the terminus of the Mitchell Glacier by the development of the Mitchell Pit, depending on the rates of glacier retreat. The Proponent anticipates that by Year 10, the Mitchell Glacier would have retreated enough to create a sufficient setback from the Mitchell Pit for the construction of the Stage 2 inlet. The Application reports that if this assumption is not the case, the toe of the glacier would be excavated to allow mining with a sufficient safety setback of the ice from the pit edge. Proposed project-related dust generation could result in dusting of the glacier surface, which could affect rates of surface ice melt. However, the Application concludes that it is expected the proposed Project related effects on the Mitchell Glacier would be minor and any changes in the mass balance and rate of retreat during the proposed Project life would be much more heavily influenced by natural factors such as climate.

PTMA

At the PTMA, surface water quantity would be most affected by the TMF, and the system of diversions that would route non-contact water around its three cells.

From Year 1 to Year 25, the TMF's North Cell and the carbon-in-leach Cell will be in operation. Diversions will carry non-contact water to South Teigen and North Treaty Creeks. Excess flows in the North Cell will be pumped via discharge pipeline to Treaty

Creek until Year 45, after which it is expected that water quality will satisfy receiving environment criteria, allowing discharge to South Teigen Creek via a spillway. Between Years 25 and 30, the TMF South Cell will be brought online, and will then operate until Year 51.5, with excess water discharged to Treaty Creek. During post-closure, all diversion channels except those associated with the seepage dams will be decommissioned and runoff will report to the reclaimed TMF. During reclamation, the pre-existing flow patterns within the TMF valley will be re-established. Water will be discharged to North Treaty Creek and South Teigen Creek.

These diversions would cause changes in annual, monthly, peak and low flows, particularly in on-site catchments as described below and represented in the hydrographs of North Treaty Creek just before confluence with Treaty Creek (NTR2), Treaty Creek downstream of the confluence with North Treaty Creek and below the initial dilution zone (TRC2), South Teigen Creek just before the confluence with Teigen Creek (STE3) and Teigen Creek downstream of the confluence with South Teigen Creek (TEC2) in figures 12-15.

Changes in Annual Flows

The Proponent predicts a reduction in annual flow volumes of 75% in North Treaty Creek during closure, diminishing downstream to 2% at Treaty Creek due to the diversion channels, tunnels and TMF that would alter flow pathways and drainage areas. In the Teigen Creek drainage, a maximum annual flow reduction of 5% is predicted at assessment point TEC2. In addition, post-closure effects include a 1% reduction in flows at Teigen Creek (TEC2) and a 0.1% reduction of flow at Treaty Creek TRC2.

Predicted residual effects on annual flow volumes on the Bell-Irving River are substantially less than those in the PTMA LSA. The predicted reduction in annual flow volumes is 0.2% at assessment point BIR2. Predicted post-closure effects are negligible.

Changes in Monthly Distribution of Flows

Noticeable but comparatively minor changes to flow distribution on North Treaty Creek (between Year 25 and 50), and to a lesser extent, on South Teigen Creek with decreasing effects downstream including those in the Bell-Irving River are expected. These changes are attributable to diversion efficiencies, evaporation and storage of water in the TMF ponds.

Changes in Peak Flows

Increased peak flows are predicted in North Treaty and South Teigen Creeks due to diversion channels that reduce natural flood attenuation effects. These effects diminish downstream in Treaty and Teigen Creeks. The Proponent predicts a 38% increase in

peak flows in North Treaty Creek at post-closure, diminishing downstream to a 5% increase at Treaty Creek (TRC2). For South Teigen Creek the Proponent predicts a 52% increase in peak flows diminishing downstream to a 16% increase at Teigen Creek (TEC2) and 4% increase at Bell-Irving River (BIR2).

Changes in Low Flows

The Proponent predicts that low flows would decrease during the operations period when runoff from North Treaty and South Teigen subcatchments are diverted to Treaty Creek. The Proponent predicts an annual seven-day low flow reduction of 18% at North Treaty Creek during operations and closure, which diminishes downstream to 1% at Treaty Creek (TRC2). Within the Teigen Creek watershed, the Proponent predicts an annual seven-day low flow reduction of 19% at South Teigen Creek, 3% at Teigen Creek (TEC2). The annual seven-day low flow reduction at Bell-Irving River is predicted to be less than 1% with conservative assumptions.

Figure 13: Hydrograph of Average Monthly Flows at North Treaty Creek (NTR2)

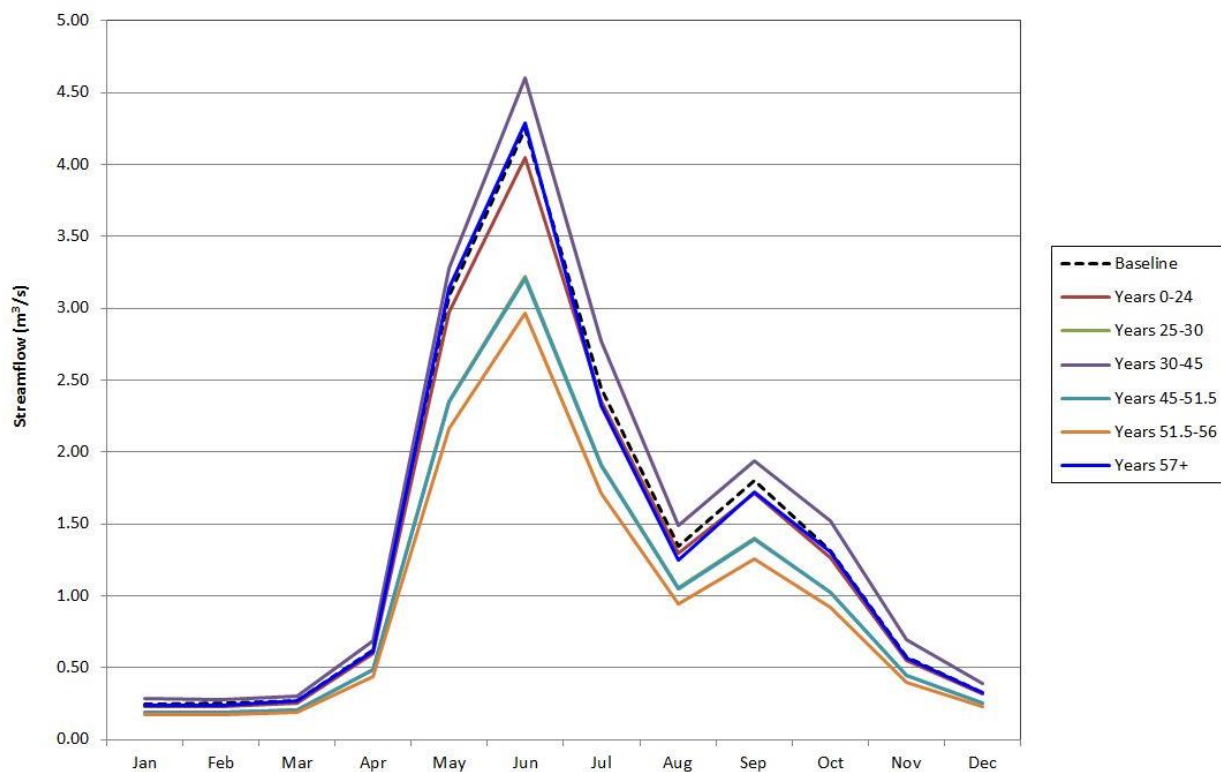


Figure 14: Hydrograph of Average Monthly Flows at Treaty Creek (TRC2)

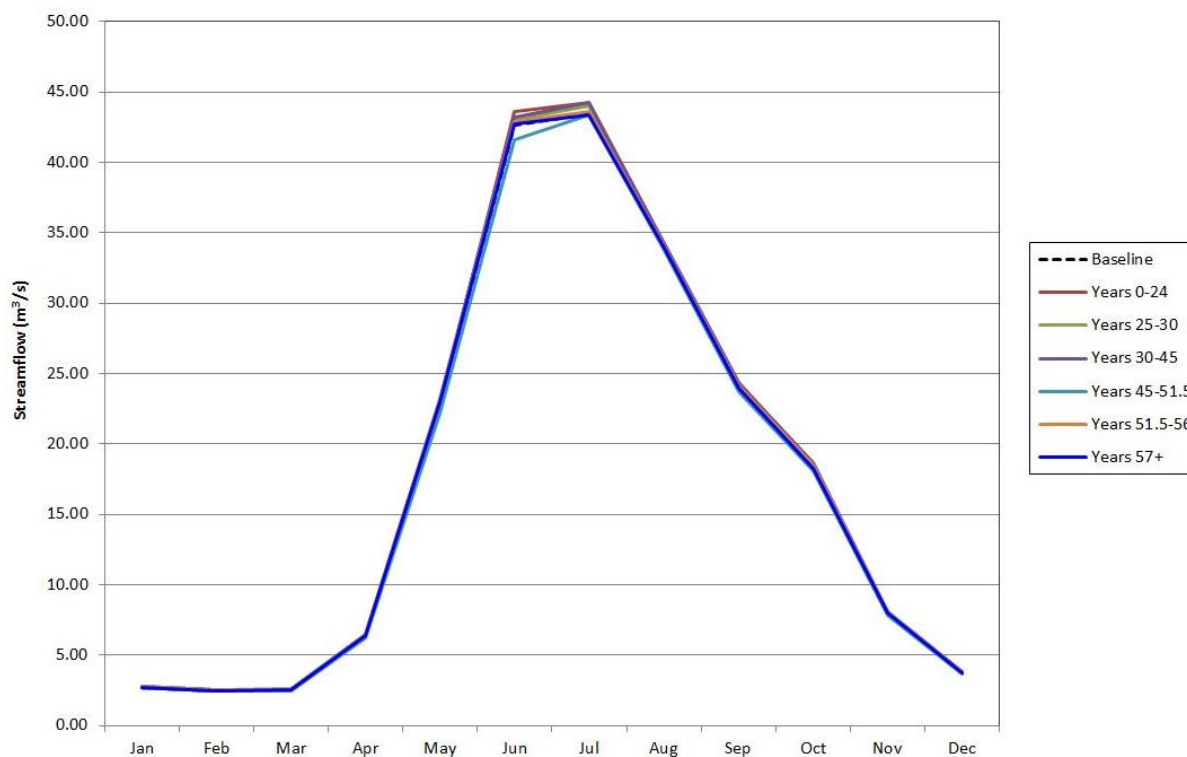


Figure 15: Hydrograph of Average Monthly Flows at South Teigen Creek (STE3)

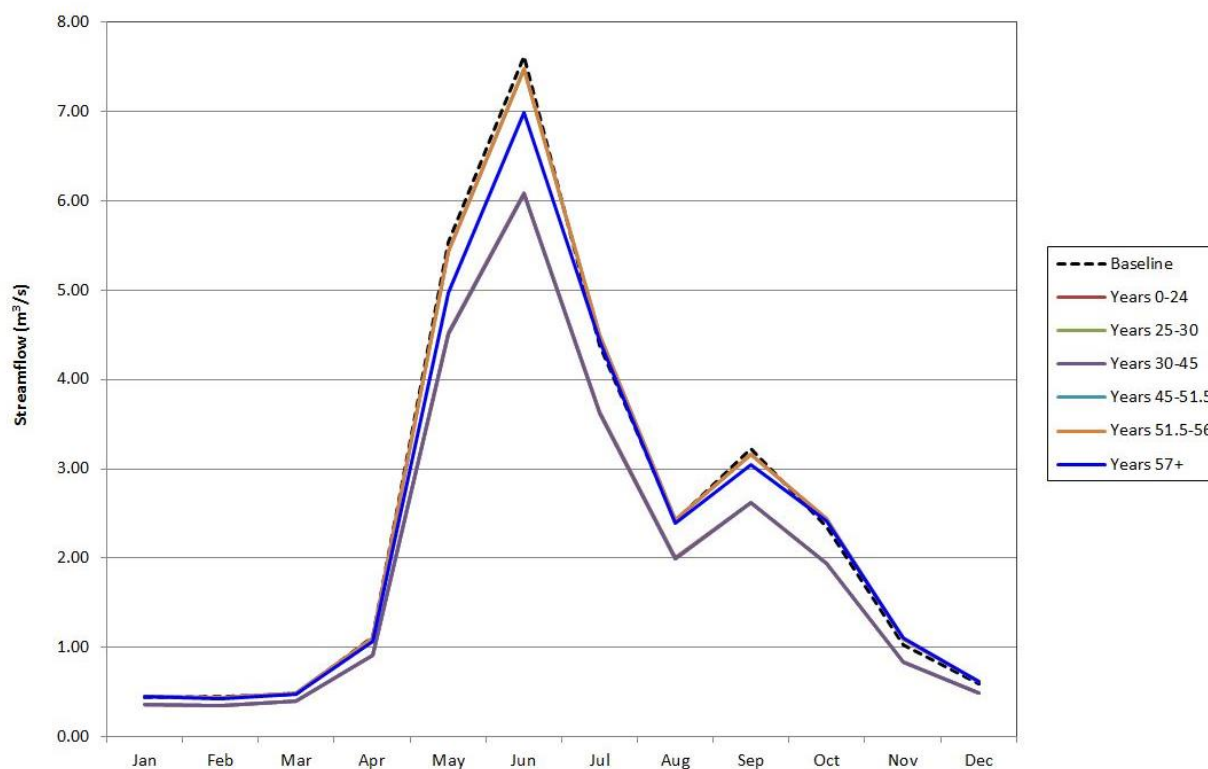
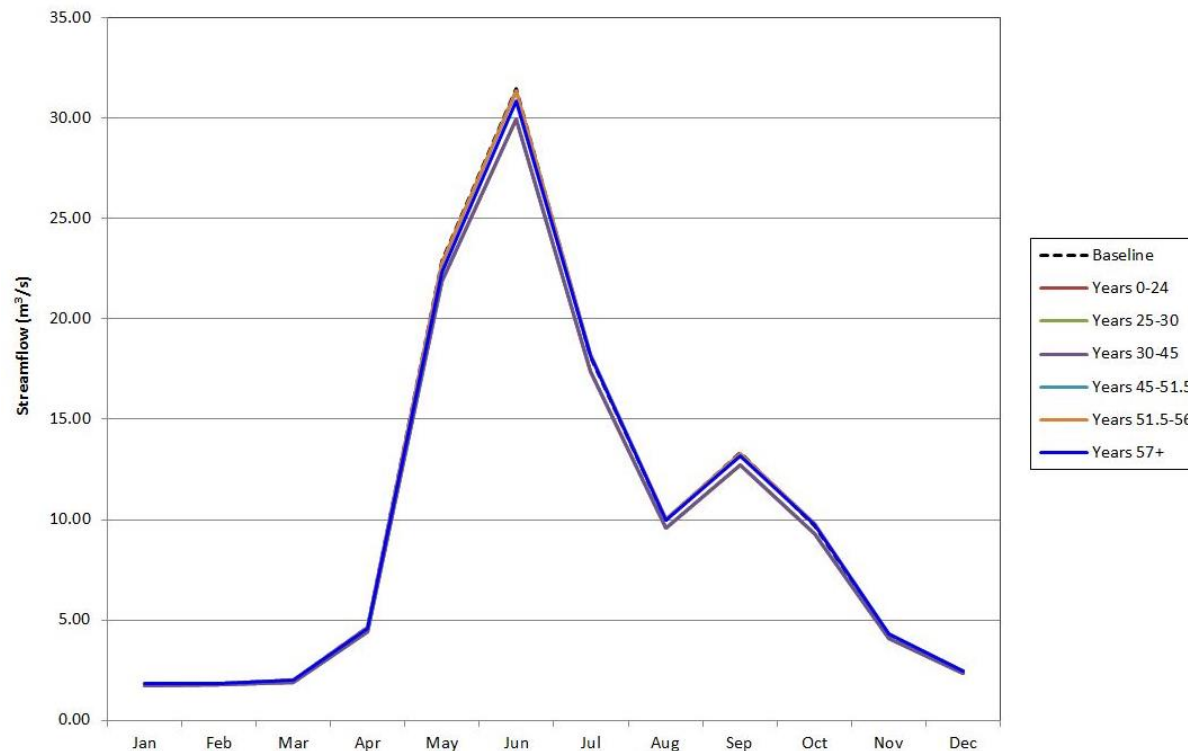


Figure 16: Hydrograph of Average Monthly Flows at Teigen Creek (TEC2)



Summary of Mitigation Proposed in the Application

The Proponent's WMP includes various measures to mitigate effects on annual, monthly, peak and low flows of surface water. The overall objectives of the WMP are to divert non-contact water around the proposed Project and to collect and treat contact water from the proposed Project. The Proponent's planned surface water diversions act as mitigation measures in the following ways:

- reduce the volume of water that must be treated;
- reduce the magnitude of any potential changes in flow volumes; and
- decrease the potential for erosion and sediment production by limiting the volume of water that enters a work area.

Mine Site

The Proponent proposed the following surface water quantity mitigation measures at the Mine Site:

- increasing the throughput capacity of the WTP from 3.3 m³/s to 7.5 m³/s to allow for staging of discharge to the natural hydrograph and minimize the attenuation of natural runoff events that could have resulted from the lower WTP capacity;
- stage discharge to Sulphurets Creek to the natural hydrograph to take advantage of

natural assimilative capacity, thereby avoiding or minimizing changes to water quality during the low-flow winter and early spring periods. This measure should also minimize any changes to the monthly flow distribution;

- divert non-contact meltwater from the Mitchell Glacier via sub-glacial inlets into diversion tunnels for discharge into Sulphurets Creek, and from the McTagg Glacier, to Gingras Creek; and
- route non-contact water via diversion channels into either the MDT or the MTDT or directly to Mitchell Creek downstream of the WTP. Diversion channels would be shotcreted¹³ or paved with an asphalt liner, if necessary to reduce water losses in rock-based sections.

PTMA

The Proponent proposes the following surface water quantity mitigation measures at the PTMA:

- install non-contact diversion ditches on both valley walls to direct flow north into Teigen Creek via South Teigen Creek. This would supplement flows that could potentially be altered by the TMF footprint. The East Diversion Tunnel would divert flows from the East Creek catchment to South Teigen Creek up to a maximum of 2 m³/s; and
- restrict discharge to the receiving environment from the TMF to surplus water from the flotation tailings ponds. Store effluent during the winter low-flow periods and schedule discharge release during the high flow period (May 15 to October 15) of each year to mimic the stream flow rates.

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 CPD and TOC (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued.

Many reviewers expressed concerns with the complex water management system,

¹³ Shotcrete is concrete (or sometimes mortar) conveyed through a hose and pneumatically projected at high velocity onto a surface, as a construction technique

including the volumes of contact and non-contact water to be managed, the design capacities of major water storage and handling structures such as the WSF, WTP and TMF, the volumes of contact water to be treated, and downstream effects on stream flows and water quality and its related effects. Reviewers including MEM noted that the proposed Project involves the largest and most complex water management and water treatment system ever proposed for a BC mining project and will be very challenging to implement. Examples of specific concerns are summarized below.

Mine Site

- MOE and EC stated concerns with respect to the consideration of climate change in the Proponent's water quantity predictions. MOE required the Proponent to consider the effects of projected increased flows on the design and operation of all water management systems. EC required the Proponent to provide justification for the use of these particular climate models.
 - The Proponent responded that climate change was considered in the design of the WSF and effects of climate change are accommodated in the water balance model by provision of sufficient levels of conservatism within the base case and provision of storage capacity to accommodate the range of increases in average annual precipitation values.
 - The potential increase in annual precipitation due to climate change can be managed within the range of conservative features in the selection of the design storage capacity of the WSF.
 - If additional mitigation against climate change is required, the storage dam could be raised and the diversion tunnels and channels could be upgraded.
 - In response to EC's concerns re: climate models, the Proponent more fully evaluated the available downscaled global climate model data for the specific proposed Project area and predicted change in annual temperature and precipitation over three future time periods (2020, 2050 and 2080).
- MEM raised concerns with the design capacity of the conveyance system for water from the Kerr pit to the water treatment facilities, from the commencement of open pit mining until Year 27. MEM noted that it is only at the end of mining that the facility will be able to contain a 200-year 24-hour flood inflow. MEM considered this conveyance system to be higher risk and under-designed given the potential for significant environmental consequences with a failure outside of the WSF containment area.
 - In response, the Proponent committed to providing a collection and conveyancing capacity for Kerr Pit drainage to withstand a 1-in-200 year

peak flow event once Kerr Pit commences. EAO added this as a condition in the EA Certificate.

- Provision of the above referenced capacity could be achieved by staging of pit excavation to provide storage, enlargement of pipeline inlets and pipeline diameters or provision of inlet pumping as is required in detail design.
- MEM and MOE requested further information to demonstrate the robustness of the water collection, conveyance, and treatment system to deal with peak events and upset conditions including sensitivity analyses of combined worst case scenarios for various mine components and stages of mine life (for example, peak snow pack, rain on snow, multiple wet years with limited storage, failure of all diversions, no snow management, failure in lime supply, failure of power, etc.).
 - The Proponent provided examples of how the proposed Project has been designed to deal with peak events and upset conditions including:
 - diversion and collection ditches of the WSD have been designed for peak flow events (200-year 24-hour peak flow);
 - factors lowering ditch efficiencies considered include rock fall and avalanche hazard (increasing the probability of a breach in the diversion), and "glaciation" or ice damming of the diversion. Mitigating strategies have been adopted to prevent glaciation of diversions. These include widening of sections of ditches prone to glaciation or avalanche impacts and the bypassing of avalanche areas with buried pipes paralleling ditches. Liners are provided with a granular drain under the liner to prevent icing under the liner and the liner is extended upslope above the ditches to prevent groundwater from emerging and freezing in the ditch, rather it will freeze on the slopes above the ditch;
 - it would be possible to optimize lining and seepage control measures based on an assessment of diversion ditch performance after the mine is in operation. The water balance could be improved on by the addition of more ditches even if they are not available in all seasons;
 - there are opportunities for implementing some of the closure channels earlier in the mine plan than scheduled which will reduce treatment requirements; and,
 - there is a strong motive for the operation to maximize ditch efficiency in order to reduce the amount of water that will have to be treated, so it is expected that ditch efficiencies will be maintained or improved upon.

5.3.4 Residual Effects and Significance Analysis

Residual effects are predicted on annual flow volumes, monthly flow distribution, peak flows and low flows. These residual effects will vary both spatially within the Mine Site and PTMA, and temporally, at different proposed Project phase.

Mine Site

Residual surface water quantity effects at the Mine Site would be associated with the diversion channels, tunnels and the WSF-WTP system. These effects are most pronounced during the first 30 years of operations, while water is diverted around the Mitchell pit and Mitchell Glacier meltwater is diverted to Sulphurets Creek. Despite effects at upstream assessment points, EAO has considered residual surface water quantity effects on Sulphurets Creek at SC3 and on the Unuk River at UR1 as UR1 represent the high fisheries values downstream of the Mine Site.

EAO notes the Proponent's commitment, and proposed condition, to stage the WTP discharge to mimic the stream flows of Sulphurets Creek to minimize water quantity effects at the Mine Site.

PTMA

Residual surface water quantity effects in the PTMA would be associated with the diversion channels, tunnels and the TMF. During the first 25 years of operations, non-contact water will be routed to South Teigen and North Treaty Creeks. For the remainder of operation excess water from the TMF will be routed to Treaty Creek. During post closure, once water quality satisfies receiving environment guidelines, excess flows from the TMF cells will be routed north to South Teigen Creek. EAO has considered residual surface water quantity effects on Teigen Creek (TEC2), Treaty Creek (TRC2) and the Bell-Irving River (BIR2).

EAO notes the Proponent's commitment, and proposed condition, to stage the TMF discharge to mimic the stream flows of Treaty Creek.

EAO has undertaken the following significance analysis on the residual adverse effects on surface water quantity.

Table 16: EAO's Significance Analysis for Surface Water Quantity

Factor	Rationale
Context	<p>For surface water quantity VCs, there is not a ready measure of context (or resilience). EAO has considered the degree of reversibility of flow effects, and their implications for downstream water quality and aquatic resources.</p> <p>Surface water quantity is a key component of the physical and</p>

	<p>biological environment, being closely linked to other ecosystem components, including surface water quality, fish and fish habitat, and aquatic resources.</p> <p>Downstream fisheries of the Mine Site and PTMA such as oolichan and salmon are important to Nisga'a Nation and First Nations for sustenance and commercial fisheries.</p>
Magnitude	<p><u>Mine Site</u></p> <p>For the LSA VCs (i.e. streamflows within the Mine Site), effects are of high magnitude on upper sections of small watersheds, notably associated with the effects of tunnels, diversions, the WSF-WTP system on annual, peak and low flows, although monthly flow distributions are little affected. These effects are predicted to be low or negligible for most other proposed Project components, especially at the downstream boundaries of the LSA along Sulphurets Creek.</p> <p>For the RSA VCs (i.e. streamflows within the Unuk River), the magnitude of direct proposed Project effects is negligible or low, with the exception of a moderate magnitude effect on annual, peak and low flows in the Unuk River during the closure phase, linked to the effects of diversions, tunnels and the WSF-WTP.</p> <p><u>PTMA</u></p> <p>For the LSA VCs (i.e. streamflows within the PTMA), high magnitude effects on upper sections of small watersheds are identified, notably associated with the effects of tunnels, diversions and TMF on annual, peak and low flows, although monthly flow distributions are little affected. These effects are predicted to be low or negligible for most other proposed Project components, especially at the downstream boundaries of the LSA along Teigen and Treaty Creeks (TRC2 and TEC2).</p> <p>For the RSA VC (i.e. streamflows within the Bell-Irving River), the magnitude of direct proposed Project effects are predicted to be negligible or low.</p>
Extent	<p><u>Mine Site</u></p> <p>While effects are most evident in the LSA, the geographic extent of</p>

	<p>residual effects is rated regional, since some effects are detectable downstream of LSA boundaries.</p> <p><u>PTMA</u></p> <p>While effects are most evident in the LSA, the geographic extent of residual effects is rated regional, since some effects are detectable downstream of LSA boundaries.</p>
Duration	<p><u>Mine Site</u></p> <p>Since some residual effects on annual, peak and low flows will be detectable at all proposed Project phases, the residual effects are considered far future in duration.</p> <p><u>PTMA</u></p> <p>Since some residual effects on annual, peak and low flows will be detectable at all proposed Project phases, the residual effects are considered far future in duration.</p>
Reversibility	<p><u>Mine Site</u></p> <p>Flow alterations associated with diversions, tunnels, the WSF and the WTP, the RSFs, pits and the block cave are reversible over the long term. Residual effects attributable to other proposed Project components (such as camps and access roads) are considered reversible in the short term.</p> <p><u>PTMA</u></p> <p>Flow alterations associated with diversions, tunnels and the TMF are reversible over the long term. Residual effects attributable to other proposed Project components (such as camps and access roads) are considered reversible in the short term.</p>
Frequency	<p><u>Mine Site</u></p> <p>The assessed variables, annual, monthly, peak and low flows are continuous hydrologic indices that would be affected on an ongoing basis, although not to the same degree, at all proposed Project phases.</p> <p><u>PTMA</u></p>

	The assessed variables, annual, monthly, peak and low flows are continuous hydrologic indices that would be affected on an ongoing basis, although not to the same degree, at all proposed Project phases.
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Likelihood

Mine Site

The likelihood that the predicted residual effects on surface water quantity would occur, varies, but is generally considered high. Effects associated with many proposed Project components including the diversions, tunnels, the WSF and WTP, the RSFs, pits and block cave are essentially certain, given a clear cause and effect link between these components and expected effects.

PTMA

The likelihood that the predicted residual effects on surface water quantity would occur, varies, but is generally considered high. Effects associated with many proposed Project components including the TMF, diversions and tunnels are essentially certain, given a clear cause and effect link between these components and expected effects.

5.3.5 Significance Determination

Mine Site

From a watershed perspective, although the residual effects on flows of the diversions, tunnels, the WSF and the WTP are of high magnitude in the upper reaches of streams within the LSA, the magnitude of these changes decrease in the downstream direction. EAO also notes that none of the predicted residual effects on flows were considered critical to downstream resource values.

EAO notes the Proponent's commitment to implement the WMP is a requirement of the *Mines Act* permitting process, and a condition of the EA Certificate, if issued, which describes water management and the Mine Site water balance. EAO also notes the condition to stage the WTP discharge to mimic the stream flows of Sulphurets Creek to minimize water quantity effects at and downstream of the Mine Site. EAO also notes the condition to implement fish compensation plan as a mitigation measure for flow reductions in North Treaty Creek.

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 surface water quantity at and downstream of the Mine Site.

PTMA

From a watershed perspective, although the residual effects on flows of the TMF, diversions and tunnels are of high magnitude in the upper reaches of streams with the LSA (North Treaty and South Teigen), the magnitude of these changes decrease in the downstream direction. EAO also notes that none of the predicted residual effects on flows were considered critical to the resources in those affected streams.

EAO notes the Proponent's commitments, which EAO has added as conditions, to implement the WMP which is a requirement of the *Mines Act* permitting process and to stage the TMF discharge to mimic the stream flows of Treaty Creek.

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 surface water quantity downstream of North Treaty (NTR2) and South Teigen (STE3) Creeks in the PTMA.

5.3.6 Cumulative Effects

The potential exists for residual cumulative effects on annual flow volumes, monthly flow distribution, peak flows and low flows associated with an overlap of the proposed Project and Brucejack Mine Project effects. However, the Brucejack Mine Project layout and WMP are not yet defined in sufficient detail to form a reliable basis for assessing cumulative surface water quantity effects. Likely, they will be minor and localized, since both projects are expected to employ best management practices and proven mitigation strategies to minimize direct project effects on surface water quantity. No residual cumulative effects for surface water quantity are identified.

5.3.7 Certainty

Mine Site

Annual flow volumes and monthly flow distributions are estimated based on a water balance model that has been calibrated to observed flows within the Mine Site. Potential uncertainty due to climate change has been accounted for through sensitivity analysis. Therefore, there is a high level of certainty for changes in annual flow volumes and monthly flow distribution associated with diversion, tunnels, the WSF and WTP and a medium level of certainty associated with RSFs, pits and block cave mines.

Peak and low flow estimates were primarily based on regional analysis. Therefore, there is a medium level of certainty associated with changes in peak and low flows. To account for such uncertainty, the Proponent used conservative approaches for peak and low flow estimates.

PTMA

Annual flow volumes and monthly flow distributions are estimated based on a water balance model that has been calibrated to observed flows within the PTMA. Potential uncertainty due to climate change has been accounted for through sensitivity analysis. Therefore, there is a high level of certainty for changes to annual flow volumes and monthly flow distribution associated with diversions, tunnels and the TMF.

Peak and low flow estimates were primarily based on regional analysis. Therefore, there is a medium level of certainty for changes in peak flows and changes in low flows associated with diversions, tunnels and the TMF. To account for such uncertainty, the Proponent used conservative approaches for peak and low flow estimates.

5.3.8 Conclusion

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 surface water quantity.

5.4 Groundwater

5.4.1 Background Information

The Proponent selected groundwater quantity and groundwater quality as VCs for the groundwater assessment. As with other water VCs, the LSAs are the Mine Site LSA and the PTMA LSA.

Given the close relationship between groundwater quantity and quality, this Report will provide a single significance assessment for “groundwater” rather than separate quantity and quality assessments.

Groundwater Quantity

The Proponent investigated baseline groundwater quantity conditions by means of groundwater monitoring wells, boreholes, slug tests and packer tests from which hydraulic properties and permeability could be evaluated and groundwater levels measured. The Proponent also took stream low-flow measurements to estimate seepage rates, validate groundwater flow modeling results and assess changes in seepage rates and surface water quantity arising from the effects of the proposed Project on groundwater quantity.

The Proponent then developed three-dimensional groundwater models to examine the mine designs and mitigation measures and to predict changes of groundwater flow patterns and baseflows, as well as seepage arising from the proposed Project. A sensitivity analysis was also conducted in order to consider possible “worst-case” scenarios and to address uncertainties of the predicted groundwater quantity effect associated with the permeability of overburden and bedrock and with the recharge rates in wet and dry climates.

Mine Site Groundwater Quantity

The Proponent predicted groundwater flow regimes across the Mine Site LSA for two proposed Project phases:

- end of operations phase: this is the phase where all open pit and underground workings and dams would be at their largest extent and have active dewatering. This phase is assumed to have the greatest operation-phase effects on groundwater quantity; and
- post-closure phase: after the mine is closed, all pits and underground works are flooded or backfilled, the WSF pond level would maintain its peak level. This phase represents the maximum long-term effects on groundwater quantity, potentially being maintained for many years after the end of operation.

PTMA Groundwater Quantity

For the PTMA, the Proponent predicted flow regimes for three stages of TMF development:

- upon completion of the North Cell, following 25 years of operations and assuming that the tailings cells are in their full capacities throughout the years;

- upon completion of the South Cell, following 51.5 years of operations, marking the end of the operations phase and assuming that the tailings cells are in their full capacities throughout the years; and
- post-closure phase, assuming that the tailings cells are in their full capacities after the closure.

Groundwater Quality

The Proponent investigated baseline groundwater quality conditions by means of sampling of groundwater monitoring wells and natural groundwater seeps on slopes. The Proponent tested groundwater samples and seeps for physical properties, total and dissolved metals, nutrients, total organic carbon and cyanide concentrations.

Groundwater flow and transport models were completed to assess potential residual effects on groundwater quality from the open pits, block caves, reservoirs that store contact water, the RSFs and tunnels. Models were developed that showed where the groundwater plumes from each component would go, as well as how long they would take to develop. The models also provided information on the concentrations of these groundwater plumes.

As with groundwater quantity, the Proponent modeled “worst-case” scenario simulations to address uncertainties of the predicted groundwater quality effect associated with the permeability of overburden and bedrock and with the recharge rates in wet and dry climates.

Mine Site Groundwater Quality

The Proponent predicted groundwater quality across the Mine Site LSA for the same two scenarios used to describe groundwater quantity.

PTMA Groundwater Quality

For the PTMA, the Proponent predicted groundwater quality for the same three phases used to describe groundwater quantity.

A full discussion on groundwater can be found in the Proponent’s Application posted on EAO’s website at:

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35959.html

5.4.2 Project Issues, Effects and Proposed Mitigation in the Application

Groundwater Quantity

Groundwater quantity effects are predicted to occur throughout construction, operations, closure and post-closure. Potential effects include changes in the surface water

environment in the proposed Project area including changes in hydraulic gradients, affecting groundwater flow rate, flow direction and water level.

The Application reports that alterations to groundwater flow patterns and water levels would be confined to the immediate catchments basins within the proposed Project footprint.

Mine Site Groundwater Quantity Effects

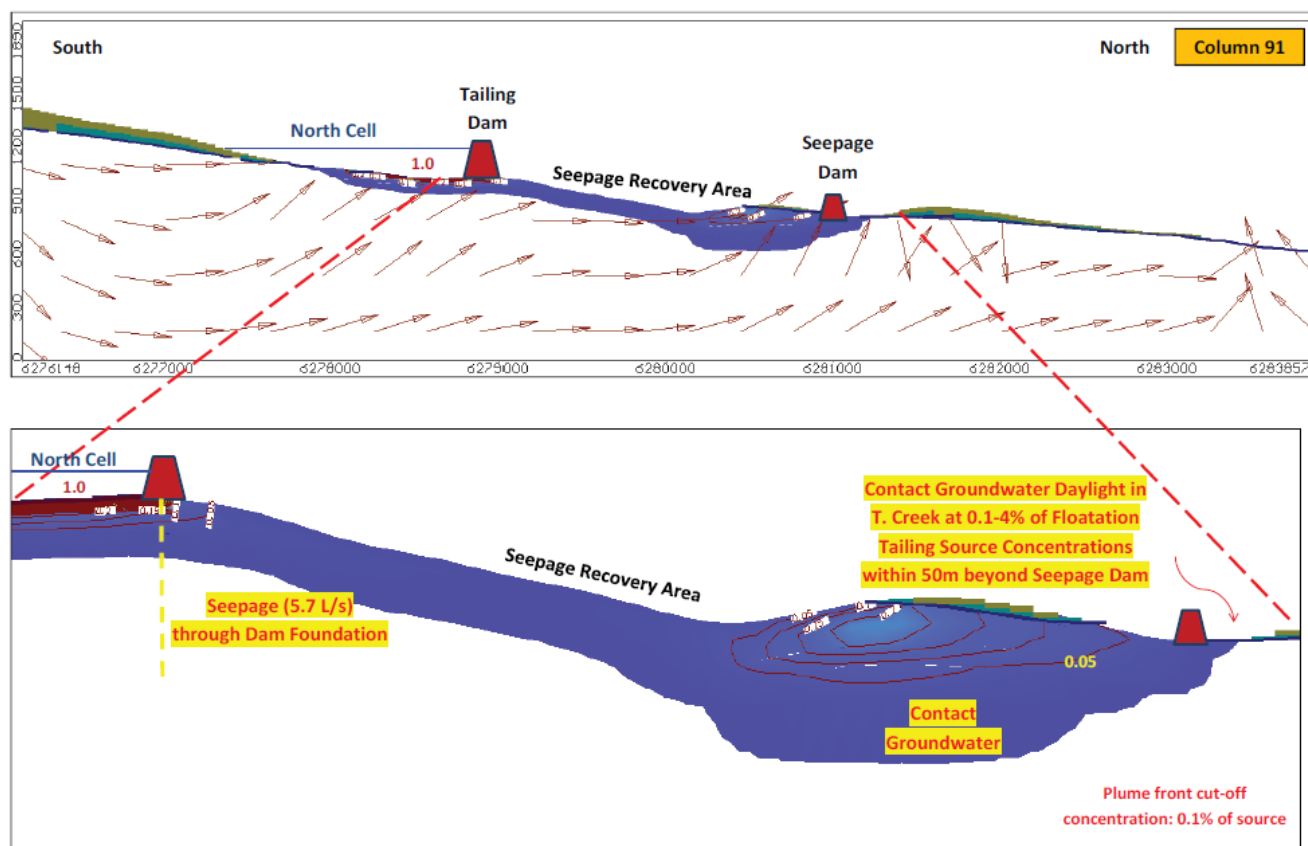
Mine Site components with the potential to impact groundwater quantity include the open pits, block cave mines, MDT, MTDT and WSF. The following are specific examples of groundwater quantity effects at the Mine Site:

- reductions in water levels and the creation of groundwater sinks from mine dewatering;
- higher groundwater levels beneath the WSF due to water storage and reduced groundwater discharge downstream of the WSF into the Mitchell Creek due to seepage controls;
- water level “mounding” beneath the Mitchell and McTagg RSF as ground elevation increases with the accumulation of waste rock; and,
- low groundwater levels in the Sulphurets Pit backfill due to the installed basal drainage system.

PTMA Groundwater Quantity Effects

PTMA components with the potential to impact groundwater quantity include the TMF, East Diversion Tunnel and the MTT. The main groundwater quantity effect associated with the TMF would be higher groundwater levels beneath and reduced groundwater discharge downstream of the TMF into South Teigen and North Treaty Creeks due to water storage and seepage controls. As a result of seepage control structures, groundwater which would normally flow into these creeks would report to seepage dam reservoirs and be pumped back into the TMF. Figure 16 below shows the relationship between the main TMF dam, groundwater and the seepage recovery dams. It illustrates the effect of upward groundwater discharge and hydraulic gradients on attenuating and containing the dam seepage into downstream creeks.

Figure 17: End of Operation and Post-closure (200 Years) Plume under North Cell and Seepage Recovery Area (Cross-section through Tailings and Seepage Dams) and Hydraulic Containment



The Application and subsequent memorandums provided to EAO and the Working Group show that approximately 5.7 L/s seepage is expected to flow under the North TMF dam and 4.6 L/s seepage would flow under the South TMF dam. The models show that 98% of this seepage would be recovered in the North seepage collection facilities and 100% in the South seepage collection facilities. The memos state that the worst-case groundwater modeling predicts that no seepage would migrate beyond the south seepage collection dam and that only 2% of the seepage (but in very low concentrations of the floatation tailings source) may potentially migrate in a distance of about 50 m beyond the north seepage collection dam but would be diluted by the fresh groundwater discharge downstream and surface water in South Teigen Creek.

Groundwater contributions to the flows in South Teigen and North Treaty Creeks are predicted to decrease by approximately 77% and 78%, respectively, due to the loss of headwater catchment areas.

In South Teigen, this reduction will be offset by fresh water from the diversion ditches and east catchment diversion tunnels which will report to South Teigen below the

seepage collection facilities, as well as by the discharge of water from the tailings pond and seepage recovery area if the water quality meets the requirement. The Proponent proposed to stage the TMF discharge to mimic the stream flows to reduce water quantity effects.

Flow reduction for North Treaty are more pronounced since most water diversions do not report into the creek below the seepage collection ponds, but rather the discharge from the TMF is directed into the main stem of Treaty Creek. Maximum baseflow reductions in North Treaty are closer to 78%, but the Application reports that considering the high precipitation and surface water runoff from slopes, the actual reduction of stream flow in the creek downstream the south seepage collection dam may be not noticeable.

Groundwater Quality

Groundwater quality would also be impacted by the proposed Project. The Application states that seepage of contact water from mine infrastructure into the groundwater environment would alter the current groundwater quality within the immediate catchments of the proposed mine components. Accidental release of industrial or other controlled substances could also affect groundwater quality in local spots.

Mine Site Groundwater Quality Effects

Proposed Project activities that could generate contact water include the exposure of rock at the Mine Site and blasting for construction or mining purposes. Contact water release may occur from the open pits and block caves, the RSFs, along the access roads during construction, inside tunnels and from the WSF.

PTMA Groundwater Quality Effects

Proposed Project activities that could generate contact water include the exposure of rock at the PTMA, blasting for construction and discharge of tailings water from the Treaty Process Plant. Contact water release may occur along the access roads during construction, inside tunnels and from the TMF.

As discussed above, the main predicted groundwater effect is seepage. The seepage collection facilities are predicted to be 98% and 100% effective for the North and South respectively and any groundwater quality effects would be due to seepage potentially escaping the seepage collection facilities. The Proponent's worst-case groundwater modeling predicts that no seepage would migrate beyond the south seepage collection dam and that only 2% of the seepage (but in very low concentrations of the floatation tailings source) may potentially migrate in a distance of about 50 m beyond the north seepage collection dam but would be diluted by the fresh groundwater discharge

downstream and surface water in the South Teigen Creek. The effects of this on surface water quality are discussed in that section.

Summary of Mitigation Proposed in the Application

Groundwater Quantity

The Application reports that reclamation activities are expected to change how proposed Project components interact with the groundwater environment and as a result, baseline groundwater flows would be permanently changed.

The Application reports that the following activities within closure plans would provide for recovery towards natural drainage conditions and minimize effects.

Mine Site

- The development of a lake in Mitchell Pit following completion of extraction would allow for recovery of water levels surrounding the pit towards pre-existing conditions.
- The decommissioning of certain tunnels by capping of all portals would reduce the quantity of seepage through tunnel walls.

PTMA

- The TMF Management and Monitoring Plan would provide for post-operation discharge of water from the TMF cells once effluent quality meets Metal Mining Effluent Regulations (MMER), which would result in a trend towards baseline groundwater flow conditions.
- The decommissioning of tunnels by capping of all portals would reduce the quantity of seepage through tunnel walls.

Groundwater Quality

Mine Site

The Proponent proposed the following mitigation measures in the Application:

- stop dewatering the pits and block caves after excavation;
- management of water levels in the Mitchell Pit and Block Cave Mine post-closure below the natural local groundwater level to sustain a groundwater sink in the mine post-closure;
- sustained drainage of the Sulphurets Pit and the backfilled waste rock indefinitely, and collect and divert the contact water into the WSF for treatment;
- sustained drainage of the Kerr Pits indefinitely via drill holes or a tunnel to a pipeline, and convey the contact water collected from the pits into the WSF for treatment; and

- design of the WSF includes measures to reduce seepage below and through the dam, and into the down-gradient groundwater environment. These measures include a grout curtain and asphalt core and a system of seepage interception tunnels in the subsurface between the WSD and the seepage collection dam grout curtains.

PTMA

The Proponent proposed the following mitigation measures in the Application:

- all TMF dams (including tailings cell dams and seepage collection dams) are designed with a low-permeability compacted till core to reduce seepage rates through the dams;
- seepage cut-off walls built with low-permeability native fine-grained soils amended with bentonite are planned below the North, Splitter, and Southeast tailings dams. No cut-off wall is planned below the Saddle dam because drainage materials are required in this area to relieve artesian pressure below the Centre Cell liner;
- three seepage collection dams downstream of the TMF along the North Treaty and South Teigen valleys to minimize seepage into the down-gradient environment without unduly increasing the overall TMF footprint. These dams are designed to capture seepage water emanating from the TMF and to pump it back up to the cells; and
- the Proponent has committed to a number of Environmental Management Plans (EMP), which EAO had added as conditions, that would be further developed during *Mines Act* permitting that include measures to avoid, reduce, control and monitor proposed Project effects on groundwater quality including:
 - Water Storage Facility Management and Monitoring Plan and the Tailings Management Facility Management and Monitoring Plan to reduce seepage;
 - WMP to minimize seepage of contact water;
 - ML/ARD Management Plan to avoid or reduce the potential for ML/ARD; and
 - Groundwater quality long-term monitoring as per the Groundwater Monitoring and Mitigation Plan.

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 CPD and TOC (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 are set out below.

General Groundwater

- MOE required the Proponent to conduct monitoring programs to develop an understanding of the performance of the seepage mitigation measures that could not be derived from studies and analysis prior to construction. MOE also recommended the Proponent conduct a performance monitoring program to evaluate the effectiveness of the seepage cutoffs and seepage collection works.
 - In response, the Proponent submitted additional information on seepage rates and pathways and stated these requirements would be discussed during permitting.
 - The Proponent's commitment to a Groundwater Monitoring and Mitigation Plan would also address MOE's concerns.
- EC questioned whether the groundwater modeling shows potential changes in where groundwater discharges that in turn may impact surface waters. EC was concerned that the proposed Project has the potential to change where groundwater discharges to surface water and hence, the potential exists for changes in fish and aquatic habitat as these discharge areas could potentially be into valuable habitat (such as areas of fish spawning or over-wintering).
 - In response, the Proponent stated that the groundwater modeling results show that the potential reduction of groundwater discharge into the surface waters will be limited to the Mitchell/McTagg Creeks above the Mitchell/Sulphurets confluence at the Mine Site and in the Teigen South and Treaty North tributaries in the PTMA.
 - The potential reduction of groundwater discharge is predicted to be small ($0.28 \text{ m}^3/\text{s}$ in Mitchell/McTagg Creeks, $0.12 \text{ m}^3/\text{s}$ in South Teigen tributary and less than $0.01 \text{ m}^3/\text{s}$ in North Treaty tributary), in comparison to the contribution of the surface water flows in these creeks.
 - The reduction of groundwater discharge will be compensated by the diverted surface runoffs, glacial melt-water and the treated mine water in both areas. No effect is predicted on groundwater discharge in the downstream Unuk River at the Mine Site and in Teigen and Treaty Creeks at the PTMA.

Mine Site

- MOE and MEM raised concerns with the Proponent's assessment of infiltration rates and seepage at the backfilled Sulphurets Pit. MEM questioned the assumptions the Proponent used for infiltration and flows throughout the operations and closure

period. MEM requested further information to support the seepage estimates, water balance, design capacities (ditches, pipeline, WSF, SeTP, WTP) and to assess the reasonableness of inputs into the water quality modelling.

- The Proponent prepared a memorandum which stated that the amount of infiltration into the Sulphurets backfill was determined based on the monthly annual precipitation that falls onto the Sulphurets backfill with defined waste rock infiltration coefficients for the operation, closure, and post-closure phases.
- The Proponent stated that the water quality model did not consider water storage in the materials in the Sulphurets backfill. All infiltration through the uncovered materials was assumed to report to the basal drain.

After reviewing the information provided by the Proponent, MEM required a sensitivity analysis of the effects to water quality, the high-density sludge treatment plant discharge and downstream water quality of the potential bypass of up to 100 L/s of seepage from the backfilled waste rock to the WSF without selenium treatment under maximum conditions over Years 26 to 28.

- In response, the Proponent stated that the expected case water quality model already includes seepage bypass to the WSF.
- Later in the EA as discussed in section 5.2.3, the Proponent committed to construct and commission a SeTP at the WSF with a capacity of 500 L/s to treat water from both the McTagg/Mitchell RSF and from Sulphurets and Kerr pits as a contingency to manage selenium levels that might be higher than expected.
- Reviewers raised concerns with the assumptions used by the Proponent for seepage modeling at the WSF and seepage pond stating that it was not conservative and has the potential to be higher than predicted and assessed by the Proponent.

MOE raised concerns that a higher seepage rate could lead to an underestimation of selenium concentrations and loadings. MOE requested additional information on what mitigation can or would be implemented to avoid downstream environmental effects if WSF selenium concentrations are greater than predicted.

MOE stated that seepage has the potential to impact water quality and quantity in Sulphurets/ Unuk drainages, primarily during winter low flows. Impacts have the potential to be of a high magnitude as downstream water quality already has elevated levels of selenium and the seepage would not be treated.

- The Proponent responded that according to the modeling results presented in the Application, the WSF is physically and hydraulically contained by the steep Mitchell Canyon walls together with the glacial till sediments at the valley bottom.
- Seepage emanating from the WSF would be diluted by the fresh groundwater discharge from the canyon slopes and would be captured by the seepage mitigation/recovery systems (including asphalt dam core, grout curtains under the dam foundations and in the abutments, seepage collection tunnels, seepage drain galleries, and seepage recovery dam and pond).
- To be conservative for the EA purpose, contact groundwater with 5% of the WSF reservoir concentrations was assumed to daylight beyond the seepage collection dam (despite not predicted even in the worst case of groundwater modeling) and was applied in the surface water quality modeling inputs, in order to account for the potential uncertainties in the groundwater seepage predictions.
- The Proponent prepared an additional memo regarding the [WSF seepage mitigation plan](#) noting that the WSF system includes a seepage interception system and seepage collection dam to intercept seepage that bypasses the dam to allow it to be collected and treated. Modelling results of capture efficiencies with seepage mitigation systems in place shows that no seepage would daylight in the receiving surface water beyond the seepage collection dam and that seepage of contact water bypassing the seepage collection dam would be limited to the deep groundwater environment and have low concentrations and would meet water quality objectives in the receiving environment.
- The memo provides a complete list of available seepage mitigation measures.

MEM required additional sensitivity analysis on the seepage rate from the WSF bypassing the downstream seepage collection dam and water quality predictions in Sulphurets Creek at SC3 and downstream in the Unuk River.

- The Proponent's additional sensitivity analysis showed that increased concentrations in the low flow periods for elements that are controlled by the WTP (arsenic, copper and iron). Concentrations of parameters not controlled by the WTP (selenium, nitrogen and phosphorus) are not sensitive to seepage bypass rates.

PTMA

- MOE raised concerns about the potential for seepage from the TMF, past the collection dams and the resulting water quality, sediment quality and fish and fish habitat effects. MOE observed discrepancies in the Proponent's modeled concentration of seepage plume for the North Dam. MOE recommended the Proponent conduct a comprehensive monitoring program and updates of groundwater modelling to address these concerns which could include potential design refinements.
 - In response, the Proponent completed additional sensitivity analysis varying the configurations for the cut-off trenches including width and permeability in the cut off fill material. The results were nearly identical to the base case, and indicate that seepage from the TMF would flow to the seepage recovery pond.
 - The Proponent stated that their modelling shows that all flow paths from the impoundment report to the seepage collection ponds; thus the contact water component of flow under the North and Southeast seepage dam is negligible.
- NLG raised concerns about the long-term management and risk of the proposed Project including closure activities such as long-term seepage pump back. NLG suggested the following alternatives to long-term pump back: seepage could be stored in a pond and released to South Teigen Creek during periods of higher stream flow; or controlled release of the North Tailings Pond water (post-closure) to combine with the seepage water during low flow months such that water quality exceedances would not occur in South Teigen Creek.
 - In response, the Proponent stated that the WMP indicates that the seepage collection pond pumping system will operate in the closure phase until seepage collection pond water quality meets regulatory permit requirements. At closure, the water quality in the North seepage pond is predicted to improve indicating that at some point long-term pump back is likely to cease.

5.4.4 Residual Effects and Significance Analysis

Groundwater Quantity

Mine Site Groundwater Quantity Residual Effects

There would be residual effects to baseline groundwater levels and flow conditions near the pits, the block caves and the WSF.

Reductions in water levels and the creation of groundwater sinks are predicted to result

from mine dewatering. Other residual effects include higher groundwater levels beneath, and reduced seepage downstream of the WSF (due to water storage and seepage controls), water level “mounding” beneath the Mitchell and McTagg RSF (as ground elevation increases with the accumulation of waste rock), and low groundwater levels in the Sulphurets Pit backfill (due to the installed basal drainage system acting as a sink).

Groundwater flows around the WSF would exhibit complex changes in flow patterns and groundwater levels linked to storage of substantial water volumes, grouting and seepage collection. Groundwater discharge rate downstream of the WSF in the Mitchell valley would be reduced.

PTMA Groundwater Quantity Residual Effects

There would be residual effects to baseline groundwater levels and flow patterns as the result of the development of the TMF, TMF dams and seepage collection dams.

Groundwater flows around the TMF would exhibit complex changes in flow patterns and groundwater levels linked to storage of substantial water volumes, grouting and seepage collection downstream of the TMF in South Teigen and North Treaty Creeks. There would be higher groundwater levels beneath the TMF and groundwater discharge rates into North Treaty and South Teigen would be reduced.

Groundwater Quality

Mine Site Groundwater Quality Residual Effects

There would be residual effects on groundwater quality in the form of plumes of degraded water which will emanate from the Iron Cap Block Cave mine, the Mitchell and McTagg RSFs and the WSF. Seepage of water from mine waste storage and conveyance facilities may affect groundwater quality downstream in the Mitchell and Sulphurets Creeks.

PTMA Groundwater Quality Residual Effects

There would be residual effects on groundwater in the form of plumes of degraded water emanating from the TMF and which may affect groundwater quality downstream in North Treaty and South Teigen Creeks.

Significance Analysis

EAO has undertaken the following significance analysis on the residual adverse effects on groundwater.

Table 17: EAO's Significance Analysis for Groundwater

Factor	Rationale
Context	<p>The proposed Project is situated within a wet alpine setting which provides for relatively shallow groundwater levels and strong hydraulic gradients aligned with the topography resulting in abundant groundwater with strong upwelling in valley bottoms. This “artesian” effect is particularly notable in the Treaty/Teigen headwaters.</p> <p>Groundwater provides base flow to streams in valley bottoms, contributing to overall surface water quantity and quality and ultimately supports fish, terrestrial wildlife and people. Groundwater supplies streamflow and affects water quality and temperature, which influences the quality of fish habitat.</p> <p>At the Mine Site, groundwater shows evidence of influence from the sulfide mineralization and is of poor quality in the Mitchell and Sulphurets valleys.</p> <p>Groundwater quality at the PTMA is suitable for aquatic habitat and human consumption. The water is potable and downstream fish habitats support diverse fish species.</p> <p>There are no licenced groundwater users in the LSA. Four groundwater wells were identified within the RSA (two are at Bell II Lodge and another two are at camps). These four wells are located greater than 15 km from the proposed Project and therefore would not be affected.</p>
Magnitude	<p><u>Mine Site</u></p> <p><i>Quantity:</i> The magnitude of groundwater quantity effects is high within the areas adjacent to mine infrastructure (pits, WSF, RSF, underground caves) with water levels and flow patterns changing significantly from baseline. This magnitude would decrease to low at a point downstream of the WSF.</p> <p><i>Quality:</i> The magnitude of residual groundwater quality effects is high immediately down-gradient of all proposed Project components predicted to produce plumes, with most contaminants exhibiting concentrations well beyond the range of natural baseline variability,</p>

	<p>and well above aquatic life guidelines. The magnitude is low to moderate in those areas downstream of the seepage collection facilities as most contaminated groundwater should report to these facilities.</p> <p><u>PTMA</u></p> <p><i>Quantity:</i> The magnitude of groundwater quantity effects is high within the headwaters of Treaty/Teigen Creek as the construction of the TMF is expected to significantly change water levels and flow patterns locally around the TMF. These changes would change markedly from baseline conditions under and near the TMF.</p> <p><i>Quality:</i> The magnitude of residual groundwater quality effects is high for those areas immediately down-gradient of the TMF between the main TMF dams and the seepage collection dams. Considering that the vast majority of contaminated groundwater is expected to report to the seepage collection facilities, the magnitude of groundwater quality effects downstream of the seepage dams is low to moderate.</p>
Extent	<p><u>Mine Site</u></p> <p><i>Quantity:</i> The extent of groundwater quantity effects is considered landscape as the alterations to groundwater flow patterns and water levels would be confined to the immediate catchment basins of the proposed Project footprint. These effects may extend somewhat past the physical footprint of the proposed Project footprint.</p> <p><i>Quality:</i> Groundwater quality effects would be local as plumes from the Mine Site components would extend only a short distance past the physical footprint of the mine infrastructure.</p> <p><u>PTMA</u></p> <p><i>Quantity:</i> The groundwater quantity effects of the TMF are rated landscape because the reduced groundwater flow rates would be limited to the headwaters of the Treaty/Teigen Creek and effects are not expected to influence flows in the mainstreams of Teigen and Treaty Creeks.</p> <p><i>Quality:</i> Groundwater quality effects would be landscape as the plumes emanating from under the TMF dams are expected to report</p>

	to seepage control facilities and not extend further into North Treaty and South Teigen Creeks. Any seepage reporting beyond those facilities is expected to be attenuated by fresh groundwater.
Duration	<p><u>Mine Site</u></p> <p><i>Quantity:</i> Effects are permanent. Water levels would be managed in perpetuity for the Mitchell Pit and Block Cave, the Sulphurets RSF, the Kerr Pit and the WSF.</p> <p><i>Quality:</i> Effects are essentially permanent. Plumes have been predicted to attain steady states, with contact water contributions remaining present possibly for centuries following end of operation.</p> <p><u>PTMA</u></p> <p><i>Quantity:</i> The duration of residual groundwater quantity effects for the TMF would be essentially permanent; water levels would be managed in perpetuity for the TMF. Alterations to flow fields associated with seepage cut-off walls beneath the TMF dams would also be permanent.</p> <p><i>Quality:</i> Plumes have been predicted to attain steady states, with tailings water contributions remaining present possibly for centuries following end of operations.</p>
Reversibility	<p><u>Mine Site</u></p> <p><i>Quantity:</i> Residual groundwater effects at the open pits, the Mitchell Block Cave Mine, the RSFs and the WSF are considered irreversible since water levels at these proposed Project components would be managed into and beyond post-closure. There may be a trend towards recovery of baseline groundwater flow conditions, but full restoration of baseline conditions is not feasible due to continuous loading.</p> <p>The groundwater quantity effects of the Iron Cap Block Cave would be reversible over the long term. Following mining, dewatering of the Iron Cap Block Cave would cease and it would be allowed to flood, restoring unmanaged groundwater flow conditions.</p> <p><i>Quality:</i> Groundwater quality effects are irreversible. Remediation and restoration of baseline conditions is not considered feasible due</p>

	<p>to continuous loading.</p> <p><u>PTMA</u></p> <p><i>Quantity:</i> The groundwater quantity effects of the TMF would be irreversible.</p> <p><i>Quality:</i> Groundwater quality effects are irreversible. Remediation and restoration of baseline conditions is not considered feasible due to continuous loading.</p>
Frequency	<p><u>Mine Site</u></p> <p><i>Quantity:</i> The interactions between proposed Project components and groundwater quantity linked to pit de-watering and water level management would be ongoing or continuous.</p> <p><i>Quality:</i> Contact water loading of down-gradient groundwater would be continuous.</p> <p><u>PTMA</u></p> <p><i>Quantity:</i> Groundwater quantity effects would be continuous.</p> <p><i>Quality:</i> Tailings water loading of down-gradient groundwater would be continuous.</p>

Likelihood

Mine Site

Residual groundwater effects are likely. Pit and block cave dewatering is essential, and water storage and seepage control at the WSF would alter adjacent groundwater flows. The effect pathways are well understood, well documented, and confirmed by hydrogeological modeling and groundwater solute transport modeling.

PTMA

Residual groundwater effects are likely. Water storage and seepage control at the TMF would alter adjacent groundwater flows. The effect pathways are well understood, well documented, and confirmed by hydrogeological modeling and groundwater solute transport modeling.

5.4.5 Significance Determination

Mine Site

Groundwater Quantity and Quality:

EAO has considered the fact that groundwater effects would be confined to the immediate catchment basins of the proposed Project footprint. EAO notes that the magnitude of effects is high in areas adjacent to the mine infrastructure but is low overall. EAO considered the permanence of these effects. EAO considered the lack of licenced groundwater users in the proposed Project area but notes the value groundwater provides to surface water quality and fish and aquatic habitat and notes that the mine infrastructure is located in an area that ultimately flows into the Unuk River which has high fisheries values both in BC and Alaska.

These conclusions have been informed by water management and treatment commitments developed by the Proponent, that EAO has added as conditions, which will ensure that effects will not be greater than predicted. In particular, EAO notes that the Proponent has committed to implementing the following plans: WSF Seepage Management and Monitoring Plan; WMP; ML/ARD Management Plan; and Groundwater Monitoring and Mitigation Plan. EAO recognizes the details of these programs will be considered in greater depth during the *Mines Act* permitting process.

Considering the above analysis and having regard to the conditions for mitigation of groundwater quantity and quality impacts including mine water management identified in the TOC and the CPD (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 quantity and quality at and downstream of the Mine Site.

PTMA

Groundwater Quantity and Quality:

EAO notes that the magnitude of effects is high in areas adjacent to the TMF infrastructure but is low overall and that any effects that do occur are likely to be permanent. EAO has considered the lack of licenced groundwater users in the proposed Project area but notes the value groundwater provides to surface water quality and fish and aquatic habitat, particularly as the TMF is located in an area that ultimately flows into the Nass River, a river system with high fisheries values.

These conclusions have been informed by water management and treatment commitments developed by the Proponent, and added as conditions by EAO, which will ensure that effects will not be greater than predicted. In particular, EAO notes that the

Proponent has committed to implementing the following plans: TMF Management and Monitoring Plan; WMP; ML/ARD Management Plan; and Groundwater Monitoring and Mitigation Plan. EAO recognizes the details of these programs will be considered in greater depth during the *Mines Act* permitting process.

Considering the above analysis and having regard to the conditions for mitigation of groundwater quantity and quality impacts including water management identified in the TOC and the CPD (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 quantity and quality at and downstream of the PTMA.

5.4.6 Cumulative Effects

EAO considered cumulative effects on groundwater from past, current and proposed projects. The proposed Snowfield Mine pit is the only project located close enough for an interaction with the proposed Project. Plumes could emanate from the Snowfield Mine pit and waste rock dumps and interact with plumes emanating from the proposed Project components in the Mitchell Creek Valley. Mixing of plumes may increase contaminant loads (e.g. dissolved metals concentrations) in groundwater within the Mitchell Creek catchment basin. Due to the lack of information regarding any plans for the Snowfield Mine, this cumulative effect is not considered further in the cumulative effects assessment.

5.4.7 Certainty

Groundwater Quantity

Mine Site and PTMA

EAO considers the certainty related to predicted groundwater quantity effects as being moderate to high. Effects were predicted by a model calibrated by water level measurements taken in large numbers of installed wells and piezometers over a four year period, and by detailed measurements of low flows in streams. Sensitivity analysis was conducted in “worst-case” simulations to account for uncertainty in the permeability of geological materials and groundwater recharge rates. Results from modeling the “worst-case” scenarios were consistent with base case results and showed that predicted results were robust. EAO does recognize that there is an inherent uncertainty in all models, specifically those which predict the future effects on groundwater. EAO notes the Proponent has made reasonable efforts to address these inherent uncertainties in their responses to reviewer questions and through the development of the Groundwater Monitoring and Mitigation Plan.

Groundwater Quality

Mine Site

The certainty in groundwater quality effects ranges from moderate to high depending on the proposed Project component. For all components except the WSF the certainty is high as the cause-effect relationship between the proposed Project and its interaction with current conditions is supported by good data, modeling and scientific analyses. The analyses included worst-case scenario simulations to account for uncertainty in the permeability of geological materials and groundwater recharge rates. Plume extents predicted by the “worst-case” scenarios are consistent with base case predictions, and calibration correlated closely with field measurements.

EAO notes that the level of certainty related to groundwater effects associated with the WSF is moderate or moderately low. The Proponent observed some fractures in the WSF foundation, indicating that areas of high-conductivity groundwater flow paths could be present and could have effects that cannot be fully characterized by field observations or captured in a quantitative model. This uncertainty is also discussed in the water quality section of this report.

PTMA

EAO considers the certainty related to groundwater effects for all PTMA components to be high. The Proponent’s models have demonstrated a good understanding of the cause-effect relationship between the proposed Project and its interaction with current conditions and these models are supported by very good baseline datasets and scientific analyses. The analyses included worst-case scenario simulations to account for uncertainty in the permeability of geological materials and groundwater recharge rates. Plume extents predicted by the “worst-case” scenarios are consistent with base case predictions, and calibration correlated closely with field measurements. EAO is also aware that a range of additional engineering mitigations can be undertaken to control groundwater effects. These include grouting, additional seepage control facilities and water collection wells.

5.4.8 Conclusion

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 quality and/or quantity.

5.5 Fish and Aquatic Habitat

5.5.1 Background Information

For the fish and aquatic habitat assessment, the following VCs were selected:

- Dolly Varden;
- bull trout;
- rainbow trout/steelhead;
- Pacific salmon (coho, sockeye, chinook); and
- aquatic habitat.

In addition to desktop studies, the Proponent conducted five years of baseline studies.

The LSA covers 34,198 ha, encompassing watersheds in the immediate area of the proposed Project with a potential for direct effects within, and immediately downstream of the proposed Project footprint, including the following sub-watersheds: the mainstem Unuk River and Coulter, Gingras, Kaypros, McTagg, Mitchell, Sulphurets and Ted Morris Creeks, and the mainstem Bell-Irving River and North Treaty, Snowbank, South Teigen, Teigen, Treaty and Tumbling Creeks.

The RSA covers an area of 70,876.4 ha, and includes portions of watersheds both downstream and upstream of the proposed Project footprint with a potential for direct effects. The downstream RSA boundaries are placed immediately downstream of the Treaty/Bell-Irving confluence, and on the Unuk River at the Canada/US Border. The RSA includes, in addition to the LSA sub-watersheds West Teigen Creek.

Dolly Varden is the only species present in those reaches of North Treaty and South Teigen Creeks, which lie within the footprint of the proposed TMF. On the Mine Site there are no fish species present upstream of the Sulphurets Creek cascade.

Table 18 identified the VCs, the watersheds they are present in and the types of habitat within the watersheds.

Table 18: Fish and Aquatic Habitat VCs, Watersheds and Habitat Types

VC	Watersheds/ sub- watersheds	Habitat
Dolly Varden	North Treaty	Rearing, spawning and overwintering habitat.
	South Teigen	Rearing and overwintering habitat; and Spawning, fry-rearing and parr-rearing habitat in tributaries.

VC	Watersheds/ sub- watersheds	Habitat
	Other RSA Listed Watersheds*	Rearing habitat, spawning and overwintering habitat.
Bull trout	South Teigen	Spawning at two localized sites below falls; and Rearing and overwintering habitat.
	Teigen	Rearing, spawning and overwintering habitat.
	Treaty	Rearing and overwintering habitat; and Spawning in tributaries.
	Bell-Irving River	Rearing and overwintering habitat; and Spawning in tributaries.
Rainbow trout/ steelhead	South Teigen	Rearing and overwintering habitat.
	Teigen	Support summer-run steelhead populations; and Rearing, spawning and overwintering habitat.
	Treaty	Support summer-run steelhead populations; Rearing and overwintering habitat; and Spawning habitat in tributaries.
	Bell-Irving River	Rearing and overwintering habitat; and Spawning in tributaries.
Pacific salmon (Coho, Sockeye, Chinook)	Teigen	Rearing, spawning and overwintering habitat.
	Treaty	Rearing and overwintering habitat; and Spawning in tributary of Treaty Creek.
	Bell-Irving River	Rearing and overwintering habitat; and Spawning in tributaries.
	Unuk River	Rearing, spawning and overwintering habitat.
Aquatic Habitat	All watersheds	Sediment quality – slightly alkaline in most streams; Mean concentrations of naturally-occurring arsenic, copper, iron, manganese

VC	Watersheds/ sub- watersheds	Habitat
		<p>and nickel in all watersheds, including reference watersheds, exceed levels set in federal and provincial sediment quality guidelines.</p> <p>Periphyton - Periphyton biomass, dominance, species richness, and diversity was typically low in the mine site area, but was higher in the PTMA.</p> <p>Benthic Invertebrates - Overall, the density, dominance, richness, and species diversity of benthic invertebrates was spatially and temporally variable across the RSA, but was often lower in the mine site area than in the PTMA.</p>

* Except McTagg, Mitchell, Ted Morris, Gingras, and Sulphurets watersheds (upstream of the Sulphurets Creek cascade), where no fish are present.

A full discussion on Fish and Aquatic Habitat can be found in the Proponent's Application posted to EAO's website at:

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35958.html

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

The Application identified the following proposed Project key potential effects on fish and aquatic habitat VCs.

Water Quality Degradation

Water quality degradation could occur during all proposed Project phases and has the potential to affect both fish and aquatic habitat. The main ways in which water quality degradation could occur due to the proposed Project include:

- ML/ARD from non-point sources or effluent discharge (point sources);
- petroleum product spills;
- blasting residues or sewage treatment plant effluent; and
- other chemical toxicity.

The Application reports that point sources of metals are expected to occur as a result of discharges from the TMF or the Mine Site WTP. Metals that may be present in effluent discharge were identified as the most important pathways through which water quality degradation effects could affect fish and aquatic habitat and were the focus of the effects assessment. Without mitigation, exposure to metals (or other contaminants) could result in a range of potential effects on fish and aquatic resources, from lethal to sublethal effects.

The Application reports that chemicals used in ore processing or water treatment may be released in effluent discharged from the TMF or the Mine Site WTP, or through accidental spills. These chemicals have the potential to cause toxicity in fish and aquatic invertebrates, provided that they are present in high enough concentrations for enough time to affect fish or aquatic organisms.

Spills of diesel fuel or lubricant associated with proposed Project traffic, use of mechanized equipment and fuel storage areas could enter aquatic habitat directly or in runoff. Contact with petroleum products may cause physiological or behavioral changes in fish and aquatic invertebrates, as well as loss of productive habitat capacity.

The use of explosives and disposal of effluent from sewage treatment plants at camps could introduce nitrogenous compounds and phosphorus into the aquatic environment which has the potential to cause toxicity or alteration in the productivity of the aquatic environment.

Habitat Loss and Alteration

Fish habitat loss may entail complete removal or alteration of riparian and instream habitat, loss of productive capacity, fish passage restrictions and altered water quantity. The construction, operation, maintenance, and closure of access roads, transmission lines, TMF, dams, mine pits, RSFs and hydroelectric power (HEP) facilities have the potential to cause aquatic habitat loss and alteration. For example, TMF water management may affect productivity of non-fish aquatic life by altering discharge rates, modifying the wetted width available for aquatic life colonization, as well as nutrient loading rates. The development of the access roads and transmission line could cause sedimentation, riparian zone disturbance, and changes in channel morphology. The installation of dams may alter both the amount of sediment available for transport and the ability of the channel to transport sediment potentially affecting recruitment for fish spawning or reducing usable spawning habitat.

The development of the TMF would remove riparian habitat from streams in the North Treaty and South Teigen watersheds. Riparian vegetation performs numerous functions, including shading, stabilizing stream banks, controlling sediments, contributing large woody debris and organic litter, and regulating the composition of

nutrients.

TMF water management could affect downstream stream temperatures. Increases in surface water temperature beyond diurnal or seasonal averages could accelerate embryo development, alter the timing of emergence, growth and downstream migration of juveniles, reduce metabolic efficiencies of food conversion into growth, alter adult spawning migration and spawning timing, increase susceptibility to disease and undermine the competitive advantage of salmonids over non-salmonid species.

Mine Site water management could have several potential effects on downstream non-fish bearing aquatic habitats. Instream and riparian habitat would be lost within the non-fish bearing McTagg, Mitchell, and Gingras Creeks due to water diversions.

The WSF would alter downstream aquatic habitat in Sulphurets Creek by potentially decreasing the supply of organic matter, benthic invertebrates and sediments from its catchment. The WSF would act as a sedimentation pond, and by settling of suspended solids, would decrease the movement of sediments from the Mitchell watershed and the McTagg RSF into Sulphurets Creek.

Other Potential Effects on Fish and Aquatic Habitat

Three other potential effects on fish and aquatic resources were discussed in the Application, including:

Direct mortality: could be linked to increased fishing pressures, interactions with construction machinery and other events that cause immediate or near-immediate death in fish (e.g. sedimentation that smothers embryos). Proposed Project activities that may be associated with direct mortality effects include construction of the access roads, transmission line and the TMF.

Noise: loud noise associated with blasting near watercourses can potentially cause physical damage to fish eggs, larvae, juveniles and adults and tissue damage affecting the swim bladders of fish. Noise pollution caused by construction machinery and blasting may affect fish behaviour. The Application states that construction of the access roads, transmission line and TMF would be associated with blasting activities and sustained construction noise affecting fish and aquatic habitat.

Erosion and Sedimentation: could increase turbidity causing the smothering of primary and secondary producers at various life stages, reduced visibility, diminished feeding efficiency, increased exposure to elevated metal concentrations, and lead to habitat avoidance by aquatic organisms. Potential proposed Project-specific sources of erosion and sedimentation include construction of access roads, transmission line, TMF, tunnels, RSFs, pits, WSD, camps and diversion ditches.

Summary of Mitigation Proposed in the Application

The Application outlined the Proponent's mitigations to address effects to fish and aquatic habitat including a range of mitigation measures incorporated into proposed Project design elements as well as specific operational policies. The Proponent has proposed effects monitoring in the AEMP to detect alterations to the receiving environment including changes to sediment quality or effects on aquatic life and fish, and implementing adaptive management strategies, where warranted.

Proposed mitigation measures to address effects include:

- prohibiting employees and contractors from engaging in fishing while present at the proposed Project site;
- deactivating non-essential roads at closure;
- developing and implementing site-specific riparian management prescriptions and riparian vegetation maintenance plan/prescriptions to guide transmission line construction and maintenance activities;
- implementing sediment control measures (e.g. silt fences surrounding waterbodies), and repairing areas that are potential sediment sources in a timely manner;
- installing settling ponds to intercept runoff from areas outside the WSF catchment during construction;
- installing aeration systems within the temporary construction-phase WTPs to increase ammonia volatilization, thereby decreasing loadings in downstream receiving environments generated by explosives use;
- installing a high-density sludge lime WTP at the Mine Site to treat contact water stored in the WSF to reduce concentrations of some metals, total suspended solids and some ions, as well as adjusting the pH from acidic to a more neutral pH;
- reducing selenium concentrations in contact water at the Mine Site, backfilling the Sulphurets Pit with Kerr Pit waste rock, and covering the material with liners to reduce infiltration rates;
- directing drainage from the backfilled Sulphurets Pit to an ion exchange SeTP for treatment, prior to pumping to the Mine Site WTP for further treatment;
- routing TMF discharge into Treaty from North Treaty Creeks during TMF operations;
- planting riparian vegetation around diversion tunnels, channels, and ditches on both the northeast and southwest sides of the TMF, to protect against temperature increases in these water conduits, and offer some new aquatic habitat for colonization during construction and operations;
- decommissioning diversion structures on the northeast side of the TMF during

closure and post-closure, allowing natural drainage into the reclaimed TMF;

- converting the TMF from a wetland and stream habitat to a lake-type habitat during closure and post-closure; and
- developing the two seepage recovery ponds located downstream of the TMF dam, as far as possible, into small lakes suitable for aquatic invertebrates during closure and post-closure.

Fish Habitat Compensation Plans

The Proponent developed two Fish Habitat Compensation Plans as required under Section 35(2) of the *Fisheries Act Regulations* and the MMER: the first is to offset loss of the productive capacity of fish habitat linked to construction and operation of the TMF dams, road crossing structures, transmission line crossings and water quantity reductions in South Teigen and North Treaty Creeks downstream of the TMF dams; and the second is to offset loss of the productive capacity of fish habitat linked to the deposit of deleterious substances within fish-bearing watercourses beneath the footprint of the proposed TMF and related seepage collection ponds. Both plans were developed with input from the Working Group and target Dolly Varden habitat with benefits to other salmonid species, such as coho salmon.

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 CPD and TOC (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:

- MOE, Gitanyow Nation and Tahltan Nation raised concerns regarding the Proponent's bioaccumulation model in relation to the selenium thresholds as some sampling stations and fish tissue levels were above provincial guidelines at baseline.

MOE required the Proponent to describe the potential effects of long-term exposure to elevated selenium on invertebrates, fish and birds. MOE was particularly concerned with the potential for selenium concentrations and loadings to be underestimated in the Proponent's ground and surface water quality model predictions and the potential for the residual effects to water quality and fish to be greater than predicted.

Gitanyow Nation stated the Proponent should develop additional mitigation measures now to be included in the AEMP as adaptive management, should elevated selenium levels be detected in the future during operations.

- The Proponent responded that the AEMP includes sampling of water, sediment, primary producers, and secondary producers (including tissue metals), with fish sampling to occur as per MMER requirements. The Proponent asserted the monitoring program was designed to ensure the collection of data that may be required in the future if bioaccumulation

modeling is needed and adaptive management strategies would be implemented, depending on the results of monitoring.

- The Proponent stated that additionally, guidelines for the receiving environment are established to protect the most sensitive species and lifestage in the most sensitive environments. However, there is no shared, consistent toxicity threshold that is common to all species when exposed to selenium. Species-specific dose-response thresholds make it difficult to put in place a single, universal guideline that is protective of aquatic life. Based on the available information, the Proponent stated that toxicity is not likely to occur in cold water fish species with the body burden that was measured in Dolly Varden.
- The Proponent responded that bioaccumulation of selenium in fish is not predicted to reach levels harmful to fish, fish-eating wildlife or to the health of humans consuming fish originating from rivers downstream of the proposed Project.
- The Proponent provided additional details in the SeMP, developed during the Application review in response to review comments, including a plan to address uncertainty associated with the potential bioaccumulation of selenium. A long-term objective of the plan is to establish the relationship between fish tissue metal (selenium) concentrations and benthic tissue metal (selenium) concentrations. If a relationship can be established between fish and benthic tissue metal concentrations, then annual monitoring of benthic tissue metals would provide an 'early-warning' or trigger that concentrations of metals in the aquatic environment are changing.
- Adaptive management measures described in the SeMP include implementation of additional/ new engineering controls or measures, alteration in water management, water treatment, risk assessment, and additional, more targeted monitoring.
- MOE provided comments on the draft SeMP noting that the plan does not address the risk to salmon species posed by high baseline tissue concentrations of selenium and potential effects on the lower Unuk River. MOE and Gitanyow were concerned about the effects of selenium loadings that would be discharged into the Unuk, Bell-Irving and Nass watersheds over the life of the proposed Project and the potential for selenium to bioaccumulate. MOE specifically noted the Unuk River estuary and Gitanyow noted the Nass estuary, both of which are fish rearing areas and potential deposition zones.

- The Proponent responded indicating that salmon species (coho) in the Unuk River do not have elevated baseline tissue concentrations of selenium. The mean concentration of selenium in coho salmon collected from four sites in the Unuk River in 2013 was between 1.79 and 3.04 mg/kg dry weight, which is below the tissue residue guideline of 4 mg/kg dry weight.
- The Proponent responded that the SeMP outlines a monitoring framework that includes sampling of water, sediment and tissue residues that would apply to both the Unuk River and to waterways downstream of the proposed TMF.
- The Proponent committed to implement the SeMP prior to construction of the proposed Project.
- MOE was concerned that there could also be an enhanced uptake of selenium and perhaps mercury by aquatic insects and into fish and wildlife that eat insects or fish that was not assessed by the Proponent.
 - In response, the Proponent stated that it is possible that increased productivity in streams may allow for increased uptake of selenium into the food chain, although it is not certain that increased productivity will occur since other factors may also control biomass (e.g. water temperature, water flow, availability of other micronutrients, etc.). The proposed monitoring in the AEMP includes the measurement of periphyton biomass and community structure, and benthic invertebrate community structure and tissue metal analysis. These monitoring programs would identify changes in productivity, as well as any changes in selenium uptake into the food chain via the aquatic environment.
 - The AEMP is a condition of the EA Certificate.
- MOE was concerned with the baseline mercury exceedances in Dolly Varden fish tissue in the Unuk River, North Treaty Creek and South Teigen Creek (maximum fish tissue residues measured during baseline studies). MOE required additional information from the Proponent to determine potential effects including bioaccumulation of mercury. MOE required the Proponent to provide effects assessments of all COPC that are predicted to exceed BCWQG including the predicted elevated copper concentrations in the Unuk River and Sulphurets Creek.

