

# MORRISON COPPER/GOLD MINE PROJECT

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

Prepared by:

Environmental Assessment Office

August 21, 2012



## Preface

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

- opportunities for the involvement of all interested parties;
- consultations with First Nations;
- 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 (EA), 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 proposed Morrison Copper/Gold Mine Project's (proposed Project) potential to cause significant adverse environmental, economic, social, heritage and health effects. It identifies measures to prevent or reduce adverse effects, and sets out EAO's analyses and conclusions. It also documents the work undertaken by EAO to consult and accommodate First 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 EAs is available on the EAO website at [www.eao.gov.bc.ca](http://www.eao.gov.bc.ca). Questions or comments can be directed to:

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## **Acronyms Used in this Report**

Act:	British Columbia Environmental Assessment Act
AIA:	Archaeological Impact Assessment
AOA:	Archaeological Overview Assessment
ARD:	Acid Rock Drainage
BC:	British Columbia
BCIOM:	British Columbia Input Output Model
BCWQG:	BC Water Quality Guidelines for the Protection of Aquatic Life
CCME:	Canadian Council of Ministers of the Environment
CEAA:	Canadian Environmental Assessment Act
CEA Agency:	Canadian Environmental Assessment Agency
CMT:	Culturally Modified Tree
CO <sub>2</sub> :	Carbon Dioxide
CO:	Carbon Monoxide
DFO:	Fisheries and Oceans Canada
EA:	Environmental Assessment
EAO:	Environmental Assessment Office
EC:	Environment Canada
EMS:	Environmental Management System
EMP:	Environmental Management Plan
FSR:	Forest Service Road
FTE:	Full Time Equivalent
GDP:	Gross Domestic Product
ha:	hectare
HDS:	High Density Sludge
km:	kilometre
LGO:	Low Grade Ore
LSA:	Local Study Area
m:	metre
MFLNRO:	Ministry of Forests, Lands and Natural Resource Operations
ML:	Metal Leaching
MOE:	Ministry of Environment
Mt:	Million tonne
NAG:	Non-Acid Rock Drainage Generating
NO <sub>2</sub>	Nitrogen Dioxide
PAG:	Potentially Acid Rock Drainage Generating
PBM:	Pacific Booker Minerals Inc.
PM:	Particulate Matter
RSA:	Regional Study Area
SO <sub>2</sub> :	Sulphur Dioxide

TEK: Traditional Ecological Knowledge  
TSF: Tailings Storage Facility  
VC: Valued Component

## **SUMMARY OF THE ASSESSMENT REPORT**

### **Overview of proposed Project**

Pacific Booker Minerals Inc. (Proponent) is proposing to develop an open-pit copper/gold/molybdenum mine located approximately 65 km northeast of Smithers and 35 km north of Granisle, British Columbia, on the eastern shore of Morrison Lake. The proposed Project would be constructed on provincial Crown land, and be designed to extract 30,000 tonnes of ore per day over an anticipated 21-year mine life.

### **Overview of the environmental assessment**

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

- surface water quality and quantity;
- groundwater quality and quantity;
- aquatic resources;
- ecosystems and wetlands;
- wildlife resources;
- employment and economy;
- land and resource uses;
- human and ecological health factors; and,
- heritage and archaeological resources.

EAO assessed relevant issues raised by First Nations during the course of the EA and whether the Crown has fulfilled its obligations for consultation and accommodation. This Assessment Report and EAO's First Nations Consultation Report have been provided to the provincial ministers for consideration in their decision of whether or not to issue an EA Certificate for the proposed Project.

EAO is satisfied that:

- consultation with government agencies and the public have been adequately carried out by the Proponent;

- relevant issues identified by the public and government agencies were duly considered and assessed by the Proponent during the review of the Application;
- the Crown's consultation duty has been discharged; and,
- the proposed Projects would not result in any significant adverse effects with the successful implementation of mitigation measures and conditions..

## **PART A – INTRODUCTION AND BACKGROUND**

### **1 Purpose of the Report**

The purpose of this Report is to summarize the EA of the application (Application<sup>1</sup>) by the Proponent for an EA certificate for the proposed Project. EAO is required to prepare this Report for provincial ministers who are responsible for making a decision on the proposed Project under section 17 of the BC *Environmental Assessment Act* (Act). For mine projects, the deciding ministers are the Minister of the Environment and the Minister of Energy and Mines.

The Report:

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

### **2 Project overview**

#### **2.1 Proponent**

The Proponent for the proposed Project is Pacific Booker Minerals Inc. (Proponent), a publicly-traded, BC-based mineral resource company with its head office in Vancouver, BC.

#### **2.2 Project Location**

The proposed Project is located on Crown land 65 km northwest of Smithers and 35 km north of the Village of Granisle near the southern end of the eastern shore of Morrison Lake, a 15 km long lake which flows into Babine Lake. Babine Lake is the largest natural lake in BC and forms a large part of the headwaters of the Skeena River watershed.

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<sup>1</sup> Application refers to the following Proponent documents submitted during the Application Review: the Application, Application Addendum, Review Response Report Rev2, 3<sup>rd</sup> Party Review Response Report, and 3<sup>rd</sup> Party Review Response Report Addendum 1.

The proposed Project is centered on 55°11'24" north latitude and 126°19'7" west longitude. The mine tenure area includes approximately 12,200 hectares (ha).

There are two past-producing mines in the area that are now closed: Bell Mine and Granisle Mine. Both are in the post-closure phase.

**Figure 1: Regional map of proposed Project location**

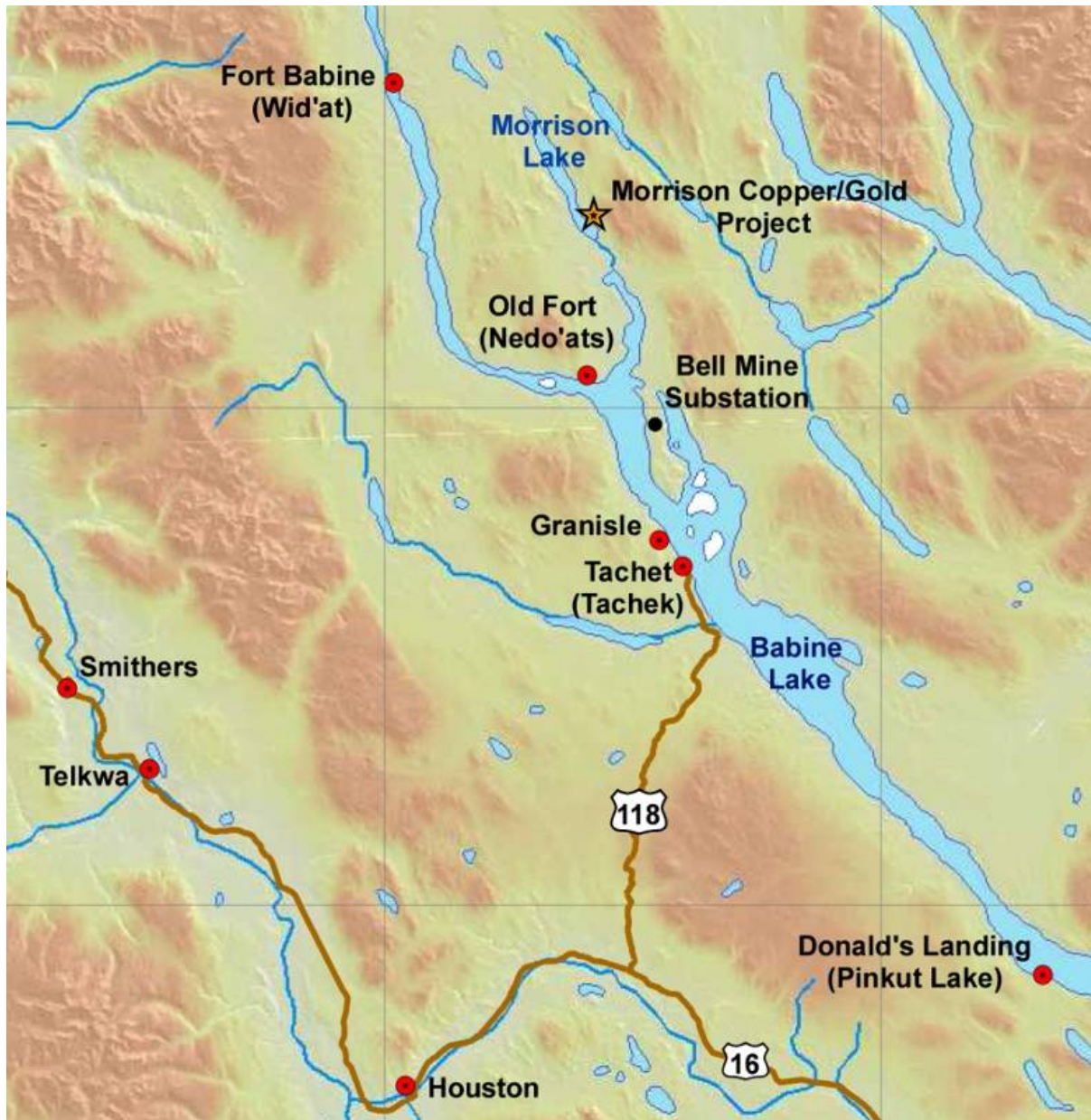
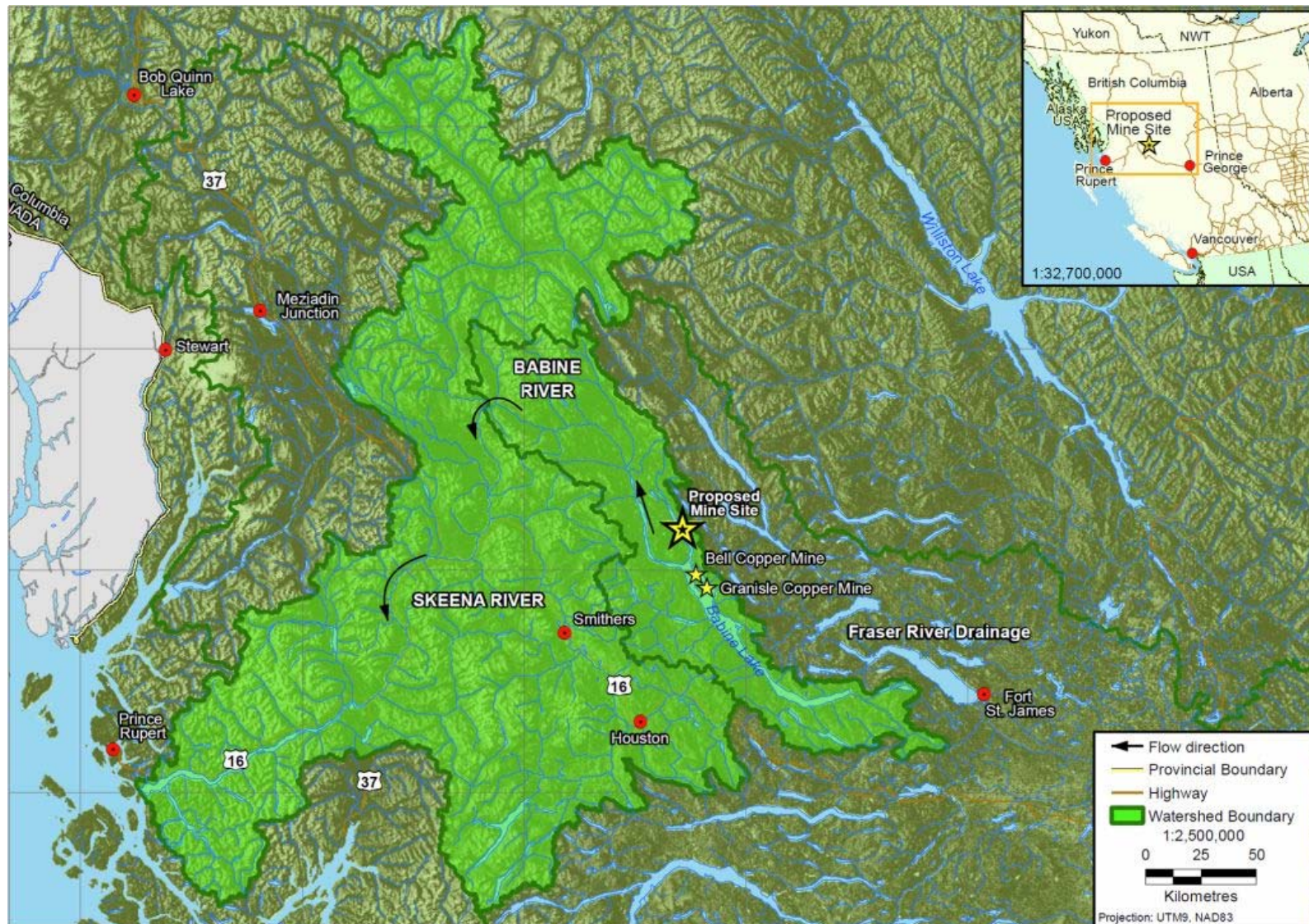




Figure 2: Project location in Skeena Watershed





## 2.3 Project Description

Additional details of the proposed Project can be found in the Proponent's Application.

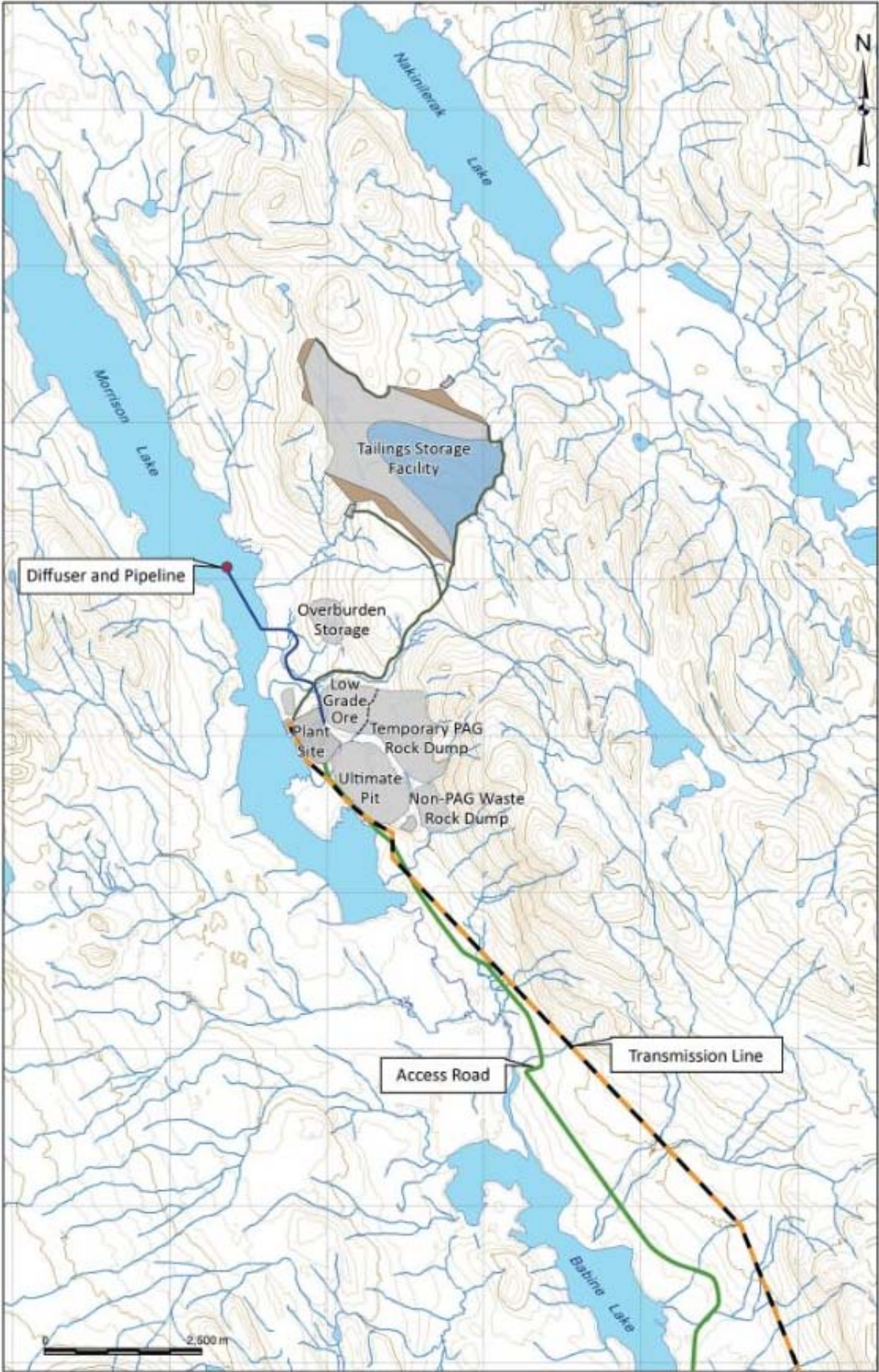
The Proponent is proposing to develop a copper/gold/molybdenum mine and ancillary facilities in north-central BC. The proposed Project is based on a conventional truck-shovel open pit mine and copper flotation process plant that has been designed to produce an average of 130,000 tonnes of concentrate per year containing copper and gold. A separate molybdenum concentrate would also be produced. Over the expected 21-year mine life, the proposed Project would produce over 1.37 billion pounds of copper, 658,000 ounces of gold and about 10 million pounds of molybdenum. The total disturbance area of the mine site and off-site facilities is estimated to be 1,165 ha, with an additional buffer zone of approximately 863 ha for a total proposed Project area of 2,028 ha. The Application outlines a 24-month construction period, followed by the start of commercial operations, subject to the receipt of all required approvals.

The scope of the proposed Project consists of the following on-site and off-site components and activities:

- approximately 30,000 tonnes per day open pit mine and process plant;
- mill tailings storage facilities including containment dams;
- waste rock storage;
- site runoff, diversion and sediment control;
- ore and marginal ore storage;
- borrow pits, overburden and topsoil storage;
- sewage and waste water management facilities;
- water treatment facilities, including sludge storage;
- groundwater and/or surface water use for monitoring and/or extraction;
- explosives transport, manufacturing plant and storage;
- an existing 138 kV transmission line from Babine Substation, crossing Babine Lake, to the Bell Mine and a new 25 km extension of the transmission line from the Bell Mine site to the proposed Project site;
- a power substation at the proposed Project site;
- mine haul roads within the mineral property;
- existing barge and barge facilities;

- associated mine facilities such as assay buildings, ore load out facilities, labs, maintenance shops, warehouse, equipment lay down areas, office complex parking, change-house, security building; and,
- routes for hauling the ore to the milling facility and for personnel access and delivery of supplies and materials to the site, including new or existing roads.

Figure 3: Main mine site components



### 2.3.1 Changes from Original Mine Design Resulting from the EA Process

#### **Concerns with Initial Mine Design**

The Proponent originally submitted an Application to EAO in the fall of 2009 which presented a number of water quality predictions. EAO, with advice from the Working Group, determined that there were information deficiencies and the Application was not accepted for review. In June 2010 the Proponent submitted an addendum, which was subsequently accepted for review.

Significant concerns were raised by technical reviewers during the first 90 days of the review. These concerns were almost exclusively focused on water quality and included a focus on water balance (the flow of water in and out of the proposed Project area), in particular the assumption of a zero-surface discharge facility, and water quality modelling and assumptions.

Some specific water quality concerns with the original Application and addendum included:

- lack of baseline data to verify that Morrison Lake “turns over” completely every year (this assumption was a key component of the proposed water treatment strategy);
- inadequate baseline (multi-year, monthly sampling) water quality data for Morrison Lake (which reduced the ability to accurately predict changes to surface water quality);
- Tailing Storage Facility (TSF) pond issues, including risk of dam failure because of large volumes of stored water, as well as concerns about TSF water quality predictions and predictions of negligible impacts to groundwater from water contained within the tailings;
- insufficient data to predict the onset time for metal leaching/acid rock drainage (ML/ARD); and,
- concerns over baseline groundwater sampling.

#### **Project changes during suspension of EA timelines**

Due to a large volume of technical comments and concerns on the original Application, the Proponent requested and was granted a time limit suspension in October 2010 in order to prepare responses to reviewer questions. The lack of satisfactory resolution to these technical concerns was a major factor in EAO advising the Proponent in December 2010 that EAO had serious concerns about the potential long-term environmental risks and liabilities to Morrison Lake from the Project as originally proposed in the Application.

In response to this information and the concerns expressed by EAO, the Proponent made a number of major changes to the proposed Project design to address these concerns.

Both EAO and the Canadian Environmental Assessment Agency (CEA Agency) advised the Proponent that a new supplemental submission was required that would comprehensively describe the proposed Project changes and related changes to the effects assessment. A March 9, 2011 letter from Chris Hamilton, Project Assessment Director at EAO, to the Proponent stated:

*... EAO ha[s] serious concerns about the long-term environmental liability of the proposed Project with particular respect to the land-based waste rock storage, the plan for a mine drainage water collection and treatment system in perpetuity, and the potential impacts on water quality in the receiving environment.*

The letter went on to describe new information requirements, such as a final revised mine plan and water quality predictions, baseline information and field work, updated effects assessments, a description of which sections of the original Application are superseded by new information and an updated Table of Conditions.

In response to this letter, the Proponent prepared a document called a “*Review Response Report Rev 2*” which addressed the points noted above. The document outlined the following major revisions to the mine plan and operations:

**Table 1: Summary of major waste management changes in Review Response Report Rev 2**

<b>Mine Component</b>	<b>Previous Proposal</b>	<b>Revised Proposal</b>
Overburden Stockpile	Located on Morrison Point	Relocated to 700 m inland from Morrison Lake
Waste Rock Dump	On-land dump with soil cover to remain in far future	Submerge and lime potentially acid rock drainage generating (PAG) waste rock in the open pit on closure and maintain pit area pond/wetland and water treatment
Booker Lake and Ore Pond Sediments	Store in overburden and organic sediment storage stockpile	Geochemistry testing plan and Adaptive Management storage facility within the footprint of the TSF
TSF	Mix cleaner and rougher tailings and discharge together	Separate cleaner and rougher tailings and discharge cleaner tailings near reclaim pond. Place rougher tailings on the TSF beaches. Place cleaner tailings from milling of low grade ore (LGO) into the open pit
LGO Stockpile	Milled or to remain in perpetuity	Milled or placed in open pit
Waste Rock	PAG rock not subdivided into units for management	Waste rock to be segregated into high PAG and low PAG
Water on Closure	Discharge to open pit and then reclaim as lake or closed system	Pump all process water to the open pit and accelerate return of TSF pond water quality to BC water quality guidelines (BCWQGs). Close as combination pond, wetland and forest
Water Treatment Plant	Design flow 214 m <sup>3</sup> /hr for far future	Design flow 55 m <sup>3</sup> /hr for far future
Morrison Lake Diffuser and Pipeline	Pipeline diameter 300 mm and 100:1 mixing plume width of 5.5 m, 25 m high	Pipeline diameter 150 mm and 100:1 mixing plume width of 5 m, 40 m high

## Concerns with the Revised Mine Design

Once the *Review Response Report Rev 2* was received and the EA process resumed, EAO commenced preparation of the draft Assessment Report. After receiving comments from the Working Group members on the draft Assessment Report, EAO again suspended the review on day 176 of the 180 day review (September 29, 2011) because EAO could not come to a final conclusion on the potential for impacts to water quality and sockeye salmon in Morrison Lake due to the lack of appropriate information.

## External, Third-party Reviews

Following the September 29, 2011 suspension, EAO commissioned an external, third party review of the Proponent's water quality, hydrogeology and fisheries effects assessments. These third party reports, which were delivered to EAO in December 2011, confirmed that there was insufficient information to demonstrate that the proposed Project would not have significant adverse effects on water quality in the long term. The reports provided a number of recommendations for additional work.

EAO informed the Proponent that they must respond to the external review recommendations. EAO also shared the reports with the Working Group and First Nations and sought their input on any additional requirements that should be included in the Proponent's scope of work.

The Proponent provided EAO with an additional submission on January 31, 2012, entitled *3<sup>rd</sup> Party Review Response Report*. EAO again had this information reviewed by the external third party hydrogeologist and retained a lake behaviour specialist to also examine the *3<sup>rd</sup> Party Review Response Report*.

EAO indicated to the Proponent that, despite information contained in the *3<sup>rd</sup> Party Review Response Report*, there were still significant outstanding concerns, particularly as they related to water quality in Morrison Lake and potential impacts to sockeye salmon spawning areas.

On April 30, 2012, the Proponent submitted its final addendum, called *3<sup>rd</sup> Party Review Response Report – Addendum 1*. This report provided information on several new design options, including:

- A 60 mil low density polyethylene geomembrane liner that would cover 96 percent of the 5 km<sup>2</sup> TSF. The liner was proposed to virtually eliminate seepage from the TSF and address many water quality issues; and,
- Secondary water treatment facilities to address parameters of concern, including aluminium, cadmium, iron, and magnesium in the water that would discharge to Morrison Lake.



This report is an assessment of the current mine plan described in section 2.3.2 below, which reflects a number of significant changes to both the design of the major mine components and effects analysis over the course of the EA for the proposed Project. This report also reflects the findings and analysis of third party reviewers.

### *2.3.2 Final Mine Plan Proposed by Proponent*

The mine site is proposed to be accessed by a barge across Babine Lake, then by travelling north on forest service roads approximately 50 km to the proposed Project site. Power to the mine is proposed to come from Bell Mine substation, via a new 25 km overhead transmission line constructed by the Proponent.

The proposed Project is a conventional open pit mine, mined in four phases over 21 years. The majority (90 percent) of waste rock is characterized as PAG and is likely to leach metals under neutral pH conditions. Preliminary testing demonstrated that the onset of acid generation may occur during operations or early post-closure.

The final pit area is proposed to be approximately 1500 m long x 900 m wide, and to a maximum depth of 372 m. By way of comparison, Morrison Lake is 15 km long with an average depth of 21 m and a maximum depth of 60 m. The pit crest on the southern side would be approximately 85 m from the shores of Morrison Lake. There would also be a 40 m wide main access road in between the pit wall and the lake.