Gitanyow Nation was also concerned about potential impacts of copper in Treaty Creek salmon and questioned why copper wasn't considered by the Proponent as a COPC in their assessment.

- In response the Proponent submitted additional information regarding all COPC including mercury and copper. The Proponent stated mercury water concentrations in the PTMA and in the Unuk River downstream of the Mine Site are not expected to change significantly relative to baseline, and changes in mercury bioaccumulation is not expected in the receiving environment downstream of the TMF or the Mine Site. Therefore, the Proponent concluded that the baseline mercury tissue residue guideline exceedance is not a proposed Project-related effect and mercury was scoped out from further assessment in the EA.
- Similarly, the Proponent prepared additional information for copper and aluminum indicating that the predicted concentrations exceed guideline concentrations, but was similar to or lower than baseline concentrations. Therefore, neither dissolved aluminum nor total copper were selected as COPCs and were not assessed further because there are no predicted proposed Project-related effects on concentrations of these metals at either the PTMA or Mine Site.
- MOE, FLNR, Fisheries and Oceans Canada (DFO) and NLG noted a number of uncertainties with the Proponent's fish salvage program which includes salvage of the Dolly Varden from the TMF area and relocating them into Treaty Creek. DFO was concerned that there may not be a sufficient amount of existing habitat in Treaty Creek to support both the existing population of Dolly Varden and the relocated fish from the TMF and suggested the Proponent construct the fish compensation habitats in Treaty and Teigen Creeks in advance of fish salvage. NLG suggested the Proponent consider relocation to underutilized, clear water habitat within the Upper Bell-Irving watershed. MOE and NLG required the Proponent to implement a post transfer monitoring program to evaluate the success of the re-location strategy.
 - Based upon KSM Fisheries Working Group recommendations on November 15, 2013, the Proponent conducted further assessment of the relocation strategy for Dolly Varden to ensure that all potential relocation options are considered and evaluated. This assessment included a risk assessment to assess the specific risks associated with relocating Dolly Varden from the TMF in North Treaty and South Teigen Creeks to other waterbodies within Teigen and Treaty watersheds.
 - The results of the environmental risk analysis indicate the waterbody options of least risk for Teigen and Treaty watersheds; Hodkin Lake was identified as the preferred option in the Teigen Watershed; and Treaty Creek is the preferred option in the Treaty Watershed.

- The Proponent committed to monitoring Dolly Varden relocation following a Before-After-Control-Impact experimental design.

NLG raised additional questions regarding the Proponent's fish salvage program which the Proponent responded to in an additional [memo](#).

FLNR stated that generally, it does not see a significant advantage to the fish salvage operation. It is unlikely that salvaging fish would result in the preservation of any unique genetic diversity, nor will it permanently increase the productivity of Hodkin Lake or Treaty Creek.

- EAO added a condition that the Proponent must implement a Fish Salvage Plan that will describe how the effectiveness of the Fish Salvage Plan will be evaluated.
- DFO recommended that the Proponent's proposed water temperature monitoring program within the TMF and in the receiving watercourses be implemented during those times when the TMF would have the highest likelihood of affecting the water temperature in the receiving environment (e.g. during those times when it is discharging the greatest amount of water into South Teigen (years greater than 45), North Treaty Creek (Years 30 to 45 and greater than 56), and Treaty Creek (during TMF development and Years 45 to 50).

NLG also wanted the Proponent to continue water temperature monitoring in North Treaty, Treaty, South Teigen and Teigen Creeks for the life of the mine, including closure and post closure as part of the AEMP.

- In response, the Proponent committed to monitor water temperatures in North Treaty, Treaty, South Teigen and Teigen Creeks for the life of the mine, including closure and five years post closure as part of the AEMP.
- NLG, Gitanyow Nation and Tahltan Nation were concerned about potential impacts to salmon including impacts from reduced water quantity in Teigen Creek (and potential impacts to spawning Chinook). Tahltan Nation was particularly concerned about potential impacts to the high value fisheries in the Teigen Creek and North Treaty Creek areas and the adequacy of the AEMP to protect the fish species in these areas.

Tahltan Nation requested the Proponent commit to a salmon management plan to protect the salmon species within the Bell Irving River system.

- The Proponent responded that they have committed to monitoring fish and aquatic habitat in the AEMP, which includes the Bell-Irving and Unuk River watersheds. In addition to this program, the Proponent has committed to monitoring Teigen Creek salmon through the implementation of a program to verify the predictions of the effects assessment. This program will

include monitoring of adult returns, juvenile abundance in relation to flow, gravel/bedload transport and supply, hydrology, and water temperatures.

- Gitanyow Nation submitted a number of reports regarding sublethal effects of metals and non-metals on salmon. The reports stated that the Application lacked scientific information regarding metal toxicity effects on salmonids including sub-lethal effects to fish. Gitanyow Nation stated that without adequate information, it is impossible to accurately assess harm of the proposed Project on salmon and biota within the salmon food-web.

Gitanyow Nation stated that Teigen and Treaty Creeks, and the Bell Irving River, all in close proximity to the TMF, are vulnerable to ML/ARD effects. These streams support important populations of Nass River salmonids. Gitanyow Nation was very concerned that these potential impacts from the TMF would diminish salmonid availability not only in and around Teigen and Treaty Creeks but in the Bell Irving and Nass Rivers. Gitanyow Nation stated these fish form part of their constitutionally protected aboriginal fishing rights.

Gitanyow Nation recommended the Proponent develop and conduct an effective biotic response monitoring program to determine post proposed Project adverse effects to fish abundance and biomass.

- In response to Gitanyow Nation's report, the Proponent submitted a review of the potential for metals from the TMF to affect salmonids in Treaty and Teigen Creeks. This report concludes that the COPC screening conducted by the Proponent followed standard risk assessment approaches as recommended by MOE and EC and used a reasonable approach to evaluate if predicted concentrations exceed baseline concentrations.
- The Proponent noted that sublethal effects of metals were considered in the Application for fish and aquatic habitat. The Proponent's assessment of not significant (minor) effects due to water quality degradation considered the potential for sublethal toxicity and concluded that the potential for chronic sublethal effects that are proposed Project-related is unlikely since concentrations are predicted to be below toxicity thresholds. In addition, predicted metal concentrations are similar to baseline metal concentrations downstream of the TMF, so the proposed Project is not likely to lead to residual effects that are different than what is currently occurring under natural conditions.

MOE reviewed the reports submitted by the Proponent and Gitanyow Nation with respect to potential metal toxicity from the PTMA and presented their conclusions in a letter to EAO. MOE agreed with the Gitanyow Nation report in that the Application does not assess predicted changes in dissolved metal concentrations

to levels above water quality guidelines, even if total metals show little change. MOE stated that this creates uncertainty in the assessment results and conclusions for aquatic effects.

MOE stated that sediment contaminant loadings and downstream effects to Treaty Creek, Bell-Irving River and Nass River should be addressed through the Proponent's proposed AEMP, required through *Environmental Management Act* permitting. MOE recommended monitoring to assess potential changes to fish behavior such as the avoidance of spawning areas due to chemical stresses relating to tailings seepage and effluent.

After considering the Application and the Proponent's subsequent Hazard Quotient memo, MOE concluded that uncertainty remains as to the potential effects of contaminants predicted to be discharged from the PTMA because assessments are lacking for metals that were inappropriately screened out.

EC commented that the methods used to assess sub-lethal toxicity to salmonids, along with the results presented in the Application are acceptable and consistent with expectations set out in the AIR.

- As discussed in section 5.2.3, EAO re-reviewed the information presented in the Application, the subsequent December 19, 2013 memo from the Proponent on hazard quotient methods, additional information from the Proponent on the baseline and predicted concentrations of COPCs which were screened out using the alternative screening method, and Working Group comments. As a result of this re-review, [EAO concluded](#) that the Proponent's decision to not carry these COPCs into the effects assessment was appropriate at the EA level. EAO recognizes that additional information may be required by MOE at the *Environmental Management Act* permitting stage with respect to this issue should an EA Certificate be issued for the proposed Project.

DFO submitted a [letter](#) on April 9, 2014, providing a summary of DFO's understanding of the relative importance or value of Teigen, Treaty or Bell-Irving salmon to the Nass River fishery, as follows:

- Sockeye: In general, Teigen and Treaty Creeks have low productive capacity for sockeye and currently produce very few sockeye. The importance of these systems as sockeye production areas would be considered low.
- Chinook: The Bell-Irving River is an important chinook producer, with Teigen Creek being an important contributor to the Bell-Irving. Treaty Creek appears to be much less important than Teigen Creek, with low chinook production.

- Coho: The Bell-Irving River is an important coho producer. Coho information specific to Teigen and Treaty Creeks is very limited. However, it is recognized that these tributaries provide important rearing habitat for Nass coho.

Gitanyow Nation continued to express concerns with the information presented by reviewers and the Proponent stating that they underrepresent the fisheries values of Teigen and Treaty Creeks.

- NLG was concerned about the potential for effects on aquatic communities due to changes in nutrient loadings to Teigen and Treaty Creek.
 - In response the Proponent noted that the AEMP outlines the following monitoring for aquatic resources: monitor primary and secondary producers annually during the operation phase for biomass and community structure, and analyze benthic invertebrate tissue metals; similar monitoring will be conducted during the first 10 years after the operation phase (i.e. closure/post-closure phases) for benthic invertebrates at sites not subject to MMER or *Environmental Management Act* discharge permits.
 - The Proponent stated that further discussion of the AEMP will be done during the permitting phase, in consultation with regulatory agencies and NLG in order to ensure that ongoing monitoring proposed under the AEMP is conducted in a manner that ensures regulatory compliance.
- United States Department of the Interior asserted that the Proponent should have conducted an analysis of potential proposed Project-related impacts on oolichan and each salmon species found in the Unuk River and the subsistence fisheries associated with those species and proposed mitigation measures for effects.

The State of Alaska was concerned about the potential elimination of fish habitat in BC watersheds that drain to Alaska, and the impact downstream to Alaskan fishery resources and water quality.

- In response the Proponent noted that the AIR did not require study of Chum Salmon, Pink Salmon, and oolichan as they are not found in the RSA. Further, during the review of the draft AIR, EAO and DFO determined that other species such as Dolly Varden, Bull trout, rainbow trout/steelhead, and Pacific salmon were sufficient to determine if there is any potential for adverse effects on downstream oolichan populations.
- Further the Proponent stated that significant residual effects were not predicted for fish and aquatic habitat due to water quality degradation downstream of the PTMA (i.e. Nass watershed) or the Unuk River downstream of the Mine Site.

- NLG stated the increased fishing pressure from simply enabling more people to be aware of the resource and access it off duty is not fully mitigated. NLG requested the Proponent to commit to assist in enhanced fishery monitoring of anglers in the Bell-Irving watershed.
 - The Proponent responded that mitigation measures to control access to fisheries resources by mine employees/contractors on the proposed Project site are proposed. However, monitoring of anglers in the Bell-Irving watershed falls under provincial and federal jurisdiction.

NLG responded that BC and Canada have diminishing resources to enforce fishing in the Bell-Irving watershed and there is currently no monitoring program. NLG noted that through the NFA Joint Fisheries Committee NLG strives to protect fish resources in the watershed and funding is a bottleneck to a proper monitoring program.

- MOE, NLG and Gitanyow Nation stated that sediment toxicity monitoring should have been included in baseline studies and should be included in the Proponent's AEMP.
 - In response, the Proponent stated that sediment toxicity testing was not conducted as part of baseline studies as it was not a requirement of the AIR and is not recommended by the "BC Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (2012)".
 - The AEMP will be discussed and confirmed by MOE, EC and the Proponent during the permitting process for the scope of activities required to construct and operate the mine.
 - The SeMP will include lentic¹⁴ and lotic¹⁵ habitat mapping. This mapping will contribute to an understanding of potential sediment depositional areas downstream of the TMF and WSF.
 - In response to a recommendation by NLG, the Proponent added additional sediment sampling sites and benthic invertebrate sampling on the Bell-Irving River up and downstream of Treaty Creek in the SeMP.

¹⁴ Lentic refers to of, relating to, or living in still water.

¹⁵ Lotic refers to of, relating to, or living in moving water.

5.5.4 Residual Effects Significance Evaluation

Mine Site

The key residual effects are due to water quality degradation (i.e. the potential for toxicity due to bioaccumulation of selenium in the fish VCs; Dolly Varden, rainbow trout/steelhead, and Pacific salmon) and non-fish bearing aquatic habitat loss.

PTMA

Residual effects are related to water quality degradation (i.e. the potential for toxicity due to bioaccumulation of selenium in the fish VCs; bull trout, Dolly Varden, rainbow trout/steelhead, and Pacific salmon) and habitat loss and alteration in the PTMA.

The TMF North and South dams, Saddle Dam, seepage dams, waste piles and Treaty Creek pipeline outlet would lead to a loss of fish habitat in the Treaty, North Treaty and South Teigen watersheds. These stream fish habitat losses and wetland fish habitat losses are summarized in table 19 below. Dolly Varden is the only species present within the TMF. A total of 69 fish-bearing streams and six fish-bearing wetlands would lose habitat in the proposed TMF development.

Table 19: Stream Fish Habitat and Wetland Fish Habitat Losses in the PTMA

	Area Lost (m ²)	Percentage of LSA
Stream Habitat Loss	117,549	0.001
Wetland Fish Habitat Loss	11,556	0.1
Total	129,105	0.1

A total area of 89,590 m² (8.96 ha) of stream and wetland fish habitat would be lost from South Teigen and North Treaty watersheds as a result of the deposit of deleterious substances into the proposed TMF and seepage collection ponds. A total area of 39,515 m² (3.95 ha) of stream and wetland fish habitat would be lost from TMF and seepage pond dams, TMF waste piles and Treaty Creek pipeline outlet.

In addition to the direct loss of habitat, the proposed dams would prevent fish movement to upper reaches of North Treaty and South Teigen watersheds. Specifically, the reach in South Teigen Creek between the falls and the seepage collection dam would be isolated. This reach of South Teigen Creek is limited in low gradient tributaries that Dolly Varden would use for spawning habitat. Rearing and overwintering habitat are not limited in the mainstem reaches. The long-term longevity and/or abundance of this

isolated Dolly Varden population may decline due to the loss of tributary spawning habitat in the upper watershed.

Access Roads and Transmission Line

In addition, residual effects on fish and aquatic habitat are predicted from fish habitat loss and alteration due to construction of the access roads and the transmission line. Proposed Project access roads are expected to remove 1,108 m² of fish habitat through the installation of bridge piers, culverts, and rip-rap. The transmission line would result in the alteration of 9,000 m² of riparian habitat from clearing activities. Dolly Varden is the primary affected fish species from access roads and transmission line construction.

Other Residual Effects

Other residual effects include:

- streamflow alteration in North Treaty Creek, South Teigen Creek, Teigen Creek and Treaty Creek;
- reduction of sediment transport in South Teigen and Teigen Creeks; and
- TMF-related water temperature effects on fish and aquatic productivity.

EAO has undertaken the following significance analysis on the key residual adverse effects on fish and aquatic habitat.

Table 20: EAO's Significance Analysis for Fish and Aquatic Habitat

Factor	Rationale
Context	<p><u>Mine Site</u></p> <p>Elevated metal concentrations, including selenium and copper, occur naturally in the water and sediments of the LSA and RSA due to the presence of mineral-rich deposits, often at concentrations exceeding federal and/or provincial water quality guidelines for the protection of aquatic life. These streams have poor aquatic resource productivity.</p> <p>No fish are located in Mitchell or Sulphurets Creeks upstream of the cascades on Sulphurets Creek. A small section of Sulphurets Creek between the cascade and the Unuk River has some resident Dolly Varden.</p> <p>The Unuk River crosses the BC-Alaska Border 35 km downstream of the proposed Mine Site. The Unuk River supports all five Pacific salmon species and oolichan making it an important sustenance</p>

	<p>and commercial fishery river to BC First Nations and federally registered tribes in Alaska.</p> <p><u>PTMA</u></p> <p>Some baseline metal concentrations exceed BCWQG in all PTMA watersheds, except Teigen Creek, due to upstream mineralization and glaciation processes.</p> <p>Dolly Varden is the only species present in the reaches of North Treaty and South Teigen Creeks which lie within the footprint of the proposed TMF. Dolly Varden, bull trout, mountain whitefish and rainbow trout are present in South Teigen Creek, downstream of a 2.5 m high falls and outside of the proposed TMF footprint.</p> <p>Teigen and Treaty Creeks have valuable salmon habitat. Teigen and Treaty Creeks support steelhead and Pacific salmon species including coho, sockeye and chinook. Teigen Creek supports important chinook populations. Snowbank Creek, a sub-watershed of Teigen Creek, supports important coho populations. Todedada Creek, a sub-watershed of Treaty Creek, supports important coho populations. Teigen Creek and Todedada Creek support riverine sockeye populations. These creeks in turn drain into the Bell-Irving River, which in turn drains into the Nass River. The Bell-Irving River is an important chinook and coho producer, with Teigen Creek being an important chinook contributor to the Bell-Irving (Teigen Creek comprises approximately 42% of the Bell-Irving River chinook salmon stocks, and approximately 8% of the total Nass River chinook salmon stocks). Coho information specific to Teigen and Treaty Creeks is very limited. However, it is recognized that these tributaries provide important rearing habitat for Nass coho.</p> <p>Steelhead are known to inhabit Teigen and Treaty Creeks in densities high enough to support annual recreational and angler guided fisheries.</p> <p>The Nass River support important populations of oolichan, all five species of Pacific salmon and other salmonids, such as steelhead and trout. The Bell-Irving River supports Pacific salmon. Access to healthy populations of these fish are a treaty right of the Nisga'a Nation and support aboriginal rights fisheries for other First Nations such as the Tahltan, Gitksan and Gitanyow Nations. These fish also</p>
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	contribute to valuable commercial fisheries.
Magnitude	<p><u>Mine Site</u></p> <p><i>Water Quality Degradation:</i> The magnitude for water quality degradation effects on the fish and aquatic habitat VCs is moderate, linked to predicted elevated selenium concentrations downstream of the Mine Site WTP in all proposed Project phases except construction. Concentrations of selenium in water and sediment are predicted to increase relative to baseline concentrations in lower Sulphurets Creek, but would meet BCWQG at UR1 and UR2 on the Unuk River. Fish tissue selenium residues of Dolly Varden in Sulphurets Creek already exceed the BC tissue residue guideline, and increases in water selenium concentrations will likely lead to increases in selenium in fish tissue and aquatic life.</p> <p>Other metals, such as copper, lead, cadmium and zinc are predicted to improve in Sulphurets Creek and the Unuk River due to proposed water treatment and the elevated baseline metal levels.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i></p> <p>Streamflow in Sulphurets Creek or the Unuk River is not predicted to be substantially altered based on hydrological modelling. Habitat loss is limited to non-fish bearing areas of the Mitchell, McTagg, Gingras, and Sulphurets Creeks; these areas had low aquatic resource productivity in baseline studies. The magnitude for effects due to aquatic habitat loss and alteration is low.</p> <p><u>PTMA</u></p> <p><i>Water Quality Degradation:</i></p> <p>With the condition that water quality must meet either BCWQG or SSWQO at a point 100 m downstream of the effluent discharge point on Treaty Creek and 100 m downstream of the last point of control on South Teigen Creek, the magnitude of the water quality degradation effects on fish and aquatic habitat in these creeks is considered low. This rating is in reference to the fact that while there are some minor changes in water quality relative to baseline, the predicted water quality is below BCWQG which would, by definition, be protective of the aquatic environment. Although there may be slight changes in selenium concentrations relative to baseline conditions which may translate into slight increases in selenium</p>

	<p>tissue residues, it is unlikely that the concentrations would exceed toxicity thresholds.</p> <p>Effects on Pacific salmon VCs downstream of the TMF, in the Bell Irving and Nass Rivers are predicted to be negligible as water quality will not change relative to baseline.</p> <p>The magnitude is low for all other water quality degradation effects on the fish or aquatic habitat VCs, since water quality is predicted to be similar to baseline conditions.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i></p> <p>Streamflow (mean annual discharge) in North Treaty and South Teigen Creek is predicted to change measurably over the duration of TMF development, resulting in a total of 4211 m² of residual fish habitat loss and alteration, through an alteration of the suitability or area of Dolly Varden habitat. The magnitude is moderate for fish and aquatic habitat loss and alteration, reflecting the offsetting effects of proposed fish habitat compensation programs with respect to fish habitat losses.</p>
Extent	<p><u>Mine Site</u></p> <p><i>Water Quality Degradation:</i> Water quality degradation effects on fish and aquatic habitat downstream of the Mine Site WTP are considered landscape since selenium concentrations would exceed both BCWQG and baseline levels in Sulphurets Creek. With the Proponent's commitment to construct and operate a SeTP with a capacity of 500 L/s at the WSF by year five of operations, selenium concentrations would meet BCWQG in the Unuk River at both UR1 and UR2. Concentrations of nitrogen would also be elevated relative to baseline during the construction and operation phases.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i> Habitat loss and alteration effects are considered landscape in extent since fish depend on habitat downstream of the proposed Project footprint to carry out life processes (e.g. spawning, rearing and migration).</p> <p><u>PTMA</u></p> <p><i>Water Quality Degradation:</i> Water quality degradation effects on fish and aquatic habitat downstream of the TMF are considered landscape in extent, as the Proponent has committed to meet</p>

	<p>BCWQG and/or SSWQO at a point 400 m downstream of the discharge point of any temporary water treatment plants operating in Upper Treaty Creek or South Teigen Creek, while these plants are in operation; and 100 m downstream of the effluent discharge point of the TMF pipeline into Treaty Creek and 100 m downstream of the North seepage dam in South Teigen Creek during the operations, closure and post closure phases of the proposed Project. The potential for residual selenium effects would decrease with distance from the TMF discharge point due to dilution, and residual effects are not predicted in Treaty or Teigen Creeks.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i> Habitat loss and alteration effects are considered landscape in extent since fish depend on habitat downstream of the proposed Project footprint to carry out life processes (e.g. spawning, rearing and migration).</p>
Duration	<p><u>Mine Site</u></p> <p><i>Water Quality Degradation:</i> Water quality degradation effects on fish and aquatic habitat VCs downstream of the Mine Site WTP are rated far future as effluent discharge from the Mine Site is proposed from the construction phase into the post-closure phase. The effects are due to release of metal and non-metal water quality parameters and with the longer term onset of ML/ARD. All these effects would require long term water treatment as a key mitigation.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i> Aquatic habitat loss and alteration effects are considered permanent as no compensation is proposed.</p> <p><u>PTMA</u></p> <p><i>Water Quality Degradation:</i> Water quality degradation effects on fish and aquatic habitat VCs downstream of the TMF are rated long-term, slowly improving after mining operations cease until such time that water from the TMF meets water quality discharge requirements and can be discharged.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i> Fish habitat loss and alteration effects are considered short term: a short time would elapse between habitat destruction and the creation of habitat under the fish habitat compensation plans.</p>

<p>Reversibility</p>	<p><u>Mine Site</u></p> <p><i>Water Quality Degradation:</i> Water quality degradation effects on fish and aquatic habitat VCs are expected to occur into the far future until such time that ML/ARD processes have ceased. EAO notes that natural ML and ARD processes do account for a significant portion of the elevated metals and other elements in areas around the Mine Site.</p> <p>Both conventional high density sludge water treatment and selenium treatment are expected to be required into the far future. Given the time frames involved and the scale of disturbance, effects at the Mine Site should be considered irreversible.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i> Residual effects are irreversible, since no fish habitat compensation measures are proposed.</p> <p><u>PTMA</u></p> <p><i>Water Quality Degradation:</i> Water quality degradation effects on fish and aquatic habitat VCs of TMF discharge would begin to diminish within several decades after the end of mining and milling operations and are expected to stabilize at some point in the future due to increased dilution from precipitation in the TMF.</p> <p>Diminished water quality would still be present from TMF seepage and the management and pump-back may be required over the long term to ensure water quality in the receiving environment is not affected.</p> <p>Water quality degradation effects on fish and aquatic habitat VCs are considered reversible in the long term.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i> Residual effects for Dolly Varden habitat loss effects from the construction of the TMF are irreversible but not significant due to the Proponent's commitment to implement fish habitat compensation plans. All other residual fish habitat loss effects are reversible in the short-term, since fish habitat compensation measures should replace lost habitat within five to ten years.</p>
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<p>Frequency</p>	<p><u>Mine Site</u></p> <p><i>Water Quality Degradation:</i> Frequency is continuous for water quality degradation effects on Dolly Varden, rainbow trout and aquatic habitat VCs downstream of the Mine Site WTP lasting through post-closure, although water quality effects would be worse during the winter months when less surface water is available for dilution.</p> <p>Frequency is regular for water quality degradation effects on migratory fish VCs (steelhead and Pacific salmon) downstream of the Mine Site WTP, since these fish are not present in the LSA or RSA during at least half of their lifespan. Development of outmigrating smolts to adults and maturation of adults occurs in the Pacific Ocean.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i> Frequency is one-time for fish habitat loss effects, which would occur during proposed Project construction.</p> <p><u>PTMA</u></p> <p><i>Water Quality Degradation:</i> Frequency is continuous for water quality degradation effects on fish and aquatic habitat VCs within the initial dilution zone in Treaty Creek. The potential for residual selenium effects would decrease with distance from the TMF discharge point due to dilution, and residual effects are not predicted in Treaty or Teigen Creeks, throughout operations, closure and post closure.</p> <p><i>Fish and Aquatic Habitat Loss and Alteration:</i> Frequency is one-time for fish habitat loss effects, which would occur during proposed Project construction.</p>
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Likelihood

Mine Site

Considering that predicted water concentrations are close to BCWQG and in recognition that further work would be required during the joint *Environmental Management Act* and *Mines Act* permitting process, as well as the Proponent's commitment to implement a comprehensive AEMP, a SeMP and water treatment, EAO considers the likelihood of effects to fish and aquatic habitat due to water quality degradation downstream of the

Mine Site WTP to be low to moderate for all proposed Project phases.

The only exception is the high likelihood of effects to fish and aquatic habitat due to water quality degradation within lower Sulphurets Creek, as modeled selenium concentrations would exceed BCWQG for the protection of freshwater aquatic life.

Likelihood is rated high for habitat loss effects as fish habitat loss would occur during the construction of proposed Project infrastructure.

Water quality degradation effects on fish and aquatic habitat VCs related to catastrophic failure of the WSF dam are considered very unlikely (as further described in section 5.2.7).

PTMA

Likelihood is rated low for water quality degradation effects on fish and aquatic habitat VCs downstream of the TMF during all phases, since metal and non-metal concentrations in effluent must meet BCWQG or SSWQO and are predicted to be very similar to baseline concentrations.

Likelihood is rated high for habitat loss effects as fish habitat loss would occur during the construction of proposed Project infrastructure.

Water quality degradation effects on fish and aquatic habitat VCs related to catastrophic failure of the tailings and seepage dams are considered very unlikely (as further described in section 5.2.7).

5.5.5 Significance Determination

Mine Site

Water Quality Degradation: EAO has considered the high fisheries values downstream in the Unuk River which eventually flows into the US. The effects are limited to Sulphurets Creek (i.e. landscape extent), where aquatic habitat values are low and fish presence is limited to the lower reach of Sulphurets Creek below the cascade; selenium concentrations are predicted to be below BCWQG at UR1 and UR2 on the Unuk River where fish and aquatic habitat values are higher. EAO notes that water and sediments of the LSA and RSA currently contain elevated levels of numerous metals and other elements due to naturally occurring processes and the significant mineralization of the area. EAO has also considered the moderate magnitude of the predicted effects as well as the far future duration and continual nature of residual effects.

EAO notes the Proponent's commitment, which EAO has added as conditions, to implement the AEMP and WMP. EAO recognizes the details of these programs will be considered in greater depth during the joint *Mines Act* and *Environmental Management*

Act permitting process. EAO also considered the Proponent's commitment and subsequent condition to have a fully operational SeTP with a 500 L/s capacity constructed by year five of operation.

Fish and Aquatic Habitat Loss and Alteration: EAO has considered the moderate magnitude, landscape extent and permanent duration of effects. EAO notes the existing high metal concentrations in Mine Site LSA streams and recognizes the importance of downstream fisheries values.

Considering the above analysis and having regard to the conditions for mitigation of water quality impacts including water treatment and aquatic effects monitoring identified in the TOC and the CPD (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 fish and aquatic habitat at and downstream of the Mine Site.

PTMA

Water Quality Degradation: EAO has considered the fisheries and aquatic habitat values in the receiving environment in Treaty and Teigen Creeks, and the Bell-Irving and Nass Rivers where water from the proposed TMF drains into. In addition to the landscape level of effects, EAO notes current water quality in both Treaty and Teigen Creeks frequently has elevated levels of metals and other elements due to natural mineralization in the area. EAO has also considered the low magnitude of the predicted water quality effects as well as the long term and continual nature of effects. EAO notes that any water quality effects of TMF discharge would stabilize and diminish in the future due to increased dilution from precipitation.

The Proponent's mitigation commitment and the proposed EA Certificate condition to meet BCWQG and/or SSWQO during the operations, closure and post- closure phases of the proposed Project is important to ensuring the proposed Project will not cause significant adverse residual effects and are central to EAO's conclusions. EAO also notes that modeled information presented during the EA indicates these objectives can be met.

EAO also notes the Proponent's commitment to implement the AEMP and WMP as well as a SeMP. EAO recognizes the details of these programs will be considered in greater depth during the joint *Mines Act* and *Environmental Management Act* permitting process. EAO also notes the Proponent's commitment to a Salmon Monitoring Plan on Teigen Creek as part of the AEMP.

Fish and Aquatic Habitat Loss and Alteration: EAO has considered the moderate magnitude, landscape extent and short term duration of effects.

EAO notes that DFO is satisfied that the Proponent's fish habitat compensation projects

describe technically feasible compensation options and would compensate for the anticipated habitat loss associated with the proposed Project. Final offsetting amounts and measures would be stipulated by DFO in the regulatory phase of the proposed Project.

Considering the above analysis and having regard to the conditions for mitigation of water quality impacts including meeting BCWQG and/or SSWQO during the operations, closure and post- closure phases of the proposed Project, aquatic effects monitoring and fish habitat compensation identified in the TOC and the CPD (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 fish and aquatic habitat at and downstream of the PTMA.

5.5.6 Cumulative Effects

The only project with the potential for cumulative water quality effects linkages with the proposed Project is the Brucejack Mine Project, which has the potential for local, low magnitude effects on fish and aquatic habitat via water quality changes. Because the effects of the Brucejack Mine Project are expected to be localized and are therefore unlikely to extend into Sulphurets Lake or Creek, a spatial overlap between potential effects from the Brucejack Mine Project and the proposed Project are not expected.

Fish habitat loss and alteration effects associated with future infrastructure development (e.g. access roads) are anticipated in the cumulative effects assessment study area. Lost and altered fish habitat will be offset in accordance with DFO policies with the goal of maintaining or improving the productivity of the commercial, recreational or Aboriginal fishery. On this basis, cumulative effects associated with past, present and future projects should be minimal.

5.5.7 Certainty

Mine Site

Water Quality Degradation Effects

There is low to moderate certainty in the effects to fish and aquatic habitat from water quality. The uncertainty relates to a number of factors. These factors are described in more detail in section 5.2.7:

- The unproven nature of the large scale selenium treatment facility, although EAO notes that, if an EA Certificate is issued, a fully operational facility would be required by year five of operations;
- Assumptions and input related to the source terms and other factors used to model

water quality effects;

- The reliance on a very efficient WSF as a primary mitigation for downstream water quality. EAO notes however, that the Proponent has described a range of potential engineering solutions which can increase the efficiency of the WSF should seepage exceed the levels included in the Application;
- Assumptions made relating to current water quality under the Mitchell Glacier. EAO notes, however, that if an EA Certificate is issued, it would be a legal requirement for the Proponent to have a full understanding of this water quality prior to the commencement of construction.
- Uncertainty about baseline tissue metal residues in fish, the magnitude of potential increases in fish tissue metal residues, and the body burden at which toxic effects may occur in fish species downstream of the WTP and the potential for toxic effects in (non-fish) aquatic life at lower trophic levels. EAO notes that the SeMP, which would be a legal requirement if an EA Certificate is issued, would address the monitoring of these effects.

Fish and Aquatic Habitat Loss Effects

There is a moderate to high degree of certainty that the compensation program proposed by the Proponent will be effective in offsetting habitat losses associated with the CCAR. These programs are administered by DFO under the *Fisheries Act* and DFO has provided their preliminary support for the Proponent's proposed plan. The losses will occur primarily during proposed Project construction.

Sublethal Effects

BCWQG are developed to address the most sensitive species within the aquatic receiving environment. However EAO recognizes there is not perfect knowledge of all species and the type of effects that could occur from long term exposure to an increase in metals (such as selenium in the case of the Sulphurets/Unuk drainages) or other elements over baseline levels or to exposure to multiple metals and other elements in combination. Notwithstanding this uncertainty, EAO accepts these guidelines as the best technical information on effects which is currently available to decision makers. While this uncertainty may exist at the EA stage of the review, EAO believes these uncertainties can be addressed through the *Mines Act* and *Environmental Management Act* permitting processes and ongoing monitoring.

Dam Failures Effects

Considering the mitigations and design processes developed for the WSD, there is a very low likelihood of a catastrophic failure including a dam breach and the associated significant environmental impacts to water quality. The certainty is high that the rigorous

design standards and oversight associated with dam construction, operation, monitoring and surveillance will result in a very low likelihood of catastrophic dam failure.

PTMA

Water Quality Degradation Effects

There is moderate to high degree of certainty linked to the effects on fish and aquatic habitat from downstream water quality degradation. The certainty is primarily due to a number of factors:

- predicted water quality in Teigen and Treaty Creeks is expected to be substantially similar to existing baseline water quality;
- conditions which, if an EA Certificate is issued become legally enforceable, require the Proponent to meet BCWQO or SSWQO in Treaty and Teigen Creeks as well as implementing an AEMP which will provide mechanisms for early detection of potential effects; and
- the ability of the Proponent to control water quality in the TMF through mill outputs as well as having a range of dam seepage mitigation options.

Fish and Aquatic Habitat Loss Effects

There is high certainty that the compensation programs proposed by the Proponent will be effective in offsetting habitat losses associated with construction and operation of the TMF dams and related seepage collection ponds, road crossing structures, transmission line crossings and water quantity reductions in South Teigen and North Treaty Creeks downstream of the TMF dams. These programs are administered by DFO under the *Fisheries Act* and DFO has provided their preliminary support for the Proponent's proposed plans. The losses would occur primarily during proposed Project construction and over the duration of TMF development from changes to streamflow in North Treaty and South Teigen Creek causing the alteration of the suitability or area of Dolly Varden habitat. DFO noted that a sequential approach to constructing the fish habitat compensation projects and applying lessons learned from the first project to the others would reduce the level of uncertainty associated with the successful construction and implementation of the fish habitat compensation projects.

Salmon Populations in Teigen and Treaty Creeks

EAO recognizes that the absolute abundance of salmon in many watersheds throughout the province is uncertain. The Proponent and reviewers have presented information on salmon abundance in Teigen and Treaty Creeks based upon the Proponent's baseline data, DFO data, Nisga'a data, and existing peer-reviewed literature. Given this information, EAO recognizes there is uncertainty regarding the absolute abundance of

salmon in these watersheds. Notwithstanding this uncertainty, EAO accepts the information used to assess potential effects on fish and fish habitat. While this uncertainty may exist at the EA stage, EAO believes these uncertainties can be addressed through the Proponent's commitments for monitoring salmon through the implementation of the Teigen Creek Chinook Salmon Monitoring Program (which would become legally binding as a condition of an EA Certificate).

Sublethal Effects

BCWQG are developed to address the most sensitive species within the aquatic receiving environment. However, EAO recognizes there is not perfect knowledge of all species and the type of effects that could occur from long term exposure to an increase in metals or other elements over baseline levels or to exposure to multiple metals and other elements in combination. Notwithstanding this uncertainty, EAO accepts these guidelines as the best technical information on effects which is currently available to decision makers. While this uncertainty may exist at the EA stage of the review, EAO believes these uncertainties can be addressed through the *Mines Act* and *Environmental Management Act* permitting processes and ongoing monitoring.

Dam Failures Effects

Considering the mitigations and design processes developed for the TMF, there is a very low likelihood of a catastrophic failure including a dam breach and the associated significant environmental impacts to water quality. The certainty is high that the rigorous design standards and oversight associated with dam construction, operation, monitoring and surveillance will result in a very low likelihood of catastrophic dam failure.

5.5.8 Conclusion

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 fish and aquatic habitat.

5.6 Wetlands

5.6.1 Background Information

The Proponent selected wetland extent and wetland function as VCs for the effects assessment.

The assessment LSA covers 10,021 ha including the proposed Project footprint plus a 100-m buffer zone. The Application reports that the width of the buffer zone is intended to ensure that adjacent wetlands that would most likely be affected by effects such as

dust/metal deposition or the hydrologic effects of surface development, ditching and runoff are included in the assessment.

The RSA covers 729,784 ha including the Unuk, Bell-Irving and Bowser watersheds and also serves as the cumulative effects study area.

The Proponent conducted 111 wetland surveys in addition to desktop studies to classify wetland ecosystems and determine wetland extent and function. The Proponent conducted a footprint analysis of proposed Project components to determine effects on wetland extent and function.

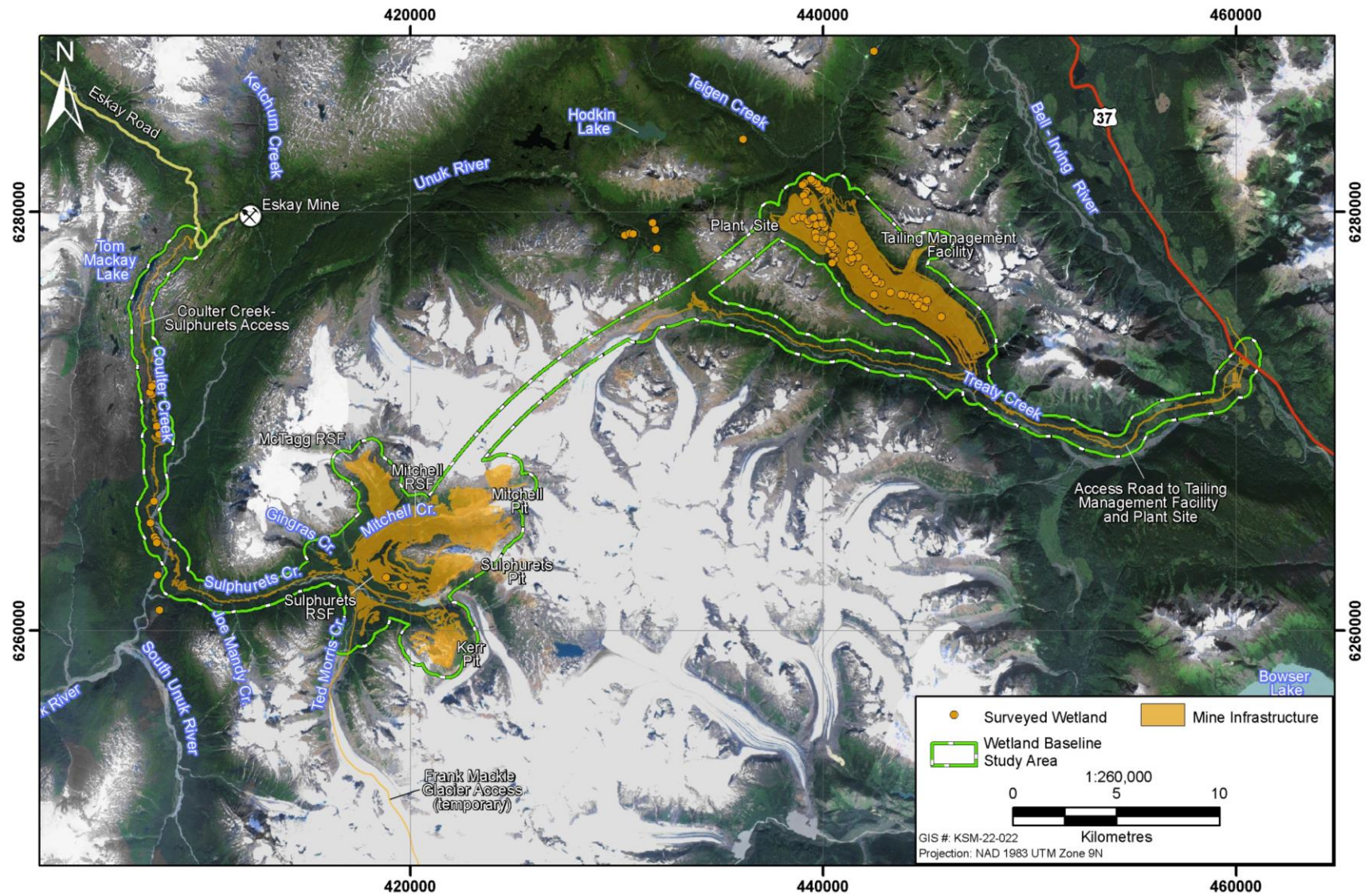
A full discussion on wetlands can be found in the Proponent's Application posted on EAO's website at:

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35958.html

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

Wetlands would be affected by development of the CCAR and TCAR, construction camps #3 and #7, the Kerr Pit, the Sulphurets Laydown Area, the TMF, and the Treaty OPC as shown in figure 17.

Figure 18: Wetland Baseline Study Area and Mapped Wetland Sites



Wetlands may be partially or entirely eliminated by proposed Project component development and/or wetland function may be altered or degraded through direct or indirect interactions with proposed Project components. Specific effects of wetland function may include:

- alterations to wetland biochemical function through sedimentation, dust fall, site runoff and point source discharge;
- alterations to wetland ecological function through the introduction of invasive or non-native wetland plant species and loss of adjacent upland buffer areas;
- alterations to wetland hydrological function through ditching, culverting, watercourse crossing and water flow alteration; and
- alterations to wetland habitat function through fragmentation, change of vegetation structure, change of water sources, noise impacts, artificial light sources, and litter/garbage.

Summary of Mitigation Proposed in the Application

The Application states that the preferred mitigation option is wetland avoidance, which has been achieved by:

- design and layout planning have allowed for wetlands at the Treaty OPC and along the TCAR and minimized effects on wetland loss and degradation; and
- the original access route corridor to the PTMA followed the Teigen Creek Valley, affecting 2.6 ha of wetlands directly, and another 40 ha indirectly. Switching to the Treaty Creek Valley has reduced effects to an area of 22.6 ha of wetlands (loss of 0.8 ha and degradation to 21.8 ha).

The Proponent proposed the following mitigation measures for impacts to wetland function:

- establish reserve and management area buffers around all wetlands in accordance with provincial riparian management guidelines;
- maintain wetland function, wildlife and wildlife habitat, fish and aquatic habitat by following strategies laid out in the various management plans;
- install and maintain effective sediment control and protection structures (i.e. silt fences, sumps, and proper ditching/culverts, etc.);
- implement erosion and slope protection measures over disturbed soils and all organic and mineral soil stockpiles (e.g. developing stockpiles away from surface water, skirting with silt fences, re-vegetation etc.);
- conduct site restoration as soon as possible to re-establish ground cover; and

- implement spill response, reporting and notification procedures.

The Proponent proposed a Wetland Compensation Plan. Once the proposed Project is closed more than 2.5 times as much area of wetlands would have been created, restored, or compensated than affected.

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 and First Nations. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The CPD and TOC (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued.

- EC questioned the Proponent's plan to compensate for lost fen wetland habitat, noting that fen wetland habitat is very difficult to restore, and perhaps only achievable over the long term (in the order of fifty to hundreds of years).
 - In response, the Proponent stated the wetland compensation plan was developed to compensate for wetlands lost due to the development of the TMF.
 - The wetlands in this area are low gradient wetlands associated with a small meandering stream. The primary functions of wetlands in this area are water storage and filtration, wetland complexing and fish habitat. The wetland compensation projects will be associated with fish habitat and will provide similar functions. These compensation projects will regulate storm flow through the fish compensation areas, will reduce erosion by providing aquatic vegetation to disburse wave action, and will provide benthic invertebrate habitat which will support fish habitat.
 - Creating marsh wetlands similar in vegetation structure to fens associated with swamps and open water features will provide compensation for the hydrological, biochemical, ecological, and habitat functions lost due to development of the TMF.

Following a meeting with the Proponent in October 2013, EC concluded that the Federal Policy on Wetland Conservation does not apply to the proposed Project and EC agreed with the Proponent's conclusion there are no significant residual effects on wetland birds. However, EC is prepared to review any wetland compensation plan that the Proponent will prepare in support of its environmental management efforts.

- NLG disagreed with the Proponent's conclusion that impacts to wetlands would be not significant (minor), as the wetland creation post-closure, some 50-60

years hence should not be used to fully discount the impacts from the loss of wetland habitat in the intervening years.

- The Proponent maintained that the wetland compensation plan was developed as a best practice to offset the immediate effects to wetland resources by the proposed Project. Once the proposed Project is closed more than 2.5 times as much area of wetlands would have been created, restored, or compensated than affected.
- Gitanyow Nation expressed concerns with the Proponent's different linkage maps for different VC cumulative effects assessment. Gitanyow stated that as surface water and wetlands are hydrologically intrinsically linked, the same biophysical maps should be used to evaluate cumulative impacts.

Gitanyow Nation also expressed concerns that EC no longer requires a wetland compensation plan from the Proponent. Gitanyow Nation was not satisfied with the Proponent's plan to no longer construct any off-site wetland compensation and instead consider the fisheries compensation plan to double as wetland compensation.

Gitanyow Nation was concerned about impacts to wetland ecosystems because if headwater wetlands are destroyed then there would be negative cumulative effects that would affect the Nass watershed within Gitanyow Territory, thereby potentially affecting Gitanyow Nation rights and title.

- The Proponent responded that while various components can be potentially or ecologically linked (e.g. wetlands can be linked to wildlife, surface water quantity, and surface water quality), residual effects are not necessarily linked. When describing the cumulative effects for wetlands, the residual effects considered were loss of wetland extent and loss of wetland function. Residual effects to water quality were not determined to result in either a loss of wetland function or extent.
- The Proponent has committed to wetland compensation as per the compensation projects proposed in the Application which includes a monitoring protocol. EAO has added this as a proposed condition to the EA Certificate.

5.6.4 Residual Effects and Significance Analysis

Proposed Project-related wetland losses are briefly summarized in the table below.

Table 21: Area of Wetland Loss (Maximum Extent of Disturbance) in Baseline Study Area (BSA)

Wetland Class	Lost (ha)	Number of Wetlands Lost	Total Present in the Local BSA (ha)	Percent of Class Lost in the Local BSA (%)
Fen	39.4	64	70.6	56
Marsh	0.4	6	35.6	1
Swamp	19.0	17	361.8	5
Open Water	0.6	7	41.8	1
Total	59.3	94	522.2	12

The proposed Project would have a residual effect on wetland extent and function in areas where the proposed Project footprint directly overlays identified wetland habitat, or significantly isolates wetland habitats from adjacent habitats, or segments/bisects existing wetland habitats. The largest residual effects on wetlands and their associated functions occurs within the TMF footprint (48.8 ha) and at the Treaty OPC (8.3 ha).

Prior to mitigation, it is predicted that 52.1 ha of wetlands would be degraded at the maximum extent of proposed Project disturbance. An additional 17.4 ha of wetlands are expected to become fragmented, primarily within the Treaty OPC footprint. Table 22 summarizes the proposed Project's predicted residual wetland function alteration and degradation effects.

Table 22: Summary of Predicted Residual Wetland Function Alteration and Degradation Effects

Wetland Class	Degraded (ha)	Fragmented (ha)	Total Area Mapped (ha)	Percent of Class Degraded (%)
Fen	11.9	16.8	70.6	41
Marsh	10.1	0	35.6	29
Swamp	21.7	0	361.8	6
Open Water	8.3	1.1	41.8	22
Total	52.1	17.4	522.2	14

EAO has undertaken the following significance analysis for the residual adverse effects on wetlands.

Table 23: EAO's Significance Analysis for Wetlands

Factor	Rationale
Context	<p>Wetlands are present throughout the study area, although large portions of the study area consist of rock, ice and large dynamic river floodplain systems, which are environments that do not favor the formation of wetland ecosystems. Wetlands account for about 520 ha (or less than 3%) of the baseline study area, which is below the average of 5.6% wetland area for the entire province. Both wetland extent and wetland function (hydrological, physical, biochemical and ecological) are at risk from development of the TMF and other proposed Project components.</p> <p>Wetland functions may take years (even decades) to develop, and are not likely to be mitigated at the same rate as wetland extent.</p>
Magnitude	<p><u>Mine Site</u></p> <p>Individually, the effects of camp 3, the Sulphurets Laydown Area and the Kerr Pit are rated negligible for both wetland extent and function (they account for less than 1% of total proposed Project-related wetland losses), while for the CCAR, the magnitude of residual effects on wetland extent is rated low (it accounts for less than 17% of proposed Project-related wetland losses), and on function, negligible.</p> <p><u>PTMA</u></p> <p>The magnitude of overall residual effects is rated high, primarily reflecting the residual impact of TMF on wetland extent (which accounts for 82% of proposed Project-related wetland losses in the LSA). The TMF's residual effect on wetland function is rated moderate. For camp 7, the TCAR and the Treaty OPC the magnitude of residual effects on wetland extent is rated low (they account for less than 17% of proposed Project-related wetland losses), and on function, negligible.</p>
Extent	<p>The residual effect of loss of wetland extent is local for all proposed Project components, since the losses would be confined to the proposed Project footprint.</p>

	The geographical extent of the loss or alteration of wetland function is rated landscape, since effects could extend outside the proposed Project footprint buffer zone, but would still be closely tied to the proposed Project footprint.
Duration	The duration of residual effects for wetland losses is essentially permanent, since the proposed Project footprint would not be reclaimed to wetlands with the exception of the TMF that would be reclaimed to wetlands after mining ceases.
Reversibility	Although the TMF footprint would be reclaimed to wetlands after closure, the area would be irrevocably altered and it is recognized that reclaimed wetlands may not restore functions as previous or for a considerable time. Wetland losses elsewhere within the LSA would not be reversed through site reclamation.
Frequency	The frequency of residual effects on wetland extent and function in the LSA is rated one-time as effects would occur at the time of construction of individual proposed Project components.

Likelihood

All effects were identified as having a high likelihood of occurrence. It is inevitable that proposed Project construction would eliminate some wetlands and disturb others.

5.6.5 Significance Determination

EAO has considered the geographic context of the study area for the proposed Project, which is heavily dominated by glacial watercourses, rock and ice. A very small wetland area on the mine side would be affected. EAO notes the wetlands under the TMF footprint would be lost to project infrastructure, although some wetlands functions may be regained in the moderate to long term. Wetlands affected by the TMF represent approximately 12% of the wetlands in the baseline study area. EAO recognizes the condition requiring the Proponent to implement a wetland compensation plan that provides for the creation, restoration and compensation of more than 2.5 times as much area of wetlands as the proposed Project would have affected.

Based on the above analysis and having regard to the conditions identified in the TOC and the CPD for a Wetlands Management Plan (which would become legally binding as part of an EA Certificate), EAO concludes that there would not be a potential significant effect on wetland extent and function.

5.6.6 Cumulative Effects

The Northwest Transmission Line (NTL), the past Eskay Creek Mine, the proposed Brucejack, Kitsault and Schaft Creek mines, as well as mineral and energy resource exploration and timber harvesting, have the potential to generate effects on wetlands that overlap with those of the proposed Project. Cumulative effects on wetland extent should be limited to projects in proximity to the proposed Project, since effects on the geographical extent of individual wetlands are typically local. The proposed Project and other projects could affect wetland function over a broader area. However, by the post-closure phase of the proposed Project more than 2.5 times as much area of wetlands would have been created as would have been adversely affected, including 48 ha created through compensation projects, and approximately 275 ha restored through reclamation efforts. Even though the proposed Project would be responsible for a net increase in wetland extent in northwest BC the temporal context of the effect, i.e. the lag between the effect and reclamation, would still result in an overall effect to wetland extent and function.

There are also a number of elements of uncertainty that make quantifying the direct benefit of the reclamation at 55+ years on proposed Project effects tenuous.

While a residual cumulative effect on the loss of wetland extent is predicted, its significance is ranked not significant in view of the wetland compensation and reclamation activities proposed for the proposed Project and anticipated for other projects.

5.6.7 Certainty

The certainty associated with all effects is high, especially for loss of wetland extent, which is predetermined by the proposed Project layout. Effects on wetland function are less certain, but are assumed to be proportional to the area of wetlands eliminated or disturbed. The uncertainty relates to the recovery of wetland functions and the time it would take for wetland compensation projects to become functional as wetland habitat.

5.6.8 Conclusion

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 wetlands.

5.7 Terrestrial Ecosystems

5.7.1 Background Information

The following terrestrial ecosystem VCs were selected:

- potential pine mushroom habitat;
- avalanche track ecosystems;
- listed ecosystems;
- riparian and floodplain ecosystems;
- alpine and parkland ecosystems;
- old forests; and
- other terrestrial ecosystems.

The LSA covers 66,500 ha and the boundaries coincide with the height-of-land surrounding both the Mine Site and PTMA. Along the proposed TCAR and CCAR, the boundary is represented by a 1.5 km buffer. The LSA incorporates the same watersheds assessed for the surface water quantity VC.

The RSA covers 308,080 ha, and corresponds to the wildlife RSA, which was delineated on the basis of the expected extent of use by potentially affected wildlife species, and provides a suitable regional context for ecosystem distribution.

The Proponent used Terrestrial Ecosystem Mapping (TEM) and Predictive Ecosystem Mapping (PEM) to map terrestrial ecosystems within the LSA and RSA, respectively. The Proponent conducted field surveys and used BC Conservation Data Centre and Committee on the Status of Endangered Wildlife in Canada (COSEWIC) data to document known occurrences of listed (red and blue) ecosystems and plants. The Proponent also conducted an assessment of plants of cultural importance, a review of invasive plants and analyzed 100 plant tissue samples to establish baseline metal concentrations in local vegetation.

The provincial biogeoclimatic ecosystem classification (BEC) zones present within the RSA include:

- Boreal Altai Fescue Alpine (BAFA);
- Coastal Mountain-Heather Alpine (CMA);
- Coastal Western Hemlock (CWH);
- Engelmann Spruce–Subalpine Fir (ESSF);
- Interior Cedar Hemlock (ICH); and
- Mountain Hemlock (MH).

Potential Pine Mushroom Habitat

The Application reports that the pine mushroom is the most economically important wild mushroom harvested in BC and local Aboriginal groups identify mushroom harvesting as an important cultural activity and economic generator. The Proponent identified pine mushrooms in the field within the ICH very wet cold BEC subzone, on dry slopes above the proposed TCAR. Potential mushroom habitat was also mapped within the CWH wet maritime BEC subzone, primarily along the CCAR and along the Unuk River and lower Sulphurets Creek.

Avalanche Track Ecosystems

The Application states that in the LSA, avalanche tracks support a variety of deciduous shrub and herb species including Sitka alder, willows, salmonberry, Sitka valerian, arrow-leaved groundsel, Indian hellebore and cow-parsnip. Several of these have cultural importance to local Aboriginal groups.

Listed Ecosystems

The Proponent identified twelve ecosystems (six terrestrial and six wetland) that are blue-or red-listed within the RSA and LSA.

Riparian and Floodplain Ecosystems

The Application reports that forested ecosystems on aggraded fluvial deposits, often dominated by large mature cottonwoods with an understory of either subalpine fir or hybrid white spruce, are very common in the RSA and the LSA, particularly along Treaty Creek and the Unuk River.

Alpine and Parkland Ecosystems

The Application characterized parkland ecosystems as discontinuous tree islands growing on elevated sites, occupying a narrow elevation band above dense coniferous forests and below treeless alpine ecosystems. These sites experience earlier snowmelt, and permit drainage of excessive moisture that prohibits forest establishment at other higher-elevation locations.

Forested Ecosystems Including Old Forests

The Application states that below approximately 1,100 m above sea level, forested ecosystems dominate the landscape. Forested ecosystems are generally fairly continuous, but can be interrupted by natural disturbances such as avalanches and

mass wasting, as well as fluvial disturbances such as flooding, channel aggradation¹⁶ and degradation, and debris flows.

The Application reports that many forested ecosystems in the lower slopes and valley bottoms, except immediately adjacent to Hwy 37, are very old, due largely to the rarity of stand disturbance or replacement events such as wildfire and forest harvesting.

A full discussion on terrestrial ecosystems can be found in the Proponent's Application posted on EAO's website at:

http://a100.gov.bc.ca/appsdata/epic/html/depoly/epic_document_322_35958.html

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

Potential proposed Project effects could include:

- loss of terrestrial ecosystems and plants of interest from land clearing;
- alteration of natural patterns of diversity (seral stage diversity, ecosystem diversity) from land clearing, construction and operational activities;
- introduction of invasive plant species through ground disturbance associated with construction activities and through plant dispersal mechanisms associated with the movement of people and equipment along linear facilities;
- deposition of fugitive dust from blasting and ore processing activities, use of gravel roads and TMF dam and beach construction activities;
- windthrow associated with site clearing; and
- changes to ecosystem composition, structure and/or function linked to changes in hydrology from construction activities.

Summary of Mitigation Proposed in the Application

Proposed measures to mitigate potential loss and degradation of the terrestrial ecosystem include:

- adherence to the general impact management considerations within the Terrestrial Ecosystems Management and Monitoring Plan;
- reclamation of disturbed sites that accord with end land use objectives;
- avoiding and/or reducing windthrow hazard by using best management practices, retaining wind-firm trees, feathering edges, topping/pruning of individual trees, and

¹⁶ Aggradation involves the raising of the streambed elevation due to a deposition of sediment.

monitoring for windthrow;

- avoiding the introduction and spread of invasive plants through development of on-site training and education programs, minimizing the creation of suitable habitat for invasive species, minimizing potential for transport of such species into the proposed Project area, and detecting/eradicating identified plants;
- reducing effects on terrain and soil by adhering to the Terrain, Surficial Geology and Soil Management and Monitoring Plan; and
- reducing fugitive dust accumulation by adhering to the provisions of the Air Quality Management Plan.

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 CPD and TOC (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 raised during the Application review stage include:

- EC and NLG raised concerns over the management of rare plants at the TMF and the adequacy of rare plant surveys.
 - In response, the Proponent undertook additional rare plant surveys in July and August 2013 and submitted a [draft assessment](#) on potential impacts to rare plants and lichens in December 2013.
 - The Proponent identified 65 individual species of rare plants and lichens. Seven of the species have not previously been identified, and are considered previously unknown species. Eight of the species are either newly discovered in BC or have been identified in very few populations.
 - During construction, six rare plant and lichen individuals representing five species have the potential to be lost, mostly due to the construction of the mine pits. During operations, 51 rare plant and lichen individuals representing 29 species have the potential to be lost. Within the Kerr Pit, 25 rare plant and lichen species will be lost due to pit development. During construction, degradation will affect 18 rare plant and lichens species. During operations ten species have the potential to be affected by the proposed Project.

NLG recommended that the Proponent take further measures to reduce the uncertainties associated with potential risks to rare plants caused by proposed

Project development including providing more details on proposed mitigation.

- The Proponent responded that pre-construction surveys will support micro-siting of infrastructure to avoid direct impacts to rare plants by making minor adjustments to infrastructure locations wherever feasible. Due to a low success rate associated with transplanting rare plants and lichens the primary mitigation measures will be focussed on dust and suppression activities to minimize degradation of species habitats.

NLG recommended the Proponent predict the percentage of the documented local population that would be lost and the approximate proportion of what is understood to be the supporting habitats for rare plants that would be lost.

- The Proponent responded that there is a lack of regional survey data and information related to rare plants and lichens in the area surrounding the proposed Project to quantify the proposed Project's potential adverse effects on regional rare plant populations.
- EC raised concerns with respect to potential impacts to rare plants and required the Proponent to provide a description of how the identification of potential impacts to rare plants late in the proposed Project planning stage would be mitigated. EC concerns relate to the high potential for occurrence of rare plants in the southern portion of the proposed Project study area.
 - In response, the Proponent stated that measures to mitigate direct loss to rare plants located under proposed Project infrastructure would include avoidance, where possible, or translocation. Measures to mitigate degradation/alteration impacts will include relevant measures identified in the Vegetation Clearing Management Plan, and Invasive Plant Management Plan, sub plans of the Terrestrial Ecosystems Management and Monitoring Plan.
- MEM raised concerns with the potential metals in plant tissues during closure and post-closure and asked what additional mitigation measures could be implemented.
 - The Proponent responded that the mitigation options include selecting plants that do not take up metal, remediating the soil so that metals are no longer present, and changing the land use to one that does not include plants.
 - The Proponent committed to a Terrestrial Plant Monitoring Plan to monitor metal levels in plant tissues during all proposed Project phases.

5.7.4 Residual Effects Significance Analysis

Development of the proposed Project would necessitate land clearing and result in vegetation loss. Proposed Project activities would result in degradation effects, including the spread of invasive plant species, deposition of fugitive dust, and increased windthrow along new forest edges. Residual vegetation loss and degradation effects are predicted during construction, operation and closure (table 24 below).

**Table 24: Area of Valued Component Project-specific Vegetation Loss and Degradation at End of Operation
Phase – Local Study Area Assessment**

Ecosystem Valued Component	Upper Unuk River Watershed ¹			Sulphurets Creek Watershed			Treaty Creek Watershed			Teigen Creek Watershed		
	Total Baseline Area	Area Lost	Area Degraded	Total Baseline Area	Area Lost	Area Degraded	Total Baseline Area	Area Lost	Area Degraded	Total Baseline Area	Area Lost	Area Degraded
Potential pine mushroom habitat	1,302.8 ha	42.9 ha (3.3%)	125.0 ha (9.6%)	256.5 ha	13.1 ha (5.1%)	75.4 ha (29.4%)	152.9 ha	9.8 ha (6.4%)	34.4 ha (22.5%)	0.0 ha	-	-
Avalanche track	1,746.7 ha	0.0 ha (0%)	0.0 ha (0%)	1,695.2 ha	456.9 ha (27.0%)	311.3 ha (18.4%)	4,078.4 ha	179.7 ha (4.4%)	270.6 ha (6.6%)	3,943.2 ha	33.9 ha (0.9%)	70.9 ha (1.8%)
Listed	380.2 ha	6.8 ha (1.8%)	24.6 ha (6.5%)	163.6 ha	7.3 ha (4.5%)	48.9 ha (29.9%)	533.3 ha	7.7 ha (1.5%)	42.3 ha (7.9%)	246.9 ha	0.0 ha (0%)	0.0 ha (0%)
Riparian and floodplain	1,985.1 ha	0.2 ha (0.005%)	4.2 ha (0.2%)	424.8 ha	54.4 ha (12.8%)	125.3 ha (29.5%)	1,485.0 ha	210.1 ha (14.1%)	178.9 ha (12.0%)	2,585.0 ha	266.0 ha (10.3%)	284.5 ha (11.0%)
Alpine and parkland	5,900.1 ha	7.8 ha (0.1%)	117.5 ha (2.0%)	3,441.2 ha	394.9 ha (11.5%)	549.2 ha (16.0%)	2,419.3 ha	3.2 ha (0.1%)	82.6 ha (3.4%)	3,608.5 ha	5.5 ha (0.2%)	88.7 ha (2.5%)
Old forests	1,078.8 ha	28.3 ha (2.6%)	102.9 ha (9.5%)	612.2 ha	214.0 ha (34.9%)	236.4 ha (38.1%)	179.6 ha	44.5 ha (24.8%)	39.2 ha (21.8%)	250.3 ha	45.7 ha (18.3%)	12.4 ha (5.0%)
Other terrestrial	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Notes:

TEM data was used for all proposed Project footprint area calculations. The Proponent calculated loss estimates resulting from vegetation clearing within the footprint, and degradation estimates within buffers surrounding the footprint. The watershed baseline distributions are derived primarily from TEM, with augmentation of PEM data in few areas without TEM data.

Totals of areas lost and degraded are not additive since VCs overlap. NR = not reported.

Areas of vegetation lost and degraded within the Bell-Irving drainage (outside the Treaty and Teigen watersheds) are not shown because baseline ecosystem mapping data are not available. For all relevant VCs (listed, riparian and floodplain, and old forest ecosystems), the area of vegetation lost in the Bell-Irving drainage is less than 20 ha, and the area degraded is less than 35 ha.

¹ Upper Unuk River watershed is defined as upstream of the Sulphurets Creek / Unuk River confluence.

EAO undertook the following significance analysis on the residual adverse effects on terrestrial ecosystems.

Table 25: EAO's Significance Analysis for Terrestrial Ecosystems

Factor	Rationale
Context	<p>The proposed Project is situated within a region of steep, relatively undisturbed mountainous terrain, and overlaps six provincial BEC units. Non-vegetated ecosystems, including water features, glaciers and rock outcrops and sparsely-vegetated alpine areas, constitute nearly half of the LSA. Forested ecosystems, dominated by sites with mesic soil moisture and nutrient regimes, account for approximately one-quarter of the LSA. Given the steep terrain and high annual snow accumulations, avalanche track ecosystems are also common.</p> <p>The resiliency of the terrestrial ecosystem VC's in the face of vegetation loss and degradation effects ranges from neutral in cases where the VC may successfully respond and adapt to the changes, to low, where the VC is expected to exhibit low resilience and limited adaptability to changes. VCs for which resilience is considered neutral include potential pine mushroom habitat, avalanche track ecosystems and other terrestrial ecosystems. VCs for which resilience is considered low include listed ecosystems, riparian and floodplain ecosystems, alpine and parkland ecosystems and old forest ecosystems. The low resilience VCs either develop within a very specific range of site and soil conditions or take a very long time to become established.</p>
Magnitude	<p>The magnitude of vegetation loss and degradation effects is low as predicted residual losses incurred by most VCs are less than 20% of their baseline distribution within any one local watershed and these VCs would be able to maintain hydrological and wildlife habitat integrity despite loss and degradation.</p> <p>The magnitude of area lost is rated moderate for avalanche track ecosystems and for old forest ecosystems, based on losses of these two VCs predicted within the Sulphurets Creek watershed.</p> <p>Residual degradation effects are also rated of low magnitude for all terrestrial ecosystem VCs except for listed and riparian/floodplain ecosystems and old forest ecosystems, both rated moderate.</p>

Extent	The geographic extent for loss and degradation effects on VCs is rated local in all cases. Loss effects are confined to the proposed Project footprint, and degradation effects are assumed to extend no more than 300 m from the proposed Project footprint boundary.
Duration	Residual loss and degradation effects on all VCs are considered long term since they would last for more than 40 years. Although vegetated communities may re-establish sooner in areas re-vegetated during construction and operations, restoring the baseline functionality of forested ecosystems would take several decades or more, especially considering the cool, high elevation nature of the ecosystems and short growing season. Degradation effects adjacent to active infrastructure are expected to continue until the end of the operations phase.
Reversibility	Except for the potential pine mushroom habitat VC, for which residual effects are considered reversible over the long-term, losses of terrestrial ecosystem VCs are rated irreversible, since some proposed Project components would be in place permanently. Degradation is generally considered reversible over the long term, except adjacent to access roads that would remain permanently operational.
Frequency	Vegetation loss is considered a one-time occurrence for all terrestrial ecosystem VC's, regardless of the proposed Project phase within which land clearing occurs. Degradation is considered sporadic, occurring rarely and/or at sporadic frequencies, such as when roads or other facilities are under construction or in use.

Likelihood

The likelihood that the predicted effects on VCs would be realized within a terrestrial ecosystem VC varies, depending upon the level of confidence in the mapping upon which effects assessments are based. For vegetation loss, the likelihood that the predicted residual effects would occur is moderate for the VC's that are either modeled (pine mushroom habitat) or mapped with lower certainty (listed ecosystems). For other VCs, it is likely that loss of vegetation would occur. Similarly, the likelihood that the predicted degradation effects would occur is moderate to high.

5.7.5 Significance Determination

EAO has considered the moderate magnitude of the effects on avalanche tracks and old forest ecosystems in the Sulphurets Creek watershed but notes these VCs are common throughout the wider LSA and the RSA. EAO considers that vegetation effects are expected to be of local extent, long term in duration and be irreversible, given the time to re-establish old forests. Established old growth management areas (OGMA) in the southern portion of the RSA are not affected and no connectivity between OGMA is lost.

EAO notes that other terrestrial ecosystem effects are predicted to be of low magnitude and local extent. No VC is expected to experience residual effects that would threaten the viability or sustainability of its local or regional distribution.

EAO notes the conditions to implement the Terrestrial Ecosystems Management and Monitoring Plan and Terrestrial Plant Monitoring Plan. EAO also notes the Proponent is required to implement the Terrain, Surficial Geology and Soil Management and Monitoring Plan as part of the *Mines Act* permit. These mitigation measures are expected to be successful in mitigating potential terrestrial ecosystem effects during all phases of the proposed Project.

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 terrestrial ecosystems.

5.7.6 Cumulative Effects

Fifteen other projects, and several land use activities including timber harvesting, and mineral/energy resource extraction, were assessed for potential overlapping loss and degradation. However, ecological mapping information required to effectively quantify an assessment of cumulative effects is unavailable for most of the past and future projects. The other projects and activities with the highest potential to interact cumulatively with the proposed Project's residual vegetation effects are those resulting in additive vegetation loss or degradation within local watersheds such as Treaty Creek and Sulphurets Creek. These include the proposed Snowfield and Brucejack mines and Treaty Creek HEP, none of which would result in additional loss of avalanche track or old forest ecosystems within the Sulphurets Creek watershed.

Where similar terrestrial ecosystem VC assessments are documented for other projects (NTL, Forrest-Kerr HEP and McLymont Creek HEP projects), low to moderate magnitude effects are typically predicted, with no significant effects predicted. The potential losses of avalanche track and old forest ecosystems, the most important

potential effects from the proposed Project, are considered of low to moderate magnitude within the cumulative effects study area, with low-magnitude cumulative losses expected from other projects and activities. EAO concludes that all cumulative residual effects on terrestrial ecosystem VCs would be not significant.

5.7.7 Certainty

The certainty in the prediction of residual vegetation loss and degradation effects is medium for all VCs, except the avalanche track VC, since cause-effect relationships may not be fully understood or unknown external variables may be influential. Certainty is high in the effects assessment for the avalanche track VC.

5.7.8 Conclusion

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 terrestrial ecosystems.

5.8 Geohazards

5.8.1 Background Information

Geohazard concerns include the risk posed to proposed Project facilities, activities and personnel by mass movements (such as landslide, debris flows and rock falls) and avalanches. The focus of the Proponent's geohazard assessment was on the potential of the proposed Project to increase the magnitude or frequency of geohazard events, specifically landslides and snow avalanches.

The geohazards LSA is 38,852 ha, and encompasses all sites where proposed Project infrastructure may interact with existing geohazards. No RSA was defined for geohazard assessment purposes.

The Proponent's assessment of terrain, surficial geology and soils provided key information for the geohazards assessment. The Proponent also conducted additional baseline studies including assignment of terrain stability classes to terrain polygons, the identification of landslide areas and snow avalanche track mapping.

Much of the terrain in the proposed Project area is either unstable or potentially unstable, since all of the main valleys have been subject to glacial advance and retreat, and to associated erosion and deposition processes. Post-glacial processes have also contributed to terrain instability.

A full discussion on geohazards can be found in the Proponent's Application posted on EAO's website at:

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35959.html

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

The Application reports that the alteration of natural terrain conditions could exacerbate baseline terrain instability, resulting in higher risks of adverse effects on terrain and proposed Project infrastructure in cases where feasible and effective design options and/or mitigation measures are not available.

The Proponent's baseline studies identified a total of 268 geohazard scenarios that present various degrees of risk to proposed Project infrastructure and human safety, assuming no mitigation. The proposed Project components that could be affected include the PTMA, transmission line, access roads and the Mine Site.

The Application identified the following geohazard scenarios and associated risk:

- 170 geohazard scenarios at the proposed Mine Site (within the Mitchell, McTagg, Sulphurets and Ted Morris valleys), 69 of which are considered to pose a high or very high risk;
- 29 geohazard scenarios at the PTMA, 12 of which pose a high risk;
- Nine geohazard scenarios along the CCAR, three of which pose a high or very high risk; and
- 60 geohazard scenarios along the TCAR, 32 of which pose a high or very high risk.

The Application reports that snow avalanches pose the greatest overall geohazard risk to the proposed Project, because their frequency of occurrence is several orders of magnitude higher than that of landslides. Proposed Project related activities could create additional snow avalanche terrain. Logging of slopes directly below snow avalanche terrain could result in longer avalanche run-out paths. Incremental avalanche terrain could also be created through removal of trees in avalanche initiation and run-out zones, and through re-contouring of ground that has the effect of increasing slope gradient, although the Proponent does not anticipate such effects.

Summary of Mitigation Proposed in the Application

The Proponent has developed mitigation strategies that are contained in the Soil Salvage and Handling Plan, Erosion Control Plan and Vegetation Clearing Management Plan (as required under the *Mines Act* permit and Special Use Permit for the access roads) to deal with the risk of erosion and sedimentation. The Proponent proposes to temporarily close roads during periods of high risk. To mitigate for snow avalanche activity the Proponent proposes the following strategies:

- ongoing monitoring and management of the hazard;
- avalanche protection measures such as seasonal closure of certain work areas, temporary road closures, installation of avalanche detection systems, and avalanche control; and
- in high-risk areas that cannot be avoided, avalanche prevention or deflection using permanent engineered structures or earthworks would be considered.

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

During the review of the Application, additional issues were raised by MEM. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The CPD and TOC (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 are set out below.

- Following a third-party review of the proposed snow avalanche program, MEM requested a more detailed summary of snow climate data since avalanche magnitude and frequency is greatly influenced by snowfall, in addition to terrain. MEM suggested the Proponent conduct an analysis to estimate snowpack height with a frequency of 1:1, 1:10, 1:30, and 1:100 years. This work would be relevant to the Proponent's Active Avalanche Management Plan, which in part identifies the scope of avalanche risk mitigation measures based on anticipated avalanche activity.
 - The Proponent has committed to ensuring the safety of its workers while working at the site, with the implementation of an extensive and proactive Avalanche Management Plan. The Proponent has also committed to conduct further snow climate analysis as the proposed Project development advances.

MEM accepted the Proponent's commitments to conduct further snow climate analyses as part of the *Mines Act* permitting requirement. EAO added the requirement for an Avalanche Management Plan as a condition.

- MEM required additional assessment information from the Proponent for avalanche hazards and glacial travel feasibility up the Frank Mackie glacier temporary access road.
 - In response, the Proponent submitted additional information on the assessment of the avalanche risks associated with the proposed Frank Mackie Glacier road. The Proponent's preliminary analysis indicates that over 15 km of the alignment is estimated to be affected by avalanches; with

careful routing of the road, the length of potential exposure could be reduced to approximately 12 km. A large proportion of the exposed segments along the route are estimated to be within low frequency avalanche terrain, with a return period of greater than ten years. The potential consequences of avalanches reaching the temporary road include vehicle impact, possible fatalities, and lost productivity due to road closures associated with periods of elevated avalanche risk, and avalanche deposit clearing.

- As with all other exposed areas within the proposed Project, avalanche hazard along the route will be mitigated by temporary closure and control of hazard areas during periods of elevated avalanche hazard.
- MEM requested additional information surrounding the possible effects that mining in the Mitchell Open Pit may have on the Snowfield Landslide, and the potential for a catastrophic failure of the landslide into the pit.
 - In response, the Proponent provided a report that better defined the slide mass, as well as a Preliminary Snowfield Landslide Management Plan. The Proponent also hired an expert third party reviewer to comment on the suitability of the Landslide Management Plan, who endorsed the plan.

MEM concluded that the issues surrounding the Snowfield Landslide have been adequately addressed at the EA level. It would be a *Mines Act* permitting requirement to keep the Landslide Management Plan up to date, and to adhere to the plan.

- MEM requested additional information surrounding the nature and extent of lacustrine clays that were identified in the Mitchell Valley, particularly with respect to the effect that this material could have on the stability of the Mitchell RSF. The Proponent was also asked to provide assurances that the development plan for the Mitchell RSF would adequately consider the safety of personnel located at the Mitchell OPC.
 - In response, the Proponent provided RSF staging plans, instrumentation and monitoring plans, and run-out analyses for the RSF. An expert third party reviewer endorsed the development plan. The Proponent also committed to conduct additional strength and consolidation testing of the lacustrine clays before any rock placement in the affected area.

MEM considers that the issues surrounding the lacustrine clays in the Mitchell Valley have been adequately addressed at the EA level. It would be a *Mines Act* permitting requirement to conduct additional testing on the lacustrine clays before rock placement, and to develop the Mitchell RSF in a manner that adequately protects personnel at the Mitchell OPC.

- MEM raised concerns about the potential effects of overtopping the tailings dam and wave damage to other infrastructure such as perimeter diversions.
 - In response, the Proponent conducted modelling to assess the potential by estimating the potential size of avalanche waves and predicting run-up distances on the tailings beaches and tailings dams. The modelling results indicated that with the proposed mitigation measures the TMF freeboard and setback of infrastructure from the high pond level is adequately designed to resist overtopping from avalanche waves during both normal and Probable Maximum Flood events. The Proponent expects damage to other infrastructure due to avalanches or avalanche waves to be minor and repairable.

5.8.4 Residual Effects and Cumulative Effects

In consideration of EAO's assessment of the Application, and the Working Group's consideration of this information, EAO finds that geohazard risks to the proposed Project would be mitigated as a result of the condition for an Avalanche Management Plan.

5.8.5 Conclusion

Based on the above analysis and having regard to the conditions identified in the TOC and the CPD (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that there would not be adverse residual effects on geohazard stability as a result of the proposed Project.

5.9 Wildlife and Wildlife Habitat

5.9.1 Background Information

The Proponent characterized wildlife and wildlife habitat baseline conditions by means of literature reviews, field surveys from 2008-2011 and habitat suitability modelling. The Proponent also conducted a grizzly bear population study using deoxyribonucleic acid (DNA) techniques.

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

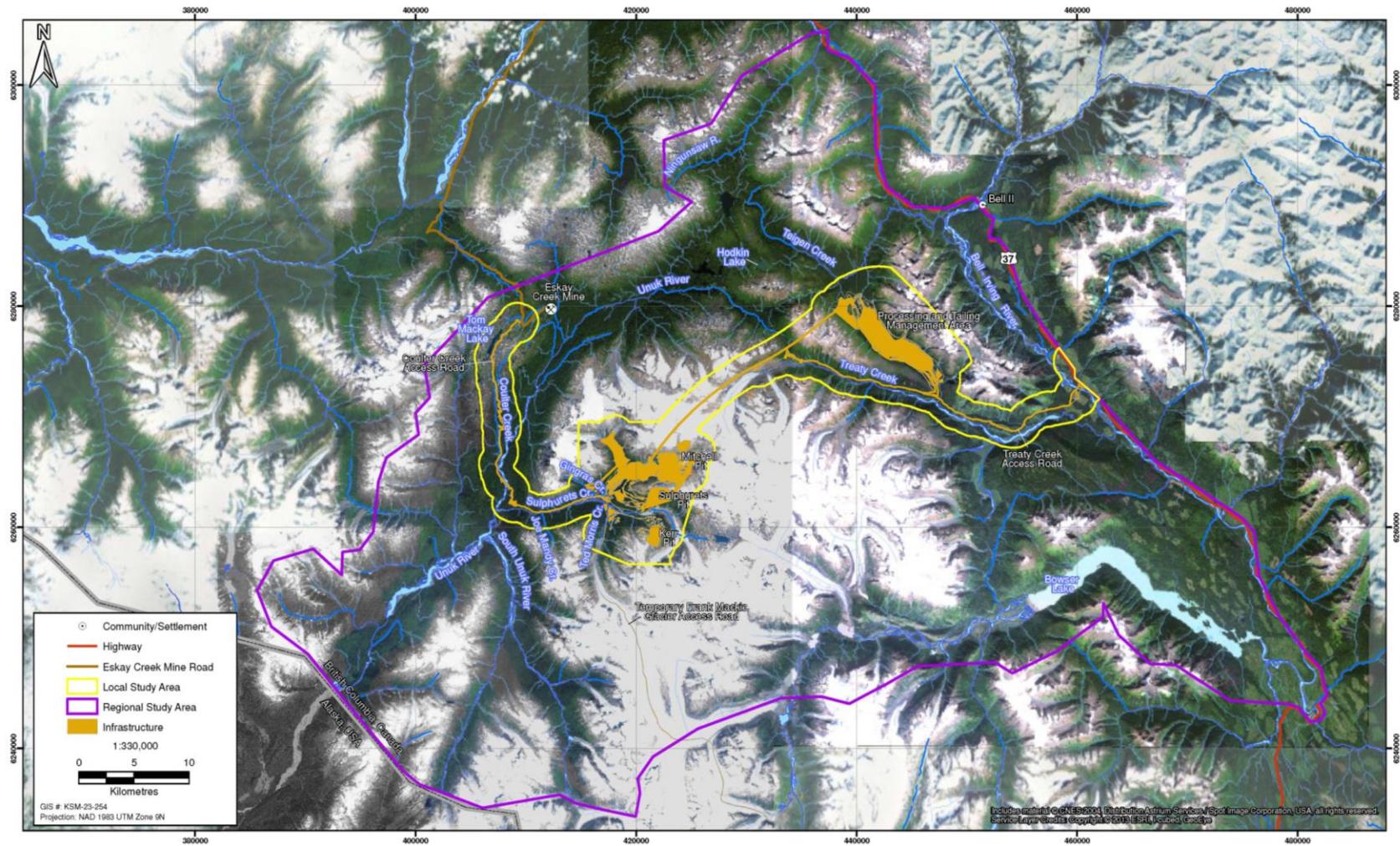
- Moose;
- Mountain goats;
- Grizzly bears;
- Black bears;

- American marten;
- Hoary marmot;
- Bats;
- Raptors;
- Wetland birds;
- Forest and alpine birds; and
- Western toads.

The wildlife LSA covers an area of 44,983 ha, including the proposed Project footprint and a 1.5 km buffer zone around the footprint (see figure 18).

The wildlife RSA covers an area of approximately 338,000 ha, extending approximately 24 km north and 24.5 km south of the proposed Project footprint (see figure 18). The RSA reflects the area anticipated to provide habitat for wildlife species that may come in contact with proposed Project infrastructure during the course of a season or lifetime, and to include sufficient area beyond the influence of the proposed Project for future monitoring.

Figure 19: Wildlife Local and Regional Study Areas

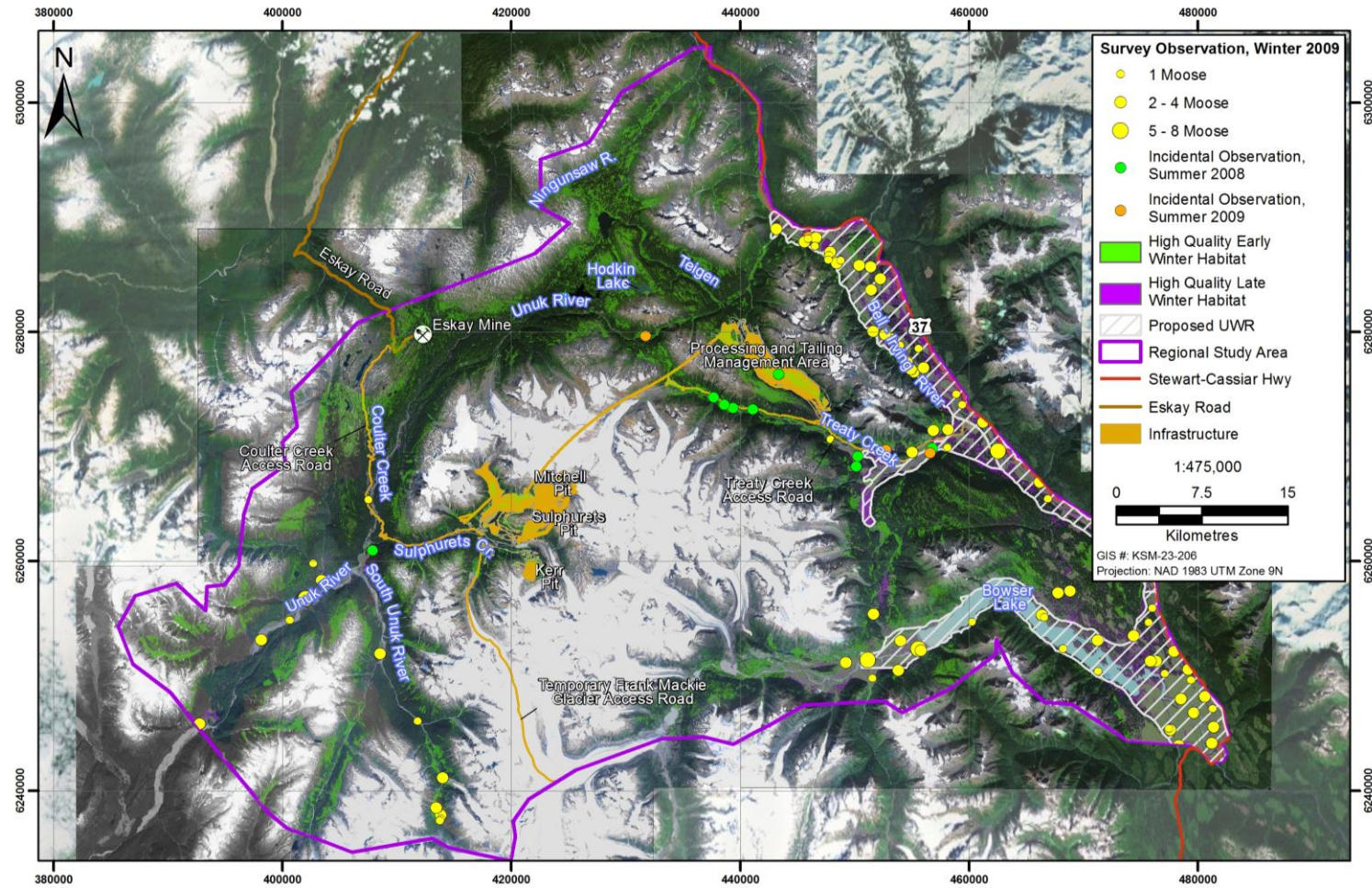


Moose

The Proponent's habitat suitability modeling and winter aerial surveys identified moose habitat in the wildlife RSA. Most high quality late winter moose habitat, and provincial Ungulate Winter Range (UWR), occur along river valleys on the eastern side of the RSA, including the valleys of the Bell-Irving River, Treaty Creek, Snowbank Creek, Teigen Creek, and around Bowser Lake. These areas overlap the proposed Project along the TCAR, but other proposed Project infrastructure occurs at too high an elevation to be good late winter habitat due to snow accumulation. A smaller amount of moose habitat occurs in the western, coastally-influenced part of the RSA, along the Unuk River (see figure 19).

The Proponent's winter aerial surveys in 2009 revealed that the density and number of moose across the RSA was higher in the eastern interior area near the PTMA, Treaty Creek, Bell Irving River, and Bowser Lake (0.59 moose/km²; 198 moose), than in the more coastally-influenced western area near the Mine Site and long the Unuk River (0.27 moose/km²; 33 moose). A lower male to female ratio was observed in the interior area (47 bulls for 100 cows), which is indicative of harvest pressure on males where access to high-quality moose habitat is available from Hwy 37 along the Bell-Irving River and along forestry roads near Bowser Lake.

Figure 20: Moose Observed during Baseline Surveys and High Quality Winter Habitat



Mountain Goats

The Proponent's habitat suitability models indicated that the most suitable year-round goat habitat in the RSA occurs in the eastern interior area along the Snowslide Range and in western areas around John Peaks to the west of the Mine Site. Within the LSA, suitable habitat was identified at the Mine Site and southeast of the TMF. The LSA and RSA overlap with provincially designated mountain goat UWR U-6-002.

The Proponent conducted mountain goat population surveys in the RSA during the summer of 2008 and the winter of 2009. During the summer surveys in 2008, the Proponent observed 230 goats in 62 groups in the RSA. During the winter 2009 survey, 178 goats were observed in 69 groups in the RSA. The average density during both winter and summer was 0.2 goats/km² of capable habitat. Goats were observed near the Mine Site during both winter and summer surveys. Around the PTMA, goats were observed on the Snowslide Range (located between the PTMA and the Bell-Irving River). In addition, two potential mineral licks were identified, one in the valley between the Sulphurets and Kerr pits (confirmed in 2013) and one on the Snowslide Range (unconfirmed).

Grizzly Bears

Grizzly bears are considered a species of special concern by COSEWIC and are blue-listed in BC. The Proponent's habitat suitability modeling revealed that overall, between 8% and 38% of habitat within the RSA is moderately high and high quality habitat for spring (27%), summer (38%), and fall (8%). In addition, 5% of the LSA was identified as suitable denning habitat for grizzly bears, particularly in the PTMA. The area near the proposed TMF and the TCAR has also been identified by the province as a candidate grizzly bear Wildlife Habitat Area (WHA). The Proponent estimated the superpopulation¹⁷ of grizzly bears that used the RSA during the DNA studies at 31 females and 27 males, for a total of 58 bears. Two thirds of these bears were located in the coastal zone along the Unuk River.

Black Bears

Black bears are common and widespread in BC. The Proponent detected black bears throughout the RSA and LSA along all river drainages, particularly along the Unuk, Bell-Irving, and Bowser rivers, as well as near Bowser Lake, and in the Treaty and Teigen creek valleys. The Application reports that a large amount (approximately 59,740 ha) of suitable denning habitat was identified in the RSA, particularly along the Unuk and Bell-Irving rivers wherever large diameter old-growth trees are available.

¹⁷ The observed population is from a finite population and is treated as a sample from a larger 'superpopulation'

American Marten

The American marten was selected by the Proponent as a VC to represent furbearers in the proposed Project area. The Proponent conducted habitat suitability modeling for American marten winter habitat. The majority of the forested habitat within the RSA was modeled as highly suitable winter habitat for marten. Within the RSA, continuous blocks of highly suitable habitat were distributed across lower elevations within all major watersheds, particularly in mature forests along the Unuk River watershed. Over a quarter of the LSA was identified as highly suitable winter habitat for marten, including most of the forest habitat within the TMF and the low-elevation older forests along the Coulter Creek and Treaty Creek corridors.

Hoary Marmot

The Proponent conducted field surveys and habitat suitability modeling for hoary marmot. During field surveys in 2008 and 2009, marmot colonies were found throughout the alpine in all of the areas surveyed at both the Mine Site and the PTMA, with the highest densities being observed in alpine areas near the PTMA (e.g. the Snowslide Range) surrounding the proposed TMF (average 0.62 colonies/km²). High quality habitat was mainly distributed across the alpine near the Mine Site and PTMA.

Bats

The Proponent observed two species of myotis (little brown myotis and western long-eared myotis) within the LSA, mainly within riparian habitat. The Proponent identified mature and old-growth conifer forests near moist areas and at lower elevations along waterways as sensitive bat habitat. The Application states the most important habitat features for bats such as the little brown myotis are cave-based hibernacula, typically associated with karst (limestone) topography. The only area with exposed limestone in the LSA is located in the McTagg Creek Valley, extending south to Sulphurets Creek.

Raptors

The Proponent detected eight raptor species during baseline studies including hawks, falcons, owls and other birds of prey. Listed species observed in the LSA include the rough-legged hawk (blue-listed) and the Swainson's hawk (red-listed). In addition, the northern goshawk *laingi* subspecies is red-listed in BC and designated as threatened on Schedule 1 under the *Species at Risk Act* (SARA); however, the Proponent was unable to confirm if the northern goshawks observed during baseline surveys are of the *laingi* subspecies. The Proponent identified two raptor nests (one bald eagle nest and one osprey nest) in riparian areas outside of the LSA.

Wetland Birds

The Proponent detected 25 wetland bird species during 2008 and 2009 baseline studies including ducks, geese, shorebirds and other bird families associated with water bodies. Three species identified in the RSA are of regional or provincial conservation concern: harlequin duck (provincially ranked as vulnerable during the non-breeding season); surf scoter, which is blue listed and provincially ranked as vulnerable during the breeding season; and trumpeter swan, which is blue-listed and provincially ranked as vulnerable during the non-breeding season.

The Proponent identified areas with high species diversity during the breeding period in wetland complexes associated with the Teigen/Bell-Irving confluence, and along Treaty and Todedada Creeks. Areas that were occupied during the fall staging survey, while birds are migrating south, included the habitat around Unuk Lake, Treaty Creek, and near the Teigen Creek/Bell-Irving River confluence. During the spring staging surveys, the majority of birds were observed near the Teigen Creek/Bell-Irving confluence and at Border Lake along the Unuk River near the BC-Alaska border.

Forest and Alpine Birds

The Proponent detected 60 forest and alpine birds during 2008 and 2009 baseline studies including songbirds, hummingbirds, woodpeckers and game birds in terrestrial areas. The greatest species richness, highest numbers of individual birds, and highest diversity of birds were recorded within the proposed TMF footprint, along the CCAR corridor adjacent to the Unuk River, and near Bowser Lake. The olive-sided flycatcher, which is federally listed as threatened (SARA Schedule 1), was observed within the RSA adjacent to Unuk Lake.

Western Toads

Western Toad is listed as a Species of Concern by COSEWIC, listed under SARA, and is a provincially blue listed species. The Proponent selected Western Toad as a VC to represent amphibians in the proposed Project area. During ground surveys in 2008 and 2009, three western toad breeding sites were observed, all of which were located outside of the LSA in low elevation ponds with shallow open water, an open canopy, and warm water temperatures. Two toad breeding sites were found on West Teigen Lake, and a third at low elevation along the lower reaches of Teigen Creek near its confluence with the Bell-Irving River. Other breeding sites likely occur in the RSA. No high-quality potential sites were identified within the proposed Project footprint or LSA, although moderately suitable habitat is present.

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

http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_document_322_35957.html

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

The proposed Project has the potential to adversely affect wildlife VCs to some degree in the following ways:

- habitat loss and alteration (construction and operations phases);
- disruption of movement (construction and operations phases);
- sensory disturbance (construction and operations phases);
- direct mortality (construction and operations phases);
- indirect mortality (primarily linked to increased access and increased hunting pressure; construction, operations, closure, and post-closure phases);
- attractants (construction and operations phases); and
- chemical hazards (resulting in health effects in wildlife; construction, operations, closure, and post-closure phases).

Risks to wildlife along the transportation corridors are discussed in Section 10 – Assessment of Potential Road Use Effects.

Habitat Loss

Moose: Moose habitat loss and alteration due to the proposed Project is summarized in table 26 below. Winter habitat, in particular late winter habitat, is a critical limiting feature for moose due to deep snow during the later winter that restricts their movement (provincial UWRs are based on the area of late winter habitat). The Application reports the proposed Project would interact with early winter habitat in the PTMA, Treaty Processing Plant site and TCAR, but the critical late winter habitat overlaps only the TCAR, with the Treaty Processing Plant site being at too high elevation to be good late winter habitat.

The Application reports that 648 ha of late winter habitat (1.8%) would be removed at low elevation by the TCAR and transmission line. A larger area (2,554 ha, 6.3%) of early winter habitat would be removed in the TMF and Treaty Processing Plant site.

In addition, 443 ha (0.9%) of the proposed moose UWR 6-018 would be altered due to the TCAR. Due to the range in size of moose home range the loss associated with the proposed Project could be equivalent to 16% or as little as 3.5% of a home range. The Proponent estimates that reclamation activities could restore 62 ha of high quality early winter habitat upon closure within the TMF footprint if the water and vegetation are deemed safe for wildlife consumption.

Table 26: Moose Habitat Loss and Alteration due to the Proposed Project

Season	Habitat Lost and Altered (ha)	RSA		LSA	
		Total Habitat ¹ (ha)	Habitat Lost/Altered (%)	Total Habitat ¹ (ha)	Habitat Lost/Altered (%)
Early Winter	2,554	40,637	6.3	5,864	43.6
Late Winter	648	20,928	3.1	2,082	31.1
Total Early and Late Winter ²	2,765	40,623	6.8	6,581	42.0
Proposed UWR 6-018	443	25,270	1.8	2,069	21.4

¹Total habitat refers to high-quality habitat in the RSA and LSA.

²An additional 162 ha of early and late winter habitat would be lost during the construction phase outside of the RSA due to construction of the Transmission Line Connector near Treaty Creek.

Mountain Goats: Mountain goat habitat loss and alteration due to the proposed Project is summarized in the table below. As with moose, winter habitat is a limiting feature of goat habitat when snow accumulation restricts their movement to forested areas, typically at medium-elevation, downslope from their summer range (provincial UWRs are based on these winter ranges). The proposed Project overlaps with several areas of summer range in the Mine Site, which is at high elevation but with winter range only where the CCAR travels through the UWR along Sulphurets Creek, a relatively small area in McTagg and Mitchel valleys, and parts of the 300 m buffer around the footprint interacts with winter goat habitat on the western edge of the TMF.

The Application reports that the loss and alteration of winter goat habitat could be equivalent to a maximum of 69.4 home ranges, or as little as five home ranges. In addition, the proposed Project development overlaps approximately 547 ha of designated UWR.

Table 27: Mountain Goat Habitat Loss and Alteration due to the Proposed Project

Season	Habitat Lost and Altered (ha)	RSA		LSA	
		Total Habitat ¹ (ha)	Habitat Lost/Altered (%)	Total Habitat ¹ (ha)	Habitat Lost/Altered (%)
Winter	1,150	58,511	2.0	6,687	17.2
Summer	1,703	76,718	2.2	9,028	18.9
Total Winter and Summer	1,703	76,757	2.2	9,028	18.9
UWR	547	14,195	3.8	3,094	17.7

¹Total habitat refers to high-quality habitat in the RSA and LSA.

Grizzly Bears: Grizzly bear habitat loss and alteration due to the proposed Project is summarized in the table below. The Application reports the overall loss and alteration of approximately 10,866 ha is roughly equivalent to 58% of the home range of a single male grizzly bear in the interior of BC, or up to two female coastal grizzly bear home ranges. In addition, the proposed grizzly bear WHA within the RSA would be affected.

Table 28: Grizzly Bear Habitat Loss and Alteration due to the Proposed Project

Season	Habitat Lost and Altered (ha)	RSA		LSA	
		Total Habitat ¹ (ha)	Habitat Lost/Altered (%)	Total Habitat ¹ (ha)	Habitat Lost/Altered (%)
Spring	5,000	90,377	5.5	14,214	35.2
Summer	7,874	129,309	6.1	20,176	39.0
Fall	1,077	26,532	4.1	3,804	28.3
Winter (denning) ²	308	-- ²	-- ²	2,346	13.1
Four season combined ³	10,886	172,614	6.3	27,734	39.3
Proposed WHA ⁴	1,807	21,008	8.6	3,779	47.8

¹Total habitat refers to high-quality habitat in the RSA and LSA.

²The winter denning area was mapped for the LSA because soils information was required, which was collected in the LSA, but not in the RSA.

³An additional 158 ha of habitat would be lost during the construction phase outside of the RSA due to construction of the Transmission Line Connector near Treaty Creek.

⁴The WHA habitat loss and alteration calculation does not consider where the WHA overlaps with high-quality habitat previously counted as lost; therefore, some areas have been counted twice.

Black Bears: Black bear habitat loss and alteration due to the proposed Project is summarized in the table below. The Application predicts a small amount of the proposed Project would result in the alteration of 6.4% of the available high-quality black bear habitat in the RSA.

Table 29: Black Bear Habitat Loss and Alteration due to the Proposed Project

Season	Habitat Lost and Altered (ha)	RSA		LSA	
		Total Habitat ¹ (ha)	Habitat Lost/Altered (%)	Total Habitat ¹ (ha)	Habitat Lost/Altered (%)
Spring	5,000	90,377	5.5	14,214	35.2
Summer and Fall	7,874	129,309	6.1	20,176	39.0
Winter (denning)	4,653	59,740	7.8	10,356	44.9
Four Season Combined ²	11,132	174,880	6.4	28,191	39.5

¹Total habitat refers to high-quality habitat in the RSA and LSA.

²An additional 158 ha of habitat will be lost during construction outside of the RSA due to construction of the Transmission Line Connector near Treaty Creek.

American Marten: The Application reports that the development of the proposed Project would modify 7.4% of American marten habitat in the RSA and 46% in the LSA. Further, the amount of suitable marten habitat that would be altered (6,352 ha) represents the home ranges of 525 ha for males and 316 ha for females.

Hoary Marmot: The Application reports that approximately nine of the 49 colonies observed (18%) may be displaced from habitat that would be affected by the development of the proposed Project. However, only two of these colonies directly overlap with the footprint, while the remaining seven are within the 300 m buffer (five colonies) or within fragmented habitat (two colonies).

Bats: The Application states a total of 4,435 ha of mature forest bat habitat within 1 km of wetland bat habitat would be lost or altered, which represents 7.9% of available mature forest present within the RSA and 46% within the LSA.

Raptors: For raptors, the Application states that of the 86,356 ha of suitable nesting habitat identified for raptors within the RSA, 6,341 ha (7.4% of the RSA, 45.5% of the LSA) would be lost, or altered due to the development of the proposed Project.

Wetland Birds: Wetland bird habitat loss and alteration due to the proposed Project is summarized in the table below.

Table 30: Wetland Bird, Cavity nesting Waterfowl and Riverine Bird Habitat Loss and Alteration due to the Proposed Project

	Habitat Lost and Altered (ha)	RSA		LSA	
		Total Habitat ¹ (ha)	Habitat Lost/Altered (%)	Total Habitat ¹ (ha)	Habitat Lost/Altered (%)
Wetland birds	311	7,976	3.9	804	38.7
Cavity-nesting waterfowl	4,435	56,153	7.9	9,697	45.7
Riverine birds ²	144 km	2,896 km	5.0	467 km	30.8

¹Total habitat refers to high-quality habitat in the RSA and LSA.

²Area of lost or altered is given in length of stream (km) rather than area.

Forest and Alpine Birds: The Application states that overall, at the end of the operations phase, 4,046 ha of forest and alpine bird habitat would be removed or altered, including habitat for the SARA-listed rusty blackbird, olive-sided flycatcher and common nighthawk.

Western Toads: The Application reports that of the 38 wetlands suitable for breeding identified for western toads in the RSA, three wetlands would be lost or altered within the 300 m buffer during the construction phase of the proposed Project. Overall, the proposed Project would result in the loss or alteration of 7.9% of the potentially suitable wetlands in the RSA and 18.8% of the suitable wetlands in the LSA.

The Application notes that for each of these wildlife VCs, the area described as “lost” is made up of the proposed Project footprint (34%) and a 300 m buffer (66% of the total area). Hence, where 46% of the habitat is rated as “lost” within the LSA, 15% of the LSA would be in the footprint, and 31% of the LSA would be in the 300 m buffer. When comparing these values to the LSA and RSA the Proponent states it is important to note that the LSA is an arbitrary boundary set at 1.5 km or 500 m (for roads) from proposed Project infrastructure, whereas the RSA uses ecological boundaries of rivers and mountain ridges and roughly approximates the area used by a moose or grizzly bear during its lifetime and is therefore a better ecological comparison of effects due to the proposed Project.

Disruption of Movement

The Proponent identified disruption of wildlife movement as a potential effect for six VCs (moose; mountain goats; grizzly bears; black bears; American marten; and Western toad) as described in the table below.

Table 31: Summary of Disruption of Movement Effects on Wildlife VCs

VC	Project Components	Description of Effect
Moose	TMF, TCAR, CCAR, saddle portals	Disruption of movement along Treaty drainage, Unuk River, TMF valley and Saddle portal. Access road acting as a movement corridor for moose.
Mountain Goat	All Mine Site (excluding access road) components, helicopter flights lines, saddle portals	Disruption of movement due to the development of the Mine Site and Saddle portals; blockage of movement to a potential salt lick around the Mine Site.
Grizzly Bear	All components	Disruption of movement due to development in high quality bear habitat and increased human presence (e.g. roads and vehicles).
Black Bear	All components	Disruption of movement due to development in high quality bear habitat and increased human presence (e.g. roads and vehicles).
American marten	TMF, TCAR, CCAR, RSFs	Disruption of movement along Unuk River, Sulphurets Creek, Teigen Creek and TMF valley.
Western toad	TCAR, CCAR	Disruption of movement from aquatic breeding habitat to terrestrial habitat along TCAR and CCAR.

Sensory Disturbance

The Application states sensory disturbance from proposed Project related light or noise and human presence may alter the behaviours of wildlife species, resulting in behavioural changes or habitat avoidance. The Application notes that sensory disturbance affecting mountain goats could equate to a functional loss of habitat of approximately 13% of the winter population within the RSA and 19% of the subpopulation during operation.

Direct Mortality

The Application states that direct mortality could affect all 11 wildlife VCs during the following activities:

- vehicle-wildlife collision;
- vegetation clearing/ pit construction;
- avalanche control; and
- wildlife interactions with the transmission line.

Indirect Mortality

The Application described indirect mortality as mortality due to increased access and hunting and range shifts due to disturbance. The Proponent identified potential indirect mortality effects on the following VCs: moose, mountain goats, grizzly bears and black bears. The Application states that the primary source of indirect mortality identified for wildlife VCs in association with the proposed Project development is increased hunting pressure on ungulates and bears, both legal and illegal, as a result of greater human access to the RSA.

Attractants

The Proponent identified nine VCs that may be affected by attractants associated with the proposed Project: moose, mountain goats, grizzly bears, black bears, American martens, bats, raptors, wetland birds and western toads. The Application identified the following proposed Project features and materials that have the potential to attract wildlife:

- odours and food sources associated with cooking, incinerators, garbage or sewage;
- refuge, shelter, nesting, perching or roosting habitat provided by proposed Project structures;
- regenerating vegetation on road verges or other disturbed areas that creates desirable forage;
- travel corridors such as roads or cleared areas under transmission lines that facilitate movement through otherwise difficult terrain or vegetation;
- de-icing salts used on roads in winter; and
- ponds or ditches created by development that provide water and aquatic habitat.

Chemical Hazards

The Application defines a chemical hazard as a chemical that has the potential to cause an adverse health effect on wildlife VCs due to the proposed Project during any phase. All 11 VCs have the potential to be affected by chemical hazards. Sources of proposed Project related COPCs include:

- available in water (within the Mine Site, in the WSF; water discharged from the Mine

Site; within the ponds of the TMF; and water discharged from the TMF);

- associated with mine development and operation;
- available in ML/ARD generated from exposed waste rock; and
- deposited in fugitive dust.

Summary of Mitigation Proposed in the Application

The Application outlines a broad range of mitigation measures to reduce potential effects on wildlife, many of which are contained and further described in the Wildlife Effects Monitoring Plan. Examples of some of the measures include:

- avoiding construction activities that may disturb wildlife VCs during wildlife sensitive periods. If avoidance is not possible, conduct preferable non-intrusive pre-construction clearing surveys to identify evidence of breeding or dens that must be avoided;
- having an Environmental Monitor on site during construction to identify sensitive wildlife features and implement appropriate procedures to minimize potential adverse effects to these areas;
- managing roadside vegetation (e.g. by clearing along the edges and planting vegetation that is unattractive to wildlife) to minimize attractiveness to wildlife and provide good line of sight to avoid vehicle-wildlife collisions;
- minimizing the risk of trapping wildlife (particularly moose) along the major access roads and the on-site roads by managing snow bank height and creating escape pathways in snow banks;
- incorporating and monitoring of wildlife passages into road and bridge design at river and creek crossings, to allow wildlife to move beneath these structures and adaptation of wildlife crossings if monitoring indicates that crossings are ineffective;
- educating employees to assess and adapt their driving activities during dawn and dusk, which are periods of high wildlife activity;
- yielding to wildlife observed along proposed Project roads and Hwys;
- controlling vehicle speeds and vehicles per hour on proposed project roads to reduce direct mortality (wildlife vehicle collisions) and disruption of movement to wildlife;
- incorporating appropriate design provisions along proposed Project roads to minimize wildlife/traffic collision risk, thereby facilitating wildlife movement (e.g. western toads);
- providing signage along proposed Project roads in high-value wildlife areas or

known wildlife travel corridors to warn vehicle operators of the potential to encounter wildlife;

- the proposed Project's access roads (the CCAR and the TCAR) would be gated and staffed to prohibit the entry by non-authorized vehicles thereby limiting new hunting opportunities and associated indirect mortality;
- deactivating all non-essential roads, including the CCAR, at closure, when traffic volumes will be greatly reduced; and,
- monitoring and adaptively managing the use of proposed Project structures by wildlife for security habitat (refuge, shelter), daily activities (roosting, perching) or nesting purposes.

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

Note: wildlife issues relating to the transportation corridors (Hwys 37 and 37A) 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 CPD and TOC (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:

- FLNR stated that there is a high likelihood that the Proponent's sightings of northern goshawk in the coastal-influenced Unuk River drainage were *laingi* subspecies, which is red listed in BC and threatened under SARA. FLNR required the Proponent to conduct additional surveys in order to identify and potentially mitigate impacts during construction of the CCAR and portions of the proposed Project footprint within potentially suitable habitat.
 - The Proponent responded that pre-clearing surveys for raptor nests are planned during construction of the CCAR and other areas where there is suitable habitat. This commitment will be expanded upon in the detailed Wildlife Mitigation and Monitoring Plan to be developed during the permitting stage.
- FLNR commented that breeding sites of western toad can be hard to find and western toads may not breed every year. Given this, FLNR considers it highly possible that breeding locations were missed within the Proponent's surveys of the TMF and Mine Site footprint. Further, FLNR stated that the Proponent's finding of an adult western toad within the planned TMF and at the Mine Site locations should be considered as potential indicators of breeding habitat nearby. FLNR required the

Proponent to incorporate this finding into the effects assessment and commit to additional surveys within the TMF for breeding ponds before the TMF is developed.

- The Proponent responded that the possibility that toad surveys did not find toads due to the timing of the surveys was included in the Application.
- The Wildlife Effects Monitoring Plan states that if construction occurs between May and August in wetland and pond habitat, construction monitors will survey the wetlands and ponds prior to construction activity, and, if toad breeding is confirmed, a buffer zone of at least 30 m will be established between construction activities and identified breeding habitat or a salvage/relocation program will be implemented.
- FLNR and *wilp* Skii km Lax Ha raised concerns with respect to the mitigation proposed for effects to American marten. FLNR requested additional information from the Proponent with respect to the feasibility of leaving abundant coarse woody debris on the ground of the transmission line right of way to provide cover and subniven¹⁸ spaces to facilitate martin movement to mitigate the barrier from the transmission line right of way. FLNR also requested additional information regarding the placement of drainage culverts on the access roads to mitigate road impacts on martin movement.
 - The Proponent responded that clearing would leave shrubs and low lying vegetation in place and the potential to leave fallen timber in place in the right of way would be investigated. The Proponent noted that fire restrictions and other permitting requirements may limit the potential for the proposed Project to use fallen timber to mitigate furbearer movement.
- FLNR required additional information from the Proponent with respect to clearing within natal areas for moose from April to July. Tahltan Nation was also concerned about potential impacts to moose natal areas and moose habitat. The question of the location of moose calving areas was also raised at Wildlife Working Group meetings.
 - The Proponent stated that: 1) late winter habitat is the most important habitat for moose as evaluated in the application (i.e. late winter habitat defines the locations of provincial moose UWR); 2) moose typically do not have a “calving area” that they return to every year; and 3) determining the locations of calving areas would require collaring of female moose, which is

¹⁸ refers to a zone that is in or under the snow layer

not supported by FLNR. Thus moose calving habitat would not be identified prior to construction.

- The Proponent's preferred mitigation is to avoid clearing during early spring when moose cows are calving. If a cow moose is observed incidentally to be calving during clearing and construction, then mitigation to reduce disturbance would be triggered.
- The Proponent is preparing a detailed Wildlife Effects Monitoring Plan to support permit applications. The plan will describe mitigation measures including stopping machinery until the animals move away.
- FLNR and *wilp* Skii km Lax Ha questioned the Proponent's proposed mitigation measure of setting out artificial salt licks for goats to enhance habitat quality outside of the Mine Site. FLNR stated this is strongly discouraged by the provincial Wildlife Branch as salt blocks are thought to be a significant vector for disease transmission. *Wilp* Skii km Lax Ha stated that concentrations of mountain goats in the wrong areas could increase predation risk, be an attraction for mine staff, and possibly be an attraction for hunters.
 - In response, the Proponent noted two potential salt licks were identified for mountain goats within the RSA during baseline surveys. Remote cameras during 2013 confirmed the use of one of these salt licks - located approximately 575 m south of the Kerr Pit Haul Road and 1,060 m northwest of the Sulphurets Pit.
 - The Application includes several commitments related to the salt lick, including 1) minimizing noise and disturbance in the area of the salt lick, 2) monitoring the salt lick to evaluate if goats continue to use the salt lick, and 3) if use of the lick reduces over time, installing additional artificial salt licks in appropriate goat habitat to offset disturbance at the existing lick in consultation with FLNR. The creation of multiple licks would allow goats to choose which one is safe from predators. The pros and cons of using commercial salt licks for mountain goats will be evaluated in the Wildlife Effects Monitoring Plan, to be developed during the permitting stage.
- EC required the Proponent to provide information to support the significance determination for Little Brown Myotis as 46% of mature forest within the local study area would be lost or altered as a result of the proposed Project.
 - The Proponent responded that the effect of habitat loss and alteration on bats was not considered to be a residual effect in the Application, and therefore was not assessed for significance. Of the area assessed, 34% was "lost" in the footprint, and 66% was in the 300 m buffer - hence, 15% of the

LSA would actually be lost. The Application included an assessment of the possible location of bat hibernacula that may be used for overwintering.

- The Proponent conducted further study in the spring of 2013 which confirmed the presence of bats during the summer, although no hibernacula were confirmed. The Proponent hypothesized that bats observed in May in the study area may have emerged from hibernacula in these areas along the Stikine and Iskut rivers to the north and possibly similar to the west in Alaska, and flown a relatively short distance to the study area where they were detected. These results support the conclusion reached in the Application that habitat loss and alteration would not result in a residual effect on bats.
- Gitanyow Nation questioned the Proponent's significance determination based solely on a comparison of the area of habitat lost by the proposed Project to a much larger area (the RSA) in order to show a low percentage of habitat area lost. Gitanyow Nation disagreed with using this as the only method of assessing severity of impact to moose and other wildlife species.
 - The Proponent responded that in the wildlife effects assessment in the Application the amount of habitat loss is compared to the amount of available habitat in the RSA and the LSA. The approach is consistent with other EAs in BC. The severity of the impact was also assessed by measuring the amount lost or altered habitat in terms of number moose home ranges and number of moose given the density found during baseline surveys.
- MEM raised concerns about the Proponent's proposed reclamation strategies. MEM required clarification as to how the predevelopment and post-closure land capability compare. Specifically, MEM requested additional information on: 1) how much area will not be reclaimed, 2) how much habitat of each relevant species will be reclaimed, and 3) will the reduction in habitat area potentially impact particular wildlife species on a population level.
 - In response, the Proponent stated that areas were evaluated as lost (4,369 ha) in the footprint and altered (8,967 ha) in a 300 m buffer surrounding the footprint. The footprint would be cleared, while the buffer may experience edge effects, noise, dust, disturbance, etc. At closure, 1,887 ha (43%) of the footprint would be reclaimed while the area in the 300 m buffer (8,967 ha), would recover naturally when sources of dust and disturbance are removed.
 - The Proponent's detailed responses to question #2 are presented in the [memo](#) addressing MEM's reclamation comments.

- The reclamation of wildlife habitat as identified in the Closure and Reclamation Plan was not a mitigation strategy used to evaluate the impact of the proposed Project on wildlife. Mountain goat was the only species identified with the potential for a distinguishable effect on the local population due to habitat loss from the proposed Project.

5.9.4 Residual Effects Significance Analysis

After considering all relevant mitigation measures proposed, EAO concludes that the proposed Project would result in residual adverse effects on wildlife and their habitat primarily due to:

- habitat alteration and loss (primarily through land clearing for construction, and degradation of habitat near to proposed Project components through dusting, noise, etc.); and
- sensory disturbance for some species, such as mountain goats and grizzly bears, which are more sensitive to disturbance.

The other effects listed below have proven and well understood mitigation measures such as standard best practices and would have lesser residual effects on wildlife populations:

- disruption of wildlife movement (primarily linked to traffic and large infrastructure components such as the TMF that block migration corridors and to a lesser extent semi-permeable barriers);
- sensory disturbance (linked to noise, visual and lighting intrusion);
- direct mortality of wildlife due to construction-related incidents and vehicle-wildlife collisions;
- indirect mortality (mainly due to increased access and hunting pressures), risks posed by mine-related attractants (such as garbage or attractive vegetation along roadways); and
- health risks due to chemical hazards.

EAO has undertaken the following significance analysis on the residual adverse effects on wildlife and their habitat.

Table 32: EAO's Significance Analysis for Wildlife and Wildlife Habitat

Factor	Rationale
Context	Mature forests, wetlands, alpine areas and riparian forests provide high-value habitat to diverse wildlife communities in the proposed Project area. Common species or groups that occur in the RSA include ungulates (e.g. moose and mountain goat),

	<p>omnivores/carnivores (e.g. grizzly bear, black bear and wolves), furbearers (e.g. fisher, marten and wolverine), hoary marmots, bats, birds (forest birds, raptors and waterfowl), and amphibians (e.g. Columbia spotted frog and western toad).</p> <p>Forest harvesting within the RSA is minimal compared to many other areas in BC, due to the remoteness of the area and the relatively poor productivity of forests in this northerly location, so that wildlife habitats in most of the RSA are essentially undisturbed. Local and regional populations of most species are healthy in this area of BC, although regional moose populations have declined over the last decade.</p> <p>The ecological implications of residual wildlife effects vary, depending on the VC. Implications are more severe for moose, western toad and bats (particularly little brown myotis) as they are less able to adapt to changes in the environment, have a declining population or are a listed species. Mountain goats, grizzly bears, and American marten are expected to have capacity to adapt to changes in the environment or have a stable population status making them more resilient. However, mountain goats are more sensitive to disturbance than most other ungulates and grizzly bears are more vulnerable to mortality-related issues due to attraction to camps. Some populations of birds are increasing (i.e., high resilience) while others (e.g. Schedule 1 species) are or may be declining (i.e. low resilience). Black bears and hoary marmots are expected to be the most resilient since their populations are large and healthy.</p>
Magnitude	<p><i>Moose:</i> The magnitude of habitat loss effects to moose is moderate. Areas of summer and early winter habitat would be lost in the TMF and Treaty Processing Plant site, but the important, and limiting habitat of late winter overlaps with the proposed Project only at low elevations along the TCAR.</p> <p><i>Goats:</i> The magnitude of habitat loss effects for goats is moderate. Areas of winter habitat would be lost due to the CCAR, small areas in the Mine Site and at the TMF, where areas of the 300 m buffer overlap winter habitat.</p> <p>The magnitude of disturbance effects is also moderate. Goats are susceptible to noise and disturbance and the Proponent's noise modeling indicated that areas of winter and summer habitat would</p>

	<p>effectively be lost at the Mine Site.</p> <p><i>Grizzly bears:</i> The magnitude of habitat loss effects for grizzly bears is moderate. The TMF contains areas of high quality spring and summer range.</p> <p>The magnitude of disturbance effects is also moderate, since grizzly bears are known to avoid human activities to a greater degree than other large mammals.</p> <p><i>Other VCs:</i> The magnitude of habitat loss effects is moderate or low for all VCs when compared to the RSA (+/- 5%) but are moderate to high when compared to the LSA (+/- 40%).</p>
Extent	<p>The extent of residual wildlife effects is localized to the LSA for most effects categories, although for some wildlife VCs with larger ranges (grizzly bears, black bears, moose, and mountain goats), residual effects will extend to the landscape level, while remaining tied to the proposed Project footprint or to individual animals within the RSA (e.g. effects linked to disruption of movement, direct and indirect mortality, or sensory disturbance). The abundance of individuals of particular species may decline during construction and operation in the immediate area of the proposed Project footprint; however, most wildlife VCs are mobile, and will likely seek alternative habitat if displaced by mining-related disturbances, if alternative habitat is available.</p>
Duration	<p>Duration of residual wildlife effects is predicted to be long-term or far future, depending on the extent of habitat removal and animal displaced from the LSA. As the level of on-site activity declines, or where site reclamation begins to reverse earlier habitat effects, the duration of residual effects may be shortened.</p>
Reversibility	<p>All residual wildlife effects are considered reversible, except where habitat is permanently removed during construction and cannot be reclaimed. Direct mortality effects on hoary marmot colonies are rated irreversible if entire colonies are removed by open pit mining and the RSFs.</p>
Frequency	<p>For most effects, frequency will be sporadic rather than regular or continuous. Sporadic effects will include wildlife mortality, disruption of movement and the effects of attractants. Frequency is rated regular for sensory disturbance effects such as noise, and regular or continuous for chemical hazard effects on some VCs (mountain</p>

	goats, bats, wetland birds), since exposure risk will be continuous during construction and operation.
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Likelihood

The likelihood that predicted residual wildlife effects would be experienced varies with the VC and effect. The likelihood that habitat loss and alteration effects will occur is considered high, and that bears will be attracted to proposed Project infrastructure and personnel camps. Indirect mortality effects are difficult to predict for moose and mountain goats, and the likelihood of effects is rated low due to the standard mitigation proposed by the Proponent. The likelihood of direct mortality effects is moderate for moose, bears, American martens, hoary marmots, and western toads, but low for mountain goats because they will not interact with proposed Project roads at high elevations. Likelihood is medium for predicted disruptions of animal movements and sensory disturbance of mountain goats. The likelihood of chemical hazard effects is medium.

5.9.5 Significance Determination

EAO considered the low to moderate magnitude effect, the reversibility of wildlife effects, and the sporadic nature of most effects other than sensory disturbance and chemical hazard effects and the long-term duration of effects.

EAO notes the Proponents commitments to specific mitigation measures contained in the Wildlife Effects Monitoring Plan identified in the TOC are expected to be successful in mitigating potential wildlife effects during all phases of the proposed Project.

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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.

5.9.6 Cumulative Effects

Depending on the wildlife VC, numerous other projects and activities have the potential for residual effects that overlap with the proposed Project's potential residual wildlife effects. Projects include the past Eskay Creek, Kitsault, Granduc and Snip mines, the current Wolverine Mine, Forrest Kerr and Long Lake HEPs and the NTL, the proposed Bronson Slope, Brucejack, Galore Creek, Arctos Anthracite, Granduc Copper, Schaft Creek, Red Chris, Swamp Point, Bear River Gravel and Snowfield mines, the McLymont Creek and Treaty Creek HEPs, and past and potential mineral and energy resource exploration, residential and Aboriginal resource harvesting, fishing, guide-outfitting, recreation and tourism, timber harvesting and road traffic. However, considering the

suite of standard mitigation that would be applied for these projects, the cumulative effects on wildlife is considered not significant.

5.9.7 Certainty

Confidence in habitat loss effects is medium as habitat suitability modeling by the Proponent identified high-quality habitat. Areas of lost and degraded habitat were evaluated through a conservative approach, which included a 300-m buffer surrounding all footprint areas.

Confidence in the assessment of some wildlife effects, such as disruption of movement, direct mortality (vehicle collisions), indirect mortality (new access leading to new hunting), attractants, and chemical hazards is moderate. Mitigation is available for each of these effects that have been shown to be effective at similar industrial operations and resource roads.

Confidence in wildlife displacement due to disturbance is low. The Application included noise modeling which used low threshold values (suburban nighttime noise limits), but the actual degree that wildlife may avoid active proposed Project facilities is difficult to predict. Some wildlife may be attracted (e.g. bats and food-rewarded bears) while other species or individuals may avoid the proposed Project (e.g., moose and bears).

5.9.8 Conclusion

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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.

6 Assessment of Potential Economic Effects

6.1 Economic Effects

6.1.1 Background Information

VCs selected for the assessment include employment and income, and business opportunities and economic development.

The employment and income VC encompasses potential Project effects on direct and spin-off (indirect and induced) employment, personal and household income, Gross Domestic Product (GDP) and government tax revenues, as well as opportunities for, and benefits to, Aboriginal communities. The business opportunities and economic development VC includes potential proposed Project benefits on local businesses,

including Aboriginally-owned businesses, and the overall growth and development of the local and regional economy.

LSA communities are depicted in figure 20 and include the four Nisga'a villages, Terrace, Smithers, Stewart, Hazelton, New Hazelton, Dease Lake, Bell II, Meziadin Junction, Bob Quinn Lake, Gitanyow 1 (Gitanyow Nation), Telegraph Creek 6 and 6A, Guhthe Tah 12, Dease Lake 9 and Iskut 6 (Tahltan Nation).

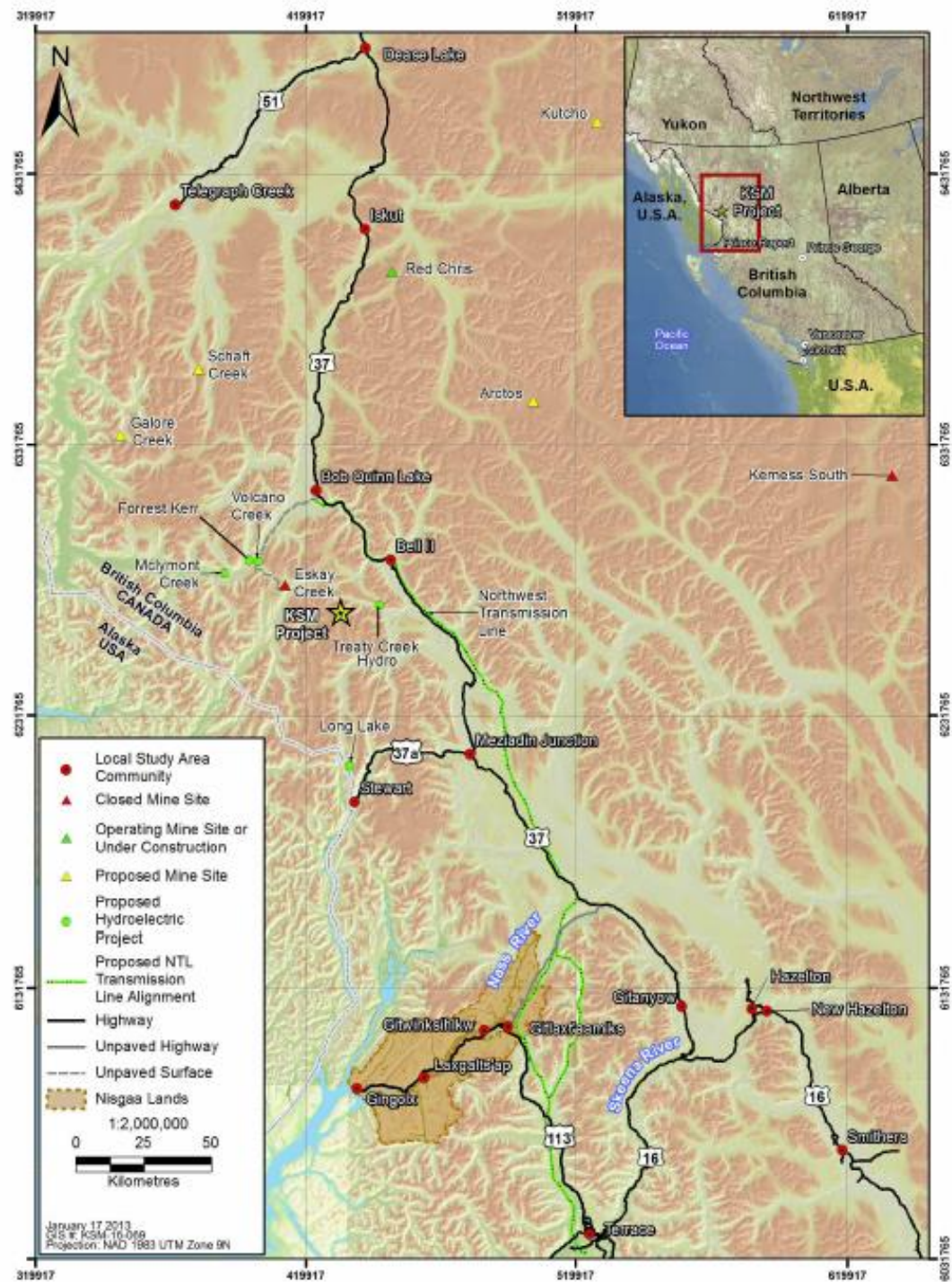
The RSA covers 9,559,100 ha, and is comprised of two administrative regions - the Regional District of Kitimat-Stikine, and Electoral Area A of the Regional District of Bulkley-Nechako. The Province of BC is also defined as a study area, since some economic impacts would be realized at the provincial scale.

The Application describes past and current economic conditions observed in the province, and regional and local communities.

The Proponent's assessment of the economic effects is based on the results of an economic impact model, DYNATEC, based on Statistics Canada's Input/ Output Model for BC and Canada, but incorporating dynamic and non-linear simulations of the likely effects. Based on information provided by the Proponent, the model produced estimates of the proposed Project effects on provincial GDP, income, government revenue and total employment.

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

Figure 21: Social and Economic Local Study Area Communities



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

Overall Effects

The Application states that direct employment and procurement of goods and services are the only proposed Project components that have the potential to interact with the two economic VCs (employment and income, and business opportunities and economic development). They would do so throughout the proposed Project life cycle, but these impacts would be most evident during construction and operations.

The Application reports that based on modeling the proposed Project is expected to generate substantial employment opportunities, as well as spending on supplies and services, resulting in direct and spin-off (indirect and induced) economic impacts that would include increases in employment, personal income and overall GDP. The proposed Project would also contribute to government revenues mainly through personal income tax, corporate profit tax and sales tax, and would also pay rural property tax and revenues (BC mineral tax). Key economic impacts are summarized in the table below.

Table 33: Summary of Economic Impacts of the Proposed Project for Construction and Operation

Year	Employment (Person- years)	GDP (Million Constant Dollars)	Tax Revenue ¹ (Million Constant Dollars)		
			Federal	Provincial	Total
Construction Phase					
BC	31,094	\$3,445.6	\$408.4	\$182.8	\$591.3
Canada	55,248	\$6,020.8	\$731.6	\$344.5	\$1,076.0
Operation Phase					
BC	194,313	\$20,846.8	\$2,808.0	\$1,265.2	\$4,073.2
Canada	395,868	\$41,673.7	\$5,368.4	\$2,641.1	\$8,009.6

Source: 2012 Economic Model Report (Appendix 20-B of the Proponent's Application).

Note: Proposed Project-related employment includes the sum of direct, indirect, and induced employment. Operation employment includes construction for underground mining (pit caving).

¹ The estimation of government tax revenues is limited to personal income tax, indirect corporate profit tax, and sales tax. It does not include direct taxes on the profit of the proposed Project, property taxes, or any royalties paid by the proposed Project.

The Application reports that businesses that are direct and indirect suppliers to the proposed Project are expected to benefit from the development of the proposed Project. During construction and operations, the spending of personal income from direct and indirect proposed Project-related employment is predicted to result in additional opportunities for businesses as workers spend their incomes, inducing further income and GDP impacts. Businesses may also invest and/or expand operations to take advantage of new opportunities. The Proponent predicts that proposed Project related changes in income and GDP would result in a beneficial residual effect on business opportunities and economic development.

Construction Phase Effects

The Application says for the construction phase, total direct capital investment for the proposed Project would be approximately \$5.26 billion, of which about \$4.61 billion is expected to be direct expenditures in Canada. Most capital expenditures would be sourced within BC, followed by Alberta, Ontario, and to a lesser extent, Quebec. The remaining expenditures would be sourced internationally.

The Application estimates direct on-site proposed Project employment to be an average of approximately 314 person years (PY) for the first year of construction increasing to a peak of 2,260 PY. The Proponent estimates the total direct proposed Project employment over the five-year period to be approximately 7,450 PY in BC and 9,314 PY for all of Canada.

Operations Phase Effects

The Proponent predicts the proposed Project would be in operations for 51.5 years and estimates operating expenditures to be initially \$852 million, thereafter varying from as low as approximately \$570 million/year to a high of \$780 million/year. Total direct operation-phase spending by the proposed Project is estimated to be approximately \$34.3 billion over the life of the mine, with most expenditures being made in BC.

Direct employment is predicted to be approximately 1,066 PY during Year 1 of operation (2020), remaining at that approximate level for four years, then decreasing moderately to 865 PY by 2029 and remaining near that level for approximately 10 years.

Employment is expected to increase again beginning in Year 21 (2040), reaching a peak total of approximately 1,709 PY in Years 32 and 33 (2051 and 2052), mainly reflecting the switch to underground mining. Total employment is projected to then decrease moderately until the estimated end of operation in Year 52 (2071).

The Application predicts direct employment over the 51.5-year mine life, excluding construction employment necessitated by the switch to underground mining, to total approximately 35,205 PY in BC and 52,537 PY for all of Canada. These figures exclude

the relatively small foreign worker component. For the underground mining construction component, direct employment is estimated to total approximately 4,621 PY in BC and 5,811 PY for all of Canada.

The Application predicts substantial economic benefits during operation through employment and through businesses directly and indirectly supplying the proposed Project. The Application reports that the long duration of the operation phase would substantially enhance the work experience, education, and skill levels of the regional workforce, including both Aboriginal and non-Aboriginal workers, and would provide the necessary confidence for local and regional businesses to commit funds, time and resources to help meet the proposed Project's supply and service needs.

Closure and Post-Closure Phases

During closure and post-closure, activities would include the decommissioning and reclamation of various facilities at the Mine Site and the PTMA, and the ongoing operation and maintenance of permanent proposed Project components. These activities would provide employment and business opportunities; however the Application reports estimates are not available because closure would take place far in the future.

The Application describes the adverse effects from closure on LSA communities that have become economically dependent on the proposed Project during operation. Since direct proposed Project expenditures and employment would be much lower than during operation, an overall loss of employment, income, GDP and government tax revenues are predicted at closure, likely triggering indirect and induced employment and income losses.

Summary of Mitigation Proposed in the Application

Mitigation measures for the potential effects on employment and business are contained within the Proponent's Labour Recruitment and Retention Strategy, Procurement Strategy, Workforce Training Strategy and Workforce Transition Program.

Labour Recruitment and Retention Strategy

The objective of the Labour Recruitment and Retention Strategy is to maximize employment benefits within the LSA communities, the RSA and the province.

Examples of recruitment measures include the following:

- communication activities within LSA communities to provide advance notification of employment opportunities and expectations, hiring schedules and skill/certification requirements;
- development of employment policies and programs that consider the needs of workers from regional and Aboriginal communities; and

- development of co-operative working relationships with regional post-secondary educational institutions to facilitate worker preparedness for proposed Project positions.

Examples of labour retention measures include the following:

- flexibility to accommodate cultural and familial commitments and responsibilities of workers;
- provision of financial management and life skills training opportunities for workers; and
- implementation of zero-tolerance policies for drug and alcohol use, including clear communication and commitment to the policies by workers.

Procurement Strategy

The overall objective of the Procurement Strategy is to encourage the involvement of local and regional businesses in the proposed Project, so as to maximize proposed Project-related benefits within the RSA. Examples of measures provided for in the strategy include:

- development of a Procurement Information System that would be accessible to local and regional businesses, with information on such topics as qualification requirements, health and safety requirements, current and future supply opportunities, quality and business conduct expectations, and required technical standards;
- cooperation with local economic development agencies and educational institutions to assist them to encourage local business development (e.g., by sponsoring courses or workshops on business development and contract tendering); and
- development of an inventory of suppliers (including information on the types of goods and services provided, capacities and capabilities) that would be accessible by proposed Project procurement personnel, as well as the Engineering, Procurement and Construction Management contractor and other contractors.

Workforce Training Strategy

The objective of the Workforce Training Strategy is to develop qualified locally and regionally based workers for the proposed Project through measures intended to maximize the work experience, education and skill levels of the regional workforce. The Workforce Training Strategy is intended to:

- support the development of worker training programs delivered through external education and training facilities by communicating proposed Project workforce hiring schedules and skill/certification requirements, and by developing strategic

partnerships with post-secondary education institutions to deliver appropriate training within the RSA;

- provide in-house training and career development opportunities, including worker training programs as part of worker recruitment and on-the-job training programs to enhance worker job expertise and to promote internal worker advancement; and
- make education, training, and employment opportunities available to Aboriginal peoples within the LSA.

Workforce Transition Program

The Workforce Transition Program would be developed and implemented prior to closure. Its objective would be to help workers secure suitable employment elsewhere and, thus, minimize the adverse effects of employment loss. Anticipated elements of the Workforce Transition Program would include:

- development of materials that would assist workers to describe the skills acquired through proposed Project-related employment, to match their skills to alternative industries and positions, and to articulate their skills and experience effectively in personal resumes and other job search materials;
- creation of an inventory of available workers and their skills/experience, to be made available to external Human Resources officials; and
- coordination with post-secondary training institutions to promote the development of specific retraining initiatives in response to both industry demand at closure and the level of interest expressed by proposed Project workers.

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, NLG¹⁹ and the public. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1.

The CPD and TOC (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:

¹⁹ 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 Regional District of Kitimat Stikine was concerned that the refuse from the proposed Project could overwhelm the small landfill facilities in the region. The Regional District expects ongoing communication with the Proponent to ensure solid waste, septic waste and recyclables from the proposed Project is managed efficiently and not becoming a financial or logistical burden on the Regional District.
 - In response the Proponent committed to consult the Regional District of Kitimat-Stikine to ensure solid waste, septic waste and recyclables from the mine or construction camps are managed efficiently and do not become a financial or logistical burden on the Regional District.

6.1.4 Residual Effects

In consideration of EAO's assessment of the Application, and comments from the public, EAO finds that net beneficial effects on the economy from the proposed Project are anticipated.

6.1.5 Conclusion

Based on the above analysis and having regard to the conditions identified in the TOC and the CPD (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.

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. The Proponent selected the following VCs for the social assessment: community demographics, infrastructure, and services; education, skills development and training; and community well-being.

The Proponent accessed information from Statistics Canada Census data, BC Stats, Aboriginal Affairs and Northern Development Canada and various provincial and municipal government agencies in addition to conducting interviews.

The social LSA and RSA were the same as the ones used for the economic assessment.

As part of the social assessment, the Proponent also assessed land use effects and

selected the following VCs for the assessment:

- commercial recreation;
- guide-outfitting and trapping;
- recreational hunting and fishing;
- subsistence;
- traditional or heritage value of land;
- water licenses;
- navigable waters; and
- mining and mineral exploration.

The Proponent conducted desktop studies and fieldwork to identify land users and their frequency and type of use of the land within the LSA and RSA.

The proposed Project falls under two provincial land and resource management plans: the Nass South Sustainable Resource Management Plan and the Cassiar-Iskut-Stikine Land and Resource Management Plan. The proposed Project activities are allowable activities under these plans.

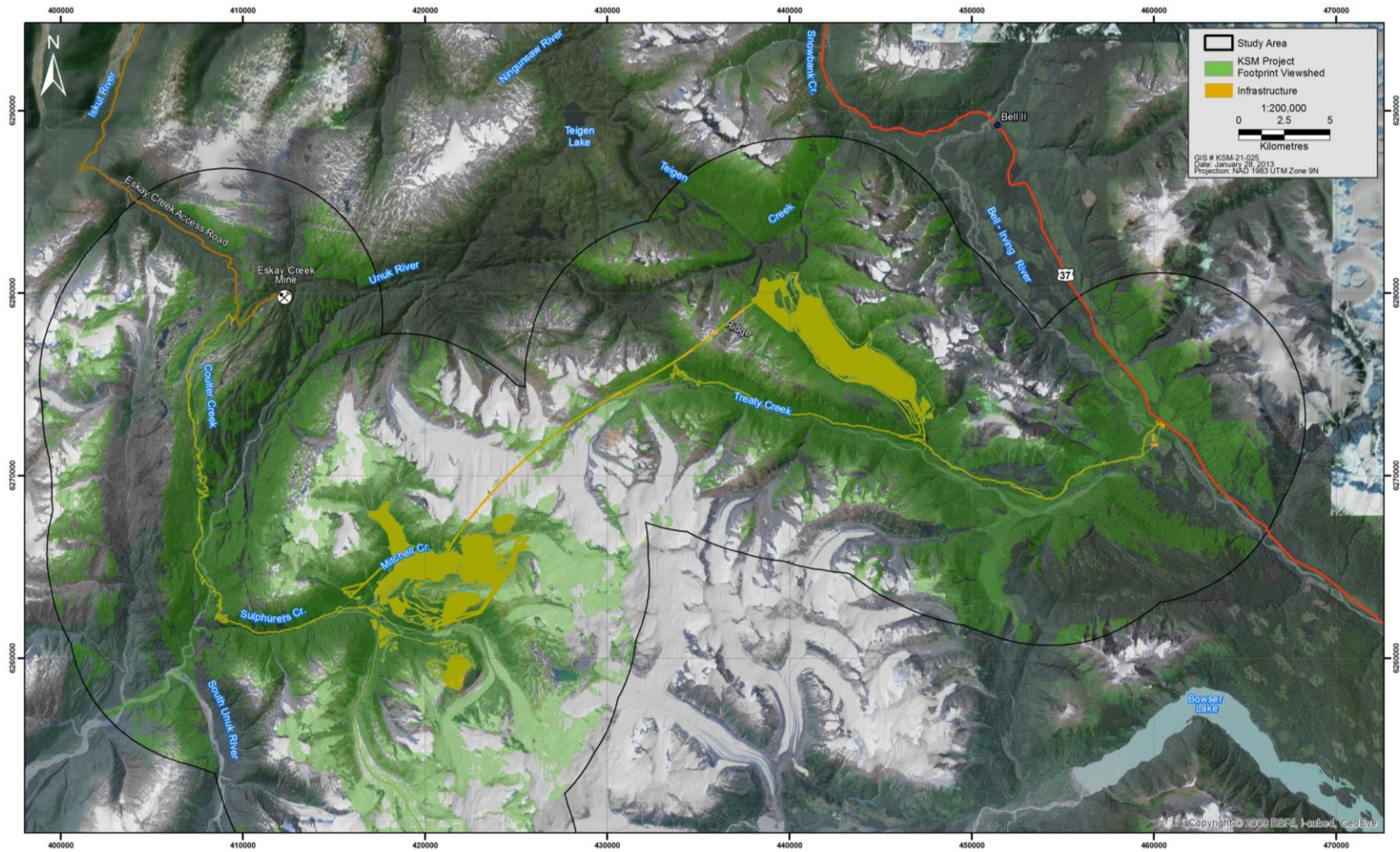
The Proponent also assessed visual and aesthetic effects of the proposed Project using the following VCs:

- visual quality for river rafting tours;
- visual quality for heli-skiing tours;
- visual quality for guided backcountry expeditions;
- visual quality for guided angling trips;
- visual quality for visitors to the Treaty Creek Site (a protected heritage site); and
- visual quality for Hwy 37 users.

The Proponent identified potentially visually sensitive areas and conducted a viewshed analysis of the proposed Project area to determine how much of the proposed Project infrastructure would be visible from the selected viewpoints (see figure 21).

Land use effects relating to Nisga'a Nation and First Nations are described in part D of this Report.

Figure 22: Areas from which Proposed Project Infrastructure may be Viewed



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

The Application states that direct employment and the procurement of goods and services are the only proposed Project components that have the potential to impact the social VCs. Impacts would be most evident during construction and operations. The Application says the proposed Project's primary potential social effects would be linked to changes in employment, income, population, tax base and traffic.

Based on economic modeling, the Proponent predicted the proposed Project related employment generation (direct, indirect and induced) for the RSA, BC and Canada for the duration of construction and operation (more than 55 years). This job creation is summarized, as it relates to the current size of the labour force, in the table below.

Table 34: Proposed Project-Specific Employment Effects

			Annual Average Project-related Employment	
	Experienced Labour Force (persons, 2006)	Total Project-related Employment (PYs)	Total (FTEs)	Proportion of 2006 Labour Force (%)
Construction Phase				
RSA	22,530	1,497	272	1.21%
BC	2,193,115	31,094	5,653	0.26%
Canada	16,861,180	55,248	10,045	0.06%
Operation Phase				
RSA	22,530	21,810	423	1.88%
BC	2,193,115	194,313	3,773	0.17%
Canada	16,861,180	345,868	6,716	0.04%

Notes: Active labour force statistics from Statistics Canada (2007). Other data are derived from estimates of the 2012 Economic Model Report (Appendix 20-B of the Proponent's Application, Chapter 20). Proposed Project-related employment includes the sum of direct, indirect, and induced employment. Operation employment includes construction for underground mining.

The Application states the proposed Project is expected to increase income in the RSA through the creation of direct, indirect, and induced employment. The table below

provides a summary of the predicted proposed Project-specific personal incomes, compared to median RSA, BC and Canada-wide salaries in 2005.

Table 35: Project-specific Effects on Income

Median Full-time Earnings (2005)		Project-related Income	
		Average Worker Income	Proportion of 2005 Median Full-time Earnings
Construction Phase			
RSA	\$46,775	\$99,132	212%
BC	\$42,230	\$79,115	187%
Canada	\$41,404	\$72,839	176%
Operation Phase			
RSA	\$46,775	\$93,838	201%
BC	\$42,230	\$66,716	158%
Canada	\$41,404	\$63,661	154%

Notes: Median full-time earning (2005) statistics from Statistics Canada (2007). Other data are derived from estimates of the economic impact modeling (Appendix 20-B of the Proponent's Application, Chapter 20). Average proposed Project-related worker income estimated as total personal income divided by total employment (direct, indirect and induced).

The Application provides details on both the positive and negative effects of increased employment in the region. Some effects described in the Application include:

- new employment opportunities associated with the operation of the proposed Project could increase individual and community income profiles, allowing for improved financial independence and greater access to goods and services. However, the rotation schedules for staff residing in camps may adversely affect family and community dynamics and contribute to stress. Access to additional income may also contribute to substance misuse or other negative social behaviours;
- changes to community demographics from immigration for employment that could affect a community's social fabric, sense of identity, stability and education profile;
- increases in populations and incomes could lead to increased demand for housing, water, sewage, waste management and road infrastructure;

- change in demand on local and regional education facilities, programs and resources;
- positive impacts on the municipal and regional tax base within the RSA and some LSA municipalities as some of the goods and services for the proposed Project are expected to be procured from the RSA;
- increase in traffic associated with transporting materials, staff and concentrate, raising the possibility of adverse effects including noise levels, air quality and public safety; and
- loss of employment and a reduction in expenditures on supplies and services during closure and post-closure could trigger indirect and induced employment and income losses. If residents out-migrate from the RSA, a potential population decline is possible, and this could affect community demographics, education profiles and decline in community well-being.

The Application identified the following effects on land use:

- *Restrictions on access to land and resources* - Public access to the proposed Project area would be restricted for safety and jurisdictional reasons which may impact tenure holders, subsistence hunters and recreational hunters and fishers. Specifically, Last Frontier Heliskiing would lose access to approximately 61,450 ha (6.8%) of its total licence area (904,355 ha), Guide-outfitting licence holder #601066 would have restricted access to 8% of its licence area, including areas that overlap with the PTMA and access roads, and Explorer's League river expeditions would be unable to navigate the Unuk River bridge crossing during construction and decommissioning activities.
- *Change in sensory disturbances* - Proposed Project-related noise, vibration, visual/aesthetic changes and light may disturb wildlife and fish resources, and also land and resource users accustomed to a remote wilderness experience in the LSA. Aboriginal groups, guide outfitters, resident hunters, commercial recreation stakeholders and trapline holders may be affected.
- *Change in the amount of resources* - The placement of the proposed Project, and the presence of proposed Project staff and contractors, in a formerly remote area may open up wildlife, fish and vegetation resources to increased pressures that could result in a change in the amount of these harvestable resources. Increased pressure may result from the loss of vegetation and habitat associated with land clearing for infrastructure development, wildlife mortality due to increased traffic, and barriers to wildlife movement. The Application reports an estimated 4,050 ha area of lost vegetated ecosystems, and degradation and fragmentation of additional habitats as a result of infrastructure barriers. The proposed Project's presence may facilitate

unregulated hunting, trapping and fishing pursuits by opening up access to the area. Species of potential harvest interest for land users include moose, black bear, grizzly bear, mountain goat, American marten, salmon and steelhead. Four commercial stakeholders could be adversely affected by a change in the amount of resources.

With respect to visual and aesthetic effects, the Application identified an alteration of visual quality for all six of the VCs due to the proposed development of the access roads, TMF, open pits and RSFs.

Summary of Mitigation Proposed in the Application

The Proponent proposed the following mitigation for social effects:

- Labour Recruitment and Retention Strategy, Procurement Strategy and Workforce Training Strategy (further described in section 6 – Economic Effects) contains measures designed to: maximize employment benefits within the RSA and LSA; encourage the involvement of local and regional businesses in the proposed Project; and maximize work experience, education and skills and education;
- Employee Assistance Program would provide support to employees to deal with personal or family issues including stress or breakdowns in family relationships linked to work schedules;
- provide financial management and general life skills development training programs to employees to enhance income benefits;
- zero tolerance drug and alcohol policy for employees and suppliers;
- at proposed Project closure, the Workforce Transition Program would provide mitigation for any potential decrease in financial independence by helping workers to secure new employment; and
- facilitate resource planning and capacity-building focused on proposed Project-specific educational and skills development to help manage demand on education facilities.

The Proponent proposed the following mitigation for land use effects:

- installing gates and signs at entrances of the access roads and transmission line right-of-way to indicate the restricted use of the proposed Project areas;
- implement measures contained in the Noise Management Plan and Traffic and Access Management Plan to reduce sensory disturbance to wildlife and land users; and
- implementing and enforcing a “no hunting” and “no fishing” policy for employees and contractors while on-site.

The Proponent proposed the following mitigation measures for the alteration of visual quality:

- maintain tree buffers on access roads to reduce the degree of visual effect; and
- decommission and revegetate non-essential roads and infrastructure at proposed Project closure to diminish the effect on visual quality.

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

During the review of the Application, additional issues were raised by the agencies, NLG²⁰, 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 CPD and TOC (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 District of Stewart raised concerns with respect to the socioeconomic impacts on Stewart including the impact on health and social services, noting that improved economic situations (including local job creation) tend to lead to increases in social problems like drugs and alcohol.

Tahltan Nation questioned the Proponent's responsibilities in supporting enhanced community services, especially, victim services, the Native Alcohol Drug Abuse Problem and counseling services for both the employee and their families on and off the job. Tahltan Nation recommended the Proponent consider different shift rotations to mitigate potential impacts related to community well-being and sought further details related to training, employing and retaining Aboriginal people.

- The Proponent responded that with respect to proposed Project employees and their families, the Proponent has committed to implement programs such as an Employee Assistance Program and a plan to communicate proposed Project information to local governments, stakeholders and residents in the region. These communications help facilitate planning by local governments and service providers with respect to investments in community infrastructure and services.

²⁰ 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 confirmed its commitment to training and employment opportunities for Aboriginal people, referring to the Labour Recruitment and Retention Strategy, and Procurement Strategy and Workforce Training Strategy.
- The Proponent stated that over the life of the proposed Project, the proposed Project would make significant contributions to tax revenues, thus providing the provincial government with additional revenues to invest in infrastructure and contribute to services.
- During the public comment period in the Application review phase, Last Frontier Heliskiing and Rivers West Enterprises, doing business as Bell 2 Lodge submitted a comment in support of the proposed Project. The comment indicated that while Last Frontier Heliskiing will be losing some nice ski runs in some of the areas due to the proposed Project, the Proponent has mitigated many of their concerns.

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

7.1.4 Residual Effects Significance Analysis

EAO has undertaken the following significance analysis on the residual adverse effects on regional demographics, services and infrastructure and land use.

Table 36: EAO's Significance Analysis for Potential Social Effects

Factor	Rationale
Context	<p>Social - LSA communities have experienced population and demographic changes in the past, related to the RSA's resource-based economy, and have demonstrated that they have the capacity to accommodate demographic change. The resilience of community infrastructure and services in response to increased demands is expected to be high, since LSA communities should be able to adapt their infrastructure and services to changing demand patterns over time.</p> <p>LSA communities possess a moderate degree of resilience to potential community well-being effects, and LSA workers and their families have some familiarity with the challenges and benefits of mine-related employment. Social and mental health services have some capacity to adapt to increased demand.</p> <p>Land use - Six commercial recreation licence holders operate in the LSA and RSA, including guide outfitters, trappers, heli-skiing,</p>

	<p>guided mountaineering, guided freshwater rafting and anglers. Members of several Aboriginal groups, notably the Skii km Lax Ha, currently use the RSA and LSA for subsistence harvesting activities. No other Aboriginal practices, customs or traditions were identified within the RSA or LSA. The RSA landscape is currently accessed seasonally, and only infrequently, by helicopter, boat or the Eskay Creek Mine road, or by trekking across difficult terrain. Subsistence harvesters and trappers cite the undisturbed wilderness environment as a key element of their enjoyment of activities conducted in the area. For commercial recreationists and guide-outfitters, being able to offer a wilderness experience is a key factor in gaining clients for outdoor recreation activities in the RSA's relatively undeveloped natural landscape.</p> <p>Levels of land use activity are currently low, and none of the residual land use effects are critical to, and therefore affect the ability to engage in recreational and subsistence land uses in the extensive surrounding areas of wilderness backcountry.</p>
Magnitude	<p>Social – The magnitude is low for all social effects because of the likelihood that many local workers and their families are familiar with rotational employment and, thus, have a degree of resilience to the effect. In addition, it is predicted that a relatively small percentage of local community residents will be employed by the proposed Project, limiting the number of workers and families affected. It is also assumed that most new residents will likely settle in the larger communities, which have greater infrastructure and service capacity. Similarly, only a relatively small proportion of community, regional and BC residents receive training, education and skills upgrading and the magnitude of any enhanced capacity of educational institutions is expected to be low in the context of overall demand on their education and training programs.</p> <p>Land use – The magnitude is moderate for land use effects as commercial recreation licenses cover large areas, providing license holders with the ability to pursue their commercial interests in other parts of their tenures, if necessary. This rating also reflects adverse proposed Project effects predicted for species of harvesting importance, notably moose, grizzly and black bears.</p>
Extent	<p>Social – Effects range from local communities to regional in extent.</p>

	<p>The effect of population change on community demographics is limited to LSA communities and the effects on community well-being would occur at the community level, whereas effects on education, skills and training and effects on social and mental health well-being and services would be regional as these facilities serve regional populations.</p> <p>Land use - Residual effects on commercial recreation tenure holders and subsistence harvesters linked to access restrictions are predicted to be of local geographic extent at all proposed Project phases, given that they are largely tied to the proposed Project footprint while the land uses that are affected take place over much larger areas. Residual effects on commercial recreation tenure holders and subsistence harvesters linked to sensory disturbance (noise and visual intrusion) and wildlife resource reductions are considered regional in geographic extent during construction and operation, since they may extend to the RSA. They are predicted to decline to landscape extent during closure, and local extent during post-closure.</p>
Duration	<p>Social - The duration of social effects ranges from medium duration to long term. The effects of population change on community demographics and on community well-being would be long term as effects would persist through operations. Effects on social and mental health and related services and community infrastructure would be medium duration as services are expected to adapt and improve to accommodate increased demand over the medium term.</p> <p>Land use - The duration of residual land use effects is rated far future as some access restrictions would be permanent, and some wildlife effects may not be reversible until post-closure.</p>
Reversibility	<p>Social – Many of the effects would be reversible at closure as employees leave LSA communities in search of employment elsewhere and associated demand for services diminishes.</p> <p>Land use - The residual effects of access restrictions are irreversible because some proposed Project infrastructure would be permanent. Sensory disturbance effects linked to noise are reversible as the effects cease when the noise source is terminated, although it takes a long time for landscapes to recover from visual disturbance. Wildlife residual effects with implications for the</p>

	amount of resources available are reversible in the long-term, since long-term ecological processes are involved in the restoration of wildlife habitat and species.
Frequency	<p>Social - The frequency of effects is rated continuous as the increased demand on services associated with an increased population would be continuous. Community well-being effects would be related to continuous factors such as employment, financial independence, population change and demands placed on social and mental health services.</p> <p>Land use - The frequency of effects on land use would be continuous overall, as access restriction would be continuous and sensory disturbance and wildlife effects on land use would be continuous during construction and operation, although declining to regular during closure (due to the decrease in activities associated with closure) and sporadic during post-closure.</p>

Likelihood

Social - The likelihood of social effects is rated high as predictions and evidence from other mining projects in the area suggest that community demographics, demand for community infrastructure and services, and community well-being are typically affected.

Land use - The likelihood of effects on land use is rated high overall: changes in access would occur, sensory disturbances would increase during construction and operation, and changes in the amount of wildlife resources would affect guide-outfitters, recreational hunters and subsistence harvesters; however there is uncertainty in predicting wildlife effects as species would respond to proposed Project infrastructure and activities in a variety of ways (habituation or avoidance, habitat abandonment, etc.).

7.1.5 Significance Determination

Social - EAO considered the low magnitude effects, the reversibility of effects in the long term, the medium to long term effects and the local to regional effects. EAO notes the Proponent has committed to a Labour Recruitment and Retention Strategy, Procurement Strategy and Workforce Training Strategy, Employee Assistance Program and Workforce Transition Program to mitigate social effects from the proposed Project.

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 social effects.

Land use - EAO considered the moderate magnitude continuous effects, from local to regional in extent, far future in duration and irreversible. EAO notes that a large land base unaffected by the proposed Project is available to land users within which to conduct commercial recreation, recreational hunting and subsistence harvesting activities.

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 land use.

7.1.6 Cumulative Effects

Social - Many past, present, and reasonably foreseeable future projects (mainly mines) in the RSA individually have created, do create, or will create changes in employment, income and value-added, population, demand, tax base, noise, air quality and transportation patterns. These effects may interact spatially with direct proposed Project effects on social VCs. The significance of the overall residual cumulative effects on the three social VCs is predicted to be not significant.

Land use - Almost all past, present and reasonably foreseeable projects and activities have the potential to contribute to residual cumulative land use effects within the LSA and the RSA. Collectively, they could result in incremental increases in access use restrictions, sensory disturbance and resource harvesting, and in wildlife mortality and habitat losses. They could also result in an incremental reduction in the amount of resources available to land and resource users. However, the significance of residual cumulative effects on commercial recreation tenure holders, recreational hunters and subsistence harvesters is considered not significant.

7.1.7 Certainty

Social - Certainty ranges from medium to high recognizing that it is difficult to predict the number of new residents in migrating to the RSA, especially at the community level, however past mining projects provide relevant experience and impacts. Certainty in community well-being effects is medium including effects on individual esteem, stress, substance misuse, social and mental health, and vehicle accidents, because causal relationships are difficult to measure and evaluate.

Land use – There is a high degree of certainty in the assessment that changes in access will affect certain land users, since available information on patterns of access

and land use by commercial recreation tenure holders is high. There is medium certainty in the assessed residual sensory disturbances effects, since land users will display a variety of reactions to sensory disturbances. There is a high degree of certainty in the prediction of effects on wildlife harvesters, based on available information on use patterns and the reliability of the Proponent's wildlife effects assessments.

7.1.8 Conclusion

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 social effects or effects on land use.

8 Assessment of Potential Heritage Effects

8.1 Archaeological and Heritage Resources

8.1.1 Background Information

The Proponent selected archaeological sites protected under the BC *Heritage Conservation Act* as the VC for the assessment. The Proponent reviewed available archaeological data and conducted field assessments to identify heritage sites.

The Proponent's Archaeological Impact Assessment (AIA) identified 37 heritage sites within the RSA. Most of them (28) are prehistoric subsurface lithic scatters²¹ or single artifact finds. Three sites are historic telegraph and trapline cabins (located 1.6 km, 11.9 km and 9.6 km outside the LSA respectively). Two sites are historic burials (located 18 km and 2.4 km outside the LSA respectively). One petroform is located 1.9 km outside the LSA. A possible village site was located 2.7 km outside the LSA, and a culturally modified tree, 9.2 km outside the LSA. The Treaty Creek Site, the site of a late 19th Century treaty between the Nisga'a and Tahltan people, is located 4.4 km outside the LSA (the site was designated under the *Heritage Conservation Act* pursuant to provisions of the NFA).

The proposed Project facilities with the greatest number of nearby sites are the Saddle Car Wash (11 sites), the CCAR (7 sites) and the Treaty Creek transmission line (3

²¹A surface scatter of cultural artifacts and debris that consists entirely of lithic (i.e. stone) tools and chipped stone debris

sites). Of the 37 sites found in the RSA, only seven sites are located within the LSA, and all of those sites are small lithic scatter sites.

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

The Application states that the construction of the CCAR, Mitchell Pit, WTP, Energy Recovery Area, and TCAR could potentially directly affect known heritage sites and indirect effects could occur during operations due to increased human presence. Specific proposed Project-related construction activities with the potential to affect archaeological sites include clearing and grading for roads and power line rights-of-way, clearing, grading and excavation for foundations and building footings, earth moving and blasting for mine construction, and tailings deposition in the TMF.

The Application reports that five of the 37 archaeological sites identified during the AIAs are in direct conflict with proposed Project-related activity (four lithic scatters and one artifact find), while two sites may be indirectly affected (both are lithic scatters).

Summary of Mitigation Proposed in the Application

The Proponent has proposed the following mitigation measures for heritage sites:

- avoidance of the two sites potentially subject to indirect effects;
- determine specific mitigation measures with the Archaeology Branch to minimize any loss of scientific data resulting from site disturbance or destruction. Possible measures could include systematic data recovery, construction monitoring, fencing and/or site capping; and,
- Heritage Management and Monitoring Plan includes a Chance Find Procedure, under which any new archaeological sites found within the proposed Project footprint, but not identified during previous AIAs, would be avoided and/or effects mitigated.