The Proponent's proposed waste management plan is to store waste rock on land during operations in a hillside dump constructed (east) of the pit, within the drainage area of the pit. The waste rock would be tested and segregated into non-acid rock drainage-generating (NAG) and PAG; the PAG rock would be further segregated into rock with higher and lower acid-generating potential so that "high PAG" could be placed back into the open pit sooner after closure. The dump would cover 175 ha and reach approximately 150 m high, in constructed benches. After open pit mining ceases in year 19, the waste rock would be placed back into the pit and submerged. There may be a surplus of PAG waste rock relative to the available space in the mined-out pit, and therefore the mine plan proposes to place and submerge surplus waste rock into the TSF during operations. The Proponent would assess the volume of waste rock and the disposal requirements around year 15 of operations.

The Proponent plans to close the open pit, after the waste rock has been backfilled, as a combination of shallow till cover reclaimed as grassland with a portion of the surface existing as a shallow pond about 0.1 km<sup>2</sup>. The pond would collect precipitation and run-off from the pit walls. This water would be routed to the treatment plant. The water quality in the pit lake is expected to be acidic and elevated in metals at closure, requiring active water treatment into the distant future prior to discharge. A key element



of the closure plan will be to keep the final level of pit lake several meters below the level of Morrison Lake to ensure pit water would not flow to Morrison Lake.

Low grade ore (up to 38 million tonnes (Mt)) would be stockpiled north of the pit, up against the waste rock dump, to be milled during operations when required, and fully milled in years 19-21 of mine life prior to closure. During operations, the surface water run-off and seepage from the ore stockpile would be collected and recycled for use in the process plant during operations. In the event that the low grade ore is not fully milled post-closure, the contingency plan is to put this rock into the pit or the TSF at closure.

In terms of water management, while the mine is designed as a “zero-surface discharge” facility during operations, it is acknowledged that there would likely be a surplus water balance during operations. The TSF would play a key role in storing and managing water for the mine. The TSF would be approximately 3.2 km northeast of the open pit, approximately 190 m higher in elevation than the plant site. The TSF would cover about 5 km<sup>2</sup>. The TSF would initially be formed with a 50 m high starter dam, which would be expanded to include north and west dams with ongoing mining to an ultimate height of approximately 95 m. The tailings pumped from the mill during mine life would be separated into “cleaner” (high sulphide) and “rougher” (low sulphide) tailings and placed in the TSF so as to minimize sulphide tailings being exposed in the TSF. There would be a water cover over the majority of the tailings facility during mine life.

The Proponent committed to lining the TSF with a 60 mil polyethylene geomembrane liner to reduce groundwater seepage to very low amounts.

At closure, the TSF would be reclaimed with a 1.7 km<sup>2</sup> shallow water pond, wetland and reforested areas. Excess water in the TSF is planned to be discharged to the environment post-closure, once the water quality meets guidelines.

The Proponent intends to build a high density lime water treatment plant in order to treat contaminated pit water. The plant would produce high-density sludge which would be stored in sludge containment pads constructed adjacent to the water treatment plant. The treated water would be discharged via a submerged effluent diffuser pipeline constructed from the proposed Project and extending on the lake bottom for approximately 2 km until the discharge point in the deepest part of Morrison Lake (depth of approximately 60 m). The Proponent also committed to adding several secondary water treatment methods to address parameters of concern.

### 3 Assessment Process

#### 3.1 Provincial EA Process – Major Milestones

- The EA process started in September 2003, when the Proponent submitted a Project Description to EAO and an Order under section 10 of the *Environmental Assessment Act* was issued.
- On January 18, 2008, EAO issued an Order under section 11 of the *Environmental Assessment Act* which defined the scope of the proposed Project, and the procedures and methods for conducting the review.
- On May 21, 2009, EAO approved final Terms of Reference to the Proponent.
- On September 28, 2009, the Proponent submitted their initial Application for evaluation. On October 27, 2009, EAO determined that the Application did not contain the information required by the Terms of Reference.
- On May 28, 2010, the Proponent re-submitted the Application, including a number of Addendum documents, for evaluation by EAO. On June 28, 2010, the Application was accepted for review and the 180-day review began on July 12, 2010.
- On October 28, 2010, EAO issued a time limit suspension and “stopped the clock” on the Application Review at the Proponent’s request in order to provide time for the Proponent to fully respond to the issues raised by the technical reviewers.
- On February 18, 2011, the Proponent advised EAO that it intended to revise the mine plan for the closure phase in order to reduce potential environmental risks associated with the original project design.
- In June 2011, the Proponent submitted the required supplemental information. EAO accepted the documents and the review commenced again on July 27, 2011, at day 109 of the review period.
- The review was suspended from August 25 to September 1, 2011, at the request of the Proponent, in order to provide clarification and additional information regarding the Proponent’s mitigations and commitments.
- On September 29, 2011, the time limit was again suspended at day 176 by EAO because EAO could not come to a final conclusion on the potential for impacts to water quality and sockeye salmon in Morrison Lake due to the lack of appropriate information.
- On August 20, 2012, EAO referred the proposed Project to Ministers for a decision on whether to issue an EA certificate.

### 3.2 Public Consultation

EAO invited public comment on the draft Terms of Reference for the proposed Project in November-December 2008, and held three open houses during that time in Granisle, Houston, and Burns Lake. Attendance at the Granisle open house was highest, with nearly 70 participants.

The key issues raised by the public included: employee housing, transportation and safety impacts, water quality and fisheries, and economic revitalization in the region. EAO received 64 comments from five individuals on the draft Terms of Reference, and considered those comments prior to issuing the final Terms of Reference to the Proponent in May 2009.

The formal review of the Application was initiated on July 12, 2010, and the Application was posted to EAO's electronic Project Information Centre (e-PIC). The Application was made available to the public in local libraries, municipal halls and regional district offices in Granisle, Houston, Burns Lake and Smithers.

A 70-day public comment period on the Application was held from July 22, 2010 to September 30, 2010. The public comment period and open house was advertised in two local newspapers in the week prior to the open houses. A direct mail-drop notice of the open house was distributed to every resident in Granisle several days before open houses as well.

Four open houses were held by EAO during the Application Review period: two in Granisle (total of 110 attendees) and one each in Burns Lake (8 attendees) and Smithers (25 attendees). The open houses provided information about the EA process and specifics about the proposed Project.

EAO received 88 comments from seven individuals and organizations. Issues raised by the public generally included: water quality, ML/ARD, dust and air contaminants, wildlife displacement and health risks, increased traffic, accident and contingency planning, and potential economic and employment benefits to the local communities.

A summary of the Proponent's consultations which contains details of public consultations in the pre-application period are included in section 2 of the Application. The Proponent's Application Review period consultation report is posted to EAO's website.

A second, online-only, two-week public comment period was jointly initiated by EAO and the CEA Agency in July 2011 on the new Project information provided by the Proponent.

### 3.3 First Nations Consultation

The footprint of the proposed Project is situated within the asserted traditional territory of Lake Babine Nation. A section of the proposed transmission line route also passes through the northeastern section of Yekooche First Nation's asserted traditional territory. Lake Babine and Yekooche First Nations were invited to participate in the EA as members of the technical working group. Lake Babine Nation participated throughout the EA. Yekooche First Nation has not participated in the technical working group, nor have they indicated an interest in direct government consultation, although they have requested to be kept informed of studies and key issues, which EAO has done.

In September 2010, Gitanyow and Gitksan contacted EAO expressing concerns with the proposed Project as it related to fishing rights on Skeena River and impacts to fish in Morrison Lake. They were consulted from that point forward, primarily through the Skeena Fisheries Commission, who joined the Working Group.

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

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

### 4 General

#### 4.1 Assessment Methodology

##### 4.1.1 *Assessment of Potential Significant Adverse Effects Methodology*

In undertaking this evaluation, EAO assessed whether the Project as proposed would have significant adverse environmental, economic, social, heritage and health effects, including cumulative impacts, and potential effects on First Nations' asserted aboriginal rights and interests, having regard to the mitigation measures proposed in the Application, or otherwise developed through the EA process.

In addressing what may constitute a “significant” adverse effect, EAO considers the following factors:<sup>2</sup>

- **Context:** This refers to the ability of the environment to accept change. For example, the effects of a project may have an impact if they occur in areas that are ecologically sensitive, with little resilience to imposed stresses.
- **Probability:** The likelihood that an adverse effect will occur.
- **Magnitude:** This refers to the magnitude or severity of the effect. Low magnitude effects may have no impact, while high magnitude effects may have an impact.
- **Geographic Extent:** This refers to the extent of change over the geographic area of the proposed Project. The geographic extent of effects can be local or regional. Local effects may have a lower impact than regional effects.
- **Duration and Frequency:** This refers to the length of time the effect lasts and how often the effect occurs. The duration of an effect can be short term or long term. The frequency of an effect can be frequent or infrequent. Short term and/or infrequent effects may have a lower impact than long term and/or frequent effects.
- **Reversibility:** This refers to the degree to which the effect is reversible. Effects can be reversible or permanent. Reversible effects may have lower impact than irreversible or permanent effects.

The specific parameters for assessing the level of significance vary according to the valued component.

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

The development and refinement of mitigation measures is a key component of the EA process and one where EAO spends an extensive amount of time facilitating discussion and negotiation among the Proponent, interested parties and First Nations. For this proposed Project, a key component of the EA process was the design changes made by the Proponent to reduce potential effects. The Proponent has made commitments which are set out in detail in Appendix 2. Key commitments will be discussed in the following sections of this report, but for a full explanation and consideration of commitments, readers are advised to consult Appendix 2.

#### *4.1.2 Ensuring the Crown's Duties to Consult and Accommodate First Nations are Met*

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 the Assessment 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.

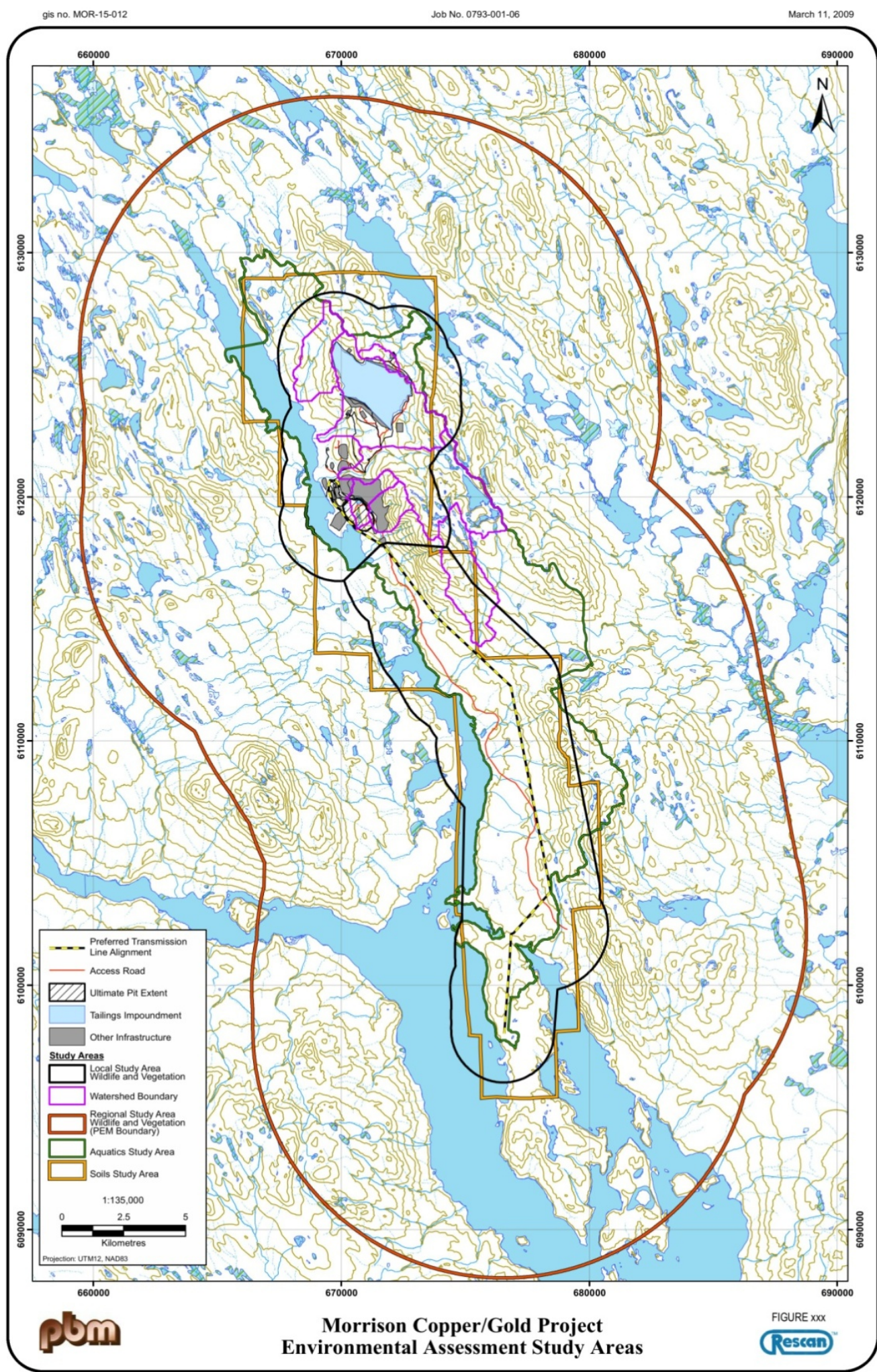
#### **4.2 Spatial Boundaries**

The Proponent's Application contains details on the three study area boundaries for assessing potential project impacts. They are shown in figure 4 and include:

- An 18,860 ha Local Study Area (LSA) which includes a 2 km buffer around the proposed Project facilities to allow the assessment of all potential direct effects from proposed Project-related activities, including access roads and the transmission line right-of-way.
- A 108,015 ha Regional Study Area (RSA) which includes the proposed Project and a 10 km buffer in the surrounding region encompassing the zone of influence for project-specific effects.
- For social and economic impact studies, the RSA was expanded to include Granisle, Burns Lake, Houston, Smithers, and other communities (where appropriate) which have the potential to be directly affected by the proposed Project.



Figure 4: Spatial area study boundaries for potential effects



### 4.3 Temporal Boundaries

Temporal boundaries for the effects assessment are defined by the characteristics of the proposed Project and the valued components being assessed, and include the time prior to proposed Project-related activity (baseline) and the periods when the valued components would be affected by the proposed Project. Details are provided in the Proponent's Application, but the following table illustrates the phases and some of the activities associated with each phase.

**Table 2: Proposed Project phases and activities**

<b>Phase</b>	<b>Duration (years)</b>	<b>Description</b>
Construction	2	Construction of on-site components and off-site infrastructure. Includes stripping of open pit overburden, and construction of new transmission line.
Operations	21	Mining, milling, waste disposal, and ongoing establishment of the TSF.
Closure and Decommissioning	6	Mine site would be decommissioned and reclaimed, with the objective of returning the area to the equivalent of its current (baseline) condition. Of the 1,165 ha of direct disturbance, 788 ha (69 percent) would be reclaimed and 175 ha of the TSF pond would be formed. Decommissioning includes: backfill of waste rock into the pit; removal of equipment and infrastructure; reclamation of the prior waste dump site, tailings impoundment, open pit, roads, and water courses; and re-vegetation.
Post-Closure	100+	Construction and operation of water treatment facilities. Ongoing environmental monitoring and maintenance to ensure effective reclamation, until baseline or stable conditions are reached. The duration of this phase may vary between valued components, depending on the amount of time required for a specific aspect of the environment to be reclaimed.

### 4.4 Cumulative Effects

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



- An examination of background information on relevant valued components including:
  - approved land use plans that designate the most appropriate activities on the land base; and,
  - historical data, trends and comprehensive baseline studies that set out the current conditions and factor in effects of prior developments.
- An identification of potential impacts of the proposed Project on relevant valued components.
- An identification of potential overlapping impacts due to other developments, even if not directly related to the proposed Project.
- An identification of predicted impacts from future developments that are reasonable, foreseeable and sufficiently certain to proceed.
- An assessment of the potential for residual adverse effects, taking into account the mitigation measures proposed by the Proponent for the proposed Project.
- An assessment of the significance of any residual effects after mitigation, including cumulative effects, considering the following factors: context, magnitude, probability, geographic extent, duration and frequency, and reversibility.

The effects of the proposed Project on valued components are evaluated by EAO in conjunction with effects of past, present and reasonably foreseeable projects and/or activities as described in Table 3.

**Table 3: Projects and activities included in the cumulative effects assessment**

<b>Project/Facility/Activity</b>	<b>Description/Location</b>	<b>Status of operations</b>	<b>Temporal timeframe</b>
Forestry: Canfor existing and future cut blocks	Approximately 49 ha of cutblocks	Logging expected to restart in 2011 in RSA. No logging planned for LSA	2010-2015 (based on forestry management plans)
Mineral exploration: Dome Mountain	Gold-silver mine located 60 km southwest of proposed Project	Advanced exploration, received Mines Act permit for two years (2011-2012)	Exploration and construction in 2010, operations 2011+
Bell Mine (Xstrata)	22 km south of proposed Project	Post-closure, monitoring. Active water treatment required, eventual discharge to Babine Lake	Closure monitoring (water quality, reclamation) ongoing, effluent discharge to Babine Lake predicted by 2018, to continue in perpetuity
Granisle Mine (Xstrata)	29 km south of proposed Project	Post-closure, monitoring. Active water treatment required, eventual discharge to Babine Lake	Closure monitoring (water quality, reclamation) ongoing, effluent discharge to Babine Lake predicted by 2090, to continue in perpetuity

## 5 Assessment of Potential Environmental Effects

### 5.1 Overview of Morrison Lake Water Setting

#### 5.1.1 *Water in the Environmental Assessment*

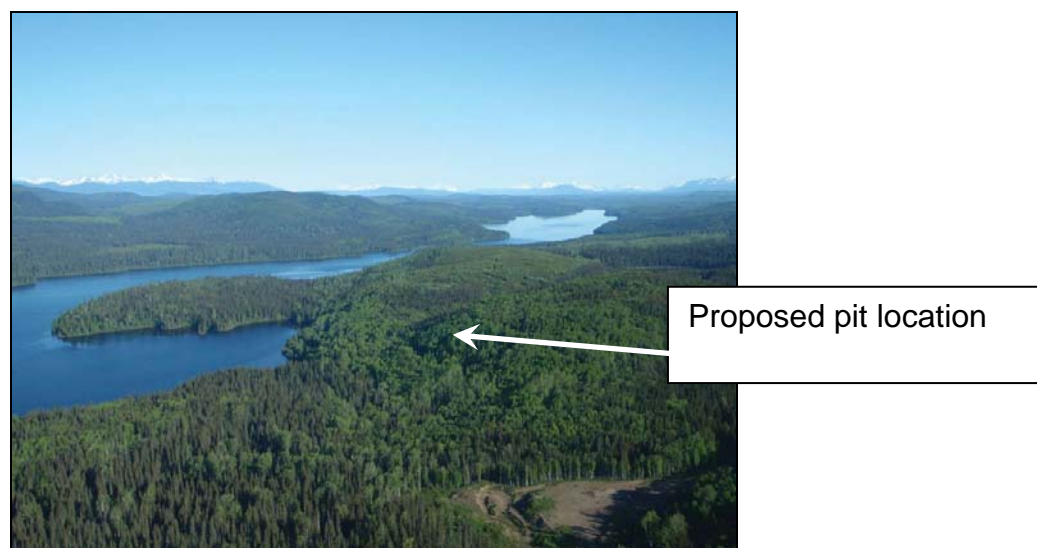
Water was the predominant issue discussed in the EA for the proposed Project. While water is clearly linked and connected to a variety of valued components (e.g. fish, wildlife, and health), for the purposes of the EA these valued components are discussed separately. In particular, this report breaks water down into its separate components of quality and quantity of both surface and groundwater.

This section provides an overview of the overall water context of the area around the proposed Project and highlights some of the key factors discussed and referenced throughout this report, especially as they relate to Morrison Lake.

#### 5.1.2 *Background Information*

The proposed Project site is located along the east side of Morrison Lake in the Babine River watershed. The whole area comprises a large part of the headwaters of the Skeena River. Morrison Lake itself is a long narrow lake approximately 15 km in length with an average width of approximately 880 m. The lake consists of two basins joined by a shallower channel. The much larger north basin has a maximum depth of approximately 60 m and the south basin, adjacent to the proposed mine site, has a maximum depth of approximately 13 m. The proposed Project is located at the southern end of the lake, near Morrison River, which forms the outlet of the lake. There is no road access to Morrison Lake.

**Figure 5: View of Morrison Lake, looking northwest**



## Surface Water Context

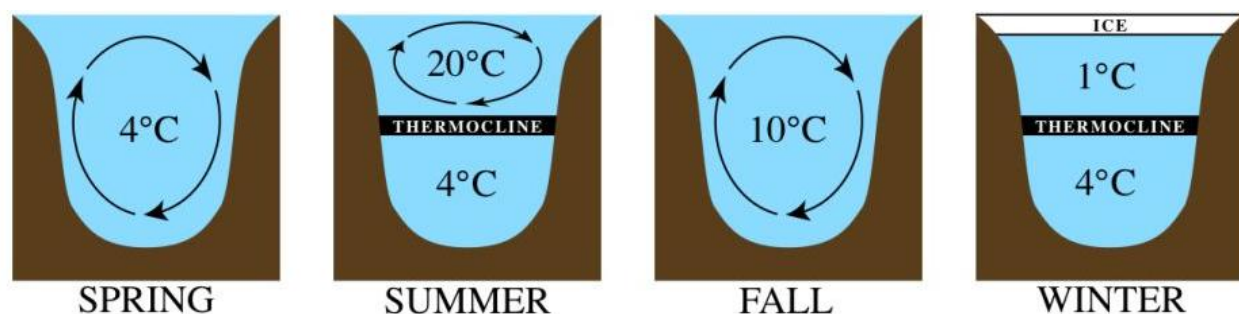
The proposed Project site contains a small lake (called “Booker Lake” by the Proponent), several ponds, wetland areas and numerous streams that flow principally into Morrison Lake. A very small portion of the catchment area flows east to Nakinilerak Lake, which is part of the Fraser River Basin.

Morrison Lake is “dimictic”, meaning that it mixes completely (or “turns over”) once in the spring and once in the fall (shown in figure 6 below). During summer, the lake has two distinct layers – an area of warm surface waters (the epilimnion) and an area of cold waters along the bottom (the hypolimnion). They are separated by a discrete “thermocline” and have little interaction.

During the ice-covered winter season the lake has the opposite layering, with cold water on the top and warmer water on the bottom of the lake.

Understanding the stratification and behaviour of Morrison Lake is critical because the Proponent’s proposed water management plan involves discharging treated effluent to the north basin of the lake. The Application assumes that effluent becomes fully mixed and “flushes” out annually.<sup>3</sup>

**Figure 6: Typical mixing pattern for a dimictic lake**



## Groundwater Context

The proposed TSF is surrounded by highlands to the east and northwest. The groundwater flows from these highlands into the proposed TSF area, which is located in a low saddle of land with a number of wetlands and ponds. From these wetlands and ponds, groundwater predominantly flows towards Morrison Lake.

The geology of the proposed Project area is complex. The primary type of soil on the proposed Project site is glacial till. The low permeability and poor drainage of the overburden generally results in wet, swampy conditions in the area.

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<sup>3</sup> The average residence time for water in Morrison Lake is approximately two years, based on an annual flow through of 145 Mm<sup>3</sup>.

Surface water is mainly recharged from rainfall and spring snowmelt. The bedrock groundwater is recharged from surface water in the soil and seepage through faults and fractures on the property. In some of the lower elevations, there is an upward hydraulic gradient (artesian well conditions), suggesting that some surface water flows actually come from groundwater at certain times of the year.

## 5.2 Surface and Groundwater Quantity

### 5.2.1 *Background Information*

This section describes how water flows around the area of the proposed Project and discusses how the proposed Project would likely change those flows over time. Section 5.3 addresses the water quality and predicted effects resulting from the proposed Project.

The Application described the process the Proponent followed to collect information on water flow. Monitoring wells and piezometers (a device used to measure groundwater pressure) were installed in a number of drill holes in the TSF and pit area to make a feasibility-design-level determination of groundwater flow directions and recharge/discharge zones. Hydraulic conductivity tests were carried out on the glacial till in the TSF area, in a number of holes in the TSF and pit areas. The Application notes that hydraulic conductivity in the bedrock was found to be higher in the upper, highly fractured bedrock unit and generally decreased with depth.

A summary of the references for a full discussion on the Proponent's water quantity work are summarized below:

<b>Reference Document</b>	<b>Document Section</b>
EA Certificate Application	
EA Certificate Addendum	Sections: 3.2.3, 3.2.5 & 3.3.1
Review Response Report Rev.2	Section 6, 7 & 10.2; Appendix II & III
3 <sup>rd</sup> Party Review Response Report	Sections: 2 & 6; Appendix I & V
3 <sup>rd</sup> Party Review Response Report – Addendum 1	Sections: 2, 4.2 & 4.3; Appendix II

### *5.2.2 Project Issues and Effects Identified in the Application*

The Application predicted that, *without mitigation*, impacts to surface water flow and to groundwater quantity and flow could result from a range of activities throughout the mine life, including:

- construction of the open pit and associated water diversion structures;
- construction of the TSF and associated dams and water diversion structures;
- changes to groundwater flows and stream flows due to dewatering the areas around the open pit;
- construction of a water treatment plant and pumping water into the TSF and Morrison Lake; and,
- draining and dredging of existing wetlands and lakes in the proposed Project footprint.

The main mitigation presented in the Application was a water management strategy, which focused on a detailed “water balance” plan. A number of features were built into the conceptual mine design and water balance to address potential surface water and groundwater quantity impacts, and to minimize reliance upon, or potential effects to, local water sources. Some of these features included recycling water from the TSF for use in the processing plant, installing seepage ponds below the TSF and constructing clean water diversions around the mine facilities to minimize contact of clean water with water potentially affected by mining activities.