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 and the public with respect to potential impacts to archaeological and heritage resources.

Issues raised by Nisga'a Nation and First Nations are discussed in part C and D of this Report.

8.1.4 Residual Effects Significance Analysis

Based on the information presented in the Application and the Working Group's consideration of this information, EAO finds there would be adverse residual heritage effects as a result of the proposed Project.

EAO has undertaken the following significance analysis for potential heritage effects.

Table 37: EAO's Significance Analysis for Potential Heritage Effects

Factor	Rationale
Context	<p>Heritage resources are protected under the <i>Heritage Conservation Act</i> and alteration to protected heritage sites requires a site alteration permit issued under Section 12 of the <i>Heritage Conservation Act</i>.</p> <p>The Proponent's AIA studies identified 37 heritage sites within the RSA. Of these, seven are located within the LSA. Five sites are in direct conflict with the proposed Project footprint, and two sites may be indirectly affected.</p> <p>Mitigation measures for potentially affected sites would be determined in consultation with the Archaeology Branch, and may take the form of systematic data recovery, construction monitoring and/or site capping to avoid or reduce the loss of scientific data resulting from site destruction.</p>
Magnitude	<p>The magnitude of change to known sites is rated low since only seven small lithic scatters within the LSA would be potentially impacted out of the 37 known sites within the RSA. The five lithic scatters potentially directly affected by the proposed Project are all small, non-stratified sites.</p> <p>The magnitude of change to unknown sites was rated low, since the AIA conducted for the proposed Project covered the moderate to high potential areas within the proposed Project footprint.</p>
Extent	<p>The geographic extent of site disturbance (whether of known or unknown sites) is local, since such disturbance has no effect on other archaeological sites in the area.</p>
Duration	<p>Effects on archaeological sites (whether of known or unknown</p>

	sites), once incurred, are permanent.
Reversibility	Effects on archaeological sites are irreversible. Once disturbance or destruction of a site has occurred, and has been mitigated through being effectively curated, there would be no additional effects on the site linked to proposed Project activity or due to other causes, since the site cannot be rebuilt or reconstituted.
Frequency	The disturbance or destruction of sites (whether of known or unknown sites) would likely occur at one time only, prior to or during construction.

Likelihood

Disturbance and destruction of some archaeological sites is highly likely to occur, since there are archaeological sites in direct conflict with the proposed developments. It is anticipated that archaeological sites HcTo-1, HdTn 1, HdTn-2, and HdTo-7 cannot be avoided. Based on past AIA work, it is also highly likely that few (if any) as yet unknown sites would be disturbed.

8.1.5 Significance Determination

EAO considered the low magnitude local effects that would be permanent and irreversible. EAO notes that heritage resources are protected under the *Heritage Conservation Act* and alteration to protected heritage sites requires a site alteration permit issued under Section 12 of the *Heritage Conservation Act* and the mitigation measures for potentially affected sites would be determined in consultation with the Archaeology Branch.

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 residual heritage effects.

8.1.6 Cumulative Effects

Due to the spatially localized nature of archaeological sites, no cumulative effects are predicted to result from the overlap of effects of other projects and activities in the RSA with the predicted direct proposed Project effects on archaeological sites (known or unknown).

8.1.7 Certainty

The confidence level in the assessment is high, since the requirements of the *Heritage Conservation Act* to conduct site investigations and implement acceptable level of mitigation for site disturbance provides a rigorous framework for understanding proposed Project effects on archaeological sites.

8.1.8 Conclusion

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 residual heritage effects.

9 Assessment of Potential Health Effects

9.1 Human Health

9.1.1 Background Information

The Proponent selected the following VCs for the assessment of health effects: drinking and recreational water; air quality; country foods; and noise. For this assessment, the Proponent relied on the assessments of the various VCs identified for air quality, water quality, fish, wetlands and vegetation, wildlife and noise.

Section 25.4.1 of the Application describes the LSAs and RSAs for the human health effects assessment.

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

The following proposed Project activities could affect human health:

- high noise levels from blasting, the use of helicopters, large construction machinery, mining activities and road traffic could potentially lead to sleep disturbance or loss of speech comprehension;
- air emissions may lead to deposition of airborne material into water, and onto soils and plants potentially affecting water quality and the quality of country foods.
- excavation, removal and storage of large quantities of rock and soil and disposal of tailings and groundwater seepage would create a potential for ML/ARD and associated effects on drinking and recreational water quality and country foods;

- surface runoff and waste rock storage activities may cause siltation and associated water chemistry effects, which could affect the quality of drinking water and country foods; and
- sewage treatment plant effluent, garbage, seepage, and accidental spills could affect human health.

Spills during transport and storage of fuel, chemicals and explosives could contaminate drinking and recreational water and country foods. Routine proposed Project-related traffic and in-water works could introduce oils and diesel fuels into the aquatic environment via spills and leaks, affecting fish and water quality.

The Application reports that predicted concentrations of metals, nutrients and cyanide do not exceed BC and Canadian drinking water guidelines at stations on Teigen (TEC2) and Treaty Creek (TRC2) during operation, closure or post-closure. Thus, no related human health effects from the consumption of surface water from Teigen and Treaty Creeks downstream of the TMF were identified. Nor would people hunting, trapping or recreating in the Unuk River Valley be exposed to concentrations of metals or nutrients that exceed drinking water criteria.

Potential effects to human health would decrease during the closure phase as decreased activity at the site and reclamation and closure of the site would decrease the potential for effects to air quality, surface water quality, and country foods quality. However, the potential for ML/ARD to affect drinking and recreational water quality and the quality of country foods would continue thorough to the post-closure phase.

Summary of Mitigation Proposed in the Application

The Application lists the mitigation measures set out below to address effects.

Drinking and Recreational Water

- Mitigation measures proposed to reduce effects on water quality would reduce effects on human health linked to the ingestion of drinking water;
- Posting signs around the TMF to indicate that the water is not potable, and that no public access is permitted while the mine is operating. Upon closure, TMF water quality would be monitored for wildlife mitigation purposes. If water quality deteriorates in the TMF after mine operation, additional mitigation may be implemented, including the possibility of a risk assessment to determine if human use of water from downstream creeks is safe.
- Water quality monitoring in accordance with the AEMP and Closure and Reclamation Plan to ensure that WTP effluent meets discharge permit limits.

Air Quality

- The Air Quality Management Plan includes both an Emissions Management Plan and a Fugitive Dust Emissions Management Plan that would be implemented to meet BC MOE ambient air quality objectives.
- Monitoring of air quality and fugitive dust emissions during construction and operation under the Air Quality Management Plan including vehicle and equipment emissions and fugitive dust monitoring.

Country Foods

- Access management measures in the Proponent's Traffic and Access Management Plan would mitigate some of the risk of effects on human health by inhibiting direct public access to the proposed Project footprint.
- Monitoring of soils, water quality and levels of metals and other COPCs in mine-disturbed soils.
- Monitoring of terrestrial plant tissue metal concentrations.

Noise

- Maximizing distances between major noise sources and sleeping quarters.
- Calculating the appropriate level of building insulation required to meet predicted equivalent sound levels of 30 decibal A-scale or less.

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, NLG²², 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 CPD and TOC (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 are set out below.

- NLG was concerned with the Proponent's assessment associated with the inhalation of diesel particulate matter less than 2.5 microns in diameter (PM_{2.5}) as it exceeded the accepted risk level of 1 in 100,000 (i.e., 1×10^{-5}) at the sensitive receptor

²² 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.

locations. The Proponent interpreted these risks, in part, by suggesting that the BC air quality objective for PM_{2.5} would also be associated with an incremental lifetime cancer risk that exceeds the 1×10^{-5} risk level.

- In response, the Proponent provided a detailed discussion on how comparisons between the BC air quality objective for PM_{2.5} and the derived incremental lifetime cancer risk for diesel PM_{2.5} were made. The Proponent concluded that it is justified to make this comparison to provide perspective on a highly conservative assessment of potential incremental human health risks from the inhalation of PM_{2.5}. This comparison assumes that diesel exhaust PM_{2.5}, for which the California Environmental Protection Agency has provided a slope factor, is the predominant constituent of PM_{2.5}, which is a reasonable assumption in the context of a mining operation.

NLG was not satisfied with the proposed country foods sampling program. These discussions with the Proponent will continue.

- Health Canada (HC) and NLG raised concerns with potential effects to human health due to arsenic in country foods from baseline and proposed Project conditions that exceeded the incremental lifetime cancer risk benchmark of 1×10^{-5} .
 - In response the Proponent prepared a technical memorandum to clarify why predicted exposures for operations and closure are different between the Mine Site and the PTMA and to clarify the toxicity reference values used for the assessment of arsenic.
 - The Proponent's memo explains that the country foods screening level risk assessment conservatively assumed that all of the arsenic in tissues would occur as the most toxic form of arsenic, which is inorganic arsenic. However, organic arsenic species are the predominant form of arsenic found in seafood and other meats. Therefore, the wildlife model over-estimated tissue concentrations of toxic inorganic arsenic and the screening level risk assessment over-estimated health risks.
 - The Proponent revised the ingestion rates for various environmental media which resulted in total arsenic concentrations in grouse that are lower than what was assessed in the Application. Modelled moose arsenic concentrations are comparable to domestic beef arsenic concentrations. Modelled grouse arsenic concentrations are higher than arsenic concentrations in poultry due to the high level of arsenic ingestion with soil, but do not pose a human health risk.
 - The Proponent revised the estimation of cancer risks based on updated model inputs for the country food arsenic concentrations and prepared a

multi-media health risk assessment. The incremental lifetime cancer risk from all country foods combined does not exceed the accepted incremental lifetime cancer risk of 1 in 100,000 (1×10^{-5}).

- The Proponent committed to collect empirical data for arsenic in grouse and moose in the monitoring phase of the proposed Project should monitoring data indicate that arsenic concentrations increase in environmental media (soil, water, plants) above background due to proposed Project activities.

NLG responded that the continued uncertainty with respect to actual arsenic concentrations in grouse tissue reinforces the option to compare the modelled concentrations with the measured data. NLG continued to advocate for the completion of a study which incorporates measured tissue concentrations into an appropriate risk assessment framework.

- The Proponent responded that their comparison of inorganic to total arsenic was based on the most recent and defensible analytical (measured) data available.

HC advised including the collection of empirical data for arsenic in grouse and moose in the monitoring phase of the proposed Project to confirm modelled predictions of contaminant levels in country foods, to reduce uncertainties in the assumptions used in the risk assessment, and to increase confidence in the assessment results and conclusions.

- HC and NLG raised concerns with aluminium levels in grouse.
 - The Proponent responded that aluminum is very poorly absorbed by the body and will be excreted in the feces and urine and not bioaccumulate. The Proponent reiterated a statement made by HC that exposure to aluminum from the consumption of country foods is not expected to pose unacceptable health risks.
 - The Proponent committed to consider collecting empirical aluminum grouse tissue concentrations in the future should aluminum concentrations be found to increase in environmental media during monitoring.
- NLG raised concerns with the Proponent's use of ecological endpoints rather than human endpoints for the screening of COPCs for humans. NLG questioned if the guidelines are not applicable for wildlife health are they applicable to protecting human health?
 - The Proponent responded that the approach used is consistent with the screening approach provided in the Federal Contaminated Site Risk Assessment in Canada, Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment, Version 2.0 for soils and drinking water.

Guidelines for protection of aquatic life were used because these guidelines are intended to be protective of fish health and fish, which may be used for human consumption.

NLG stated that according to Health Canada's Preliminary Quantitative Risk Assessment guidance, "COPCs are identified as ... those chemicals for which the maximum on-site concentration exceeds appropriate human health-based soil quality guidelines". Similarly, the identification of COPC in water should rely on comparison to health-based guidelines according to HC. NLG asked the Proponent to comment on whether the list of COPC changes when HC's Preliminary Quantitative Risk Assessment guidance is followed.

- The Proponent responded that the Canadian Council of Ministers of the Environment (CCME) and BCWQG for the Protection of Aquatic Life were used as COPC screening benchmarks for water metal concentrations in the country foods screening level risk assessment. These guidelines were used rather than health-based Health Canada Guidelines for Canadian Drinking Water Quality, because the country foods screening level risk assessment does not assess drinking water, but assesses potential food chain effects of surface waters to receptors, such as fish or wildlife for human consumption.

HC recommended that in order to adequately characterize the risks associated with exposure to COPCs in country foods, measured tissue levels should be compared to modelled levels in order to validate model assumptions. HC also recommended using the additional guidance document for country foods: [Health Canada. 2010. Supplemental Guidance on Human Health Risk Assessment for Country Foods\(HHRAFoods\). Federal Contaminated Site Risk Assessment in Country Foods.](#)

- NLG questioned why a quantitative risk assessment for chemicals associated with the waste incinerator and other sources of combustion emission including polynuclear aromatic compounds in diesel exhaust, was not completed.
 - The Proponent responded that emissions of criteria air contaminants from incinerators and combustion sources were included in the human health assessment.
 - Chemicals in addition to criteria air pollutants were not included because generators for the Project will be in compliance with the US Environmental Protection Agency Tier 4 standards. Incinerators will have to comply with Canada-wide standards for dioxins and furans (CCME 2009) and Canada-wide standards for mercury emissions.

NLG replied that the evaluation of only criteria air contaminants is less than what is currently required in many Canadian jurisdictions. Potential risks related to

dioxins and furans should have been assessed for the waste incinerator for transparency and risk communication purposes.

- The Proponent responded that in BC, emissions of dioxins and furans (in total equivalent toxicity) are regulated by CCME Canada-Wide Standards, but an ambient air concentration criterion does not exist. The incinerators will operate in batches and therefore are not continuous sources of emissions.
 - In addition, the locations of the incinerators were chosen so that the plume will not affect sensitive receptors. The Proponent is committed to implementing a waste segregation program and plastics will not be burned at the site.
- HC questioned why mercury and lead were not included in the country foods baseline risk assessment or in the screening level risk assessments used to support the effects assessment.
 - The Proponent responded that mercury and lead were included in the assessments but provided additional clarification, information and calculations to show that no risks to human health were identified due to these metals in country foods.
- NLG stated that in light of recent changes in the treatment of lead in risk assessments it may be valuable to re-evaluate the assessment of lead.
 - The Proponent responded that a published tolerable daily intake (TDI) of 3.6 µg/kg body weight (HC 2010b) was available when the submission was prepared. Subsequently, this TDI was removed and is currently under review by HC. It is expected that the TDI for lead will be lowered. However, it is not possible to confirm what the final accepted TDI will be at this time. Therefore, a re-evaluation is not considered useful at this time.

NLG recommended a commitment to re-evaluate the lead exposures at the time of the release of new guidance or when measured data become available from the periodic ongoing monitoring will remove any uncertainty regarding health risks associated with lead exposures.

- The Proponent responded that a commitment for ongoing monitoring of environmental media was made in the Application's environmental monitoring plans. Lead exposures will be re-evaluated if lead concentrations increase above background in environmental media and new guidance becomes available.
- NLG raised concern with the Proponent's assessment of cadmium in moose, stating that in order to adequately characterize the risks associated with exposure to cadmium measured tissue levels should be compared to modelled levels in order to

validate model assumptions.

- The Proponent responded that although model assumptions and inputs may have under-estimated cadmium concentrations in moose, the conclusion of the Screening Level Risk Assessments will not change.

NLG noted that in a published study, cadmium concentrations in organ meat were orders of magnitude higher than in muscle. NLG recommended the Proponent conduct a revision of the Screening Level Risk Assessments including measured concentrations in order to more reasonably represent risk to consumers.

- The Proponent responded that risks from the consumption of cadmium with moose organ meat may exist, but are not proposed Project-related.
- The Proponent will consider the collection of wildlife tissue samples and a re-evaluation of human health risks should ongoing monitoring show an increase in the cadmium concentrations in environmental media (water, soil, plants) during ongoing monitoring for the proposed Project.

9.1.4 Residual Effects Significance Analysis

The Application reports that residual human health effects may result from the ingestion of metals in surface water or country foods downstream of the proposed Project. The inhalation of metals in dust and inhalation of criteria air contaminants (NO₂, SO₂, CO, TSP, PM_{2.5}, PM₁₀) may result in minor increases over baseline conditions in metal hazard quotients, incremental lifetime cancer risk and excess mortality at sensitive receptor locations, including on-site personnel camps, Bell 2 Lodge and Bob Quinn Lake, and trapline and hunting cabins.

Residual noise effects are predicted to be restricted to potential sleep disturbance for off-shift workers residing in the Treaty Plant Camp (camp 5) and Treaty Saddle Camp (camp 6) construction camps and the Treaty operating camp if mitigation does not satisfy the noise attenuation requirements.

EAO has undertaken the following significance analysis for potential health effects.

Table 38: EAO's Significance Analysis for Potential Health Effects

Factor	Rationale
Context	<p>There is limited road access to the proposed Project site.</p> <p>There are no permanent residents living in the proposed Project area, but limited seasonal and temporary use of the area does occur. The nearest land users are residents of Bell 2 Lodge and Bob Quinn Lake and individuals who frequent trapping and hunting cabins along the Unuk and South Unuk rivers and in the Teigen, Bell-Irving and Treaty corridors.</p>
Magnitude	<p>It is expected that human health effects from the consumption of surface water and country foods would be negligible during operations and closure. The magnitude at post-closure is difficult to assess due to the high level of uncertainty with respect to possible unanticipated long-term effects on the quality of country foods. On a precautionary basis, the magnitude of health-related effects on drinking water and country foods is rated low at post-closure. The magnitude of all air quality-related human health effects has been assessed as low.</p> <p>Based on modeled continuous daytime/night-time noise levels, the potential residual human health effect from disturbance of sleep for workers in on-site camps is assessed as high at the Treaty Plant Camp (Camp 5) and Treaty Saddle Camp (Camp 6) during construction, and high at the Treaty operating camp during operation. However, additional mitigation measures could be incorporated during the proposed Project detailed design phase that could reduce the potential magnitude of effects to low.</p>
Extent	<p>Any health-related residual effects on air quality, quality of country foods and noise could extend across the broader regional community, or across one or more Aboriginal groups.</p> <p>The geographic extent of residual health-related effects on surface drinking water is rated individual/household because the effect, rather than being spatial, is limited to a few individuals, families or households. Health effects linked to drinking water quality may occur when land users are active downstream of the proposed Project footprint, country foods are consumed by Aboriginal people,</p>

	<p>guide-outfitters and other outdoor recreationists originating from the surrounding region. Air quality effects, similarly, may be experienced by off-site land users originating from a wider area.</p> <p>Noise effects are limited to Individuals living on-site while off-shift.</p>
Duration	<p>The duration of the effects on human health were not scaled to the length of proposed Project phases in which they occur (except for noise, which is phase-dependent). Duration was scaled to reflect the length of time that a potential proposed Project-related health effect could be experienced by a person. The selected durations were as follows: short-term = less than 1 hour; medium-term = 1 hour to 2 weeks; long-term = 2 weeks to 1 year; and far future = effects that last a lifetime.</p> <p>Since human health effects from the inhalation of particulates (e.g., asthma) can last for a long time, or even indefinitely, once initiated in sensitive people, the duration of human health effects linked to reduced air quality is rated far-future.</p> <p>Given very low potential doses, the duration of any potential human health effects associated with the ingestion of metals in water and country foods was rated short-term.</p>
Reversibility	<p>Human health effects from the exposure to water, country foods and noise are assessed as reversible in the short term, since people are likely to recover from health effects (if any) associated with low levels of contaminants or noise quickly once exposure stops.</p>
Frequency	<p>Frequency of a health effect is assessed based on how often the effect could be experienced by a person, not the frequency of the proposed Project-related cause.</p> <p>Since land users visit the proposed Project area on a seasonal and temporary basis, the frequency of any residual human health effects from the ingestion of surface water and country foods is rated sporadic.</p> <p>Residual human health effects linked to reduced air quality can be sporadic or regular, depending on the type of effect/impairment. On a precautionary basis, the frequency was rated regular.</p>

Likelihood

The likelihood that human health effects would occur is considered low. This is because non-worker human receptors are only present in the LSA or RSA transiently and for relatively short periods of time, therefore, exposure durations are short. Workers or contractors for the proposed Project would be provided with potable drinking water and prohibited from hunting or fishing while onsite, minimizing the potential for exposure to contaminants through drinking water or country foods.

9.1.5 Significance Determination

Considering the above analysis, comments from the Working Group, and having regard to the conditions identified in the TOC and the CPD, including the implementation of a Human Health Monitoring Plan (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 health effects.

9.1.6 Cumulative Effects

Future and reasonably foreseeable mining, exploration, small hydro, and other activities, specifically the Brucejack Mine and Treaty Creek HEP, could adversely affect the regional landscape for air quality. The magnitude of any increased residual effects on human health is expected to be low.

9.1.7 Certainty

The confidence is high that adverse changes to human health from the consumption of country foods during construction and operation is unlikely, based on the conservative nature of the screening level risk assessment.

The confidence in the health effects assessment for surface drinking water is medium, given uncertainties related to water quality modeling assumptions. The confidence level for health effects linked to reduced air quality and increased noise is medium, given inherent challenges in predicting health effects.

EAO also notes that a condition has been added which, if the proposed Project receives an EA Certificate would become legally enforceable, would require the Proponent to develop a comprehensive Human Health Monitoring Plan that would address many of the issues listed in this section and raised by members of the Working Group. This condition provides increased confidence regarding long term and post closure health effects (e.g. from the consumption of country foods, potable water and air quality).

9.1.8 Conclusion

Considering the above analysis, comments from the Working Group, and having regard

to the conditions identified in the TOC and the CPD (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 health effects.

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 conduct a traffic assessment to assess the potential effects of project-related traffic along Hwys 37 and 37A. 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 [Appendix 22-C of their Application](#).

The traffic assessment study area encompasses approximately 300 km of Hwy 37 from the Eskay Creek Mine access road junction, southeast to its junction with Hwy 16 in Kitwanga; and approximately 65 km of Hwy 37A from Meziadin Junction to the District of Stewart. The study area includes 500 m on either side of the Hwys.

The proposed Project is accessed from Hwy 37. See figure 22 and the descriptions below of the transportation access route.

On September 29, 2011, EAO varied the procedural order (section 11 Order) for the proposed Project to include the use of Hwy 37 between the proposed Project site and its junction with Hwy 16 at Kitwanga, including those potential effects arising from the transport of people, goods and materials, including, but not limited to, fuel, hazardous chemicals and explosives. At this time, EAO also committed to forming a technical working group to discuss road use and potential effects including effects on Nisga'a Nation and First Nations, from the use of Hwy 37 by proposed Project related traffic.

EAO initially established a Transportation Working Group specific to KSM. However, in response to concerns expressed by First Nations and others, EAO established a Hwy 37 Advisory Group to examine the effects of multiple projects as opposed to effects of each project in isolation. The new Hwy 37 Advisory Group was initially co-chaired by EAO and MOTI. As of the writing of this report, EAO is in discussions with MOTI and FLNR regarding the co-chair responsibilities and name of the Advisory Group. The intent was for the Advisory Group to review and comment on the traffic effects

assessment prepared by the Proponent, EAO's analysis of the assessment and findings, and traffic related conditions and aspects of the CPD.

During the 180 day review, Gitanyow Nation requested EAO revert back to a project specific Transportation Working Group rather than the larger Advisory Group to review the proposed Project's transportation effects. EAO agreed to this request, and the larger Advisory Group was not involved in the review and comment on the proposed Project's traffic effects assessment.

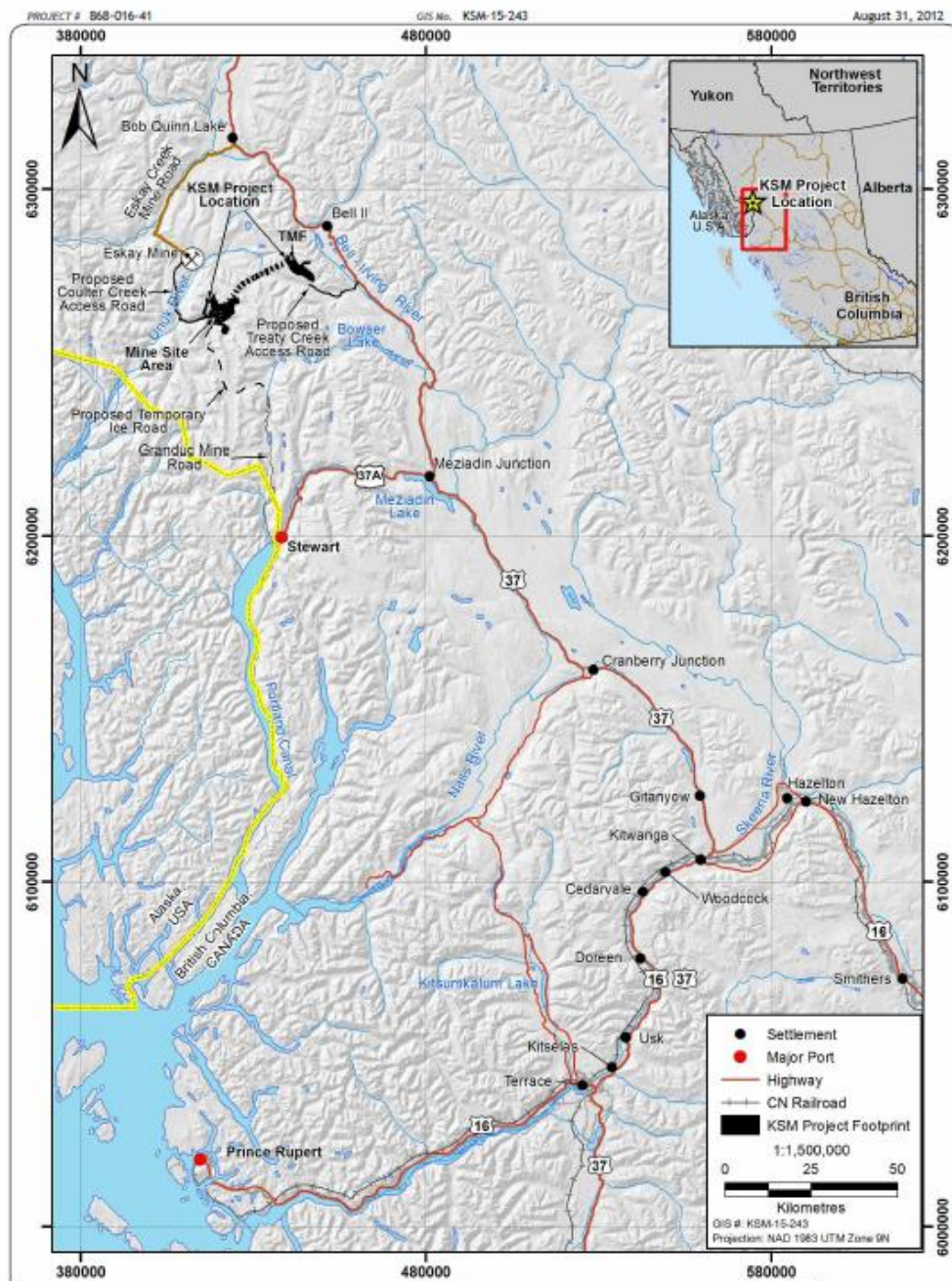
Hwy 37

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 proposed Project's transportation route overlaps with Hwy 37 from the junction of Hwy 16 to Eskay Creek Mine Access Road 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 communities of Dease Lake, Iskut, Telegraph Creek, Stewart, Bell 2, Meziadin Junction, Kitwanga and Gitanyow to service centres in Smithers and Terrace. It also forms part of a circle route through the Nass Forest Service Road to the Nisga'a communities. The Hwy also supports industrial traffic related to mining and forestry to port and rail infrastructure. The Hwy is also a popular tourist scenic route as it is one of two access points from BC to Alaska.

Hwy 37A

Hwy 37A branches westward from Hwy 37 at Meziadin Junction and terminates at Stewart, BC, near Hyder, Alaska. The Hwy supports commercial traffic and industrial traffic related to mining and forestry to the port of Stewart.

Figure 23: Transportation Routes



Traffic Volumes

The predicted traffic volumes generated for each proposed Project phase are summarized by highway segment in table 39, which indicates number of trips by day in annual average daily traffic (AADT), average number of trips with hazardous cargo per day, and total number of trips per year. Hazardous cargoes would include diesel fuel and lubricants, lime and reagents for the Process Plant and water treatment, explosives and copper and molybdenum concentrates.

Table 39: Total Average Annual One-way Trips by Route by KSM Project Phase

Project Phase		Route			
		Hwy 37 (Eskay-Treaty-Treaty-Eskay)	Hwy 37 (Treaty-Meziadin-Meziadin-Treaty)	Hwy 37A	Hwy 37 (Meziadin-Kitwanga-Kitwanga-Meziadin)
Construction	Total AADT	8	22	3	25
	Average Annual Hazardous Trips per Day	1	1	0	1
	Total Annual Trips	2,883	8,041	880	9,121
Operation	Total AADT	3	85	36	49
	Average Annual Hazardous Trips per Day	3	36	18	18
	Total Annual Trips	1,004	31,158	13,200	17,958
Closure	Total AADT	-	16	-	16
	Average Annual Hazardous Trips per Day	-	3	-	3
	Total Annual Trips	-	5,834	-	5,834
Post-closure	Total AADT		6		6
	Average Annual Hazardous Trips per Day		3		3
	Total Annual Trips		2,288		2,288

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 used a risk assessment methodology, including cumulative risks, to estimate the likelihood or probability of potentially adverse environmental effects resulting from increased proposed Project traffic. Estimates of the frequency of collisions along Hwys 37 and 37A with the proposed Project in place were key inputs to the risk analysis. The Proponent selected the following VCs to be assessed based on their direct and indirect interactions with the proposed Project transportation route:

- socio-economic;
- fish and aquatic habitat;
- wildlife and wildlife habitat;
- terrestrial ecosystems;
- wetlands;
- noise;
- climate and air quality;
- human health; and
- heritage.

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.

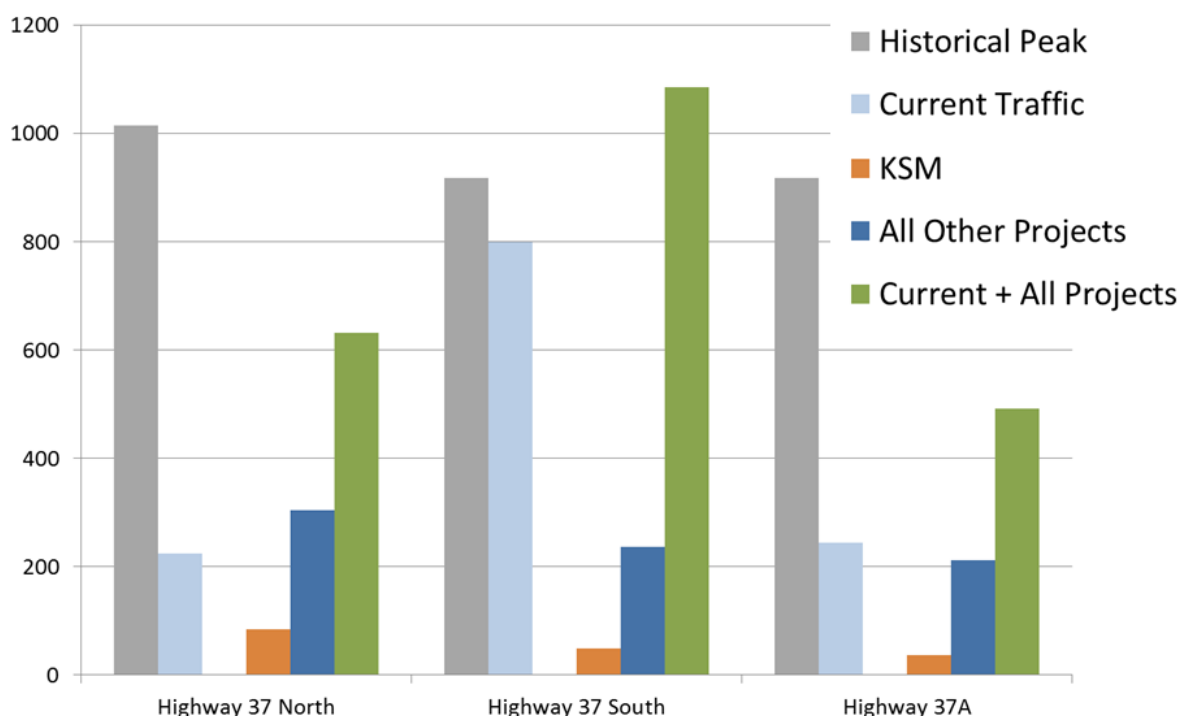
10.1.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

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 and 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.

The Proponent used estimated traffic increases from the proposed Project to assess the potential environmental and social effects of the proposed Project traffic along Hwys 37 and 37A. The Proponent estimates that the highest percentage increase in traffic as a

result of the proposed Project is during operations: 6% on Hwy 37 south, 15% on Hwy 37A and 38% on Hwy 37 north at the proposed Project site, where traffic is currently lowest. Percentage increases along other highway segments and during the other phases of the proposed Project range between one and ten percent, as shown below in figure 23.

Figure 24: Historic, Current and Future Traffic Volumes on Highway 37 and 37A



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 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. However, the Application reports that the addition of mine-related traffic would not exceed historical peaks on Hwys 37 and 37A during the 1990s.

Fish and Aquatic Habitat Effects

The Application describes potential direct effects to water quality as a result of accidents and/or malfunctions along the proposed Project transportation route. Potential indirect

transportation related effects on environmental health (including humans, mammals, birds, fish, amphibians, and invertebrates) could occur where accidents and spills happen near or into major waterbodies and tributaries along the transportation route. The potential interactions with the fish and aquatic habitat VC and the type of materials transported are listed below:

- spill of fuel or lubricants causing degradation of water quality, fish mortality at high concentrations and reduced health or altered behaviours at sublethal levels and effects to aquatic habitat;
- spill of lime and reagents causing degradation of water quality which may result in mortality or decreased fish health;
- spill of copper or molybdenum concentrates causing fish mortality and water quality degradation; and
- spill of explosives causing fish mortality, death or serious sublethal effects to invertebrate food sources for fish and to incubating or rearing juvenile fish.

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 at waterbody crossing or near waterbodies could affect aquatic organisms (see section 5.2 of [Appendix 22-C of the Application](#)). The Application reports that the likelihood of such events is predominantly characterized as unlikely or rare and the severity of potential, unintended consequences is predominantly characterized as minor to moderate, depending on the location and time lapse between occurrences and clean-up.

Wildlife Effects

The Application states that increased traffic levels from mine-related transportation activities has the potential to cause adverse effects on wildlife populations (including moose, bears, western toad, and birds) along the proposed transportation route during all phases of the proposed Project. In particular, potential effects may include injury or direct mortality of wildlife due to vehicle collisions, disruption of wildlife movement, and potential habitat degradation from spills and malfunctions. The Application notes that risks to mortality increase near or adjacent to preferred habitat, occupied habitat, and where current traffic volumes are low.

Moose

Much of Hwys 37 and 37A bisect or parallel moose winter range habitats. Moose collisions along Hwy 37 and 37A are reported more frequently during winter months as moose move into lower elevation winter ranges (timbered wetland complexes) where snow depths are limited. The Application reports that vegetation regrowth on roadsides

from brushing will also attract moose and increase the collision risk during the summer.

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 KSM transportation route are moose. The Application reports that the moose population in the NWA near Hwy 37 has been declining since 2001. The population was estimated to be approximately 1600 in 2001, and declined to 640 in 2007 and to 520 in 2011. Despite conservation measures taken in 2007 including limited entry or closure of moose hunts in some areas, the population has continued to decline.

Given the current status of moose populations along the KSM transportation route and the adverse effect of industrial accidents with wildlife and unregulated hunting, the additional proposed Project traffic may exacerbate the existing conditions.

The Proponent used a population dynamics model received from MOE to perform a historical reconstruction of the Nass moose population under known harvests and demographic rates and to conduct a quantitative population viability analysis for moose along Hwy 37 and 37A road corridors to estimate the cumulative effects of traffic on moose. The Proponent estimates that the addition of traffic from the proposed Project is projected to cause less than a 1% increase in mortality to moose populations at their current population size, equating to just less than 5 moose deaths per year.

The population viability analysis predicted that the increased traffic from the proposed Project would not cause a decline in the NWA moose population. However, results suggested that an additional increase in mortality, above what is expected due to proposed Project traffic, could cause the population to decline. Hence, assuming conditions remain constant (much-reduced moose population, current hunting rates, etc.), if all projects in the Study Area were to operate simultaneously, the population viability analysis predicted that moose-vehicle collisions from these projects may be sufficient to have an effect on the moose population in the NWA.

The Application reports the following sources of moose mortality per year as shown in table 40.

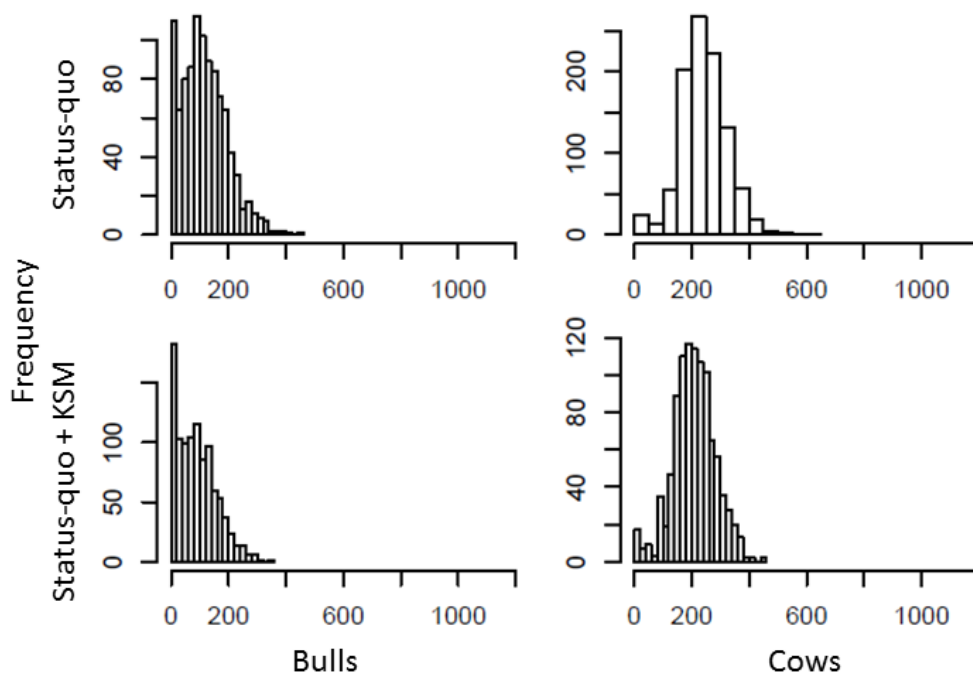
Table 40: Sources of Moose Mortality per Year

Source	Estimated Number of Moose Killed Per Year	Description
Hunting	50	50/50 male/female ratio
Existing Traffic ²³	18.5	Adjusted from MOTI's Wildlife Accident Reporting System (WARS) data
One Project	4.2	KSM
All Projects	23	All 11 potential projects considered in the cumulative effects assessment ²⁴

Figure 24 below shows the current moose population in the NWA along with predicted population effects of the addition of one major project (such as the proposed Project) and all projects.

²³ Present projects included in existing traffic include: Forest Kerr Hydroelectric, Red Chris Mine and Wolverine Mine.

²⁴ The 11 potential projects considered include: Bronson Slope Mine, Brucejack Mine, Galore Creek Mine, Kitsault Mine, Kutcho Mine, McLymont Creek Hydroelectric, Schaft Creek Mine, Snowfield Project, Storie Moly Mine, Turnagin Mine and KSM Mine.

Figure 25: Moose Sensitivity Analysis Results

The figure above shows the frequency distribution of the statistical analysis used to determine significance with and without the proposed Project, depicting little change from current conditions with the addition of the proposed Project.

Bears

The Application reports that bears will cross roads when traffic volumes are less than 10 vehicles per hour. Given that the current traffic volume is approximately nine vehicles per hour on Hwy 37 north, the additional four KSM Project-related vehicles per hour would increase traffic above the 10-vehicles-per-hour threshold. Even with mitigation, it is possible that bear movement disruption would occur.

The Application states that between 1991 and 2010, there were 108 reported vehicle accidents involving bears along Hwy 37 (average 5.7 bears/year), mostly in July through September. Along Hwy 37A, 26 bear accidents were reported. The WARS data is likely incomplete, which could mean that actual bear kills could be higher (ranging from 16 to 23 per year along Hwy 37, and six to nine per year along Hwy 37A). Even with mitigation, bear collisions with the proposed Project vehicles are possible.

Other Animals

Toad mortality is also described in the Application, which notes possible mortalities resulting from since toads and toadlets crossing roads when moving from breeding sites to upland areas during migration in the spring and late summer.

The Application reports that direct mortality of birds, particularly flocking species such as pine siskins and crossbills could occur as a result of increased traffic due to the proposed Project.

Beyond risks of collisions with wildlife and increased access, spills along the proposed Project 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 and aquatic 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.

Terrestrial Ecosystems Effects

The Application states that an increase in proposed Project traffic may result in the potential for introduction and spread of invasive plants and increased incidence of wildfire from improper disposal of smoking material. In addition traffic accidents may result in increased incidence of wildfire and chemical contamination.

Socio-economic Effects

Transportation of equipment, personnel, and materials to and from the proposed Mine Site is described in the Application to have the following possible effects on land use, quality of the natural environment and community well-being:

- increased industrial traffic related to the proposed Project may be perceived to have a negative effect on the quality of the natural environment;
- increased traffic related to the proposed Project may indirectly affect the harvest of wildlife resources through disruption of movement and direct mortality effects on wildlife;
- increased vehicle traffic may result in reduced public safety due to the probability of vehicle accidents particularly involving dangerous cargo; and
- increased noise may interrupt and degrade enjoyment of roadside land uses and residential properties.

Human Health Effects

The Application states the main human health issues related to the proposed Project would be from traffic accidents, including their potential risks to country foods, drinking water, air quality and human safety.

The Proponent notes that any increase in vehicle traffic may result in reduced public safety, for both vehicles and pedestrians, due to the increased probability of vehicle accidents. The Proponent predicts a maximum incremental increase of 0.191 collisions per year due to an increase in traffic from the proposed Project. The Proponent reports that based on MOTI's safety design thresholds, Hwys 37 and 37A are safely designed to support higher traffic volumes, including traffic from the proposed Project and other projects.

Summary of Mitigation Proposed in the Application

Full details on mitigation proposed by the Proponent can be found in the Application. Many of the following mitigation measures are also contained in the Proponent's EMP such as the Traffic and Access Management Plan, Dangerous Goods and Hazardous Materials Management Plan, Emergency Response Plan (for emergencies other than spills) and Spill Prevention and Emergency Response Plan, which are all a requirement of the Proponent's *Mines Act* permit for the proposed Project. A summary of the mitigation initially proposed includes:

- a zero-tolerance policy on alcohol and drugs while transporting goods and materials to and from the site;
- making information on weather and highway conditions available to all drivers before departure and requiring drivers to adjust driving styles to conditions;
- providing appropriate training to drivers and personnel; and
- advising local communities of driving routes, peak transportation periods and potential road shutdowns, if required, when transporting heavy/wide loads, and communicating proposed Project traffic plans to provincial and local governments to ensure that adequate signage is posted beside public roads.

Wildlife

Measures to minimize interactions between wildlife and vehicles and reduce disruption to wildlife movement include:

- ensuring that proposed Project personnel (including drivers) communicate locations of observed wildlife to drivers; and
- documenting locations of collisions between wildlife and vehicles to inform mitigation

measures and adaptive management.

Terrestrial Ecosystems

Measures to mitigate potential effects to terrestrial ecosystems include:

- establishing on-site vehicle inspection stations for vehicles entering and exiting proposed Project access roads, and taking appropriate action where risk of invasive plant introduction is identified; and
- ensure vehicles are washed during appropriate time of the year prior to leaving areas with known invasive species.

The Dangerous Goods and Hazardous Materials Management Plan provides for the following mitigation measures:

- transporting explosives or concentrate in enclosed or covered trailers/closed containers;
- conducting regular vehicle inspections;
- dewatering concentrate to a low moisture content before transport; and
- adhering to measures specified in procedures when transporting materials over or near any aquatic systems.

Fish and Aquatic Habitat

In the event of an emergency (other than a spill), the Emergency Response Plan is intended to ensure that all available resources will be used appropriately to minimize the extent and severity of the effect on the safety of personnel, the public and the environment. Examples of actions include:

- ensuring that emergency contacts will be readily accessible to drivers;
- including a description of communication and warning systems in the plan; and
- arranging for required training for workers and contractors;

The Spill Prevention and Emergency Response Plan is intended to prevent spills of hazardous and non-hazardous cargo as a result of traffic accidents, and to mitigate the effects of any spills that do occur, in accordance with standards and best management practices. Measures provided for in the Spill Prevention and Emergency Response Plan include the following:

- outlining procedures to minimize response time and ensure prompt clean-up;
- performing spill simulation drills;
- excluding wildlife (e.g. bears, moose) from spill sites until effective clean-up of the

area;

- monitoring soil, water and vegetation within the spill area; and
- developing a procedure to respond to an unplanned release of process concentrate.

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 CPD and TOC (Appendix 2) contain specific mitigation measures, which would be legally enforceable if an EA Certificate is issued.

- The Regional District of Kitimat Stikine raised concerns with the cumulative impacts on Hwy 37 and was interested in mitigation to minimize collisions with wildlife and improve safety.
 - The Proponent responded that they look forward to working with the Regional District to further develop mitigation measures to minimize collisions with wildlife and improve safety.
 - EAO notes that MOTI formed a Hwy 37 sub-group to the Hwy 37 Advisory Group to facilitate regular ongoing meetings regarding Hwy 37 and Hwy to address issues and ideas specific to the Hwy. All members of the Hwy 37 Advisory Group were invited to participate in the Hwy 37 sub-group.
- Gitanyow Nation was concerned about the potential for a significant cumulative effect on the local moose population from traffic on Hwy 37, primarily from vehicle collisions. Gitanyow Nation was especially concerned about the impact this would have on their asserted right to hunt and associated food security impacts. Gitanyow Nation thought that hunting of moose should be an activity considered in the Proponent's cumulative effects assessment due to the published literature stating that the moose population is declining from overhunting.

Gitanyow Nation provided traffic data collected from 2012 to 2013 that showed a differing traffic volume than recorded by the Proponent.

Gitanyow Nation recommended that in order to better understand and rebuild the Nass moose population, baseline data on wolf, black and grizzly bear populations are required (to understand moose mortality due to predation).

FLNR also raised concerns with the Proponent's estimate of vehicle-moose collisions, stating that it is oversimplified. FLNR stated that vehicle-moose collisions along a road are influenced by multiple factors which should be considered including speed, vehicles per day, moose abundance, roadside

vegetation, etc.

- In response the Proponent stated that cumulative effects on wildlife were initially assessed for the worst case scenario (i.e. fourteen mine and hydro projects proceed at the same time). The overall cumulative effects on moose were assessed as significant using this worst case scenario and were further assessed.
- The Proponent's moose report in Appendix 22-C of their Application also states that the model used for the analysis was overly-sensitive to changes in mortality, and so the level of additional mortality required to cause a population decline is likely considerably higher than stated.
- The Proponent reanalyzed potential effects on moose in the Population Viability Analysis conducted as part of the Traffic Effects Assessment using only the data reported by the Gitanyow Nation study and concluded that the use of these traffic data instead of the MOTI data did not alter the outcome of the analysis.
- EAO established the Hwy 37 Advisory Group to look at cumulative effects and to provide an ongoing venue to discuss the collection and sharing of information and to discuss solutions and improved management actions.

Gitanyow Nation continued to assert that there would be a cumulative impact on the Nass moose population and an impact on their aboriginal right to hunt.

EAO asked FLNR to comment on the criticism raised by Gitanyow Nation and evaluate the assumptions used by the Proponent in their assessment. FLNR submitted a [memo](#) to EAO on March 17, 2014, stating that the model has made the following valid predictions:

- Estimated traffic mortalities from the proposed Project, and the “likely development scenario” of KSM plus two other projects, are not likely to result in a population level decline.
- The proposed Project traffic will result in increased moose mortality and pressure on the Nass moose population. This pressure will be present for the life of the proposed Project, and may result in greater or lesser impacts on the moose population as its health changes.

FLNR raised concerns regarding the Proponent's use of the model to make long term predictions and conduct an effects assessment of the proposed Project over its 52 year life. This is because the prediction requires that a large number of assumptions remain valid, which is unrealistic. Unforeseen developments, changes in habitat productivity, predation, and the regulated and unregulated hunt are all likely to be significantly different 25 years from now. Climate change

would also have to be considered. The degree of uncertainty in any of these factors renders efforts to make long term predictions ineffective. FLNR concluded that the uncertainty of the model's prediction over the life of proposed Project, the current context of the moose population, and the demonstrated downward pressure resulting from the vehicle collisions, all highlight the need for mitigation/offsetting.

Gitanyow Nation requested a commitment by the Proponent to a plan to monitor numbers and types of all proposed Project related traffic along Hwy 37 and 37A, including staff, contractors and support personnel. Gitanyow Nation also requested involvement in any monitoring.

- The Proponent responded that they have made the following commitments in regards to Hwys 37 and 37A including: a Geographic Response Plan; a plan to gather and share proposed Project information with respect to its traffic schedules and volumes and wildlife collisions and mortalities; and funds for the purposes of supporting Nass moose recovery or coordinated management of aquatic and wildlife populations.
- EAO also added a condition requiring a Wildlife Collisions Protocol for annual monitoring and reporting of collisions between proposed Project vehicles and moose, black bear, grizzly bear and deer and the mortality of such wildlife along provincial Hwys 37 and 37A.

On April 30, 2014, MOTI released a report, [Hwy 37 and 37A Traffic Effects Assessment](#). In this report, MOTI states that the capacity of Hwy 37 and 37A is described by the level of service, which characterizes the operating conditions of the Hwy: speed and travel time, freedom to maneuver, traffic interruptions, and comfort. MOTI data shows that the Hwy has ample capacity to accommodate additional traffic volume. MOTI concludes that although moose mortality due to vehicle collisions is a concern because of the sensitivity of the current population, it is likely that other factors have and will continue to play a more significant role in the sustainability of the moose population.

- NLG raised concerns with the Proponent's cumulative effects assessment for impacts to moose, noting that moose roadkill is of great concern to NLG. NLG was concerned that the moose mortality was over-estimated in the Proponent's model as the NWA moose survey area does not go all the way south to Hwy 16.
 - In response the Proponent stated that their traffic-related mortality input to the model is inflated by approximately 14%, resulting in a more conservative model (e.g. more sensitive to increased mortality from vehicles). Hence, the results of the cumulative effects assessment on moose and traffic mortality

stands and the effect of the proposed Project will not result in a significant adverse effect on moose.

- Gitanyow Nation questioned the Proponent's comparison that traffic volumes would not exceed historical levels as a result of the proposed Project as no data is available on the environmental impacts that occurred at the time of those historical traffic volumes.
 - The Proponent responded that the data reported by Gitanyow Nation falls within the historic range of values reported by MOTI. The Proponent stated that the projected results of the traffic effects assessment continue to be valid and the proposed Project traffic is anticipated to remain below historical truck traffic along Hwys 37/37A as well as the safety design threshold for the Hwys.
- Gitanyow Nation was concerned that the Proponent's traffic assessment did not accurately predict the potential increase in traffic volume that is indirectly related to the proposed Project. Indirect effects include workers who move to the area recreating and accessing service centres. Gitanyow Nation noted that other mine related traffic is important to consider as light duty pickups tend to speed on the Hwy.
 - The Proponent responded that the traffic effects assessment included all types of vehicles expected to be used for the proposed Project, including flat deck trucks, vans, tankers and passenger vehicles.
- In addition to moose impacts, Gitanyow Nation was especially concerned about the potential effects to fish and wildlife from an accident or spill and disagreed with the Proponent's assessment of effects and questioned the adequacy of the Proponent's proposed mitigation measures. In particular, Gitanyow Nation was concerned about the streams that support fisheries that Gitanyow Nation rely upon for food security and wildlife species that support food security such as moose.

Gitanyow Nation suggested the Proponent commit to the following additional mitigation measures:

- increased road maintenance including financial contribution by the Proponent;
- construction of more roadside pull-outs or increasing the shoulder width of the Hwy;
- guard rails along certain watercourses including, at a minimum, Bell Irving River, Nass River, Hanna and Tintina Creeks, Cranberry River, Brown Bear Creek and the Kitwanga River;
- improve on speed limit enforcement by financially contributing to the creation of new RCMP positions dedicated to patrolling Hwy 37;

- actions taken towards increasing the regional capacity for spill response;
- brushing to widths that are shown by the best available research to be effective at reducing collisions;
- chipping of woody debris along the right-of-way to suppress vegetation growth;
- planting of plant species that are not palatable to moose;
- time brush cutting to reduce the palatability of the re-growing brush for moose;
- conduct wildlife hotspot research along the Hwy and place effective signage along key parts of the Hwy to alert drivers;
- during winters of extreme snowfall, create diversionary trails parallel to the Hwy, and additional trails that lead away from the Hwy into areas where there is moose forage;
- work with Gitanyow Nation and DFO to develop vegetation management solutions along the many riparian areas alongside the Hwy; and
- the province, the Proponent and other proponents that use Hwy 37 work together to establish a Food Security Trust Fund to support a budget for wildlife monitors, moose salvage program and processing facility for road kill.

In response the Proponent noted that the mitigation proposed is along an existing provincial public hwy. The provincial government is responsible for the Hwy, including maintenance and design (installation of guard rails). The Proponent is committed to participate on the Hwy 37 Advisory Group, along with other industrial users. In addition, the Proponent is committed to installing emergency response kits at strategic points along Hwys 37 and 37A, in consultation with the provincial government.

EAO added a condition requiring the Proponent to prepare a Geographic Response Plan to coordinate training and spill response along Hwys 37 and 37A with other industrial users.

EAO notes that MOTI formed a Hwy 37 sub-group to the Hwy 37 Advisory Group to facilitate regular ongoing meetings regarding Hwy 37 and 37A to address issues and ideas specific to the Hwy. All members of the Hwy 37 Advisory Group were invited to participate in the Hwy 37 sub-group.

EAO also notes the condition for the Proponent to develop standard operating procedures for company and subcontractor vehicles as part of the Wildlife Effects Monitoring Plan.

- *Wilp Skii km Lax Ha* expressed concerns with the proposed Project specific and cumulative effects of traffic on Hwy 37 and requested regional-level guidance on this issue. *Wilp Skii km Lax Ha* also raised concerns about moose-vehicle collisions, moose mortality and the reporting of incidences.
 - In response, the Proponent stated their commitment to participate on the Hwy 37 Advisory Group, along with other industrial users to address cumulative traffic effects along Hwy 37 on moose and traffic mortality.
- Tahltan Nation was concerned with the Proponent's assessment of potential social and environmental risks from traffic accidents to be rare and unlikely occurrences over the life of the proposed Project.
 - In response the Proponent explained that the potential increase in traffic accidents was determined using a collision prediction model. The model is based on an accepted formula used in other published traffic studies. The model predicts traffic accidents are expected to be rare occurrences. The report notes that both Hwys experienced higher traffic volumes during the 1990s. A large proportion of traffic during the 1990s was forestry trucks. Anticipated proposed Project-related traffic on the Hwys will be below the volumes experienced on these Hwys in the past. Based on MOTI's safety design thresholds for Hwys, Hwys 37 and 37A are safely designed to support higher traffic volumes, including traffic from the proposed Project and other projects.
- FLNR stated the development of the proposed Project would result in an incremental cumulative effect to wildlife (and aquatic) resources along the Hwy 37 corridor. While some mitigation is possible through traffic management, the risk will remain elevated for decades. The magnitude and significance are difficult to assess given potential shifts in regional population levels, and changes in "context" that will likely occur over the full 50-year life of the proposed Project.

Given these unknowns and the values at risk, FLNR recommended the Proponent be directed to participate in and contribute to the Northwest 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 responded it does not currently support contributing to a trust unless all industrial users of Hwy 37 contribute to the trust and the fund is legally and politically supported by the province. The Proponent noted that if the proposed Project is approved and developed, the Proponent will pay provincial and federal taxes and it is the provincial government's responsibility to manage and fund initiatives that it deems are a priority.

- Later in the review, the Proponent proposed a commitment to contribute \$30,000 per year, commencing with construction, to a habitat trust fund (where the money would be spent on supporting recovery of the Nass moose population and mitigating potential cumulative effects along Hwys 37 and 37A). The Proponent would start the fund with an initial \$75,000 contribution. Details are provided in the Table of Conditions.

On [April 10, 2014](#) the Assistant Deputy Ministers of MOE and FLNR wrote to EAO providing support for the proposed condition requiring the Proponent to participate in and contribute to the Northwest Assessment and Monitoring Trust to mitigate potential cumulative effects to wildlife populations along Hwy 37.

On [April 23, 2014](#), the Assistant Deputy Minister of FLNR wrote to EAO providing additional details on the framework of the trust to administer funds dedicated to assessing, monitoring and mitigating the adverse environmental effects of resource development in northwest BC. The initial priority of the trust would focus on strategies to support Nass moose population recovery efforts.

10.1.4 Residual Effects Significance Analysis

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 from accidents and malfunctions on the following VCs:

- air quality;
- terrestrial ecosystems and fish and aquatic habitat;
- wildlife;
- socio-economic; and
- human health and safety.

EAO has undertaken the following significance analysis of potential residual road use effects.

Table 41: EAO's Significance Analysis for Potential Road Use Effects

Factor	Rationale
Context	Hwys 37 and 37A 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. MOTI confirmed that these Hwys are considered to be an adequate standard for road access to the proposed Project

	<p>without significant upgrades and the Hwy has ample capacity to accommodate additional traffic volume.</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. EAO notes that winter road conditions can be challenging on these Hwys.</p> <p>Portions of the Proponent's proposed travel routes pass along provincial Hwys through areas of sensitive wildlife and aquatic habitat. In particular, EAO understands that moose populations in the Nass are at risk and have been declining for a number of years. Other sensitive aquatic habitats include, but are not limited to the Cranberry, Nass, Bell-Irving and Kitwanga Rivers as well as numerous wetland complexes such as the Hanna Tintina Conservancy. The Nass River is 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.</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 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.</p> <p>The area in question also overlaps with the asserted traditional territory of the Gitanyow Nation, with asserted aboriginal rights 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 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 Gitxsan Nation asserted a right to hunt within the</p>
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	<p>Nass. EAO is not aware of any other First Nations who would be hunting pursuant to an aboriginal right to hunt in this area.</p> <p>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.</p> <p>EAO understands that proposed Project related traffic would contribute, at peak levels, additional incremental traffic volumes of 38% during operations on Hwy 37 between the Treaty Creek access road and Meziadin Junction and 15% along Hwy 37A.</p>
Magnitude	<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 proposed Project, given 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 low magnitude of effects on air quality. <p>Terrestrial Ecosystems and Fish and Aquatic Habitat:</p> <ul style="list-style-type: none"> The magnitude of an accident and malfunction (e.g. spills) which occurs along the transportation varies. Accidents or spills are likely to be very low in magnitude if the spill is small and 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 proposed Project is expected to kill approximately 5 moose per year, which equates to less than a 1% increase in mortality to moose populations at their current population size. The Nass

	<p>moose population is currently considered at some risk by the Provincial Fish and Wildlife Branch due to declining populations. The transportation route passes through valuable winter moose range. Recognizing the decrease in the Nass Valley moose population, the magnitude of effects from mine-related traffic during critical moose wintering is considered, at five mortalities a year, moderate.</p> <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.
Extent	<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>Terrestrial Ecosystems and Fish and Aquatic Habitat:</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 linear corridors

	<p>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 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.
Duration	<p>Air Quality:</p> <ul style="list-style-type: none"> Air quality impacts will be intermittent during construction and operations and intermittent during closure and post-closure. <p>Terrestrial Ecosystems and Fish and Aquatic Habitat:</p> <ul style="list-style-type: none"> 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 be unpredictable and

	<p>accidental during all phases of the proposed Project.</p> <p>Economic:</p> <ul style="list-style-type: none"> Any positive economic impacts from transportation will be continuous during construction and operations and intermittent 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 during all phases of the proposed Project. <p>Human Health and Safety:</p> <ul style="list-style-type: none"> Any human health and safety effects from accidents would only occur during the life of the proposed Project.
Reversibility	<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>Terrestrial Ecosystems and Fish and Aquatic Habitat:</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 e.g. salmon and steelhead) could have effects which will take longer to recover to baseline levels. A catastrophic spill could cause irreversible effects to a population. <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 proposed Project, the Proponent predicts that individual moose mortality would not result in impacts to regional moose populations. Therefore, mortality of individual

	<p>animals is unlikely to result in an irreversible impact to regional populations.</p> <p>Economic:</p> <ul style="list-style-type: none"> Any positive economic impacts from transportation are expected to decline over the life of the proposed Project, with a peak occurring during operations and gradually declining through 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 proposed Project, with a peak occurring during operations and gradually declining through closure and post-closure. <p>Human Health and Safety:</p> <ul style="list-style-type: none"> Any human health and safety impacts from accidents would cease with the end of the proposed Project.
Frequency	<p>Air Quality:</p> <ul style="list-style-type: none"> Air quality impacts will be frequent during construction and operations and infrequent during closure and post-closure. <p>Terrestrial Ecosystems and Fish and Aquatic Habitat:</p> <ul style="list-style-type: none"> Any water quality impacts are expected to be extremely infrequent. <p>Wildlife:</p> <ul style="list-style-type: none"> Direct mortality to wildlife is expected to occur rarely or infrequently, with individual events unpredictable and accidental. For moose, the Proponent predicts five mortalities per year from vehicle collisions. Collision risks are highest during the operation period with larger volumes of vehicle traffic as well as in the winter, when snow banks are highest and wildlife, moose in particular spend more time in lower areas adjacent to road corridors. Frequency of collisions should increase through construction and operations 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 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 frequent during construction and operations and infrequent during closure and post-closure. <p>Human Health and Safety:</p> <ul style="list-style-type: none"> Any human health and safety effects from accidents would only occur during the life of the proposed Project.
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Likelihood

Air Quality:

- Air quality effects are very likely.

Terrestrial Ecosystems and Fish and Aquatic Habitat:

- As spills are, by their nature, accidental or related to malfunctions, their likelihood is difficult to predict. With the conditions related to the placement of spill containment kits and spill prevention planning, all reasonable efforts have been made to ensure the lowest likelihood possible.

Wildlife:

- While it is very likely that there will be increased mortality of individual animals as a result of the proposed Project, there is a low likelihood of population level effects to wildlife. The moose population would likely face increased population level pressure as the result of project-related effects, but in the current context, this is unlikely to result in a significant population impact in the short term.

Economic:

- There will likely be positive economic effects along the transportation routes.

Social:

- There is a low likelihood 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. formal recreation sites and informal areas used for recreation (e.g. roadside parking near popular fishing areas)).

Human Health and Safety:

- There is a low probability of accidents and collisions occurring along the transportation route. The Proponent predicted the greatest increase in collisions per year during the operations phase along the northern segment of Hwy 37 (a total increase of 0.19 collisions).

10.1.5 Significance Determination

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (which would become legally binding as a condition of an EA Certificate) including: a Geographic Response Plan and sharing of information regarding cumulative effects, EAO determines that the proposed Project is not likely to have significant adverse effects on social, economic, human health and safety, air quality and terrestrial ecosystems and fish and aquatic habitat VC associated with transportation.

EAO notes a number of factors which should be considered prior to a finding of adverse effects on wildlife:

- EAO is 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 Hwy 37 and 37A are very complex and related to a number of issues including legal, illegal and unregulated hunting, land use decisions, habitat loss and alteration and access. EAO notes that the proposed Project's use of Hwy 37 and 37A is but one of these issues and a solution to declining moose populations is outside the scope of one road user to address; and
- EAO along with MOTI formed a Hwy 37 Advisory Group to address the cumulative incremental impacts of additional project related traffic along Hwy 37 and 37A. This Advisory Group includes representation from Nisga'a Nation, Tahltan First Nation, Skeena First Nation and Gitanyow Nation, FLNR, MOE, MOTI, MEM, Ministry of Aboriginal Relations and Reconciliation (ARR), EC, local governments and a number of other industrial road users. EAO expects this Advisory Group to provide a venue for industrial users and First Nations, Nisga'a Nation, local government and agencies to continue sharing information and pursuing ideas and initiatives that will further reduce potential transportation-related effects.
- EAO has also included a condition in the draft TOC which would require the

Proponent to make significant financial contributions to a trust which is being established by FLNR to support moose recovery initiatives in the Northwest. At least one other mining project has been asked to make financial contributions to this trust as a condition of its EA Certificate.

With the addition of the condition to contribute financially to moose recovery efforts as well as conditions related to coordinated spill response, participation the Hwy 37 Advisory Group, monitoring and reporting wildlife collisions and standard operating procedures for company and subcontractor vehicles, all which would become legally enforceable should an EA Certificate be issued, EAO is satisfied that the proposed Project would not likely result in significant adverse effects to wildlife.

10.1.6 Cumulative Effects

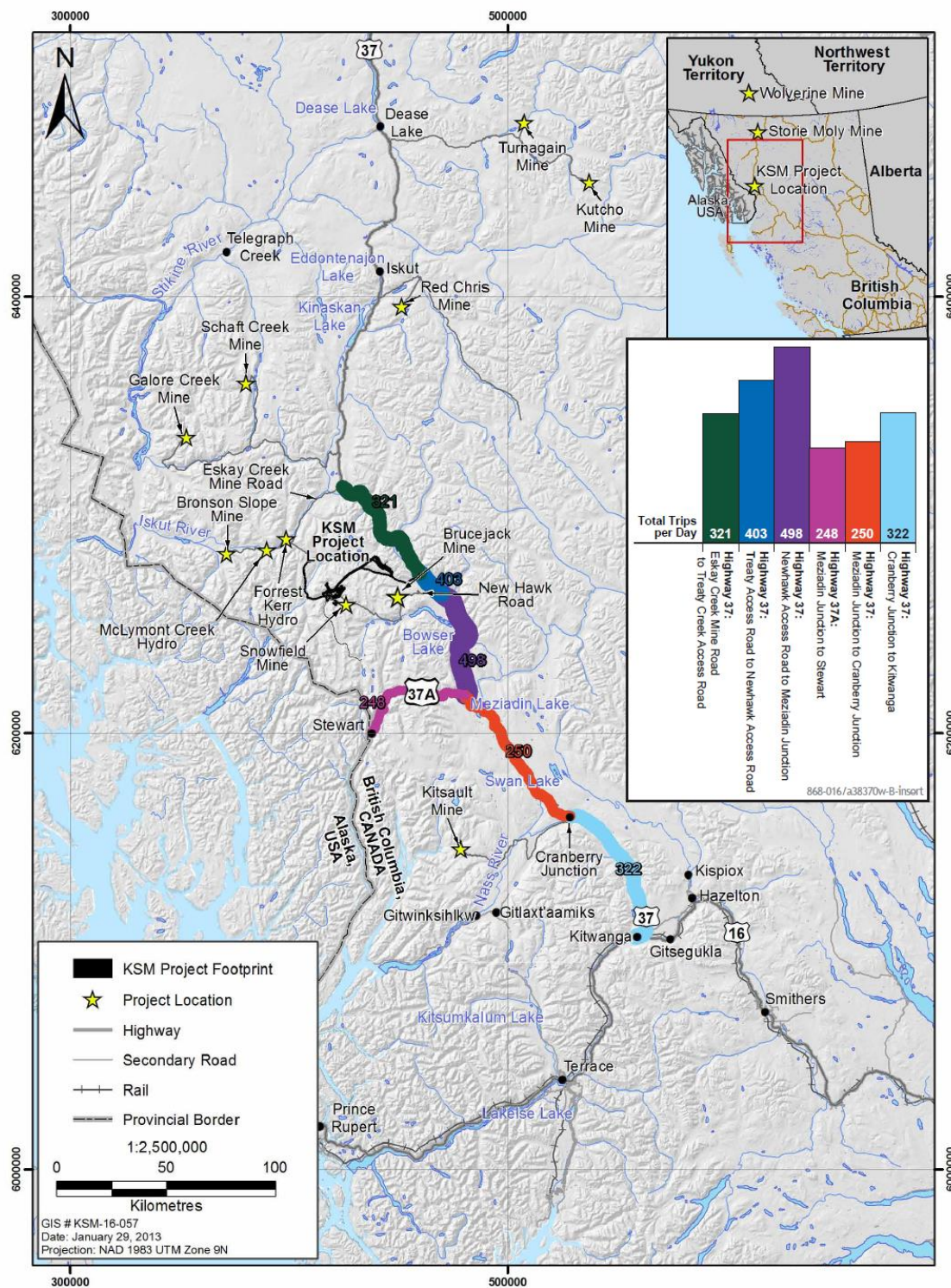
The Application describes cumulative effects related to increased vehicular traffic of the proposed Project, which would interact in combination with potential transportation effects from past, present, and reasonably foreseeable projects.

The Proponent conducted a traffic cumulative risk assessment considering current and reasonably foreseeable future traffic along Hwys 37 and 37A as shown in figures 23 and 25.

Cumulative effects on wildlife were initially assessed for the worst case scenario (i.e. fourteen mine and hydro projects proceed at the same time). In the cumulative effects assessment, the Proponent identified two effects as significant using this worst case scenario: 1) the overall cumulative effects on moose; and 2) the cumulative effect of traffic near Stewart BC (i.e. community well-being). Both of these effects were further assessed using two traffic scenarios: 1) a likely development scenario (KSM Project + 2-3 projects) was considered and rated as Not Significant Moderate, and 2) an unlikely development scenario (fourteen projects concurrently operating) was considered as rated as Significant. EAO notes that the Proponent identified the following projects as present projects: Forest Kerr Hydroelectric, Red Chris Mine and Wolverine Mine.

The Application states that the model used for the moose analysis was overly-sensitive to changes in mortality, the level of additional mortality required to cause a population decline is likely considerably higher than stated.

Figure 26: Potential Cumulative One-Way Trips per Day as a Result of KSM and Other Projects



The Proponent estimated cumulative traffic collisions per year on Hwy 37 and 37A as summarized in table 42 below.

Table 42: Predicted Number of Traffic Collisions per Year: Baseline vs. Cumulative Traffic

Collision Type	Hwy 37 North Segment			Hwy 37 South Segment			Hwy 37 A		
	Baseline	Cumulative Traffic	Change	Baseline	Cumulative Traffic	Change	Baseline	Cumulative Traffic	Change
PDO ¹	1.036	1.536	+0.500	3.693	3.829	+0.136	0.973	1.219	+0.246
Severe	1.525	2.006	+0.481	5.889	6.051	+0.162	1.016	1.300	+0.284
Total	2.561	3.542	+0.981	9.582	9.880	+0.298	1.989	2.519	+0.530

¹ Property Damage Only

A summary of mitigation proposed for cumulative effects includes:

- the Proponent will participate in an integrated management strategy that includes all stakeholders that have regulatory oversight both with respect to transportation activities on provincial Hwys and for managing wildlife populations. EAO and MOTI have struck a Hwy 37/37A Transportation Advisory Group and the Proponent is participating; and,
- as part of the Proponent's Geographic Response Plan, the Proponent is required to work together with other industrial operators in the region regarding spill response including training and spill response kits and plans.

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.

10.1.7 Certainty

EAO concludes there is moderate certainty around the nature of effects arising from increased project-specific traffic, but there is some uncertainty relating to the magnitude of those effects. The source of this uncertainty and the actions EAO has taken to address the uncertainty includes the following:

- With the exception of dust and increased emissions, most effects discussed in the traffic assessment are based on accidents and malfunctions. It is in the best interests of all parties, including the Proponent, to ensure that those accidents and malfunctions are at the lowest levels possible, with an ultimate target of zero.
- Given the length of the transportation corridors, it is impossible to discuss, with any degree of certainty, where a site specific effect may take place. A tanker truck spill may occur in a dry terrestrial area and be of small scale and immediately cleaned up. A similar spill could occur into a sensitive wetland and be challenging to clean up. The same applies to animal mortality. There may be no proposed Project-related

moose mortality in one year, but due to snow levels, storms or other unpredictable events it could be ten the next year. As such, the actual magnitude of effects can only be determined over time and with appropriate and accurate monitoring.

- EAO notes that conditions related to transportation, which will become legally enforceable should an EA Certificate be issued, are all focused on decreasing the chance of effects (e.g. standard operating procedures for company and subcontractor vehicles), ensuring effects can be addressed in a timely way (e.g. coordinated spill response), increasing understanding regarding the magnitude of effects (e.g. monitoring and reporting) and offsetting effects that occur but cannot be prevented through design or other mitigation (e.g. contributions to a trust).
- Another factor related to certainty relates to modelling long term wildlife populations. There are many factors related to the health of a wildlife population, especially one such as Nass Moose, which have continued to experience a downward trend in recent years, despite the elimination of resident and non-resident hunting and significant voluntary harvest reductions by First Nations and the Nisga'a Nation. These models have some use over the short term (one to five) years but are of limited value for the long term.
- EAO also notes that the governance of Hwy corridors is a factor that increases uncertainty related to project-specific effects. Active management of the Hwy corridor is the responsibility of government, not individual proponents. Many mitigation suggestions made by members of the Working Group through the EA for this proposed Project and others (e.g. Kitsault Mine Project) actually relate to the actions of government and not the Proponent. Since EA Certificate conditions apply only to proponents and not government, the consideration and implementation of those suggestions cannot be factored into conclusions on this proposed Project. However, in recognition of these larger issues, EAO has initiated, along with MOTI and FLNR, the key agencies with responsibility for managing resources and transportation in the corridor, the Hwy 37 Advisory Group. This group has met several times and has already begun working with a multi-agency, multi-stakeholder, Nisga'a and First Nation group to identify these issues and begin to develop collaborative solutions.

10.1.8 Conclusion

Considering the above analysis and having regard to the conditions identified in the TOC and the CPD (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 traffic effects.

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 include the following plans and sub-plans:

- Construction Management;
- Rock Storage Facilities Management and Monitoring;
- Tailings Management Facility Management and Monitoring;
- Water Storage Facility Management and Monitoring;
- Dangerous Goods and Hazardous Materials Management;
- Explosives Management;
- Spill Prevention and Emergency Response;
- Air Quality Management:
 - Emissions Management;
 - Fugitive Dust Emissions Management; and
 - Meteorology Monitoring;
- Greenhouse Gas Management;
- Terrain, Surficial Geology and Soil Management and Monitoring:
 - Soil Salvage and Handling;
 - Erosion Control; and
 - Soil Contamination Prevention;
- Water Management;
- Mine Site Water Management;
- Metal Leaching and Acid Rock Drainage Management;
- Groundwater Monitoring and Mitigation;
- Glacier Monitoring;

- Water Management;
- Selenium Management Plan;
- Fish and Aquatic Habitat Management:
 - Fish and Aquatic Habitat Effects Protection and Mitigation;
 - Aquatic Effects Monitoring;
 - Fish Salvage; and
 - Salmon Monitoring;
- Wetlands Management;
- Terrestrial Ecosystems Management and Monitoring:
 - Vegetation Clearing Management Plan;
 - Invasive Plant Management Plan;
 - Transmission Line Management Plan; and
 - Terrestrial Plant Tissue Metal Concentrations Monitoring Plan;
- Wildlife Effects Monitoring:
 - Wildlife and Wildlife Habitat Management; and
 - Ungulate Winter Range Management;
- Human Health Monitoring;
- Noise Management;
- Heritage Management and Monitoring;
- Visual Quality Management;
- Traffic and Access Management;
- Accidents and Malfunctions; and
- Reclamation and Closure.

The Proponent must submit the EMPs to the appropriate 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 CPD (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 is a Gitxsan group of Tsimshian and Athapaskan heritage who speak a dialect of the Nass-Gitxsan division of the Tsimshian language family. Historically, Gitanyow Nation was one of seven Gitxsan 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 undertaken by Gitanyow Nation. 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 (located at the confluence of the Kitwanga and Kitwancool rivers) was Gitanyow Nation's winter village.

Gitanyow Nation is comprised of the following eight *Huwilp*, each of which belongs to one of two clans and asserts its own individual traditional territory:

Lax Gibuu (Wolf Clan)

- Gwass Hlaam
- Malii
- Haizimsque
- Wii Litsxw

Lax Ganeda (Frog/Raven Clan)

- Gamlakyeltxw
- Gwinuu
- Watahayetsxw
- Luuxhon

The Gitanyow Hereditary Chief's Office (GHCO) advised EAO that it represents the Gitanyow *Huwilp*, and described them as the social, political, and governing units of the Gitanyow Nation. In correspondence from the GHCO to EAO dated July 31, 2008, the Gitanyow *Wilp Lax'yip* (traditional territories) are described as follows:

“The *Lax Yip* covers the area from Kitwancool Lake, or Gitanyow Lake in the south, north to the Bell One Bridge on the Bell-Irving River and from Kitsault Lake in the west to Bonny Lakes in the east, for a total of approximately 6,200 square kilometres. Gitanyow’s main village is situated on Hwy 37, approximately 20 kilometres north of Kitwanga Junction.”

In March 2012, Gitanyow Nation and the Province of British Columbia signed the *Gitanyow Huwilp Recognition and Reconciliation Agreement* (Agreement). The purpose of the Agreement is to build upon the relationship between the Gitanyow Nation and the Province with the intention of guiding land and resource management on the Gitanyow Lax’yip. The Agreement addresses the asserted or determined aboriginal rights, including title, as recognized and affirmed under section 35 of the *Constitution Act, 1982* (Aboriginal Interests). Specifically, section 2.2 of the Agreement states that the intent of the Agreement is to:

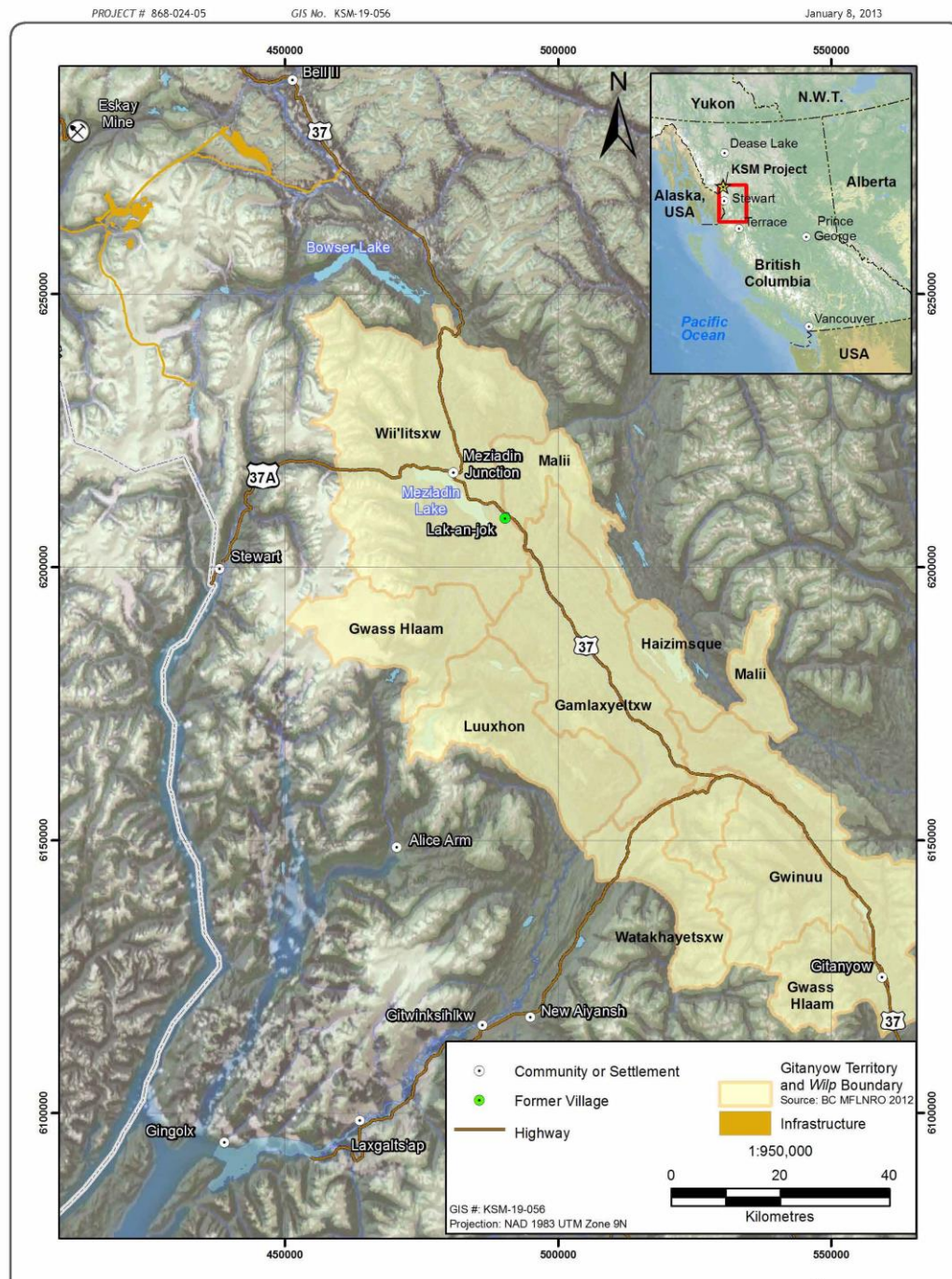
- “provide a foundation for a respectful Government-to-Government relationship within which the Parties can collaborate in the implementation and monitoring of this Reconciliation Agreement;
- create increased certainty in regard to land and resource management and economic benefits for both Parties;
- establish a clear, reliable and efficient framework for Shared Decision-Making, Land and Resource Decisions; and
- achieve meaningful engagement, a common understanding of each Party’s respective interests, including *Wilp* sustainability, and the Parties’ shared interests, and promote well-informed decision-making.”