### *5.2.3 Project Issues, Effects and Mitigation Identified during Application Review*

#### **Water Balance Background**

One of the central issues discussed during Application Review was how the proposed Project would affect the flow and quantity of water in the vicinity of both the open pit and TSF over the life of the proposed Project. This was a significant concern due to the very close proximity of the mine infrastructure to Morrison Lake.

As previously described in section 2.3.1, the proposed Project was originally proposed and modelled as having zero-surface discharge during operations, followed by treatment plant effluent discharge and TSF pond water surface discharge starting within five years of the end of mining. However, as the review continued, new information indicated that the proposed Project would likely have a surplus water balance, meaning that there would be more surface and groundwater available than is required for use in mine operations. Any surplus water would need to be returned to the environment in a way to ensure adverse effects would not occur.

During Application Review, the technical working group, including First Nations, expressed considerable concerns over uncertainty related to:

- the predicted water balance for the proposed Project;
- the hydrogeological baseline data available and presented;
- the hydrology characterization including amount of precipitation; and,
- the functioning and role of the TSF as a means of storing and recycling water.

Because the proposed Project is expected to have a surplus water balance, a significant amount of attention was given in the review to understanding the site conditions, how excess water could be managed and any potential effects from the management of excess water.

During the first suspension, EAO requested that the Proponent present both an Expected Case and Upper Bound Case (i.e. “worst-case”) for the water balance that took into account new site-specific information, information from other similar mines nearby (analogous, or “analogue” data), and the potential for climate change. The Upper Bound information request was in response to concerns that the effects assessment for water quantity was not sufficiently conservative. The predictions discussed below show both the Proponent’s Expected and Upper Bound scenarios.

It should be noted that most of EAO’s analysis has been completed on the Upper Bound, or worst case scenario.

The information presented by the Proponent showed that the main sources of water inputs to the proposed Project are from precipitation (rain and snow) and groundwater seeping into the open pit<sup>4</sup>. The main sources of water losses are evaporation, seepage to groundwater, and water that is stored in the tailings voids (e.g. “pore water”)<sup>5</sup>.

The Upper Bound water balance scenario presented by the Proponent differs from their Expected Case in the following ways:

- assumes more precipitation;
- assumes water diversion structures are less effective;
- assumes that tailings are more dense (less porous) so less water is stored in the tailings voids;
- less fresh water is needed from Morrison Lake; and,
- more water seeps into the open pit and needs to be collected.

The analysis of these scenarios shows that excess water could require treatment and discharge into Morrison Lake as early as five years into operations, rather than on

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<sup>4</sup> A small amount of fresh water would also be pumped from Morrison Lake for use in the plant and as potable water.

<sup>5</sup> Approximately 80 percent of the water used within the proposed Project is recycled, with the remaining 20 percent non-recycled water primarily accumulating in the tailings pore water.

closure, as originally proposed. Table 4 below shows the potential volumes of water to be discharged to Morrison Lake (either treated or not treated) for both the Expected Case (EC) and Upper Bound (UB).

It should be noted that, after the Proponent committed to a geomembrane liner for the TSF, the amount of surplus water needing management increased by 5 to 10 percent. This is due to less water being lost to groundwater seepage.

**Table 4: Summary of surplus water discharges to Morrison Lake (m<sup>3</sup>/hr)**

Component	Year 5		Year 10		Year 18	
	EC*	UB*	EC	UB	EC	UB
Pit dewatering	152	271	229	409	368	685
Discharge of pit dewatering flows to Morrison Lake	110	150	150	330	223	515
Water treatment plant discharge to Lake	0	200	0	190	0	206
<b>Overall Mine Water Balance requiring discharge to Morrison Lake</b>	<b>110</b>	<b>350</b>	<b>150</b>	<b>520</b>	<b>223</b>	<b>721</b>

\*EC: Expected Case

\*UB: Upper Bound

### **Water Flow Change – Effects**

The four main sources of potentially negative water quantity effects are:

- effects from changes to surface water flow;
- effects from fresh water extraction;
- effects from changes to groundwater flow near the open pit; and,
- effects from changes to groundwater flow near the TSF.

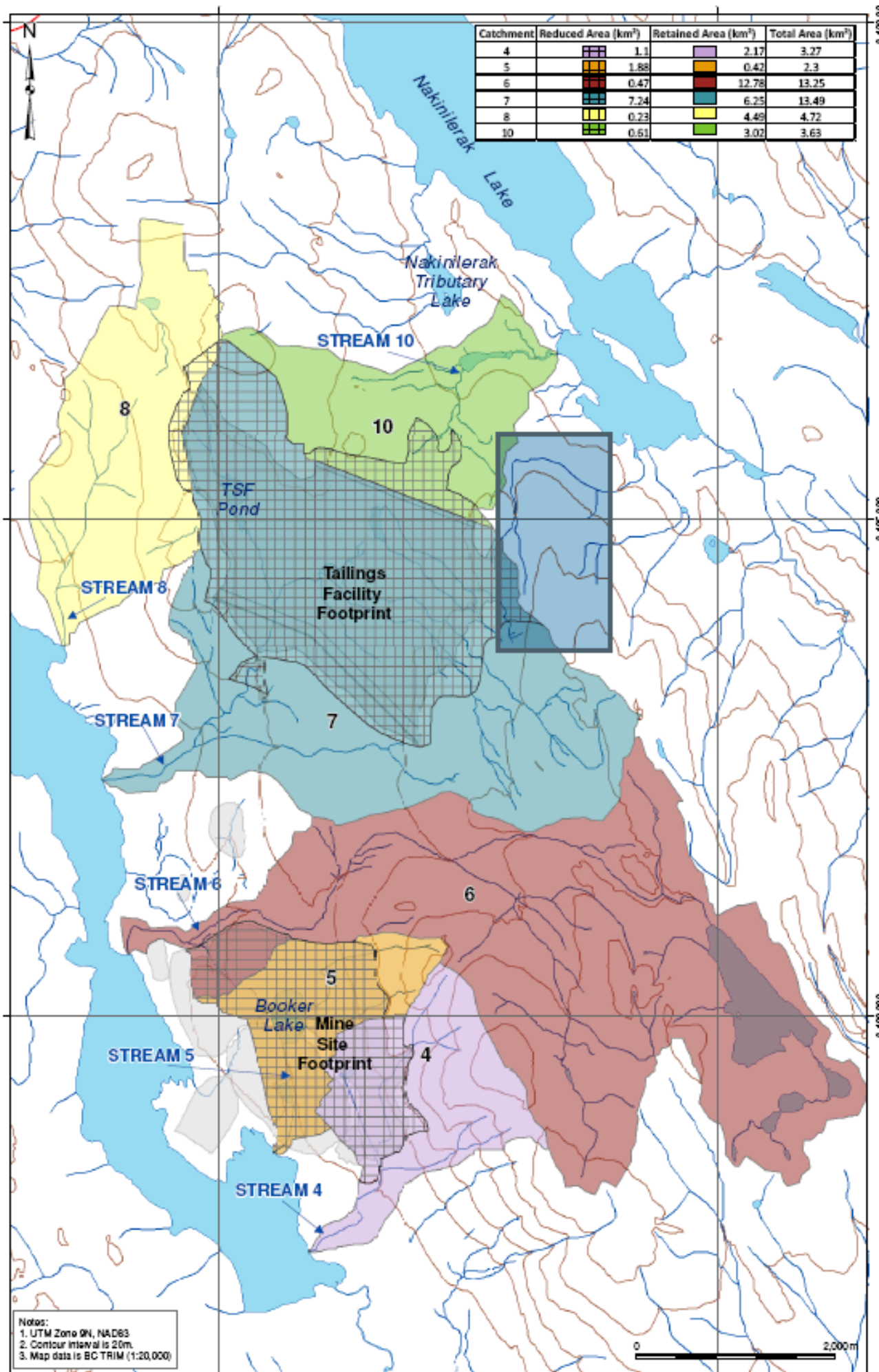
#### ***Effects from Changes to Surface Water Flow***

The Application states that Booker Lake, several ponds (including Ore Pond), wetland areas and several streams would be partially or completely lost during development of the mine site and the TSF. The wetlands in the TSF area would be eliminated completely. In addition to removal of these water bodies, a number of small catchment areas would be reduced or isolated from Morrison Lake and Nakinilerak Lake watersheds, thereby reducing water levels in streams downstream of the mine site and in Morrison and Nakinilerak Lakes.



Concerns were noted that the loss of these catchment areas could affect water quantity in Morrison Lake and streams flowing into Morrison Lake. Figure 7 below shows the watersheds in the mine footprint and the reductions in catchment areas. This effect is also discussed in section 5.5 as it relates to fish habitat.

Figure 7: Affected watersheds in the proposed Project area



Stream 7, the main stream affected by the TSF and an area of fish habitat, would experience flow reductions ranging from 37 percent at the beginning of operations (when the TSF is relatively small) to 54 percent at the end of operations (when the TSF would reach its maximum size). Streams 4, 5 and 6, which also drain into Morrison Lake would have reduced catchment area. Stream 10 drains to Nakinilerak Lake. The catchment area reductions and corresponding reductions in average annual flow are shown below in Table 5.

**Table 5: Summary of reduction in watershed areas and water quantity**

<b>Stream Catchment</b>	<b>Total area (km<sup>2</sup>)</b>	<b>Average annual flow (m<sup>3</sup>/hr)</b>	<b>Reduced Area (km<sup>2</sup>)</b>	<b>% Reduction</b>	<b>Reduction in average flow (m<sup>3</sup>/hr)</b>
4	3.27	67	1.1	34	23
5	2.3	58	1.9	82	48
6	13.3	972	0.5	3.5	34
7*	13.5	407	up to 7.2	up to 54	220
10	3.6	25	0.6	17	4

\*Flow reduction increases during the mine life as the TSF gets larger

The reduction in catchment areas due to the Project represents approximately 2.2 percent of the Morrison Lake catchment area, and is equivalent to an average flow reduction of 325 m<sup>3</sup>/hr.

#### ***Effects from Fresh Water Extraction from Morrison Lake***

The majority of the process water is recycled, however, fresh water is required for use in mixing reagents and for the pumps, and potable water. The Project includes a fresh water intake from Morrison Lake which will have the capacity to provide fresh water and, if required, provide process makeup water in the event of dry periods or lower than predicted groundwater inflows into the open pit. The fresh water intake is sized to provide the total fresh water requirement of 87 m<sup>3</sup>/hr, with standby capacity to provide twice that. However, the current water balance model predicts that only 47 m<sup>3</sup>/hr would be required for the first few years of the project, and then the majority of the fresh water would be drawn from the open pit dewatering system.

### ***Effects from Changes to Groundwater Flow in the Open Pit Area***

Potential effects from changes to groundwater flow was one of the main issues addressed during the EA and a major topic of concern from the Working Group, agencies and First Nations because the proposed pit is directly adjacent to Morrison Lake.

During the EA, there were two principal concerns expressed related to groundwater quantity and flow. The first concern was the extent of the hydraulic connectivity between Morrison Lake and the open pit. Concerns were raised that water from Morrison Lake would flow into the open pit, significantly lowering the level of the lake. The second was that, when the pit eventually filled up with water on closure, poor quality water from the pit would make its way into Morrison Lake through faults and other preferential groundwater flows, impacting water quality and fish in Morrison Lake.

There are several major faults in the proposed Project area, including two that bisect the proposed pit and travel into Morrison Lake and several located under the TSF. Concerns were raised that these faults could allow groundwater to move quickly and to carry contaminants.

The Proponent's models indicate that groundwater would flow into the open pit during operations and on closure. The inflow rates into the open pit are influenced by the hydraulic pressure of Morrison Lake and water coming from the steep hills behind the open pit. Essentially, the deeper the open pit becomes, the more water would flow into the pit. This is illustrated in Table 4 – pit inflows are considerably higher later in mine life.

During operations, the open pit would act as an extremely large well. As more water flows into the pit as it becomes deeper, the groundwater table around the pit would continue to lower. The groundwater flow direction would undergo a significant change from baseline conditions during operations. As the groundwater level decreases during open pit dewatering, the groundwater flow direction would be reversed on the western side of the pit, drawing water from Morrison Lake into the pit. On the eastern side of the open pit, the groundwater flow would continue to flow from east to west, but would be intercepted by the open pit instead of flowing into Morrison Lake as it would under baseline conditions.

The Proponent presented information on hydraulic connectivity between Morrison Lake and the pit, basing the assessment on nine drill holes to a maximum depth 151.2 m below the lake (the ultimate pit depth is approximately 250 m below the lake). To supplement limited site-specific hydrogeological data, the Proponent also used analogue data from the nearby Bell and Granisle Mines to estimate groundwater inflows. The Application predicts that groundwater inflows to the pit, at the end of operations when the pit is at its deepest, would be in the order of 368 m<sup>3</sup>/hr to 685 m<sup>3</sup>/hr

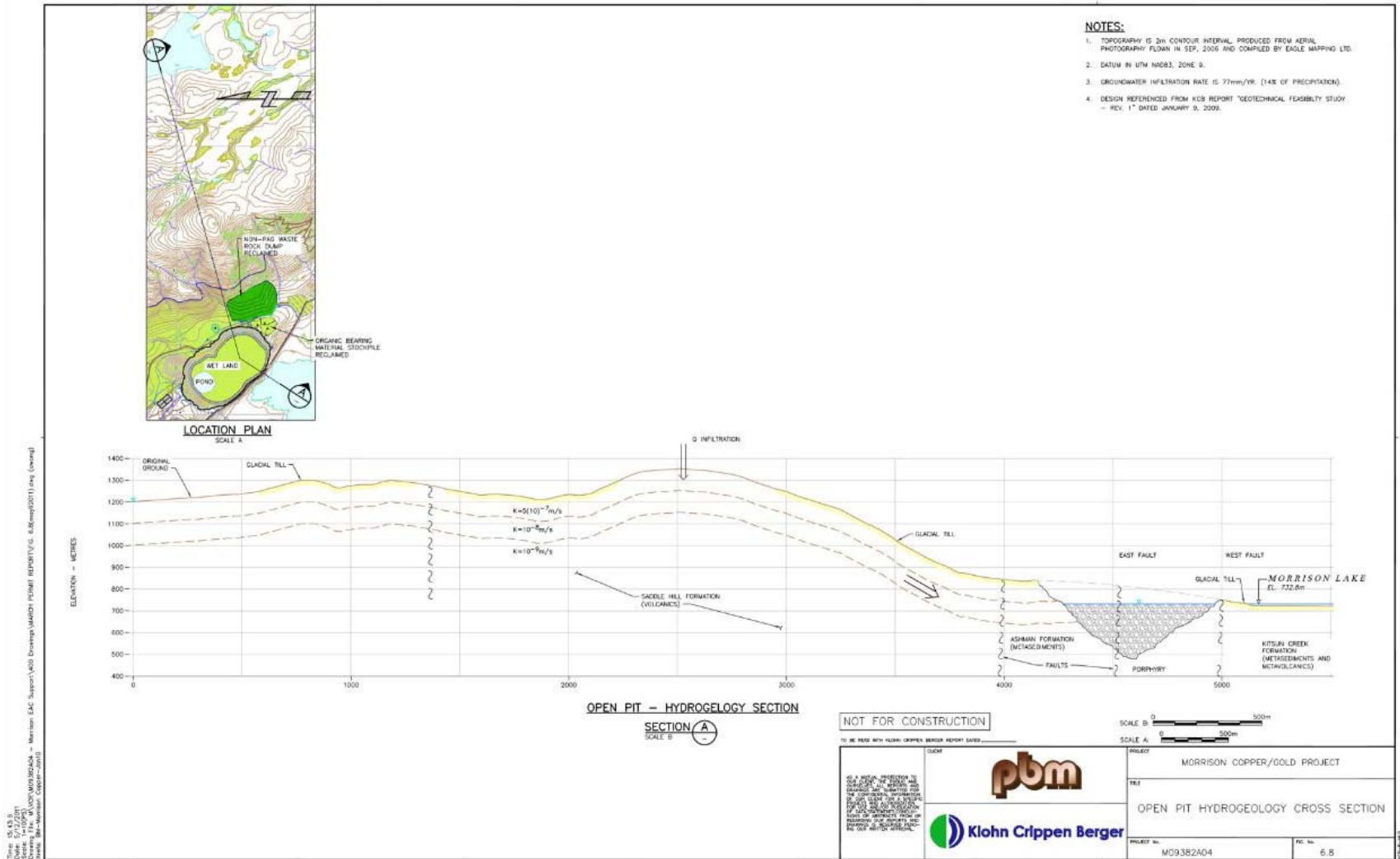
at Upper Bound<sup>6</sup>. Forty percent of that flow is estimated to come from Morrison Lake and 60 percent from the uphill catchment area.

On closure and once the waste rock has been placed back into the open pit and flooded with a combination of TSF pond water, tailings, and groundwater, the groundwater system in the open pit area would return to a similar pre-mining baseline condition.

Figure 8 below is a cross-section of the proposed Project showing groundwater flow directions and the location of the open pit in relation to Morrison Lake.

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<sup>6</sup> For sense of scale, at the Upper Bound, that is the equivalent of about seven Olympic-sized swimming pools per day.



### ***Effects from Changes to Groundwater Flow in the TSF Area***

The other dominant hydrogeology issue discussed during the EA was the change in groundwater flow resulting from seepage from the TSF into the groundwater which would enter Morrison Lake, and to a lesser extent, Nakinilerak Lake.

To assess groundwater quantity and flow for the Application, the Proponent drilled approximately 20 groundwater wells in the TSF area, along the area of the proposed main (south) and north dams, as well as excavated a number of shallow test pits.

Because the TSF is situated above all other components of the proposed Project site, the principal issue in the assessment for this component was the anticipated volume and quality of groundwater seepage from the TSF into the adjacent lakes and streams.

Initially, there were concerns expressed about TSF permanently increasing groundwater flow because it would store tailings and water at the highest elevation on the mine site. Groundwater levels surrounding the TSF would have been higher than the pre-mining conditions, which could have changed other aspects of groundwater flow around the site.

However, the Proponent commitment to line the TSF with a geomembrane liner significantly reduced predicted groundwater flows. Initial estimates for TSF seepage were predicted to be in the range of 65 m<sup>3</sup>/hr for the EC and 137 m<sup>3</sup>/hr for the UB. However, with a geomembrane liner the predicted groundwater flows are 1m<sup>3</sup>/hr for EC and 10m<sup>3</sup>/hr for UB.

The lined TSF is estimated to result in some small reductions in groundwater contributions to streams in the area around the TSF, in addition to reductions in the surface catchment. These changes are in the range of 5 to 10 percent of base flows and are shown below in Table 6 and represent a total of 7 m<sup>3</sup>/hr, which is a relatively minor effect on surface water flow.

**Table 6: Base flow reductions in receiving streams due to lined TSF**

<b>Stream</b>	<b>Groundwater Base Flow to Surface Water (m<sup>3</sup>/hr)</b>	<b>Expected Case (% Reduction)</b>	<b>Upper Bound (% Reduction)</b>
7	58	6.2	2.4
8	43	7.8	5.3
10	<3.6	4.9	5.3

## Summary of Surface and Groundwater Flow Effects

The net potential flow reduction to Morrison Lake would vary over the life of the proposed Project. It would also vary seasonally. The key variations include the following:

- During the spring to fall period flow reductions are mainly due to the reduced runoff as a result of the reductions in catchment areas.
- Flow reductions due to groundwater flow from Morrison Lake to the open pit would occur throughout the year and increase during the Project life as the open pit gets deeper.
- All surplus water balance water is treated and discharged into Morrison Lake.

A summary of the water balance flows for Morrison Lake for Year 18, which is the full extent of the open pit, is presented below in Table 7.

**Table 7: Summary of water quantity changes – Year 18**

Component	Expected Case (m <sup>3</sup> /hr)		Upper Bound (m <sup>3</sup> /hr)	
	Average Flow	Winter Flow	Average Flow	Winter Flow
Fresh water extraction	-15	-15	-3	-3
Catchment area reduction	-325		-325	
Groundwater Flow (Morrison Lake to pit)	-133	-133	-320	-320
Surplus water discharge to Morrison Lake	+223	+223	+721	+721
Change in groundwater recharge to Morrison Lake	-83	-83	-157	-157
Net change	-337	-8	-10	+241
Morrison Lake/Morrison River Flow*	16,500	2,000	16,500	2,000
% Reduction (increase)	2	0.4	0.06	(12)

\*Winter low flow is based on the 7 day Q2 (2 year low flow)



The net result suggests a minor effect on water quantity reduction both to Morrison Lake and Morrison River. The results, however, are sensitive to the actual pit dewatering requirements, with greater effects occurring if pit dewatering flows are less than predicted. The Proponent has indicated that a net effect of up to 150 m<sup>3</sup>/hr reduction in winter low flows could occur if pit dewatering flows are lower than predicted and the freshwater makeup from the lake of 87 m<sup>3</sup>/hr is utilized. The Proponent has committed to monitoring the flows in Morrison River and to maintaining the In-stream Flow Requirement for maintenance of low flows during the winter months if actual mine water balances result in further reductions in flows.

### **Summary of Issues and Mitigation**

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Project Description and Table of Conditions (Appendix 2) contain specific mitigation measures. Examples of some of the key issues and additional commitments include:

- Many concerns were expressed by reviewers over the adequacy of comprehensive baseline hydrogeology and water flow information. In particular, there were gaps noted in groundwater quantity, including groundwater levels, flow direction and velocity, hydraulic conductivity, presence of faults and zones of recharge and discharge. A common theme was the lack of information relating to groundwater flow under the TSF, and in areas between the TSF and Morrison Lake and Morrison Lake and the open pit.
  - EAO commissioned a third party review of the Proponent's hydrogeology baseline and modelling. The initial third party review indicated some concerns about modelling and UB predictions, in particular groundwater flow to the open pit during operations. The Proponent addressed these outstanding concerns in their *Third Party Review Response Report* and provided new predictions. The third party reviewer confirmed that the new Proponent models represented a reasonable UB and groundwater flow predictions from Morrison Lake to the open pit during operations were reasonable. The third party reviewer also indicated that the Proponent's commitment to, on closure, keep the final pit lake below the elevation of Morrison Lake would prevent water in the open pit from impacting Morrison Lake. EAO is satisfied with the recommendations of the third party review.
  - The Proponent committed to installing groundwater monitoring wells between the open pit and Morrison Lake to annually monitor water quality to ensure the predicted water quality of Morrison Lake is being met.
  - The Proponent committed to monitor water inflows to the open pit and report annually on the groundwater seepage to the open pit.

- The Proponent committed to lining 96 percent of the TSF with geomembrane with a maximum seepage of 10m<sup>3</sup>/hr. During the detail design and permitting phase, the Proponent may potentially reduce the aerial extent of the geomembrane liner or increase the seepage rate if they are able to demonstrate to the satisfaction of the permitting authority that the seepage rate can be achieved with a different method of seepage management and/or that an incremental increase in seepage does not result in an effect that would exceed agreed upon site specific water quality objectives in the receiving streams and spawning areas in Morrison Lake.
- Concerns were expressed about the lack of a detailed monitoring plan for information collection during the operations and post-closure period, including monitoring of water levels and groundwater flow regimes.
  - The Proponent committed to the following monitoring requirements:
    - Monitor sulphate concentrations in groundwater and surface water downstream of the TSF on a monthly basis;
    - Monitor water inflows to the open pit and prepare annual reports on groundwater seepage to the open pit; and,
    - Monitor Morrison Lake water quality annually in the area west of the open pit.
- Lack of confidence was expressed in the Proponent's water balance predictions. Concerns were noted that that water flows into the open pit and Morrison Lake would exceed UB predictions, resulting in too much water to discharge to the environment and additional treatment being required. Climate change was also noted as a factor which could result in more precipitation.
  - As noted above, EAO undertook a third party review of the Proponent's hydrogeology baseline and modelling which indicated the predictions were reasonable.
  - If surplus water accumulates for more than two years, the Proponent has committed to construct a water treatment plant and collect, treat and discharge any excess contact and non-contact water to Morrison Lake. The Proponent commitment to line the TSF with geomembrane significantly reduces uncertainty related to TSF seepage rates and water balance.
- Concerns were expressed regarding potential for adverse effects due to lower flows in Morrison River as the result of reduced water volume in Morrison Lake, particularly during fall and winter low flows.
  - The Proponent committed to measuring year round water flows and spawning habitat in Morrison River and develop an Instream Flow Requirement based on the Instream Flow Incremental Methodology.

#### 5.2.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures, EAO concludes that the proposed Project would result in residual adverse effects on water quantity. The proposed Project would change surface and groundwater movement and flow during the operations phase of the proposed Project and would permanently remove a number of small catchment areas and permanently reduce or alter others, affecting surface and groundwater flows.

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

Factor	EAO Analysis and Rationale
Context	<p>Surface and groundwater flows in the vicinity of the proposed mine footprint would be affected by mine infrastructure. Both the timing of flow changes and the volume of those changes are important due to the high value fisheries and aquatic resources in the Morrison Lake watershed. A number of potentially affected streams are used for spawning by salmon and trout, and changes to water levels have the potential to impact those populations. As well, shore spawning salmon are dependent on certain volumes of groundwater seeping into the lake for spawning success. Fish in Morrison River, which drains Morrison Lake into Babine Lake, are dependent upon certain minimal flow rates during critical volumes of the year, especially late summer and early fall and winter.</p> <p>Given that there are no licensed surface or groundwater users in the area, changes in water flow are primarily focused on the potential for effects to fish and aquatic resources, and in particular impacts to spawning areas.</p> <p>There are 18 fish-bearing creeks and streams which drain into Morrison Lake. The proposed Project would affect five of those streams and one stream which flows into Nakinilerak Lake. Of those streams, loss of catchment area due to mine infrastructure would slightly reduce flows in four streams (streams 4, 6, 8 and 10). One stream (stream 7) would have an average flow reduction of 50 percent for at least 25 years and one stream (stream 5) would have the majority of its flow permanently eliminated.</p> <p>The affected catchment areas represent approximately 2 percent of the</p>

	<p>overall Morrison Lake catchment area.</p> <p><i>Effects of this flow reduction on fish and aquatic resources are discussed in the section 5.4 and 5.5</i></p>
<b>Probability</b>	<p>Surface and groundwater flows to all streams within the proposed mine footprint would definitely change during the life of the proposed Project.</p> <p>Groundwater flows in the area of the open pit would definitely change during operations and prior to backfilling of the pit, after which they would return to normal.</p>
<b>Magnitude</b>	<p>Flow reductions in streams around the open pit, waste rock dump and TSF are relatively minor, with the exception of stream 7 and stream 5. Approximately 54 percent of the catchment area for stream 7 would be located under the TSF and, as a result, would have an average reduction in flow of 50 percent over a period of approximately 25 years, after which flows would return to normal. About 85 percent of the flow to stream 5 would be permanently eliminated.</p> <p>There is a high natural seasonal variability in precipitation in the area of the proposed Project. Since most streams are recharged by groundwater, any reduction in groundwater could mean that affected streams would be impacted more during extended dry periods or winter low flows. As a result, the magnitude of impacts on streams in and around the TSF could be low on normal years and moderate on dryer years or during winter low flows.</p> <p>In addition to the streams around the proposed Project, groundwater patterns around the open pit would change during operations. Groundwater would no longer flow downhill into Morrison Lake. Rather, water from areas around the open pit, including Morrison Lake, would be directed to the open pit, which would act as a large well.</p> <p>The net potential effect on Morrison Lake from these changes in water flow range up to 150 m<sup>3</sup>/hr. The average annual flow through Morrison Lake and into Morrison River is approximately 16,550 m<sup>3</sup>/hr. These flow reductions represent about one percent of the flow that moves through Morrison Lake, resulting in a maximum potential drawdown on Morrison Lake of several centimetres. This level of flow reduction would be within the natural variation in stream flow.</p> <p>Baseline flows would return to normal on closure.</p>

<b>Geographic Extent</b>	Surface and groundwater flow changes are limited to streams within the mine footprint, Morrison Lake and potentially Morrison River.
<b>Duration and Frequency</b>	<p>The groundwater flow regime would be altered for a period between 25 years to the far future, depending on the mine component.</p> <p>Water diversion around the open pit and TSF, and associated flow reductions, would last approximately 25 years, from construction through post-closure. The period could be longer if TSF surface water quality is not suitable for discharge, requiring longer maintenance of surface water diversion channels.</p> <p>The reduced surface water flow and increased groundwater flow from TSF seepage in Stream 8 and 10 would be permanent.</p> <p>The groundwater flow rates from Morrison Lake to the open pit would slowly increase in volume as the open pit increases in size and depth. Those flow rates peak when the open pit reaches its maximum size at year 18. Groundwater flows are expected to return to normal when the open pit is backfilled with waste rock and allowed to fill up with water.</p>
<b>Reversibility</b>	<p>Some small surface water bodies, such as Booker Lake, Ore Pond, wetlands under the TSF, and stream 5, would be permanently removed.</p> <p>Catchment areas for streams 4, 6, 8 and 10 would be slightly reduced permanently by mine infrastructure.</p> <p>Reductions in flow to stream 7 would return to baseline within 25 to 30 years once TSF pond water is suitable for discharge to the environment.</p> <p>Water withdrawals from Morrison Lake would cease at the end of mining.</p> <p>The groundwater regime in the pit area would be mostly restored within 5 years of closure.</p> <p>Baseline water flows in Morrison River would return to normal within 5 years of mine closure.</p> <p>The groundwater regime in the TSF area would be altered slightly over the long term due to geomembrane liner, which would modify infiltration</p>

	rates.
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The proposed Project's impacts to surface and groundwater quantity are not anticipated to act cumulatively with other current and proposed development activities in the local or regional study areas. Impacts are predicted to be local in nature and impacts outside the LSA would be negligible.

#### *5.2.5 Conclusion*

EAO has considered the high valued fisheries and aquatic resources in the Morrison Lake watershed, but recognizes that the affected catchment is only approximately 2 percent of the overall Morrison Lake catchment area. The change in water flow would be within the natural variation in stream flow, the effects would be limited to the LSA and most effects would be reversible after mine closure. These factors outweigh the certainty of effects, extended duration and permanence of effects to a limited number of streams.

Given the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on surface and groundwater flow with the successful implementation of mitigation measures and conditions.

## 5.3 Surface and Groundwater Quality

### 5.3.1 *Background Information*

The potential for adverse effects of the proposed Project on water quality dominated the EA during both Pre-Application and Application Review. Water quality was an important issue to almost all reviewers as it has strong links to potential impacts on aquatic organisms, wildlife, health, drinking water, fisheries, and First Nations interests.

For the purposes of this report, any indirect effects on other valued components resulting from changes to water quality - either surface water or groundwater - are addressed in their respective sections. This section of the report addresses only the potential effects of the proposed Project on surface and groundwater quality, and specifically on the critical end-points for measuring the effects assessment, which are the streams that flow into Nakinilerak and Morrison Lake, Morrison Lake and by extension, Babine Lake.

For water quality, the Application defined a LSA that consisted of the six small local-area watersheds (total of 38 km<sup>2</sup>) that could be affected by mining infrastructure. The Application contains a significant amount of baseline information for streams within those watersheds as well as baseline information for existing water quality in Morrison Lake.

Baseline work undertaken by the Proponent indicates that the natural surface water quality in the LSA is good and is below the BCWQGs for the protection of freshwater aquatic life. The exception to this is cadmium, which is close to, or slightly exceeds the BCWQG in some streams. The Application notes that baseline water quality for Morrison Lake is also good and is below the BCWQGs for all values, except iron.

However, information presented in the Application shows that various metals and sulphate concentrations in the baseline groundwater at the proposed Project site approach or exceed the maximum allowable concentrations listed in the BCWQGs for protection of aquatic life. The Application noted that these baseline exceedances should be taken into consideration when managing and displacing groundwater during mine development, operation and closure, especially near Morrison Lake.

A summary of the references for a full discussion on the Proponent's water quality work are summarized below:

Reference Document	Document Section
EA Certificate Application	
EA Certificate Addendum – Lake Effects Assessment	Sections: 3 & 5; Appendix I
Review Response Report Rev.2	Sections: 8, 10.2.2, 10.2.4 & 10.2.5
3 <sup>rd</sup> Party Review Response Report	Sections: 3 & 7; Appendix V
3 <sup>rd</sup> Party Review Response Report – Addendum 1	Sections: 2.3 & 5; Appendices I & II

### 5.3.2 *Water Quality and Metal Leaching/Acid Rock Drainage*

The potential for Metal Leaching/Acid Rock Drainage was central to water quality discussions during the review of the Application. ML/ARD are naturally-occurring processes caused when minerals containing metals and sulphur (called sulphides) come in contact with air and water. As sulphides oxidize, they can produce acid, which can be carried to streams and watercourses (this is called ARD). That acid can also leach metals from surrounding rocks causing drainage that has high amounts of dissolved metals (such as aluminum, cadmium, copper, zinc, etc). That is called metal leaching (ML). High levels of metals and/or acid can be harmful or toxic to living organisms and can be passed through the food chain. Fish are particularly sensitive to metals in water.

The environmental impacts of ML/ARD will depend on magnitude, the sensitivity of the receiving environment and the degree of neutralization, dilution and/or attenuation that the receiving environment can provide. Once ML/ARD has been initiated, it can persist for hundreds of years until the sulphides in the rock are completely oxidized and the acid and metals are leached from the rocks.

The proposed Project is located in an environment with substantial precipitation and water flow, at the edge of a high-value lake at the headwaters of the Skeena River system and has mineral deposits high in sulphides. In the absence of any mitigation measures, ML/ARD would potentially have major adverse effects on the receiving environment. Accordingly, the Proponent was required to outline an ML/ARD prediction and management plan in the Application, and include the determination of the geochemical characterization of tailings, cyclone sand used in dam construction, ore, low grade ore, waste rock, overburden, sediments, pit rock walls, and the mine water drainage.



### 5.3.3 Project Issues and Effects Identified in the Application

The majority of the project issues and effects related to water quality outlined in the Application focus on the potential for ML/ARD. The Application notes that about 90 percent of the 170 million tonnes of waste rock produced by the proposed Project are expected to become acidic and to leach metals over the long term. Waste rock and LGO are proposed to be stored on the land upslope of the open pit during operations. During the time this rock is stored on land, oxidation of PAG mining waste will occur and oxidation products (including acid and metals) will be released to the soil, groundwater and surface waters as well as stored in dumps.

In addition to the potential for these ML/ARD impacts, which will be discussed in more detail below, the Application predicted that, *without mitigation*, impacts to water quality could result from other activities throughout the mine life, including:

- Accelerated erosion and siltation resulting from ground disturbance during construction of the transmission line, access roads and mine facilities;
- Anoxic water (water with very low levels of oxygen) being drained from Booker Lake and Ore Pond into Morrison Lake at the time of construction;
- Airborne contaminant loading affecting streams and Morrison Lake during operations due to blasting and associated residues, in particular nitrogen, nitrate, nitrite and ammonia;
- Seepage of tailings porewater containing elevated cadmium into the groundwater during operations and post-closure, which would eventually report to the surface water that includes streams feeding Morrison Lake and, to a very minor extent, Nakinilerak Lake; and,
- Surface discharge of contaminated tailings water to the environment during operations and post-closure.

### Potential Sources of Water Quality Effects

The three main sources of potentially negative water quality effects are:

- TSF seepage;
- Water Treatment Plan effluent discharged to Morrison Lake; and,
- Open Pit lake groundwater flowing into Morrison Lake.

### ***Tailing Storage Facility***

The TSF is the most significant water management/storage structure in the mine design. The mine plan proposes that the TSF serve two functions. Its primary role is to store all the tailings that are produced from the mine. Its secondary purpose is to store water.

Given the significant water needs of a mine, some of the stored water would be recycled for use in the mill during operations (called “process water”). While some of the water in the TSF would be on the surface in the form of a “pond”, other water would fill the voids between the tailings. This water is tailings “porewater”.

Water quality within the TSF will change over the life of the mine. Much of the water that is transported to the TSF would be “contact water” meaning it could be affected by ML/ARD transported to the TSF from seepage collected from oxidizing waste rock, low grade ore and open pit walls.

A key component of the proposed Project’s management plan for water quality protection and to minimize metal leaching is to control the pH of solutions<sup>7</sup>. The pH of the tailings process water is proposed to be maintained at or above an alkaline pH=8, which is considered neutral pH.

The Proponent had initially designed the TSF to be built on a layer of low permeability glacial till (soil). With this design, some water would seep through the tailings and the glacial till and make its way into the groundwater. Seepage would have been relatively low in early years of operation but would have increased as more water and tailings are put into the TSF. The most recent design of the proposed Project involved the Proponent committing to lining 96 percent of the TSF with geomembrane, reducing seepage from the TSF to extremely low levels.

Tailings would be delivered to the TSF from the processing plant via two tailings pipelines. One pipeline would contain those tailings which are low in metals and sulphides and are not predicted to produce ML/ARD (called “rougher” tailings because they are made of rock that no longer contains metals and is therefore not processed further). These “rougher” tailings would be used for the construction of the tailings dam.

The other tailings stream which contains elevated metals (called “cleaner” tailings since all the gold, copper, silver and molybdenum have been removed through further processing) would be piped to the inner part of the TSF and submerged under water. Cleaner tailings are of most concern because they can become ML/ARD-producing more quickly if they are exposed to the atmosphere.

The initial design of the TSF had between 65 m<sup>3</sup>/hr (Expected Case) and 137 m<sup>3</sup>/hr (Upper Bound) of water from the TSF reporting to groundwater – this would have been the equivalent of about an Olympic-sized swimming pool every day. The seepage would have formed a plume that would slowly move downhill towards Morrison Lake, and to a

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<sup>7</sup> pH of water is very important in controlling ML/ARD. The lower the pH (the more acid the water) the more dissolved metals can be suspended in the water, making it potentially more harmful to the environment. Increasing the pH (making it less acidic) has the effect of making metals precipitate (or settle), making water less harmful.

much lesser extent, Nakinilerak Lake. A portion of this seepage would have reported to surface water in the creeks below the TSF, mainly creeks 7, 8 and 10. During low flow periods, such as the late fall and winter, the flows in the creeks below the TSF would have contained mostly seepage flows.

The Proponent commitment to lining the TSF with a geomembrane liner, however, virtually eliminates seepage from the TSF. The new Expected Case is about 1 m<sup>3</sup>/hr and the Upper Bound is 10 m<sup>3</sup>/hr.

The Application indicates that, on closure, most of the poor quality water in the TSF would be pumped into the open-pit to flood the backfilled waste rock. A small residual pond of approximately 10,000 m<sup>3</sup> (equivalent to four Olympic-sized swimming pools) would remain. The final TSF pond would progressively refill with runoff and precipitation to a final volume of approximately 4 million m<sup>3</sup> (equivalent to 1,600 Olympic-sized swimming pools). This strategy is intended to lead to better water quality in the post-closure phase and accelerate the period when TSF water would be suitable for direct discharge to the environment. The Application states that there would be no discharge of TSF pond water to the streams in the area during mine life.

The Application predicts that the TSF pond water quality at three years after mining has four parameters of potential concern. Aluminum, arsenic, cadmium and selenium would exceed the BCWQGs at the planned time of discharge. Water quality would continue to improve over time with vegetation cover and dilution with natural runoff water.

### ***Water Treatment Plant Effluent***

On closure, the Proponent plans to backfill the open pit with waste rock and flood it with water from the TSF. A portion of this waste rock is projected to become acidic over the life of the mine. Acid and metal precipitates would be present on the rock surfaces and would mix with water in the open pit. The Proponent proposes to apply a lime slurry to waste rock as it is backfilled, with the objective of maintaining the pH of the water around the backfilled rock at or above pH=8. This management strategy is intended to cause most toxic metals to settle and not be dissolved in water.

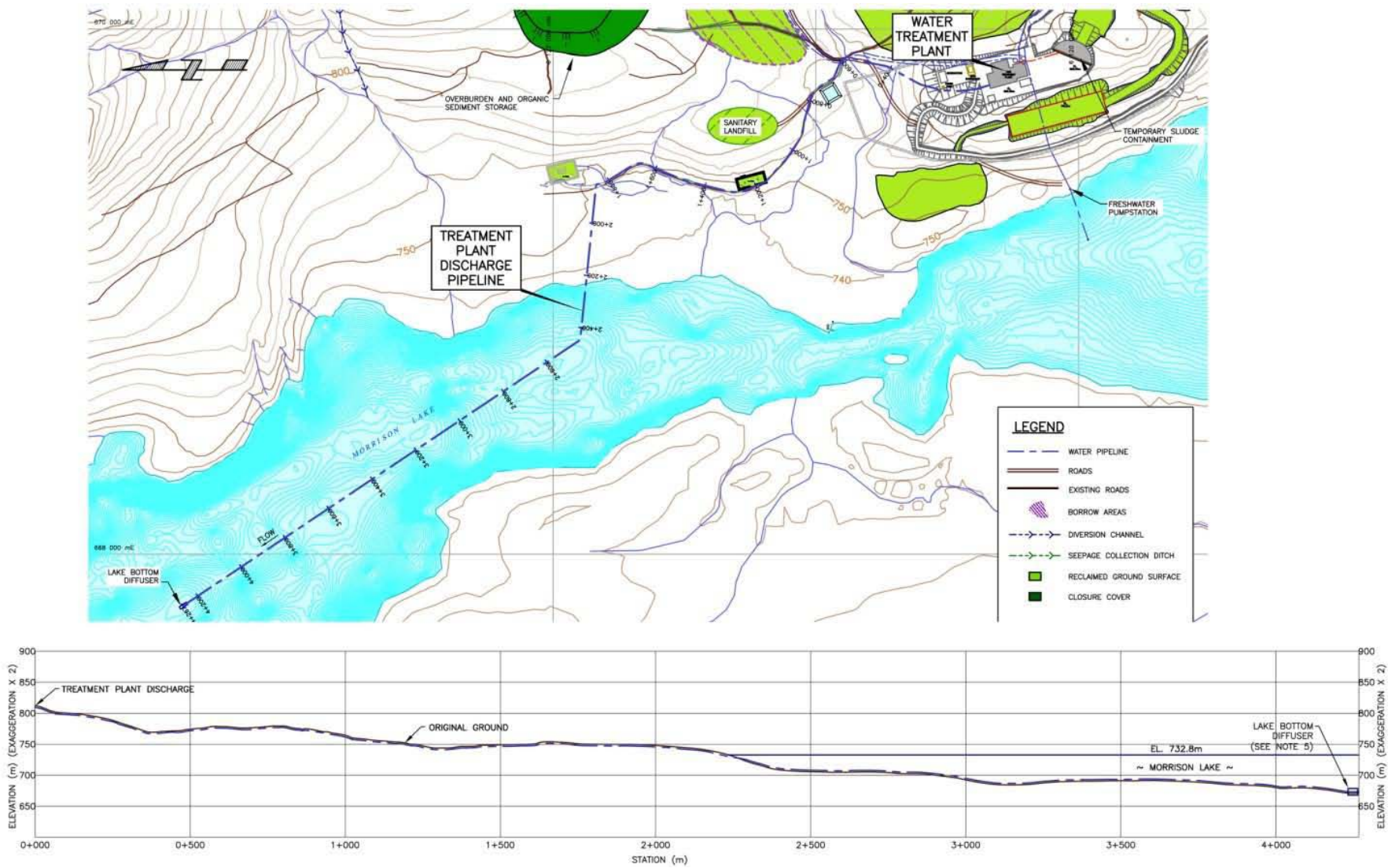
While the Proponent has committed to maintain the level of the backfilled rock and water below the level of Morrison Lake in order to ensure to prevent pit water from entering Morrison Lake, some groundwater would continue to flow into the pit. Precipitation in the form of rain and snow would also contribute to surplus water in the pit. The exposed pit walls, which would be as high as 100 m, are also predicted to contribute acidic drainage and metal loadings to the pit pond. As a result, all surplus contact water would need to be treated through a water treatment plant before being returned to Morrison Lake.

The proposed water treatment plant is planned to commence operations near the end of the mine life<sup>8</sup> and continue far into the future (in perpetuity). The water treatment plant would be large enough to treat 150 percent of all water that collects within the pit area for a maximum plant capacity of 210 m<sup>3</sup>/hr to deal with potential extreme weather events. Discharge of treated water would be pumped to a submerged diffuser in the deep north basin of Morrison Lake, as shown below in Figure 9.

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<sup>8</sup> The Proponent has committed to construction of a water treatment plant as soon as required, possibly as early as the first year of operations.

Figure 9: Location of lake diffuser



The Proponent has also committed to adding secondary water treatment procedures to the existing proposed High Density Sludge (HDS) water treatment plant. These additional processes would address aluminum, cadmium, copper, iron, magnesium and zinc.

Even with treatment, the effluent at the point of discharge, would exceed the BCWQG for most parameters (highlighted areas exceed BCWQG), as shown in Table 8 below.

**Table 8: End of pipe discharge parameters**

Parameter (dissolved mg/L)	Treatment Plant Effluent (Expected Case)	BCWQG	Variance over BCWQG (times factor), pre-dilution
Flow Rate – m <sup>3</sup> /hr	127		
Nitrate	90	13.3	6.8
Sulphate	2000	100	20.0
Aluminum	0.1	0.05	2
Cadmium	0.0001	0.000024*	4.2
Copper	0.007	0.0036*	1.9
Iron	0.01	0.15	0.07
Magnesium	50	n/a	n/a
Selenium	0.0019	0.002	1.0
Zinc	0.064	0.0075	8.5

As a result of the “end of pipe” water quality not meeting the BCWQG, the Application describes the Proponent’s approach to meeting the BCWQG. The Proponent is proposing that the effluent would be treated and discharged to Morrison Lake at its deepest point. Treated effluent would be dispersed using a diffuser, which would create an elongated elliptical plume of treated water dispersed from a point source of discharge, as illustrated by the dotted line in the centre of Figure 9. The Application predicts that there would be a dilution mixing zone, where effluent enters the lake basin and mixes with the natural water. To achieve a 100:1 dilution and bring the parameters to within guideline levels, the Application states that the effluent plume would extend 40 m vertical and have a maximum width of about 5 m.

The rate of water treatment and effluent discharge is expected to be steady and continuous into the far future (in perpetuity).

#### **Open Pit Groundwater Effects**

The Proponent anticipates it would take approximately five years to backfill the waste rock into the open pit. When this is completed and the pit is flooded with water from the TSF, the Proponent expects the water surrounding the backfilled rock to exceed water quality guidelines for nitrate, sulphate, aluminum, cadmium, copper, selenium and zinc.

In order to eliminate the possibility of the poor quality pit water making its way through groundwater to Morrison Lake, the Proponent would maintain the level of the pit lake below the level of Morrison Lake in perpetuity. As a result, there is predicted to be a very small flow rate of  $0.4 \text{ m}^3/\text{h}$  from the pit water to Morrison Lake (at that rate, it would take close to a year to fill an Olympic-sized swimming pool). This represents a very small fraction of the loadings to Morrison Lake in comparison to the contributions of loadings from the treatment effluent diffuser and the TSF seepage.

### **Summary of Water Quality Loading Sources**

The loadings from the three main sources discussed above would reach Morrison Lake and mix with lake water throughout the year.

Information presented in the Application shows that the effluent loads to Morrison Lake would peak in year 50 (25 years after mining), and would decrease gradually over the long-term. The Application explains that the modeling used a conservative approach to the effects assessment and assumed that all loads contribute to Morrison Lake at the maximum concentrations, at the same time.

The Application predicts that it may take up to 30 years after the end of mining for Morrison Lake to develop a new water quality baseline that reflects inputs from the effluent diffuser. The following table shows the volume from each source and how Morrison Lake would change as a result of mining activities and the sources of those changes.

**Table 9: Long term concentrations of key parameters in Morrison Lake – Upper Bound case (all parameters in mg/L)**

Parameter mg/l	Water treatment plant	PAG	TSF	Morrison Lake Baseline	Morrison Lake New Steady State	Edge of Effluent Plume	BCWQG	CCME
Flow Rate	172 m <sup>3</sup> /hr	0.4 m <sup>3</sup> /hr	10 m <sup>3</sup> /hr					
Nitrate	90	90	1	0.16	1.31	2.2	13.3	13
Sulphate	2000	4000	1700	2.3	29	49	100	
Aluminum	0.10	0.41	0.39	0.033	0.035	0.039	0.05	0.1
Cadmium	0.0001	0.0042	0.0016	0.000012	0.000015	0.000019	0.000024	
Copper <sup>9</sup>	0.007	0.032	0.06	0.011	0.0019	0.0020	0.0036	0.004
Iron	0.01	0.02	0.053	0.16	0.16	0.16	0.15	0.3
Magnesium	50	210	210	1.9	4.7	6.8		
Selenium	0.0019	0.0023	0.019	0.00014	0.00017	0.00018	0.002	0.001
Zinc	0.02	0.064	0.44	0.0016	0.0022	0.0023	0.0075	0.0075

Notes:

1. Shaded box for iron indicated that it is the only parameter that exceeds BCWQGs, however, it is noted that the baseline also exceeds BCWQG.
2. CCME refers to the Canadian Council of Ministers of the Environment

#### *5.3.4 Project Issues, Effects and Mitigation Identified during Application Review*

As previously noted, the Proponent significantly revised aspects of their proposed Project during the review of the Application due to water quality concerns expressed by members of the Working Group.

During the spring of 2011, the Proponent focused on changes to the ore and waste rock management strategies. These changes included the elimination of the fully water covered TSF to reduce the risk of a geotechnical instability, as well as proposing to backfill the open pit with waste rock to reduce water treatment requirements in the long term. In the spring of 2012, the Proponent focused on the TSF and water treatment plant, committing to a full geomembrane liner for the TSF and secondary water treatment as early as required.

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<sup>9</sup> The noted exceedance for copper is due to several baseline water quality samples which had elevated suspended solids and are not representative of lake water quality.



A more comprehensive list of issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Project Description and Table of Conditions (Appendix 2) commits to specific mitigation measures. Examples of some of the key additional issues and commitments include:

- Concerns about seepage from the TSF, specifically impacts from this seepage on: shoreline sockeye spawning; preferential paths of seepage resulting in "hot spots" of concentrated effluent upwelling in the lake; and, higher concentrations of seepage in fish-bearing streams below the TSF.
  - In response to those concerns, the Proponent committed to replacing the proposed glacial till liner with a geomembrane liner which would cover 96 percent of the TSF.
  - EAO engaged a third party lake behaviour specialist to review issues related to "hotspots" and areas of higher effluent concentration. The review indicated that, in the absence of a geomembrane-lined TSF, seepage from the TSF would likely create "hotspots" and areas of higher effluent concentration. However, the Proponent commitment to a geomembrane liner would effectively eliminate this concern.
  - The Proponent also committed to monitor sulphate concentrations in groundwater and surface water downstream of the TSF on a monthly basis. If seepage occurs in Morrison Lake or receiving streams which exceeds any site specific water quality objectives, the Proponent committed to implement measures to the satisfaction of Ministry of Environment, in order to bring the effect within the objectives.
- Concerns that effluent from the TSF and the effluent diffuser would not fully mix with the lake, would change long term lake behaviour (i.e. stop it from turning over twice a year), or would concentrate on the bottom of Morrison Lake, resulting in areas of poor water quality.
  - In response to those concerns, the Proponent committed to replacing the proposed glacial till liner with a geomembrane liner which would cover 96 percent of the TSF.
  - The Proponent committed to operate a water treatment plant that produces an "end of pipe" water quality of treated effluent with concentrations of parameters which meet the concentrations used for the effects assessment presented in Addendum 1 to the *Third Party Review Response Report*.
  - EAO engaged a third party lake behaviour specialist to review the Proponent's diffuser design, with a specific question on the efficacy of how it could affect lake mixing. These reviews indicated that the diffuser would likely operate as asserted by the Proponent, and would act to mix effluent in Morrison Lake. Further, the effluent diffuser would not be expected to change lake behaviour.