Part 2 of the Agreement comprises the Gitanyow Lax’yip Land Use Plan, which section 8.2 of the Agreement states will enable the Gitanyow Nation and the Province to work together on:

- “implementing the results of Government to Government land use discussions in a spirit of collaboration; and
- addressing strategic and operational land use issues as they arise in the future.”

See Table 43 (section 12.2.5) of this report for EAO’s analysis of the potential impacts from the proposed Project on the March 2012 Gitanyow Land Use Plan.

Figure 27: Proposed KSM Project and Gitanyow Nation Traditional Territory



12.1.2 Gitanyow Nation Traditional Use of the Proposed Project Area

Although there are no proposed Project components located within the Gitanyow Nation's traditional territory, *Wilp* Wii Litsxw and other *Huwilp* territories are located approximately 58 km downstream of the TMF and are bisected by Hwys 37 and 37A, which comprise the primary transportation corridor for the proposed Project.

Of the eight Gitanyow *Huwilp*, the traditional territory associated with *Wilp* Wii Litsxw is located in closest proximity to the proposed Project area and is also traversed by the proposed transportation corridor for the Project along Hwy 37. The Proponent's Application for an EA certificate states that *Wilp* Wii Litsxw's traditional territory, which extends from south of Bowser Lake to south of Meziadin Lake, includes culturally and ecologically important hunting and fishing areas. *Huwilp* activities within the traditional territories include gathering country foods such as fish, moose meat, and berries.

Areas of particular significance to the Gitanyow Nation for the exercise of traditional use activities include the Hanna and Tintina Creek watersheds and the confluence of the Meziadin basin with the Nass River, where salmon spawning and harvesting are common. According to the Proponent's Application, the Hanna and Tintina drainages represent high-value grizzly bear habitat, along with areas to the north along the Bell-Irving River towards Surveyors Creek. The Hanna-Tintina watersheds also represent an area of high cultural value to the Gitanyow Nation and, according to the Proponent's Application, contain numerous traditional knowledge/traditional use sites.

Correspondence from the GHCO to EAO on February 11, 2014, provided information regarding the fishing activities undertaken by the Gitanyow Nation within the Skeena and Nass Rivers. Specifically, the GHCO advised that, as part of an agreement with the DFO, they harvest sockeye, chinook, coho, chum, and pink salmon for food, social, and ceremonial purposes in the following areas:

- in the waters of the main stem of the Nass River from a point 800 m downstream of the confluence with the Kinskuch River to the confluence with the Bell-Irving River;
- in the waters of the Meziadin River from a point 12 m downstream of the Meziadin Fishway to the confluence of the Nass and Meziadin Rivers;
- the Cranberry River; and
- the Kitwanga River.

The Gitanyow Nation's preferred salmon is sockeye, followed by chinook and coho. Steelhead and bull trout are also harvested by the Gitanyow Nation, the steelhead mostly as bi-catch in the Nass River and bull trout as a target species within tributaries of the Nass, Kitwanga and Upper Kispiox Rivers.

Hunting (and in particular the hunting of moose) and trapping are also important activities undertaken throughout the territories, and wildlife species regularly used by Gitanyow Nation include the following:

- grizzly bear;
- mountain goat;
- moose;
- deer;
- marmot;
- beaver;
- marten;
- wolverine; and
- rabbit.

Vegetation species gathered for traditional purposes by Gitanyow Nation include:

- blueberries;
- cranberries;
- devil's club;
- hellebore;
- Labrador tea;
- water lily roots;
- nettles;
- soapberries;
- balsam bark;
- red alder bark; and
- wild mint.

According to the Proponent's Application, the harvesting of pine mushrooms is also an increasingly important economic activity for Gitanyow Nation.

12.1.3 Consultation with Gitanyow Nation

12.1.3.1 *Gitanyow Nation involvement with EAO*

Pre-Application Stage

Gitanyow Hereditary Chiefs Office

EAO notified the GHCO of the initiation of the EA for the proposed Project via letter on April 30, 2008; in that letter, EAO advised that the EA process had been initiated and that it would contact the GHCO again shortly in order to discuss opportunities for the Gitanyow Nation to participate.

EAO followed up with a second letter to the GHCO on May 22, 2008, to suggest a meeting to discuss Gitanyow Nation's interests in the proposed Project area and to determine whether Gitanyow Nation wanted to participate in the EA.

On June 2, 2008, EAO sent another letter to the GHCO to provide additional information regarding the proposed Project, extend an invitation to participate in an upcoming Working Group meeting, and request a government-to-government meeting to discuss the Gitanyow Nation's Aboriginal Interests downstream of the proposed Project. EAO and the GHCO communicated via e-mail and telephone throughout June 2008 in an attempt to schedule a meeting.

The GHCO sent EAO a letter on July 31, 2008, confirming their interest in participating in the EA and requesting capacity funding. The GHCO also provided EAO with information regarding the Gitanyow *Huwilp* and advised that the proposed Project could result in effects on Gitanyow Nation's asserted rights and interests as they relate to water quality, wildlife, and snow impacts in their asserted traditional territory. EAO responded to the GHCO by letter on August 11, 2008 and advised that information regarding capacity funding from EAO would be provided shortly, and that the GHCO should also consider requesting capacity funding from the Proponent. EAO conveyed capacity funding to the GHCO via letter on August 18, 2008 to assist the GHCO's participation in the EA of the proposed Project, including travelling to EAO-sponsored meetings, document review, and other EA-related work. EAO provided the GHCO with additional capacity funding in the name of the Gitanyow Huwilp Society on October 28, 2008.

In May 2009, EAO wrote to the GHCO to provide a copy of the Proponent's 2008 Baseline Studies Report and asked for feedback regarding whether there were any gaps that should be incorporated into the 2009 Baseline Studies Workplan, which was attached for review and comment. EAO's letter also included information about upcoming meetings of the full Working Group and technical sub-working groups, as well as an invitation to meet on a government-to-government basis to discuss the EA process and the nature and scope of Gitanyow Nation's Aboriginal Interests in the proposed Project area.

On June 3, 2009, EAO met with representatives of the GHCO and the Canadian Environmental Assessment Agency (CEA Agency) to discuss the EA of the proposed Project and opportunities for the Gitanyow Nation to be involved. The following topics were also discussed at the meeting:

- employment opportunities for Gitanyow Nation members;
- downstream effects from the proposed Project;
- increased traffic on Hwy 37 from the proposed Project and impacts on public safety, ecotourism, and Gitanyow Nation's future economic opportunities;

- the opportunity for the Gitanyow Nation to submit comments on the draft AIR and the timeline for doing so;
- the draft order under section 11 (Section 11 Order) of the Act, which First Nations will be consulted during the EA, and timing for finalization of the Section 11 Order;
- upcoming technical meetings that the GHCO were invited to attend; and
- capacity funding, which the GHCO advised was insufficient.

On June 16, 2009, EAO sent the GHCO a letter conveying a copy of the Chapter 7 Geochemistry Baseline Study Report and invited them to participate in a meeting to discuss issues related to metal leaching/acid rock drainage in Vancouver on June 22, 2009. No representatives from the GHCO participated in the June 22 meeting.

EAO sent another letter to the GHCO on July 10, 2009 to advise that EAO's initial understanding had been that the GHCO represented the Gitanyow *Huwilp*, but that *Wilp* Wii Litsxw had communicated the desire to be consulted directly. EAO encouraged the GHCO to continue to participate in the EA and to remain on the Working Group, but informed them that EAO would also be contacting *Wilp* Gamlakyeltxw and *Wilp* Watahayetsxw directly to inquire about their interest in participating in the EA for the proposed Project. EAO also provided the GHCO with a copy of the draft Section 11 Order for review and comment.

On June 18, 2010, EAO sent a copy of the draft AIR for review and comment, but the GHCO wrote to EAO on June 29, 2010, to advise that, without adequate funding, the GHCO was unable to review the draft Application Information, as requested. The GHCO did, however, submit comments on the draft Section 11 Order, and advised that the proposed Project has the potential to affect the resource values within Gitanyow Nation's traditional territory, potentially affecting Gitanyow Aboriginal Interests. The GHCO further advised that even though the proposed Project is outside the territory, it could adversely affect water quality downstream (downstream effects) and fish and wildlife values within Gitanyow lands. The GHCO indicated that there was potential for socio-economic impacts from the proposed Project on Gitanyow Aboriginal Interests as well, and requested additional capacity funding to facilitate participation in the EA. EAO responded to the GHCO's request for additional capacity funding on

September 7, 2010, and indicated that capacity funding had already been provided to the GHCO to facilitate participation in the pre-Application stage of the EA for the proposed Project, and advised that this was the maximum amount that could be allocated to the GHCO for the time being due to budget constraints. EAO also offered additional time for the GHCO to submit comments on the draft AIR, as well as a face-to-face meeting with GHCO representatives to discuss the draft AIR and the EA of the proposed Project in general.

In September 2010, the GHCO wrote to EAO to submit comments on the draft AIR. The GHCO requested that EAO recognize that the Gitanyow Nation has Aboriginal Interests that could be impacted by the proposed Project and that EAO consult directly with the GHCO and *Wilp* Wii Litsxw. EAO responded to GHCO's letter on November 25, 2010 (copied to *Wilp* Malii) and provided a copy of the Proponent's responses to their comments on the draft AIR. EAO indicated that a number of changes were made to the draft AIR to reflect some of GHCO's comments, but noted that many of the comments were related more to the design, construction, and operation of the proposed Project; EAO advised that they had directed the Proponent to contact the GHCO and *Wilp* Malii directly to discuss the issues raised and then report back to EAO with the results of that discussion. EAO also extended an invitation to meet with *Wilp* Wii Litsxw to meet with EAO to discuss the EA for the proposed Project and any concerns they may have.

In March 2011, EAO received a letter from the GHCO requesting an amendment to the Section 11 Order that would expand the scope to include all eight of the Gitanyow *Huwilp*, as well as the GHCO, as opposed to just *Wilp* Wii Litsxw. The GHCO pointed out the potential for impacts on air and water quality and fish production from metal leaching/acid rock drainage as a result of the proposed Project, and therefore on the Gitanyow *Huwilp*'s rights to harvest fish and wildlife and gather vegetation. The GHCO also advised that there could be direct impacts on wildlife in and around Gitanyow territory due to increased traffic from the proposed Project.

EAO responded to the GHCO's concerns via letter on April 28, 2011, stating that EAO wrote to *Wilp* Gamlakyeltxw, *Wilp* Watahayestxw, and *Wilp* Wii Litsxw on July 10, 2009 to inform them that the proposed Project may potentially result in impacts on Gitanyow Nation Aboriginal Interests due to downstream impacts and impacts from trucking. The July 10, 2009 letter went on to say that EAO intended to consult with *Wilp* Wii Litsxw because it is the *Wilp* closest to proposed Project and because Wii Litsxw territory includes part of the Nass River, as well as the trucking route to Stewart. EAO did not consider it necessary to consult the remaining Gitanyow *Huwilp* because EAO did not believe there would be impacts on those *Huwilp*'s territories due to the distance from the proposed Project (at least 80 kilometres to the south). The July 9, 2009 letter concluded by asking if the *Huwilp* wished to be engaged in the EA for the proposed Project, but no response was received. In addition to summarizing past consultation efforts previously outlined in July 2009, EAO's April 28, 2011 letter to the GHCO also communicated EAO's intention to amend the Section 11 Order to address the following:

1. broaden the scope of the assessment to include transport of construction and operational materials to the site of the proposed Project;
2. include those Gitanyow *Huwilp* located adjacent to the Hwy 37 corridor, as well as the GHCO in the Section 11 Order;

3. clarify in the Section 11 Order that the scope of the consultation with the newly added *Huwilp* is to encompass only on the potential impacts arising from the transportation corridor and that any Proponent engagement will only be on those impacts; and
4. clarify that the GHCO is to be added to the definition of First Nations and thereby order the Proponent to consult with that office (this addition was in recognition of the role of the GHCO in supplying technical expertise to the Gitanyow *Huwilp*).

EAO's April 28, 2011 letter also outlined EAO's preliminary assessment as to the potential impacts from the proposed Project on Gitanyow Aboriginal Interests, stating that EAO considers the scope of its duty to consult with Gitanyow as being between in the middle of the *Haida* spectrum. EAO offered the following reasons for its preliminary assessment:

1. transportation of materials is along existing roads which are already maintained and regulated by provincial agencies through existing policy;
2. the rights potentially being impacted are in those traditional use and gathering areas in close proximity to the existing Hwy corridor. Impacts would be limited to dust, accidents and malfunctions from mine traffic such as spills, and such impacts would be localized and limited to individual animals or relatively small areas;
3. the roads being used for transportation have been in place for years and any impact from designation or construction of these roads occurred in the past and is not part of the scope of the duty to consult about the proposed Project; and
4. with respect to *wilp* Wii'litsxw territory, the footprint of the proposed Project itself is well upstream from the edge of their territorial boundary. It is only potential downstream effects of the proposed Project that are being addressed.

On June 13, 2011, EAO wrote to the GHCO to convey a draft order under section 13 of the Act (Section 13 Order) for review and comment. The purpose of the Section 13 Order was to change several aspects of the scope and process for the EA of the proposed Project, specifically the inclusion of Hwy 37 from the proposed Project site to the junction of Hwy 16 at Kitwanga, and consultation with Gitanyow *Huwilp* regarding potential impacts arising from the use of Hwy 37.

On September 12, 2011, EAO sent another letter to the GHCO advising that, based on a technical report from the Proponent regarding potential effects (a copy of which was provided in the letter), EAO had determined that there would not be measurable effects on water quality downstream of the proposed Project in the Bell Irving or Nass Rivers. EAO stated that it would consider widening the scope of consultation beyond *Wilp* Wii Litsxw on potential downstream effects if new information is presented that could change EAO's conclusion. EAO also confirmed the provision of capacity funding to the GHCO to support participation in the pre-Application stage for the EAs for the proposed Kitsault and KSM Projects for Gitanyow *Huwilp*, with additional capacity funding sent to

Wilp Luuxhon. EAO's letter confirmed that GHCO representatives had advised at the July 21, 2011 meeting that all funding should flow to the GHCO (except for *Wilp* Luuxhon) to coordinate on behalf of potentially affected *Huwilp*, and requested correction if that understanding was incorrect.

When no comments were received from the GHCO or Gitanyow *Huwilp* on the draft Section 13 Order, EAO followed up by letter on October 4, 2011 to the GHCO and *Wilp* Gamlaxyelxw, *Wilp* Gwass Hlaam, *Wilp* Gwinuu, and *Wilp* Wii Litsxw to advise that the Section 13 Order had been finalized, and to invite them to participate in a technical working group for First Nations potentially affected by proposed projects that would increase the usage of Hwy 37.

EAO heard concerns from the GHCO and *Wilp* Wii Litsxw in an April 2012 letter regarding the potential for chronic and catastrophic effects on downstream waters in the Nass watershed and the associated effects of fish. EAO responded via a joint letter with the CEA Agency on July 19, 2012, reiterating EAO's previous statements regarding the lack of information indicating the potential for downstream effects in the Bell Irving or Nass Rivers. EAO and the CEA Agency also expressed satisfaction with the Proponent's "February 2012 Assessment of Alternatives for the KSM Project TMF" and advised that it was still in draft form and available for review and comment by Gitanyow.

On August 14, 2012, EAO wrote to the GHCO and the Gitanyow Fisheries Authority to convey capacity funding to assist with costs associated with Gitanyow Nation's participation in a traffic study designed to inform EAs for projects proposed along Hwy 37, including the proposed Project.

On September 14, 2012, the GHCO submitted comments on the Proponent's "KSM Project Hwy 37 and 37A Traffic Effects Assessment". The comments were submitted in the context of the March 28, 2012, Gitanyow *Huwilp* Recognition and Reconciliation Agreement (Agreement) signed by the eight Gitanyow chiefs and the Province. The GHCO's comments referenced the Gitanyow Lax'yip Land Use Plan, stating that the March 2012 Agreement and provides detailed management objectives and land use zones for the Gitanyow Nation's asserted traditional territory, and that the GHCO expects the proposed Project to adhere to those management objectives. The GHCO expressed significant concern over the potential effects of the proposed Project on wildlife (primarily moose) from vehicle collisions, as well as the potential adverse effects on aquatic ecosystems and human safety in the event that one of the proposed Project vehicles is involved in an accident that results in the release of deleterious substances into the surrounding environment.

In December 2012, EAO contacted the GHCO to provide information regarding the timing for the Proponent to submit their Application and invited the GHCO to participate in the evaluation process. On January 23, 2013 the GHCO advised EAO via a letter that the Skeena Fisheries Commission would be providing technical support to the GHCO

during the Application review stage of the EA for the proposed Project, and EAO responded to confirm that funding would still be sent to the GHCO. A week later on January 30, 2013, EAO sent a copy of the Proponent's "KSM Project – Gitanyow First Nation Section 11 Order Consultation Summary Report" to the GHCO for review and comment. On February 13, 2013, the GHCO thanked EAO for the opportunity to and provided a copy of their comments submitted to the Proponent in December 2012.

On February 26, 2013, EAO sent a letter to the GHCO to provide capacity funding to the GHCO and the Gitanyow Huwilp Society on behalf of *Wilp* Wii Litsxw, *Wilp* Malii, *Wilp* Gamlakyeltxw, *Wilp* Gwass Hlaam and *Wilp* Gwinuu to assist with participation in the Application review stage of the proposed Project. On March 1, 2013, the GHCO confirmed receipt of their requested copies of the Application from the Proponent, and on May 1, 2013, requested a one-day extension to submit their screening comments, which EAO granted. On June 4, 2013, EAO wrote to the GHCO to advise that the Application was found to include all of the information set out in the AIR; the letter also provided additional information regarding the Application review stage and indicated that the 180-day Application review would be initiated once all Working Group members and First Nations had received their requested copies of the Application.

***Wilp* Luuxhon, *Wilp* Gwass Hlaam, *Wilp* Gamlakyeltxw, *Wilp* Wii Litsxw, and *Wilp* Watakhayetsxw**

On June 25, 2009, EAO met with representatives from *Wilp* Luuxhon and *Wilp* Gwass Hlaam to discuss Gitanyow traditional laws and customs, the role of the GHCO versus individual Gitanyow House Groups, and the provincial EA process. During the meeting, *Wilp* Luuxhon representatives advised that EAO and the Proponent should be consulting directly with the hereditary chiefs regarding the EA of the proposed Project, and not the GHCO; EAO requested that the direction to EAO to consult directly with the hereditary chiefs of the *Huwilp* be formally communicated in a letter. At the request of the *Huwilp* representatives at the meeting, EAO later followed up by providing additional information about the proposed Project, as well as a map of all projects currently in the EA process located within the Gitanyow *Huwilp* territories.

On July 7, 2009, EAO called Head Chief Morris Derrick of *Wilp* Wii Litsxw to determine if the house wished to be consulted directly regarding the EA of the proposed Project or through the GHCO. On the advice of Chief Derrick, EAO contacted Wing Chief Tim Martin, who indicated that he was aware of the proposed Project since his sister had met with the Proponent; he also advised that he had requested that the Proponent meet with the village to discuss the proposed Project. EAO explained the EA process, the current status of the EA of the proposed Project, as well as the purpose of the section 11 Order and the Working Group. EAO invited Wing Chief Martin to contact EAO with any questions and committed to sending him a follow-up letter with additional information about the proposed Project and the section 11 Order.

On July 10, 2009, EAO wrote to *Wilp* Gamlakyeltxw and *Wilp* Watakhayetsxw to notify them of the initiation of the EA for the proposed Project. EAO extended an invitation to the *Huwilp* to participate in the EA because of the understanding that there was the potential for downstream impacts on the *Huwilp* territories from the proposed Project. EAO wrote to *Wilp* Wii Litsxwe at the same time to provide information regarding the EA process and a map of the proposed Project location in relation to the Gitanyow *Huwilp* territories. EAO also provided a copy of the draft Section 11 Order to *Wilp* Wii Litsxw and *Wilp* Gamlakyeltxw for review and comment and advised that EAO would add *Wilp* Wii Litsxw to the Working Group. On September 28, 2009, EAO followed up with a letter to *Wilp* Wii Litsxw requesting confirmation of the authorization of two individuals to represent the *Wilp* on the Working Group. EAO received a letter from *Wilp* Wii Litsxw on April 6, 2010, confirming that the hereditary chiefs should be consulted directly regarding the EA of the proposed Project.

On September 7, 2010, EAO wrote a letter to *Wilp* Wii Litsxw explaining the purpose of the AIR and inviting comments on the draft AIR for the proposed Project. EAO also offered to schedule a meeting in September to discuss the draft AIR and the EA process in general, if desired by *Wilp* Wii Litsxw.

Between September 2010 and August 2012, EAO communicated via e-mail with *Wilp* Wii Litsxw regarding the EA of the proposed Project as members of the Working Group. EAO also copied Gitanyow *Huwilp* on correspondence to the GHCO in June and October 2011 regarding opportunities to review and comment on the draft section 13 Order (see section above for details).

Application Review Stage

Initiation of the 180-Day Review

The 180-day Application review stage of the EA for the proposed Project was initiated on August 12, 2013. EAO communicated with the Gitanyow Nation between August and September regarding the initiation of the review, including:

- **August 15, 2013** – e-mail advising that the 180-day review has been initiated; and;
- **August 29-September 12, 2013** – e-mails regarding a conference call to discuss the initiation of the 180-day Application review stage; EAO canvassed for preferences regarding potential dates for the call and provided copies of the a proposed agenda and a revised EA review schedule.

On September 13, 2013, EAO held the conference call with the Proponent and representatives from the CEA Agency and the Working Group (including the Gitanyow Nation) to discuss the initiation of the 180-day Application review stage. EAO and the CEA Agency presented the provincial and federal EA processes and timelines, including the following milestones and key steps in the EA:

- initiation of the 180-day review on August 12, 2013;
- a 45-day public comment period from September 6-October 9, 2013 with open houses in Iskut, Telegraph Creek, Smithers, Terrace and Stewart;
- a series of Working Group and sub-Working meetings to be held throughout the review;
- an opportunity to review and submit comments on the Proponent's Application;
- an opportunity to review and submit comments on the Proponent's responses to comments on the Application;
- an opportunity to review and submit comments on EAO's draft Assessment Report, CPD, and TOC; and
- an opportunity for First Nations (including the Gitanyow Nation) to review and submit comments on EAO's draft First Nations Consultation Report.

During the call, Working Group members were also given an opportunity to engage in discussion with, and ask preliminary questions of, the Proponent regarding the Application. EAO asked Working Group members for their feedback regarding the format and intent of future Working Group meetings, including the utility of forming technical sub-Working Groups. EAO provided information regarding upcoming open houses and advised that the deadline for the first round of Working Group comments on the Application was October 11, 2013.

Working Group and Technical Sub-Working Group Meetings

Between October 2013 and May 2014, EAO and the CEA Agency scheduled the following Working Group and technical sub-Working Group meetings for the EA of the proposed Project:

- **October 2-3, 2013** – the Proponent presented their significance determination framework and key areas of the Application, followed by a discussion, and an opportunity to ask questions (Gitanyow Nation representatives participated in the meeting on October 2, 2013)
- **November 6-8, 2013** – an opportunity to engage in technical level discussions on issues related to wildlife and water quality on both the mine side and tailings side of the proposed Project (no Gitanyow representatives participated in these meetings)
- **November 26-28, 2013** – an opportunity to engage in a technical level discussion, review the Proponent's proposed mitigation measures and conditions, and identify outstanding geotechnical issues for resolution (Gitanyow representatives participated in all three days of meetings)
- **May 13-15, 2014** – a three-day Working Group meeting to discuss EAO's draft Assessment Report, TOC, CPD, and issues tracking table. The meetings provided Working Group members with an opportunity to discuss and ask

questions about EAO's key findings with respect to potential effects from the proposed Project on water quality, wildlife, fish, and transportation (Gitanyow participated in all three days of meetings)

Correspondence and Meetings Between EAO and the Gitanyow Nation

Correspondence

Between September 2013 and March 2014, EAO communicated with the Gitanyow Nation regarding the status of the EA, including the following:

- **September 20, 2013** – EAO e-mail conveying the proposed agenda for the October 2-3, 2013 Working Group meeting and requesting feedback regarding attendance;
- **September 24, 2013** – GHCO e-mail requesting a copy of the Lorax Environmental groundwater comments referenced in comments submitted by MEM (EAO provided a link to the comments on October 15, 2013);
- **October 1, 2013** – EAO e-mail to the Working Group conveying the finalized agenda and PowerPoint presentations for the October 2-3, 2013 Working Group meeting;
- **October 11, 2013** – GHCO e-mail conveying comments on the Application and raising concerns with the short timelines associated with the EA, the need for a third-party independent review, EAO's approval of the Proponent's request to have some permits and authorizations reviewed concurrently with the Application, inadequate response to GHCO's screening comments, the Proponent's lack of consultation with the GHCO on the finalization of the Gitanyow Traditional Use/Traditional Knowledge Study, the belief that the Proponent is unaware of the that the Hanna Tintina was legally established as a Conservancy on March 14, 2013, and concern that the Proponent does not appear to recognize the Gitanyow Lax'yip Land Use Plan;
- **October 21/26, 2013** – EAO e-mails inviting the Working Group members (including the Gitanyow Nation) to participate in technical sub-Working Group meetings for wildlife and water quality, conveying the proposed agendas, and requesting feedback regarding participation;
- **October 21, 2013** – GHCO e-mail commenting on budget constraints and the challenge for Gitanyow Nation Working Group members to attend meetings in Vancouver, as well as requesting confirmation that the GHCO's first round of comments on the Application had been received; EAO confirmed on November 15, 2013 that the GHCO's comments had in fact been received;
- **October 21, 2013** – GHCO e-mail requesting clarification regarding whether the technical wildlife sub-Working Group meeting will include transportation-related effects, or if there would be a separate Working Group established for transportation; EAO clarified that transportation-related effects would be dealt

- with in the Hwy 37 Working Group that is currently under development;
- **November 1, 2013** – EAO e-mail conveying the draft summaries of the October 6-9, 2013 technical sub-Working Group meetings for review and comment;
 - **November 5, 2013** – EAO e-mail to the Working Group (including the Gitanyow Nation) conveying agendas for the upcoming technical sub-Working group meetings, graphs depicting water quality predictions from the Proponent, as well as a draft CPD and an explanation regarding the purpose of that document;
 - **November 6, 2013** – EAO e-mail to Kevin Koch to determine whether additional follow-up was required after he experienced technical difficulties in participating in the November 6, 2013 technical wildlife sub-Working Group meeting by telephone; EAO also directed the Proponent to follow up with Kevin Koch directly, which was done by November 11, 2013;
 - **November 18, 2013** – EAO e-mail inviting Working Group members (including the Gitanyow Nation) to participate in geotechnical and selenium sub-Working Group meetings on November 26-28, 2013, reminding that comments on the Application were due on October 11, 2013 and requesting notice if additional time was required;
 - **November 18, 2013** – GHCO e-mail advising that the notice given for the November 26-28, 2013 meetings was too short and that the Gitanyow Nation would be submitting additional comments on the Application;
 - **November 19, 2013** – EAO e-mail providing the agendas for the November 26-28, 2013 meetings, as well as copies of the Proponent's responses to geotechnical comments from MEM (or "Batch 1 Responses");
 - **November 20, 2013** – GHCO e-mail requesting copies of the section 11 Order for the proposed Project showing the section 13 Order amendments; EAO responded on the same day to advise that there is only one section 11 Order and that the section 13 Orders serve to vary the section 11 Order;
 - **November 20-December 4, 2013** – e-mails back and forth between EAO and the GHCO regarding:
 - comments submitted by the GHCO during the evaluation of the proposed Application and clarifying that they were considered at a high level at that stage of the review and would now be considered in detail,
 - clarification of statements made by EAO at Working Group meetings regarding the shift in focus from the Proponent's Application to EAO's Draft Assessment Report, CPD, and TOC;
 - clarification of statements made by EAO at Working Group meetings regarding the number of conditions that will likely be attached to the Draft EA Certificate, if issued; and
 - the fact that while EAO will consider all comments submitted by the

Gitanyow Nation, the focus will be on those comments providing information related to potential effects from the proposed Project on Gitanyow Nation's Aboriginal Interests, according to the scope of consultation set out in the section 11 and 13 Orders (transportation and downstream effects on *Wilp Wii Litsxw* and transportation effects on the four other *Huwilp*).

- **November 21, 2013** – GHCO letter to the provincial and federal environment Ministers requesting a meeting and expressing concerns with the proposed Project, including:
 - metal leaching and acid rock drainage that will require indefinite water treatment;
 - location of the TMF in the headwaters of the Nass River, the third largest salmon-producing river in BC;
 - dissatisfaction with the EA process for the proposed Project, including inadequate timelines for meaningful consultation and ensuring proper mitigation is identified;
 - a reminder that the Province must consider and abide by case law and existing agreements, such as the *Gitanyow Recognition and Reconciliation Agreement*;
 - the potential for impacts from the proposed Project on an already declining moose population and moose habitat (particularly from increased traffic along Hwy 37), water quality, fish and fish habitat, grizzly bears, and Aboriginal Interests, and comparing the proposed Project to the New Prosperity Project;
 - a request to suspend the EA in order to allow adequate time for all parties to consider the proposed Project; and
 - the desire to establish a Project-specific Traffic Effects Working Group instead of the newly established Hwy 37/37A Advisory Group.
- **November 26, 2013** – EAO e-mail conveying copies of the Proponent's PowerPoint presentations for the November 26-28, 2013 technical sub-Working Group meetings;
- **December 4, 2013** – GHCO e-mail requesting copies of the Proponent's PowerPoint presentations from the November 6-8, 2013 technical sub-Working Group meetings; EAO provided the copies on December 9, 2013;
- **December 11, 2013** – EAO e-mail conveying "Batch 2" of the Proponent's responses to the Working Group's comments on the Application for review and comment by January 10, 2014;
- **December 16, 2013** – EAO e-mail providing a copy of the Proponent's assessment of far-field downstream hydrologic effects;

- **December 17, 2013** – letter from the Honourable Mary Polak, Minister of Environment, responding to the GHCO's November 21, 2013 letter regarding the EA of the proposed Project, and advising the following:
 - that she has toured the proposed Project site and is aware of its scale and potential for effects;
 - that she believes the EA process to be robust and effective in assessing and addressing the potential for adverse effects, as well as fulfilling the Crown's duty to consult with First Nations;
 - her confidence in EAO as her delegated authority;
 - assurance that EAO remains committed to meeting the Crown's duty to consult and accommodate with respect to the proposed Project;
 - encouragement for the Gitanyow Nation to identify in a timely manner any potential impacts on Gitanyow Aboriginal Interests and interests, as well as any measures that could avoid or mitigate such impacts;
 - while there is no limit on conditions, EAO's improved and more rigorous approach with the introduction of CPDs has reduced the number of conditions as compared to previous EAs;
 - agreement that BC must honour its contractual commitments, including the commitments made in the *Recognition and Reconciliation Agreement*, and support and encouragement to finalize the Letter of Understanding being developed by EAO and the Gitanyow Nation to clarify EAO's role in the *Recognition and Reconciliation Agreement*; and
 - confirmation that the work of the Hwy 37/37A Advisory Group will contribute to consultation, but will not replace other venues for government-to-government consultation; this is consistent with BC's approach to consultation and ensures that the commitments made to consult the Gitanyow Nation as a government regarding potential impacts to asserted Aboriginal Interests are maintained, while enabling the technical working group to inform the issues.
- **December 20, 2013** – EAO e-mail conveying the Proponent's responses to Working Group comments on the Application and providing an opportunity to comment on those responses by January 24, 2014;
- **December 20, 2013** – EAO e-mail advising that the Proponent requested a 30-day extension to the 180-day review;
- **January 7, 2014** – GHCO letter responding to EAO's December 4, 2013 e-mail regarding correspondence with Mark Cleveland for the consultation record for the EA of the proposed Project, including the following:
 - the Proponent's response to comments submitted by the GHCO during the Application evaluation stage of the EA;

- EAO comments from the November 8, 2013 Working Group meeting; and,
 - GHCO's issues with the EA process for the proposed Project.
- **January 8, 2014** – e-mail providing an update on next steps, timelines, and upcoming opportunities for input into the EA, including an extension from the January 10, 2014 deadline for submitting comments on all Proponent responses to January 24, 2014;
- **January 9, 2014** – GHCO e-mail requesting a copy of the Proponent's "Batch 1" responses to comments and an update regarding the Proponent's request for a 30-day extension to the 180-day review timeline; EAO responded the same day to provide the responses, advise that EAO's Executive Director was still in the process of considering the Proponent's extension request, and offer any additional information or assistance that GHCO may require;
- **January 17, 2014** – e-mail to the Working Group (including the Gitanyow Nation) acknowledging the complexity and volume of materials for review as part of this EA, and requesting feedback regarding what EAO could do to facilitate the Working Group's review of those documents;
- **January 17, 2013** - EAO e-mail acknowledging that the GHCO will be meeting with the CEA Agency in Vancouver on January 21, 2014 and offering to set up a separate meeting for EAO and the GHCO (as EAO understands it is the GHCO's preference to hold separate meetings with the federal and provincial agencies) that same week;
- **January 20, 2013** – e-mail conveying the finalized summary of the October 2-3, 2013 Working Group meeting;
- **January 21, 2014** – GHCO letter responding to EAO's January 17, 2014 e-mail regarding the workload associated with the EA of the proposed Project and requesting that the EA be suspended in order to design and come to agreement on a consultation process;
- **January 27, 2014** – EAO e-mail conveying the draft summaries of the November 15, 2013 technical fisheries conference call and November 26-28, 2013 technical sub-Working Group meetings to participants for review and comment within two weeks;
- **January 28, 2014** – GHCO e-mail requesting an update on the Proponent's timeline extension request; EAO responded the same day to advise that the extension would likely be granted shortly to extend the deadline to March 20, 2014, but that additional time beyond March 20 may be required;
- **January 29, 2014** – EAO e-mail thanking those Working Group members who have submitted their comments on the Proponent's responses and requesting an update from those who haven't;
- **January 29, 2014** – GHCO e-mail conveying comments on the Proponent's responses to Working Group comments on the Application;

- **January 30, 2014** – e-mail conveying an order under section 24(4) of the Act extending the 180-day review timeline by 30 days, as requested by the Proponent;
- **February 4-7, 2014** – e-mails back and forth between EAO and the GHCO regarding documents posted on EAO's website, clarification of numbers provided in GHCO comments regarding Hwy 37 impacts, and a request from EAO for input from the GHCO with respect to potential mitigation measures/conditions that could alleviate their concerns;
- **February 11, 2014** – GHCO letter regarding potential impacts from the proposed Project on the Gitanyow Nation's Aboriginal Interests;
- **February 11-20, 2014** – e-mails back and forth between EAO and the Gitanyow Nation regarding scheduling a meeting on February 25 or 26, 2014;
- **February 17, 2014** – GHCO letter regarding the scope of consultation for the EA of the proposed Project and the draft section 13 Order, and providing information regarding the Gitanyow *Huwilp*;
- **February 21, 2014** – GHCO e-mail conveying the GHCO's additional comments on the Application;
- **February 24, 2014** – EAO letter regarding the following:
 - the scope of consultation with the Gitanyow Nation for the EA of the proposed Project;
 - EAO's agreement to amend the section 11 Order for the proposed Project in order to include all of the Gitanyow *Huwilp*, as requested by the GHCO, and supported by information submitted by the GHCO regarding potential effects of the proposed Project on Bell-Irving salmon, which swim up the Nass River and into Gitanyow Nation's traditional territory where Gitanyow Nation has an Aboriginal Interest related to fishing;
 - a request for confirmation of EAO's understanding that the GHCO represents all of the Gitanyow *Huwilp*, with the exception of *Wilp* Luuxhon;
 - an explanation of EAO methodology for assessing Gitanyow Nation's Aboriginal interests;
 - EAO's decision not to suspend the timeline for the EA of the proposed Project, as requested by the GHCO, because of the existence of sufficient opportunities for meaningful engagement;
 - providing a list of government agency reviewers working on the EA of the proposed Project, as well as contractors, as requested by the GHCO;
 - reiteration of EAO's commitment to respectful dialogue and a safe environment for all participants, and assurance that ground rules will be followed by all participants;
 - acknowledgement of the GHCO's comments on the Application and a commitment to ensure that the GHCO will have an opportunity to review

- responses;
- GHCO's concerns regarding transportation effects along Hwy 37 and the wish to have mitigation measures previously proposed for the EA of the proposed Kitsault Mine Project applied to the EA for the proposed KSM Project;
- providing a table listing all of the transportation-related issues and suggested mitigation/accommodation measures raised by the GHCO for the EAs of both the proposed Kitsault and KSM Projects;
- EAO's agreement to discuss transportation-related effects from the proposed Project at a KSM-specific transportation working group as opposed to the Hwy 37/37A Advisory Group, as requested by the GHCO;
- an explanation of the format and purpose of the Certified Project Description and TOC and a proposal to discuss the documents in more detail at a future meeting;
- EAO's commitment to provide additional capacity funding to assist the GHCO's continued participation in the Application review stage of the EA of the proposed Project;
- an explanation of how EAO considers and assesses information;
- EAO's continued commitment to discussing and finalizing the Letter of Understanding between EAO and the GHCO to clarify the role of the *Gitanyow Huwilp Recognition and Reconciliation Agreement* to EA projects; and
- EAO's continued commitment to uphold the honour of the Crown and meet the duty to consult, consistent with applicable case law.
- **February 24, 2014** – GHCO e-mail conveying proposed discussion topics for the February 26, 2014 meeting between EAO and the GHCO;
- **February 26-27, 2014** – e-mails and telephone calls between EAO and the GHCO to advise that EAO's February 24, 2014 letter came back as undeliverable to some of the *Gitanyow Huwilp* and requesting alternate contact information as well as confirmation of receipt; the GHCO confirmed receipt on February 27, 2014;
- **February 27, 2014** – e-mails back and forth between EAO and the GHCO regarding documents posted on EAO's website;
- **February 28, 2014** – EAO e-mail conveying British Columbia's Bonding Policy for Mines (an action item from the February 26, 2014 meeting) and advising that EAO will send additional bonding information from other provincial agencies shortly;
- **March 4, 2014** – EAO e-mail conveying the Proponent's responses to the GHCO's comments on potential traffic impacts and moose;
- **March 5, 2014** – EAO e-mail providing a copy of the draft CPD and TOC for the

Kitsault Mine Project for the GHCO's information (an action item from the February 26, 2014 meeting);

- **March 5, 2014** – EAO e-mail conveying the Proponent's responses to comments submitted by the US Department of the Interior, HC and FLNR, as well as a copy of the signed section 24(4) Order, extending the 180-day review by an additional 45 days, as requested by the Proponent;
- **March 10, 2014** – EAO letter to the GHCO and *Huwilp* wing chiefs regarding action items from the February 26, 2014 meeting. EAO confirmed the consultation approach it would take, including analysis of the potential effects of the proposed Project on the land use objectives set out in the Gitanyow Land Use Plan, and outlined a list of potential effects from the proposed Project on Gitanyow Aboriginal interests that had been identified to date, with the proposal that they be discussed at the next meeting. (Delivery failed on March 10 and was re-sent on March 11).
- **March 11-12, 2014** – EAO e-mail to the GHCO advising that e-mails to various Gitanyow representatives have been coming back as undeliverable and asking for suggestions regarding a potential solution. On March 12, 2014, the GHCO provided an alternate e-mail address to which EAO could send documents and confirmed that those documents would be provided to the appropriate representatives.
- **March 11, 2014** – GHCO letter to EAO regarding:
 - the consultation approach and scope of the EA;
 - the draft section 13 Order;
 - an update on the proposed Project, including the Price and Kennedy Reports and the review timeline;
 - bonding and liability;
 - traffic and moose;
 - fish;
 - permitting; and
 - conditions.
- **March 12, 2014** – EAO e-mail to *Wilp* Luuxhon following up on a telephone conversation regarding *Wilp* Luuxhon's awareness of, and interest in, the EA of the proposed Project. EAO provided info regarding the proposed Project and copies of key documents from the EA, including the draft section 13 order for review and comment. EAO advised that funding is available for *Wilp* Luuxhon and confirmed availability to participate in a meeting on March 22, 2014 in Terrace.
- **March 13, 2014** – GHCO letter to EAO conveying the GHCO's comments on the draft section 13 Order.
- **March 13, 2014** – EAO e-mail to the GHCO conveying a memo from MOE

regarding their PTMA Aquatic Impact Assessment Review as follow-up to the February 26, 2014 meeting.

- **March 13, 2014** – GHCO e-mail to EAO proposing a meeting on March 25, 2014 in Vancouver. EAO responded on March 17 re: their availability to meet with the GHCO, as requested, and the GHCO confirmed the date and location.
- **March 14, 2014** – EAO e-mails to the Working Group (including the GHCO and *Huwilp* wing chiefs) conveying the Proponent's responses to comments submitted by the NLG, GHCO, MOE, MEM, and EC, as well as a memo submitted by MOE regarding potential toxicity from the PTMA.
- **March 16, 2014** – GHCO e-mail to EAO conveying the GHCO's comments on the February 12, 2014 report by Dr. Chris Kennedy's for the Proponent regarding metal toxicity effects from the TMF (Kennedy Report).
- **March 17/18, 2014** – EAO e-mails to the Working Group (including the GHCO and *Huwilp* wing chiefs) conveying the following:
 - memo from FLNR re: the Nass Moose Population Viability Assessment conducted by the Proponent in the Application (EAO clarified that the purpose of the memo was to provide guidance as to the appropriate use of the Population Viability Assessment for effects assessment, thereby addressing some of the comments regarding the modeling, and identifying a path forward for a reasonable assessment of the effects of KSM traffic on Nass Moose);
 - GHCO's assessment of the Kennedy Report and a letter from the Proponent regarding additional selenium conditions; and
 - an update regarding technical memos submitted by the Proponent, the upcoming opportunity to review of key documents and submit comments, upcoming Working Group meetings, timelines, and next steps;
- **March 21, 2014** – GHCO e-mail to EAO cancelling the March 25, 2014 meeting because GHCO needed additional time to prepare, and advised that they would propose an alternate meeting date.
- **March 21, 2014** – EAO e-mail to the GHCO providing information regarding permits for the proposed Project, as follow-up to the February 26, 2014 meeting.
- **March 25, 2014** – GHCO letter to EAO conveying Michael Price's response to the Kennedy Report.
- **March 24/26, 2014** – EAO e-mails to the Working Group (including the GHCO and *Huwilp* wing chiefs) conveying the following:
 - the Proponent's response to comments from DFO on the Dam Failure Effects Assessment;
 - a memo from EC regarding the potential for sub-lethal effects toxicity from the TMF; and
 - a letter from the GHCO conveying Michael Price's response to the

Kennedy Report.

- **April 1, 2014** – EAO letter to the GHCO outlining EAO’s consideration of GHCO’s comments on the draft section 13 Order, and conveying a memo summarizing EAO’s perspective on the information presented in the Price and Kennedy reports, with an invitation for the GHCO to submit comments on both documents.
- **April 2, 2014** – GHCO letter to EAO conveying a revised version of the draft Letter of Understanding regarding consultation between EAO and the GHCO.
- **April 4, 2014** – GHCO e-mail to EAO forwarding information regarding a “Unified Transboundary Workgroup Teleconference Call”.
- April 7, 2014 – EAO e-mails to the Working Group (including the GHCO and *Huwilp* wing chiefs) providing an update on the EA of the proposed Project (including upcoming opportunities to review the draft Assessment Report, TOC, and CPD, and advising of a probable Working Group meeting on May 13-15, 2014 in Smithers). EAO also conveyed the following memos from the Proponent:
 - “KSM Project - Response to Comments submitted by Intrinsik Environmental Sciences Inc. Review on behalf of the NLG - Human Health Assessment in the KSM Project Dam Failure Effects Assessment Report”;
 - and
 - “KSM Project – Response to Comments from Michael Price submitted on behalf of the GHCO on March 25 2014”.
- **April 7, 2014** – GHCO letter to EAO advising that the GHCO does not support the wording of the draft section13 order and opposes its finalization. The GHCO letter criticizes the amount of time given to provide additional comments, but confirms that additional comments on the draft section13 order will be submitted by April 14, and additional comments on the Price report(s) will be provided by April 11. EAO responded the same day to advise that the timing for receiving additional comments is acceptable.
- **April 11, 2014** – GHCO e-mail to EAO advising that the GHCO needs an additional week to submit follow-up comments on the March 14, 2014 response from Patrick Williston and the March 20, 2014 response from Harp Gill to the GHCO’s concerns with potential sub-lethal toxicity effects from the proposed TMF.
- **April 14, 2014** – EAO e-mails to the Working Group (including the GHCO and *Huwilp* wing chiefs) conveying the following:
 - a memo from FLNR and MOE providing clarification regarding the use of the Environmental Mitigation Policy to support decisions under the Act and the proposed Project; and
 - a memo from DFO providing their opinion on fish values downstream of the proposed TMF (which represents a follow-up from the submission of

the Cleveland report on February 11, 2014).

- **April 15, 2014** – GHCO letter conveying the following:
 - additional comments on the revised draft section 13 order;
 - a report entitled “KSM baseline data inadequacies in the Bell-Irving Sub-basin: Risk Assessment Uncertainties” in response to EAO’s memo regarding the Price reports; and
 - confirmation that additional comments will be submitted prior to the Working Group meeting scheduled for May 2014.
- **April 16, 2014** - GHCO letter conveying a response to Rescan's two memos of February 28, 2014 and FLNR’s memo of March 27, 2014.
- **April 16-17, 2014** – EAO e-mails to the Working Group conveying the following:
 - two memos prepared by Michael Price entitled: “Price_2014_KSM baseline WQ data critique” and “Response to Hamilton Memo[5].pdf”; and
 - a memo submitted by the Proponent responding to the March 25, 2014 Price response; and
 - the GHCO’s letter response to Rescan's two memos of February 28, 2014 and FLNR’s memo of March 27, 2014.
- **April 22, 2014** – EAO e-mail to the Working Group (including the GHCO and *Huwilp* wing chiefs) regarding upcoming Working Group meetings and opportunities/timing for reviewing and commenting on key documents.
- **April 28, 2014** – EAO e-mail conveying a memo from FLNR regarding the creation of a trust-like arrangement for environmental mitigation in northwest BC.
- **April 28, 2014** – EAO e-mail to the GHCO conveying a letter responding to GHCO’s comments on the draft section 13 order; including additional information outlining how EAO made its determination regarding the scope of consultation with Gitanyow and what changes were made to the order based on comments received from the GHCO;
- **April 29, 2014** – EAO e-mail conveying copies of the recently issued section 13 and 24(4) orders for the EA of the proposed Project, as well as outlining the topics for discussion at the May 13-15, 2014 Working Group meetings;
- **April 29, 2014** – EAO e-mail to the GHCO requesting meeting as a follow-up to the February 26 meeting, where it was agreed that discussion would continue on March 25. The March 25 meeting was cancelled at the GHCO’s request, so EAO proposed meeting the week of May 19 or 26, 2014 and offered to travel to Gitanyow for the meeting;
- **April 29, 2014** – EAO letter responding to the April 14, 2014 letter from Michael Price regarding EAO’s March 16, 2014 memo to the Working Group regarding hazard quotients;
- **May 1, 2014** – EAO e-mail conveying MOTI’s Hwy 37 report for information;
- **May 1, 2014** – EAO e-mail conveying two Proponent memos: “Response to Comments from GHC regarding Gitanyow Traffic Surveys and KSM Moose Modeling submitted on April 15, 2014” and “Response to Comments from Michael Price submitted on behalf of the Gitanyow Hereditary Chiefs on April 7

2014” for information;

- **May 1, 2014** – EAO e-mail conveying two Proponent memos: “Response to Comments from Gitanyow Hereditary Chiefs regarding Gitanyow Traffic Surveys and KSM Moose Modeling submitted on April 15, 2014” and “Response to Comments from Michael Price submitted on behalf of the Gitanyow Hereditary Chiefs on April 7th 2014” for information. EAO also outlined next steps, including the fact that the contents of the memos have been incorporated into EAO’s draft Assessment Report, which will be circulated for review and comment for a three-week review.
- **May 2, 2014** – EAO letter conveying the draft Assessment Report, First Nation Consultation Report, CPD, TOC, and issues tracking table for GHCO’s review and comment. EAO also reiterated the opportunity for the GHCO to prepare a separate submission for Ministers by June 12, 2014, if desired.
- **May 5, 2014** – GHCO letter conveying two responses: 1) Response to Price Baseline Critique, prepared by Kelsey Norlund on April 29, 2014, and 2) EAO’s April 29, 2014 letter responding to Mr. Price’s April 14, 2014 letter.
- **May 7, 2014** – EAO e-mail to the Working Group (including the GHCO) conveying the finalized section 13 or 24(4) orders for information, as well as providing notice of the discussion topics at the upcoming May 13-15, 2014 Working Group meetings.
- **May 7-8, 2014** – e-mails back and forth between EAO and the GHCO regarding the May 13-15, 2014 Working Group meeting.
- **May 9, 2014** – GHCO letter to EAO expressing continued concern with EAO’s scope of consultation with the GHCO on the EA of the proposed Project, including the fact that EAO did not incorporate many of the GHCO’s comments and did not specifically reference the Gitanyow *Huwilp* Recognition and Reconciliation Agreement in the section 13 order.
- **May 12, 2014** – GHCO letter to EAO requesting a government-to-government meeting with Ministers Polak and Bennett prior to referral, and proposing the week of June 2 or 9, 2014; EAO confirmed via e-mail on May 13, 2014 that the request had been forwarded to Ministers, and asked for confirmation regarding whether the GHCO did not wish to submit comments on the draft Assessment Report, CPD, First Nation Consultation Report, TOC, and issues tracking table.
- **May 12, 2014** – EAO e-mail to the Working Group (including the GHCO) conveying copies of the PowerPoint presentations in advance of the upcoming May 13-15, 2014 Working Group meeting.
- **May 13-15, 2014** – EAO had discussions with GHCO representatives regarding considering what key issues for resolution and offering to meet to discuss options for new conditions or revisions to existing conditions. EAO Also advised that a request was put in for a meeting with deputy ministers from the MOE, MEM, ARR, and EAO. The GHCO representatives advised that they were looking for an accommodation package, stating that it was dishonourable of the Crown to ask the Proponent to undertake all of the accommodation, and that government needs to provide accommodation as well. There was also a request from GHCO representatives for funding associated with travel for the government-to-government meeting requested by the GHCO.

- **May 21, 2014** – GHCO letter to EAO requesting an update on the government-to-government meeting, advising that while their preference is for a meeting with Ministers, they would be willing to meet with Deputy Ministers. The GHCO also requested a two-week extension to the deadline for submitting comments on the draft referral documents.
- **May 21, 2014** – EAO letter responding to a GHCO request for a document comparing monthly baseline values to monthly predicted values, and concerns raised by the GHCO regarding baseline ground and surface water information. EAO provided the monthly baseline values as requested and advised that the MOE considered the Proponent's baseline work to be adequate, and pointed out a number of draft conditions related to protecting water quality and fish.
- **May 21, 2014** – EAO e-mail conveying the draft summaries from the May 13-15, 2014 Working Group meeting for review and comment, as well as circulating recent submissions from the FLNR in response to the GHCO's April 15, 2014 memo regarding the moose population viability analysis model, and the Proponent's response to the GHCO regarding baseline data.
- **May 23, 2014** – GHCO e-mail requesting a telephone call. Chris Hamilton responded and left a voicemail message, as well as following up with an e-mail the same day to confirm that the Executive Director agreed to grant the GHCO a one-week extension on the deadline for submitting comments on the draft referral package. EAO also advised that anything arriving after that date would be provided to Ministers directly as a separate submission and not reflected in the Assessment Report. EAO confirmed availability for a meeting with Deputy Ministers from EAO, FLNR, ARR, and MEM in Smithers on June 6, 2014, and requested that the GHCO confirm their availability. Glen Williams responded via e-mail the same day that their preference was now to meet in Vancouver on June 6, 2014. Chris Hamilton again responded via e-mail on the same day that it would be helpful to have a proposed agenda to ensure the right people are in attendance before confirming a Vancouver date.
- **May 27, 2014** – GHCO letter requesting an additional week's extension until after the June 6, 2014 government-to-government meeting to submit comments on the draft referral documents, and stating that they did not receive EAO's Gitanyow Land Use Plan analysis, as promised. Chris Hamilton responded to Sandra Littlewood via e-mail the same day to clarify and confirm receipt of an e-mail from Nicole Vinette on May 2, 2014, conveying the draft Gitanyow Land Use Plan analysis for review and comment, and that EAO's Executive Director would be making a decision shortly regarding the GHCO's request for an additional extension.
- **May 28, 2014** – EAO letter to the GHCO following up on the May 2, 2014 letter confirming EAO's continued commitment to developing a Letter of Understanding with the GHCO in order to clarify consultation between EAO and the Gitanyow *Huwilp*. EAO also provided its rationale for comments on the GHCO's suggested edits to the draft Letter of Understanding and requested feedback.
- **May 29, 2014** – EAO letter advising that EAO's Executive Director decided to extend the timeline for referral to Ministers from June 12 to June 20, 2014, but that any materials submitted by Gitanyow after May 30 would be sent to Ministers

as a separate submission and not reflected in EAO's referral documents. The letter also outlined capacity funding provided by EAO and the Proponent, attempts by EAO to meet with the GHCO to discuss potential effects from the proposed Project on Aboriginal rights and interests, and confirming that EAO did in fact send the Gitanyow Land Use Plan analysis via e-mail from two different staff members on May 2, 2014, as promised.

- **May 29, 2014** – EAO e-mail confirming the government-to-government meeting scheduled for June 6, 2014 in Vancouver, and advising that the meeting location would soon be confirmed as well. EAO provided a list of provincial government attendees and requested a list of GHCO attendees and a proposed agenda of the topics that the GHCO wished to discuss.
- **May 30, 2014** – GHCO letter to EAO expressing the GHCO's disappointment in EAO's decision to extend the deadline for comments on the draft referral documents by one week instead of two, and confirming that the GHCO will be making a separate submission to Ministers.
- **June 2, 2014** – GHCO e-mail confirming GHCO attendees at the June 6, 2014 government-to-government meeting in Vancouver, and advising that the GHCO will provide discussion topics shortly.

Meetings Between EAO and the Gitanyow Nation

On February 25, 2014, EAO met with representatives from the GHCO in Vancouver to discuss the following:

- the status of the EA of the proposed Project, including timelines, key documents, upcoming opportunities for the Gitanyow Nation to continue to provide input into the EA, and next steps;
- key issues raised to date by the Gitanyow Nation;
- EAO's consultation to date with the Gitanyow Nation regarding the EA of the proposed Project and the draft section 13 Order;
- fisheries values (Cleveland Report);
- adequacy of the water quality assessment undertaken by the Proponent and the "Sub-lethal Toxicity Concerns for Salmonids from the KSM Tailings Impoundment" report compiled by Michael Price on behalf of the GHCO;
- scope of the study area chosen by the Proponent;
- wetland compensation;
- moose impacts from increased traffic;
- proposed monitoring; and
- the alternatives assessment undertaken by the Proponent.

As requested by the GHCO, EAO arranged for a government-to-government meeting between the GHCO and EAO, MOE, MEM, FLNR, and ARR. The meeting was

scheduled for June 6, 2014 in Vancouver, at the request of the GHCO, in order to discuss the GHCO's concerns with the proposed Project.

Meetings and Key Correspondence with *Wilp* Luuxhon

In a letter to *Wilp* Luuxhon on March 12, 2014, EAO provided information regarding the EA of the proposed Project and suggested scheduling a meeting to answer any questions or discuss any concerns that *Wilp* Luuxhon may have. EAO also provided a copy of the section 11 order, as well as the draft section 13 order for review and comment. EAO advised that the GHCO had requested that all of the Gitanyow *Huwilp* be added to the section 13 order, and since it was EAO's understanding that the GHCO does not represent *Wilp* Luuxhon, EAO requested that *Wilp* Luuxhon confirm whether they were interested in being added to the section 13 order and participating in the EA.

EAO met with representatives from *Wilp* Luuxhon on March 22, 2014 to discuss the EA of the proposed Project, capacity funding, and opportunities for *Wilp* Luuxhon to participate. EAO followed up with a letter on April 22, 2014, offering capacity funding and confirming that *Wilp* Luuxhon had all of the information they required to participate in the EA. On April 29, 2014, *Wilp* Luuxhon confirmed interest in participating in the EA and receiving the capacity funding offered by EAO, which EAO then provided in June 2014.

On May 30, 2014, EAO wrote to *Wilp* Luuxhon to confirm whether they would be submitting any comments or a separate submission for ministers, and *Wilp* Luuxhon confirmed that they would be providing a separate submission. EAO reiterated the deadline of June 19, 2014 for providing a separate submission, and indicated that the contents would be provided directly to Ministers, but not reflected in EAO's Assessment Report.

Comments on the Application and Proponent Responses

On October 11, 2013, the GHCO submitted its first round of comments on the Application, presented as follows:

Appendix A

- TMF;
- hydrology and long-term monitoring;
- mine plan;
- geochemistry;
- water quality
- reclamation and closure;
- cumulative effects assessment;
- wildlife and wildlife habitat impacts; and
- fisheries and aquatic impacts.

Appendix B

- GHCO's September 14, 2012 "Specific Comments on the Draft Traffic Effects Assessment for the KSM Project: and
- Appendix 22C of the Application.

The first round of comments submitted by the Gitanyow Nation expressed concerns regarding the following:

- economics and bonding;
- surface and groundwater quality, modeling, and monitoring;
- selenium treatment and potential effects to aquatic biota, fish, wildlife, and humans;
- potential impacts on fish and aquatic habitat;
- consequences and risks associated with natural geo-hazards (i.e. avalanches, landslides, etc.);
- cumulative impacts; and
- potential impacts on wildlife and wildlife habitat.

EAO provided all of the comments submitted by the Gitanyow Nation to the Proponent for inclusion in an issue tracking table and response. On November 27, December 11, and December 20, 2013, EAO circulated the Proponent's responses to comments on the Application and requested feedback. Although EAO initially requested feedback on the Proponent's responses by December 11, January 10, and January 24 respectively, the volume and complexity of the documents submitted by the Proponent led to EAO extending the deadline for all feedback on the Proponent's responses to comments to January 24, 2013.

On January 27, 2014, the GHCO submitted additional comments which served to provide commentary on the Proponent's responses, as well as following up on the comments originally submitted on October 11, 2013. The January 9 comments were focused on the following topics:

- water quality;
- fish and aquatic habitat;
- wetlands;
- wildlife and wildlife habitat; and
- the traffic effects assessment.

The GHCO expressed particular concern about the Proponent's decision to locate the TMF in the headwaters of the Bell-Irving River and the potential impacts on Gitanyow Nation's Aboriginal Interests related to fishing and hunting, as well as maintain food security and manage resources within their traditional territory. The GHCO reiterated its

concerns regarding the potential for downstream impacts on Gitanyow lands and resources from the proposed Project and submitted a report to EAO entitled “Sub-lethal Toxicity Concerns for Salmonids from the KSM Tailings Impoundment”. The report, which was commissioned by the GHCO and completed by ecologist, Michael Price, concluded that the Proponent’s Application lacked adequate information to adequately assess the potential impacts on water quality and fish health, and led to the GHCO’s determination that the proposed Project poses a significant, long-term adverse effect on the Gitanyow Nation’s Aboriginal Interests.

On February 21, 2014, the GHCO submitted a third round of comments that focused on the following topics presented in the Proponent’s Application:

- environmental management and monitoring plans;
- Aboriginal Interests; and
- the “Gitanyow First Nation Traditional Knowledge and Use Desk-Based Research Report”.

Environmental Management and Monitoring Plans

The GHCO’s comments included the following key concerns regarding the information provided in the Proponent’s Application:

- consultation with the Gitanyow Nation regarding permitting, sampling, monitoring, and reporting, including GHCO’s desire for the Proponent to submit monitoring reports to the Gitanyow Nation, including ML/ARD, water effluent quality, and water quality monitoring;
- the timing and frequency of water quality and quantity monitoring;
- the Environmental Effects Monitoring Plan and AEMP should be developed in consultation with Gitanyow Nation;
- sampling locations and frequency for monitoring required under the MMER; and
- timing and locations for fish sampling and mark/recapture.

Aboriginal Interests

The GHCO’s comments included the following key concerns regarding the information provided in the Proponent’s Application:

- why the Proponent was assessing potential impacts from the proposed Project on Aboriginal Interests when it is the Crown’s duty to undertake that analysis;
- Proponent’s focus on assessing potential impacts only from residual effects of the proposed Project on Aboriginal Interests;
- characterization that the proposed Project is located outside the Gitanyow Nation’s traditional territory;
- assessment methods;
- inadequate information to adequately assess potential impacts on fish in the Bell-Irving and Nass watersheds;

- Proponent's characterization of the potential impacts on Gitanyow Nation's right to hunt, particularly with respect to traffic impacts on moose;
- inadequacy of the analysis regarding potential impacts on the right to gather; and
- inadequacy of the Proponent's proposed mitigation measures to address socio-economic impacts on Gitanyow communities.

"Gitanyow First Nation Traditional Knowledge and Use Desk-Based Research Report"

The GHCO disagreed with some of the content in the "Gitanyow First Nation Traditional Knowledge and Use Desk-Based Research Report", including the Proponent's characterization of the Gitanyow Nation's:

- traditional territory, including its location relative to the proposed Project;
- governance system and social organization;
- interests as they relate to Hwy 37;
- cultural significance of the ancestral village area of Lax Anjok and landscape features such as the Nass River system and the Hanna Tintina watershed;
- the Fisheries Agreement, Gitanyow Fisheries Authority, and the importance of these entities for managing, protecting and enhancing fish and fish habitat;
- traditional use and traditional economy;
- historic and current use;
- lack of consideration of the Gitanyow Lax'yip land Use Plans, including water quality and quantity;
- use of fish, plant, and wildlife resources; and
- travel within the traditional territory.

A complete list of all comments submitted by the Gitanyow Nation regarding the proposed Project and the associated responses from the Proponent is presented in the Tracking Tables, which are an appendix to the Assessment Report.

12.1.3.2 Gitanyow Nation involvement with Proponent

Pre-Application Stage

On November 6, 2009, EAO issued an order under section 11 of the Act, which required that the Proponent consult with the Gitanyow *Wilp Wii Litsxw* regarding the EA of the proposed Project. The Proponent initiated consultations with the Gitanyow Nation prior to the start of the EA, and met with their representatives on March 6, 2008 to introduce the proposed Project and discuss the environmental and socio-economic baseline studies.

Starting in June 2008, the Proponent participated in Working Group meetings led by EAO and the CEA Agency and organized tours of an operating and a closed mine in June 2011. Representatives of the Gitanyow Nation participated in almost all of the

Working Group meetings and also attended both site tours. The Proponent also provided opportunities for representatives of the Gitanyow Nation to tour the proposed KSM Project site, which took place in August 2009/10 (*Wilp* Wii Litsxw) and September 2008/10 (Gitanyow Nation).

As set out in the section 11 Order, the Proponent provided the Gitanyow Nation with electronic and paper copies of the draft AIR in June 2010, as well as notifications regarding upcoming open houses.

On September 29, 2011, EAO amended the section 11 Order to include consultation with the Gitanyow *Wilp* Malii, *Wilp* Gamlakyeltxw, *Wilp* Gwass Hlaam, and *Wilp* Gwinnu, either directly or, if requested, through the GHCO.

Although not specifically required by EAO, the Proponent provided GHCO with capacity funding to facilitate their participation in the EA, including the review of the KSM Preliminary Economic Assessment and a desk-based Traditional Knowledge/Traditional Use Study. The Proponent provided the GHCO and *Wilp* Wii Litsxw with a copy of the draft desk-based Traditional Knowledge/Traditional Use Study report for review and comment in February 2011, and followed up by meeting with *Wilp* Wii Litsxw representatives in March 2011 to discuss the report. The Proponent also provided the GHCO with additional funding in 2012 to be used for traffic or socio-economic studies, or for community infrastructure needs, as determined by the GHCO.

In addition to giving a presentation on the proposed Project at the Gitanyow Career Fair in April 2012, the Proponent also facilitated the delivery of a “Mining 101: Mining for Non-Miners” workshop in Gitanyow with participation from the Northwest Community College School of Exploration and Mining. The Proponent offered to organize an Occupational First Aid Level 1 course, however, the GHCO opted not to pursue that opportunity. Employment opportunities connected with baseline field studies were also offered to the Gitanyow Nation by the Proponent between 2008 and 2011/2012.

After the Proponent provided the Gitanyow Nation with the draft report on December 12, 2012 and received comments back on December 20, 2012, changes were made to the report to reflect the GHCO’s feedback.

Application Review Stage

As required by the section 11 Order issued by EAO, the Proponent undertook the following consultation activities with the Gitanyow Nation during the Application review stage of the EA of the proposed Project:

- distributed copies of the Application to the Gitanyow Nation for information and consultation purposes;
- wrote to the Gitanyow Nation to identify the dates of the public comment period on the Application, and the dates, times and locations of open houses;

- provided a written report to the Gitanyow Nation, EAO, and the CEA Agency on the results of consultation activities with the Gitanyow Nation;
- considered and responded to issues identified in comments submitted by the Gitanyow Nation during the review of the Application;
- where requested by, and within any time limits set by EAO, provided specific additional information in relation to, or to supplement, the information provided in the Application;
- attended Working Group meetings organized by EAO to provide information related to the Application and responded to questions on the Application;
- prepared a tracking table of issues raised by First Nations (including the Gitanyow Nation) on the Application and responses to those issues;
- considered and prepared written responses to key issues raised by the Gitanyow Nation regarding the Application; and
- by mutual agreement, arranged consultation meetings with the Gitanyow Nation to identify any specific Aboriginal interests that may be potentially affected by the proposed Project, as identified in Aboriginal interest and use studies, traditional use studies, or other sources of information; to identify measures to avoid or mitigate potential adverse effects; and/or to otherwise address or mitigate the Gitanyow Nation's concerns.

Following acceptance of the Application and the initiation of the 180-day review by EAO, the Proponent provided the Gitanyow Nation with copies of the Application.

Meetings and Key Correspondence Between the Proponent and Gitanyow Nation

In addition to participating in open houses and Working Group meetings organized by EAO, the Proponent also held the following meeting with representatives of the Gitanyow Nation:

- **October 17, 2013** – meeting in Smithers BC, with Chief Glen Williams and Joel Starlund with the GHCO to provide updates on the proposed Project, concurrent permitting, and upcoming meetings.

According to the Proponent's February 2014 Gitanyow First Nation Consultation Report, the Proponent communicated regularly with the Gitanyow Nation during the Application review stage of the EA of the proposed Project. In addition to communications regarding logistics for meetings and requests for information, the Proponent exchanged 60 letters, emails, and news releases with the Gitanyow Nation.

The Proponent also provided capacity funding to assist the Gitanyow Nation's participation on the EA of the proposed Project.

12.1.4 Analysis of Potential Impacts from the Proposed Project on the March 2012 Gitanyow Lax'yip Land Use Plan

See the appended table presenting EAO's analysis of the potential impacts from the proposed Project on the goals and objectives set out in the Gitanyow Lax'yip Land Use Plan, presented as Schedules A and B in the March 12, 2012 Gitanyow *Huwilp* Recognition and Reconciliation Agreement.

12.1.5 Potential Impacts to Gitanyow Nation Aboriginal Interests and Measures to Mitigate or Accommodate Impacts

A consideration of Gitanyow Nation's Aboriginal Interests 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, guidance from the courts regarding Aboriginal Interests, and consideration of the Agreement.

Some of the information EAO considered with respect to understanding Gitanyow Aboriginal Interests that may be impacted by the proposed Project include the following:

- Gitanyow Ayookxw (Constitution) – provided by the GHCO to EAO on March 7, 2011;
- Preliminary Assessment of the Gitanyow Strength of Claim - provided by GHCO to EAO on March 7, 2011;
- letter from Bob Friesen to Skii Km Lax Ha - provided by GHCO to EAO on March 7, 2011;
- *Wii'litsxw v British Columbia Ministry of Forests* - provided by GHCO to EAO on March 7, 2011;
- Extensive correspondence between EAO, the GHCO, and other Gitanyow *Huwilp*;

It is EAO's assessment, based on current information available, and having regard to the applicable legal test, that the area of 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 Interests, EAO has focused on the potential for adverse effects to flow from the proposed Project.

With respect to the transportation component that may impact Gitanyow Aboriginal Interests, 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 claim to aboriginal rights to hunt and fish in the area, to be moderate. With respect to the potential downstream impacts of the proposed Project on Gitanyow fishing within its territory, on the basis of the information related to water quality and potential downstream impacts discussed in section 5 of the Assessment Report, EAO considered the potential impact to be low. 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.

At the beginning of the EA in 2008 and 2009, EAO's original understanding was that the potential impacts from the proposed Project were due to downstream impacts and impacts from trucking, and that those impacts would likely only affect *Wilp Wii Litsxw*. EAO's understanding was based on the fact that *Wilp Wii Litsxw*'s traditional territory is located closest to the proposed Project, and their territory includes part of the Nass River and the trucking route. Based on its preliminary understanding in 2009, EAO proposed to consult only with *Wilp Wii Litsxw* on the EA of the proposed Project as opposed to all of the Gitanyow *Huwilp*.

Additional information was provided by the GHCO to EAO in March 2011 advising that the proposed Project has the potential to impact all of the Gitanyow *Huwilp* and, therefore, all of the Gitanyow *Huwilp* should be consulted on the EA. EAO reviewed the additional information and agreed that in connection with the TMF, which is located in the headwaters of the Nass/Bell Irving system, there is potential for impacts to water quality from ML/ARD, to wildlife, to the harvesting of plants, and to fish productivity and quality, and that those issues are within the scope of the Province's duty to consult. However, EAO was of the view that those potential impacts, to the extent that they may arise, related only to *Wilp Wii Litsxw*'s traditional territory. EAO also recognized that the approximately 100 trucks per day traveling from the site of the proposed Project to Stewart via Hwy 37 and Hwy 37A have the potential to impact *Wilp Wii Litsxw*. EAO proposed to revise its consultation to include the potentially impacted Gitanyow *Huwilp* in relation to the transportation corridor, and to consult with *Wilp Wii Litsxw* in relation to

potential downstream impacts associated with the TMF. On September 29, 2011, EAO revised the scope of the EA to:

- broaden the scope of the assessment to include transport of construction and operational materials to the site of the proposed Project;
- include those Gitanyow *Huwilp* located adjacent to the Hwy 37 corridor, as well as the GHCO in the section 11 Order;
- clarify in the section 11 order that the scope of the consultation with the newly added *Huwilp* is to encompass only the potential impacts arising from the transportation corridor and that any proponent engagement will only be on those impacts; and
- clarify that the GHCO is to be added to the definition of First Nations and thereby to order the Proponent (Seabridge Gold) to consult with their office (this addition was in recognition of the role of the GHCO in supplying technical expertise to the Gitanyow *Huwilp*).

On February 9, 2014, EAO received a letter from Gitanyow which referenced spawning and rearing habitat in Teigen and Treaty Creeks and discussed the important contributions those streams made to salmon populations the Nass and Bell-Irving Rivers. EAO understood this to be a different issue than previously identified by Gitanyow, which had been framed as downstream water quality effects; that is, poor water passing through Gitanyow territory. On the basis of this new information, EAO agreed to expand the scope of the consultation to include all eight *Huwilp*. EAO and Gitanyow exchanged views on how the order should be drafted. EAO, having considered Gitanyow's views, issued a section 13 Order on April 28, 2014 which expanded the scope of consultation to all eight *Huwilp* for the remainder of the assessment. EAO notes that, notwithstanding the expansion of the order to include all eight *Huwilp*, EAO has been considering all comments made by the Gitanyow Hereditary Chiefs' Office, which EAO understands to speak for the Gitanyow *Huwilp*.

EAO has also engaged separately in discussions with *Wilp* Luuxhon.

Potential Project Effects on Aboriginal Interests and Proposed Measures to Mitigate and Accommodate Impacts

On March 10, 2014, EAO wrote to Gitanyow to indicate its understanding of the range of potential effects the proposed Project could have on Gitanyow Aboriginal Interests, including impacts to Gitanyow hunting, fishing and gathering within Gitanyow traditional territory. This list included the following:

- with respect to impacts along the transportation corridor, we see the potential for effects coming from potential spills of chemicals, fuel and other materials into

riparian areas, wetlands, creeks and rivers and into soils and vegetation in the right of way. Where these spills occur in creeks or rivers, effects could travel away from the area of the spills;

- additional effects along the transportation corridor may occur as the result of individual mortalities of a variety of animals, including moose, deer, bear and furbearers;
- increased traffic along Hwy 37 may result in greater risks to human safety, especially during poor weather and in populated areas;
- increased traffic has the potential to create effects as the result of dust and diminished air quality in the corridor;
- the physical footprint of the project may also have impacts on regional wildlife populations, including moose and other ungulates and bear, which have large home ranges;
- water quality effects from the TMF may result in increased mortality or reduced health of fish in Treaty and Teigen Creeks, the Bell Irving River and the Nass River. The potential for diminished water quality also has the potential to affect human health;
- sedimentation and habitat loss due to construction of the TMF may have effects on fish populations; and
- catastrophic failure of the TMF may have significant effects on downstream water quality and physical fish habitat, with a resulting effect on fish health and fish populations.

The letter noted that this potential list of effects could result in the potential to impact Gitanyow Aboriginal Interests associated with fishing in the Nass and Bell Irving Rivers, the Kitwanga River, the Cranberry River, the Hanna Tintina Conservancy and a range of other water bodies. As well, the effects listed above could affect Gitanyow Aboriginal Interests associated with hunting a range of animals, with a particular emphasis on moose, a staple and important animal for Gitanyow. Additionally, these effects may impact Gitanyow Aboriginal Interests associated with gathering and utilizing a range of plants and vegetation in the transportation corridor.

In order to accommodate these potential effects on Gitanyow Aboriginal Interests, EAO worked with Gitanyow through the course of the EA, listening to suggestions and working with the Proponent to address potential concerns. As a result of those conversations, EAO has developed a list of measures that could be incorporated as conditions in any environmental assessment certificate that may be issued.

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, an appendix to the Assessment Report. Additional information on how concerns have been addressed,

including mitigation and Proponent commitments, is provided in the relevant sections of the Assessment Report.

The following is intended only to be a summary of the major issues raised, the potential effects on Gitanyow Aboriginal Interests and accommodations of those issues offered by EAO and the Proponent, as well as EAO's conclusions on the appropriateness of accommodations.

Transportation and Increased Traffic

Among the key concerns expressed by the Gitanyow Nation during the EA of the proposed Project are the potential effects on moose from collisions with proposed Project vehicles on Hwy 37/37A. These concerns relate to impacts on Gitanyow Aboriginal Interests associated with hunting animals and trapping furbearers along the Hwy corridor, with a particular emphasis on moose, which EAO understands is a key component of Gitanyow hunting. As well, potential spills into important waterbodies like the Nass, Kitwanga, Cranberry, Hanna Tintina and others could impact the key fisheries which play a very important role in Gitanyow Aboriginal Interests. Cultural activities such as pine mushroom harvesting, berry picking and harvesting medicinal and other important vegetation also have the potential to be affected by Project-related transportation.

The following discussion provides a summary list of the issues raised by Gitanyow during the review. EAO responses to these issues, including measures for accommodations, are listed below each issue.

- Gitanyow Nation expressed serious concerns about increased truck traffic along Hwy 37/37A as a result of the proposed Project and potential adverse effects on human safety, cultural activities, and community well-being; the Gitanyow Nation proposed a number of mitigations including increased road maintenance, including potential financial contributions by the Proponent to support more maintenance, construction of more roadside pullouts or increasing the shoulder width of the Hwy, improved guardrails, signage and funding for additional Royal Canadian Mounted Police officers.
- The Proponent has committed to ensuring the safe travel of staff and contractors along Hwy 37/37A, as set out in the Traffic and Access Management Plan. The Proponent expects drivers/contractors to comply with this plan, including speed limits and detailed journey management procedures designed to ensure safe travel.
- The Proponent's Hwy 37/37A Traffic Effects Assessment indicates that proposed Project traffic is anticipated to remain below historical truck traffic along Hwy

37/37A, as well as the safety design threshold for the Hwys. Decisions with respect to Hwy maintenance and design (including pullouts) and staffing of Royal Canadian Mounted Police positions are under the provincial/federal government's jurisdiction.

- The Proponent is committed to participating in the Hwy 37/37A Advisory Group, along with other industrial users. In addition, the Proponent has committed to installing emergency response kits at strategic points along Hwys 37/37A, in consultation with the provincial government.
- EAO views many of the Gitanyow suggestions for improved management of Hwy 37 to be more appropriately managed by the Province as opposed to an individual Proponent. A key initiative EAO has developed to address these larger issues relating to Hwy maintenance, improved infrastructure (e.g. guardrails), changes to management (e.g. changes to brushing schedules) is the Hwy 37 Advisory Group. The Hwy 37 Advisory Group was formed primarily in response to Gitanyow concerns regarding the cumulative effects of increased industrial use on Hwy 37. The Hwy 37 Advisory Group has met a number of times, and a sub-group has been formed specifically to develop solutions and advise MOTI of ways to address Hwy safety issues.
- Part B of the Assessment Report also provides an analysis that there is a very low probability of accidents and collisions, and that the overall magnitude of negative effects is very low as it relates to Project-specific traffic. The assessment showed an increase in collisions per year during the operations phase along the northern segment of Hwy 37 as being 0.19 collisions.
- Gitanyow Nation also expressed concerns regarding traffic-related spills and asked that the Proponent explain how a spill of diesel or ore concentrate along the transportation route was determined to be only a moderate impact when the nearby Hanna and Tintina Creeks hold the majority of sockeye that spawn in the Nass watershed.
- The Proponent explained that the risk assessment severity scale descriptors were assigned after mitigation for the entire alignment, not on a stream by stream basis. It was identified that prompt containment and clean-up of spills is essential to mitigating risks to aquatic habitat and organisms, and the Spill Prevention and Emergency Response Plan will minimize response time and maximize clean-up efficiency, preventing long-term or geographically extensive effects.
- The Proponent has also committed to developing and implementing a Geographic Response Plan, which would ensure that trained spill responders are notified immediately in the event of a spill. Minimized response times and maximized clean-up efficiencies would ensure that the duration and extent of spill

effects are minimized.

- Part B of EAO's Assessment Report concludes that spills are, by their nature, accidental or related to malfunctions, and as such their likelihood is difficult to predict. With the conditions related to the placement of spill containment kits and spill prevention planning, all reasonable efforts have been made to ensure the lowest likelihood possible and should a spill occur, that appropriate tools are in place to address that event.
- Gitanyow Nation expressed serious concerns about the potential for adverse impacts on an already declining moose population due to vehicle collisions from increased truck traffic as a result of the proposed Project. They made a number of suggestions around mitigation, many of which focused on management of the Hwy and adjacent areas (e.g. changes to maintenance and brushing regimes):
 - Significant work was undertaken during the review to address the issue of potential impacts on moose. EAO expanded the scope of the review to address the issue of transportation effects, which was the first study of its kind for an environmental assessment. EAO directed the Proponent to undertake a Traffic Effects study to examine the potential effects of project-related traffic. The study contained both quantitative and qualitative assessments and modeled the long term effects of the proposed Project on moose populations.
 - Part B of the Assessment Report concludes that the proposed Project is expected to kill approximately five moose per year, which equates to less than a 1% increase in mortality to moose populations at their current population size. The Nass moose population is currently considered at some risk by the Provincial Fish and Wildlife Branch due to declining populations. The transportation route passes through valuable winter moose range. Recognizing the decrease in the Nass Valley moose population, the magnitude of effects from mine-related traffic during critical moose wintering is considered, at five mortalities a year, moderate. EAO concluded, with support from FLNR wildlife biologists, that this mortality would not result in a population level effect.
 - In order to further address potential effect on moose, EAO added a number of conditions. They include:
 - contributing \$30,000 per year, commencing with construction, to a habitat trust fund (where the money would be spent on supporting recovery of the Nass moose population and mitigating potential cumulative effects along Hwys 37 and 37A), starting with an initial \$75,000 contribution;

- developing a wildlife mortality tracking protocol to accurately understand and communicate wildlife mortality;
- requirement to share all wildlife mortality data;
- mandatory participation in any future planning exercises around cumulative effects of wildlife;
- mandatory participation in the Hwy 37 Advisory Group; and
- developing a wildlife effects monitoring plan.

Taking into account the above, EAO's assessment of the potential impact of the transportation component of the proposed Project on Gitanyow Aboriginal Interests, including in relation to hunting and gathering, that may be impacted by the transportation of materials, is that it is low to moderate for the following reasons:

- the transportation route is along existing roads, which have been in place for years, are already maintained and regulated by provincial agencies through existing policy;
- potentially impacts arising from dust, accidents and malfunctions from mine traffic such as spills, and such impacts would be localized and limited to individual animals or relatively small areas;
- many of the issues relating to the decline and recovery of the Nass moose population, and the potential contribution of road use on Hwy 37 and 37A are very complex and related to a number of issues including legal, illegal and unregulated hunting, land use decisions, habitat loss and alteration and access. EAO notes that the proposed Project use of Hwy 37 and 37A is but one of these issues and a solution to declining moose populations is outside the scope of one road user to address;
- EAO along with MOTI formed a Hwy 37 Advisory Group to address the cumulative incremental impacts of additional project related traffic along Hwys 37/37A. The Hwy 37 Advisory Group includes representation from Nisga'a Nation, Tahltan First Nation, Skeena First Nation and Gitanyow Nation, FLNR, MOE, MOTI, MEM, ARR, EC, local governments and a number of other industrial road users. EAO expects the Hwy 37 Advisory Group to provide a venue for industrial users and First Nations, Nisga'a Nation, local government and agencies to continue sharing information and pursuing ideas and initiatives that will further reduce potential transportation-related effects; and,
- EAO has also included a condition in the draft TOC which would require the Proponent to make significant financial contributions to a trust which is

being established by FLNR to support moose recovery initiatives in the Northwest. At least one other mining project has been asked to make financial contributions to this trust as a condition of its EA Certificate.

With the addition of the condition to contribute financially to moose recovery efforts as well as conditions related to coordinated spill response, participation the Hwy 37 Advisory Group, monitoring and reporting wildlife collisions and standard operating procedures for company and subcontractor vehicles, all which would become legally enforceable should an EA Certificate be issued, EAO is satisfied that the potential impacts to aboriginal rights to hunt moose and other wildlife in the Hwy 37/37A corridor have been appropriately accommodated.

Reclamation, Closure and Bonding

Gitanyow Nation expressed concerns about the size of the bond that would likely be required in order to protect Canadian taxpayers from extreme financial liability associated with the closure and post-closure requirements for the proposed Project, which they felt would represent an unprecedented amount for a mine security in BC. While the link to a potential effect on an aboriginal right is less clear than with other effects (e.g. moose mortality from trucks), EAO understands that this concern primarily relates to long term water quality and downstream fish habitat if there are not sufficient resources in place to ensure any effects are regulated and mitigated. Another key interest relates to potential failure of the tailings dams, which could result in losses of fish habitat and decreased water quality.

In response to these concerns, EAO has communicated to Gitanyow Nation that bonding requirements are statutory decisions made under the *Mines Act*²⁵ during subsequent permitting processes are outside the scope of the environmental assessment. EAO also noted that Gitanyow Nation would be consulted through these future mine development processes. Notwithstanding this, EAO took a number of steps during the review to address the concerns raised. Some of these included:

- The Proponent recognized that the cost of closure and reclamation are associated with the proposed Project and that this has been incorporated

²⁵ Subsection 10(4) of the *Mines Act* (1996) requires mine proponents to "give a security in the amount and form specified by the Chief Inspector of Mines for mine reclamation, and to provide protection of, and mitigation of damage to, watercourses and cultural heritage resources affected by the mine." Subsection 10(5) of the *Mines Act* requires mine proponents to "deposit a security in an amount and form satisfactory to the Chief Inspector of Mines so that, together with the deposit under subsection 10(4) and calculated over the estimated mine life, there will be money to perform and carry out properly: a) all conditions of the permit relating to the matters referred to in subsection (4) at the proper time; and b) all the orders and directions of the Chief Inspector or an inspector respecting the fulfillment of the conditions relating to the matter referred to in subsection 4."

into the planning. The Proponent also noted that if the proposed Project receives an EA certificate and all other necessary regulatory approvals and authorizations, the amount of security would be determined by the MEM as part of a *Mines Act* permit application.

- The Proponent advised that costs of closure (including long-term water treatment) were outlined in the Application and in the pre-feasibility study economics evaluation; all the costing was done in 2012 dollars. The Proponent will develop a closure water treatment trust fund based on production revenue from Year 1 to end of mine life in Year 52 that will provide the necessary funding to maintain the long-term water treatment requirements at the mine site.
- The Proponent advised that the Northwest Mine Development Review Committee would be involved in reviewing the *Mines Act* permit application and, as such, would have the opportunity to comment on the scope of the activities considered by the Chief Inspector of Mines when determining the security for the proposed Project.
- The Proponent included, at the request of EAO, a comprehensive dam break assessment in their Application. This assessment looked at a number of possible events and modelled downstream water quality and potential losses to fish habitat.
- As bonding is a statutory requirement, EAO did not add any conditions that would fetter future decision makers. However, a number of conditions were added to address the concerns regarding long-term closure and accidents associated with infrastructure:
 - requiring the development of a Closure and Reclamation Plan to be approved by MEM prior to the commencement of construction on the TMF dams.
 - requiring the development of an Accidents and Malfunctions Plan to be approved by MEM and MOE prior to the commencement of construction on the TMF dams.
- Part B of the Assessment Report also notes, as it relates to dam failure, there is extremely low likelihood of a catastrophic failure including a dam breach or failure and the significant environmental impacts to water quality. The certainty is very high that the rigorous design standards and oversight associated with dam construction will mean that the likelihood of catastrophic dam failure is very low.

Taking into account the above, EAO's assessment of the potential impact of bonding and reclamation decisions on Gitanyow Aboriginal Interests, including in relation to fishing and other uses related to downstream water quality is that those effects have been appropriately accommodated.

Fish, Aquatic Habitat and Water Quality

Another of the key concerns expressed by the Gitanyow Nation during the EA of the proposed Project was potential effects on fish due to diminished water quality, habitat loss and mortality. EAO understands that these concerns relate specifically to water quality effects from the TMF and construction of the TMF and associated infrastructure. Gitanyow Nation has told EAO that the chinook, steelhead, coho and other salmon which they catch in the Bell-Irving and Nass Rivers (those rivers run through Gitanyow territory farther downstream) spawn in Teigen and Treaty Creeks. A February 9, 2014 memo to EAO from Gitanyow Nation said that "Gitanyow FSC annual allocation makes up approximately 5% of the Nass sockeye Annual Escapement Target (AET), 4% of the Nass chinook AET and 1% of the Nass coho AET". It also states that "the Gitanyow steelhead annual harvest is thought to make up between 5% and 12.5% of the total Nass steelhead AET". Impacts to water quality in these streams would potentially harm these populations, resulting in a direct impact on the aboriginal right to fish these populations further downstream. This memo provided EAO with an excellent understanding of the scope and scale of the aboriginal rights to be considered.

The following discussion provides a summary list of the issues raised by Gitanyow Nation during the review related to fish and water quality. EAO responses to these issues, including measures for accommodations, are listed below for each issue:

- Gitanyow Nation expressed concerns with the groundwater modelling undertaken by the Proponent and potential adverse effects from seepage through/beneath the dam, and requested that the modelling of seepage rates from the dam be confirmed by an independent consultant:
 - The Proponent advised that the work on the waste storage facility was completed by qualified professional engineers and the results of the hydrogeological model generated for engineering design was reviewed by an independent professional.
 - EAO provided a list of the federal and provincial reviewers working on the review of the Proponent's work, as well as their professional designations.
 - The Proponent clarified that groundwater models built for the purpose of the environmental effects assessment in the mine area, including the waste storage facility and the PTMA area were reviewed by Professor Dr. Leslie Smith at the University of BC, the recognized expert of groundwater modeling and hydrogeology in BC, Canada, and the world.

The models were also reviewed by other independent consultant reviewers contracted by the regulators. The modeling was implemented by following the MOE *Groundwater Modelling Guidelines for Assessing Impacts of Proposed Natural Resources Development Activities*, and the work was done by a qualified senior hydrogeological modeling specialist with hydrogeological and modeling experience. The models can be updated in the future when new information is collected and is substantial. In addition, to account for the uncertainties in the model predictions, follow-up groundwater monitoring plans have been developed in the mine area and the PTMA area to monitor the potential effects in groundwater, and adaptive management plans can be developed, if necessary.

- EAO added a condition which requires the Proponent to prepare and submit to the MOE and MEM for approval Groundwater Monitoring and Mitigation Plan prior to construction of the TMF dams. There is a requirement for the Proponent to consult with Gitanyow on this plan.
- Gitanyow Nation expressed significant concerns regarding the potential impacts to downstream fisheries from the proposed Project, including what they considered to be an inadequate assessment by the Proponent of sub-lethal effects to fish downstream of the TMF; potential impacts to the Nass estuary from multiple decades of selenium loading; effects on lentic habitats in the Bell-Irving and Nass Rivers from selenium loading; and, devastation of the Nass fishery from chemical contamination if a catastrophic failure of the TMF occurred:
- The Proponent clarified that sublethal effects were considered in the Application for fish and aquatic habitat (Chapter 15), and the information provided in Chapter 30 is based on the Project assessment provided in Chapter 15. In Chapter 15 (Sections 15.7.4, 15.8.2.4, and 15.8.3.2), 'chronic' toxicity (which was intended to mean chronic sublethal toxicity) was assessed in consideration of endpoints such as reproductive toxicity, effects to growth, etc. All of the potential effects of selenium, described in the Application and in the Selenium Management, are forms of chronic, sublethal toxicity. The Proponent's assessment of not significant (minor) due to water quality degradation considered the potential for sublethal toxicity and concluded that the potential for chronic sublethal effects that are Project-related is unlikely in the PTMA since concentrations are predicted to be below toxicity thresholds.
- The Proponent advised that the potential for effects due to selenium was assessed in the Application (Chapter 15) in terms of the predicted concentration of selenium, which is more relevant when considering existing literature and guidelines which are based on selenium concentration. In the PTMA, concentrations of selenium are predicted to remain within 20% of baseline

conditions. According to the Proponent, the incremental change in selenium concentration (or loading) due to the proposed Project is small. No significant flow effects to Treaty Creek were assessed; therefore, if predicted concentrations and flows are similar to background, then predicted loadings are similar to background loadings. The contribution of the proposed Project to the concentrations (or loadings) of selenium already present in the natural aquatic environment is small, including in areas closest to the TMF. With distance, the contribution of selenium (either in terms of concentration or loading) due to the proposed Project relative to natural sources of selenium is diminished due to dilution and would be expected by the Proponent to become negligible. Any potential residual effects to water quality, fish, or aquatic resources (due to metals, including selenium) may be expected to occur only within the local study area, so no effects are predicted by the Proponent to the Bell-Irving or Nass Rivers.

- The Proponent has committed to the mapping of lentic and lotic habitats, as set out in the SeMP. Although no differentiation between lentic and lotic habitat was made in the Application, the potential for effects to fish and aquatic habitat due to selenium were assessed, and concluded that the potential for effects to fish and aquatic habitat due to water quality degradation (specifically due to selenium) in the PTMA is not significant (minor).
- The Proponent noted that dam failure has a very low probability of occurrence and that mitigation measures (e.g. proper construction, inspection, maintenance, etc.) are proposed to ensure that the probability of failure remains very low. Additional mitigation measures are proposed in the Dam Failure Effects Assessment and include avoidance or prevention of a dam failure, minimizing environmental effects, remediation, and monitoring.
- EAO has responded by adding a condition which requires the Proponent to meet BCWQG or SSWQO within 100 m of the point of discharge. This very conservative condition has the effect of ensuring that water in Treaty and Teigen Creeks will always be protective of the most sensitive aquatic species.
- EAO is aware Gitanyow Nation has concerns regarding the BCWQG and that they believe that sub-lethal effects can occur even when BCWQG are met. EAO responded to this concern with an April 29 letter, saying “BCWQGs provide a consistent basis for assessing water quality conditions throughout much of the Province. These guidelines are set through a rigorous scientific process which includes peer review, and are set to be safe concentrations for the protection of aquatic life, drinking water, and other water users. BCWQGs are used by EAO during EAs as a benchmark against which to assess the potential for effects to a range of aquatic valued components. It is EAO’s view that they represent an

appropriate tool for environmental assessments. We also recognize that examining the potential aquatic effects does not cease at the end of an environmental assessment and will continue throughout the permitting process, should the project receive an EA certificate. I note that Gitanyow has been invited to participate in the Mine Review Committees, which is the main group which oversees the joint *Mines Act* and *Environmental Management Act* permitting.”

- In addition to condition 8, which requires that water quality 100 meters downstream of the point of seepage meet BCWQG or SSWQO, EAO has also added a number of additional conditions to address potential water quality effects to fish; they include:
 - the requirement for a WMP which provides for the detailed design of the TMF and associated water management facilities and demonstrates how condition 8 will be satisfied during all phases of the proposed Project. This must be completed prior to construction of the TMF dams.
 - the requirement for an Accidents and Malfunctions Plan that shows how the Proponent will address any accidental water quality effects. This must be completed prior to construction of the TMF dams.
 - the requirement that the proposed Project must be constructed to enable the addition of infrastructure and facilities that could collect any seepage and treat any discharges from the TMF to ensure that condition 8 is met during all phases of the proposed Project.
 - the requirement for an AEMP that continuously examines water quality in Teigen and Treaty Creeks. This must be completed prior to construction of the TMF dams.
 - the requirement for a Groundwater Monitoring and Mitigation Plan which shows how the Proponent will prevent groundwater effects to Treaty and Teigen Creeks. This must be completed prior to construction of the TMF dams.
 - the requirement that, during the operations, closure and post-closure phases of the Project, the EA Certificate Holder must ensure that the rate of water discharge from the TMF to Treaty Creek will be staged to mimic stream flows.
 - the requirement for a Salmon Monitoring Plan in Teigen Creek.
- Gitanyow Nation raised concerns about the potential adverse effects from selenium on aquatic biota, fish, wildlife, and humans.
- The Proponent advised that a SeMP has been prepared for the proposed Project, although the potential for effects due to water quality degradation

(including selenium) in the PTMA was assessed as not significant (minor) and downstream of the mine site it was assessed as not significant (moderate).

- The Proponent further advised that baseline fish whole body metal concentration data was collected in 2008, 2009, 2011, and 2013. The data is summarized in the SeMP and provides a solid foundation for comparison of future fish tissue metal concentration data.
- As part of the AEMP, the Proponent has committed to collecting benthic tissue metal data on an annual basis at stream sites downstream of the Mine Site WTP and TMF in the PTMA. Fish sampling is recommended at the frequency required by the MMER in order to avoid population level impacts from sampling (e.g. some areas have relatively few fish). Establishing the relationship between fish tissue metal (selenium) concentrations and benthic tissue metal (selenium) concentrations is a long-term objective (set out in the SeMP), and is not intended to replace fish monitoring. If a relationship can be established between fish and benthic tissue metal concentrations, then annual monitoring of benthic tissue metals will provide an 'early-warning' or trigger that concentrations of metals in the aquatic environment are changing.
- EAO added a number of conditions related to water quality which are listed in the section above. They include a selenium monitoring plan as well as an AEMP, which includes monitoring fish tissues.
- Gitanyow Nation pointed out the amount of scientific research that is occurring on selenium speciation, environmental, human health effects, and treatment, and the widely acknowledged fact that selenium treatment is very problematic and expensive, with few proven methods:
 - The Proponent advised that measures set out in the SeMP will provide an early warning of potential environmental and human health risks. By the time the SeTP is required in Year 5 of the mine life, it will have been well proven.
 - The Proponent agreed with Gitanyow Nation's comment as it related to temperature and biomass volume and explained that that is why the focus has been on applying a physiochemical selenium removal process. The ion exchange process works very well to remove selenate and selenite to very low levels. The reduction step for reducing selenate to selenite is an electrochemical process. Once the selenate is reduced it is co-precipitated with ferric iron. The chemical sludge formed is orders of magnitude less than the biomass from a biological treatment process. The Proponent's plan would be to move the selenium sludge offsite to a treatment facility or to a level one secure landfill.

- The Proponent stated that the initial research work completed by Bioteq and Rescan was picked up by Teck Corp and a full-scale pilot plant was built and is being operated by Bioteq on the Elk River Coal Project. The ion exchange is proven technology and works very well. The focus of the pilot plant is on the selenate reduction step and the chemical sludge produced. The results are very encouraging, with the plan to expand the process to 15,000 m³/d plant. As for the independent verification of the treatment system, the Teck Selenium Evaluation is made up of a number of independent experts as well as the Southeast Coal Selenium Working Group.
- EAO added a condition which required the Proponent to develop a pilot selenium treatment plant near the proposed WTP in the Mitchell Drainage.
- The Proponent also notes they have committed to a five-year funding program for the University of British Columbia to increase knowledge around selenium treatment method.
- Part B of this Report discusses the certainty around selenium treatment methods. This Report says that, while there are a number of successful pilot projects underway and full scale selenium treatment plants are currently being planned, the type of selenium treatment systems proposed by the Proponent are not currently proven. EAO notes that this discussion in the Assessment Report is focused on the mine side and not the PTMA, which drains into the Nass. Selenium was considered to be a larger uncertainty on the mine side due the long-term storage and oxidization of waste rock in the Mitchell and McTagg RSFs. Modelled selenium levels in Treaty and Teigen Creek were not determined to be significantly different from current baseline levels of selenium, which are often currently elevated.
- Gitanyow Nation raised concerns about potential adverse impacts from the proposed Project on fish and aquatic habitat, and submitted comments regarding the frequency, locations, timing, and consultation/reporting of aquatic monitoring presented in the Proponent's Application.
 - The Proponent has committed to developing a Salmon Monitoring Plan and providing it to relevant First Nations (including the Gitanyow Nation), DFO and FLNR. The purpose of the plan would be to build upon existing baseline hydrology, water temperature, and juvenile fish abundance, adult Chinook surveys, and Chinook salmon red distribution data collected for the proposed Project since 2008. The plan will include monitoring objectives related to hydrology and fluvial, instream flow, and fisheries, and will include recapture of Chinook salmon tags to support Nass River mark recapture programs.

- The Proponent has committed to providing monitoring reports and/or records and related applications (including the AEMP, Effluent Waste Discharge permit application, Water Management Plan, and Groundwater Monitoring and Mitigation Plan) to relevant First Nations, including the Gitanyow Nation, as well as notifying them when there are any proposed changes to monitoring frequencies.
- The Proponent has committed to salvaging Dolly Varden with the TMF footprint of the proposed Project and developed the November 28, 2013 Fish Salvage Plan, which provided information on the identification of water bodies within Teigen and Treaty watersheds that could potentially receive relocated Dolly Varden, a literature review of stocking rates for Dolly Varden and/or similar species, the number of Dolly Varden that could be relocated to identified water bodies, the ecological risks associating with relocating Dolly Varden, as well as the risk for each identified water body
- The Proponent advised that the MMER specifies sampling requirements (including frequency) for water quality, toxicity, sediment, benthic invertebrates, and fish in areas downstream of discharge points. The Proponent will be required to follow these standards and guidelines to monitor for potential aquatic effects.
- The Proponent has committed to monitoring stream water temperatures annually (and prior to development of the TMF) in North Treaty, Treaty, South Teigen, and Teigen Creeks during the operations, closure and post-closure (five years) phases of the proposed Project.
- EAO added a number of conditions relating to fish and fish habitat, including the following:
 - the requirement for an AEMP that continuously examines water quality in Teigen and Treaty Creeks. This must be completed prior to construction of the TMF dams;
 - the requirement for a Teigen Creek Salmon Monitoring Plan; and
 - the requirement for a Fish Salvage Plan, to be developed prior to the commencement of construction of the TMF dams, which would explain how Dolly Varden which are currently located within the footprint of the TMF can be salvaged and relocated.
 - EAO notes that primary responsibility for managing potential loss to fish habitat resides with Canada. Notwithstanding this, Part B of the Assessment Report says that there is high certainty that the compensation programs proposed by the Proponent will be effective in

offsetting habitat losses associated with construction and operation of the TMF dams and related seepage collection ponds, road crossing structures, transmission line crossings and water quantity reductions in South Teigen and North Treaty creeks downstream of the TMF dams. These programs are administered by DFO under the *Fisheries Act* and DFO has provided their preliminary support for the Proponent's proposed plans. The losses would occur primarily during proposed Project construction and over the duration of TMF development from changes to streamflow in North Treaty and South Teigen Creek causing the alteration of the suitability or area of Dolly Varden habitat.

Taking account the above discussion, and in particular the conclusions that water quality in Teigen and Treaty Creeks will, as a condition of an EA Certificate, be protective of the most sensitive aquatic species; salmon populations and water quality will be monitored and managed through an AEMP and a SeMP, and finally that DFO has provided its preliminary support for the Proponent's proposed compensation programs, EAO's assessment is that potential impacts of the proposed Project on Gitanyow Aboriginal Interests, including fishing and other uses related to downstream water quality, including aboriginal rights to fish in the Nass and Bell-Irving Rivers, has been appropriately accommodated.

Wildlife and Wildlife Habitat

Gitanyow Nation expressed significant concerns regarding the potential impacts to wildlife from the proposed Project, with a focus on moose, and stated that the Gitanyow Nation would consider any further decline in the moose population from the proposed Project to be a significant impact to moose, as opposed to the Proponent's finding of "not significant – moderate" and to the Gitanyow Nation's Aboriginal Interests related to hunting.

- EAO notes that proposed Project infrastructure is located well outside Gitanyow territory. Potential effects to wildlife and moose are discussed in the Transportation Effects assessment in Part B of this Report and in the transportation section.
- EAO acknowledges the fact that wildlife move through and around various administrative boundaries and that mortality and habitat loss within the footprint of the proposed Project notes that the magnitude of habitat loss effects is moderate or low for all VC. Approximately (+/- 5%) of the RSA and +/- 40% of the LSA would be affected by the proposed Project.
- This Report says the magnitude of habitat loss effects to moose is moderate, with areas of summer and early winter habitat being lost in the TMF and processing plant site, but the most important habitat of late winter overlaps with

the proposed Project only at low elevations along the Treaty Creek Access Road. The extent of residual wildlife effects is localized to the LSA for most effects categories, although for some wildlife VC with larger ranges (grizzly bears, black bears, moose, and mountain goats), residual effects will extend to the landscape level, while remaining tied to the proposed Project footprint or to individual animals within the RSA (e.g. effects linked to disruption of movement, direct and indirect mortality, or sensory disturbance). The abundance of individuals of particular species may decline during construction and operation in the immediate area of the proposed Project footprint; however, most wildlife VC are mobile, and will likely seek alternative habitat if displaced by mining-related disturbances, if alternative habitat is available.

- EAO also added a number of conditions relating to the management of wildlife on the proposed Project site in order to mitigate potential regional effects on wildlife, including the following:
 - prior to the commencement of construction of the Treaty Creek and the Coulter Creek access roads, the EA Certificate Holder must develop a standard operating procedure that will form a component of the Wildlife Effects Monitoring Plan and that will address potential impacts to wildlife along the Treaty Creek and Coulter Creek roads resulting from transportation use related to the proposed Project;
 - the EA Certificate Holder will develop and submit to the FLNR for approval a standard operating procedure (the “Bear SOP”) that details efforts to be taken by the EA Certificate Holder to avoid and reduce risks of potential bear-human conflicts that could arise during proposed Project operations;
 - the EA Certificate Holder will develop and submit for approval to the FLNR a Wildlife Effects Monitoring Plan completed prior to the commencement of construction on the Treaty Creek and Coulter Creek Access Roads;
 - the EA Certificate Holder will develop and submit to the FLNR a Terrestrial Ecosystems Management and Monitoring Plan prior to the commencement of construction on Treaty Creek and Coulter Creek Access Roads;
 - the EA Certificate Holder must develop and submit for approval to the FLNR, the MEM and EAO a Traffic and Access Management Plan for the Treaty Creek and Coulter Creek access prior to the commencement of construction on Treaty Creek and Coulter Creek Access Roads; and

- the EA Certificate Holder must construct and operate a gate or barrier on the Treaty Creek Access Road that will restrict access across the bridge to the West side of the Bell Irving River. Any such gate or barrier must be in place at any time that the Treaty Creek Access Road is usable by a passenger vehicle or all-terrain vehicle.
- Gitanyow Nation raised concerns about cumulative effects from the proposed Project on western toad; moose; grizzly and black bear; terrestrial ecosystems; surface:
 - the Proponent provided clarification and/ or pointed to information in the Application related to the methodology and/or rationale employed for the cumulative effects assessments related to each of the concerns raised by Gitanyow Nation, including VC, temporal and spatial boundaries, residual effects, determination of the significance of potential adverse effects and the associated criteria, consideration of other projects in the vicinity of proposed Project area, etc.
 - part B of this Report has described, where appropriate, where there are potential cumulative effects. With respect to the VC raised by Gitanyow, EAO found a number of cumulative effects related to transportation effects, which are reported and discussed in that chapter. There were no cumulative effects identified for the PTMA.

Taking account the above discussion, and in particular noting that the footprint of the proposed Project is outside Gitanyow Nation's territory, and with the conditions discussed above, EAO's assessment of the potential impacts of the proposed Project on Gitanyow Aboriginal Interests, including hunting of wildlife, with an emphasis on moose, is that those effects are low. EAO is satisfied that the potential impacts to aboriginal rights to hunt within Gitanyow Nation's territory have been appropriately accommodated

12.1.6 Conclusions Regarding Gitanyow Nation

In view of the consultation that has taken place with Gitanyow Nation, EAO's conclusion is 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 Aboriginal Interests

(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 Aboriginal Interests related to hunting and fishing 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, it is EAO's conclusion that the Crown's duty to consult and appropriately accommodate the potential impacts of the proposed Project on Gitanyow Nation's Aboriginal Interests has been adequately fulfilled.

Table 43. EAO Analysis of Potential Effects from the Proposed KSM Project on the Gitanyow Lax'yip Land Use Plan (GLUP)

Plan Goals:	Objectives:	Potential Effects from the Proposed Project:	Mitigations/Accommodations/Conditions:	Conclusion:
<i>Water Resources</i>				
Protect and maintain surface and groundwater to: <ul style="list-style-type: none"> • Provide a safe and sufficient drinking water supply that supports healthy communities; • Maintain water quality, quantity, peak and low flows within the range of natural variability in rivers, streams, lakes, and wetlands to protect the hydrological integrity of their watersheds (water quality includes temperature, turbidity, and chemistry) 	<ul style="list-style-type: none"> • Limit potential for soil surface erosion • Manage human activities to maintain hydrologic stability of watersheds • Maintain ecological functioning of streams, rivers, wetland complexes, and lakes, including those that do not support fish populations • Maintain the functional integrity of floodplains and alluvial fans • Restore the water quality and hydrologic integrity of damaged watersheds throughout the plan area • Maintain the watershed of Ten Link Creek as a community watershed to provide domestic water supply to Gitanyow village (Cranberry Planning Unit) 	<ul style="list-style-type: none"> • See section 5.2.2 of the Assessment Report for a detailed analysis of potential effects on surface water quality. • See section 5.4.2 of the Assessment Report for a detailed analysis of potential effects on groundwater quality/quantity. • See section 5.3.2 of the Assessment Report for a detailed analysis of potential effects on surface water quantity. • See section 5.6.2 of the Assessment Report for a detailed analysis of potential effects on wetlands. 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 5.2.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on surface water quality. • See section 5.4.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on groundwater quality/quantity. • See section 5.3.2 of the Assessment Report for a detailed list of potential effects on mitigation measures for surface water quantity. <ul style="list-style-type: none"> • Accidents and Malfunctions Plan • WMP • Groundwater Monitoring and Mitigation Plan • WSF Seepage Management and Monitoring Plan • TMF Management and Monitoring 	Consistent with the GLUP

		<p><u>Wetlands</u></p> <ul style="list-style-type: none">Wetlands would be affected by development of the CCAR and TCAR, construction camps #3 and #7, the Kerr Pit, the Sulphurets Laydown Area, the TMF, and the Treaty OPC.Wetlands may be partially or entirely eliminated by proposed Project component development and/or wetland function may be altered or degraded through direct or indirect interactions with proposed Project components. <p><u>Groundwater</u></p> <ul style="list-style-type: none">Application states that groundwater quantity effects would occur throughout construction, operations, closure and post-closure. Potential effects include changes in the surface water environment in the proposed Project area including changes in hydraulic gradients, flow	<p>Plan</p> <ul style="list-style-type: none">ML/ARD Management PlanAEMPSeMPTerrain, Surficial Geology and Soil Management and Monitoring PlanClosure and Reclamation Plan <p><u>Conditions:</u></p> <p>In addition to the plans listed above, there are 12 conditions related to water management and five conditions related to selenium management in the TOC, including:</p> <ul style="list-style-type: none">Requirements to meet BC Water Quality Guidelines or Site Specific Water Quality Objectives approved by the MOE during all phases of the proposed ProjectRequirements to consult with First Nations, including the Gitanyow NationRequirements for agency and First Nation notification, and compliance with MOE direction regarding mitigation, in the event of contaminant level exceedancesRequirements to develop and	
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		<p>rate, flow direction and water level.</p> <ul style="list-style-type: none"> • The Application reports that alterations to groundwater flow patterns and water levels would be confined to the immediate catchments basins within the proposed Project footprint. • The Application states that seepage of contact water from mine infrastructure into the groundwater environment would alter the parameters that characterize groundwater quality. • Accidental release of industrial or other controlled substances could also affect groundwater quality. • Application states that groundwater quality would be affected along access roads during construction at the mine site and the PTMA. <p><u>Surface Water</u></p> <ul style="list-style-type: none"> • Key surface water quantity issues discussed in the 	<p>submit the environmental management plans listed above to the MOE and/or the MEM for approval</p> <ul style="list-style-type: none"> • Requirements for discharge rates to mimic stream flows • A requirement to report out on the baseline, pre-disturbance water quality under Mitchell Glacier • A requirement to backfill and flood low-grade ore into Mitchell Pit if it is not milled at the end of the proposed Project life • Requirements regarding the design and construction of the Kerr Pit water management system infrastructure to withstand and operate during a 1-in-200 year peak flow event through all proposed Project phases • Requirements for a pilot water treatment plant to evaluate feasibility and submit a report to the MOE, MEM, and EAO • Requirements related to a seepage collection system at the base of the McTagg/Mitchell Rock Storage Facility • Requirements related to the construction/operation of a water treatment plant at the 	
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		<p>Proponent's Application included potential impacts at all proposed Project phases on annual flow volumes, monthly flow distribution, peak flow and low flows.</p> <ul style="list-style-type: none">• From a watershed perspective, although the residual effects on flows of the TMF, diversions and tunnels are of high magnitude in the upper reaches of streams with the local study area, the magnitude of these changes decrease in the downstream direction. None of the predicted residual effects on flows were considered critical to downstream resource values.• The Proponent identified the following sources of potential water quality effects: metal leaching/acid rock drainage, effluent discharge, sedimentation and erosion, leaching of blasting residues, sewage, accidental spills, seepage, and atmospheric deposition.	<p>Mitchell Water Storage Facility</p> <ul style="list-style-type: none">• Requirements for reporting to inform cumulative effects assessments	
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Biodiversity				
<ul style="list-style-type: none"> • Ensure ecosystem function across the range of ecosystem types, reflective of the historic natural disturbance regime at the landscape and stand level over time • Maintain habitat connectivity throughout the landscape • Connect old-growth management areas • Provide a continuum of relatively undisturbed habitats that possess interior forest conditions for indigenous species that depend on mature and old-growth forests • Facilitate movement and dispersal of organisms across the landscape by providing core areas and dispersal corridors that will help a variety of organisms re-colonize their historic range • Protect and maintain effectiveness of riparian habitats; all riparian 	<ul style="list-style-type: none"> • Maintain a landscape pattern of patchiness that, over the long term, reflects the natural disturbance pattern • Maintain or recruit structured attributes of old forests to support stand-level biodiversity • Preserve red-listed (endangered or threatened) plant communities, as classified by the BC Conservation Data Centre • Conserve blue-listed (at risk) plant communities as classified by the BC Conservation Data Centre • Maintain a diversity of coniferous and deciduous species that represent the natural species composition at the landscape and stand levels • Maintain a range of forest seral stages by BEC variant, within each landscape unit, that reflects the natural 	<ul style="list-style-type: none"> • See section 10.1.2 of the Assessment Report for a detailed analysis of potential transportation-related effects on terrestrial ecosystems, wildlife, and heritage. • See section 5.7.2 of the Assessment Report for a detailed analysis of potential effects on terrestrial ecosystems (including vegetation and riparian ecosystems). • See section 5.9.2 of the Assessment Report for a detailed analysis of potential effects on wildlife. <p><u>Transportation</u></p> <ul style="list-style-type: none"> • The Application states that increased traffic levels from mine-related transportation activities may cause adverse effects on wildlife populations (including moose, bears, western toad, and birds) along the 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 5.7.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on terrestrial ecosystems (including vegetation and riparian ecosystems). • See section 5.9.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on wildlife. • See section 10.1.2 of the Assessment Report for a detailed list of mitigation measures for potential transportation-related effects on terrestrial ecosystems, wildlife, and heritage. • Terrestrial Ecosystems Management and Monitoring Plan • Terrain, Surficial Geology and Soil Management and Monitoring Plan • Wildlife Effects Monitoring Plan • Traffic and Access Management Plan • Dangerous Goods and Hazardous Materials Management Plan • Emergency Response Plan • Spill Prevention and Emergency Response Plan • Northwest Wildlife and 	Consistent with the GLUP

<p>habitats have disproportionately high biodiversity values relative to their proportional occupancy of the landscape</p> <ul style="list-style-type: none"> • Preserve Gitanyow traditional use sites and maintain opportunities for traditional use of the land 	<p>disturbance regime</p> <ul style="list-style-type: none"> • Maintain structured connectivity in the Ecosystem Network identified in Schedule A, Maps 1-10 	<p>proposed transportation route during all phases of the proposed Project.</p> <ul style="list-style-type: none"> • In particular, potential effects may include injury or direct mortality of wildlife due to vehicle collisions, disruption of wildlife movement, and potential habitat degradation from spills and malfunctions. • The Application states that an increase in traffic may result in the potential for introduction and spread of invasive plants and increased incidence of wildfire from improper disposal of smoking material. <p><u>Terrestrial Ecosystems</u></p> <ul style="list-style-type: none"> • There is potential for loss of terrestrial ecosystems and plants of interest, alteration of natural patterns of diversity, introduction of invasive plant species, deposition of fugitive dust, windthrow, changes to ecosystem composition, and 	<p>Environmental Management Advisory Group (co-chaired by EAO and the FLNR, with participation from other provincial government agencies, local government, First Nations, federal government agencies, and industrial road users).</p> <ul style="list-style-type: none"> • Salmon Monitoring Plan • Wetlands Management Plan • Fish Salvage Plan • Closure and Reclamation Plan <p><u>Conditions:</u></p> <p>In addition to the plans listed above, there are several conditions related to biodiversity in the TOC, including:</p> <ul style="list-style-type: none"> • Requirements regarding descriptions of alternate Ungulate Winter Ranges to offset proposed Project impacts, including habitat mapping and aerial surveys • Requirements for consulting with First Nations, including Gitanyow Nation • Requirements for access restrictions • Requirements for reporting to inform cumulative effects assessments 	
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		<p>structure and/or function.</p> <p><u>Wildlife</u></p> <ul style="list-style-type: none"> The proposed Project has the potential to adversely affect wildlife due to disturbance of movement during the construction and operations phases. 		
<i>Pine Mushroom Resources</i>				
Maintain pine mushroom resources and provide opportunities for a sustainable harvest	Maintain productive pine mushroom sites across the plan area	<ul style="list-style-type: none"> See section 5.7.2 of the Assessment Report for a detailed analysis of potential effects on terrestrial ecosystems, including pine mushroom. Potential effects on pine mushroom due to land clearing for the proposed Project The Application states that residual effects on pine mushroom would be reversible in the long term 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> See section 5.7.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on terrestrial ecosystems, including pine mushroom. Terrestrial Ecosystems Management and Monitoring Plan Terrain, Surficial Geology and Soil Management and Monitoring Plan Air Quality Management Plan 	Consistent with the GLUP
<i>Moose</i>				
<ul style="list-style-type: none"> Manage moose winter range to help ensure a healthy moose population 	<ul style="list-style-type: none"> Maintain, enhance or restore moose winter range habitats identified on Schedule A Maps 1-10 	<ul style="list-style-type: none"> See section 5.9.2 of the Assessment Report for a detailed analysis of potential effects on 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> See section 5.9.2 of the Assessment Report for a detailed list of mitigation measures for 	Consistent with the GLUP

<ul style="list-style-type: none"> • Minimize pressure on the moose population from legal and illegal harvest through human access management 	<ul style="list-style-type: none"> • Through access management, minimize mortality and disturbance to moose within and adjacent to the moose winter ranges identified on Schedule A, Maps 1-10 	<p>moose.</p> <ul style="list-style-type: none"> • See section 10.1.2 of the Assessment Report for a detailed analysis of potential transportation-related effects wildlife (including moose). • The Application states that increased traffic levels from mine-related transportation activities may cause adverse effects on wildlife populations (including moose) along the proposed transportation route during all phases of the proposed Project. In particular, potential effects may include injury or direct mortality of wildlife due to vehicle collisions, disruption of wildlife movement, and potential habitat degradation from spills and malfunctions. • The Proponent estimates that the addition of traffic from the proposed Project is projected to cause an additional <1% mortality to the moose population at the current population size. 	<p>potential effects on moose.</p> <ul style="list-style-type: none"> • See section 10.1.2 of the Assessment Report for a detailed list of mitigation measures of potential transportation-related effects on wildlife (including moose). • Wildlife Effects Monitoring Plan • Traffic and Access Management Plan • Dangerous Goods and Hazardous Materials Management Plan • Emergency Response Plan • Spill Prevention and Emergency Response Plan • Northwest Wildlife and Environmental Management Advisory Group (co-chaired by EAO and the FLNR, with participation from other provincial government agencies, local government, First Nations, federal government agencies, and industrial road users). • Terrestrial Ecosystems Management and Monitoring Plan • Wildlife Collisions Protocol • Closure and Reclamation Plan 	
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		<ul style="list-style-type: none">• 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 KSM transportation route are moose.• Given the current status of moose populations along the KSM transportation route and the adverse effect of industrial accidents with wildlife, the additional proposed Project traffic may exacerbate the existing conditions.• Potential for cumulative effects on moose.• The Application reports the amount of high quality winter moose habitat that would be affected (2,765 ha) is 7% of the total amount of winter habitat available in the RSA and 42% of the total amount of winter habitat available in the LSA. In addition, 443 ha (0.9%) of the proposed moose UWR 6-018 would be altered due to the TCAR.	<p><u>Conditions:</u></p> <p>In addition to the plans listed above, there are several conditions related to moose in the TOC, including:</p> <ul style="list-style-type: none">• A requirement for addressing potential transportation-related impacts to wildlife along Treaty and Coulter Roads• Requirements regarding descriptions of alternate Ungulate Winter Ranges to offset proposed Project impacts, including habitat mapping and aerial surveys• Requirements for contributing funding and reporting to support recovery of the Nass moose population and the mitigation of wildlife impacts along Hwy 37 and 37A• Requirements for reporting to inform cumulative effects assessments• Requirements for consulting with First Nations, including Gitanyow Nation	
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		<p>Due to the range in size of moose home range the loss associated with the proposed Project could be equivalent to 16% or as little as 3.5% of a home range. The Proponent estimates that reclamation activities could restore 62 ha of high-quality early winter habitat upon closure within the TMF footprint if the water and vegetation are deemed safe for wildlife consumption.</p> <ul style="list-style-type: none">• The Application identified potential for disruption of movement (along Treaty drainage, Unuk River, TMF valley and Saddle portal; also, potential for the access road to act as a movement corridor for moose), sensory disturbance, direct mortality (vehicle-wildlife collisions, vegetation clearing/pit construction, avalanche control, and wildlife interactions with the transmission line), indirect mortality (increased hunting pressure from increased access), attractants, and chemical hazards.		
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Mountain Goat				
<ul style="list-style-type: none"> • Manage mountain goat winter range to help ensure a healthy mountain goat population • Avoid disturbance and displacement of mountain goats during vulnerable periods • Minimize pressure on the mountain goat population from legal and illegal harvest through human access management 	<ul style="list-style-type: none"> • Minimize adverse disturbance to goats within the mountain goat winter range identified on Schedule A, Maps 1-10 • Minimize the number or roads within 500 m of mountain goat winter range and 1000m of canyon-dwelling goat winter range • Minimize adverse disturbance to mountain goat winter range from helicopter logging activities 	<ul style="list-style-type: none"> • See section 5.9.2 of the Assessment Report for a detailed analysis of potential effects on mountain goat. • The Application reports that the loss and alteration of winter goat habitat could be equivalent to a maximum of 69.4 home ranges, or as little as five home ranges. In addition, the proposed Project development overlaps approximately 547 ha of designated UWR. • There is potential for disruption of movement (due to the development of the Mine Site and Saddle portals; blockage of movement to a potential salt lick around the Mine Site), sensory disturbance (could equate to a functional loss of habitat of ~13% of the winter population within the RSA and 19% of the subpopulation during operations), direct mortality 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 5.9.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on mountain goat. • Wildlife Effects Monitoring Plan • Wildlife Mitigation and Monitoring Plan • Reclamation and Closure Plan <p><u>Conditions:</u></p> <p>In addition to the plans listed above, there are several conditions related to mountain goat in the TOC, including:</p> <ul style="list-style-type: none"> • A requirement for addressing potential transportation-related impacts to wildlife along Treaty and Coulter Roads • Requirements regarding descriptions of alternate UWR to offset proposed Project impacts, including habitat mapping and aerial surveys • Requirements for consulting 	Consistent with the GLUP

		(vehicle-wildlife collisions, vegetation clearing/pit construction, avalanche control, and wildlife interactions with the transmission line), indirect mortality (due to increased access/hunting and range shifts due to disturbance), and chemical hazards.	with First Nations, including Gitanyow Nation <ul style="list-style-type: none"> Requirements for reporting to inform cumulative effects assessments 	
Grizzly Bear				
Provide adequate grizzly bear habitat to help ensure a healthy population of grizzly bears	<ul style="list-style-type: none"> Preserve the highest value grizzly bear habitat, identified in Schedule A, Maps 1-10 as either: <ul style="list-style-type: none"> a) Grizzly Bear Habitat Complex <ul style="list-style-type: none"> Class 1: Very High; provincially significant value Class 2: High Value (Cranberry, Kispiox and Kalum Planning Units) or b) Grizzly Bear Specified Areas (Nass South Planning Unit) Maintain the quality and effectiveness of grizzly bear foraging habitat 	<ul style="list-style-type: none"> See section 5.9.2 of the Assessment Report for a detailed analysis of potential effects on grizzly bears. The Application reports the overall loss and alteration of approximately 10,866 ha is roughly equivalent to 58% of the home range of a single male grizzly bear in the interior of BC, or up to two female coastal grizzly bear home ranges. The proposed grizzly bear WHA within the RSA would be affected. There is potential for disruption of movement due 	<u>Mitigations:</u> <ul style="list-style-type: none"> See section 5.9.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on grizzly bears. Wildlife Effects Monitoring Plan Traffic and Access Management Plan Closure and Reclamation Plan <u>Conditions:</u> <p>In addition to the plans listed above, there are several conditions related to grizzly bear in the TOC, including:</p> <ul style="list-style-type: none"> A requirement for addressing 	Consistent with the GLUP

	<ul style="list-style-type: none"> • Minimize human-bear conflicts • Minimize long-term displacement of grizzly bears from industrial access development 	to development in high quality bear habitat and increased human presence (e.g. roads and vehicles), sensory disturbance, indirect mortality (due to increased access/hunting and range shifts due to disturbance), attractants, and chemical hazards.	<p>potential transportation-related impacts to wildlife along Treaty and Coulter Roads</p> <ul style="list-style-type: none"> • Requirements related to development of a Bear Standard Operating Procedure to avoid/reduce risks of bear-human conflicts • Requirements for reporting to inform cumulative effects assessments • Requirements for contributing funding and reporting to support the mitigation of wildlife impacts along Hwy 37 and 37A • Requirements for consulting with First Nations, including Gitanyow Nation 	
<i>Fur-bearers</i>				
Maintain high-value habitat for identified fur-bearer species to help ensure a healthy population of fur-bearers	Minimize impact to known high-value fisher and wolverine habitat	<ul style="list-style-type: none"> • See section 5.9.2 of the Assessment Report for a detailed analysis of potential effects on furbearers (as represented by the American Marten). • The Application reports that 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 5.9.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on furbearers (as represented by the American Marten). • Wildlife Effects Monitoring Plan 	Consistent with the GLUP

		<p>the development of the proposed Project would modify 7.4% of American marten habitat in the RSA and 46% in the LSA. Further, the amount of suitable marten habitat that would be altered (6,352 ha) represents the home ranges of 525 ha for males and 316 ha for females.</p> <ul style="list-style-type: none"> • Potential for disruption of movement (along Unuk River, Sulphurets Creek, Teigen Creek and TMF valley), sensory disturbance, direct mortality, and effects from attractants and chemical hazards. 	<ul style="list-style-type: none"> • Terrestrial Ecosystems Management and Monitoring Plan <p><u>Conditions:</u></p> <p>In addition to the plans listed above, there are several conditions that support fur-bearers in the TOC, including:</p> <ul style="list-style-type: none"> • Requirements for access restrictions • Requirements for reporting to inform cumulative effects assessments • Requirements for contributing funding and reporting to support recovery of the Nass moose population and the mitigation of wildlife impacts along Hwy 37 and 37A. • Requirements for consulting with First Nations, including Gitanyow Nation 	
Northern Goshawk				
Maintain a viable population of northern goshawk within the plan area	<ul style="list-style-type: none"> • Maintain nesting and post-fledgling habitat at known goshawk nest areas to support continued use and reproduction in those areas 	<ul style="list-style-type: none"> • See section 5.9.2 of the Assessment Report for a detailed analysis of potential effects on raptors. 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 5.9.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on northern goshawk. 	Consistent with the GLUP

	<ul style="list-style-type: none"> • Maintain foraging habitat around known goshawk nest and post-fledgling areas 	<ul style="list-style-type: none"> • For raptors, the Application states that of the 86,356 ha of suitable nesting habitat identified for raptors within the RSA, 6,341 ha (7.4% of the RSA, 45.5% of the LSA) would be lost, or altered due to the development of the proposed Project. 	<ul style="list-style-type: none"> • During Application review, the Proponent advised that pre-clearing surveys for raptor nests are planned during construction of the CCAR and other areas where there is suitable habitat. • Wildlife Mitigation and Monitoring Plan 	
General Wildlife				
Protect special habitats for general wildlife	<ul style="list-style-type: none"> • Maintain effectiveness of riparian habitats adjacent to wetlands in polygons identified on Schedule A, Maps 1-10 as Special Habitats for General Wildlife • Maintain effectiveness of alder brush and aspen patch habitats in polygons identified on Schedule A, Maps 1-10 as Special Habitats for General Wildlife (Cranberry and Kalum Planning Units) 	<ul style="list-style-type: none"> • See section 5.7.2 of the Assessment Report for a detailed analysis of potential effects on terrestrial ecosystems (including vegetation and riparian ecosystems). • There is potential for loss of terrestrial ecosystems and plants of interest, alteration of natural patterns of diversity, introduction of invasive plant species, deposition of fugitive dust, windthrow, changes to ecosystem composition, and structure and/or function. 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 5.7.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on terrestrial ecosystems (including vegetation and riparian ecosystems). • Terrestrial Ecosystems Management and Monitoring Plan • Terrain, Surficial Geology and Soil Management and Monitoring Plan 	Consistent with the GLUP

Fisheries Resources				
Protect fish populations by preserving, maintaining and restoring fish habitat	<ul style="list-style-type: none"> • Maintain habitat for indigenous fish populations • Restore habitat for indigenous fish populations 	<ul style="list-style-type: none"> • See section 5.5.2 of the Assessment Report for a detailed analysis of potential effects on fish and aquatic habitat. • See section 10.1.2 of the Assessment Report for a detailed analysis of potential transportation-related effects on fish and aquatic habitat. • The Application identified the following potential effects on fish and aquatic habitat: noise, erosion and sedimentation, water quality degradation, and habitat loss. • Potential effects from project-related traffic due to accidents and spills • The assessment concluded that spills of chemicals and/or fuel from transport trucks along the transportation route at waterbody crossing or near 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 5.5.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on fish and aquatic habitat. • See section 10.1.2 of the Assessment Report for a detailed list of mitigation measures for potential transportation-related effects on fish and fish habitat. • AEMP • Fish Habitat Compensation Plans under the <i>Fisheries Act</i> • WMP • Fish Salvage Plan • Traffic and Access Management Plan • Dangerous Goods and Hazardous Materials Management Plan • Emergency Response Plan • Geographic Response Plan • Spill Prevention and Emergency Response Plan • Salmon Monitoring Plan • Northwest Wildlife and Environmental Management Advisory Group (co-chaired by EAO) 	Consistent with the GLUP

		<p>waterbodies could affect aquatic organisms.</p>	<p>and the FLNR, with participation from other provincial government agencies, local government, First Nations, federal government agencies, and industrial road users).</p> <p><u>Conditions:</u></p> <p>In addition to the plans listed above, there are several conditions that support fisheries resources in the TOC, including:</p> <ul style="list-style-type: none">• Numerous conditions related to protecting water quality and quantity, managing selenium, and managing hazardous materials spills along the transportation route• Requirements for consulting with First Nations, including Gitanyow Nation• Requirements for consulting with First Nations, including Gitanyow Nation• Requirements for reporting to inform cumulative effects assessments	
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Cultural Heritage Resources				
Recognize and respect Gitanyow traditional areas, values, and activities so that they may exercise their aboriginal rights on the landscape	<ul style="list-style-type: none"> • Preserve cultural sites • Preserve cultural heritage resources • Address Gitanyow interests in access to cultural sites • Identify and record locations of CMTs; minimize impact to these where appropriate • Maintain a sustainable source of cedar for Gitanyow traditional, cultural and subsistence use • Reserve land surrounding Gitanyow Lake for Gitanyow management of cultural heritage resources 	<ul style="list-style-type: none"> • See section 8.1.2 of the Assessment Report for a detailed analysis of potential effects on archaeological and heritage resources. • The Application states that the construction of the CCAR, Mitchell Pit, WTP, Energy Recovery Area, and TCAR could potentially directly affect known heritage sites and indirect effects could occur during operations due to increased human presence. • Specific proposed Project-related construction activities with the potential to affect archaeological sites include clearing and grading for roads and power line rights-of-way, clearing, grading and excavation for foundations and building footings, earth moving and blasting for mine construction, and tailings deposition in the TMF. 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 8.1.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on archaeological and heritage resources. • Heritage Management and Monitoring Plan • AEMP • Fish Habitat Compensation Plans under the <i>Fisheries Act</i> • WMP • Wildlife Effects Monitoring Plan • Wildlife Mitigation and Monitoring Plan • Closure and Reclamation Plan <p><u>Conditions:</u></p> <ul style="list-style-type: none"> • Requirements for consulting with First Nations, including Gitanyow Nation 	Consistent with the GLUP

		<ul style="list-style-type: none"> The Application reports that five of the 37 archaeological sites identified during the AIAs are in direct conflict with proposed Project-related activity (four lithic scatters and one artifact find), while two sites may be indirectly affected (both are lithic scatters). 		
Timber Resources				
<ul style="list-style-type: none"> Promote full utilization of productive sites while providing stable or increased harvest levels Develop a sustainable and economically viable forest industry that contributes to the local community over the short and long terms, while respecting Gitanyow interests 	<ul style="list-style-type: none"> Dedicate and maintain a productive timber harvesting land base, that promotes an economically sustainable forest industry Avoid timber harvesting within proposed treaty settlement lands shown on Schedule A, Maps 1-10 (from Gitanyow Treaty Settlement Lands Offer – 2002) Manage the forest harvest to represent the timber quality and terrain profile Maintain the long-term health and site productivity of the timber harvesting land base Limit conversion of the available productive forest 	N/A	N/A	N/A

	land base for non-timber purposes			
	<ul style="list-style-type: none"> • Develop long-term plans that recognize and respect Gitanyow interests in the forest resource 			
Water Management Units				
Manage surface water and groundwater to maintain water quality and peak and low flows within the range of natural variability, and protect the hydrologic integrity of the watersheds	Ensure proper hydrological functioning of streams, lakes, and wetlands within water management units identified in Schedule A, Maps 1-10	<ul style="list-style-type: none"> • See section 5.6.2 of the Assessment Report for a detailed analysis of potential effects on wetlands. • See section 5.2.2 of the Assessment Report for a detailed analysis of potential effects on surface water quality. • See section 5.4.2 of the Assessment Report for a detailed analysis of potential effects on groundwater quality/quantity. • See section 5.3.2 of the Assessment Report for a detailed analysis of potential effects on surface water quantity. 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 5.2.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on surface water quality. • See section 5.4.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on groundwater quality/quantity. • See section 5.3.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on surface water quantity. <ul style="list-style-type: none"> • WMP • ML/ARD Management Plan • AEMP • SeMP 	Consistent with the GLUP

		<p><u>Wetlands</u></p> <ul style="list-style-type: none">• Wetlands would be affected by development of the CCAR and TCAR, construction camps #3 and #7, the Kerr Pit, the Sulphurets Laydown Area, the TMF, and the Treaty OPC.• Wetlands may be partially or entirely eliminated by proposed Project component development and/or wetland function may be altered or degraded through direct or indirect interactions with proposed Project components. <p><u>Groundwater</u></p> <ul style="list-style-type: none">• Application states that groundwater quantity effects would occur throughout construction, operations, closure and post-closure. Potential effects include changes in the surface water environment in the proposed Project area including changes in hydraulic gradients, flow rate, flow direction and	<p><u>Conditions:</u></p> <p>In addition to the plans listed above, there are 12 conditions related to water management and five conditions related to selenium management in the TOC, including:</p> <ul style="list-style-type: none">• Requirements to meet BC Water Quality Guidelines or Site Specific Water Quality Objectives approved by the MOE during all phases of the proposed Project• Requirements to consult with First Nations, including the Gitanyow Nation• Requirements for agency and First Nation notification, and compliance with MOE direction regarding mitigation, in the event of contaminant level exceedances• Requirements to develop and submit the environmental management plans listed above to the MOE and/or the MEM for approval• Requirements for discharge rates to mimic stream flows• A requirement to report out on the baseline, pre-disturbance water quality under Mitchell	
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		<p>water level.</p> <ul style="list-style-type: none"> • The Application reports that alterations to groundwater flow patterns and water levels would be confined to the immediate catchments basins within the proposed Project footprint. • The Application states that seepage of contact water from mine infrastructure into the groundwater environment would alter the parameters that characterize groundwater quality. • Accidental release of industrial or other controlled substances could also affect groundwater quality. • Application states that groundwater quality would be affected along access roads during construction at the mine site and the PTMA. <p><u>Surface Water</u></p> <ul style="list-style-type: none"> • Key surface water quantity issues discussed in the Proponent's Application 	<p>Glacier</p> <ul style="list-style-type: none"> • A requirement to backfill and flood low-grade ore into Mitchell Pit if it is not milled at the end of the proposed Project life • Requirements regarding the design and construction of the Kerr Pit water management system infrastructure to withstand and operate during a 1-in-200 year peak flow event through all proposed Project phases • Requirements for a pilot water treatment plant to evaluate feasibility and submit a report to the MOE, MEM, and EAO • Requirements related to a seepage collection system at the base of the McTagg/Mitchell RSF • Requirements related to the construction/operation of a water treatment plant at the Mitchell WSF • Requirements for reporting to inform cumulative effects assessments 	
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		<p>included potential impacts at all proposed Project phases on annual flow volumes, monthly flow distribution, peak flow and low flows.</p> <ul style="list-style-type: none">• From a watershed perspective, although the residual effects on flows of the TMF, diversions and tunnels are of high magnitude in the upper reaches of streams with the local study area, the magnitude of these changes decrease in the downstream direction. None of the predicted residual effects on flows were considered critical to downstream resource values.• The Proponent identified the following sources of potential water quality effects: metal leaching/acid rock drainage, effluent discharge, sedimentation and erosion, leaching of blasting residues, sewage, accidental spills, seepage, and atmospheric deposition.		
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Upper Kispiox Special Management Zone				
<ul style="list-style-type: none"> • Primary goal is to maintain key resource values such as wildlife habitat, water quality, fish habitat, and cultural heritage resources • Secondary goal is to allow identified economic opportunities to prevail 	<ul style="list-style-type: none"> • Ensure proper hydrological functioning of all streams, lakes and wetlands within the Upper Kispiox Special Management Zone, as identified on Schedule A, Map 8 • Minimize long-term displacement of grizzly bears from industrial access development 	<ul style="list-style-type: none"> • See section 10.1.2 of the Assessment Report for a detailed analysis of potential transportation-related effects on fish and aquatic habitat, terrestrial ecosystems, wildlife, socioeconomics, and heritage. • See section 5.9.2 of the Assessment Report for a detailed analysis of potential effects on wildlife. • See section 5.5.2 of the Assessment Report for a detailed analysis of potential effects on fish and aquatic habitat. • See section 5.2.2 of the Assessment Report for a detailed analysis of potential effects on surface water quality. • See section 5.4.2 of the Assessment Report for a detailed analysis of potential effects on groundwater quality. 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 10.1.2 of the Assessment Report for a detailed list of mitigation measures for potential transportation-related effects on fish and aquatic habitat, terrestrial ecosystems, wildlife, socioeconomics, and heritage. • See section 5.9.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on wildlife. • See section 5.5.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on fish and aquatic habitat. • See section 5.2.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on surface water quality. • See section 5.4.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on groundwater quality. 	Consistent with the GLUP

		<ul style="list-style-type: none">• See section 8.1.2 of the Assessment Report for a detailed analysis of potential effects on archaeological and heritage resources.• See section 6.1.2 of the Assessment Report for a detailed analysis of potential effects on economics. <p><u>Wildlife</u></p> <ul style="list-style-type: none">• There is potential for effects on wildlife due to: habitat loss/alteration, disruption of movement, sensory disturbance, direct and indirect mortality, attractants, and chemical hazards.• The Application states that increased traffic levels from mine-related transportation activities may cause adverse effects on wildlife populations (including moose, bears, western toad, and birds) along the proposed transportation route during all phases of	<ul style="list-style-type: none">• See section 8.1.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on archaeological and heritage resources.• See section 6.1.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on economics. <ul style="list-style-type: none">• Wildlife Effects Monitoring Plan• Wildlife Mitigation and Monitoring Plan• Traffic and Access Management Plan• Dangerous Goods and Hazardous Materials Management Plan• Emergency Response Plan• Spill Prevention and Emergency Response Plan• Northwest Wildlife and Environmental Management Advisory Group (co-chaired by EAO and the FLNR, with participation from other provincial government agencies, local government, First Nations, federal government agencies, and industrial road users).• AEMP• Fish Habitat Compensation Plans under the <i>Fisheries Act</i>• WMP	
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		<p>the proposed Project.</p> <ul style="list-style-type: none">• In particular, potential effects may include injury or direct mortality of wildlife due to vehicle collisions, disruption of wildlife movement, and potential habitat degradation from spills and malfunctions. <p><u>Fish and Aquatic Habitat</u></p> <ul style="list-style-type: none">• The Application identified the following potential effects on fish and aquatic habitat: noise, erosion and sedimentation, water quality degradation, and habitat loss.• Potential effects from project-related traffic due to accidents and spills• The assessment concluded that spills of chemicals and/or fuel from transport trucks along the transportation route at waterbody crossing or near waterbodies could affect aquatic organisms.	<ul style="list-style-type: none">• ML/ARD Management Plan• Heritage Management and Monitoring Plan <p><u>Conditions:</u></p> <p>See relevant sections above (Fisheries Resources, Wildlife Resources, Water Resources)</p>	
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		<p><u>Surface Water Quality</u></p> <ul style="list-style-type: none">• The Proponent identified the following sources of potential water quality effects: metal leaching/acid rock drainage, effluent discharge, sedimentation and erosion, leaching of blasting residues, sewage, accidental spills, seepage, and atmospheric deposition. <p><u>Groundwater Quality</u></p> <ul style="list-style-type: none">• The Application states that seepage of contact water from mine infrastructure into the groundwater environment would alter the parameters that characterize groundwater quality.• Accidental release of industrial or other controlled substances could also affect groundwater quality.• Application states that groundwater quality would be affected along access roads during construction at the mine site and the PTMA.		
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		<p><u>Heritage Resources</u></p> <ul style="list-style-type: none">• The Application states that the construction of the CCAR, Mitchell Pit, WTP, Energy Recovery Area, and TCAR could potentially directly affect known heritage sites and indirect effects could occur during operations due to increased human presence.• Specific proposed Project-related construction activities with the potential to affect archaeological sites include clearing and grading for roads and power line rights-of-way, clearing, grading and excavation for foundations and building footings, earth moving and blasting for mine construction, and tailings deposition in the TMF.• The Application reports that five of the 37 archaeological sites identified during the AIAs are in direct conflict with proposed Project-related activity (four lithic scatters and one artifact find), while two sites may be		
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		<p>indirectly affected (both are lithic scatters).</p> <p><u>Socioeconomics</u></p> <ul style="list-style-type: none">• The Application reports that the proposed Project is expected to generate substantial employment opportunities, as well as spending on supplies and services, resulting in direct and spin-off (indirect and induced) economic impacts that would include increases in employment, personal income and overall economic value-added (GDP).• The proposed Project would also contribute to government revenues through personal income tax, corporate profit tax and sales tax, and would also pay rural property tax and revenues (BC mineral tax).• The Application predicts that Project-related changes in income and GDP would result in a beneficial residual effect on business		
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		<p>opportunities and economic development.</p> <ul style="list-style-type: none"> • Transportation of equipment, personnel, and materials to and from the proposed Mine Site is described in the Application to have possible effects on land use, quality of the natural environment, and community well-being. 		
Area To Be Protected				
<p>Protect key resource values such as fisheries, wildlife, recreation and cultural heritage resources while allowing for continued traditional use activity and identified economic opportunities to prevail</p>	<ul style="list-style-type: none"> • Maintain conservation, recreation, and cultural heritage values and features and features within the area to be protected identified as the Hanna-Tintina Area to be protected in Schedule A, map 1 • Recognize the rights and interests of existing eligible tenures within the area to be protected • Maintain ecosystem representation, abundance and integrity, and protect key resource values and natural features • Protect cultural heritage values 	<ul style="list-style-type: none"> • See section 10.1.2 of the Assessment Report for a detailed analysis of potential transportation-related effects on fish and aquatic habitat, wildlife, socioeconomics, and heritage. • See section 8.1.2 of the Assessment Report for a detailed analysis of potential effects on archaeological and heritage resources. • See section 5.5.2 of the Assessment Report for a detailed analysis of potential effects on fish and aquatic habitat. • See section 5.9.2 of the 	<p><u>Mitigations:</u></p> <ul style="list-style-type: none"> • See section 8.1.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on archaeological and heritage resources. • See section 6.1.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on economics. • See section 5.5.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on fish and aquatic habitat. • See section 5.9.2 of the Assessment Report for a detailed list of mitigation measures for 	<p>Consistent with the GLUP</p>

	<ul style="list-style-type: none"> • Recognize hunting and angling as an acceptable use within Protected Areas 	<p>Assessment Report for a detailed analysis of potential effects on wildlife.</p> <ul style="list-style-type: none"> • See section 7.1.2 of the Assessment Report for a detailed analysis of potential social effects, including recreation. • See section 6.1.2 of the Assessment Report for a detailed analysis of potential effects on economics. <p><u>Heritage Resources</u></p> <ul style="list-style-type: none"> • The Application states that the construction of the CCAR, Mitchell Pit, WTP, Energy Recovery Area, and TCAR could potentially directly affect known heritage sites and indirect effects could occur during operations due to increased human presence. • Specific proposed Project-related construction activities with the potential to affect archaeological sites include clearing and grading 	<p>potential effects on wildlife.</p> <ul style="list-style-type: none"> • See section 7.1.2 of the Assessment Report for a detailed list of mitigation measures for potential effects on social effects, including recreation. • See section 10.1.2 of the Assessment Report for a detailed list of mitigation measures for potential transportation-related effects on fish and aquatic habitat, socioeconomics, and heritage. <ul style="list-style-type: none"> • Heritage Management and Monitoring Plan • AEMP • Fish Habitat Compensation Plans under the <i>Fisheries Act</i> • WMP • Wildlife Effects Monitoring Plan • Wildlife Mitigation and Monitoring Plan • Closure and Reclamation Plan • Procurement Strategy • Traffic and Access Management Plan • Dangerous Goods and Hazardous Materials Management Plan • Emergency Response Plan • Spill Prevention and Emergency Response Plan 	
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		<p>for roads and power line rights-of-way, clearing, grading and excavation for foundations and building footings, earth moving and blasting for mine construction, and tailings deposition in the TMF.</p> <ul style="list-style-type: none">• The Application reports that five of the 37 archaeological sites identified during the AIAs are in direct conflict with proposed Project-related activity (four lithic scatters and one artifact find), while two sites may be indirectly affected (both are lithic scatters). <p><u>Fisheries Resources</u></p> <ul style="list-style-type: none">• The Application identified the following potential effects on fish and aquatic habitat: noise, erosion and sedimentation, water quality degradation, and habitat loss.• Potential effects from project-related traffic due to accidents and spills• The assessment concluded	<ul style="list-style-type: none">• Northwest Wildlife and Environmental Management Advisory Group (co-chaired by EAO and the FLNR, with participation from other provincial government agencies, local government, First Nations, federal government agencies, and industrial road users). <p><u>Conditions:</u></p> <p>See relevant sections above (Fisheries Resources, Wildlife Resources)</p>	
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		<p>that spills of chemicals and/or fuel from transport trucks along the transportation route at waterbody crossing or near waterbodies could affect aquatic organisms.</p> <p><u>Wildlife Resources</u></p> <ul style="list-style-type: none">• There is potential for effects on wildlife due to: habitat loss/alteration, disruption of movement, sensory disturbance, direct and indirect mortality, attractants, and chemical hazards.• The Application states that increased traffic levels from mine-related transportation activities may cause adverse effects on wildlife populations (including moose, bears, western toad, and birds) along the proposed transportation route during all phases of the proposed Project.• In particular, potential effects may include injury or direct mortality of wildlife		
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		<p>due to vehicle collisions, disruption of wildlife movement, and potential habitat degradation from spills and malfunctions.</p> <p><u>Recreation</u></p> <ul style="list-style-type: none">• There is potential for effects on recreational hunters and fishers (due to access restrictions to the land and resources) and commercial recreation stakeholders (as a result of sensory disturbances). <p><u>Socioeconomics</u></p> <ul style="list-style-type: none">• The Application reports that the proposed Project is expected to generate substantial employment opportunities, as well as spending on supplies and services, resulting in direct and spin-off (indirect and induced) economic impacts that would include increases in employment, personal income and overall economic value-added		
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		<p>(GDP).</p> <ul style="list-style-type: none">• The proposed Project would also contribute to government revenues through personal income tax, corporate profit tax and sales tax, and would also pay rural property tax and revenues (BC mineral tax).• The Application predicts that Project-related changes in income and GDP would result in a beneficial residual effect on business opportunities and economic development.• Transportation of equipment, personnel, and materials to and from the proposed Mine Site is described in the Application to have possible effects on land use, quality of the natural environment, and community well-being.		
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12.2 Gitxsan Nation (including *wilp* Skii km Lax Ha)

12.2.1 Gitxsan Nation Overview

The term Gitxsan means “people of the Skeena River”. Gitxsan Nation’s asserted traditional 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).

The social unit of Gitxsan society is the *wilp* (house). 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 considers the *wilp* to be the sole land and resource managing authority within their specific territory (lax yip). 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 by the Gitxsan Nation to be more than 13,000.

Currently there is no single political organization that represents all Gitxsan *Huwilp* regarding asserted claims to aboriginal rights and title (Aboriginal Interests). For the proposed Project, the Province consulted the *wilp* that is geographically closest to the proposed Crown action or decision on behalf of the broader Gitxsan Nation. *Wilp* Skii km Lax Ha asserts a traditional territory separate from the rest of the Gitxsan Nation and was consulted directly.

Figure 28a: Proposed KSM Project and Skii km Lax Ha and Gitxsan Nation Traditional Territories (source: Proponent's Application and based on information supplied by First Nations)

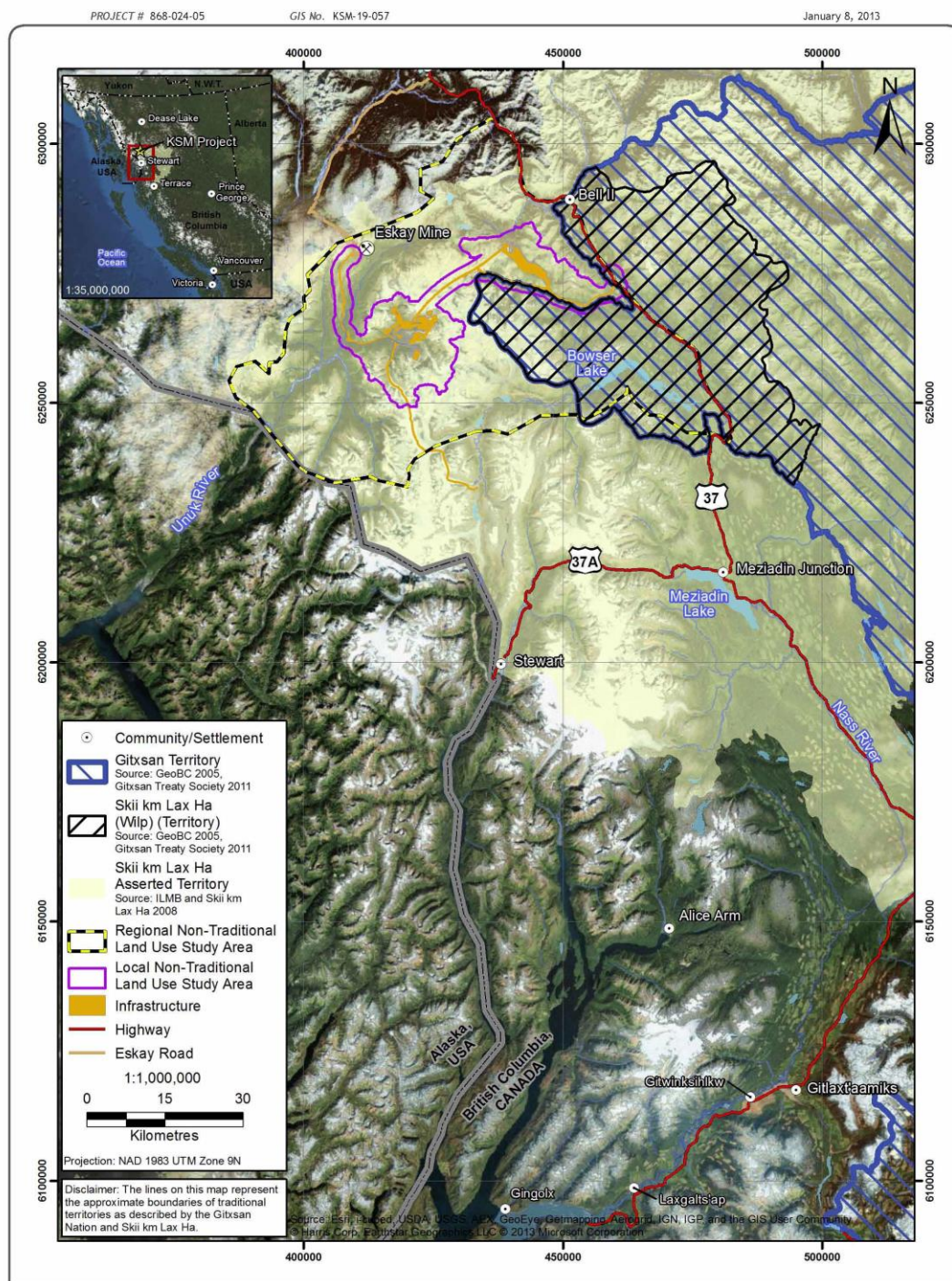


Figure 27b: Proposed KSM Project and Skii km Lax Ha Traditional Territory
(source: EAO's preliminary strength of claim analysis for Skii km Lax Ha)

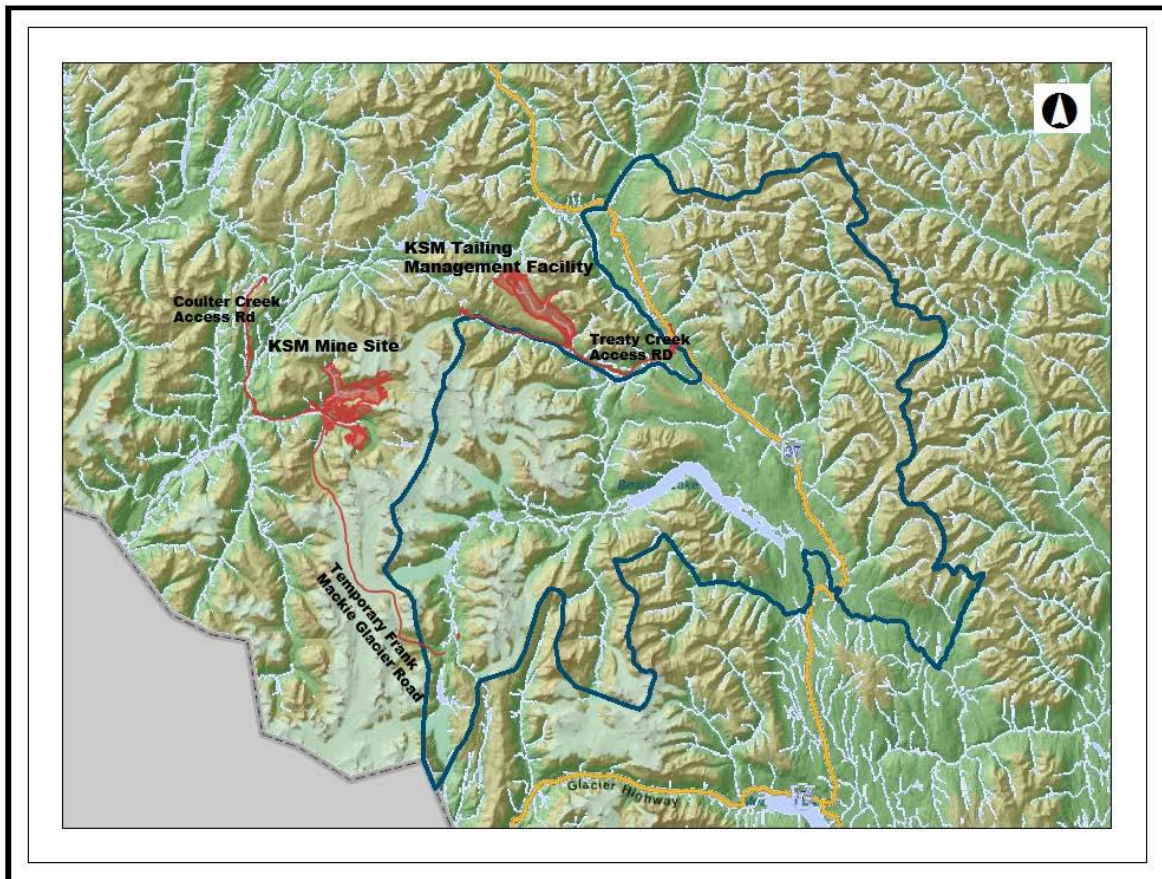
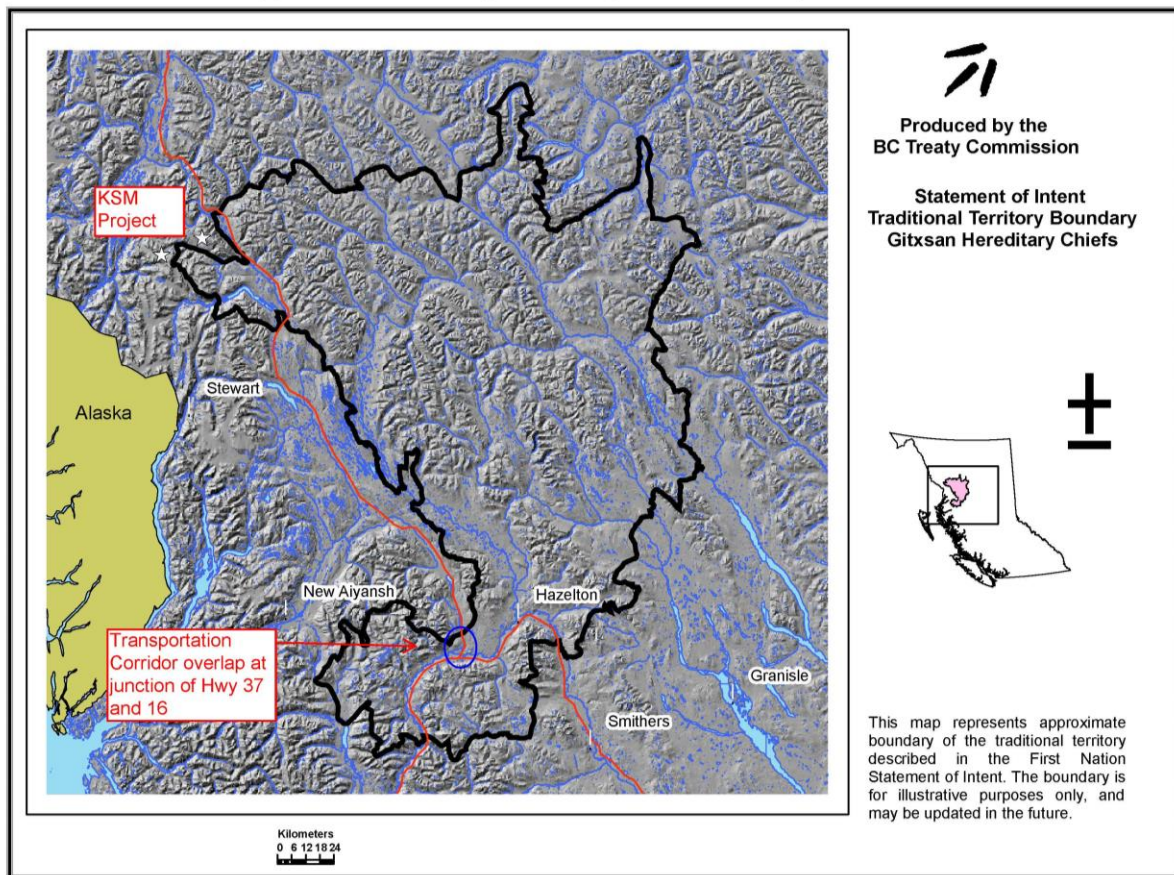


Figure 27c: Proposed KSM Project – Transportation Corridor Overlap with Traditional Territories of *wilp* Sakum Higookxw and *wilp* Gaxsbgabaxs (source: EAO’s preliminary strength of claim analysis)



12.2.2 Traditional Use of the Proposed Project Area by Gitksan Nation (including *wilp* Skii km Lax Ha)

Although the proposed mine site is not located within the asserted traditional territory of the Gitksan Nation, a segment of the proposed transportation route along Hwy 37 (south from the Treaty Creek Access Road to the junction of Hwy 16) is located within the Gitksan Nation’s asserted traditional territory. In addition, the Bell-Irving River (a tributary of the Nass River) is located downstream of the proposed Project and flows through portions of the Gitksan Nation’s asserted traditional territory (Figure 27).

Wilp Skii km Lax Ha has asserted a separate traditional territory and has stated that the proposed Project is located within it (Figure 27). According to the Proponent’s Application, the proposed Mine Site, PTMA, and related infrastructure are located within *wilp* Skii km Lax Ha’s asserted traditional territory and could potentially impact their Aboriginal Interests. In addition, a temporary access road to support construction activities during the winter is located within the traditional territory asserted by *wilp* Skii

km Lax Ha, although the Proponent found that there would not be any significant residual effects associated with this temporary road.

According to the Proponent's Application, the Gitxsan hunt, fish, trap and harvest berries and other plants for food and medicinal purposes throughout their traditional territory. The Gitxsan Nation harvest the following wildlife for subsistence purposes:

- deer;
- moose;
- mountain goat;
- black bear; and
- grizzly bear.