- There was concern about the Proponent having a water cover over the entire TSF to prevent ML/ARD. Reviewers noted that the tailings were not predicted to become acidic and therefore questioned the need for a water cover as an ML/ARD water quality management strategy, especially since there would be additional geotechnical stability risk with water against the tailings dam.
  - The Proponent changed the management plan of the TSF by separating and discharging the higher sulphide (cleaner) tailings and lower sulphide (rougher) tailings via two different pipelines. This would ensure that only rougher tailings would be used to produce cyclone sand for construction of the dams and for discharge over the final beach slopes. All cleaner tailings would be submerged under water. This enabled the elimination of the full water cover.
  - The closure plan was modified from a large water pond with perimeter wetlands to a combination of water pond with wetlands and forest cover for the remainder of the impoundment area.
- Concerns over anoxic water from Booker Lake and Ore Pond being discharged to Morrison Lake and additional concerns sediment might have higher concentrations of metals.
  - In response, the Proponent committed to the draining of Booker Lake and Ore Pond to Morrison Lake in the six months prior to winter so that soft lake bottom sediments could then freeze and be handled more easily with less sedimentation risk. Sediment and erosion prevention features included in the Proponents' environmental management plan are intended to limit the total suspended solids entering the aquatic environment.
  - The Proponent has also committed to the preparation of a sediment testing and disposal plan for Booker Lake and Ore Pond sediments. Any unsuitable material (containing residual contaminants that cannot be released to the environment) would be placed within the TSF.
- Concerns about the long-term environmental liability of leaving PAG rock exposed (i.e. not submerging it in the TSF before it goes acidic).
  - The Proponent committed to placing all PAG waste rock back into the open pit on closure and covering with water from the TSF. The pH of the new pit lake would be maintained at a pH of 7 or more using a combination of mixing lime with the pond water and/or discharging lime solutions into the waste rock haul trucks prior to placement of the rock. The pit would be capped with glacial till and a small pond will collect any water in contact with the pit walls. Water from this pond would be collected, treated in the water treatment plant and discharged to Morrison Lake.
  - The Proponent has committed to place all surplus PAG materials in the TSF on an annual basis and cover it with water if it will not fit into the open pit.

- Concerns about a surplus water balance during operations.
  - The Proponent has committed to constructing a water treatment plant if a surplus water balance develops during operations such that a discharge is required.
- Concerns about the perpetual discharge of treated effluent to Morrison Lake, resulting in a new “baseline” with elevated levels of some parameters.
  - The Proponent has committed to implementing additional measures if monitoring of Morrison Lake indicates that parameters of potential concern exceed BCWQGs.
- Concerns regarding gaps in knowledge of Morrison Lake and key streams baseline water quality data.
  - The Proponent committed to filling all required baseline gaps in Morrison Lake.
  - The Proponent committed to collecting additional information on the physical behaviour of the lake, including water quality monitoring and temperature and conductivity probes. The design of the diffuser and lake mixing model would be further developed prior to construction.
- Concerns about groundwater impacts due to the placement of the waste rock and LGO stockpiles.
  - The LGO must be placed on a low permeability glacial till base. Surface runoff and near surface seepage must be collected and recycled. All water which has been in contact with the LGO must be managed as contact water.
  - The LGO stockpile material would be processed on closure, or failing that, would be placed in the TSF under water.
  - Groundwater monitoring wells must be installed between the open pit and Morrison Lake.
- Uncertainty regarding the technical feasibility of developing site-specific water quality objectives that would ensure protection of aquatic ecosystems in the affected streams, in particular with a focus on a single organism (i.e. sockeye salmon) as opposed to a wider range of organisms (e.g. phytoplankton/algae).
  - The Proponent has committed to addressing detailed requirements for water quality protection with the regulatory agencies at the post-EA permitting stage.
- Potential changes to the phytoplankton/algae community in Morrison Lake due to increased nitrogen and sulphate loading, which could have an unknown effect on the lake.
  - The Proponent has committed to addressing detailed requirements for water quality protection with the regulatory agencies at the post-EA permitting stage.

- Concerns about water quality impacts on Nakinilerak Lake.
  - The Proponent commitment to a geomembrane liner for 96 percent of the TSF would effectively eliminate seepage into Stream 10.

### 5.3.5 *Residual Effects and Cumulative Effects*

After considering all relevant mitigation measures, EAO concludes that the proposed Project would result in residual adverse effects on water quality. Most notably, the proposed Project would permanently change the baseline water quality of Morrison Lake, increasing the level of nitrate and sulphate significantly over existing baseline. The proposed Project would change groundwater movement and flow during the operations phase and would permanently remove a number of small catchment areas and permanently reduce or alter others, affecting surface and groundwater flows.

The proposed Project's impacts to water quality are not anticipated to act cumulatively with other current and proposed development activities in the local or regional study areas due to the fact that impacts are predicted to be local in nature and impacts outside the LSA would be negligible.

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

<b>Factor</b>	<b>Rationale</b>
<b>Context</b>	<p>Morrison Lake forms a portion of the headwaters of the Skeena River system, the second largest salmon producing river in Canada. The watershed is relatively pristine (with the exception of some past logging) and provides habitat to a wide variety of fish species, including burbot, lake trout, rainbow trout and several species of pacific salmon.</p> <p>Morrison River, which drains Morrison Lake into Babine Lake, has excellent spawning and rearing habitat for sockeye and coho salmon. Sockeye salmon also spawn along the Morrison Lake shoreline. Morrison Lake is a rearing area for juvenile salmon, some of which spend their first year in the lake. Some sockeye salmon continue through Morrison Lake to the Tahlo Lake/Creek area and spawn in those areas. Some of the sockeye that spawn in Tahlo Lake/Creek also rear in Morrison Lake.</p> <p>The Morrison Tahlo Lake/Creek watershed contributes about 2.5 to 3.5 percent of the overall sockeye to the Skeena River system. The Morrison Lake/Tahlo sockeye stock is considered a conservation</p>

	<p>unit under Canada's Wild Salmon Policy, meaning the sockeye are genetically distinct and require careful management.</p> <p>Morrison Lake also supports a valued sport fishery for lake trout, a long-lived species which, because it spends much of its time at the bottom of lakes, is especially susceptible to changes in water quality in Morrison Lake.</p> <p>Fisheries stocks from Morrison Lake are part of a food source for First Nations in the Skeena River watershed. Sockeye salmon are a key aspect of the culture and a food source for Lake Babine Nation. These salmon are also a valuable aspect of the culture and a food source for Gitxsan and Gitanyow, who intercept sockeye bound for Babine Lake/Morrison Lake further downstream in their territories along the Skeena River.</p> <p>Very little is known about the physical behaviour and ecosystem of Morrison Lake.</p> <p>The Proponent proposes to use much of the assimilative capacity of Morrison Lake to provide dilution for effluent discharges from the TSF and the open pit on closure.</p>
<b>Probability</b>	<p>Probability of water quality changes is high because it is certain that effluent from the mine would enter water bodies via surface and subsurface drainage. Probability of biologically significant effects on aquatic life due to changes to water quality is low due to long term water quality meeting the BCWQG.</p> <p>If the water quality predictions are accurate, the probability of a widespread biologically significant effect in the water column or substrate of the lake is anticipated to be low due to effluent mixing in Morrison Lake. There is a moderate to high likelihood of localized biological impacts in the area around the effluent diffuser where end-of-pipe, pre-mixing effluent does not meet BCWQGs.</p>
<b>Magnitude</b>	<p>Water chemistry/quality in streams 7, 8 and 10 would be slightly degraded from baseline, but the predicted concentrations would meet BCWQGs, with the exception of slightly elevated baseline concentrations of nitrite, aluminum, and cadmium, which are naturally elevated in the baseline.</p> <p>Water chemistry/quality in Morrison Lake and River would be</p>

	<p>degraded over baseline, particularly for nitrate and sulphate and would reach a new general steady state. This new steady state is predicted to differ from the baseline conditions, although the parameters of concerns are still predicted to meet BCWQG for the protection of aquatic life.</p> <p>After closure, the quality of the water in the TSF and open pit porewater is predicted to gradually improve.</p>
<b>Geographic Extent</b>	Changes to the water quality parameters would encompass streams within and adjacent to the mine footprint, Morrison Lake and River, but are unlikely to extend to Babine Lake due to significant dilution further downstream.
<b>Duration and Frequency</b>	Effluent discharge from the proposed water treatment plant could start as soon as early operations, although it is predicted to only be required on closure. As soon as the water treatment plan begins operations, effluent discharge would be continuous and permanent.
<b>Reversibility</b>	Water quality effects in Morrison Lake would be permanent as it reaches a new steady state. Water treatment is expected for a minimum of 100 years, and likely much longer (in perpetuity).

### 5.3.6 Conclusion

EAO has considered the contribution of Morrison Lake to the high valued Skeena River sockeye salmon fishery. As such, EAO attaches greater weight to the fact that water quality is predicted to meet BCWQG for the protection of aquatic life, water quality effects are restricted to the LSA, and the low probability of biologically significant effects on aquatic life from water quality effects than it does to the duration and permanence of effects.

Considering the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on surface and groundwater water quality with the successful implementation of mitigation measures and conditions.

## 5.4 Aquatic Resources

### 5.4.1 *Background Information*

For the purposes of the assessment, the term “aquatic resources” refers to communities of primary and secondary producers in freshwater environments.

Aquatic resources form the biological foundation of aquatic ecosystems. They process available water-borne nutrients and provide biomass that supports organisms at higher aquatic and non-aquatic trophic levels, such as fish, birds and people. Groups of organisms included in the assessment were:

- stream periphyton;
- stream benthic invertebrates;
- lake and pond phytoplankton;
- land and pond benthic invertebrates; and,
- lake zooplankton.

Aquatic resources were considered a valued component in the Application because of their importance as a fundamental component of aquatic ecosystems. The spatial boundaries for the effects assessment were the transmission line, mine site, TSF, Morrison Lake and Morrison Creek. The total study area was 16,196 ha. Field studies at various streams, lakes and ponds in the proposed Project area were used to characterize community composition and productivity. Thirteen streams near the proposed Project site were surveyed for aquatic resources between 2006 and 2008. These stream sites are associated with the following proposed Project components:

- access road sites;
- proposed pit/stock pile sites;
- sites draining the tailings facility;
- reference sites;
- Morrison Creek, which is the outlet of Morrison Lake; and,
- two sites along the proposed transmission line were sampled.

### 5.4.2 *Project Issues and Effects Identified in the Application*

Potential effects to aquatic resources identified in the Application include surface runoff and siltation, airborne contaminant loading, leaching of nitrogen residues from blasting, ML/ARD from waste rock piles, the discharge/seepage of potential contaminants into

waterbodies and habitat loss. The Application's assessment of these effects is summarized below.

### **Surface Runoff and Siltation**

Disturbance and erosion of soil during proposed Project construction and operation could release sediment and contaminants into waterbodies. Increased amounts of suspended solids in waterbodies would decrease water clarity and therefore light penetration, leading to reduced primary productivity. Metals associated with the sediment entering waterbodies could increase metal concentrations and result in toxic effects to aquatic resources. Based on the amount of activities carried at the various phases of the proposed Project, the Application says that impacts could occur, in the absence of mitigation, from the mine site during construction and operations, at the mine site during and following closure and along the access road and transmission line during all project phases.

### **Airborne Contaminant Loading**

Airborne contaminants generated from various proposed Project activities have a potential to enter surface water and adversely affect water quality and ultimately aquatic resources. Proposed Project activities that would generate contaminants that could affect aquatic resources include: blasting and crushing rock, soil disturbance, vehicle and generator emissions and dust generated by road traffic. Based on the air quality effects assessment, the Application states that, after mitigation, there is minimal potential for negative effects.

### **Contaminant Loading from Blasting**

Nitrogen residues from explosives used to develop the pit could increase nitrogen loading in streams via dust deposition and surface runoff from waste rock material. Nitrogen loading increases the potential for eutrophication in aquatic systems which can degrade the quality of the water, alter aquatic resource community structure and adversely affect ecosystem productivity and trophic structure. The Application characterizes the extent of nitrogen residue effects, in the absence of mitigation, as negligible. This characterization is based on plans to collect run-off from waste rock in the pit and the assumption that contamination of streams by air-borne nitrogen residues would be minor.

### **Metal Leaching and Acid Rock Drainage**

The Application estimates that a considerable proportion of the waste rock is potentially acid rock drainage generating. As a result, in the absence of mitigation, drainage from waste rock piles during operations could degrade surface water quality by raising acidity and metal concentrations which could cause mortality or sublethal toxic effects to



aquatic resources. As weathering of disturbed rock continues through during operations, the potential for ML and ARD would increase.

The Application reports that draining from waste rock piles would be collected and used as process water. At mine closure, PAG rock would be placed into the open pit and submerged, thereby eliminating the potential for drainage to affect aquatic resources. The Application characterizes the extent of ML and ARD effects to aquatic resources as major, in the absence of mitigation, while effects from the transmission line and access road are characterized as negligible due to the minor amount of rock exposure that would occur as a result of transmission line and access road.

*See sections 5.1-5.3 for full discussions about the potential for impacts from ML/ARD as well as potential mitigations and effects analysis.*

### **Discharge and Spill Contaminant Loading**

The Application states that sources of discharge and spill contaminants could include seepage from the TSF; drainage of Ore Pond and Booker Lake; seepage of treated sewage; and, spillage of fuel, ore or chemicals and habitat loss. Effects from the TSF and draining of Booker Lake and Ore Pond are discussed more fully in section 5.3.

#### ***Sewage and Spills***

During construction and operation phases, sewage would be generated from approximately 200 to 400 personnel. This is proposed to be collected and treated onsite. During construction the Application indicates the Proponent would discharge treated sewage onsite to a location at least 100 m away from any water body. During operations, sewage would be discharged into the TSF. Any seepage or accidental spills of sewage could cause adverse effects to aquatic resources and in particular, nutrients in sewage could cause eutrophication of aquatic ecosystems.

Accidental spills (e.g. fuel, ore or other chemicals) may occur during the construction and operations phases at the mine site with the potential to be released into waterbodies. The Application assumes this is a negligible effect.

#### ***Habitat Loss***

A considerable amount of habitat for aquatic resources would be lost as a result of the proposed Project due to drainage of Booker Lake and Ore Pond, removal of wetlands at the waste rock dump and TSF, removal of stream channels and drawing water from Morrison Lake. The Application reports loss of habitat for aquatic resources, in the absence of mitigation, would be a major adverse effect.

The Application notes that most mitigation measures directed at protecting water quality/quantity would mitigate any adverse effects to aquatic resources. Mitigation measures relating to water quantity are included in section 5.2 of this report and water

quality are included in section 5.3 of this report. Section 5.5 discusses impacts to fish and potential mitigation measures.

#### 5.4.3 *Project Issues, Effects and Mitigation Identified during Application Review*

Potential effects to water quality and aquatic resources were of primary concern during the review of the Application. Numerous issues were raised by the Working Group, the public and First Nations in relation to the water quality effects assessment, which is closely linked with the effects assessment for aquatic resources because adverse water quality effects are highly correlated to adverse effects on aquatic resources. Section 5.3 of this report provides an overview of key issues identified in relation to water quality. Mitigations to address water quality are also assumed to mitigate potential effects to aquatic resources.

A more comprehensive list of issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Project Description and Table of Conditions (Appendix 2) commits to specific mitigation measures. Examples of some of the issues and additional commitments include:

- Issues were raised regarding how potential effects of seepage from the TSF could negatively affect aquatic organisms. As part of this comment, direction was also provided to the Proponent for future sampling methods of aquatic resources.
  - The Proponent responded that the species for which the current maximum provincial guideline for sulphate for the protection of aquatic life is set is the aquatic moss (*Fontinalis antipyretica*) as aquatic mosses appear to be the most sensitive freshwater organisms to sulphate. They note however, that *Fontinalis antipyretica* does not occur within the proposed Project area as the elevations are too high and the species require lower pH than what is currently observed in streams.
  - The Proponent committed to collecting additional information on the physical behaviour of the lake prior to applying for *Mines Act* or *Environmental Management Act* permits. This additional information would include water quality monitoring and temperature and conductivity probes. A component of this additional baseline study will be a commitment to improving baseline information on aquatic resources, such as fish counts and spawning habitat. This program would be developed in conjunction with Lake Babine Nation and Skeena Fisheries Commission.

#### 5.4.4 *Residual Effects and Cumulative Effects*

After considering all relevant mitigation measures, EAO concludes that the proposed Project would result in residual adverse effects on aquatic resources. Most notably, the proposed Project would result in direct habitat loss from the removal of a small lake, a pond, wetlands and partial flow reduction in streams currently providing habitat for

aquatic resources. Water quality baseline would also permanently change in Morrison Lake.

The proposed Project's impacts to aquatic resources are not anticipated to act cumulatively with other current and proposed development activities in the local or regional study areas due to the fact that impacts are predicted to be local in nature and impacts outside the LSA would be negligible.

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

Factor	Rationale
<b>Context</b>	<p>Morrison Lake is part of the headwaters of the Skeena River, a major salmon bearing river. Aquatic resources are linked closely to the overall health of aquatic ecosystems and in some cases may be more sensitive to changes in water chemistry than fish. Morrison Lake is spawning and rearing ground for potentially genetically unique wild salmon stocks, which are part of a food source for First Nations in the Skeena River watershed, particularly Lake Babine Nation.</p> <p>Morrison Lake provides habitat for the Morrison/Tahlo Sockeye Salmon Conservation Unit under the Wild Salmon Policy. This conservation unit is the greatest contributor to BC North Coast commercial, recreational and Aboriginal fisheries.</p> <p>A number of the small ponds and streams which will be affected by the proposed Project contribute periphyton and benthic invertebrates to streams draining from them.</p>
<b>Probability</b>	<p>Adverse residual effects on aquatic resources related to habitat loss would certainly occur in those aquatic habitats which are permanently removed, including Booker Lake, Ore Pond and the wetlands under the TSF.</p> <p>Other effects to some aquatic resources are likely to occur in those streams which would have their catchment areas reduced by construction of the TSF. The probability of effects on aquatic resources residing within Morrison Lake is low, since potential water quality effects are predicted to meet BCWQG.</p> <p>The probability of widespread biologically significant effects on aquatic life due to the degradation of water quality is low, assuming water quality predictions are accurate.</p>

	A moderate probability exists of altering the phytoplankton communities as a result of increased nitrate levels 6 to 8 times the baseline, which may have unforeseen effects on the lake ecosystem.
<b>Magnitude</b>	<p>A substantial amount of aquatic habitat within the LSA would be permanently lost during project development. While the Application indicates some of this will be offset by new wetlands in the TSF and open pit location approximately 30 years after the start of construction, those wetlands may take a significant amount of time to provide equivalent habitat, if ever.</p> <p>Fish habitat compensation will provide habitat for aquatic resources, though the habitat and thus the aquatic communities may be different than present naturally.</p> <p>Effects on aquatic resources within Morrison Lake are predicted to be low, as potential long term water quality is predicted to be within BCWQG.</p>
<b>Geographic Extent</b>	Effects would be local to the proposed Project site, Morrison Lake and possibly Morrison River.
<b>Duration and Frequency</b>	<p>Habitat loss for those areas that are not replaced in the TSF are permanent. The effects on aquatic resources resulting from discharge of treated effluent may last more than 100 years (in perpetuity). Siltation impacts from the mine components on aquatic resources could last from construction through closure.</p> <p>Frequency of siltation and contaminant loading effects would occur in pulses, partly dependent upon the time of year and surface water dilution. All other effects would be continuous.</p>
<b>Reversibility</b>	<p>Most habitat losses are permanent, although habitat reconstruction at mine closure would offset some direct aquatic habitat losses.</p> <p>Other effects, as noted above, would likely continue in the far future (greater than 100 years, likely in perpetuity), due to long-term water treatment requirements.</p>

#### 5.4.5 Conclusion

Recognizing the regional significance of Morrison Lake to the Skeena River fishery, the probability and magnitude of effects on aquatic resources were heavily weighted in the

above analysis. Therefore, the low probability of effects on aquatic resources within Morrison Lake and of widespread biologically effects on aquatic life, the low magnitude of effects on aquatic resources within Morrison Lake, and the local extent of effects, together outweigh the long term to permanent effects.

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

## 5.5 Fish and Fish Habitat

### 5.5.1 *Background Information*

The proposed Project site is located on the east side of Morrison Lake near the south end of the lake. There are several streams and ponds, a small lake and a wetland complex within the proposed Project footprint. Morrison Lake and some of its tributary streams support communities of at least 16 species of resident and anadromous fish, including three species of Pacific salmon which migrate to Morrison Lake via the Skeena and Babine rivers.

The Proponent's Application notes that sockeye salmon from Morrison Lake and Morrison River are a relatively small proportion of the Babine and overall Skeena salmon fishery. The Proponent reports that escapements<sup>10</sup> from Morrison Lake averaged 13,000 from 1950 to 1970 and 13,500 from 1993 to 2002 with the number of coho and pink salmon being much smaller. They reference numbers at the Babine fish counting fence (at the outflow of Babine Lake) for the same period showed an average count of 1,320,000 sockeye, resulting in Morrison representing approximately one percent of the Skeena River sockeye. The Application notes that Morrison Lake is part of the Babine sockeye salmon conservation unit under Fisheries and Oceans Canada's Wild Salmon Policy, with two genetically distinct sockeye stocks.

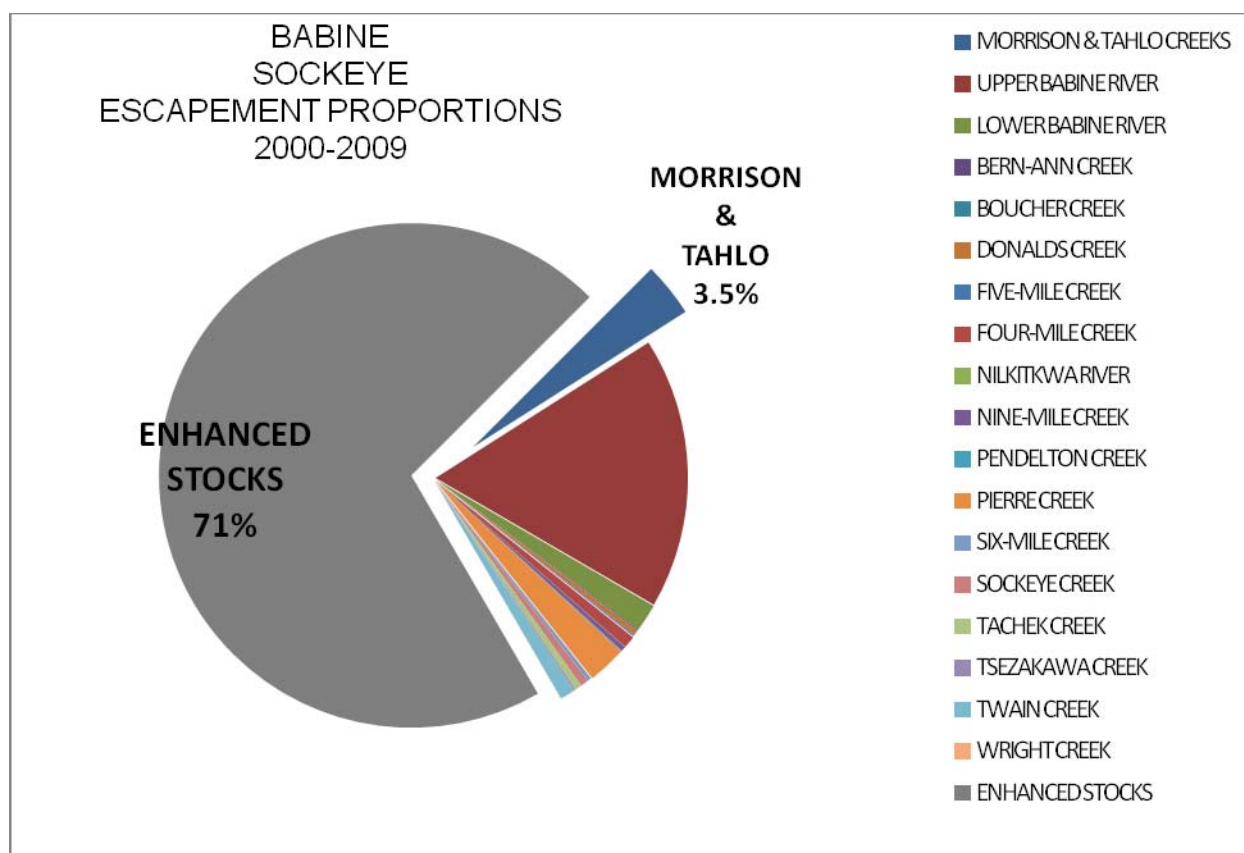
During the Application Review, a significant amount of information was also presented to EAO regarding the importance of the Morrison sockeye population, and its relationship to the Skeena River. This information came primarily from the Skeena Fisheries Commission, which provided new analysis to supplement the Proponent's analysis. This information and analysis was confirmed by the federal Department of Fisheries and Oceans and is presented in the discussion below.

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<sup>10</sup> Escapement: the portion of an anadromous fish population that escapes the commercial and recreational fisheries and reaches the freshwater spawning grounds.

The literature shows that three distinct yet unique sockeye runs return to Babine Lake every year: early, mid and late. Babine Lake sockeye were significantly enhanced in the late 1960s, which saw spawning channels and flow controls established on several mid-season runs at two hatchery facilities – Pinkut Creek and Fulton River. As a result, almost 90 percent of all Skeena Sockeye now come from areas around Babine Lake, and of those, about 75 percent come from Pinkut Creek and Fulton River hatchery facilities. These relative numbers are illustrated in Figure 10.