Mountain goat used to be hunted by the Gitxsan Nation along the Skeena River, near Stewart, and in the upper Nass and Kisgaga'as areas, while the following species were trapped (and continue to be, although at lower levels than in the past):

- beaver;
- mink;
- marten;
- fisher;
- fox;
- wolf;
- coyote;
- weasel; and
- otter.

According to the Proponent's Application, the Gitxsan Nation also harvest the following fish species within their traditional territory:

- sockeye;
- coho;
- steelhead;
- char;
- Dolly Varden;
- lake trout; and
- cutthroat trout.

The Proponent's Application also indicates that berries are harvested by the Gitxsan Nation in different areas within the traditional territory, including:

Clear-cut Areas

- saskatoon berries;
- hazelnuts;
- chokecherries;
- rosehips;
- gooseberries;
- squash berries;
- raspberries;
- thimbleberries; and
- soapberries.

Valleys

- wild crab-apples;
- swamp cranberries;
- Saskatoon berries;
- Thornberry;
- rosehips; and
- soapberries.

Lower Elevation Wet Areas

- devil's club;
- yellow pond lily root; and
- edible mushrooms, including pine mushrooms.

No specific information has been received from the Gitxsan Nation regarding their current use of land and resources within or near the proposed Project area.

In addition to the information about traditional uses undertaken by the Gitxsan Nation as a whole, the Proponent's Application also provided information about traditional uses undertaken by *wilp Skii km Lax Ha* within the traditional territory they assert as separate from the Gitsan Nation's asserted traditional territory. Similarly to the Gitxsan Nation, *wilp Skii km Lax Ha* asserts rights to hunt, fish, trap and gather berries and other plants for food and medicinal purposes throughout their asserted traditional territory.

According to the Proponent's Application, *wilp Skii km Lax Ha* harvest the following wildlife:

- moose;
- black bear; and
- grizzly bear.

The Proponent's Application also states that prior to 2009, beaver, marten, and wolverine were trapped along Hwy 37 from the Cranberry River to the *wilp Skii km Lax*

Ha cabin located on Skowill Creek. There are two *wilp* Skii km Lax Ha traplines located near the PTMA and the Treaty Creek Access Road of the proposed Project. While, *wilp* Skii km Lax Ha has indicated to the Proponent that the amount of time members have spent on the traplines has reduced in the past years because of the operation of their mineral exploration/mining sector contracting business, Tsesaut Ventures Ltd., *wilp* Skii km Lax Ha views this as temporary and plans on expanding its trapline infrastructure, as noted below.

According to the Proponent's Application, *wilp* Skii km Lax Ha have (and have had) a number of cabins in the following locations:

Historically

- Gilbert Lake (along the Treaty Creek Access Road);
- Todedada Lake;
- at the confluence of Treaty Creek and North Treaty Creek (south of the TMF);
- along the Bell-Irving River near Wildfire Ridge;
- Teigen Lake (above the PTMA); and
- Taft Creek.

Currently

- Skowill Creek (near Hwy 37);
- Bell Creek (also known as Spruce Creek); and
- the outlet of Bowser Lake.

Reportedly, *wilp* Skii km Lax Ha is also planning to replace a cabin along Teigen Creek, halfway between the mouth of the creek and Teigen Lake.

According to the Proponent's Application, *wilp* Skii km Lax Ha's primary fishing areas are located mostly downstream of the TMF along the Bell-Irving River from the confluence of Snowbank and Teigen Creeks to Bowser Lake and the Bowser/Bell-Irving confluence. Specifically, *wilp* Skii km Lax Ha harvests the following fish species at the following locations within their asserted traditional territory:

Spring Salmon

- Cranberry River;
- Snowbank Creek/Bell-Irving River confluence near Bell II; and
- Treaty Creek/Bell-Irving River confluence.

Steelhead

- west side of the Bell-Irving River; and
- along the Bell-Irving River between Treaty Creek and Wildfire Creek (*wilp* Skii km Lax Ha also fishes for steelhead trout here).

In addition to information regarding hunting, fishing, and trapping activities undertaken by *wilp* Skii km Lax Ha, the Proponent's Application also provides the following list of berries and plants collected by *wilp* Skii km Lax Ha in the Bell-Irving and Ningunsaw valleys and around Bowser Lake (located well south of the PTMA):

- huckleberries;
- blueberries;
- cranberries;
- soapberries;
- devil's club;
- mushrooms; and
- medicinal plants.

12.2.3 Gitxsan Nation Aboriginal Rights and Title (including *wilp* Skii km Lax Ha)

A consideration of Gitxsan Nation's Aboriginal Interests that may be impacted by the proposed Project was approached on the basis of information currently available to the Province, including information provided during consultation, and guidance from the courts regarding aboriginal rights.

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 is assessed on the basis of information regarding regular and exclusive use or occupation of land at 1846.

As set out in a letter from EAO to Gitxsan *wilp* Gaxsbgabaxs and Sakum Higookxw (and copied to the GHCO) dated December 23, 2013, the information that was reviewed and considered by EAO in its initial assessment of Gitxsan Aboriginal Interests is as follows:

- *Gitxsan Nation: A Preliminary Review of Ethnographic, Historical and Archaeological Resources* (April 6, 2010);
- *Gitxsan First Nation v. British Columbia (Minister of Forests)*, 2002 BCSC 1701; and
- *Delgamuukw v. British Columbia*, [1997] 3 S.C.R. 1010.

The requirements of the section 13 Order issued by EAO on September 29, 2011, which amended the section 11 Order issued on November 6, 2009, required the Proponent to assess the potential effects that could arise from the transport of people, goods and materials, including, but not limited to fuel, hazardous cargo and explosives along access roads and Hwy 37 between the proposed Project site and its junction with Hwy 16 at Kitwanga.

Approximately 14 km of the transportation route along Hwy 37 (near the junction of Hwy 16) overlaps Gitxsan Nation's asserted traditional territory. Potential impacts from the proposed Project on Gitxsan Nation Aboriginal Interests likely include the following:

- increased traffic;
- risk of accidents and malfunctions;
- collisions with wildlife; and
- spills of hazardous materials that could impact wildlife, wildlife habitat, fish and fish habitat, vegetation, and water quality.

Considering the proximity of a portion of the transportation route for the proposed Project to the Skeena and Kitwanga Rivers, the Gitxsan Nation would have likely utilized this area for hunting, fishing and gathering, which supports a strong *prima facie* claim of aboriginal rights to hunt, fish and gather in this area.

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 proposed Project to impact Gitxsan Nation's Aboriginal Interests in the area, to be low. This view is supported by the understanding that the transportation route would utilize an established provincial Hwy, and therefore no new works would be required and the potential impacts would be limited to increased traffic. 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.

12.3 Consultation with Gitxsan Nation

12.3.1 Gitxsan Nation involvement with EAO

Pre-Application Stage

EAO notified the Gitxsan Nation via the GHCO of the initiation of the EA for the proposed Project via letter on April 30, 2008; in that letter, EAO advised that the EA process had been initiated and that it would contact the Gitxsan Nation again shortly in order to discuss opportunities for the Gitxsan Nation to participate. One month later, on May 26, 2008, EAO followed up with a second letter providing more detailed information about the proposed Project and requesting a government-to-government meeting to discuss the Gitxsan Nation's interests in the proposed Project area and determine whether the Gitxsan Nation would be interested in participating in the EA. EAO noted that, based on the Province's current understanding, the proposed Project appeared to be located outside the Gitxsan Nation's asserted traditional territory, but that there could potentially be downstream effects as a result of the proposed Project. EAO requested a meeting with the Gitxsan Nation to discuss the nature and scope of the Gitxsan Nation's Aboriginal Interests in the proposed Project area.

Throughout May 2008, EAO contacted the Gitxsan Nation via telephone and e-mail to schedule a meeting, which then took place on June 10, 2008. EAO and the CEA Agency met with representatives from the Gitxsan Treaty Society in Hazelton, where Gitxsan representatives provided an overview of the traditional territory and governance structure. EAO presented a map identifying the location of the ore deposit and the proposed plant site and TMF for the proposed Project, and requested confirmation that the proposed Project lies outside the Gitxsan Nation's asserted traditional territory. The Gitxsan Nation expressed an interest in participating in the EA of the proposed Project, including Working Group meetings, and requested capacity funding. In July 2009, EAO wrote to the GHCO to provide a copy of the Proponent's 2008 Baseline Studies Report and asked for feedback regarding whether there were any gaps that should be incorporated into the 2009 Baseline Studies Workplan, which was attached for review and comment. EAO also invited the Gitxsan Nation to participate in the following meetings:

- a Working Group meeting on May 27, 2009 in Terrace to discuss the baseline studies and draft AIR;
- a sub-Working Group meeting in Terrace to discuss ML/ARD;
- a sub-Working Group meeting in Vancouver to discuss fisheries; and
- a government-to-government meeting with EAO and the CEA Agency to discuss the provincial and federal EA processes and the nature and scope of Gitxsan Nation rights in the proposed Project area.

On May 28, 2009, EAO and the CEA Agency met with representatives from the GHCO in Hazelton, where the GHCO expressed concerns about water, impacts on Hwy 37, and the economic viability of the proposed Project. EAO explained the provincial EA process and provided an outline of the opportunities for the Gitxsan Nation to be involved in the EA of the proposed Project, including timelines. EAO once again requested information about the Gitxsan Nation's interests in the proposed Project area (including a map of the Gitxsan house groups) in order to determine whether there would be any potential for impacts on asserted Aboriginal rights and interests. The GHCO representatives advised that the proposed Project is located mostly in the Nass watershed and in the upper Skeena watershed, and that the Gitxsan Nation was in the process of developing water, fish, and wildlife policies for those areas. The GHCO noted that *wilp* Skii km Lax Ha is involved and has other arrangements with the Proponent. The GHCO advised that every Gitxsan *wilp* is independent and it is not unusual to have interactions with individual *wilp*, but that they work together in the watersheds. They also advised that Gordon Sebastian is the primary contact for most *wilp*, but that *wilp* Skii km Lax Ha prefers to be consulted directly. The GHCO represents individual *wilp*, but does not have control over the *wilp* or their individual territories. EAO advised that the draft order under section 11 of the Act would identify the Gitxsan First Nation (as identified by the Gitxsan Hereditary Chiefs), and explained that this approach would enable all the Gitxsan *wilp* to participate in the EA. The GHCO requested that *wilp* Skii km Lax Ha be included in the section 11 order.

Between June 2009 and June 2011, EAO wrote the following letters to the GHCO:

- June 16, 2009 - provided a copy of the Chapter 7 Geochemistry Baseline Study Report for the proposed Project and invited the Gitxsan Nation to participate in an ML/ARD meeting in Vancouver on July 22, 2009;
- July 10, 2009 – conveying the draft section 11 order for review and comment, providing information regarding the EA process, and requesting contact information for those Gitxsan *huwilp* that may be interested in being consulted directly regarding the EA of the proposed Project;
- June 18, 2010 – conveying the draft AIR for review and comment;
- September 7, 2010 – conveying the draft AIR for review and comment a second time; and
- June 13, 2011 – conveying a draft order under section 13 of the Act for review and comment, offering to meet during the week of September 20, and requesting confirmation of the primary contact for the GHCO.

EAO met with representatives of the GHCO on August 15, 2011 in Hazelton to discuss the cooperative federal-provincial EAs for the proposed KSM, Morrison, Kitsault, and Schaft Creek projects.

On October 4, 2011, EAO wrote to the GHCO to advise that since no comments had been received from the GHCO, EAO had finalized the section 13 order and changes to the AIR.

Between December 2012 and June 2013, EAO wrote the following letters to *Huwilp* Sakum Higooxw (territories Lax Behlit and Xsu Gwin Yookhl) and Gaxsbgabaxs (territory Gasa Lax Loobit):

- December 17, 2012 – advised that EAO has been consulting with the GHCO to date regarding the EA of the proposed Project, but that ARR had suggested that the Gitxsan *Huwilp* may prefer to be consulted directly. EAO requested confirmation of whether the *Huwilp* were interested in participating in the EA;
- January 30, 2013 – conveyed a copy of the Proponent's summary of consultations already carried out in relation to the proposed Project and a proposal for a consultation process during Application review, and requested comments;
- February 6, 2013 – requested contact information for specific representatives if the *Huwilp* wished to be consulted directly regarding the EA of the proposed Project, and offered capacity funding for each *wilp* in order to facilitate their participation;
- June 13, 2013 – advised that EAO had determined that the Proponent's Application included all of the information set out in the AIR and that the 180-day review would begin once copies of the Application had been received by the Working Group and First Nations. EAO also provided information regarding opportunities for the *Huwilp* to participate in the EA and provide input.

On September 5, 2013, EAO received confirmation from *wilp* Sakum Higookxw (territories Lax Behlit and Xsu Gwin Yookhl) that they were interested in receiving capacity funding to participate in the EA of the proposed Project, which EAO then sent on October 9, 2013.

Application Review Stage

Initiation of the 180-Day Review

The 180-day Application review stage of the EA for the proposed Project was initiated on August 12, 2013. EAO communicated with the Gitxsan Nation between August and September regarding the initiation of the review, including:

- **August 15, 2013** – e-mail from EAO to the Working Group (including the Gitxsan Nation) advising that the 180-day review had started; and
- **August 29-September 12, 2013** – e-mails regarding a conference call to discuss the initiation of the 180-day Application review stage; EAO canvassed for preferences regarding potential dates for the call and provided copies of the a proposed agenda and a revised EA review schedule.

On September 13, 2013, EAO held a conference call with the Proponent and representatives from the CEA Agency and the Working Group to discuss the initiation of the 180-day Application review stage; no representatives from the GHCO participated in the call. EAO and the CEA Agency presented the provincial and federal EA processes and timelines, including the following milestones and key steps in the EA:

- initiation of the 180-day review on August 12, 2013;
- a 45-day public comment period from September 6-October 9, 2013 with open houses in Iskut, Telegraph Creek, Smithers, Terrace, and Stewart;
- a series of Working Group and sub-Working meetings to be held throughout the review;
- an opportunity to review and submit comments on the Proponent's Application;
- an opportunity to review and submit comments on the Proponent's responses to comments on the Application;
- an opportunity to review and submit comments on EAO's draft Assessment Report, CPD, and TOC; and
- an opportunity for First Nations (including the Gitxsan Nation) to review and submit comments on EAO's draft First Nations Consultation Report.

During the call, Working Group members were also given an opportunity to engage in discussion with, and ask preliminary questions of, the Proponent regarding the Application. EAO asked Working Group members for their feedback regarding the format and intent of future Working Group meetings, including the utility of forming technical sub-Working Groups. EAO provided information regarding upcoming open houses and advised that the deadline for the first round of Working Group comments on the Application was October 11, 2013.

Meetings and Key Correspondence with the Gitxsan Nation

On September 4, 2013, the Gitxsan Treaty Society sent a letter to EAO expressing support for the proposed Project. The letter provides a description of the Gitxsan Nation's asserted traditional territory and the assertion that the Gitxsan people wish to benefit more effectively from the natural resources contained within it. In the letter, the Gitxsan Treaty Society states that the Gitxsan people are in support of the proposed Project, which they believe will bring jobs and other economic benefits to their people and communities. The letter also expressed the Gitxsan Treaty Society's belief that the Proponent is committed to the community, First Nations, and the Gitxsan people.

On December 20 and 23, 2013, respectively, EAO wrote letters to *wilp* Gaxsbgabaxs and *wilp* Sakum Higookw (and copied the Gitxsan Treaty Society) to provide EAO's initial views of the potential impacts from the proposed Project on the Aboriginal Interests of the Gitxsan Nation. The letter outlined the following:

- EAO's initial assessment of the Gitxsan Nation's Aboriginal Interests in the proposed Project area;
- potential impacts of the proposed Project on Gitxsan Aboriginal interests; and
- the scope of EAO's consultation with the Gitxsan Nation regarding the EA of the proposed Project.

EAO requested feedback from the Gitxsan Nation regarding its initial assessment and the scope of consultation by January 24, 2014 and offered to meet with the Gitxsan Nation to answer any questions or discuss the EA of the proposed Project. EAO also advised that the Gitxsan Nation would have an opportunity to review and comment on EAO's draft Assessment Report, as well as the option to submit a separate report of their own to Ministers for their consideration along with EAO's Assessment Report.

Between November 2013 and January 2014, EAO communicated regularly with the Gitxsan Nation (including via e-mail as members of the Working Group. EAO provided the following information and opportunities for input into the EA of the proposed Project:

- **November 5, 2013** – EAO provided a copy of the draft CPD, explaining the purpose of the document and future opportunities to provide comments;
- **November 5, 2013** – EAO provided copies of water quality prediction graphs submitted by the Proponent;
- **November 18, 2013** – EAO advised that the deadline for the Working Group to submit comments on the Proponent's Application had passed and requested notification if any organizations that had not yet submitted comments were still planning to do so;

- **November 19, 2013** – EAO provided copies of the MEM's geotechnical comments and the Proponent's responses for information and consideration;
- **November 27, 2013** – EAO requested feedback on the Proponent's responses to the geotechnical comments and supporting information by December 11, 2013;
- **December 11, 2013** – EAO circulated the Proponent's responses to Working Group comments related to the following for review and comment by January 10, 2014:
 - wildlife;
 - closure and reclamation;
 - fisheries;
 - cumulative effects;
 - First Nations interests;
 - human health;
 - social and transportation issues;
 - rare plants; and
 - the dam failure effects assessment.
- **December 20, 2013** - EAO circulated the Proponent's responses to all remaining Working Group comments for review and comment by January 24, 2014 and advised that the Proponent had requested a 30-day extension to the 180-day review timeline.
- **January 8, 2014** – EAO advised that due to the large volume and complexity of the materials submitted by the Proponent in response to comments from the Working Group, the deadline for all comments on the responses was being extended until January 24, 2014.
- **January 17, 2014** – EAO acknowledged the challenge faced by Working Group members to review all of the materials submitted by the Proponent in response to Working Group comments, and requested feedback or input regarding how EAO could potentially facilitate that review;
- **January 20, 2014** – EAO circulated the finalized summary for the October 2-3, 2013 Working Group meeting in Smithers.
- **January 30, 2014** – EAO advised that the Proponent's request to extend the 180-day review timeline by 30 days had been approved and provided a copy of the cover letter to the Proponent and the signed order under section 24(4) of the Act.

On January 13, 2014, EAO participated in a conference call with representatives from the Gitsxan Treaty Society and the CEA Agency. The purpose of the call was for EAO and the CEA Agency to provide updates on the status of the federal and provincial EAs

for the proposed Project, including the opportunities and timelines for the Gitxsan Nation to review and provide input into the draft Assessment Report, First Nations Consultation Report, CPD, and Table of Commitments. The Gitxsan representatives reiterated their support for the proposed Project and provided the following reasons:

- the proposed Project seems very sustainable;
- no families will be displaced by the TMF;
- there are more pros than cons;
- they are pleased with the water treatment plan; and
- Gitxsan plans to be involved in the reclamation.

Although the Gitxsan representatives confirmed their support for the proposed Project, a number of concerns was also raised during the discussion, including:

- the Fish Habitat Compensation Plan;
- the effectiveness of habitat compensation for protecting Dolly Varden; and
- the potential inability of government to provide effective oversight with respect to monitoring and compliance.

The CEA Agency committed to providing the Gitxsan Nation with the specific sections of the Proponent's Application that set out the Fish Habitat Compensation Plans in more detail. EAO explained that if an EA Certificate is issued for the proposed Project, monitoring would be undertaken by responsible line agencies with oversight by EAO's Compliance and Enforcement Branch, and would be set out as conditions of the EA Certificate. Monitoring and compliance would also be undertaken according to the process set out in EAO's October 2012 follow-up report to the Auditor General's 2011 Audit of EAO's Oversight of Certified Projects Report, both of which are posted on EAO's website.

In response to an issue regarding existing culverts along Hwy 37 raised by the Gitxsan Nation representatives, EAO advised that a Hwy 37 Advisory Group had been established. One of the purposes of the Advisory Working Group is to provide a forum for representatives from First Nations, industry, and government agencies to discuss wildlife and resource issues related to the operation and maintenance of Hwy 37. EAO also committed to providing the Gitxsan Nation with the contact information for a MOTI representative from the Advisory Working Group.

Throughout the remainder of the EA, EAO continued to communicate regularly with the Gitxsan Nation and provided information and opportunities for input into the EA of the proposed Project. Via e-mails to the Working Group, EAO provided the Gitxsan Nation with the following:

- copies of memos and comments submitted by other members of the Working Group, as well as the Proponent's responses;
- invitations to participate in Working Group meetings;
- updates on the timelines and next steps in the EA of the proposed Project; and
- opportunities to provide input.

Open Houses

EAO advised the members of the Working Group (including the Gitxsan Nation) via e-mail of the date, time, and location for each of the following five open houses held during the 45-day public comment period for the EA of the proposed Project:

- Iskut → September 25, 2013
- Telegraph Creek → September 26, 2013
- Terrace → October 1, 2013
- Smithers → October 2, 2013
- Stewart → October 9, 2013

Comments on the Application and Proponent Responses

EAO provided several opportunities for the Gitxsan Nation to provide input on the Proponent's Application for an EA Certificate and the Proponent's responses to Working Group comments. No comments were received from the Gitxsan Nation.

Working Group & Technical Sub-Working Group Meetings

Between October 2013 and May 2014, EAO and the CEA Agency scheduled the following Working Group and technical sub-Working Group meetings:

- **October 2-3, 2013** – the Proponent presented their significance determination framework and key areas of the Application, followed by a discussion, and an opportunity to ask questions (no GHCO representatives participated in the meeting, although a Gitxsan Treaty Society representative advised via e-mail on October 7, 2013 that they would still like to receive information regarding future meetings)
- **November 6-8, 2013** – an opportunity to engage in technical level discussions on issues related to wildlife and water quality on both the mine side and tailings side of the proposed Project (no GHCO representatives participated in these meetings)
- **November 26-28, 2013** – an opportunity to engage in a technical level discussion, review the Proponent's proposed mitigation measures and conditions, and identify outstanding geotechnical issues for resolution (no GHCO representatives participated in these meetings)

- **May 13-15, 2014** – a three-day Working Group meeting to discuss EAO's draft Assessment Report, TOC, CPD, and issues tracking table. The meetings provided Working Group members with an opportunity to discuss and ask questions about EAO's key findings with respect to potential effects from the proposed Project on water quality, wildlife, fish, and transportation

12.3.2 *Wilp Skii km Lax Ha* involvement with EAO

Pre-Application Stage

On April 30, 2008, EAO wrote a letter to notify *wilp Skii km Lax Ha* that the EA for the proposed Project had been initiated and outlined the opportunities for *wilp Skii km Lax Ha* to participate.

On May 8, 2008, EAO sent *wilp Skii km Lax Ha* another letter that contained the following:

- information regarding the proposed Project;
- an invitation to participate in the Working Group;
- an invitation to schedule a government-to-government meeting to discuss consultation opportunities and the nature and scope of *wilp Skii km Lax Ha*'s asserted Aboriginal rights and interests in the proposed Project area; and
- an offer of capacity funding to facilitate *wilp Skii km Lax Ha*'s participation in the EA.

On June 9, 2008, EAO and the CEA Agency met with *wilp Skii km Lax Ha* representatives in Smithers to discuss *wilp Skii km Lax Ha*'s interests in the proposed Project area. In June 2008, *wilp Skii km Lax Ha* contacted EAO to indicate an interest in participating in the EA, but advised that capacity funding would be required.

On October 8, 2008, EAO responded to a letter from *wilp Skii km Lax Ha* expressing concerns with EAO's proposed consultation approach for the EA of the proposed Project, and requested additional information regarding the nature of the rights being asserted by *wilp Skii km Lax Ha*. On December 5, 2008, EAO followed up with another letter requesting clarification to support *wilp Skii km Lax Ha*'s claim that they are a distinct rights-holding group, inviting them to participate in the Working Group, and inviting them to participate in a one-on-one meeting with EAO. EAO requested information and traditional knowledge that could support *wilp Skii km Lax Ha*'s claim to lands in the proposed Project area, and outlined future opportunities for the *wilp Skii km Lax Ha* to be involved in the EA.

On December 15, 2008, *wilp Skii km Lax Ha* wrote to EAO requesting a meeting to discuss issues not adequately addressed through the Working Group and the current consultation process for the EA of the proposed Project. *Wilp Skii km Lax Ha* also

requested EAO's presence at a *wilp* Skii km Lax Ha open house being hosted by the Proponent and outlined the following concerns with the proposed Project:

- carbon footprint;
- transportation of concentrate from the proposed Project; and
- downstream effects.

On February 16, 2009, EAO wrote to *wilp* Skii km Lax Ha acknowledging receipt of information regarding their traditional territory, and encouraging *wilp* Skii km Lax Ha to participate in the Working Group. EAO also requested a meeting with the *wilp* Skii km Lax Ha to discuss consultation, *wilp* Skii km Lax Ha's customs and practices in the proposed Project area, concerns and issues, as well as the EA process. *Wilp* Skii km Lax Ha wrote back to EAO on February 23, 2009 to advise that reports being produced by the Proponent do not accurately reflect facts regarding *wilp* Skii km Lax Ha's occupation of the proposed Project area and characterizing their occupation as belonging to someone else.

On May 12, 2009, EAO wrote a letter to *wilp* Skii km Lax Ha to advise that it had instructed ARR to review and revise its existing ethnohistoric research in order to improve EAO's understanding of *wilp* Skii km Lax Ha's interests with respect to the proposed Project area. EAO also provided specific information and rationale for the revisions that were made to the report, and confirmed that EAO would continue to consult with *wilp* Skii km Lax Ha at the low end of the *Haida* spectrum, which includes giving notice, disclosing information, and discussing any issues raised in response to the notice. EAO advised that *wilp* Skii km Lax Ha would not be specifically included in the section 11 order and, as such, the Proponent would not be required to consult directly with them; however, EAO would continue to consult directly with *wilp* Skii km Lax Ha, including participation in the Working Group.

On May 25, 2009, EAO, the CEA Agency, and *wilp* Skii km Lax Ha held a conference call in order to discuss the updated ethnohistoric report, *wilp* Skii km Lax Ha's territorial boundary, and the disagreement between EAO and *wilp* Skii km Lax Ha regarding the extent of *wilp* Skii km Lax Ha's traditional territory. EAO, the CEA Agency and *wilp* Skii km Lax Ha met the following day to continue the discussion regarding consultation, the ethnohistoric report, *wilp* Skii km Lax Ha's concerns about the proposed Project and the Proponent, as well as another request from EAO and the CEA Agency for *wilp* Skii km Lax Ha to clearly outline their uses of the proposed Project area.

Between June 2009 and June 2011, EAO sent the following letters to the *wilp* Skii km Lax Ha:

- June 16, 2009 – provided a copy of the Chapter 7 Geochemistry Baseline Study Report for the proposed Project and invited *wilp* Skii km Lax Ha to participate in an ML/ARD meeting in Vancouver on July 22, 2009;

- July 7, 2009 – provided EAO’s assessment of the appropriate scope of the Crown’s duty to consult with *wilp* Skii km Lax Ha on the EA of the proposed Project, which was based on potential downstream and trucking impacts, and resulting in EAO’s determination to identify *wilp* Skii km Lax Ha in the section 11 order as a *wilp* of the Gitxsan to be consulted by the Proponent at the direction of EAO;
- July 10, 2009 – conveyed the draft section 11 order for review and comment and provided information regarding the EA process;
- June 18, 2010 – conveyed the draft AIR for review and comment;
- September 7, 2010 – conveyed the draft AIR for review and comment a second time;
- June 13, 2011 – conveyed a draft order under section 13 of the Act for review and comment;
- October 4, 2011 – conveyed the finalized section 13 order and advising that changes would be made to the AIR;
- January 30, 2013 – conveyed a copy of the Proponent’s summary of consultations already carried out in relation to the proposed Project and a proposal for a consultation process during Application review, and requested comments;
- February 6, 2013 – proposed a consultation process for the Application review stage of the EA of the proposed Project and offering capacity funding to facilitate *wilp* Skii km Lax Ha’s participation; and
- June 3, 2013 – advised that EAO had determined that the Proponent’s Application included all of the information set out in the AIR and that the 180-day review would begin once copies of the Application had been received by the Working Group and First Nations. EAO also provided information regarding opportunities for *wilp* Skii km Lax Ha to participate in the EA and provide input.

Application Review Stage

Initiation of the 180-Day Review

The 180-day Application reviews stage of the EA for the proposed Project was initiated on August 12, 2013. EAO communicated with *wilp* Skii km Lax Ha between August and September regarding the initiation of the review, including:

- **August 15, 2013** – e-mail from EAO to the Working Group (including *wilp* Skii km Lax Ha) advising that the 180-day review had started; and
- **August 29-September 12, 2013** – e-mails regarding a conference call to discuss the initiation of the 180-day Application review stage; EAO canvassed for preferences regarding potential dates for the call and provided copies of the a proposed agenda and a revised EA review schedule.

On September 13, 2013, EAO held a conference call with the Proponent and representatives from the CEA Agency and the Working Group to discuss the initiation of the 180-day Application review stage; a representative from *wilp* Skii km Lax Ha participated in the call. EAO and the CEA Agency presented the provincial and federal EA processes and timelines, including the following milestones and key steps in the EA:

- initiation of the 180-day review on August 12, 2013;
- a 45-day public comment period from September 6-October 9, 2013 with open houses in Iskut, Telegraph Creek, Smithers, Terrace, and Stewart;
- a series of Working Group and sub-Working meetings to be held throughout the review;
- an opportunity to review and submit comments on the Proponent's Application;
- an opportunity to review and submit comments on the Proponent's responses to comments on the Application;
- an opportunity to review and submit comments on EAO's draft Assessment Report, CPD, and TOC; and
- an opportunity for First Nations (including *wilp* Skii km Lax Ha) to review and submit comments on EAO's draft First Nations Consultation Report.

During the call, Working Group members were also given an opportunity to engage in discussion with, and ask preliminary questions of, the Proponent regarding the Application. EAO asked Working Group members for their feedback regarding the format and intent of future Working Group meetings, including the utility of forming technical sub-Working Groups. EAO provided information regarding upcoming open houses and advised that the deadline for the first round of Working Group comments on the Application was October 11, 2013.

Meetings and Key Correspondence with *wilp* Skii km Lax Ha

On December 20, 2013, EAO wrote a letter to *wilp* Skii km Lax Ha to provide EAO's initial views of the potential impacts from the proposed Project on the Aboriginal Interests of the Gitxsan Nation. The letter outlined the following:

- EAO's initial assessment of the Gitxsan Nation's Aboriginal Interests in the proposed Project area;
- potential impacts of the proposed Project on Gitxsan Nation's Aboriginal interests; and
- the scope of EAO's consultation with the Gitxsan Nation regarding the EA of the proposed Project.

EAO requested feedback from *wilp* Skii km Lax Ha regarding its initial assessment and the scope of consultation by January 24, 2014 and offered to meet with the *wilp* Skii km Lax Ha to answer any questions or discuss the EA of the proposed Project. EAO also advised that *wilp* Skii km Lax Ha would have an opportunity to review and comment on EAO's draft Assessment Report, as well as the option to submit a separate report of their own to Ministers for their consideration along with EAO's Assessment Report.

Between September 2013 and June 2014, EAO communicated regularly with *wilp* Skii km Lax Ha via e-mail, as members of the Working Group. Key correspondence between EAO and *wilp* Skii km Lax Ha included the following:

- **November 1, 2013** – EAO circulated a draft summary from the October 2-3, 2013 Working Group meeting for review and comment prior to finalization;
- **November 5, 2013** – EAO provided a copy of the draft CPD, explaining the purpose of the document and future opportunities to provide comments;
- **November 5, 2013** – EAO provided copies of water quality prediction graphs submitted by the Proponent;
- **November 18, 2013** – EAO advised that the deadline for the Working Group to submit comments on the Proponent's Application had passed and requested notification if any organizations that had not yet submitted comments were still planning to do so;
- **November 19, 2013** – EAO provided copies of MEM's geotechnical comments and the Proponent's responses for information and consideration;
- **November 27, 2013** – EAO requested feedback on the Proponent's responses to the geotechnical comments and supporting information by December 11, 2013;

- **December 11, 2013** – EAO circulated the Proponent's responses to Working Group comments related to the following for review and comment by January 10, 2014:
 - wildlife;
 - closure and reclamation;
 - fisheries;
 - cumulative effects;
 - First Nations interests;
 - human health;
 - social and transportation issues;
 - rare plants; and
 - the dam failure effects assessment.
- **December 20, 2013** - EAO circulated the Proponent's responses to all remaining Working Group comments for review and comment by January 24, 2014 and advised that the Proponent had requested a 30-day extension to the 180-day review timeline.
- **January 8, 2014** – EAO advised that due to the large volume and complexity of the materials submitted by the Proponent in response to comments from the Working Group, the deadline for all comments on the responses was being extended until January 24, 2014.
- **January 17, 2014** – EAO acknowledged the challenge faced by Working Group members to review all of the materials submitted by the Proponent in response to Working Group comments, and requested feedback or input regarding how EAO could potentially facilitate that review;
- **January 20, 2014** – EAO circulated the finalized summary for the October 2-3, 2013 Working Group meeting in Smithers;
- **January 24, 2014** - EAO circulated a draft summary from the November 6, 2013 technical wildlife sub-Working Group meeting for review and comment prior to finalization;
- **January 30, 2014** – EAO advised that the Proponent's request to extend the 180-day review timeline by 30 days had been approved and provided a copy of the cover letter to the Proponent and the signed order under section 24(4) of the Act.
- **February 11/12, 2014** – e-mails back and forth between EAO and *wilp* Skii km Lax Ha to schedule a meeting, which was ultimately confirmed for February 25, 2014.
- **February 25, 2014** – meeting between EAO, the CEA Agency and representatives from *wilp* Skii km Lax Ha to discuss the current status of the EA and upcoming opportunities for *wilp* Skii km Lax Ha to provide input into the EA.

- **March 5, 2014** – EAO e-mail providing a copy of the draft CPD and TOC for the Kitsault Mine Project for the GHCO's information;
- **March 5, 2014** – EAO e-mail conveying the Proponent's responses to comments submitted by the US Department of the Interior, HC, and FLNR, as well as a copy of the signed section 24(4) Order, extending the 180-day review by an additional 45 days, as requested by the Proponent;
- **March 5, 2014** – *wilp* Skii km Lax Ha e-mail to EAO requesting the reason for the 45-day extension. EAO responded the same day that the extension had been requested by the Proponent, and provided *wilp* Skii km Lax Ha with a copy of the Proponent's incoming letter requesting the extension;
- **April 15, 2014** – *wilp* Skii km Lax Ha e-mail requesting clarification regarding the referral date for the proposed Project to Ministers for a decision on whether to issue an EA certificate. EAO responded the same day to advise that the new referral date would likely be in mid-June because of an extension requested by EAO, and that draft documents would be circulated shortly for review and comment over a three-week period on or around May 1, 2014. There would also be an opportunity for First Nations to submit separate reports to Ministers, if desired;
- **April 18/23, 2014** – *wilp* Skii km Lax Ha e-mail requesting additional capacity funding; EAO responded that *wilp* Skii km Lax Ha's request was under consideration and suggested scheduling a meeting to discuss the EA of the proposed Project in May 2014;
- **April 22, 2014** – EAO e-mail to the Working Group (including *wilp* Skii km Lax Ha) advising of an upcoming Working Group meeting and outlining opportunities to review and provide input on key documents;
- **April 29, 2014** – EAO e-mail conveying copies of the recently issued section 13 and 24(4) orders for the EA of the proposed Project, as well as outlining the topics for discussion at the May 13-15, 2014 Working Group meetings;
- **May 2, 2014** – EAO letter conveying the draft Assessment Report, CPD, TOC, First Nation Consultation Report, and issue tracking table for review and comment. EAO also advised that if *wilp* Skii km Lax Ha wishes to submit a separate report to ministers, it must be submitted to EAO by June 12, 2014, but that it would not be reflected in EAO's Assessment Report;
- **May 20, 2014** – EAO provided additional capacity funding to *wilp* Skii km Lax Ha, as requested;
- **May 27, 2014** – *wilp* Skii km Lax Ha submitted comments on the draft Assessment Report, First Nation Consultation Report, and TOC. *Wilp* Skii km Lax Ha expressed frustration with the fact that EAO continues to characterize Skii km Lax Ha as a *wilp* of the Gitxsan. In addition to a request that EAO clarify a statement regarding use of traplines (a change that EAO incorporated), *wilp*

Skii km Lax Ha submitted comments regarding the following:

- disagreement regarding the methodology used for the assessment of proposed Project effects on *wilp* Skii km Lax Ha's past, present, and future land use (e.g. drawing conclusions based on availability of resources instead of considering other factors, such as noise, that may affect personal choices about whether to engage in traditional land use activities); and
- wildlife population consequences as a result of sensory disturbance.

Throughout the remainder of the EA, EAO continued to communicate regularly with *wilp* Skii km Lax Ha and provided information and opportunities for input into the EA of the proposed Project. Via e-mails to the Working Group, EAO provided *wilp* Skii km Lax Ha with the following:

- copies of memos and comments submitted by other members of the Working Group, as well as the Proponent's responses;
- invitations to participate in Working Group meetings;
- updates on the timelines and next steps in the EA of the proposed Project; and
- opportunities to provide input.

Open Houses

EAO advised the members of the Working Group (including *wilp* Skii km Lax Ha) via e-mail of the date, time, and location for each of the following five open houses held during the 45-day public comment period for the EA of the proposed Project:

- Iskut → September 25, 2013
- Telegraph Creek → September 26, 2013
- Terrace → October 1, 2013
- Smithers → October 2, 2013
- Stewart → October 9, 2013

Comments on the Application and Proponent Responses

On October 14, 2013, *wilp* Skii km Lax Ha submitted comments on the Application, expressing concerns regarding potential effects related to the following key topic areas:

- habitat alteration/loss;
- social;
- economic;
- wildlife (including grizzly bear, wolverine, moose, marten, mountain goat);
- dust;
- trapping, fishing, and hunting;
- increased traffic along Hwy 37;

- First Nations interests; and
- access to areas of importance to the *wilp* Skii km Lax Ha.

EAO provided all of the comments submitted by *wilp* Skii km Lax Ha to the Proponent for inclusion in an issue tracking table and response. On November 27, December 11, and December 20, 2013, EAO circulated the Proponent's responses to comments on the Application and requested feedback. Although EAO initially requested feedback on the Proponent's responses by December 11, January 10, and January 24 respectively, the volume and complexity of the documents submitted by the Proponent led to EAO extending the deadline for all feedback on the Proponent's responses to comments to January 24, 2013.

A complete list of all comments submitted by *wilp* Skii km Lax Ha regarding the proposed Project and the associated responses from the Proponent is presented in Appendix 1.

Working Group & Technical Sub-Working Group Meetings

Between October 2013 and May 2014, EAO and the CEA Agency scheduled the following Working Group and technical sub-Working Group meetings:

- **October 2-3, 2013** – the Proponent presented their significance determination framework and key areas of the Application, followed by a discussion, and an opportunity to ask questions (representatives from *wilp* Skii km Lax Ha participated in the meeting in person and by telephone)
- **November 6-8, 2013** – an opportunity to engage in technical level discussions on issues related to wildlife and water quality on both the mine side and tailings side of the proposed Project (*wilp* Skii km Lax Ha participated in the November 6 technical wildlife sub-Working Group meeting)
- **November 26-28, 2013** – an opportunity to engage in a technical level discussion, review the Proponent's proposed mitigation measures and conditions, and identify outstanding geotechnical issues for resolution (no *wilp* Skii km Lax Ha representatives participated in these meetings)
- **May 13-15, 2014** – a three-day Working Group meeting to discuss EAO's draft Assessment Report, TOC, CPD, and issues tracking table. The meetings provided Working Group members with an opportunity to discuss and ask questions about EAO's key findings with respect to potential effects from the proposed Project on water quality, wildlife, fish, and transportation

12.3.3 Gitxsan Nation involvement with Proponent

Pre-Application Stage

On November 6, 2009, EAO issued an order under section 11 of the Act, which required that the Proponent consult with the *wilp* of the Gitxsan Nation (as identified by the GHCO) regarding the EA of the proposed Project. The Proponent initiated consultations with the Gitxsan Nation prior to the start of the EA, and met with their representatives on February 27, 2008, to introduce the proposed Project and receive a presentation on Gitxsan culture, society and sustainability policies.

Starting in June 2008, the Proponent participated in Working Group meetings led by EAO and the CEA Agency and organized tours of an operating and a closed mine in June 2011. Representatives of the Gitxsan Nation participated in most of the Working Group meetings and also attended both site tours. The Proponent also provided opportunities for representatives of the Gitxsan Nation to tour the proposed KSM Project site, which took place in September 2008 and August 2010.

As set out in the section 11 Order, the Proponent provided the Gitxsan Nation with electronic and paper copies of the draft AIR in June 2010, as well as notifications regarding upcoming open houses.

Although not specifically required by EAO, the Proponent provided the Gitxsan Hereditary Chiefs Office with capacity funding to facilitate their participation in the EA, including the review of the KSM Preliminary Economic Assessment and a desk-based Traditional Knowledge/ Traditional Use Study. The Proponent provided the GHCO with a copy of the draft desk-based Traditional Knowledge/ Traditional Use Study report for review and comment in February 2011, and followed up by meeting with GHCO representatives in April 2011 to discuss the report. The Gitxsan advised that they had no specific comments on the report, but did provide feedback on some maps portraying watersheds and Gitxsan boundaries, which the Proponent then incorporated in to the report.

The Proponent also facilitated the delivery of a “Mining 101: Mining for Non-Miners” workshop in Hazelton in June 2010. Employment opportunities connected with baseline field studies were also offered to the Gitxsan Nation by the Proponent between 2008 and 2011/2012.

As set out in the section 11 Order, the Proponent prepared a draft report summarizing the consultation activities undertaken with the Gitxsan Nation during the pre-Application stage of the EA, as well as outlining their plan for consulting with the Gitxsan Nation during the Application review. Although the Proponent provided the Gitxsan Nation with the draft report on December 12, 2012 for review and comment, no feedback was received.

Application Review Stage

As required by the section 11 Order issued by EAO, the Proponent undertook the following consultation activities with the Gitxsan Nation during the Application review stage of the EA of the proposed Project:

- distributed copies of the Application to the Gitxsan Nation for information and consultation purposes;
- wrote to the Gitxsan Nation to identify the dates of the public comment period on the Application, and the dates, times and locations of open houses;
- provided a written report to the Gitxsan Nation, EAO, and the CEA Agency on the results of consultation activities with the Gitxsan Nation;
- considered and responded to issues identified in comments submitted by the Gitxsan Nation during the review of the Application;
- where requested by, and within any time limits set by EAO, provided specific additional information in relation to, or to supplement, the information provided in the Application;
- attended Working Group meetings organized by EAO to provide information related to the Application and responded to questions on the Application;
- prepared a tracking table of issues raised by First Nations (including the Gitxsan Nation) on the Application and responses to those issues;
- considered and prepared written responses to key issues raised by the Gitxsan Nation regarding the Application; and
- by mutual agreement, arranged consultation meetings with the Gitxsan Nation to identify any specific Aboriginal interests that may be potentially affected by the proposed Project, as identified in Aboriginal interest and use studies, traditional use studies, or other sources of information; to identify measures to avoid or mitigate potential adverse effects; and/or to otherwise address or mitigate the Gitxsan Nation's concerns.

Following acceptance of the Application and the initiation of the 180-day review by EAO, the Proponent provided the Gitxsan Nation with copies of the Application.

Meetings and Key Correspondence Between the Proponent and Gitxsan Nation

In addition to participating in open houses and Working Group meetings organized by EAO, the Proponent also held a meeting on September 10, 2013 in Hazelton, BC, with Cliff Sampare of the GHCO to provide an update on the proposed Project and discuss letters of support.

Although the GHCO did not submit any comments on the Application, they did submit a letter of support for the proposed Project on September 4, 2013. In the letter, the GHCO advised that they were satisfied with the consultation undertaken by the Proponent, including their explanations of the details of the proposed Project and the potential

impacts. The GHCO further stated that they believe the proposed Project would result in jobs and economic benefits for the Gitxsan people and communities for the life of the proposed Project and beyond.

The Proponent also provided capacity funding to assist the Gitxsan Nation's participation on the EA of the proposed Project.

12.3.4 Wilp Skii km Lax Ha involvement with Proponent

Pre-Application Stage

The November 6, 2009, Order issued by EAO under section 11 of the Act also required the Proponent to consult with *wilp* Skii km Lax Ha regarding the EA of the proposed Project. While the Proponent was initiating consultations with the Gitxsan Nation prior to the start of the EA, they also met with *wilp* Skii km Lax Ha on February 22, 2008 to introduce the proposed Project and discuss overlapping asserted traditional territories.

Unlike the Gitxsan Nation, *wilp* Skii km Lax Ha representatives only participated in some of the pre-Application Working Group meetings. While *wilp* Skii km Lax Ha opted not to attend either of the June 2011 site tours of an operating and closed mine organized by the Proponent, they did participate in a July 2008 tour of the proposed KSM Project site.

As set out in the section 11 Order, the Proponent provided *wilp* Skii km Lax Ha with electronic and paper copies of the draft AIR in June 2010, as well as notifications regarding upcoming open houses.

Although attempts by the Proponent to conclude a funding agreement with *wilp* Skii km Lax Ha were unsuccessful, they did provide *wilp* Skii km Lax Ha with capacity funding to review a draft workplan, the KSM Preliminary Economic Assessment, and a desk-based Traditional Knowledge/ Traditional Use Study. The Proponent provided *wilp* Skii km Lax Ha with a copy of the draft desk-based Traditional Knowledge/ Traditional Use Study report for review and comment in July 2012, although no comments were received despite several attempts by the Proponent to request them. The Proponent also provided additional funding to *wilp* Skii km Lax Ha to cover the cost of core cutting training in lieu of employment opportunities that did not occur in 2009. The *wilp* Skii km Lax Ha provided the Proponent with core boxes in 2010, 2011 and 2012.

As set out in the section 11 Order, the Proponent prepared a draft report summarizing the consultation activities undertaken with *wilp* Skii km Lax Ha during the pre-Application stage of the EA, as well as outlining their plan for consulting with *wilp* Skii km Lax Ha during the Application review. Although the Proponent provided *wilp* Skii km Lax Ha with the draft report on December 12, 2012 for review and comment, no feedback was received.

Application Review Stage

As required by the section 11 Order issued by EAO, the Proponent undertook the following consultation activities with *wilp* Skii km Lax Ha during the Application review stage of the EA of the proposed Project:

- distributed copies of the Application to *wilp* Skii km Lax Ha for information and consultation purposes;
- wrote to *wilp* Skii km Lax Ha to identify the dates of the public comment period on the Application, and the dates, times and locations of open houses;
- provided a written report to *wilp* Skii km Lax Ha, EAO, and the CEA Agency on the results of consultation activities with *wilp* Skii km Lax Ha;
- considered and responded to issues identified in comments submitted by *wilp* Skii km Lax Ha during the review of the Application;
- where requested by, and within any time limits set by EAO, provided specific additional information in relation to, or to supplement, the information provided in the Application;
- attended Working Group meetings organized by EAO to provide information related to the Application and responded to questions on the Application;
- prepared a tracking table of issues raised by First Nations (including *wilp* Skii km Lax Ha) on the Application and responses to those issues;
- considered and prepared written responses to key issues raised by *wilp* Skii km Lax Ha regarding the Application; and
- by mutual agreement, arranged consultation meetings with *wilp* Skii km Lax Ha to identify any specific Aboriginal interests that may be potentially affected by the proposed Project, as identified in Aboriginal interest and use studies, traditional use studies, or other sources of information; to identify measures to avoid or mitigate potential adverse effects; and/or to otherwise address or mitigate *wilp* Skii km Lax Ha's concerns.

Following acceptance of the Application and the initiation of the 180-day review by EAO, the Proponent provided *wilp* Skii km Lax Ha with copies of the Application.

Meetings & Key Correspondence Between the Proponent and *wilp* Skii km Lax Ha

In addition to participating in open houses and Working Group meetings organized by EAO, the Proponent also held the following four meetings with representatives of *wilp* Skii km Lax Ha:

- **August 21, 2013** – meeting in Vancouver, BC, with Darlene Simpson to provide an update on the proposed Project and to discuss permitting, exploration, and engage in internal discussions;
- **August 30, 2013** – meeting with Rick Connolly, from Foremost Solutions Consulting Group to provide an update on the proposed Project and engage in internal discussions;

- **September 5, 2013** – meeting with Pascale Mera of Big Sky Consulting and Peter Evans with EverNorth Consulting to discuss the Proponent's responses to the screening comments submitted by *wilp* Skii km Lax Ha; and
- **November 6, 2013** – meeting in Vancouver with Darlene Simpson to provide an update on the status of the proposed Project and engage in internal discussions.

According to the Proponent's February 2014 Skii km Lax Ha Consultation Report, the Proponent communicated regularly with *wilp* Skii km Lax Ha during the Application review stage of the EA of the proposed Project. In addition to communications regarding logistics for meetings and requests for information, the Proponent exchanged 51 letters, emails, and news releases with *wilp* Skii km Lax Ha.

The Proponent also provided capacity funding to assist *wilp* Skii km Lax Ha's participation on the EA of the proposed Project.

12.3.5 Potential Impacts to Gitxsan Nation Interests (including *wilp* Skii km Lax Ha) and Measures to Mitigate or Accommodate Impacts

See below for a description of EAO's understanding of the issues that have been identified by Gitxsan Nation (including *wilp* Skii km Lax Ha) 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.

Many of the issues raised during the review by Skii km Lax ha related to what EAO would characterize as larger conservation and wildlife management issues. The issues were largely related to ecosystem linkages, habitat fragmentation and health of fish and wildlife populations. These issues would all support concerns for a range of potential effects on aboriginal rights such as trapping, fishing, hunting and harvesting plants.

Another significant subject raised during the course of the review related to *wilp* boundaries and the relationship between Skii km Lax Ha and the Gitxsan Nation. EAO understands these issues to be more related to title and consultation than specific project related effects.

The following is intended only to be a summary of the major issues raised and accommodations of those issues.

Wildlife and Wildlife Habitat

As noted above, many of the Skii km Lax Ha concerns were broadly related to wildlife habitat and populations and thus to potential effects on aboriginal rights to hunt and trap.

- *wilp* Skii km Lax Ha expressed concerns about potential effects on wolverine.
 - The Proponent advised that the primary effects on wolverine are mortality and disturbance, which are addressed in the mitigation and management plans for marten and bears (e.g. employee education, waste management, infrastructure management, and monitoring incidents and mortalities). In addition, the Proponent has reviewed data on wolverine problems at existing mine and exploration sites in BC and determined that wolverine are not as much of a concern in BC as they are in the Arctic where resources are much less abundant. However, wolverine will be considered in the detailed wildlife management plan that will be completed at the permitting stage.
- *wilp* Skii km Lax Ha pointed out problems with marten experienced at the Brucejack Mine Project and asked whether the Proponent should consider potential residual effects due to attractants for marten.
 - The Proponent advised that the effect of attractants on marten can be effectively mitigated with implementation of proper waste and infrastructure management, employee education, and monitoring. The Proponent is committed to implement plans to limit the effects on American marten.
- *wilp* Skii km Lax Ha asked how the Proponent will know if a moose natal area or calving site is present in order to avoid vegetation clearing within two km of those areas.
 - The Proponent advised that moose winter habitat (particularly late winter habitat) is the most limiting factor for moose survival, more so than calving or natal areas. Therefore, the surveys, mitigation measures, and evaluation of effects on moose was focused on moose winter habitat instead.
- *wilp* Skii km Lax Ha requested clarification of how the setting out of artificial salt licks to minimize the loss of high-quality habitat and disruption to movement for mountain goat will be conducted.
 - The Proponent advised that the following commitments have been made with respect to salt licks:
 - minimizing noise and disturbance in the area of the salt lick;
 - monitoring the salt lick to evaluate if goats continue to use the salt lick; and

- if use of the lick reduces over time, installing additional artificial salt licks in appropriate goat habitat to offset disturbance at the existing lick.
 - The Proponent also advised that remote cameras have been set up at the lick to record goat occurrence (numbers and frequency of use). The cameras will continue to be used to monitor this lick and if a lower use is observed, then artificial licks may be created in consultation with the FLNR and other knowledgeable resources for guidance on proper implementation.
- *wilp* Skii km Lax Ha questioned the effectiveness of the five-year intervals for monitoring activities for moose, mountain goat, and bear proposed by the Proponent.
 - The Proponent advised that five-year intervals are consistent with guidance produced by FLNR.

EAO's review examined a number of the types of effects raised by *wilp* Skii km Lax Ha. These potential effects are described in Part B of the Assessment Report. EAO's findings show that the magnitude of habitat loss effects is rated moderate or low for all VCs, including those raised above, which would mostly fall into the furbearers category. Approximately (+/- 5%) of the RSA and +/- 40% of the LSA would be affected by the proposed Project.

This Report says the magnitude of habitat loss effects to moose is moderate, with areas of summer and early winter habitat being lost in the TMF and processing plant site, but the most important habitat of late winter overlaps with the proposed Project only at low elevations along the Treaty Creek Access Road. The extent of residual wildlife effects is localized to the LSA for most effects categories, although for some wildlife VC with larger ranges (grizzly bears, black bears, moose, and mountain goats), residual effects will extend to the landscape level, while remaining tied to the proposed Project footprint or to individual animals within the RSA (e.g. effects linked to disruption of movement, direct and indirect mortality, or sensory disturbance). The abundance of individuals of particular species may decline during construction and operation in the immediate area of the proposed Project footprint; however, most wildlife VC are mobile, and will likely seek alternative habitat if displaced by mining-related disturbances, if alternative habitat is available.

EAO also added a number of conditions relating to the management of wildlife on the project site in order to mitigate potential regional effects on wildlife that were raised by *wilp* Skii km Lax Ha. However, EAO notes that many of these issues relate to ongoing site management practices which would be most effectively captured in documents such as the Wildlife Effects Monitoring Plan. Some of the conditions added by EAO include:

- prior to the commencement of construction of the Treaty Creek and the Coulter Creek access roads, the EA Certificate Holder must develop a standard operating procedure that will form a component of the Wildlife Effects Monitoring Plan and that will address potential impacts to wildlife along the Treaty Creek and Coulter Creek roads resulting from transportation use related to the proposed Project;
- the EA Certificate Holder will develop and submit to the FLNR for approval a standard operating procedure (the “Bear SOP”) that details efforts to be taken by the EAC Holder to avoid and reduce risks of potential bear-human conflicts that could arise during proposed Project operations;
- the EA Certificate Holder will develop and submit for approval to the FLNR a Wildlife Effects Monitoring Plan completed prior to the commencement of construction on the Treaty Creek and Coulter Creek Access Roads;
- the EA Certificate Holder will develop and submit to the FLNR a Terrestrial Ecosystems Management and Monitoring Plan prior to the commencement of construction on Treaty Creek and Coulter Creek Access Roads;
- the EA Certificate Holder must develop and submit for approval to the FLNR, the MEM and EAO an Traffic and Access Management Plan for the Treaty Creek and Coulter Creek access prior to the commencement of construction on Treaty Creek and Coulter Creek Access Roads; and
- the EA Certificate Holder must construct and operate a gate or barrier on the Treaty Creek access road that will restrict access across the bridge to the West side of the Bell Irving River. Any such gate or barrier must be in place at any time that the Treaty Creek road is usable by a passenger vehicle or all-terrain vehicle.

Taking account the above discussion, and with the conditions discussed above, EAO’s assessment of the potential impacts of the proposed Project on *wilp* Skii km Lax Ha Aboriginal Interests, including hunting of wildlife, with an emphasis on moose, is that those effects are low. EAO is satisfied that the potential impacts to aboriginal rights to hunt and fish within *wilp* Skii km Lax Ha Territory have been appropriately accommodated

Increased Traffic Along Highway 37

wilp Skii km Lax Ha expressed concerns about Project-specific and cumulative effects from increased traffic on Hwy 37, specifically related to wildlife effects. They also requested regional-level consideration of this issue.

- The Province has established the Hwy 37/37A Advisory Group, with membership consisting of provincial, federal, and local government agencies, NLG, First Nations, and industry stakeholders.
- The purpose of the new Hwy 37/37A Advisory Group includes the following:

- to provide a forum to discuss potential cumulative impacts to wildlife and fish populations and habitat, as well as invasive plant species, due to increased resource development and industrial traffic on Hwy 37/37A;
- to provide advice to decision-makers on potential mitigations to reduce impacts that could be implemented through mechanisms such as EA certificates and ongoing management actions of government agencies; and
- to identify information and monitoring needs for wildlife populations and fish habitats, as well as information-sharing mechanisms.

EAO undertook significant work during the review to address the issue of potential impacts on moose and wildlife along Hwy 37. EAO expanded the scope of the review to address the issue of transportation effects, which was the first study of its kind for an environmental assessment. EAO directed the Proponent to undertake a Traffic Effects study to examine the potential effects of project-related traffic. The study contained both quantitative and qualitative assessments and modeled the long term effects of the project on moose populations.

Part B of this Report concludes that the proposed Project is expected to kill approximately five moose per year, which equates to less than a 1% increase in mortality to moose populations at their current population size. The Nass moose population is currently considered at some risk by the Provincial Fish and Wildlife Branch due to declining populations. The transportation route passes through valuable winter moose range. Recognizing the decrease in the Nass Valley moose population, the magnitude of effects from mine-related traffic during critical moose wintering is considered, at five mortalities a year, moderate. EAO concluded, with support from FLNR wildlife biologists, that this mortality would not result in a population level effect.

In order to further address potential effect on moose, EAO added a number of conditions. They include:

- contributing \$30,000 per year, commencing with construction, to a habitat trust fund (where the money would be spent on supporting recovery of the Nass moose population and mitigating potential cumulative effects along Hwys 37 and 37A), starting with an initial \$75,000 contribution;
- developing a wildlife mortality tracking protocol to accurately understand and communicate wildlife mortality;
- requirement to share all wildlife mortality data;
- mandatory participation in any future planning exercises around cumulative effects of wildlife;

- mandatory participation in the Hwy 37 Advisory Group; and
- developing a Wildlife Effects Monitoring Plan.

Taking account the above, EAO's assessment of the potential impact of the transportation component of the proposed Project on *wilp* Skii km Lax Ha Aboriginal Interests, including in relation to hunting, trapping and gathering, that may be impacted by the transportation of materials, is that it is low to moderate for the following reasons:

- the transportation route is along existing roads, which have been in place for years, are already maintained and regulated by provincial agencies through existing policy;
- potentially impacts arising from dust, accidents and malfunctions from mine traffic such as spills, and such impacts would be localized and limited to individual animals or relatively small areas;
- many of the issues relating to the decline and recovery of the Nass moose population, and the potential contribution of road use on Hwy 37 and 37A are very complex and related to a number of issues including legal, illegal and unregulated hunting, land use decisions, habitat loss and alteration and access. EAO notes that the proposed Project use of Hwy 37 and 37A is but one of these issues and a solution to declining moose populations is outside the scope of one road user to address;
- EAO along with MOTI formed a Hwy 37 Advisory Group to address the cumulative incremental impacts of additional project related traffic along Hwy 37 and 37A. This Advisory Group includes representation from Nisga'a Nation, Tahltan First Nation, Ski Km Lax Ha and Gitanyow Nation, FLNR, MOE, MOTI, MEM, ARR, EC, local governments and a number of other industrial road users. EAO expects this Advisory Group to provide a venue for industrial users and First Nations, Nisga'a Nation, local government and agencies to continue sharing information and pursuing ideas and initiatives that will further reduce potential transportation-related effects; and
- EAO has also included a condition in the draft TOC which would require the Proponent to make significant financial contributions to a trust which is being established by FLNR to support moose recovery initiatives in the Northwest. At least one other mining project has been asked to make financial contributions to this trust as a condition of its EA Certificate.

With the addition of the condition to contribute financially to moose recovery efforts as well as conditions related to coordinated spill response, participation the Hwy 37 Advisory Group, monitoring and reporting wildlife collisions and standard operating procedures for company and subcontractor vehicles, all which would become legally

enforceable should an EA Certificate be issued, EAO is satisfied that the potential impacts to aboriginal rights to hunt moose and other wildlife in the Hwy 37 corridor have been appropriately accommodated.

Social Effects

Wilp Skii km Lax Ha expressed concerns about the vagueness of the potential social effects presented in the Application, and requested that the Proponent more clearly define the proposed mitigation measures as they relate to potential effects on Aboriginal groups.

- The Proponent advised that due to the distance of the proposed Project from the communities in which *wilp* Skii km Lax Ha communities reside and the nominal population effects of the proposed Project, pressure on social services and infrastructure is expected to be minimal. Plans to manage potential social effects related to mine employment are outlined in the Workforce Training Strategy, Labour Recruitment and Retention Strategy, Employee Assistance Program, Procurement Strategy, and Workforce Transition Program (presented in Chapter 20 of the Application).
- The Proponent advised that the Labour Recruitment and Workforce Training Strategy will be designed to maximize the work experience, education, and skill levels of workers, as well as to develop the workforce to meet the needs of the proposed Project. Training opportunities will be made available to help *wilp* Skii km Lax Ha members take advantage of longer-term employment.
- The Labour Recruitment and Retention Strategy includes a focus on the engagement of Aboriginal workers, and identifies an approach that is to take into account their needs and the current barriers to employment (e.g. cultural and socio-economic). The Procurement Strategy is designed to assist local suppliers in being able to take advantage of opportunities to supply the proposed Project, including specific activities and processes to enhance local benefits, particularly with respect to Aboriginal-owned businesses.
- The Workforce Training Strategy is designed to maximize the experience, education and skills levels of the regional workforce. The Proponent has committed to engaging the Nisga'a Nation and First Nations, including *wilp* Skii Km Lax Ha, in the development of these strategies to address the specific needs and concerns of the communities.
- The Proponent will engage Nisga'a Nation and other First Nations to participate in the development of programs specifically targeted to their members. In addition, the Proponent is currently working with mine training organizations in northwest BC to provide sector-related skills and training to Aboriginal peoples.

12.3.6 Conclusions Regarding Gitxsan Nation (including *wilp* Skii km Lax Ha)

In view of the consultation that has taken place with Gitxsan Nation (including *wilp* Skii km Lax Ha), it is EAO's conclusion that:

- the process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns expressed by Gitxsan Nation (including *wilp* Skii km Lax Ha);
- 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 (including *wilp* Skii km Lax Ha) Aboriginal Interests (and by way of both draft and final copies of this Report, it is communicating its findings to Gitxsan Nation and *wilp* Skii km Lax Ha); and
- measures that would effectively avoid and mitigate impacts to the potential impacts to the Gitxsan Nation's (including *wilp* Skii km Lax Ha) Aboriginal rights to hunt and fish, have been meaningfully discussed with Gitxsan Nation and *wilp* Skii km Lax Ha.

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Gitxsan Nation (including *wilp* Skii km Lax Ha), it is EAO's conclusion that the Crown's duty to consult and appropriately accommodate the potential impacts of the proposed Project on Gitxsan Nation's (including *wilp* Skii km Lax Ha) Aboriginal Interests has been adequately fulfilled.

12.4 Tahltan Nation

12.4.1 Tahltan Nation Overview

The area claimed by the Tahltan Nation as traditional territory is located in north western BC, an area defined by the Alaska border in the west and Caribou Hide in the east. In the north, Tahltan Nation territory crosses the Yukon border, and it encompasses the Bell Irving and a portion of the Nass River in the south.

The Tahltan Central Council (TCC) is the elected governing structure for the Tahltan Nation and has responsibility to represent the Tahltan Nation on matters of importance to Tahltan, including all issues regarding: title, rights and interests, and lands and resources in the traditional territory. Iskut First Nation (based in Iskut) and the Tahltan Indian Band (based in Telegraph Creek) are recognized as Indian bands by Aboriginal Affairs and Northern Development Canada and are responsible for matters as directed by Aboriginal Affairs and Northern Development Canada on behalf of their band memberships. For the purposes of this report, the two bands and their members will be referred to as the Tahltan Nation.

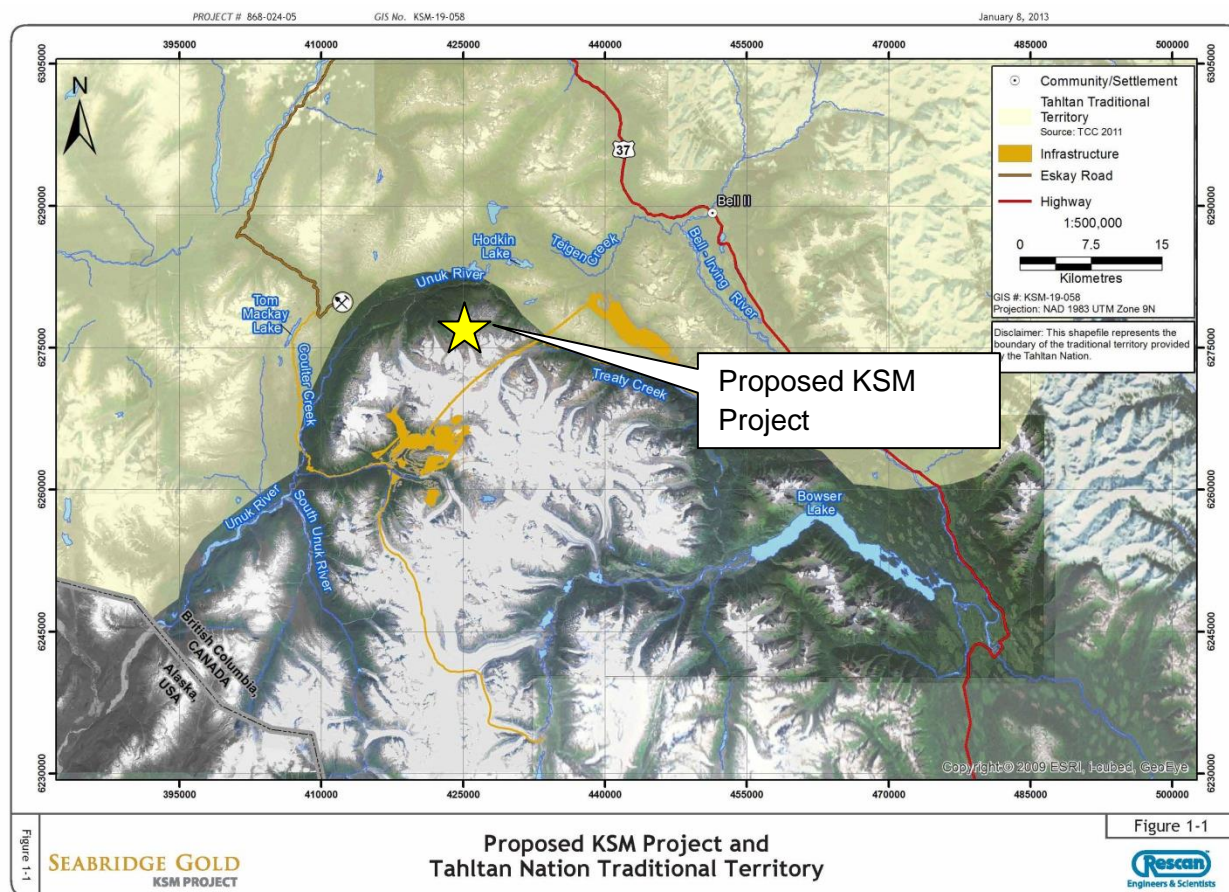
During the KSM EA process, the Tahltan Nation was represented by elected representatives of the TCC and by members of the Tahltan Heritage Resources Environmental Assessment Team (THREAT). THREAT is comprised of technical specialists appointed by the TCC to represent the Tahltan Nation's interests in EA processes, including associated consultation activities.

The Tahltan Nation is not currently engaged in the British Columbia Treaty Commission process. As noted on ARR's website, government representatives are working to build relationships with the TCC, the Tahltan Indian Band and Iskut First Nation through the reconciliation process. In March 2013, BC and the TCC signed the "Tahltan Nation Shared Decision Making Agreement", which establishes a collaborative framework for ongoing land and resource decision-making in Tahltan's asserted traditional territory.

The present day Tahltan population is estimated by the TCC to be approximately 2,577 individuals, and ARR data from 2012 indicates there are 2,413 registered Tahltan members. The majority of people living within the Tahltan Nation's asserted traditional territory are Tahltan members.

There are three main communities within Tahltan Nation's traditional territory, each with basic community infrastructure and services. Iskut and Telegraph Creek are approximately the same distance from the proposed Project, located approximately 140 km to the south, while Dease Lake is approximately 264 km from the proposed Project area.

Figure 29: Proposed KSM Project and Tahltan Nation's Asserted Traditional Territory



12.4.2 Tahltan Nation's Traditional Use of the Proposed Project Area

The following components of the proposed Project fall within the Tahltan Nation's asserted traditional territory:

- Coulter Creek access road;
- the eastern portion of the Mitchell-Treaty twinned tunnels;
- the processing plant;
- the PTMA;
- Treaty Creek access road; and
- the transmission line.

While the proposed mine site is not located within the Tahltan Nation's asserted traditional territory, both Mitchell and Sulphurets Creeks drain into the Unuk River at the southern boundary of the territory.

According to the Proponent's Application, the focus of activities undertaken by the Tahltan Nation is north of the proposed Project near the confluence of the Tahltan and Stikine Rivers, and some activities associated with the proposed Project have the potential to impact Tahltan Nation Aboriginal Interests.

No information has been received from the Tahltan Nation regarding their current use of land and resources within or near the proposed Project area. According to the Proponent's Application, the majority of the fishing, hunting, trapping and gathering activities undertaken by Tahltan members appears to take place further north, such as the area near Telegraph Creek.

As set out in a letter from EAO to the Tahltan Nation dated December 20, 2013, EAO reviewed and considered information relating to the activities, practices, traditions, or customs considered to be integral to the distinctive culture of the Tahltan Nation prior to contact with Europeans. Specifically, EAO considered currently available information regarding definite tracts of land that were regularly and exclusively used or occupied in 1846. The information that was reviewed and considered by EAO in its initial assessment of Tahltan Nation's asserted Aboriginal rights and title (Aboriginal Interests) is as follows:

- KSM Mine Project: Review of Ethnographic and Historical Sources (dated March 6, 2013; and
- Tahltan Nation: Review of Ethnographic, Historic and Archaeological Resources (revised April 7, 2009).

The Province completed the *KSM Mine Project: Review of Ethnographic and Historical Sources*, (dated March 6, 2013) and EAO shared it with the Tahltan Nation on December 20, 2013. The report draws from publicly available published historical, archival, and anthropological information, including transcribed oral histories. The report

focuses on land use practices and aspects of social organization that were in place from the time of European contact to the mid-19th century. EAO advised the Tahltan Nation that the report was not exhaustive and would be subject to change as more information became available. To help ensure an accurate and more complete understanding of Tahltan's historical interests, EAO invited the Tahltan Nation to review the report and provide comments or additional information that may be missing.

12.4.3 Tahltan Nation's Aboriginal Interests

A consideration of the Tahltan Nation's Aboriginal Interests that may be impacted by the proposed Project was approached on the basis of information currently available to the Province, including information provided during consultation, and guidance from the courts regarding aboriginal rights.

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 is assessed on the basis of information regarding regular and exclusive use or occupation of land at 1846.

It is understood that at the time of contact in 1838, the Tahltan Nation was comprised of a loose affiliation of six smaller "proto-Tahltan" tribes. One of the "proto-Tahltan" tribes was known as the Nassgotin, but was also referred to as "Laxwiiyip" or the "Eastern Tsetsaut" in ethnohistoric sources. In the early 19th century, the Nassgotin reportedly occupied an extensive territory that included the headwaters of the Nass, Skeena and Stikine Rivers. Available ethnohistoric information indicates that, at the time of contact, the Nassgotin dominated the area encompassing the proposed Project Area. The Nassgotin are known to have followed a semi-nomadic seasonal round often travelling over great distances to hunt, trap, fish and gather resources. There may be some question regarding whether there was any use of areas at higher elevations where the majority of the proposed Project components are located, given that the geography is dominated by glaciers and mountains; this supports a moderate to strong *prima facie* claim of aboriginal rights to hunt, trap, fish and gather.

There was no information indicating that the area of the proposed Project, or its vicinity, overlapped with any village sites occupied in 1846, or that there were any sites regularly or intensively used in 1846, which would to support a claim to Aboriginal title.

EAO has also considered information contained in the Proponent's Application. In the Unuk River watershed, specific Project components include the following:

- the Kerr, Sulphurets, Mitchell pits, and underground block cave Iron Cap deposit;
- a waste rock storage area;
- power plant;
- water treatment facility;
- camp;
- the Coulter Creek Access Road; and
- the Ted Morris Creek Winter Access Road.

In the upper Bell-Irving watershed, main project components include the following:

- an ore preparation plant;
- TMF;
- various camps; and
- the Treaty Creek Access Road.

The ore preparation plant, TMF, various camps, and the Coulter Creek and Treaty Creek Access Roads appear to overlap with the Tahltan Nation's asserted traditional territory.

The proposed Project, including the Mine Site, TMF, access roads and other Project components, have the potential to impact fish and fish habitat, wildlife and wildlife habitat, and vegetation, resulting from the effects of ML/ARD on water quality, loss of habitat from clearing within the proposed Project footprint, soil erosion, as well as the risk of accidents, malfunctions, and increased access. Potential downstream effects from the mine construction and activities could affect the headwaters of the Unuk River, as well as the Treaty Creek and Teigen Creek drainages of the upper Bell-Irving River.

The above high-level list of potential impacts is not meant to be exhaustive; they simply represent the major themes of potential impacts identified during the EA. As indicated in EAO's November 9, 2009 letter to the Tahltan Nation, the proposed Project area is located at the southern periphery of the area claimed by the Tahltan Nation (with Treaty Creek being the southern boundary, as EAO understands it, and the area to the south having been ceded to a Gitksan group in or around 1900). As the proposed Project's TMF appears to overlap with the Tahltan's asserted traditional territory minimally (within the Treaty Creek area), and because the rivers associated with the proposed Project flow to the south, it does not appear that Tahltan Nation's Aboriginal Interests would be significantly impacted by the proposed Project.

Given EAO's initial assessment of the nature of the potential impacts of the proposed Project on the asserted Aboriginal Interests of the Tahltan Nation, EAO's view is that the duty to consult Tahltan Nation is at the middle range of the *Haida* consultation spectrum. However, throughout the EA of the proposed Project, EAO engaged with the Tahltan Nation pursuant to the process set out in the November 6, 2009 order issued

under section 11 of the Act which in EAO's view is more consistent with consultation at the deeper end of the *Haida* consultation spectrum.

In EAO's view, the consultation process with the Tahltan Nation, through engagement by the Proponent as well as directly by EAO, adequately fulfills the Crown's duty to consult in these circumstances.

12.5 Consultation with the Tahltan Nation

12.5.1 EAO's involvement with the Tahltan Nation

Pre-Application Stage

Initial Engagement

EAO notified the TCC of the initiation of the EA for the proposed Project via letter on April 30, 2008; in that letter, EAO advised that the EA process had been initiated and that it would contact the TCC again shortly in order to discuss opportunities for the TCC to participate. Two weeks later, on May 8, 2008, EAO sent a follow-up letter to the TCC to provide background information regarding the proposed Project and to extend an invitation to participate in the first meeting of the EA Working Group. EAO also requested a government-to-government meeting with the TCC in order to discuss the following:

- consultation opportunities during the federal and provincial EAs;
- the nature and scope of the Tahltan Nation's asserted Aboriginal Interests in the proposed Project area; and
- funding to assist the TCC's participation in the EA for the proposed Project.

The TCC accepted EAO's invitation to meet, which then took place on May 29, 2008 in Vancouver. In addition to the topics listed above, the following topics were also discussed during the meeting:

- TCC's interest in participating in the EA, including baseline study work;
- timing for open houses in the Tahltan communities;
- water management in the proposed Project area; and
- scheduling a follow-up meeting with EAO and the CEA Agency after the TCC has provided additional information regarding the Tahltan Nation's interests in the proposed Project area.

In May 2009, EAO wrote to the TCC to provide a copy of the Proponent's 2008 Baseline Studies Report and asked for feedback regarding whether there were any gaps that should be incorporated into the 2009 Baseline Studies Workplan, which was attached for review and comment. EAO's letter also included information about upcoming meetings of the full Working Group and technical sub-working groups, as well as an

invitation to meet on a government-to-government basis to discuss the EA process and the nature and scope of Tahltan Nation's Aboriginal Interests in the proposed Project area.

Capacity Funding

In August 2008, EAO sent a letter to THREAT conveying capacity funding to assist THREAT's participation in the EA of the proposed Project on behalf of Iskut First Nation and Tahltan First Nation. In October 2008, EAO provided additional capacity funding to assist with the TCC's participation in the EA.

Section 11 Order and Application Information Requirements

In June 2009, EAO provided the TCC with a copy of the Proponent's 2008 baseline geochemistry report and invited the TCC to participate in a Working Group meeting to discuss ML/ARD, which a THREAT representative attended.

A month later in July, EAO sent a letter to the TCC outlining EAO's preliminary views for consulting with the TCC for the EA of the proposed Project, and invited the TCC to review and provide comments on a draft order under section 11 (Section 11 Order) of the Act. The draft Section 11 Order acknowledged that the Tahltan Nation had indicated that the proposed Project is located within its asserted traditional territory, and outlined EAO's proposal for how consultation with the Tahltan Nation would be undertaken by both EAO and the Proponent for the EA for the proposed Project.

The TCC submitted comments on the draft Section 11 Order in August 2009, followed by comments on the draft AIR. EAO made a number of revisions to the draft in response to the TCC's comments prior to finalizing the Section 11 Order on November 6, 2009. In conveying the finalized Section 11 Order on November 9, 2009, EAO provided its rationale in a letter for incorporating some but not all of the TCC's requested revisions to the Section 11 Order. EAO explained that EAO's assessment of the Tahltan Nation's Aboriginal Interests was preliminary, and was based on the understanding that the TMF appeared to only slightly overlap with the Tahltan Nation's asserted traditional territory. Also, because the rivers that may be potentially impacted by the proposed Project flow south, EAO did not believe that Tahltan Aboriginal Interests were likely to be significantly impacted. Despite EAO's preliminary assessment that the potential for the proposed Project to impact Tahltan Nation's Aboriginal Interests was relatively low, EAO committed to continuing to consult with the Tahltan Nation at the high end of the *Haida* spectrum. Finally, EAO requested clarification from the Tahltan Nation regarding whether activities such as hunting, fishing for food, social, and ceremonial purposes, and timber harvesting for domestic purposes were, and continue to be, exercised in the proposed Project area.

The TCC sent EAO a letter in December 2009 stating that EAO had assessed the Tahltan Nation's rights unilaterally and that the EA process was insufficient to discharge the Crown's duty to consult and accommodate the Tahltan Nation with the respect to potential impacts from the proposed Project. EAO responded via a letter to the TCC two days later, and reiterated the rationale behind its preliminary assessment of the Tahltan Nation's Aboriginal Interests that was originally communicated in its November 9, 2009 letter. EAO also clarified the numerous opportunities for the Tahltan Nation to participate in the EA of the proposed Project, including:

- consultation regarding draft legal orders outlining the scope of the review, the EA process, and consultation requirements;
- receipt of capacity funding to assist with engagement in the EA process;
- opportunities for Tahltan Nation input and participation in studies;
- invitations to participate as a member of the advisory working group on technical issues;
- incorporating traditional ecological knowledge and traditional use information in the Proponent's Application for an EA certificate;
- engaging in government-to-government consultation, including specific discussions about potential adverse impacts to the Tahltan Nation's Aboriginal Interests from the proposed Project;
- pursuing accommodation options through proposed Project design modifications to address the Tahltan Nation's Aboriginal Interests and to minimize or eliminate potential adverse impacts on those interests;
- soliciting the Tahltan Nation's input regarding legal commitments/conditions of an EA certificate, if one is issued for the proposed Project;
- reviewing and providing comments on EAO's draft Assessment Report to Ministers; and
- the ability for the Tahltan Nation to submit a separate report to Ministers along with EAO's Assessment Report, if desired.

Section 13 Orders

In June 2011, EAO sent a letter to THREAT conveying a draft Order under section 13 of the Act (Section 13 Order), as well as a copy of the revised draft AIR, for review and comment. The purpose of the Section 13 Order was to change several aspects of the scope and process for the EA of the proposed Project, specifically the inclusion of Hwy 37 from the proposed Project site to the junction of Hwy 16 at Kitwanga, and consultation with Gitanyow regarding potential impacts arising from the use of Hwy 37. Although no written comments were received from the Tahltan Nation, a verbal telephone conversation between EAO's Executive Project Director, Chris Hamilton, and THREAT's Nalaine Morin took place on July 22, 2011; during that call Ms. Morin relayed concerns with the draft Section 13 Order, which Mr. Hamilton understood to be related

to the rationale for scoping transportation only as far as the junction with Hwy 16 and not further, as well as the nature and scope of consultation with the Tahltan Nation. Following up on the July 22, 2011 telephone conversation, EAO wrote to THREAT on October 4, 2011 to clarify that the draft Section 13 Order would not change EAO's current instruction to the Proponent as it relates to consultation with the Tahltan Nation.