**Figure 10: 2000-2009 Morrison contributions to Babine Lake sockeye**

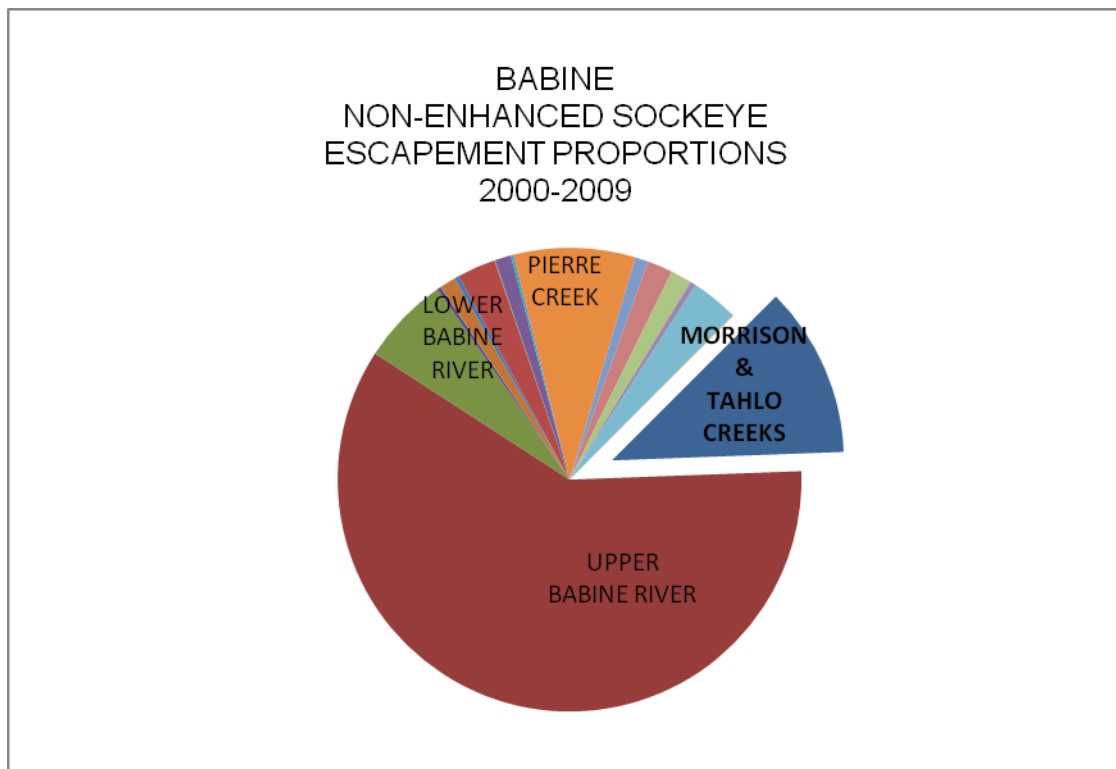


The information and analysis shows that, while Morrison Lake may make a relatively small contribution to the overall numbers of sockeye salmon (in the range of 2.5 to 3.5 percent depending on the years counted) produced from Babine Lake (and therefore Skeena River), this does not necessarily highlight Morrison Lake's value as the second largest unenhanced stock on the Babine Lake system.<sup>11</sup> These small natural

<sup>11</sup> Skeena Fisheries Commission (SFC), in a submission to EAO entitled "*The Sockeye Salmon of Morrison and Tahlo Lakes British Columbia and Their Importance to the Salmon Fisheries of the Skeena Watershed*" Gottesfeld and Lattremouille 2011" presented similar data to that provided by DFO. The SFC

(unenhanced) stocks have a very high conservation value due to their genetic diversity and uniqueness. The literature also indicates that sockeye salmon comprise about 72 percent of the open water fish in Morrison Lake. Morrison's contribution to the unenhanced sockeye population is shown below in Figure 11.

**Figure 11: 2000-2009 Morrison contributions to unenhanced Babine Lake sockeye populations**



Morrison/Tahlo sockeye salmon typically spend about a month in Babine Lake before ascending Morrison Creek in August and September. Morrison/Tahlo sockeye stocks can be further broken down into distinct sub-groups, including:

- sockeye that spawn in Morrison River and rear in Morrison Arm of Babine Lake;
- sockeye that spawn in Morrison Lake and rear in Morrison Lake or Morrison Arm;
- sockeye that spawn in Tahlo Creek and rear in Morrison Lake; and,
- sockeye that spawn in Upper Tahlo Creek and rear in Tahlo Lake or Morrison Lake.

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paper went on to provide data and analysis that suggested that, depending on the counting method, the Morrison/Tahlo contribution to the Gitxsan and Gitanyow food fishery on Skeena River could range from 3.2 to 8.8 percent. This submission is discussed in more detail in Section C.

A 2012 report from the Department of Fisheries and Oceans also notes that the escapement numbers for all early, middle and late unenhanced runs have been declining since the mid 1990s. The report notes that the number of wild sockeye has declined since enhancement began in the 1960s, but does not provide a reason why this has occurred.<sup>12</sup>

In addition to its sockeye population, Morrison Lake also supports a valued sport fishery for lake trout; a long lived, slow growing, late maturing species that avoids warm surface waters in the summer, residing mostly in cooler deeper waters. These characteristics make lake trout one of more sensitive resident fish species to water quality impacts to Morrison Lake from the proposed Project, in particular areas close to the bottom of the lake.

The Proponent collected baseline fish habitat and community composition conditions to assess potential effects of the proposed Project on fish and fish habitat. The Application says these conditions were assessed by reviewing historical studies, conducting field surveys and conducting fish tissue analysis for metals. Field surveys were carried out within areas the Proponent considered could be affected by the proposed Project, consisting of the proposed mine footprint, transmission line corridor and Morrison Lake.

The LSA for fish and fish habitat was the proposed Project footprint (mine site and transmission line), and the RSA was the Morrison watershed.

The Proponent reports approximately 28 streams within the proposed mine footprint, which includes the pit, tailings impoundment area, waste rock dump, stockpile/borrow areas and proposed Project pipelines. Electrofishing surveys completed by the Proponent indicate that five of these streams (streams 4, 5, 6, 7 and 8 on the map below) are fish bearing, with observed species consisting of sockeye salmon, coho salmon, rainbow trout and prickly sculpin. The Application reports that three of these streams (streams 5, 6 and 7) provide spawning and rearing habitat for coho salmon and rainbow trout.

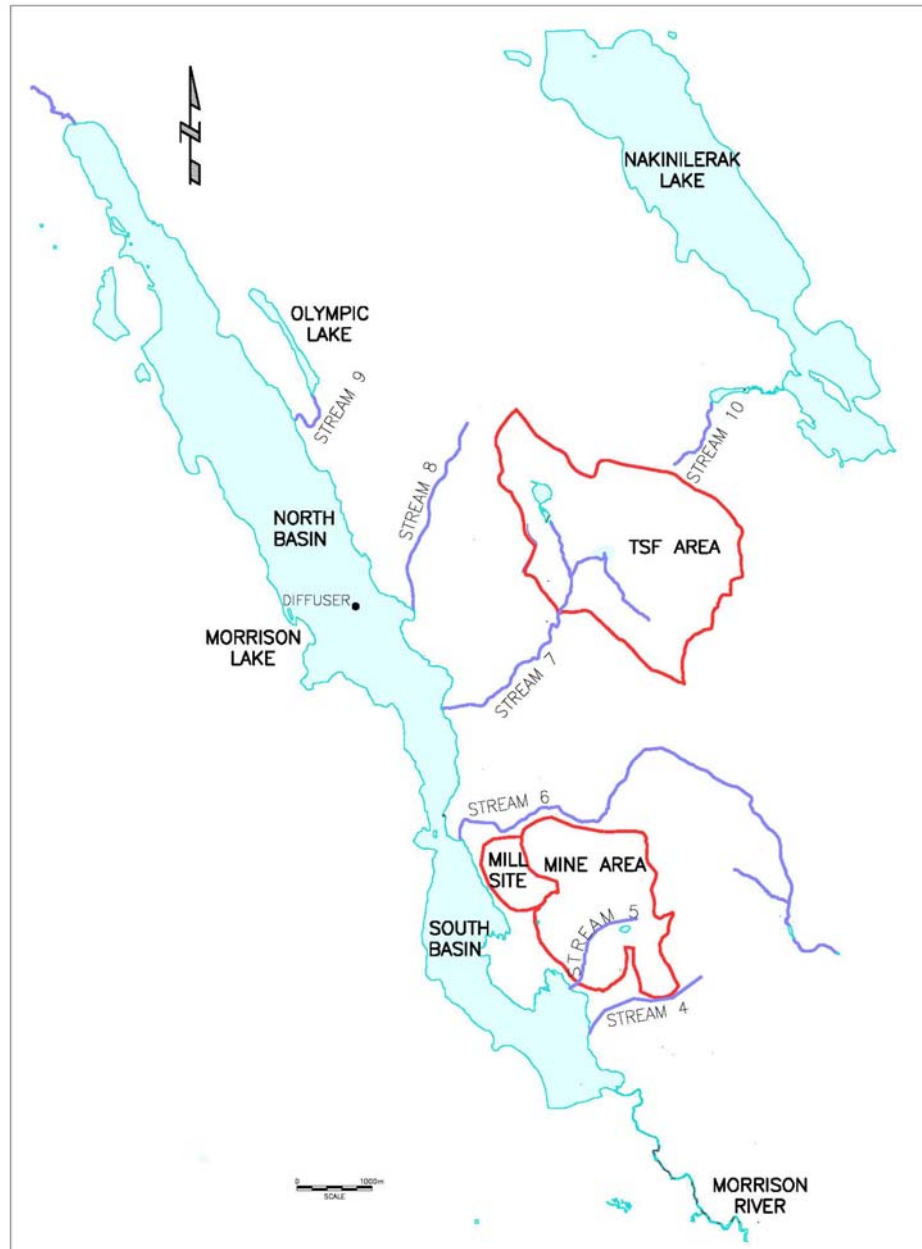
There are seven ponds and one small lake within the proposed Project footprint. Field studies carried out for the Application indicated these water bodies are not fish bearing due to the presence of barriers to fish passage.

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<sup>12</sup> *Update Assessment of Sockeye Salmon Production from Babine Lake, British Columbia*. Canadian Technical Report of Fisheries and Aquatic Sciences 2956. S.cox-Rogers and B. Spilsted. 2012.



**Figure 12: Streams within the proposed Project footprint**



The Application says that Morrison Lake itself offers a combination of deep and shallow water habitat and shoreline habitat. Fish species in Morrison Lake include:

- rainbow trout;
- cutthroat trout;
- kokanee;
- sockeye salmon;
- coho salmon;
- chinook salmon;

- lake trout;
- lake whitefish;
- mountain whitefish;
- longnose sucker;
- largescale sucker;
- northern pikeminnow;
- burbot;
- redbside shiner;
- prickly sculpin; and,
- peamouth chub.

The Application reports that shoreline habitat at surveyed sites provides productive habitat for small fish species. In addition, coho and sockeye salmon, kokanee and lake trout are known to use shoreline habitat in Morrison Lake for spawning and these spawning areas may coincide with areas of groundwater inflow along the shoreline. Field studies identified a shoreline spawning site used by coho and sockeye salmon near the outflow of stream 6, adjacent to the proposed Project site. Additional field work undertaken by Lake Babine Nation in 2011 indicated the possible presence of sockeye spawning areas and potential spawning areas in streams 5 and 7<sup>13</sup>.

Morrison River, which flows from Morrison Lake into Babine Lake, is reported in the Application to be an important spawning stream for rainbow trout and provides critical spawning habitat for sockeye and coho salmon. Morrison River is also known to provide rearing habitat for many species of small-bodied fish.

The proposed transmission line route from the Bell Mine site to the proposed mine site would cross 27 streams. Six of these streams are classified as fish bearing in the vicinity of proposed stream crossings.

#### *5.5.2 Project Issues and Effects Identified in the Application*

Fish habitat and the following fish species were considered Valued Components (VCs) in the Application: Pacific salmon species (coho, sockeye and chinook), lake trout, dolly varden, rainbow trout, cutthroat trout, kokanee, lake whitefish, mountain whitefish, longnose sucker, largescale sucker, northern pikeminnow, redbside shiner, prickly sculpin, burbot and peamouth chub. These fish species were selected as VCs based on conservation status, commercial value, cultural importance and ecological significance.

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<sup>13</sup> *Morrison Watershed Salmon Spawning Report 2011*, Prepared for Lake Babine Nation. Alana Dixon Dec 2011.

The Application categorizes potential effects to fish and fish habitat as lethal effects (e.g. mortality) sublethal effects (e.g. behavioural changes such as swimming or spawning activities, migration patterns, interruption of feeding, etc.) and loss of habitat. The Application provides an assessment of these effects for each VC species or species group. The following sections provide a summary of potential effects to fish in general and in some cases to specific species. A summary of these effects, before mitigation, is presented below. Full details can be found in the Application.

### **Lethal and Sublethal Effects**

The Application notes that potential causes of lethal and sublethal effects to all life stages of fish (including eggs, juveniles and mature fish) include:

- Physical damage due to blasting and general construction;
- Smothering due to sedimentation from construction and operations;
- Introduction of toxic substances such as petroleum products or blasting residues;
- Introduction of mine effluent; and,
- Reduction in water flows and water levels due to storing water in the TSF, groundwater inflows to the open pit and changing watershed catchment areas. This could result in stranding fish or fish eggs in pools of water.

### **Habitat Loss**

Development of the proposed Project would cause a loss of fish habitat resulting from the removal of fish bearing waterbodies, riparian habitat and non-fish bearing waterbodies that support fish downstream.

The Application notes that Booker Lake and Ore Pond, as well as a number of smaller ponds and wetland areas and numerous small streams would be partially or completely lost during development of the mine site, resulting in loss of fish habitat (although there is no reported presence of fish, the areas are still considered fish habitat).

The Application reports the proposed Project would cause the loss of approximately 1,251 m<sup>2</sup> of fish bearing habitat and 275,000 m<sup>2</sup> of non-fish bearing aquatic habitat. The loss of non-fish bearing habitat could adversely affect downstream fish populations by reducing the amount of food contributions (e.g. periphyton, benthic invertebrates) provided to fish downstream. The Application notes that the result of stream productivity tests along the reach of potentially affected streams at the proposed Project site indicate it is unlikely that the upper reaches of the non-fish bearing streams make substantial food resource contributions to fish communities downstream.

**Figure 13: Sockeye shore spawning near mouth of stream 6**



The Application notes that five of the affected waterbodies are fish bearing. These are streams 4, 5, 6, 7 and 10 shown in Figure 12. A number of these streams have spawning areas for rainbow trout, coho and/or sockeye. All of the ponds, wetlands and lakes are non-fish bearing. The catchment area reductions for each stream are shown in Table 5 earlier in this report.

### **Flows to Morrison River**

The Application<sup>14</sup> notes that the proposed Project is likely to result in potential changes to flows in Morrison Lake and Morrison River from the pumping fresh water from Morrison Lake for the process plant; inflows from Morrison Lake to the open pit; and, a decrease in surface water flows due to interception by the mine area and TSF.

The Application says that the net effect on the flow changes ranges over the year and are sensitive to the actual quantities of pit dewatering water, as discussed in section 5.2 of this report, but can be summarized as:

- Surface water flow reduction of up to 325m<sup>3</sup>/hr during the spring to fall period when flows are highest due to spring melt and higher precipitation; and,
- Flow reductions of up to 150 m<sup>3</sup>/hr during the winter low flow months.

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<sup>14</sup> January 2012 3<sup>rd</sup> Party Review Response Report

The Application indicates that, during the period of spring freshet to fall rains, the changes to Morrison Lake and Morrison River as a result of the proposed Project are within the natural variation in the flow and no measureable effects are predicted.

During winter low flows, however, the Proponent notes that the potential flow reduction in Morrison River, assuming no attenuation from the Morrison Lake outlet, is approximately 7 percent of the 7Q2 and 18 percent of the 7Q10 flows. This means that, once every two years, the project could result in a 7 percent reduction to the lowest stream flow compared to current baseline, and once every 10 years, there could be an 18 percent reduction from the lowest stream flow, as measured over seven consecutive days.

The Application says flow reductions during winter months have the potential to impact the development rates of incubating sockeye eggs, alevin, and emerging fry in Morrison River by lowering water temperatures and/or the availability of dissolved oxygen concentrations under winter ice. Decreases in winter low flows may lower the river temperatures and dissolved oxygen concentrations enough to decrease egg survival or delay fry emergence. Furthermore, flow reductions may expose a small number of redds (nests of spawning fish) along the margins of Morrison River channel and in shallow side channels.

The Application notes that the likelihood of a significant effect on the salmon spawning alevins and emerging fry during winter low flow is low given that the potential reduction in stream flows is within the natural variation of the river. The Proponent has committed to monitoring the flow in Morrison River and maintaining the minimum In-Stream Flow Requirement.

### **Habitat Loss**

The Application says the total fish bearing losses from the harmful alteration, disruption or destruction of fish and fish habitat as defined under the federal *Fisheries Act* principally relate to the fish habitat of stream 7 and include 1,242 m<sup>2</sup> of rearing habitat and 9 m<sup>2</sup> of spawning habitat. The Proponent estimates non-fish bearing habitat loss is estimated to be equivalent to 12 million organisms per year. The fish bearing riparian losses are estimated to be 13,500 m<sup>2</sup>.

In addition to removal of waterbodies and reduction in flows, the Application says the proposed Project intends to draw water from Morrison Lake. This would also have the potential to reduce water levels in Morrison Lake and Morrison River, with an anticipated water level decrease of approximately 1 cm which is within the natural variation of the lake.

### *5.5.3 Project Issues, Effects and Mitigation Identified during Application Review*

Concerns raised by the public, members of the Working Group and First Nations primarily focused on the Proponent's plan to discharge tailings effluent to Morrison Lake, data gaps in the fish inventory and lake behaviour and the proposed Fish Habitat Compensation Plan. A number of First Nations reviewers focused on sockeye spawning habitat in Morrison Lake, and in particular the gaps in understanding sockeye shoreline spawning. Section 5.3 of this report provides an overview of key issues identified in relation to water quality, which are central to understanding potential fish impacts. Section 5.2 focused on water quantity, which is also critical to understanding potential impacts to fish and fish habitat.

These issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Project Description and Table of Conditions (Appendix 2) commit to specific mitigation measures. Examples of some of the main issues and commitments around fish include:

- Concerns were expressed that effluent from the TSF and the effluent diffuser would not fully mix with the lake, would change long term lake behaviour (i.e. stop it from turning over twice a year), or would concentrate on the bottom of Morrison Lake, resulting in areas of poor water quality ("hotspots") which could impact sockeye spawning and other fish habitat.
  - See section 5.3 for a full discussion and list of proponent commitments.
- Concerns over a lack of sufficient baseline water quality data and water quality effects predictions to reach conclusions about potential water quality effects to fish in Morrison Lake.
  - See section 5.3 for a full discussion and list of proponent commitments.
- Concerns over direct loss of fish habitat resulting from reductions in stream flows on fish bearing reaches and placement of the effluent diffuser and water intake pipeline.
  - The Proponent has committed to compensate for loss of fish habitat by implementing a Fish Habitat Compensation Plan. The plan commits to compensating for loss of fish bearing habitat at a habitat area replacement ratio of 3:1 by creating 3,600 m<sup>2</sup> of stream habitat that would include rearing and spawning habitat features and be accessible to fish. To compensate for loss of approximately 275,000 m<sup>2</sup> of non-fish bearing aquatic habitat the plan commits to improving fish access from Morrison Lake to non-fish bearing waters in the Olympic Lake system approximately 7 km north of the proposed mine site. The Olympic Lake system constitutes approximately 170,000 m<sup>2</sup> of lake habitat and 2,400 m<sup>2</sup> of stream habitat, upgrading this system could increase its productive capacity. The Fish Habitat Compensation Plan proposes the construction of two off-lake channels at

the south end of Morrison Lake to provide spawning and rearing habitat for salmonids.

- The Proponent has committed to working with the Department of Fisheries and Oceans (DFO), the Ministry of Environment (MOE) and Lake Babine Nation to finalize an agreed upon Fish Habitat Compensation Plan which would compensate for any proposed Project activities that result in Harmful Alteration, Disruption or Destruction of fish and fish habitat as defined under the federal *Fisheries Act*.
- Concerns were expressed over the lack of data on fish population, abundance, migration patterns, use and health in Morrison Lake, as well as concerns about habitat assessments in Morrison Lake and streams flowing into Morrison Lake. In particular, concerns were expressed about the limited information about sockeye spawning, both along the shoreline and at depth.
  - The Proponent has undertaken additional shoreline spawning work in cooperation with Lake Babine Nation and fieldwork with Lake Babine Nation associated with the Fish Habitat Compensation Plan.
  - The Proponent committed to work with Lake Babine Nation, DFO and the Skeena Fisheries Commission to measure annual fish escapement numbers and advance the knowledge of the fish populations, behaviour and distribution in Morrison Lake.
  - The Proponent committed to undertake additional spawning surveys, particularly in the area downstream of the TSF, along the shoreline and at depth to better quantify the spatial extent of spawning habitat.
- Concerns regarding potential for adverse effects to spawning in Morrison River as the result of reduced water volume in Morrison Lake, particularly during winter low flows.
  - The Proponent committed to complete spawning surveys in Morrison River to better quantify the potential effect of the reduction in flow due to the proposed mine.
  - The Proponent committed to measure year round water flows and spawning habitat in Morrison River. Based on these measurements, the Proponent committed to develop an Instream Flow Requirement following the Instream Flow Incremental Methodology, to the satisfaction of DFO and the Ministry of Forests, Lands and Natural Resource Operations (FLNRO).

#### 5.5.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures, EAO concludes that the proposed Project would result in residual adverse effects on fish and fish habitat. Most notably, the proposed Project would result in habitat loss from flow reductions in several streams and Morrison River. Water quality baseline would also permanently change in Morrison Lake.

The proposed Project's impacts to fish are not anticipated to act cumulatively with other current and proposed development activities in the local or regional study areas due to the fact that impacts are predicted to be local in nature and impacts outside the LSA would be negligible.

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

Factor	Rationale
<b>Context</b>	<p>Morrison Lake forms a portion of the headwaters of the Skeena River system, the second largest salmon producing river in Canada. The watershed is relatively pristine (with the exception of some past logging) and provides habitat to a wide variety of fish species, including burbot, lake trout, rainbow trout and several species of pacific salmon.</p> <p>Morrison River, which drains Morrison Lake into Babine Lake, has excellent spawning and rearing habitat for sockeye and coho salmon. Sockeye salmon also spawn along the Morrison Lake shoreline. Morrison Lake is a rearing area for juvenile salmon, some of which spend their first year in the lake. Some sockeye salmon continue through Morrison Lake to the Tahlo Lake/Creek area and spawn in those areas. Some of the sockeye that spawn in Tahlo Lake/Creek also rear in Morrison Lake.</p> <p>The Morrison Tahlo Lake/Creek watershed contributes about 2.5 to 3.5 percent of the overall sockeye to the Skeena River system. However, the Morrison Tahlo Creek population is the second largest non-enhanced (e.g. non-hatchery) sockeye run on Babine Lake. Approximately 75 percent of the salmon which spawn around Babine Lake come from hatcheries, so these unenhanced wilds stocks are considered very important. The Morrison Lake/Tahlo sockeye stock is considered a conservation unit under Canada's Wild Salmon Policy,<sup>15</sup> meaning the sockeye are genetically distinct and require careful management.</p> <p>The Wild Salmon Policy states that "a Conservation Unit is a group of wild salmon sufficiently isolated from other groups that if lost is very</p>

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<sup>15</sup> A conservation unit is defined (in Canada's Policy for Conservation of Wild Pacific Salmon) as a group of salmon sufficiently isolated from other groups that, if extirpated, is very unlikely to re-colonize naturally within an acceptable timeframe (e.g. a human lifetime).



	<p>unlikely to recolonize naturally within an acceptable timeframe (e.g. a human lifetime (...)).</p> <p>Morrison Lake also supports a valued sport fishery for lake trout, a long-lived species which, because it spends much of its time at the bottom of lakes, is especially susceptible to changes in water quality in Morrison Lake.</p> <p>There are approximately 18 fish-bearing creeks and streams which drain into Morrison Lake. The proposed Project would affect five of those streams and one stream which flows into Nakinilerak Lake. Of those streams, loss of catchment area due to mine infrastructure would slightly reduce flows in four streams (streams 4, 6, 8 and 10). One stream (stream 7) would have an average flow reduction of 50 percent for at least 25 years and one stream (stream 5) would have the majority of its flow permanently eliminated. Stream 5 and stream 7 represent approximately 2.5 km of fish bearing stream length, which is approximately five percent of the total length of fish bearing streams reporting within the Morrison Lake direct watershed. In terms of the affected catchment areas, the Project affects approximately 2 percent of the total Morrison Lake catchment area.</p> <p>Fisheries stocks from Morrison Lake are part of a food source for First Nations in the Skeena River watershed. Sockeye salmon are a key aspect of the culture and a food source for Lake Babine Nation. These salmon are also a valuable aspect of the culture and a food source for Gitksan and Gitanyow, who intercept sockeye bound for Babine Lake/Morrison Lake further downstream in their territories along the Skeena River.</p> <p>Very little is known about the physical limnology<sup>16</sup> and ecosystem of Morrison Lake. There is also relatively limited understanding of habitat used (e.g. deep water and shoreline areas) by many of the fish species found in the lake.</p> <p>The Proponent proposes to use much of the assimilative capacity of Morrison Lake to provide dilution for effluent discharges from the mine on closure. Relatively little physical habitat is proposed to be altered. As a result, the focus of the EA has been on effects resulting from changes to water quality.</p>
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<sup>16</sup> Limnology, also called freshwater science, is the study of inland waters.

<b>Probability</b>	<p>The Proponent's models indicate that the water quality of Morrison Lake and a number of streams adjacent to the TSF are certain to change over time. Effects on fish are likely.</p> <p>The range of probability of effects on fish depends on the source of disturbance. These include:</p> <ul style="list-style-type: none"> <li>• Loss of habitat due to reduction in stream flows in streams 4, 5 and 7 is highly likely at least until the TSF is closed and stream flows return to normal.</li> <li>• Loss of non-fish bearing aquatic habitat is certain due to creation of the TSF.</li> <li>• Loss of habitat or direct mortality due to reduction of flows in Morrison River is unlikely, considering the Proponent's mitigation and commitments. The Proponent's information has also indicated that these flows are within the natural variation of flows.</li> <li>• Loss of spawning habitat due to the placement of the effluent diffuser and water intake pipe is certain, in particular the "mixing zone" around the effluent diffuser.</li> <li>• Impacts to sockeye shoreline spawning at depth are unlikely, considering the Proponent's commitment for a TSF geomembrane liner.</li> <li>• Impacts to fish in Morrison Lake due to the effluent discharged to the lake from the discharger are unlikely, considering that water outside the mixing zone is predicted to meet BCWQG. Effluent from the diffuser could concentrate in areas on the lake bottom over time and may not fully mix with lake water, although the review has suggested this could be addressed appropriately at the detailed design stage.</li> </ul>
<b>Magnitude</b>	<p><u>Habitat loss</u></p> <p>The proposed Project would cause the direct physical loss of about 1,251 m<sup>2</sup> of fish bearing habitat and 275,000 m<sup>2</sup> of non-fish bearing habitat. The Proponent's Fish Habitat Compensation Plan commits to compensating for habitat loss by creating 3,600 m<sup>2</sup> of stream habitat that would include rearing and spawning habitat features and be accessible to fish. Non-fish bearing habitat would be replaced by providing access to the Olympic Lake system, which has approximately 170,000 m<sup>2</sup> of lake habitat and 2,400 m<sup>2</sup> of stream habitat. While not demonstrated to be technically feasible for replacing spawning habitat, the channels would likely act as rearing areas for fish.</p>

	<p>The portion of direct physical habitat loss for rainbow trout spawning is small, at 9 m<sup>2</sup>. This represents in the order of 1.0 percent of the total spawning habitat in Morrison Lake.</p> <p>One stream (stream 7), which is used by rainbow trout for spawning and rearing, would have an average flow reduction of 50 percent for at least 20 years.</p> <p>Effects resulting in physical habitat loss for fish are predicted to be low in magnitude.</p> <p><u>Water quality</u></p> <p>Water chemistry and water quality in Morrison Lake and Morrison River would be degraded due to loadings of sulphate and nitrate. While predicted sulphate and nitrate loadings are predicted to be below BCWQG thresholds, they are still 6 to 12 times higher than baseline. Concentrations of other metals, such as cadmium, aluminum, zinc, magnesium copper, selenium and iron are all expected to meet BCWQG.</p> <p>Effects from water quality changes are predicted to be low in magnitude.</p>
<b>Geographic Extent</b>	<p>The physical disturbance of fish habitat is likely to be limited to several streams on Morrison Lake.</p> <p>If there are water quality-induced impacts to fisheries, the effects are limited in geographic extent to Morrison Lake. There are no predicted water quality impacts expected downstream of Morrison Lake into Babine Lake.</p> <p>First Nations with traditional territories further down Skeena River utilize salmon produced in the Morrison Lake watershed.</p>
<b>Duration and Frequency</b>	<p>The physical replacement of lost fish rearing habitat is expected to occur and be functional within five years of construction. Time to functioning of spawning replacement habitat is uncertain, if it occurs at all.</p> <p>Water quality impacts from the effluent diffuser could occur as early as proposed Project construction if water balance predictions indicate contact water would require treatment. Those effects would continue into the far future.</p>
<b>Reversibility</b>	<p>The Fish Habitat Compensation Plan would likely compensate for lost rearing habitat although the technical feasibility of constructed off-lake channel to provide spawning habitat, as currently proposed, is limited.</p>

	<p>The predicted effects due to flow reductions in the streams draining the TSF should be reversible as flows are predicted to return to near baseline levels after closure and reclamation of the TSF. Predicted effects of reduced flows in Morrison River are likely to return to near baseline levels after closure and reclamation of the TSF.</p> <p>Water quality will be changed in Morrison Lake permanently.</p>
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#### *5.5.5 Conclusion*

Considering the significance of the Morrison Lake sockeye to the Skeena River system, magnitude, geographic extent and probability of effects were heavily weighted in the significance analysis. The low magnitude effects and the limited geographic extent of effects and the range of probabilities outweighs the long term and permanent effects. EAO has also considered the compensation for rearing habitat that would occur within five years of construction.

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a Certificate), EAO concludes that the proposed Project does not have the potential for significant adverse effects to fish and fish habitat with the successful implementation of mitigation measures and conditions.

## 5.6 Ecosystems and Wetlands

### 5.6.1 *Background Information*

The Application identifies the following four valued components for the purposes of assessing effects to ecosystems and wetlands:

- all ecosystems not considered rare or sensitive;
- rare and sensitive ecosystems;
- wetlands; and,
- plant species used as cultural foods (assessed in section 9.3 of this report).

Ecosystems were characterized using terrestrial ecosystem mapping, predictive ecosystem mapping methods and field surveys. Wetlands were evaluated for their extent, distribution, type and function (hydrological, biogeochemical, habitat and ecological).

The Application notes a considerable ecosystem community variation within the mine footprint zone, with a total of 103 ecosystem types identified at the biogeoclimatic site series level. General ecosystem composition can be described as dominantly moderately moist forests punctuated with occasional patches of dry forest and treeless to sparsely treed areas, wet forest, wetland complexes and waterbodies with associated riparian ecosystems. Mature forest is the leading structural stage in the proposed footprint area (approximately 47 percent) followed by shrub communities (approximately 20 percent).

Notable ecological features within the proposed Project footprint include 68 ha of wetland complex, 339 ha of riparian ecosystems and two listed ecosystems. The Application reports that field studies did not identify any listed plants in the study areas.

### 5.6.2 *Project Issues and Effects Identified in the Application*

The Application notes two types of ecosystem effects. An overview of these effects is presented below.

#### **Terrestrial Ecosystem Loss and Degradation**

Development of the mine site, access road and transmission line would necessitate removal of vegetation. The proposed Project footprint would occupy approximately 1,959 ha of terrestrial ecosystems, including 320 ha of sensitive ecosystems, which are defined as riparian ecosystems, swamp forest and low bench floodplain. Approximately 40 percent of the proposed Project footprint would remain cleared indefinitely and approximately 20 percent would be reclaimed during and following operation of the proposed Project.

Forest fragmentation, edge effect, wind thrown trees, dust deposition, establishment of invasive plant species and alterations to local hydrology would cause the degradation of approximately 794 ha of terrestrial ecosystems, including 106 ha of sensitive ecosystem types.

### **Wetland Loss and Degradation**

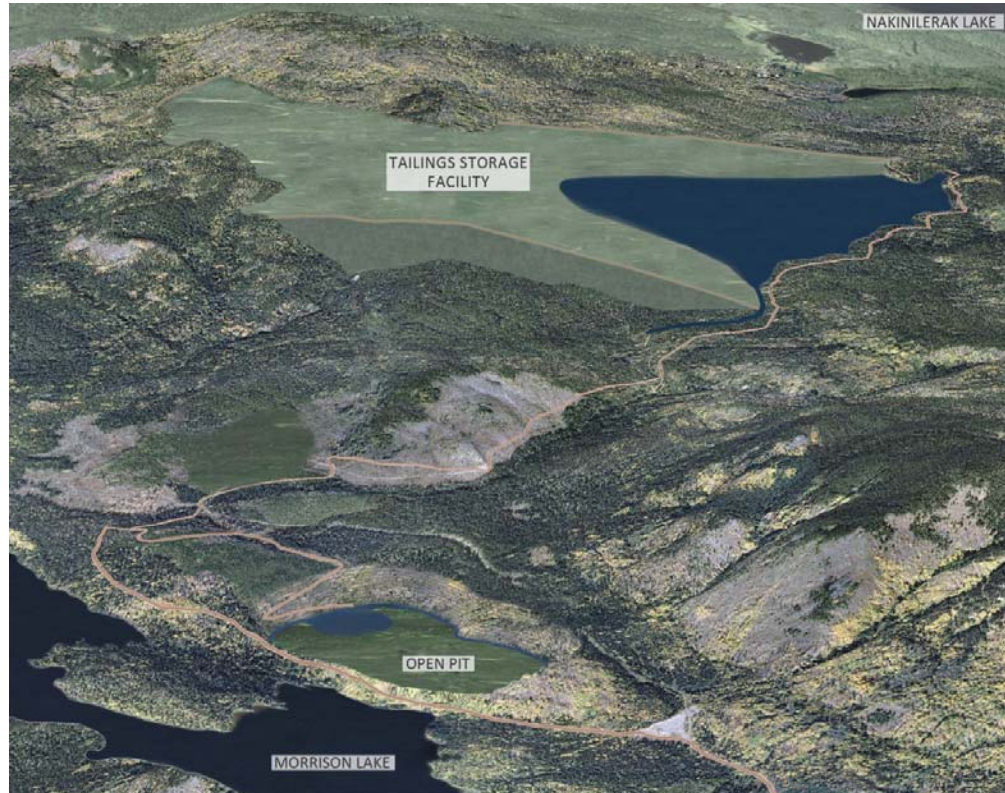
The Application notes that loss and degradation of wetlands would adversely affect or eliminate hydrological, biological, biochemical and habitat functions provided by wetlands to the ecological and hydrologic systems in which they are embedded.

All wetlands located within the proposed Project footprint would be permanently lost. Approximately 84 percent (57 ha) of the wetlands in the footprint area would be eliminated as a result of proposed Project development. The proposed TSF would be responsible for 90 percent (51 ha) of the total wetland area lost. Losses would include approximately 28 ha of blue-listed bog, almost all of which occurs within the proposed TSF footprint. Specific effects resulting from wetland loss include removal of habitat used by moose and other wildlife species (section 5.8) and alteration of hydrological regimes.

In addition to wetland losses, wetland function and community composition in wetlands adjacent to proposed Project components would be degraded as a result of invasive species, biochemical alterations and changes to wetland hydrology. The Application estimates approximately 13 ha of wetlands would be degraded, including 3 ha of blue-listed bog.

The Proponent's rendering of the proposed Project area at full reclamation is shown in Figure 14. The revised closure plan of the TSF includes a combination of "wet" and "dry" areas with reclaimed terrestrial areas accounting for 65 percent of the TSF area. The vegetation would consist of local native species including grasses, shrubs and trees. The waste rock dump would also be reclaimed with local native species after the waste rock has been backfilled to the pit at closure.

**Figure14: Proposed Project area after site reclamation**



### *5.6.3 Project Issues, Effects and Mitigation Identified during Application Review*

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Project Description and Table of Conditions (Appendix 2) commits to specific mitigation measures for each VC. Examples of some of the issues and commitments include:

- Dry grassland ecosystems were inadequately mapped and measures for retaining this high-value spring habitat for deer were not identified in the Application.
  - In response, the Proponent committed to developing a Vegetation and Ecosystems Management Plan to the satisfaction of MOE prior to applying for *Mines Act* or *Environmental Management Act* permits.
- The Application indicates wetland compensation could consist of creating wetland features at the TSF or developing wetlands at other locations in the region. Plans for construction of wetlands at the TSF are judged to be unviable, and compensation measures inadequate. Wetland functionality and metal uptake to wildlife are not acceptable.

- Proposed mitigation measures intended to deter wildlife from the TSF contradict the establishment of wetland habitat at the TSF. Plans to construct wetlands at the TSF must take into account adverse effects to plants, wildlife and cultural foods caused by metal uptake from tailings sediment and water.
  - In response to these two issues, the Proponent's revised mine closure plan includes provisions for accelerating the improvement of TSF pond water quality, and constructing wetlands in the TSF and closed pit areas at a ratio of 2:1 for the wetland area lost. Agencies note that monitoring is required to ensure that constructed wetlands in the TSF are non-toxic, and functional with respect to providing wildlife forage and habitat.

#### 5.6.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures, and the Proponent's commitments to detailed environmental managements plans as outlined in the table of conditions, EAO concludes that the proposed Project would result in residual adverse effects on ecosystems and wetlands.

The proposed Project's impacts to ecosystems and wetlands would also act cumulatively with other current and proposed development activities in the RSA, specifically forestry activities.

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

<b>Factor</b>	<b>Rationale</b>
<b>Context</b>	The proposed Project area is relatively undisturbed, with forestry being the only other significant industrial user. The Morice Land and Resource Management Plan identifies a portion of the proposed Project area for riparian and wildlife habitat protection. Sensitive, rare and endangered ecosystems exist within the proposed Project footprint and outside of the footprint. Wetlands are abundant and larger areas of mature forest remain.
<b>Probability</b>	Loss of rare dryland and wetland ecosystems is certain.
<b>Magnitude</b>	More than 1,300 ha of vegetation would be lost permanently in the TSF and open pit area, and on reclamation it would either be replaced or replaced by another forested or shrub ecosystem.  55.87 ha of wetland ecosystems, almost entirely in the TSF area, would be lost, this includes 27 ha of blue-listed bog. The mine closure plan intends to reclaim and construct 67 ha of wetlands in the TSF area, and 68 ha in the former pit area.



	<p>234 ha of two red-listed terrestrial ecosystems within the LSA would be lost. This represents 24 percent and 14 percent of two ecosystems, relative to their presence in the RSA.</p> <p>68 ha of wetlands in the project area would be lost. This represents 15 percent of the LSA wetlands, and 1.5 percent of the RSA wetlands.</p>
<b>Geographic Extent</b>	Ecosystems would be lost within the mine footprint and transmission line.
<b>Duration and Frequency</b>	There would be a minimum 30 year lag between wetland destruction and when the rehabilitated tailings impoundment facility would potentially provide wetland function and habitat.
<b>Reversibility</b>	Ecosystems and wetlands can be partially re-established over 30 to 80 years, with the exception of permanently lost blue-listed bog.

#### 5.6.5 Conclusion

EAO concludes that while impacts within the LSA are not small (24 percent and 14 percent of two ecosystems would be lost relative to the presence in the RSA), taken in the context of the broader area they are not significant. Having regard to the Proponent's commitments (which would become legally binding as a condition of a Certificate), EAO concludes that the proposed Project would have impacts that are primarily local in nature and impacts outside the LSA would be negligible. EAO is satisfied that the proposed Project is not likely to have significant adverse effects on ecosystems and wetlands with the successful implementation of mitigation measures and conditions.

### 5.7 Wildlife and Wildlife Habitat

#### 5.7.1 Background Information

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

The Application notes the following prominent wildlife species associated with the ecosystems in the footprint area:

- grizzly bear;
- moose;
- mule deer;
- wolf;

- fisher;
- wolverine;
- American marten;
- red squirrel; and,
- waterfowl such as Barrow's goldeneye.

Moose, in particular, are strongly associated with wetlands and are known to use the wetlands at the proposed TSF location. Prominent wildlife species associated with ecosystems at higher elevations in the LSA and RSA are grizzly bear, black bear, moose, mountain goat, caribou and mule deer.

Wildlife surveys included in the Application found potential for presence of a total of 223 wildlife species in the LSA. The Application provides ratings of the likelihood of occurrence in the study areas for each of these species. Presence of 96 of these species was confirmed and another 50 species are considered likely to occur in the LSA. Of the species confirmed as present, three were amphibians, 75 were birds, eight were rodents and other small mammals, eight were carnivores, and two were ungulates. Three species of conservation concern were observed in the study areas: western toad (global red-list and provincial yellow-list), grizzly bear (provincial blue-list) and fisher (provincial blue-list).

Habitat suitability modelling was carried out for five species of interest known to use the proposed Project area: grizzly bear, moose, mule deer, American marten and fisher.

#### *5.7.2 Project Issues and Effects Identified in the Application*

The Application identified the following VCs for the purposes of assessing effects to wildlife and wildlife habitat: grizzly bear, moose, mule deer, American marten, fisher, western toad, waterfowl, forest birds and raptors. The effects assessment considered changes at the individual animal level and population level with a focus on effects that could contravene provincial and federal statutes and policies and provincial best management practice guidelines.

The Application organizes potential effects to wildlife into the following categories:

- habitat loss or alteration;
- physical hazards;
- chemical hazards; and,
- sensory disturbance.

#### **Habitat Loss or Alteration**

As described in the ecosystems and wetlands section of this report (section 5.6) development of the proposed Project would result in loss and disturbance of

ecosystems in and adjacent to the proposed Project footprint. In addition to habitat loss, the proposed Project would cause habitat alterations that would decrease habitat value and functionality. Habitat alteration effects include habitat fragmentation, edge effect, dust deposition and establishment of invasive species.

The effects assessment in the Application for mammals and western toad places an emphasis on loss or degradation of habitat features known to limit the carrying capacity of VC species. For example, winter habitat is considered a limiting factor for moose and mule deer populations. Old stands of coniferous and mixed forest offer critical habitat for marten. The assessment considered winter denning habitat to be a limiting factor for fisher at a local landscape level. Aquatic breeding habitat is considered a limiting factor for western toad populations.

The effects assessment for birds focused on general habitat requirements. The waterfowl assessment discusses effects to open water, wetlands and riparian areas. The assessment of 'forest birds' includes a broad range of species requiring a corresponding broad range of habitat types, including interior forest, forest edge and wetland habitat. The raptor assessment considered habitat types associated with three forest structural stages; young, mature and old forest.

### **Physical Hazards**

Physical hazards are considered to be factors that cause mortality and disrupt movements. Specific physical hazards outlined in the Application include: vehicle traffic, roads, mine infrastructure and attractants. Collisions between vehicles and wildlife can cause mortality to wildlife and risk human safety. Proposed Project components, such as the transmission line, roads and mine infrastructure would act as barriers to movement for several species, leading to fragmentation of populations and habitat. Other species would be likely to use the transmission line right of way and roads as travel corridors thereby altering habitat use and wildlife movement patterns.

Roads would increase the vehicle accessibility of the proposed Project area which could contribute to increased hunting pressure, both legal and illegal, on game species in the vicinity of the proposed Project.

Attractants such as garbage, sewage, food and habitat provided by proposed Project components can attract wildlife to the proposed Project area thereby creating a variety of adverse effects for wildlife, including mortality risks. In particular, bear attractants can cause safety risks for humans and can lead to destruction of habituated bears.

### **Chemical Hazards**

The Application notes that development, operation and closure of the proposed Project would generate an assortment of chemicals that could be taken up by wildlife resulting in adverse health effects. Sources of chemical hazards identified in the Application are

the TSF, fugitive dust, accidental spills, sewage and a variety of hazardous substances used in mining activities including petroleum products, explosives and processing chemicals.

The effects assessment outlined in the Application is primarily directed at the potential for elevated metal concentrations within and surrounding the mine footprint. The two main sources of metals would be the TSF and fugitive dust from mine operations. Wildlife can take up metals through ingestion of contaminated water, soil or vegetation or through inhalation or dermal absorption of contaminated water, air or dust. The Application reports that during operations, closure and post-closure the average metal concentrations of water and sediment in the TSF are predicted to exceed several BVWQG parameters (*see section 5.3 for predications of surface water quality*).

A risk assessment conducted by the Proponent for eight wildlife species reports there would be no potential for wildlife health risks due to metal uptake from the TSF.

Primarily based on findings of the metals risk assessment, the Application rates the extent of potential effects to wildlife from chemical hazards, *in the absence of mitigation*, as negligible for all but two VCs. The extent of predicted effects to western toad and waterfowl are rated as minor largely due to the potential for these VCs to experience greater exposure to water in the TSF than other VC species.

### **Sensory Disturbance**

Sensory disturbance includes any noise, vibration, odour or visual stimuli that alters wildlife behaviour. Sources of disturbance during the construction and operations include noise and vibration from traffic, mine machinery and blasting; visual disturbance associated with lights, machinery and human presence; and, odours from garbage, sewage and food. The effects of sensory disturbances vary by species and life history stage and disturbance proximity, frequency, duration and intensity. Some stimuli, such as odours, attract certain species while other stimuli, such as noise, deter most species. Some species can acclimatize to sensory disturbance while others tend not to. Sensory disturbance can cause a range of adverse effects to wildlife, including increased stress levels, decreased vigilance directed at avoiding predation and displacement from critical habitat features such as foraging and denning sites.

The Proponent's Application provides a significant amount of analysis on the potential for an effect to each VC species and details can be found there.

#### ***5.7.3 Project Issues, Effects and Mitigation Identified during Application Review***

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in

Appendix 1. The Project Description and Table of Conditions (Appendix 2) commits to specific mitigation measures for each wildlife VC species. Examples of some of the issues and commitments include:

- Wildlife monitoring and mitigation plans were generally: a) not supported by sufficient pre-construction monitoring; and, b) not sufficiently detailed so as to determine if monitoring and adaptive management would be successful in mitigating effects.
  - The Proponent committed that, prior to applying for *Mines Act* or *Environmental Management Act* permits, they would provide a detailed and comprehensive Wildlife Management Plan to the satisfaction of MOE and FLNRO. The plan would include the following, in addition to what is already in the Application:
    - detailed mapping of key wildlife habitats discussed during the review, and how human/proposed Project activities would be limited in these key habitats to mitigate impacts;
    - a statistically robust monitoring plan should be designed to track proposed Project effects on grizzly bear habitat use in the proposed Project area. Results of this monitoring will inform an adaptive management plan that would require additional mitigation for unforeseen impacts; and,
    - surveys for western toad breeding habitat, and mitigation strategies for impacts on any habitat discovered by these surveys.
- Plans to monitor and mitigate potential metal uptake by wildlife at the TSF were deemed inadequate.
  - Prior to applying for *Mines Act* or *Environmental Management Act* permits, the Proponent committed to develop and implement a plan to sample bear, deer and moose tissues within the LSA.
- It was noted that the transmission line must be designed to prevent bird electrocutions.
  - The Proponent committed to minimizing bird electrocutions by deterring nest building and perching on power poles by adopting a design consistent with BC Hydro requirements.
- Compliance with speed limits is a key strategy for reducing wildlife mortality.
  - The Proponent committed to implementing instrumentation and/or automated methods of ensuring compliance with speed limits as well as implementing an effective system of non-compliance penalties.
- Grizzly bear is a VC for conservation and cultural reasons and there is a Grizzly Bear Management Area in the proposed Project area. Potential impacts to grizzly include direct and indirect mortality, and sensory disturbance. These impacts could result in changes in migration corridors and habitat use,

potentially leading to population level effects. The Application characterized the extent of these impacts as “uncertain”. The proposed Project has no monitoring plan to track impacts on grizzly bear numbers and use of high quality habitats in the proposed Project area, and would therefore not be able to determine if impacts are occurring post construction, or how significant these impacts may be. A statistically robust monitoring plan should be designed to track proposed Project effects on grizzly bear habitat use in the proposed Project area.

- Prior to applying for a *Mines Act* or *Environmental Management Act* permit, the Proponent committed to, as part of the Wildlife Management Plan, providing a monitoring plan to track effects to grizzly bear habitat within the proposed mine footprint as well as an adaptive management plan to address additional mitigation for unforeseen impacts.
- It was suggested that residual effects of the proposed Project on western toad, a *Species At Risk Act* listed species, and the long term potential for reversibility of effects are largely unknown.
  - Prior to construction the Proponent committed to conducting surveys for additional western toad breeding sites in the LSA and to implementing adaptive management measures to avoid or lessen adverse effects to western toad and its critical habitat as part of its Wildlife Management Plan.
- The Application indicates there is a high degree of uncertainty regarding the location of key mule deer winter habitat. As a result, there is insufficient information to perform an effects assessment on habitat impacts. It is recommended that ground and aerial surveys be carried out in winter to reduce carrying out an effects assessment for mule deer.
  - The Proponent completed, with Lake Babine Nation participation, a winter aerial survey for moose and mule deer during the 2010/11. Efforts to complete a ground survey with Lake Babine Nation were aborted due to weather and other circumstances.
- Further monitoring of moose and mapping of moose habitat should be carried out to support site specific avoidance and mitigation of effects to moose habitat.
  - The Proponent has committed to surveying and mapping moose calving habitat and integrating findings into the Wildlife Management Plan.

#### 5.7.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures proposed by and committed to by the Proponent (see Appendix 2), EAO concludes that the proposed Project would result in residual adverse effects on wildlife and wildlife habitat. Although it is anticipated proposed mitigation measures would reduce adverse effects, the proposed Project would result in several types of residual adverse effects primarily consisting of loss of habitat, sensory disturbance, displacement of individuals and potential mortality.

The proposed Project's impacts to wildlife resources are not anticipated to act cumulatively with other current and proposed development activities in the LSA or RSA. Impacts are predicted to be local in nature and impacts outside the LSA would be negligible.

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

<b>Factor</b>	<b>Rationale</b>
<b>Context</b>	The proposed Project is located in a relatively undisturbed landscape which contains key wildlife habitat features important to a number of notable species, such as grizzly bear and moose, as well as numerous other wildlife species. The proposed Project is located within a large Grizzly Bear Management Area and the Morrison Lake/Morrison River areas are within high biodiversity retention areas identified in the Morice Land and Resource Management Plan. Moose are of particular importance to Lake Babine Nation as a source of sustenance food and they have indicated use of the area for both hunting and trapping. The key limiting factor for moose is winter range. Key moose habitat features in the area of the proposed Project include wetlands, calving areas and winter habitat and in particular the wetlands which would be removed as the result of the TSF. Moose are also of economic importance to the guide outfitter and the area is used for recreational purposes, although access is difficult. Increased access to the proposed Project area could result in increased vehicle related mortality and hunting pressure.
<b>Probability</b>	Adverse residual effects are likely to occur as the result of direct habitat loss. Residual effects from displacement and direct mortality are less likely due to mitigation and Proponent commitments.
<b>Magnitude</b>	<p>Adverse residual effects, particularly loss of habitat and displacement due to human activities are likely to differ from baseline conditions beyond the range of natural variation.</p> <p>The amount of direct habitat which is lost is not considered a significant amount in the LSA and RSA especially considering that there are no other projects and activities that would act cumulatively with the proposed Project. Wetlands (which can be important habitat for a number of identified species) that would be lost in the proposed Project area total 57 ha, representing 15 percent of the LSA wetlands, and</p>

	<p>1.5 percent of the RSA wetlands.</p> <p>A total of 1,262 ha of terrestrial and wetland habitat would be <u>lost</u> during Project development. Approximately 34 percent of lost habitat would be reclaimed during and following operation of the mine.</p> <p>A total of 820 ha of habitat would be <u>altered</u> as a result of the proposed Project, including 13 ha of wetlands.</p> <p>The proposed Project would result in loss or alteration of 32 percent of suitable winter moose habitat in the LSA.</p>
<b>Geographic Extent</b>	<p>Overall effects are considered to be local or sub-regional due to the localized nature of disruption and loss of habitat. However, direct impact and mortality to individual animals has the possibility to affect regional population dynamics.</p>
<b>Duration and Frequency</b>	<p>Effects associated with day-to-day project activities, such as sensory disturbance and mortality risks, would cease at the end of the proposed Project (25 years). Effects caused by loss of habitat would cease following regeneration of habitat, which could take more than 100 years following mine closure. Habitat alteration effects would be permanent in areas that are permanently altered, such as at the TSF and mine pit.</p> <p>Duration depends on the time it takes for reclamation to be fully established.</p> <p>Effects would generally persist throughout the life of the proposed Project on a regular basis (25 years). As noted above, some habitat effects would persist beyond the end of the proposed Project.</p>
<b>Reversibility</b>	<p>All habitat-related effects would be reversible in the medium to long term, except for those areas where habitat is permanently altered and cannot be replaced, such as at the TSF and mine pit. The Application indicates approximately 34 percent of lost habitat would be reclaimed during and following operation of the mine.</p>

#### 5.7.5 Conclusion

While the effects are predicted to be medium to long term, the magnitude of effects is small relative to the available habitat within the RSA and the extent of effects is local to sub-regional, and taken in the context of the relatively undisturbed landscape in which the proposed Project is located, EAO concludes the effects are not significant. Based on the above analysis and having regard to the Proponent's commitments (which would



become legally binding as a condition of a Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on wildlife and wildlife habitat with the successful implementation of mitigation measures and conditions.