In December 2012, EAO notified the TCC of a second Section 13 Order, the purpose of which was simply to change the timing for the Proponent to submit its request for the concurrent review of permit applications with its Application for an EA certificate.

Proponent's Consultation Reports

On January 30, 2013, EAO sent a letter to THREAT conveying a copy of the Proponent's "KSM Project Tahltan Nation Section 11 Order Consultation Summary Report" for review and comment; no comments were received from THREAT.

Application Evaluation

On October 31, 2012, EAO canvassed the Working Group members (including representatives from the Tahltan Nation) regarding their interest in participating in the evaluation of the Proponent's Application. The purpose of the evaluation is to determine whether the Application contains all of the information set out in the Application Information Requirements. The TCC accepted EAO's invitation to participate in the Application evaluation and submitted their comments on May 3, 2013, after being granted a one-day extension to the comments deadline, as requested. The Tahltan Nation also submitted additional screening comments on May 6, 2013.

On June 3, 2013, EAO wrote to THREAT advising that the Proponent's Application for an EA certificate had been found to include all of the information set out in the AIR, and the 180-day review stage would begin once all members of the Working Group had received their requested copies of the Application. EAO also provided information regarding EAO's Assessment Report and outlined opportunities for the Tahltan Nation to participate in the remainder of the EA and provide input.

In preparation for the initiation of the 180-day review stage for the EA of the proposed Project, EAO kept the Tahltan Nation apprised of the following between June and August 2013 by EAO:

- **June 25, 2013** – e-mail providing an update on concurrent permitting and requesting feedback regarding the number and format of the copies of the Application preferred by each Working Group member;
- **August 1, 2013** – e-mail providing an update on the timing of the revised Application, as well as instructions for disposing of screening copies;
- **August 7, 2013** – EAO followed up with the Tahltan by e-mail to confirm that THREAT had received the revised Table of Concordance from the Proponent, as

requested, in order to identify specific sections of the Application to receive in hard copy; and

- **August 15, 2013** – advised via e-mail that the 180-day review had started and provided a link to the acceptance letter and the Application on EAO's website. EAO also provided an update re: the timing for hard copies, next steps and key dates in the review (presented in a draft workplan for the Application review stage).

Application Review Stage

Initiation of the 180-Day Review

The 180-day Application reviews stage of the EA for the proposed Project was initiated on August 12, 2013. EAO communicated with the Tahltan Nation between August and September regarding the initiation of the review, including:

- **August 16-21, 2013** – e-mails back and forth between EAO and the Tahltan Nation regarding dates and locations for open houses with the Tahltan communities; and
- **August 29-September 12, 2013** – e-mails regarding a conference call to discuss the initiation of the 180-day Application review stage; EAO canvassed for preferences regarding potential dates for the call and provided copies of the a proposed agenda and a revised EA review schedule.

On September 13, 2013, EAO held the conference call with the Proponent and representatives from the CEA Agency and the Working Group (including THREAT) to discuss the initiation of the 180-day Application review stage. EAO and the CEA Agency presented the provincial and federal EA processes and timelines, including the following milestones and key steps in the EA:

- initiation of the 180-day review on August 12, 2013;
- a 45-day public comment period from September 6-October 9, 2013 with open houses in Iskut, Telegraph Creek, Smithers, Terrace, and Stewart;
- a series of Working Group and sub-Working meetings to be held throughout the review;
- an opportunity to review and submit comments on the Proponent's Application;
- an opportunity to review and submit comments on the Proponent's responses to comments on the Application;
- an opportunity to review and submit comments on EAO's draft Assessment Report, CPD, and TOC; and
- an opportunity for First Nations (including the Tahltan Nation) to review and submit comments on EAO's draft First Nations Consultation Report.

During the call, Working Group members were also given an opportunity to engage in discussion with, and ask preliminary questions of, the Proponent regarding the Application. EAO asked Working Group members for their feedback regarding the format and intent of future Working Group meetings, including the utility of forming technical sub-Working Groups. EAO provided information regarding upcoming open houses and advised that the deadline for the first round of Working Group comments on the Application was October 11, 2013.

Meetings and Key Correspondence with the Tahltan Nation

On September 16, 2013, a meeting took place between THREAT, EAO and the CEA Agency in Victoria; the purpose of the meeting was to discuss the EA of the proposed KSM Project, as well as a draft Letter of Understanding outlining consultation objectives with the Tahltan Nation on EA projects in general. The timing and purpose of a Hwy 37 Working Group meeting in early October 2013 to address transportation-related impacts from a number of EA projects in the northwest was also discussed.

On December 20, 2013, EAO wrote a letter to the TCC to provide EAO's initial views of the potential impacts from the proposed Project on the Aboriginal Interests of the Tahltan Nation. The letter outlined the following:

- EAO's initial assessment of the Tahltan Nation's Aboriginal Interests in the proposed Project area;
- potential impacts of the proposed Project on Tahltan Aboriginal Interests; and,
- the scope of EAO's consultation with the Tahltan Nation regarding the EA of the proposed Project.

EAO requested feedback from the Tahltan Nation regarding its initial assessment and the scope of consultation by January 24, 2014 and offered to meet with the Tahltan Nation to answer any questions or discuss the EA of the proposed Project. EAO also advised that the Tahltan Nation would have an opportunity to review and comment on EAO's draft Assessment Report, as well as the option to submit a separate report of their own to Ministers for their consideration along with EAO's Assessment Report.

Between December 2013 and May 2014, EAO communicated with the Tahltan Nation regarding the status of the EA, including the following key correspondence:

- **December 20, 2013** – e-mail conveying the Proponent's responses to Working Group comments on the Application and providing an opportunity to comment on those responses by January 24, 2014;
- **December 20, 2013** – e-mail advising that the Proponent requested a 30-day extension to the 180-day review;
- **January 8, 2014** – e-mail providing an update on next steps, timelines, and upcoming opportunities for input into the EA;
- **January 15, 2014** – e-mail and letter conveying a copy of the ethnographic report

entitled “KSM Mine Project: Review of Ethnographic and Historical Sources” dated March 6, 2013 referenced in EAO’s December 20, 2013 letter;

- **January 17, 2014** – e-mail to the Working Group (including the Tahltan Nation) acknowledging the complexity and volume of materials for review as part of this EA, and requesting feedback regarding what EAO could do to facilitate the Working Group’s review of those documents;
- **January 20/24, 2013** – e-mail conveying draft summaries to participants from the October 2-3, 2013 Working Group meeting and the November 6-8, 2013 technical water quality, wildlife, and selenium sub-Working Group meetings; for review and comment prior to finalization;
- **January 30, 2014** – e-mail conveying an order under section 24(4) of the Act extending the 180-day review timeline by 30 days, as requested by the Proponent;
- **February 12, 2014** – e-mails back and forth between EAO and the Tahltan Nation regarding scheduling a meeting on February 21, 2014 to discuss the EA of the proposed Project and the draft Letter of Understanding (LOU) between BC and the Tahltan Nation;
- **February 20, 2014** - e-mail from EAO to the Tahltan Nation proposing topics for discussion at the February 21, 2014 meeting and requesting feedback regarding additional items of interest to the Tahltan Nation;
- **March 5, 2014** – EAO e-mail providing a copy of the draft CPD and TOC for the Kitsault Mine Project for the GHCO’s information (an action item from the February 21, 2014 meeting);
- **March 5, 2014** – EAO e-mail conveying the Proponent’s responses to comments submitted by the US Department of the Interior, HC, and FLNR, as well as a copy of the signed section 24(4) Order, extending the 180-day review by an additional 45 days, as requested by the Proponent;
- **April 3, 2014** – EAO e-mail to the Tahltan Nation conveying a copy of the revised draft LOU between EAO and the Tahltan Nation, and proposing scheduling a meeting to discuss and finalize the LOU;
- **April 11, 2014** – Tahltan Nation e-mail conveying the draft LOU with the Tahltan Nation’s suggested revisions;
- **April 22, 2014** – EAO e-mail to the Working Group (including the Tahltan Nation) advising of an upcoming Working Group meeting and outlining opportunities to review and provide input on key documents;
- **April 24, 2014** – Tahltan Nation letter conveying comments on the Proponent’s responses to issues raised by the Tahltan Nation, and outlining the Tahltan Nation’s concerns with the proposed Project;
- **April 25, 2014** – EAO e-mail conveying EAO’s suggested revisions to the draft LOU and requesting a meeting to discuss;

- **April 29, 2014** – EAO e-mail conveying copies of the recently issued section 13 and 24(4) orders for the EA of the proposed Project, as well as outlining the topics for discussion at the May 13-15, 2014 Working Group meetings; and
- **April 29, 2014** – EAO e-mail requesting to schedule a call to discuss the draft LOU and a meeting the week of May 19 or 26 to discuss the EA of the proposed Project;
- **May 2, 2014** - EAO provided the Tahltan Nation with the draft Assessment Report, TOC, CPD, First Nation Consultation Report, and issue tracking tables for review and comment. EAO also advised that the Tahltan Nation may choose to submit a separate report to Ministers for consideration, which would need to be submitted to EAO by June 12, 2014.
- **May 22, 2014** – the Tahltan Nation requested a two-week extension for submitting comments on the draft Assessment Report, TOC, CPD, First Nation Consultation Report, and issue tracking tables. EAO responded to advise that the Executive Director had agreed to grant a one-week extension, and that anything submitted after May 30, 2014 would be provided to Ministers as a separate submission, but not reflected in EAO's Assessment Report.
- **May 30, 2014** – the Tahltan Nation submitted comments on the draft TOC, with a focus on the following:
 - adding a condition that the Proponent would not be allowed to start construction of the proposed Project until bonding and financing have been finalized;
 - EAO considered this and noted that bonding is a statutory decision made through *Mine Act* permitting
 - revised wording in numerous conditions to strengthen the requirement for the Proponent to properly consult and consider Tahltan input on permit applications prior to permits being issued;
 - a recommendation to add a condition requiring the Proponent to begin ice patch archaeology, which would include having a plan and program in place prior to the start of construction in order to ensure that significant archaeological values are understood and can be protected prior to any disturbance from development of the proposed Project;
 - During the EA process the Tahltan identified the importance of snow and ice patches, which is also outlined in the Tahltan Archaeological Standards. While the KSM Project's Regional Study Area (RSA) has extensive high elevation terrain with snow and ice patches, the Project's actual footprint is mainly at lower elevations where there are no snow patches or glaciated areas. However, the proponent's AIA included assessments of 43 snow and ice patches, located in the RSA. The snow and ice patch assessment was conducted by pedestrian survey in August 2012 during the period when there was near maximum annual snow melt. Survey areas were selected based on proximity to the Project footprint and the assessed archaeological potential of the areas. No prehistoric cultural material, paleobotanical or paleontological materials were identified

- during the ice patch survey
- a request for a new condition to require an update of the hydrogeological model that was undertaken for the proposed Project and a proven contingency plan, including triggers for implementation;
 - an updated hydrogeological model will be completed as a requirement of permitting. EAO has also added conditions requiring groundwater and water management plans.
- a recommendation that wildlife population surveys be undertaken more frequently than every five years;
 - EAO notes that this condition is not supported by FLNR, who is concerned about the disturbance resulting from surveys
- a recommendation for additional identification and monitoring of effects on sensitive moose habitats;
 - EAO notes that this is addressed in the condition for a Wildlife Effects Monitoring Plan
- a request for additional monitoring and mitigations for little brown bats;
 - EAO notes that this is addressed in the condition for a Wildlife Effects Monitoring Plan
- an expression of concern that the proposed mitigation for mountain goat are too focused on habitat loss and not on population effects;
 - EAO will continue a discussion with Tahltan to better understand this request and how it may be addressed.
- a request for conditions that require proven thresholds or contingencies to deal with risk and uncertainty related to potential wildlife effects.
 - EAO will continue a discussion with Tahltan to better understand this request and how it may be addressed.

EAO met with representatives from the Tahltan Nation on February 21, 2014 in Vancouver to discuss the following:

- EAO's draft First Nations Consultation Report and the opportunity for the Tahltan Nation to review and provide comments on that document;
- EAO's December 20, 2013 letter regarding its initial assessment of the Tahltan Nation's asserted Aboriginal Interests in the proposed Project area;
- Tahltan Nation's intent to submit a separate report to provincial Ministers along with EAO's Assessment Report at the end of the EA for the proposed Project;
- EAO's methodology for assessing potential impacts on the Tahltan Nation's Aboriginal Interests in the proposed Project area;
- the need for site-specific information regarding the Tahltan Nation's use of the proposed Project area; and
- the status of the draft LOU between BC and the Tahltan Nation and next steps.

Another meeting between EAO and Tahltan Nation representatives was scheduled for June 11, 2014 in order to discuss the draft Letter of Understanding and the EA of the proposed Project.

Throughout the remainder of the EA, EAO continued to communicate regularly with the Tahltan Nation and provided information and opportunities for input into the EA of the proposed Project. Via e-mails to the Working Group, EAO provided the Tahltan Nation with the following:

- copies of memos and comments submitted by other members of the Working Group, as well as the Proponent's responses;
- invitations to participate in Working Group meetings;
- updates on the timelines and next steps in the EA of the proposed Project; and
- opportunities to provide input.

Open Houses

EAO worked with the Tahltan Nation to identify appropriate dates and communities to hold open houses, the purpose of which was to provide information regarding the Proponent's Application and explain opportunities to provide input. Two open houses were held in Tahltan communities: one on September 25, 2013 in Iskut, and one on September 26, 2013 in Telegraph Creek. Five people attended the open house in Iskut and ten people attended the open house in Telegraph Creek.

Comments on the Application and Proponent Responses

On October 11, 2013, THREAT contacted EAO to request a two-week extension to the deadline for the first round of comments on the Application, but offered to provide a high-level summary of the Tahltan Nation's issues and concerns by October 15, 2013. EAO granted the extension request and suggested scheduling a meeting between EAO and the TCC in November 2013 and perhaps again in January 2014.

On October 21, 2013, the Tahltan Central Council submitted its first round of comments on the Application, expressing concerns regarding potential effects on the following:

- economics;
- water quality and fish;
- visual and aesthetics;
- social conditions;
- access; and
- wildlife.

The TCC also expressed concerns regarding the alternative means of undertaking the Project, accidents and malfunctions, and the Proponent's presentation of Aboriginal

Interests in the Application. Additional comments were submitted by THREAT to EAO on November 14, 2013, which expanded on their October 11, 2013 comments related to:

- economics;
- water quality and fish;
- visual and aesthetics;
- accidents and malfunctions;
- cumulative effects; and
- alternative means of undertaking the Project.

EAO provided all of the comments submitted by the Tahltan Nation to the Proponent for inclusion in an issue tracking table and response. Between January and April 2014, EAO circulated responses from the Proponent to issues raised by members of the Working Group (including the Tahltan Nation) for review and comment. On April 24, 2014, the Tahltan Nation submitted comments on the Proponent's responses to the issues they had originally raised, and outlined the following overarching concerns with the proposed Project:

- effects on high fisheries values in Teigen and North Treaty Creeks;
- inadequate detail in the Proponent's fisheries and aquatic management and monitoring plans;
- impacts from the TMF to water quality/quantity in Teigen and Treaty Creeks;
- impacts on fish (especially salmon, including one of the most valuable salmon habitats in the Bell-Irving River system) due to inadequate mitigation and water treatment;
- impacts on fisheries habitat in the event of a catastrophic dam failure event;
- unproven technology associated with the SeMP; and
- removal of moose habitat, including a vital corridor for moose movement in a population that is already in decline.

A complete list of all comments submitted by the Tahltan Nation regarding the proposed Project and the associated responses from the Proponent is presented in Appendix 1.

Working Group & Technical Sub-Working Group Meetings

Between October 2013 and May 2014, EAO and the CEA Agency scheduled the following Working Group and technical sub-Working Group meetings:

- **October 2-3, 2013** – the Proponent presented their significance determination framework and key areas of the Application, followed by a discussion, and an

opportunity to ask questions (Tahltan representatives participated in person and by telephone)

- **November 6-8, 2013** – an opportunity to engage in technical level discussions on issues related to wildlife and water quality on both the mine side and tailings side of the proposed Project (Tahltan representatives participated in all three days of meetings)
- **November 26-28, 2013** – an opportunity to engage in a technical level discussion, review the Proponent's proposed mitigation measures and conditions, and identify outstanding geotechnical issues for resolution (Tahltan representatives participated in the November 28 meeting)
- **May 13-15, 2014** – a three-day Working Group meeting to discuss EAO's draft Assessment Report, TOC, CPD, and issues tracking table. The meetings provided Working Group members with an opportunity to discuss and ask questions about EAO's key findings with respect to potential effects from the proposed Project on water quality, wildlife, fish, and transportation.

12.5.2 Proponent's Involvement with the Tahltan Nation

Pre-Application Stage

On November 6, 2009, EAO issued an order under section 11 of the Act, which required that the Proponent consult with the TCC on behalf of the Tahltan Nation regarding the EA of the proposed Project. The Proponent initiated consultations with the Tahltan Nation prior to the start of the EA, and met with THREAT representatives on February 1, 2008 to introduce the proposed Project.

Starting in June 2008, the Proponent participated in Working Group meetings led by EAO and the CEA Agency and organized tours of an operating and a closed mine in June 2011. Representatives of the Tahltan Nation participated in all of the Working Group meetings and also attended both site tours. The Proponent also provided opportunities for representatives of the Tahltan Nation to tour the proposed Project site, which took place in July 2008, June/July/October 2009, and September 2011.

As set out in the section 11 Order, the Proponent provided the Tahltan Nation with electronic and paper copies of the draft AIR in June 2010, as well as notifications regarding upcoming open houses.

Although not specifically required by EAO, the Proponent provided the Tahltan Nation with capacity funding to facilitate their participation in the EA, including the review of the KSM Preliminary Economic Assessment and a desk-based Traditional Knowledge/Traditional Use Study. The Proponent provided the Tahltan Nation with a copy of the draft desk-based report for review and comment in June 2012, and followed up by meeting with the Tahltan to discuss the report and other issues. Based on a

recommendation from THREAT, the Proponent held a Traditional Knowledge/Traditional Use workshop in August 2012 in order to discuss the integration of Tahltan knowledge into the EA.

In addition to the Traditional Knowledge/Traditional Use workshop, the Proponent also facilitated the delivery of a “Mining 101: Mining for Non-Miners” workshop at the Tahltan Youth Conference in April 2010, and attended the Tahltan Resources Forum in June 2008 and the Tahltan Career Fair in May 2012.

In October 2012, the Proponent hosted community meetings in Dease Lake, Iskut, and Telegraph Creek in order to provide Tahltan members with information regarding the fisheries, water quality, and wildlife studies that had been undertaken to date for the EA of the proposed Project. Employment opportunities connected with baseline field studies were also offered to the Tahltan Nation by the Proponent between 2008 and 2011/2012.

As set out in the section 11 Order, the Proponent prepared a draft report summarizing the consultation activities undertaken with the Tahltan Nation during the pre-Application stage of the EA, as well as outlining their plan for consulting with the Tahltan Nation during the Application review. Although the Proponent provided the Tahltan Nation with the draft report on December 12, 2012 for review and comment, no feedback was received.

Application Review Stage

As required by the section 11 Order issued by EAO, the Proponent undertook the following consultation activities with the Tahltan Nation during the Application review stage of the EA of the proposed Project:

- distributed copies of the Application to the Tahltan Nation for information and consultation purposes;
- wrote to the Tahltan Nation to identify the dates of the public comment period on the Application, and the dates, times and locations of open houses;
- provided a written report to the Tahltan Nation, EAO, and the CEA Agency on the results of consultation activities with the Tahltan Nation;
- considered and responded to issues identified in comments submitted by the Tahltan Nation during the review of the Application;
- where requested and within any time limits set by EAO, provided specific additional information in relation to, or to supplement, the information provided in the Application;
- attended Working Group meetings organized by EAO to provide information related to the Application and responded to questions on the Application;
- prepared a tracking table of issues raised by First Nations (including the Tahltan Nation) on the Application and responses to those issues;

- considered and prepared written responses to key issues raised by the Tahltan Nation regarding the Application; and
- by mutual agreement, arranged consultation meetings with the Tahltan Nation to identify any specific Aboriginal Interests that may be potentially affected by the proposed Project, as identified in Aboriginal interest and use studies, traditional use studies, or other sources of information; to identify measures to avoid or mitigate potential adverse effects; and/or to otherwise address or mitigate the Tahltan Nation's concerns.

Following acceptance of the Application and the initiation of the 180-day review by EAO, the Proponent provided the Tahltan Nation with copies of the Application. The Proponent also placed advertisements in local newspapers and participated in the two open houses hosted by EAO in Iskut (September 25, 2013) and Telegraph Creek (September 26, 2013) in order to present the proposed Project to Tahltan community members.

Meetings and Key Correspondence Between the Proponent and Tahltan Nation

In addition to participating in open houses and Working Group meetings organized by EAO, the Proponent also held the following meetings with representatives of the Tahltan Nation:

- **September 10, 2013** – meeting in Smithers BC, with Nalaine Morin of THREAT to provide an update on the proposed Project and discuss the TMF alternatives assessment and road assessment;
- **October 11, 2013** – meeting in Vancouver BC, with representatives from the TCC to discuss the TCC Communication Agreement; and
- **January 30, 2014** – meeting in Vancouver BC, with representatives from the TCC and THREAT to provide an update on the proposed Project and discuss communications protocols, etc.

According to the Proponent's February 2014 Tahltan Nation Consultation Report, the Proponent communicated regularly with the Tahltan Nation during the Application review stage of the EA of the proposed Project. In addition to communications regarding logistics for meetings and requests for information, the Proponent exchanged 50 letters, emails, and news releases with the Tahltan Nation, as well as distributing a newsletter to all mailboxes in Dease Lake, Iskut and Telegraph Creek to provide Tahltan Nation members with an update on the proposed Project.

The Proponent also provided capacity funding to assist the Tahltan Nation's participation on the EA of the proposed Project.

12.5.3 Potential Impacts to Tahltan Nation Interests and Measures to Mitigate or Accommodate Impacts

The sections below describe EAO's understanding of the issues that have been identified by Tahltan Nation during the EA for the proposed Project and 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 Tahltan Nation issues relate to water quality and fish, access, economics, and alternative means of undertaking the proposed Project. 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.

With respect to the issues raised by the Tahltan Nation, many relate to aboriginal rights to hunt, with a particular emphasis on moose, although goats and other wildlife have also been discussed. Access has been a theme raised commonly by Tahltan, both physical access (e.g. new road access providing more pressure) and regulatory access, meaning hunting rules established under the *Wildlife Act*. In particular, the Tahltan Nation view General Open Season rules as placing too much pressure on wildlife and thereby making Tahltan Nation hunting activities more difficult. They have expressed a preference for Limited Entry Hunting where fewer non-aboriginal hunters provided with a limit on the number of animals to be harvested.

Tahltan Nation also expressed concerns about water quality, with a particular emphasis on Teigen Creek, given the high fisheries values in the area. This concern, as well as a concern for other rivers and creeks, is directly related to the aboriginal right to fish.

Another consistent message from Tahltan Nation is about culture. While the link between proposed Project effects and culture is somewhat more difficult to assess, it is an important value to Tahltan Nation and is connected to a range of issues and activities, including the ability to access areas and continue to harvest resources, to increased road traffic and safety concerns, being fully involved in decision-making, community well-being and cohesion and the importance of language.

Water Quality and Fish

- The Tahltan Nation expressed concerns about potential impacts to fish, and the resulting potential impacts on the aboriginal right to fish, in the Unuk River, Bell-Irving River, Treaty Creek, and Teigen Creek from impacts to water quality from the proposed Project, and recommended the development of a Salmon Management Plan for the area.
- The Proponent has committed to monitoring fish and aquatic habitat as set out in the AEMP (Chapter 26.18.2 in the Application) and to monitor Teigen Creek

Chinook salmon through the implementation of a Salmon Monitoring Plan to verify the predictions of the effects assessment. The program will include monitoring of adult returns, juvenile abundance in relation to flow, gravel recruitment, hydrology, and water temperatures.

- The Proponent's proposed mitigation measures for ensuring that residual effects of water quality on fish populations in South Teigen, Teigen, North Treaty and Treaty Creeks include: designing diversion ditches to minimize water loss, altering diversion ditch flow patterns to coincide with various phases of Project development to minimize changes in water quantity, and rotating the TMF to discharge into Treaty Creek during its operation. The Salmon Monitoring Plan proposed for Teigen Creek will be designed to detect any changes due to habitat alteration.
- The Proponent has committed to ongoing monitoring in aquatic environments downstream of discharge points (such as the TMF) in order to ensure that any changes in the aquatic environment area detected and adequately managed.
- In addition to condition 8, which requires that water quality 100 m downstream of the point of seepage meet BCWQG or SSWQO, EAO has also added a number of additional conditions to address potential water quality effects to fish. EAO also notes that Tahltan Nation will be consulted on all these conditions. They include:
 - the requirement for a WMP which provides for the detailed design of the TMF and associated water management facilities and demonstrates how condition 8 will be satisfied during all phases of the proposed Project. This must be completed prior to construction of the TMF dams;
 - the requirement for an Accidents and Malfunctions Plan that shows how the Proponent will address any accidental water quality effects. This must be completed prior to construction of the TMF dams;
 - the requirement that the proposed Project must be constructed to enable the addition of infrastructure and facilities that could collect any seepage and treat any discharges from the TMF to ensure that condition 8 is met during all phases of the proposed Project;
 - the requirement for an AEMP that continuously examines water quality in Teigen and Treaty Creeks. This must be completed prior to construction of the TMF dams.
 - the requirement for a Groundwater Monitoring and Mitigation Plan which shows how the Proponent will prevent groundwater effects to Treaty and Teigen Creeks. This must be completed prior to construction of the TMF dams;
 - the requirement that, during the operations, closure and post-closure phases of the proposed Project, the EA Certificate Holder must ensure that the rate of

- water discharge from the TMF to Treaty Creek will be staged to mimic stream flows; and
- the requirement for a Salmon Monitoring Plan in Teigen Creek.
 - With respect to fish habitat, EAO added a number of conditions relating to fish and fish habitat, including the following:
 - the requirement for an AEMP that continuously examines water quality in Teigen and Treaty Creeks. This must be completed prior to construction of the TMF dams;
 - the requirement for a Salmon Monitoring Plan; and,
 - the requirement for a Fish Salvage Plan, to be developed prior to the commencement of construction of the TMF dams, which would explain how Dolly Varden which are currently located within the footprint of the TMF can be salvaged and relocated.
 - EAO notes that primary responsibility for managing potential loss to fish habitat resides with Canada. Notwithstanding this, Part B of this Report says that there is high certainty that the compensation programs proposed by the Proponent will be effective in offsetting habitat losses associated with construction and operation of the TMF dams and related seepage collection ponds, road crossing structures, transmission line crossings and water quantity reductions in South Teigen and North Treaty creeks downstream of the TMF dams. These programs are administered by DFO under the *Fisheries Act* and DFO has provided their preliminary support for the Proponent's proposed plans. The losses would occur primarily during proposed Project construction and over the duration of TMF development from changes to streamflow in North Treaty and South Teigen Creek causing the alteration of the suitability or area of Dolly Varden habitat.
 - In addition to direct habitat loss, Part B of EAO's Assessment Report also discusses the potential effects of water quality degradation on fish. EAO considered the fisheries and aquatic habitat values in the receiving environment in Treaty and Teigen Creeks, and in particular the fact that water from the proposed TMF drains into the Bell-Irving and Nass Rivers. In addition to the landscape level of effects, EAO noted current water quality in both Treaty and Teigen Creeks frequently has elevated levels of metals and other elements due to natural mineralization in the area. We also considered the low magnitude of the predicted water quality effects as well as the long term and continual nature of effects. EAO notes that any water quality effects of TMF discharge would stabilize and diminish in the future due to increased dilution from precipitation. The Proponent's mitigation commitment to meet BCWQG and/or SSWQO during the operations, closure and post- closure phases of the proposed Project is important to ensuring the proposed Project will not cause significant adverse residual effects and are central to EAO's conclusions. EAO also notes that

modeled information presented during the EA indicates these objectives can be met.

- With respect to Tahltan Nation concerns on the Unuk River, Part B of this Report concludes that water quality at UR1 will either meet BCWQG or not change significantly over current baselines.

Access

- Tahltan Nation echoed concerns raised by the FLNR regarding the Treaty Creek Access Road, including geotechnical concerns with the old Bell-Irving bridge crossing site where the new bridge is proposed, the potential for stream channel avulsion across alluvial fans, and safety/environmental concerns associated with the proposed road design across the alluvial fan at km 4.6.
- In response to concerns regarding stream channel avulsion, the Proponent has indicated they will develop and implement an operational and maintenance program that would set out regular monitoring and maintenance activities, such as debris removal, channel dredging/training, culvert maintenance, etc., in order to minimize the potential for undesirable consequences.
- In response to concerns regarding the proposed road design at km 4.7, the Proponent has amended the design to incorporate changes requested by FLNR, including adding additional culverts and re-examining the location of the road. The Proponent has also applied for a wider corridor in the Special Use Permit near km 4.7 in the event that further design changes are required.
- The Proponent's engineers determined that the west bank of the proposed bridge location is geotechnically sensitive, and has committed to retain a geotechnical engineer with appropriate qualifications to provide appropriate field review during construction.
- Tahltan Nation also expressed concerns regarding increased access into the area via the Treaty Creek Access Road and impacts of the proposed Project on wildlife. In response, EAO has offered the following conditions:
 - prior to the commencement of construction of the Treaty Creek and the Coulter Creek access roads, the EA Certificate Holder must develop a standard operating procedure that will form a component of the Wildlife Effects Monitoring Plan and that will address potential impacts to wildlife along the Treaty Creek and Coulter Creek roads resulting from transportation use related to the proposed Project;
 - the EA Certificate Holder will develop and submit to the FLNR for approval a standard operating procedure (the "Bear SOP") that details efforts to be taken by the EA Certificate Holder to avoid and reduce risks of potential bear-human conflicts that could arise during proposed Project operations;

- the EA Certificate Holder will develop and submit for approval to the FLNR a Wildlife Effects Monitoring Plan completed prior to the commencement of construction on the Treaty Creek and Coulter Creek Access Roads;
- the EA Certificate Holder will develop and submit to the FLNR a Terrestrial Ecosystems Management and Monitoring Plan prior to the commencement of construction on Treaty Creek and Coulter Creek Access Roads;
- the EA Certificate Holder must develop and submit for approval to the FLNR, the MEM and EAO a Traffic and Access Management Plan for the Treaty Creek and Coulter Creek access prior to the commencement of construction on Treaty Creek and Coulter Creek Access Roads; and
- the EA Certificate Holder must construct and operate a gate or barrier on the Treaty Creek access road that will restrict access across the bridge to the West side of the Bell Irving River. Any such gate or barrier must be in place at any time that the Treaty Creek road is usable by a passenger vehicle or all-terrain vehicle.

Economics

- Tahltan Nation expressed concern about the lack of information in the Proponent's economic analysis regarding potential impacts from proposed liquid natural gas projects, bitumen pipelines, and other associated facilities in the region. Tahltan Nation is also concerned that commitments may not be honoured if the proposed Project is sold to another company, including commitments related to Aboriginal employment and working with local suppliers and contractors for materials and services.
- The Proponent advised that the AIR did not include proposed liquid natural gas projects, bitumen pipelines, and other associated facilities, and so they were not included in the analysis.
 - EAO notes that, when the AIR was approved in January 2011.
- The Proponent has committed to engaging with Tahltan Nation to develop training programs specifically targeted towards Tahltan members and is currently working with mine training organizations in the northwest aimed at providing sector-related skills and training to Aboriginal people.
- The Proponent has developed a Procurement Strategy designed to assist local suppliers (including First Nations) in being able to take advantage of opportunities to supply the proposed Project.
- EAO confirms that an EA Certificate (if issued) would be legally binding, and any new Project owners would be responsible for complying with the conditions attached to the EA Certificate.

Alternative Means of Undertaking the Project

- Tahltan Nation raised a number of questions and concerns regarding the methodology and results of the alternatives assessment, specifically as they related to the TMF and selenium treatment.
 - The Proponent incorporated comments received from THREAT in March 2012 into the final TMF Alternatives Assessment Report, including adding the following sub-accounts to its analysis: downstream fisheries values, groundwater quality and quantity, and surface water hydrology. The Proponent also performed an additional sensitivity analysis on downstream fisheries values.
 - The Proponent followed the Guidelines for the Assessment of Alternatives for Mine Waste Disposal (2011) in its application for a Schedule 2 Amendment to the MMER administered by EC. In addition, the sub-accounts and indicators used were guided by input from technical experts and the Working Group.
 - The TMF alternatives assessment was presented to the Working Group (including representatives from Tahltan Nation) by the Proponent in September 2011 and March 2012, and Working Group feedback was incorporated into the final report.
 - The Proponent has committed to developing and implementing the following EMPs that would monitor the effects of metal uptake: Soil Contamination Prevention Plan, AEMP, and Terrestrial Plant Tissue Metal Concentrations Monitoring Plan. If contaminants/chemicals of potential concern in plant tissue change from baseline levels, the Proponent has committed to undertaking a screening level risk assessment to determine whether changes to country foods and human health are likely to occur.

Taking account the above discussion, and in particular the following conclusions:

- that water quality in Teigen and Treaty Creeks will, as a condition of an EA Certificate, be protective of the most sensitive aquatic species;
- salmon populations and water quality will be monitored and managed through an AEMP and a SeMP;
- DFO has provided its preliminary support for the Proponent's proposed compensation programs;
- EAO has developed robust conditions around access management;
- Tahltan Nation will continue to be consulted through the development of all plans required to be developed as Conditions; and
- Tahltan Nation will be involved throughout the Mine Development Committee, should an EA Certificate be issued.

EAO's assessment is that potential impacts of the proposed Project on Tahltan Aboriginal Interests, including fishing and other uses related to water quality, including

aboriginal rights to fish in Teigen, Unuk, Treaty and the Bell-Irving Rivers, hunting throughout the area and the preservation of Tahltan culture, have been appropriately accommodated.

12.5.4 Conclusions Regarding Tahltan Nation

In view of the consultation that has taken place with Tahltan Nation, it is EAO's conclusion that:

- the process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns expressed by Tahltan 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 Tahltan Nation Aboriginal Interests (and by way of both draft and final copies of this Report, it is communicating its findings to Tahltan Nation); and
- measures that would effectively avoid and mitigate impacts to the potential impacts to the Tahltan Nation's asserted Aboriginal rights to hunt and fish have been meaningfully discussed with Tahltan Nation.

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Tahltan Nation, it is EAO's conclusion that the Crown's duty to consult and appropriately accommodate the potential impacts of the proposed Project on Tahltan Nation's Aboriginal Interests has been adequately fulfilled.

13 PART D – NISGA’A NATION CONSULTATION

Chapter 10, paragraph 8(e) of the NFA requires that all EA processes, as defined in the NFA will, in addition to the requirements of applicable EA legislation, “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.”

Chapter 10, paragraph 8(f) of the NFA requires that all EA processes, as defined in the NFA, will, in addition to the requirements of applicable EA legislation “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.”

Based on a review of the Proponent’s Application, supplemental information provided by the Proponent, plus the Proponent’s Environmental, Social and Cultural Impact Assessment (ESCIA) and related documents as well as issues raised in tripartite government meetings with the Proponent and NLG during review of the proposed Project’s Application, EAO has conducted an 8(e) and 8(f) assessment.

Part D provides an assessment of the potential effects of the proposed Project, mitigation measures and EAO’s conclusions, with respect to paragraph 8(e) and 8(f) of Chapter 10 of the NFA, based on review of the Proponent’s Application and supplemental information provided by the Proponent and input from NLG during the EA. A more detailed assessment of a range of VCs used to inform the assessments can be found in Part B of this report.

13.1 Introduction and Purpose

Chapter 10 of the NFA applies to the EA of the proposed Project as it falls within the Nass Area²⁶, as defined in the NFA. The purpose of Part D 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, including supplemental materials, plus the Proponent’s ESCIA and related documents as well as issues raised in tripartite government meetings with the Proponent and NLG during review of the proposed Project’s Application.

²⁶ For the purposed 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.

Section 13.2 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 EAO's analysis and conclusions of the Proponent's proposed mitigation measures to address concerns raised by the NLG during the EA.

Section 13.3 identifies and evaluates the impacts of the proposed Project on the social, cultural and economic well-being of the Nisga'a pursuant to Chapter 10, paragraphs 8(f) of the NFA. This analysis 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* and updates provided in December 2013. 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.

Part D is not intended to duplicate or reproduce the analysis of the Application prepared pursuant to the provincial or federal EA processes, other parts of this report or CEA Agency Comprehensive Study Report. Part D provides additional, supplemental analysis that is focused on issues, impacts, and interests that pertain directly and specifically to Nisga'a people, Nisga'a lands and Nisga'a Treaty interests.

As described in other parts of this Report, the analysis and conclusion of potential effects of the proposed Project includes consideration of the Proponent's mitigation commitments which, as defined in the CPD and TOC, 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.

The NFA defines the extent of Nisga'a Lands (1992 square kilometres) 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.

Nisga'a Lands form part of the Nass Wildlife Area (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.

The proposed Project, including the PTMA, roads and infrastructure in the Mitchell-Treaty Saddle Area, Process Plant, TMF, TCAR and transmission line is situated within the Nass Area. Only the eastern portion of the MTT falls within the Nass Area. At its closest point the straight line distance from the NWA to the PTMA is 31 km. The PTMA is located approximately 200 km upstream of the lower Nass River and Nisga'a Lands. A good portion of the transportation corridors that would be utilized in connection with the proposed Project are within both the Nass Area and NWA including the TCAR and a portion of Hwy 37. A portion of the temporary Frank Mackie Glacier access route proposed to be used during the initial stages of construction in the winter months is also within the Nass Area.

Potential Effects of the Proposed Project

For the purposes of public safety the Proponent will maintain a 500 m buffer around the PTMA, which will prohibit various activities, including any use of this portion of the Nass Area to harvest fish or migratory birds. With the PTMA and buffer covering a total area of 12,465 ha and the Nass Area spanning 2,700,000 ha, this area is a very small portion 0.005% 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 PTMA during active mining for safety purposes.

EAO's Conclusions on Lands Interests

EAO concludes that the very small area (0.005% of the Nass Area) 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.

Potential Effects of the Proposed Project

The Proponent predicts that year-round use of the proposed transportation corridors has the potential to cause adverse environmental effects to terrestrial ecosystems, fish and aquatic habitat and wildlife. Those effects are discussed in those respective sections of this report. Other effects associated with the use of the proposed transportation corridors could be linked to restrictions on access due to safety related access restrictions, and over-use or over-harvesting of fish, migratory birds or wildlife and other cultural resources as the backcountry is opened up by proposed Project roads and rights-of-way. Noise and traffic disturbances associated with the use of the proposed transportation corridors have the potential to adversely affect use of subsistence resources and harvesting practices. Indirect effects on culturally important resources could also derive from direct environmental effects, such as contamination of country foods.

Nisga'a access to different land use sites along Hwys 37 and 37A could be impeded in the short term as a result of vehicular accidents over the life of the proposed Project.

Mitigation Measures

A number of conditions have been added to address access issues. They include the development of an access management plan for the TCAR, as well as the requirement that a gate be constructed to prevent unauthorized access onto the TCAR. NLG will be consulted on the development of the access management plan and EAO will require appropriate access for Nisga'a Citizens as a component of the plan.

EAO's Conclusions on Access Interests

EAO concludes that the Proponent's proposed construction of two new access roads to the mine site as well as the use of existing Provincial Hwys is not reasonably expected to have any adverse environmental effects on the Nisga'a Access interests outlined in the NFA.

13.2.3 Water

Chapter 3 of the NFA provides the Nisga'a Nation with a water reservation of 300,000 decameters per year from the Nass River and other streams for domestic, industrial, and agricultural uses. There are provisions relating to the Nisga'a water licenses, which would be applied against the Nisga'a water reservations.

There are no direct interactions or effects expected on the Nass River or any other watersheds within Nisga'a Lands. However, EAO notes that Chapter 10 of this Report discusses risk associated with spills along the transportation route and that the transportation route does cross the Bell-Irving and Nass Rivers.

Watersheds affected within the proposed Project footprint and downstream receiving environment include the Teigen, Treaty, Mitchell and Gingras Creeks and Unuk and Bell-Irving Rivers. Teigen and Treaty Creeks and Unuk and Bell-Irving Rivers discharge into the Nass River and are situated within the Nass Area, but are outside of Nisga'a Lands.

Maintaining stream flow and water quality in waterbodies within the Nass Area is important to the protection of freshwater and marine ecosystem values 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. These are discussed more in Part B of this Report.

Potential Effects of the Proposed Project

Nass River and Other Waterbodies defined in Chapter 3 of the NFA

There are no potential significant adverse environmental effects expected from the proposed Project to stream flows, water quality or aquatic resources in the Nass River, its tributaries, 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, (Teigen and Treaty Creeks (PTMA) Mitchell and Gingras Creeks (Mine Site) and Unuk River and Bell-Irving River Watersheds) as identified in the Application for potential effects to groundwater quantity and quality, surface water quantity and quality and fish and aquatic habitat VCs. EAO notes that Section 10 of this 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 Bell Irving or Nass River and as such, no changes are expected in the Nass River.

Mitigation Measures

No direct effects on water interests as defined in the NFA were identified and therefore no mitigation was proposed. However, as section 10 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, as well as EAO's conclusions on adverse effects, are provided in section 10.

The key condition EAO developed to address effects from potential spills is the requirement for a Geographic Response Plan, which sets out a plan for how the Proponent would address project-related spills and work with other industrial Hwy users to coordinate effective responses. The Proponent's EMPs, requirements of the *Mines Act* permitting process and conditions identified in the TOC, include various measures to mitigate traffic effects, including the Traffic and Access Management Plan, Dangerous Goods and Hazardous Materials Management Plan, Emergency Response Plan (for emergencies other than spills) and Spill Prevention and Emergency Response Plan.

Some of the key mitigations the Proponent will include in these plans are:

- enforcing posted speed limits;
- a zero-tolerance policy on alcohol and drugs while transporting goods and materials to and from the site;

- requiring drivers transporting to have appropriate safety training and certification;
- transporting explosives or concentrate in enclosed or covered trailers/closed containers;
- adhering to measures specified in procedures when transporting materials over or near any aquatic systems; and
- using best management practices to minimize spill entry into waterbodies or into the terrestrial environment.

EAO's 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, which are proposed conditions of the EA Certificate, 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 Nisga'a treaty interests are described in the relevant sections below.

13.2.4 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.

Dolly Varden is the only species present in the reaches of North Treaty and South Teigen Creeks which lie within the footprint of the proposed TMF. Dolly Varden, bull trout, mountain whitefish and rainbow trout are present in South Teigen Creek, outside of the TMF footprint. While Dolly Varden is not an economically valuable sport or commercial fish species, it is an ecologically important species to the Nisga'a Nation as a wildlife fish. Teigen and Treaty Creek contain populations of salmon, including chinook, coho, sockeye and steelhead.

Potential Effects of the Proposed Project

EAO's Assessment Report includes an evaluation of a number of VCs for fish and aquatic habitat which was used to analyse potential effects to fish and to "wildlife fish". EAO's complete and detailed analysis of effects to surface water quality and quantity and fish and aquatic resources is provided in sections 5.2, 5.3, 5.5, and 10 of this 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 surface 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 - Water Quality Degradation

PTMA facilities are located in the Treaty and Teigen Creek drainages which drain into the Bell-Irving River and subsequently the Nass River. PTMA facilities include the Treaty Ore Preparation Complex, Process Plant, Concentrate Storage and Loadout Area and TMF.

At the PTMA, surface water quantity will be most affected by the TMF and the system of diversions and tunnels that route non-contact water around its three cells. Flow pathways will be changed and catchment areas in the LSA may be altered. The Proponent's modeling predicts effects on flow volumes in North Treaty and South Teigen Creeks with effects diminishing downstream.

During the first 25 years of operation, non-contact water will be routed to South Teigen and North Treaty Creeks. For the remainder of operation excess water from the TMF will be routed to Treaty Creek. During post closure, once water quality satisfies receiving environment guidelines, excess flows from the TMF cells will be routed north to South Teigen Creek.

Key water quality concerns associated with the proposed discharge of mine effluent from the TMF to South Teigen and North Treaty Creeks include elevated levels of a number of metals as well as ML/ARD from the construction of the TCAR, leaching of blasting residues during construction of the TCAR and sedimentation effects due to erosion along the TCAR. Other concerns relate to the potential for contaminated seepage into groundwater, which would eventually report to Teigen and Treaty Creeks.

Potential Effects of the Proposed Project – Fish and Aquatic Habitat

Habitat Loss and Alteration

Habitat loss and alteration effects could be linked to the construction and operation of the proposed Project's TMF and dams, and also the access roads and transmission lines, where they cross waterbodies. The development and operation of the TMF could result in streamflow, sediment load and surface water temperature changes in North Treaty and South Teigen creeks. TMF water management may affect productivity of non-fish aquatic life by altering discharge rates, modifying the wetted width available for aquatic life colonization, as well as nutrient loading rates.

In addition to the direct loss of habitat from the TMF, the proposed dams will prevent fish movement to upper reaches of North Treaty and South Teigen watersheds. Specifically, the reach in South Teigen Creek between the falls and the seepage collection dam will be isolated. The Application states that the long-term longevity and/or abundance of this isolated Dolly Varden population may decline due to the loss of tributary spawning habitat in the upper watershed.

Direct Mortality

Direct fish mortality may be linked to interactions with construction machinery and other events that cause immediate or near-immediate death in fish (e.g. sedimentation that smothers embryos), particularly during construction of the TMF. Direct mortality could affect bull trout, Dolly Varden, Steelhead and Pacific salmon.

Noise

Construction noise associated with the TCAR, transmission line and the TMF could affect bulltrout, Dolly Varden, Steelhead and Pacific salmon. Sound waves created by blasting near watercourses can potentially cause physical damage to fish eggs, larvae, juveniles, and adults.

Erosion and Sedimentation

Potential Project-specific sources of erosion and sedimentation include access roads, the transmission line, the TMF, diversion ditches and camps. Erosion and sedimentation

could result in temporary increases in turbidity in localized areas causing smothering of primary and secondary producers at various life stages, reduced visibility, diminished feeding efficiency, increased exposure to elevated metal concentrations, and habitat avoidance by aquatic organisms. Erosion and sedimentation could affect all fish and aquatic habitat VCs.

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 KSM transportation route. Other 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 access roads and Hwy 37/37A. 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 and carbon dioxide, nitrogen oxides, sulphur oxides).

The Proponent undertook a risk assessment based on the probability and consequences of accidents or malfunctions along the transportation route, which provided information on predicted effects of spills of chemicals and/or fuel from transport trucks along the transportation route near waterbodies on aquatic organisms and fish.

Potential Effects of the Proposed Project – Increased Fishing Pressure

Increased fishing pressures may be associated with the development of access roads and the rights-of-way. Direct mortality could affect bull trout, Dolly Varden, Steelhead and Pacific salmon.

Mitigation Measures for Fish and Wildlife Fish

In the Application, the Proponent proposed a number of mitigation measures to address potential adverse environmental effects to fish and aquatic habitat. These mitigations can generally be seen to fall within three categories: water quality/quantity, habitat compensation and monitoring.

Water Quality/Quantity

A complete discussion of the Proponent's water quality/quantity commitments and mitigations is discussed in sections 5.2 and 5.3 of this Report and set out in the TOC and CPD. Some of the main design factors which would conditions of an EA Certificate (if one is issued by Ministers) include:

- installing non-contact diversion ditches on both valley walls, to direct flow north into the Teigen Creek via South Teigen Creek. Diversion ditches would supplement flows that could potentially be altered by the TMF footprint;
- restricting discharge to the receiving environment from the TMF to surplus water from the flotation tailings ponds. Store effluent during the winter low-flow periods and schedule discharge release during the high flow period (May 15 to October 15) of each year;
- all TMF dams (including cell dams and seepage collection dams) are designed with a low-permeability compacted till core to reduce seepage rates through the dams; and,
- three seepage collection dams downstream of the TMF along the North Treaty and South Teigen valleys to minimize seepage into the down-gradient environment without unduly increasing the overall TMF footprint. These dams are designed to capture shallow seepage water emanating from the TMF and to pump it back up to the cells.

In addition, EAO has added a number of conditions, which, should an EA Certificate be issued for the proposed Project, would become legally enforceable. These conditions relate to water treatment and water management and are important to ensuring the proposed Project will not cause significant adverse residual effects to fish and aquatic habitat from effects to water quantity/quality. Some of these conditions include:

- water quality must meet either BCWQG or SSWQO at a point 100 m downstream of the effluent discharge point on Treaty Creek and 100 m downstream of the last point of control on South Teigen Creek. The Proponent's water quality models for both Teigen and Treaty Creeks show this condition can be met. EAO notes that predicted water quality at those points meets BCWQG and, for most parameters, is within the natural range of variability (i.e. less than the 95th percentile of baseline conditions). Considering both of these points are more than 10 km upstream of their confluence with the Bell-Irving River, and there is significant dilution in both Treaty and Teigen Creeks, there would be no residual effect on surface water quality in the Bell-Irving River;
- development of a WMP prior to construction on TMF dams;

- development of an Spill Prevention and Emergency Response Plan prior to the construction of the TMF dams; and
- staging TMF discharges to mimic stream flows in Treaty Creek.

Habitat Compensation

The Proponent developed two Fish Habitat Compensation Plans as required under Section 35(2) of the *Fisheries Act Regulations* and the MMER. Both plans were developed with input from the DFO, MOE, NLG and First Nations members of the KSM Fisheries Technical Working Group.

The first plan is to offset loss of the productive capacity of fish habitat linked to construction and operation of the TMF dams, road crossing structures, transmission line crossings and water quantity reductions in South Teigen and North Treaty Creeks downstream of the TMF dams. The second plan is to offset loss of the productive capacity of fish habitat linked to the deposit of deleterious substances within fish-bearing watercourses beneath the footprint of the proposed TMF and related seepage collection ponds.

EAO is aware that decisions related to habitat compensation fall within the jurisdiction of Canada. EAO notes that DFO is satisfied that the Proponent's fish habitat compensation projects describe technically feasible compensation options and would compensate for the anticipated habitat loss associated with the proposed Project.

Monitoring

The Proponent has developed an AEMP and a SeMP which will detect alterations to the receiving environment including changes to sediment quality or effects on aquatic life and fish, and implementing adaptive management strategies, where warranted. EAO has added the following conditions to address monitoring of potential effects on fish:

- Development of a Groundwater Monitoring and Mitigation Plan prior to the construction of the TMF dams;
- Development of an AEMP, including a SeMP; and
- Development of Salmon Monitoring Plan for Teigen Creek.

Part B concludes there will be no significant adverse effects on fish (including wildlife fish).

EAO's Conclusions on Fisheries Interests

Part B of this report concluded that project-related surface water quality and quantity, and groundwater quality and quantity changes were unlikely to result in significant

adverse effects to Treaty Creek or Teigen Creek or the Bell-Irving and Nass Rivers. This conclusion was made after considering the project design described in the CPD as well as conditions described in the TOC.

Further, EAO has concluded that the Proponent's AEMP, SeMP and Salmon Monitoring Plan are sufficiently described in the CPD and TOC, 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 and Bell Irving Rivers, two of the most important fish-bearing rivers in the Province, which makes its health critical to the treaty right of the Nisga'a Nation to harvest fish. 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) that 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, however, 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 the CPD and TOC should an EA Certificate be issued.

13.2.5 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 Aboriginal groups. 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 traplines 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 proposed 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.

EAO notes that the proposed Project falls into both the Nass Area and, within the Nass Area, the Nass Wildlife Area. As such the treaty entitlements with respect to wildlife differ within the two areas. EAO's NFA 8e assessment reflects this difference and is discussed below.

Potential Effects of the Proposed Project on Migratory Birds²⁷

With respect to the NFA, Nisga'a Citizens have the right to harvest migratory birds within the Nass Area. Potential impacts on migratory birds from Project infrastructure include the following.

Habitat Loss

The Proponent detected 25 wetland bird species during 2008 and 2009 baseline studies including ducks, geese, shorebirds and other bird families associated with water bodies. Three species identified in the RSA are of regional or provincial conservation concern: harlequin duck (provincially ranked as vulnerable during the non-breeding season); surf scoter, which is blue listed and provincially ranked as vulnerable during the breeding

²⁷ 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.

season; and trumpeter swan, which is blue-listed and provincially ranked as vulnerable during the non-breeding season.

The Proponent identified areas with high species diversity during the breeding period in wetland complexes associated with the Teigen/Bell-Irving confluence, and along Treaty and Todedada Creeks. Areas that were occupied during the fall staging survey, while birds are migrating south, included the habitat around Unuk Lake, Treaty Creek, and near the Teigen Creek/Bell-Irving River confluence. During the spring staging surveys, the majority of birds were observed near the Teigen Creek/Bell-Irving confluence and at Border Lake along the Unuk River near the BC-Alaska border.

The Application identifies habitat loss for wetland birds, riverine birds and cavity-nesting waterfowl as ranging from up to 45.7% of the LSA to a maximum of 7.9% of the RSA. The majority of this wetland habitat loss comes from the development of the TMF.

The Proponent also notes that wetlands may be partially or entirely eliminated by proposed Project component development and/or wetland function may be altered or degraded through direct or indirect interactions with proposed Project components. Specific effects of wetland function may include:

- alterations to wetland biochemical function through sedimentation, dust fall, site runoff and point source discharge;
- alterations to wetland ecological function through the introduction of invasive or non-native wetland plant species and loss of adjacent upland buffer areas;
- alterations to wetland hydrological function through ditching, culverting, watercourse crossing and water flow alteration; and
- alterations to wetland habitat function through fragmentation, change of vegetation structure, change of water sources, noise impacts, artificial light sources, and litter/garbage.

Mitigation Measures for Migratory Birds

The Proponent's Application states that the preferred mitigation option is wetland avoidance, which was addressed through a design and layout plan which allowed for wetlands at the Treaty OPC and along the TCAR and minimized effects on wetland loss and degradation. The Proponent also notes that the original planned access route corridor to the PTMA followed the Teigen Creek Valley, affecting 2.6 ha of wetlands directly, and another 40 ha indirectly. Switching to the Treaty Creek Valley reduced effects to an area of 22.6 ha of wetlands (loss of 0.8 ha and degradation to 21.8 ha).

The Proponent proposed the following mitigation measures for impacts to wetland function:

- establish reserve and management area buffers around all wetlands in accordance with provincial riparian management guidelines;
- install and maintain effective sediment control and protection structures (i.e. silt fences, sumps, and proper ditching/culverts, etc.);
- implement erosion and slope protection measures over disturbed soils and all organic and mineral soil stockpiles (e.g. developing stockpiles away from surface water, skirting with silt fences, re-vegetation etc.);
- avoid construction activities that may disturb wildlife VCs during wildlife sensitive periods. If avoidance is not possible, conduct pre-construction clearing surveys to identify nests or dens that must be avoided;
- have an Environmental Monitor on site during construction to identify sensitive wildlife features and implement appropriate procedures to minimize potential adverse effects to these areas;
- conduct site restoration as soon as possible to re-establish ground cover; and
- implement spill response, reporting and notification procedures.

EAO also added a condition requiring the Proponent to develop a Wetlands Management Plan prior to construction of the TMF dams. The plan would allow for, on closure, the creation, restoration and compensation of more than 2.5 times as much wetland area as the proposed Project affected.

Potential Effects of the Proposed Project on Wildlife

With respect to the NFA, Nisga'a Citizens have broader rights to harvest wildlife in the NWA than in the Nass Area. Potential impacts on wildlife within the NWA arise primarily from impacts associated with increased traffic on Hwys 37 and 37A. Section 10 discusses these effects in greater detail.

Moose

EAO's transportation effects assessment, included as section 10, contain a detailed analysis of potential effects to moose from the proposed Project.

Much of Hwys 37/37A bisect or parallel moose winter range habitats. Moose collisions along Hwys 37/37A are reported more frequently during winter months as moose move into lower elevation winter ranges (timbered wetland complexes) where snow depths are limited. The Application reports that vegetation regrowth on roadsides from brushing will also attract moose and increase the collision risk during the summer.

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 proposed

Project's transportation route are moose. The Application reports that the moose population in the NWA near Hwy 37 has been declining since 2001. The population was estimated to be approximately 1600 in 2001, and declined to 640 in 2007 and to 520 in 2011. Despite conservation measures taken in 2007 including limited entry or closure of moose hunts in some areas, including the Nisga'a Nation voluntarily reducing harvests below treaty allowances, the population has continued to decline.

Given the current status of moose populations along the proposed Project's transportation route and the adverse effect of industrial accidents with wildlife and unregulated hunting, the additional proposed Project traffic may exacerbate the existing conditions.

The Proponent used a population dynamics model received from MOE to perform a historical reconstruction of the Nass moose population under known harvests and demographic rates and to conduct a quantitative population viability analysis for moose along Hwys 37/37A road corridors to estimate the cumulative effects of traffic on moose. The Proponent estimates that the addition of traffic from the proposed Project is projected to cause less than a 1% increase in mortality to moose populations at their current population size, equating to just less than five moose deaths per year.

Another potential effect to wildlife, moose in particular, is the potential for increased impacts due to the cumulative effects of numerous new industrial projects in the Northwest. The Proponent's population viability analysis predicted that the increased traffic from the proposed Project would not cause a decline in the NWA moose population. However, results suggested that an additional increase in mortality, above what is expected due to proposed Project traffic, could cause the population to decline. Hence, assuming conditions remain constant (much-reduced moose population, current hunting rates, etc.), if all projects in the study area were to operate simultaneously, the population viability analysis predicted that moose-vehicle collisions from these projects may be sufficient to have an effect on the moose population in the NWA.

Section 10 provides additional analysis on the potential impacts of increased traffic on Hwy 37 and access roads being proposed for the proposed Project.

Grizzly Bears

The potential effects of the proposed Project on grizzly bear in the NWA are focused on mortality through interactions with vehicles. The Proponent's data suggests 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 access roads and Hwys 37/37A 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). Overall, the expected increased mortality associated with collisions with project-related vehicles is negligible.

Mountain Goat

The Application states that the likelihood of vehicle-mountain goat collisions along proposed Project roads or Hwy 37 is relatively low, since the majority of routes are located at elevations that are below suitable goat habitat.

Mitigation Measures

The Proponent proposed a number of commitments intended to address transportation related effects to wildlife, many of which are contained and further described in the Wildlife Effects Monitoring Plan, a condition of the EA Certificate, should one be issued. Details on the Wildlife Effects Monitoring Plan are provided in section 5.9 of and in the CPD. Examples of some of the measures include:

- avoid construction activities that may disturb wildlife during sensitive periods. If avoidance is not possible, conduct pre-construction clearing surveys to identify nests or dens that must be avoided;
- install gates and monitoring access on access roads and rights of ways to restrict access;
- prohibit hunting by proposed Project staff and contractors;
- ensure that proposed Project drivers yield to wildlife observed along the Hwys and adhere to signage in areas of wildlife crossing;
- control vehicle speeds and vehicles per hour on proposed project roads to reduce direct mortality (wildlife vehicle collisions) and disruption of movement to wildlife;
- ensure that proposed Project personnel (including drivers) communicate locations of observed wildlife to drivers; and
- document locations of collisions between wildlife and vehicles.

EAO has also added conditions to address potential effects to wildlife, moose in particular, from project-related traffic. They include:

- develop standard operating procedures for company and subcontractor vehicles for annual monitoring and reporting of collisions between proposed Project vehicles and moose, black bear, grizzly bear and deer and the mortality of such wildlife along provincial Hwys 37/37A;
- develop and implement a Geographic Response Plan to coordinate training and spill

response along Hwys 37 and 37A with other industrial users;

- participate in any cross-industry or government initiatives around the use of the Hwy 37 corridor including cumulative effects assessments; and
- contribute \$30,000 per year, commencing with construction, to a habitat trust fund (where the money would be spent on supporting recovery of the Nass moose population and mitigating potential cumulative effects along Hwys 37 and 37A), starting with an initial \$75,000 contribution.

EAO's Conclusions on Wildlife and Migratory Bird Interests

Migratory Birds

EAO's Assessment Report concluded that wetlands, which are the primary habitat for migratory birds, are present throughout the study area, although large portions of the study area consist of rock, ice and large dynamic river floodplain systems, environments that do not favor the formation of wetland ecosystems. Wetlands account for about 520 ha (or less than 3%) of the baseline study area, which is below the average of 5.6% wetland area for the entire province. However, both wetland extent and wetland function (hydrological, physical, biochemical and ecological) are at risk from development of the TMF and other proposed Project components. EAO notes the wetlands under the TMF footprint would be lost to project infrastructure, although some wetlands functions may be regained in the moderate to long term. The wetlands under the TMF represent approximately 12% of the wetlands in the baseline study area. EAO notes the condition to implement a wetland compensation plan that provides for the creation, restoration and compensation of more than 2.5 times as many wetlands as the proposed Project would have affected.

Wildlife and Moose

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 moose mortality, which is estimated at five animals per year. EAO also concluded this number is unlikely to have a long term population level effect. However, EAO is aware 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. 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 CPD and TOC, will not deny Nisga'a citizens a reasonable opportunity to harvest Nisga'a wildlife entitlements or reduce Nisga'a wildlife allocations, or reasonable opportunity to harvest migratory birds. 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. These mitigation measures will be a component of the CPD and TOC should an EA Certificate be issued.

13.2.6 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 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.

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 terrestrial ecosystems and wetlands is provided in section 5.7 and 5.6.

Habitat Loss

The Application predicted that 4,361 ha of vegetation in the Nass Area would be lost or degraded from the development of the proposed Project. This value translates to less than one-fifth of 1% of the Nass Area that would be unavailable for harvesting activities due to the development of the proposed Project.

The Application states there are no known pine mushroom collection sites within the LSA, however pine mushroom habitat is present in the Interior Cedar Hemlock unit, on dry slopes above the proposed TCAR and within the Coastal Western Hemlock unit, primarily along the CCAR (which is outside of the Nass Area.) The Application

estimates a loss of 9.8 ha of pine mushroom habitat and a further degradation of 34.4%, representing 6.4% and 22.5% respectively of the 153 ha of pine mushroom habitat in the LSA.

Health Effects

Cultural plants include plant species used for medicine, dietary and spiritual religious purposes, and utensils and dyes. The Proponent completed a cultural plant assessment which focussed on effects from the following metals: aluminum, arsenic, cadmium, copper, lead, selenium and zinc.

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. Specific key measures incorporated into the proposed Project include:

- minimise clearing dimensions through careful design and layout planning;
- mitigating potential loss and degradation of the terrestrial ecosystem by adhering to the Terrestrial Ecosystems Management and Monitoring Plan;
- reducing effects on terrain and soil by adhering to the Proponent's Terrain, Surficial Geology and Soil Management and Monitoring Plan;
- reducing fugitive dust accumulation by adhering to the provisions of the Proponent's Air Quality Management Plan;
- avoiding the introduction and spread of invasive plants through development of on-site training and education programs, minimizing the creation of suitable habitat for invasive species, minimizing potential for transport of such species into the proposed Project area, and detecting/eradicating identified plants;
- monitoring terrestrial effects by adhering to the Terrestrial Plant Tissue Metal Concentration Monitoring Plan; and
- reclamation of disturbed sites that accord with end land use objectives.

EAO also added a condition which would require the Proponent to develop a Wetlands Management Plan which would describe in greater detail the staging of their plans to compensate for the loss of TMF wetlands and associated habitat and to address residual effects of the loss of wetland extent and function at the PTMA, primarily associated with the TMF. Additional conditions were added requiring the Proponent to develop a Terrestrial Ecosystems Management and Monitoring Plan.

EAO also worked with NLG to develop the framework for a condition requiring the Proponent to develop a comprehensive Human Health Monitoring Plan. The plan has

the following objectives and is intended to ensure that, should any human health effects be detected which are related to consumption of vegetation or country foods, an appropriate management action will be identified and implemented:

- ensure there is an understanding of metals in soils, plants and animals which have the potential to affect human health;
- establish measures to monitor effects on key valued components during construction and operation of the proposed Project;
- detect potential soil contaminant accumulations and metal deposition/mobility patterns during construction and operation of the Project; and
- assess potential changes in terrestrial plant tissue metal concentrations as a result of Project activities during construction, operations, closure and post-closure phases.

EAO's Conclusions on Vegetation Resources Interests

This Report concluded that the primary effect on cultural plants would be from the loss of vegetation under the TMF as well as impacts to a small amount of pine mushroom habitat associated with the construction of the TCAR. Adverse vegetation effects would be largely localised to the LSA.

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 CPD and TOC, is reasonably expected to have minimal adverse environmental effects on the residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests. 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. These mitigation measures will be a component of the CPD and TOC, should an EA Certificate be issued.

13.2.7 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 of the NFA) as provincial heritage sites. The Treaty Creek provincial heritage site, the site of a late 19th Century treaty between the Nisga'a and Tahltan people, is located 4.4 km to the south of the proposed TCAR on the southern side of the confluence of the Bell-Irving River and Treaty Creek, and would not be affected by the proposed Project.

The NFA Appendix F-1 identifies five sites of cultural and historic significance to the Nisga'a Nation, none of which have been identified in the LSA. 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 identified 37 heritage sites within the RSA. Most of them (28) are prehistoric subsurface lithic scatters or single artifact finds. Five of the 37 archaeological sites identified during the AIA are in direct conflict with proposed Project-related activity (four lithic scatters and one artifact find), while two sites may be indirectly affected (both are lithic scatters).

Land clearing and grading for roads and power line rights-of-way, clearing, grading and excavation for foundations and building footings, earth moving and blasting for mine construction, and tailings deposition in the TMF could have the potential to impact heritage sites.

The Proponent's Application indicates that effects to archaeological and heritage sites are not anticipated beyond the LSA; however, there is a potential that unidentified sites could be discovered as the proposed Project is constructed.

Mitigation Measures

The Proponent's mitigation measures focused on site avoidance through the following proposed Project design and layout planning:

- changing the access to the PTMA from Hwy 37 to follow the Treaty Creek Valley instead of the Teigen Creek Valley avoided effects on 11 archaeological sites (sites HdTm-1 to HdTm-11);
- relocation of Construction Camp 3 resulted in the avoidance of archaeological site HdTo-6, changing the effect on the site from direct to indirect; and
- switching the transmission line route from Treaty Creek to Teigen Creek avoided impacts to archaeological site HeTI-2.

Mitigation measures for the five sites that would likely be disturbed or destroyed, and the two that could be disturbed focus on potential direct and indirect construction phase

effects and indirect operations-phase effects. The Application reports that these measures are expected to ensure that there are no direct effects during the operations, closure or post-closure phases. Specific mitigation measures include:

- avoidance of the two sites potentially subject to indirect effects;
- determine specific mitigation measures with the Archaeology Branch to minimize any loss of scientific data resulting from site disturbance or destruction. Possible measures could include systematic data recovery, construction monitoring, fencing and/or site capping; and
- Heritage Management and Monitoring Plan includes a Chance Find Procedure, under which any new archaeological sites found within the proposed Project footprint, but not identified during previous AIA, would be avoided and/or effects mitigated.

EAO's Conclusions on Archaeology and Cultural Heritage Interests

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 associated with archeological and cultural heritage interests. 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.

13.2.8 EAO's Conclusions on NFA 8e Assessment

Based on the information in this section 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 CPD and TOC, 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.

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 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 Kitsault Mine Project 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; and
- 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 the effect of changing work patterns and incomes practices; and
- 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 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. 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 51.5 years, were incorporated in the Proponent's ESCIA report.

Based on the information contained in the Proponent's ESCIA report, this section provides an overview of the effects of the proposed Project on the economic, social, and cultural well-being on Nisga'a citizens as defined in the NFA. This information has been used to inform this 8(f) assessment required under the NFA. Where the Proponent proposed any measures that mitigate any potential effects on economic, social, and cultural well-being on Nisga'a citizens, these were also considered.

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 without the proposed Project – this scenario included 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. Low Regional Development Scenario with the proposed Project – this scenario included the proposed Project, NTL, FKH, and MCH.
- c. Moderate Regional Development Scenario without the proposed Project – includes all the projects in the Low Regional Development Scenario, plus the Kitsault Mine. Kitsault Mine received an EA Certificate in 2013 and has not yet commenced construction.
- d. Moderate Regional Development Scenario with the proposed Project – includes the proposed Project, all the projects in the Low Regional Development Scenario, plus the Kitsault Mine.
- e. High Regional Development Scenario without the proposed Project – includes all the projects in the Medium Regional Development Scenario, plus the Galore Creek, Shaft Creek and Red Chris Mine Projects
- f. High Regional Development Scenario with the proposed Project – includes the proposed Project, 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 scenarios described above. Under the lowest scenario without the proposed Project, available jobs for all projects peaked at 425 person years in 2013 (during construction of the NTL, FKH and MCH) and declined to 65 in 2015 when the construction phase is expected to be completed for these projects. During operations, the projects are anticipated to have a limited demand on labour since ongoing annual maintenance is expected to be carried out using a small number of existing staff and/or external contractors. Under the lowest scenario with the proposed Project, the proposed Project represents approximately 50% of the total labour demand in 2014, 97% in 2015 and 100% thereafter.

Under the highest development scenario without the proposed Project, available jobs would peak at 2,175 person years in 2016 and would continue at those very high numbers through to 2030. Under the highest development scenario with the proposed Project, available jobs would peak at 4,185 person years in 2017. Under this scenario, the proposed Project represents approximately 14% of the total labour demand in 2014, 24% in 2015 and between 33 and 35% from 2016 to 2018. From the year 2020 to 2035 the share of the labour demand from the proposed Project is between 16 and 22%, thereafter increasing to constitute the vast majority of the labour demand for the remaining life of the proposed Project.

The proposed Project would add to this regional labour demand with up to 1800 jobs during construction, 1040 jobs during operations, and 24 positions during decommissioning and closure. Estimates of employment during post-closure are not available as it will take place far in the future. Assuming all existing and planned projects are constructed and operating, the total regional labour demand is forecasted to peak at 4,185 jobs in 2017.

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 the current employable Nisga'a labour supply is 1,140 Nisga'a citizens²⁸. Of those, 370 reside on Nisga'a Lands and 775 live off Nisga'a Lands. By 2051, this labour force is predicted to reach approximately 1,480 Nisga'a members.

The ESCIA report 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 report, 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 report 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. Nisga'a citizens 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 report 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

²⁸ 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.

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 Application provided an estimate of a maximum of 120 jobs for Nisga'a citizens during construction and 70 jobs annually during the 51.5 years of operations. The Proponent did not estimate the proportion of Nisga'a workers of the 24 jobs during decommissioning and closure. These numbers were based on an 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.

With respect to incremental income, the ESCIA report references the average annual earning for wage employees in equipment operator and labourer job categories for the operations phase are about \$66,600²⁹ 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 \$40,000 per year³⁰.

Using the \$40,000 figure, the Proponent calculated in the ESCIA report that the overall Nisga'a income effect from the proposed Project would peak at \$4.8 million in 2018, decreasing to \$2.8 million by 2020.

²⁹ The Proponent notes the figure provided is conservative because of the amount of overtime that is typical for the work, adding an additional 25% or more to earnings.

³⁰ 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 \$40,000 to \$36,000.

Nisga'a Nation Business, Earnings, and Investment Activity

The Proponent's ESCIA report estimated the potential revenue to Nisga'a businesses during construction and operation. The Proponent used an average of 10% of regional business expenditures directed to Nisga'a business based on the assumption that 30% of the expected regional expenditures of the proposed Project would go to Aboriginal businesses and that Nisga'a business should be able to secure about a third of this total. Under the high development scenario, Nisga'a businesses could expect a revenue of \$7.9 million in 2013, and dropping to \$4.9 million in 2019 and increasing to \$12 million in 2021.

The Proponent estimated the proposed Project to contribute to investment in, and growth of, Nisga'a businesses during construction and operation. For all scenarios, the incremental net income from the proposed Project during the construction phase is forecasted to reach \$5.2 million and remain strong during the operation phase (e.g. \$10.5 million in 2021).

The ESCIA report noted that most Nisga'a businesses expect their operations to grow over the next ten 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 expediting services, bus services, trucking, camp catering, security, and road and building maintenance.

The largest barriers to benefits to local Nisga'a businesses, as reported in the ESCIA report, 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 as early payment options and smaller contracts, which would enable businesses to benefit without additional capital investments.

The ESCIA report indicated 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 report 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, 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 (assessment required under Chapter 10, paragraph 8(e)) can be found earlier in Part D.

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 report 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 30, 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 report 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 report looked at a number of components of revenue to the NLG, and noted that based on the results of the assessment of the potential effects of the KSM on Nisga'a business and natural resource activity it is not possible to reasonably estimate the effects, either positive or adverse, on revenues to the NLG.

The ESCIA reports NLG 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 report focused on the following components of NLG revenue:

- Review and monitoring costs associated with the proposed Project:
 - there will be costs associated with the review of the Application, participation in ongoing environmental and socio-economic monitoring for construction, operations, closure and post closure phases of the proposed Project.
 - the Proponent notes that estimates of these costs are not provided because they are likely to be the subject of subsequent discussions between the Proponent and NLG.
- Cost implications to community infrastructure and services:
 - there will be no direct costs for community infrastructure and services as the proposed Project's activities occur well outside of the Nisga'a villages and use on site facilities;
 - 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 report notes these are conservative estimates, and another likely scenario is that Nisga'a citizens may choose to live in Terrace and not require additional housing in the four Nisga'a communities.
- Resource revenue sharing:
 - at the time of writing, negotiations between the Province and NLG have not been initiated regarding revenue sharing for the proposed Project.

Mitigation Measures

The Nisga'a Nation and the Proponent have confirmed to the EAO that the Nisga'a Nation and the Proponent have concluded a legally binding Benefits Agreement in respect of the proposed Project. Under the Benefits Agreement, the Proponent is required to implement a number of measures to address the economic, social and cultural effects of the Project on Nisga'a Citizens, including the following:

- funding as a contribution towards the predicted costs to be incurred by the Nisga'a Nation in respect of responding to adverse social and cultural effects in Nisga'a Villages;
- workplace policies to mitigate cultural effects associated with working at the proposed Project;
- initiatives and commitments to promote employment of Nisga'a Citizens and contracting with Nisga'a businesses; and
- initiatives and commitments in respect of training and education.

EAO's Conclusions on Economic Well-being

EAO has concluded that the proposed Project is not reasonably expected to adversely affect the economic well-being of Nisga'a Citizens and is likely to have beneficial effects.

13.3.2 Social Well-being

Social Well-Being Background

Migration and Population

In their ESCIA report, the Proponent provided an analysis of the potential for migration to the Nisga'a communities as well as growth in the communities. The analysis, which was based on a BC Stats model, was used to inform a population growth scenario. The information shows that, in the first year of construction (2015), the population is predicted to grow in the order of about 26 people, although it is uncertain where people would settle. The ESCIA report estimates that the net annual in-migration would decline gradually with approximately one less person per year migrating to the Nass Area each year. This suggests a steady increase in the Nass Area population to about 1,847 inhabitants in 2025. By 2030, the local Nisga'a population would have increased by almost 30% to approximately 1,988 inhabitants, and 2,500 in 2051, a 63% increase over the population in 2015 and an average annual growth rate of 1.75%.

Community Infrastructure and Services

Based on census information, the ESCIA report noted that in 2011, there were 605 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 report 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 report 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 report, the Proponent collected provincial information on different socio-economic indicators that were 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 but the numbers are likely to hide 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 two 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 = 88 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 to the proposed Project, leaving a net increase of 26 people, although it is uncertain exactly where people would settle. 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 1,847 people by 2025. By 2051, populations would have increased by one-third to 2,500, an average growth rate of 1.75% 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 1,709 people by 2025 would occur, which is an 11.5% increase. By 2035, after 15 years of operation of the proposed Project, population could be 1,863 people, representing an annual increase of 1.07%, 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.

The ESCIA noted that the difference in the level of interest among Nisga'a citizens in the construction phase employment versus operation phase employment is not statistically significant. The ESCIA concludes that the occurrence of short term versus long term migration will depend on numerous social, cultural and economic variables and interactions that are likely to far outweigh the influence of a single project.

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.

In the event of mine related accidents along Hwy 37/37A, Nisga'a emergency resources – Nisga'a Lisims RCMP and/or Nisga'a volunteer fire department - may be called upon if it is determined that emergency services located in Gitlakdamix were the closest to an accident. The ESCIA notes that such additional demand is expected to be very short term and extremely unlikely to create a noticeable burden on Nisga'a emergency service capacity. However, road blockage caused in the event of an accident could 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 Application notes that additional income could also reinforce a growing trend among Nisga'a citizens who choose to travel to Terrace for health care and other 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.

Health Risks

The potential risks of environmental exposures from the proposed Project are expected to be localized to the proposed Project site. The ESCIA states that any health effects to Nisga'a citizens would affect Nisga'a citizens who use the back country in and around the mine area, find employment with the proposed Project and/or who may travel along those sections of Hwy 37/37A being used by mine traffic.

More information regarding the proposed Project-related effects on human health, including proposed mitigation measures, can be found in section 9 of this Report.

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 in the short term would be difficult. To partially address these issues, two of the Nisga'a communities have developed 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. The Application notes that enhanced skills and training acquired by Nisga'a over the course of the proposed Project life would help offset the negative effects of mine closure, as many of these skills would be transferable.

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 Nisga'a Nation and the Proponent have confirmed to EAO that the Nisga'a Nation and the Proponent have concluded a legally binding Benefits Agreement in respect of the proposed Project. Under the Benefits Agreement, the Proponent is required to implement a number of measures to address the economic, social and cultural effects of the Project on Nisga'a Citizens, including the following:

- funding as a contribution towards the predicted costs to be incurred by the Nisga'a Nation in respect of responding to adverse social and cultural effects in Nisga'a Villages;
- workplace policies to mitigate cultural effects associated with working at the proposed Project;
- initiatives and commitments to promote employment of Nisga'a Citizens and contracting with Nisga'a businesses; and
- initiatives and commitments in respect of training and education.

EAO's Conclusions on Social Well-being

EAO has concluded that the proposed Project is not reasonably expected to adversely affect the social well-being of Nisga'a Citizens.

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 report 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 report indicated 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 report 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 report 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 an 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 a 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 groups. More recent information in the ESCIA report; 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 Nation 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 assessment undertaken by EAO pursuant to Chapter 10, paragraph 8(e) 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 report 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, which 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 weddings, 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 report 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 report 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 report 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 note 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

The Nisga'a Nation and the Proponent have confirmed to EAO that the Nisga'a Nation and the Proponent have concluded a legally binding Benefits Agreement in respect of the proposed Project. Under the Benefits Agreement, the Proponent is required to implement a number of measures to address the economic, social and cultural effects of the proposed Project on Nisga'a Citizens, including the following:

- funding as a contribution towards the predicted costs to be incurred by the Nisga'a

Nation in respect of responding to adverse social and cultural effects in Nisga'a Villages;

- workplace policies to mitigate cultural effects associated with working at the proposed Project;
- initiatives and commitments to promote employment of Nisga'a Citizens and contracting with Nisga'a businesses; and
- initiatives and commitments in respect of training and education.

EAO's Conclusions on Cultural Well-being

EAO has concluded that the proposed Project is not reasonably expected to adversely affect the cultural well-being of Nisga'a Citizens.

13.3.4 EAO's Conclusions on NFA 8(f) Assessment

The Nisga'a Nation has confirmed to EAO that a Benefits Agreement between the Proponent and the Nisga'a Nation is in place which sufficiently addresses the potential effects to be assessed under paragraph 8(f) of Chapter 10 of the NFA. Additionally, under paragraph 8(i) of Chapter 10, BC is required to take into account any agreements between the Nisga'a Nation and the Proponent concerning the effects of the proposed Project. Given the presence of a Benefits Agreement and the measures generally described above along with the Nisga'a Nation's confirmation that the economic, social and cultural effects of the proposed Project have been sufficiently addressed, EAO is also of the view that there will be no adverse effects of the proposed Project on the existing and future economic, social and cultural well-being of Nisga'a citizens, and is satisfied that the assessment required under paragraph 8(f) of chapter 10 of the NFA has been adequately conducted and completed.

14 PART E – CONCLUSIONS

Based on:

- information contained in the Application;
- the Proponent's and EAO's efforts at consultation with First Nations (Tahltan Nation, *wilp* Skii km Lax Ha of the Gitxsan Nation, Gitxsan Nation and Gitanyow 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;
- 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;
- the design of the proposed Project as specified in Schedule A of the EA Certificate to be implemented by the Proponent during the construction, operations, and decommissioning of the proposed Project; and,
- mitigation measures identified as Conditions in Schedule B of the EA Certificate to be undertaken by the Proponent during the construction, operations, 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 and Mines 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.