## 5.8 Terrain Hazards and Soils

### 5.8.1 *Background Information*

Terrain, terrain hazards and soils were characterized in the Proponent's Application by means of a literature review, regional maps, bioterrain and soil mapping, terrain stability mapping, slope analysis and field surveys. Soils, overburden and terrain are identified as VCs in the assessment. Soils and overburden were selected because of their importance as a basic component of terrestrial ecosystems. Terrain was selected because it represents the physical surface features of the environment. All three of these VCs would be modified to varying degrees over the course of the proposed Project.

The local study area covers approximately 18,860 ha encompassing the mine footprint and transmission line corridor plus a zone ranging between approximately 100 m and 4.5 km wide. Topography in the proposed Project area is characterized by northwesterly trending ridges and valleys with gentle (less than 49 percent gradient) to moderate (50 to 70 percent gradient) slopes. Elevations near the study area range from approximately 711 m at Babine Lake to 1,380 m on the summit of Hearne Hill upslope of the proposed waste rock dump location.

The landscape in the proposed Project area is dominated by well-drained, generally forested, upland soils with the exception of some wetland areas. Morainal (glacial till) and colluvial soils are the dominant surficial soils, covering approximately two-thirds and 18 percent of the proposed footprint area, respectively.

Terrain hazard studies summarized in the Application provide information on terrain stability and natural hazards that could affect construction and operation of the proposed Project. The terrain hazard assessment considers the presence or evidence of landslides, rock fall, debris flows, and snow avalanche and also considers the potential for earthquakes and volcanic activity.

### 5.8.2 *Project Issues and Effects Identified in the Application*

#### **Soil Effects**

The Application provides an assessment of soil loss, degradation and fragmentation effects. Lost soils are those that would be removed, buried, flooded or otherwise severely altered. Areas where soils would be lost are primarily areas where mine components would be sited, including the pit, TSF, waste rock dump and roads. Activities that would result in degradation effects include vegetation clearing,

compaction, mixing of soil layers and metal contamination. Fragmented soils are considered to be soils within a 100 m wide buffer of infrastructure that are likely to sustain little or no direct disturbance. The Application indicates fragmented areas may be affected by drainage alterations, dust or other unanticipated changes.

Approximately 2,028 ha of soils would be affected by the proposed Project. Of this total area, the Application reports 57 percent (1,165 ha) would be lost and 43 percent (863 ha) would be degraded or fragmented. The Application indicates approximately 50 percent (395 ha) of the areas where soils would be lost would be reclaimed with a soil cover. Mine construction would involve stripping soils and overburden from approximately 1,140 ha in the TSF, pit, waste rock dump and ore stockpile areas plus other areas of disturbance caused by construction activities and storage of overburden. Effects to soils from the proposed transmission line, resulting from pole installation, access trail construction and clearing, are characterized as minor. The most conspicuous effect on soils would result from the development of a post-mining landscape with a 2 km<sup>2</sup> pond at the TSF, steep exposed pit wall faces, and the dam faces of the TSF.

### **Terrain Effects**

The terrain effects assessment considers the likelihood of terrain hazards caused by failure of soil slopes, rock slopes and creek banks as a result of proposed Project activities or natural conditions.

The likelihood of soil slope failure is generally considered to be low. The gentle to moderate slopes which make up most of the proposed Project site are predominantly stable. Localized areas of steep terrain, such as the slopes of Hearne Hill, are considered moderately to marginally stable. Minor slumping could occur along road cuts in steeper terrain and in localized areas of weak, poorly drained soils. Potential for road related landslides could increase during periods of rain.

No evidence of rock fall activity was encountered within or near the proposed Project area. The likelihood of rock slope failure as a result of proposed Project activities is considered very low, with the exception of pit development. The likelihood of rock slope failure in the pit is considered to be low during operations and, as the pit will be backfilled on closure, low following closure of the mine.

#### ***5.8.3 Project Issues, Effects and Mitigation Identified during Application Review***

During the review of the Application, no additional issues were raised by the Working Group, First Nations or members of the public. The only comment received in relation to terrain and soils was from Natural Resources Canada, providing the Proponent with a source of data related to terrain and soils. This comment, the Proponent's response and EAO's assessment of the adequacy of the response is detailed in Appendix 1.

#### 5.8.4 Residual Effects and Cumulative Effects

After considering all relevant mitigation measures proposed by and committed to by the Proponent (see Appendix 2), EAO concludes that the proposed Project would result in residual adverse effects on terrain hazards and soils. Residual effects would result from the proposed Project due to the development of a post-mining landscape with a constructed water pond in the TSF area, TSF dam faces that would be generally steeper and drier than those of the pre-mining landscape, and steep pit walls with a constructed wetland facility in the closed pit. There is also the potential for residual terrain hazard effects resulting from pit slope failure during post-closure, although this is significantly mitigated with the pit backfill.

The proposed Project's effects relating to terrain hazards and soils would not act cumulatively with other current and proposed development activities in the proposed Project area because effects relating to terrain hazards and soils would be isolated to the proposed Project site.

EAO has undertaken the following significance analysis on the residual adverse effects relating to terrain hazards and soils, taking into account direct and cumulative residual effects.

<b>Factor</b>	<b>EAO Rationale</b>
<b>Context</b>	There are no terrain features in the proposed Project area that have been identified as causing significant management or safety issues.
<b>Probability</b>	Alterations to terrain and soils are a prominent aspect of the proposed Project, resulting in adverse residual effects. Considering mitigation measures, the probability of terrain hazards occurring, such as terrain instability, is rated as low. Rock ravelling on the final pit wall slopes would definitely occur.
<b>Magnitude</b>	During operations, terrain conditions would differ substantially from pre-project conditions. Post-closure terrain conditions would be reconstructed to eliminate most of the prominent terrain effects that would exist during operations. However, following mine closure terrain characteristics would not resemble pre-project conditions. The reclaimed upland landscapes, like the TSF dam faces, would reasonably replicate the soils function to support vegetation, if not their actual landform (i.e. terraces with moderate slopes replace the moderately gentle slopes on undulating or rolling landforms).

<b>Geographic Extent</b>	Effects would be isolated to the proposed Project site.
<b>Duration and Frequency</b>	Most terrain hazard risks would be reduced substantially upon mine closure. Post-closure, the potential for slope instability at the TSF dam walls and the pit walls would be indefinite. Residual alterations to landscape forms would be permanent.  Effects to soils and terrain would be continuous. Any terrain hazards effects that could occur, such as slope instability, would occur in pulses.
<b>Reversibility</b>	Some terrain and soil effects would be irreversible such as residual landscape alterations. As noted above, most terrain hazard risks would cease upon mine closure.

#### *5.8.5 Conclusion*

While there is a likelihood of small to moderate effects, some irreversible, taken into the regional context (no terrain features have been identified as causing significant management or safety issues) and considering the limited extent of effects and the Proponent's reclamation plans, overall effects are not significant. Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on terrain hazards and soils with the successful implementation of mitigation measures and conditions.

## **6 Assessment of Potential Economic Effects**

### **6.1 Economic Effects**

#### *6.1.1 Background Information*

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

For the purposes of this report, the economic section will primarily focus on employment and income, business opportunities and economic development and land-based livelihoods. Other VCs will be addressed in the social effects section.

A “Socio-economic Baseline Study Report” (Appendix 45 of the Proponent’s Application) was prepared which provides past and current socio-economic conditions, as well as dynamics and trends, that have been observed in the provincial, regional and local study communities. While the Application provides details on all of the above-noted regions and communities, its primary focus is on the Village of Granisle, which is the closest community to the proposed Project and one likely to experience the most social and economic change if the proposed Project moves forward.

#### *6.1.2 Project Issues and Effects Identified in the Application*

##### **Employment and Income**

The Application indicates that the British Columbia government’s input-output model (BCIOM) was used to estimate the economic effects for both the construction and operations phases of the proposed Project. The BCIOM is derived from Statistics Canada’s national model and draws on national accounting information.

The BCIOM simulates how the change in demand and income generated by the proposed Project is likely to circulate and affect the wider economy<sup>17</sup>. In order to access the BCIOM, the Proponent provided data about the proposed Project to BC Stats and BC Stats staff provided a report based on that data and the BCIOM. The results of that report form the core of the predictions included in the Application. With the exception of wage data from 2007, the report uses data from 2004.

The BCIOM reports on GDP, employment, income, output and tax revenue. Direct, indirect, and induced effects are reported for each of these indicators, and the

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<sup>17</sup>When considering the benefits predicted by BCIOM, it is helpful to highlight some of the key assumptions and potential weaknesses of the model, as predicted benefits may, in some cases, be overstated. A few key assumptions include:

- All employment figures are expressed as “jobs,” which does not necessarily mean fulltime jobs. Short-term contracts are common in the mining industry, especially in construction. This means job estimates can appear misleadingly high.
- All dollar values in the analysis are measured in current prices - inflation effects are not considered.
- Supply is assumed to be perfectly elastic, meaning any increase in demand will lead to an automatic increase in supply. This can disregard the potential for bottlenecks in the supply chain, price increases, import challenges, etc.
- All industries are assumed to be operating at full capacity and any increase in demand is presumed to require an increase in employment. This discounts the potential for worker retraining as well as capacity and hiring challenges.
- It is assumed that workers employed by the proposed Project were previously unemployed, which is unlikely to be the case in a thriving economy.
- There is no consideration for displacement effects on existing industries; that is, the potential for any adverse effects on other firms competing for the same scarce resources and people.

Application discusses how these effect employment and income in the socio-economic study communities. This information is summarized in the tables below.

### ***Construction Phase Effects***

The results of the BCIOM presented in the Application state that, during the two year construction period, the proposed Project would create about 1,117 jobs each year. Because of the nature of construction work, many of these jobs are expected to be part-time, temporary, and/or contract. This would not necessarily equate to 1,117 Full Time Equivalents (FTEs). The source of these jobs is estimated to be:

- 225 jobs/year with the Proponent;
- 422 jobs/year from direct suppliers;
- 188 jobs/year of indirect employment; and,
- 282 jobs/year of induced employment.

In each year of the construction period, the BCIOM reports that the Proponent's employees will benefit from \$35 million in household income. Provincial Gross Domestic Product (GDP) will also reportedly increase by \$35 million per year above baseline conditions as a result of direct employment with the Proponent.

The economic activity associated with the construction phase is anticipated to contribute to government tax revenues in the form of personal taxes and corporate income taxes. The Application says that the Proponent will annually generate \$22 million in direct tax revenue, of which nearly \$10 million will go to the federal government and nearly \$12 million will go to the province.

**Table 10: Predicted annual economic effects from construction**

	CDN\$ (Millions)			
	Direct	Indirect	Induced	Total
Project expenditure	\$245	-	-	-
Supply industry output change	\$70.6	\$33.1	\$33.2	\$136.9
Project contribution to GDP	\$35.3	-	-	\$35.3
Supply industry contribution to GDP	\$35.1	\$14	\$20	\$69.1
<i>Total contribution to GDP</i>				\$104.3
Project employment (jobs)	225	-	-	225
Supply industry employment (jobs)	422	188	282	892
<i>Total Employment (jobs)</i>				1,117
Project addition to household income	\$35.3	-	-	\$35.3
Supply industry addition to household income	\$22.7	\$8.9	\$11.9	\$43.4
<i>Total addition to Household Income</i>				\$78.7
Project derived federal tax revenue	\$9.5	-	-	\$9.5
Project derived provincial tax revenue	\$12.7	-	-	\$12.7
<i>Total Project Tax Revenue</i>	\$22.2	-	-	\$22.2
Supply industry derived federal tax revenue	\$3.1	\$1.2	\$2.8	\$7.1
Supply industry derived provincial tax revenue	\$1.9	\$0.9	\$2.9	\$5.7
Supply industry derived municipal tax revenue	\$0.2	\$0.2	\$0.5	\$0.9
<i>Total Supply Industry Tax Revenue</i>	\$5.1	\$2.3	\$6.1	\$13.5
<i>Total Tax Revenue</i>				\$35.8

Note: Employment estimates are based on annual wages in 2007.  
Source: (BC Stats 2009).

### ***Operations Phase Effects***

For each year of the 21 planned years of operations, the Application predicts that 601 jobs will be created. As with the construction phase, these are not necessarily 601 FTEs, however, jobs created in the operations phase are more likely to be full-time and longer than those created in construction. The source of these 601 jobs is estimated to be:

- 251 jobs/year with the Proponent;
- 94 jobs/ year with direct suppliers;
- 155 jobs/year in indirect employment; and,
- 101 jobs/year in induced employment.

In addition to these jobs, the Application states that household income directly received as remuneration by Proponent employees is predicted to amount to \$19 million annually.

The Application says that Proponent expenditures during the proposed Project's 21 year operations phase are predicted to reach almost \$1.9 billion, or \$90 million annually.

The Application estimates \$5.4 million yearly in direct federal and provincial taxes from the proposed Project during the operations phase, and an additional \$6.2 million in taxes from suppliers.



**Table 11: Predicted annual economic effects from operations**

	CND\$ (Millions)			
	Direct	Indirect	Induced	Total
Project expenditure	\$89.5	-	-	-
Supply industry output change	\$53.8	\$21.4	\$11.9	\$87.1
Project contribution to GDP	\$18.5	-	-	\$18.5
Supply industry contribution to GDP	\$13.9	\$10.5	\$7.1	\$31.5
<i>Total contribution to GDP</i>				\$50.0
Project employment (jobs)	251	-	-	251
Supply industry employment (jobs)	94	155	101	350
<i>Total Employment (jobs)</i>				601
Project addition to household income	\$18.5	-	-	\$18.5
Supply industry addition to household income	\$5.4	\$6.8	\$4.2	\$16.4
<i>Total addition to Household Income</i>				\$34.9
Project derived federal tax revenue	\$2.9	-	-	\$2.9
Project derived provincial tax revenue	\$2.5	-	-	\$2.5
<i>Total Project Tax Revenue</i>	\$5.4	-	-	\$5.4
Supply industry derived federal tax revenue	\$1.1	\$0.9	\$1.0	\$3.0
Supply industry derived provincial tax revenue	\$0.9	\$0.6	\$1.0	\$2.5
Supply industry derived municipal tax revenue	\$0.3	\$0.2	\$0.2	\$0.7
<i>Total Supply Industry Tax Revenue</i>	\$2.3	\$1.7	\$2.2	\$6.2
<i>Total Tax Revenue</i>				\$11.7

**Note:** Employment estimates are based on annual wages in 2007.  
**Source:** (BC Stats 2009).

## Business Opportunities and Economic Development

The Application says that the proposed Project is anticipated to change business and economic development opportunities in all study communities. The demand for goods and services from the proposed Project and its employees is anticipated to provide business opportunities for local suppliers throughout the life of the mine, although primarily during the construction and operations phases. The proposed Project is also expected to enhance economic growth and expand the region's capacity as a business center.

The main business contracts available during construction would be for the development of the open pit mine and the construction of mine site buildings, roads, pipelines, dams, and diversion ditches, as well as the construction of a transmission line and other mine components. However, during operations, the primary contracts would

be for trucking (ore hauling) although smaller contracts may include the provision of services such as laundry, janitorial, first-aid and site security services.

The Application notes that, even though Granisle is the closest community to the proposed Project and has a relatively high unemployment rate, a large proportion of the community's current population are of retirement age and therefore there would only be a minor opportunity to benefit from increased direct employment with the proposed Project. The Application focuses on the beneficial business and economic opportunities for the five Lake Babine Nation communities and in Smithers and other secondary study communities.

The Application says that, while direct employment in Granisle may be limited, it is expected that indirect business opportunities would increase moderately in Granisle, given its proximity to the mine site. While many businesses have downscaled in size and closed in the community since the early 1990s, it is expected that the proposed Project would help to revitalize local business and bring new businesses into the community.

## **Effects on Land-based Livelihoods**

### ***Forestry***

There are three forest tenure holders in and around the proposed Project area, including Canfor and West Fraser Mills, operated by Houston Forest Products. Canfor owns the tenures and licences to harvest and operate in the area to the east of Babine Lake. The area has been actively harvested for approximately 30 years.

Canfor's forest tenure overlaps with the proposed Project site and the company has roads which it has constructed and maintained to support its operations. The Proponent and Canfor have signed a Road Use Agreement which grants the Proponent non-exclusive use of the roads and stipulates a maintenance schedule and work.

The Application notes a number of both potentially positive and negative impacts to forestry. On the positive side, these are focused on the improved year round access during operations from the ongoing maintenance of the mine access road. Potential negative effects focus on the reduction in the potential volume of timber by the siting of mine infrastructure. In addition, there is a risk that available timber may be alienated or isolated by the proposed mine.

### ***Guide Outfitters - Tukii Lodge***

The Proponent's primary study area overlaps with portions of the tenures of two guide outfitters, David Hooper (Tukii Lodge Hunting Camp) and Stewart Berg (Double Eagle Guide and Outfitters). Both of these operations access the area by boat and/or floatplane and do not use the current network of Forest Service Roads (FSR) to access their tenure areas. Given that Mr. Berg's guiding activities are concentrated in areas outside the primary study area, the Application concentrated on the effects of the proposed Project on Tukii Lodge.

The guiding activities of Tukii Lodge are supported by two main facilities, including Tukii Lodge at Smithers Landing and Tukii Hunting Camp on the southeast shore of Morrison Lake. The facility on Morrison Lake consists of two bunk houses, one cook house with sleeping facilities, a shower house, storage, woodshed and a meat house. This camp is directly adjacent to the proposed pit area. Tukii Lodge is also an angling guide in the study area, and clients angle for rainbow trout, steelhead and salmon.

The Application identified a number of effects to Tukii Lodge from the proposed Project, including on access, and both quality and quantity of experience. Tukii camp is currently located on Morrison Lake approximately 1.7 km from the proposed open pit. The Application says that the proposed Project would have major adverse effect on Tukii camp due to noise from blasting and mine operations as well as visual impacts of mine infrastructure. Major adverse effects are derived from the fact hunting would be prohibited in the areas in and around the mine facilities, currently a high value hunting area used by the lodge. Other impacts come from impacts on drinking water quality from siltation, increasing hunting pressure on the area due to increased access, and the indirect effect of moving moose and other wildlife away from the area around the proposed mine.

### ***Ookpik Wilderness Lodge***

There are a number of parcels of private land on the Morrison Arm of Babine Lake. The only developed property is Ookpik Lodge, which is advertized as a remote wilderness accommodation specializing in wildlife viewing. The lodge is on the northeastern shore of Babine Lake, 9 km from the proposed Project. Float plane and boat provide the main means of accessing the lodge. The lodge attracts clients from the US, Europe, and elsewhere, who visit the lodge to experience the wilderness values in the area. Limited boat traffic and resulting reduced noise levels at the north end of Babine Lake along Morrison Arm contribute to this atmosphere. The proposed concentrate haul route via an existing FSR is approximately 1 km inland from the lodge. The current owners have managed the lodge since 1993, however, the lodge has been in existence since the 1930s.

The Application notes a number of potential impacts on Ookpik Lodge, including:

- increased noise from daytime and night-time noise at the proposed Project. This impact is on the quality of experience and not on human health;
- increased dust and pollution;
- diminished visual quality from the transmission line;
- increased third party presence as a security risk to the property when the owners are not present in the winter and off season; and,
- decreased wildlife abundance could impact wildlife viewing opportunities.

### ***Trapline Holders***

Two registered trapline tenures overlap with the primary study area. One intersects with the access road and a portion of the transmission line, while the latter overlaps with the mine facilities. Trapping activity is concentrated in the winter months and focused primarily on marten.

The Application outlines a number of both positive and negative effects. The largest and most significant negative effect is from access to the mining lease being prohibited due to safety reasons. As well, road hazards from industrial traffic and impacts to the marten population are identified as negligible impacts. Increased access is highlighted as a slight positive effect.

### ***6.1.3 Project Issues, Effects and Mitigation Identified during Application Review***

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Project Description and Table of Conditions (Appendix 2) commits to specific mitigation measures for each VC. Examples of some of the issues and commitments are set out below.

Key Issues from the Village of Granisle:

- The Village is concerned that there is no direct financial benefit to the Village of Granisle from the proposed mine and wish to maximize employment for residents of Granisle and surrounding area;
- The Village would like to see increased education opportunities focussed on the mining industry and ancillary support for businesses, such as those housed in the current school facility;
- The Village would like to see the Proponent encourage the management of employees within the company to reside in Granisle, and for a company presence in the community.

- The Proponent signed an Memo of Understanding (MOU) with the Village to address their concerns. They also committed to hold at least one job/ business fair in both Granisle and a second community within one year of the construction to inform local residents and businesses of upcoming opportunities for employment and contracts; and to complete a skill inventory and needs analysis in collaboration with the Village of Granisle.

#### Key Issues from Canfor:

- Canfor indicated that, should the Proponent wish to contract them to clear timber, the Proponent would have to supplement Canfor for any marginal costs incurred.
- Canfor also indicated a concern that, should old growth be harvested for the clearing of mine infrastructure, this could reduce Canfor's access to old growth in other areas of their forest tenure.
  - The Proponent committed to ongoing discussions with Canfor regarding coordinated timber removal from the proposed Project site and mitigation measures specific to address Canfor's interests, including additional information collection on timber volume; and potentially compensating for Canfor's marginal cost to harvest timber elsewhere; and ensuring consistency with land use planning timber harvest objectives.

#### Key issues from Tukki Wilderness Lodge:

- The owners of Tukki Wilderness Lodge expressed concerns about the impact of the proposed Project on their guiding business, in particular due to noise and to disruption of wildlife patterns. They suggested that the Proponent compensate for the loss of business around the mine, including the hunting camp, and to pay for the cost of developing a new hunting camp (possibly a mobile camp) to be situated elsewhere.
  - The Proponent has negotiated a mutually satisfactory agreement with the owners of Tukki Lodge which addresses their concerns. This confidential agreement is registered with EAO.

#### Key Issues from Ookpik Lodge:

- During Application Review, the owners of Ookpik lodge expressed a number of concerns related to the potential impacts of the proposed Project on their operations and property. These related to noise, dust, water quality, impacts to wildlife, visual quality and quality of experience, as well as loss of income and reduction in property value. Those issues are noted here, as opposed to being addressed in each individual section (e.g. health) as they primarily relate to the business aspect of the facility:
  - The Proponent discussed a compensation package with the owners of Ookpik Lodge, but the parties could not come to a mutually acceptable agreement.

- In the absence of a negotiated agreement, the Proponent has committed to measures to address the effects of the proposed Project on the operations and business of Ookpik Lodge, including reducing speed and volume of mine traffic on haul roads, improved road maintenance and managing blasting noise. Specific commitments include:
  - reduce speed limit of mine traffic, including haul trucks, supply trucks and maintenance trucks and transport buses to 30 km/hr, along km 24 to 29 of the Hagen Forest Service Road near Ookpik Lodge;
  - upgrade road materials along Hagen FSR from km 24 to 29 (e.g. clean crush);
  - prohibit use of engine brakes by mine traffic along Hagen FSR near Ookpik Lodge;
  - prohibit the use of personal vehicles for employees travelling from Nose Bay to the proposed mine and prohibit the use of boats to commute to the mine via Morrison Arm of Babine Lake;
  - restrictions on the movement of concentrate trailers including the number of trailers along Hagen FSR and the scheduling of movements;
  - limit blasting to once a day and use blast hole stems;
  - use the shortest pole heights allowed by BC Hydro for the transmission line to reduce the visual impact; and,
  - measures to reduce dust along Hagen FSR.

#### Key Issues Related to Trapping:

- Lake Babine Nation provided several submissions regarding the impacts of the proposed Project on the traplines in the area. Lake Babine Nation said the proposed Project would affect three traplines (one within the entire mine footprint) that are held by Lake Babine Nation members and are trapped regularly. They also asserted it would take at least 100 years for this area to reach peak furbearer potential again and suggested compensation for the trapline holder.
  - The Proponent committed to providing compensation to the trapline holders.

#### *6.1.4 Residual and Cumulative Effects*

In consideration of EAO's assessment of the Application, supplementary reports, and comments from the public, Working Group and First Nations, EAO finds that several land-based tourism/guiding facilities and trapline holders would be potentially impacted from the proposed Project, however, these potential impacts have been mitigated as a result of negotiations and agreements with the Proponent or with other mitigation

measures. 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 Proponent's commitments (which would become legally binding as a condition of an EA certificate), EAO is satisfied that the proposed Project would not have residual adverse economic effects with the successful implementation of mitigation measures and conditions.

## 7 Assessment of Potential Social Effects

### 7.1 Social Effects

#### 7.1.1 Background Information

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

For the purposes of this report, EAO looked at employment, education skills and labour, population and demographics and services and infrastructure. This social effects chapter will look at the effects to Socio-cultural activities of Lake Babine Nation<sup>18</sup> and transportation.

A "Socio-economic Baseline Study Report" (Appendix 45 of the Proponent's Application) was prepared which provides past and current socio-economic conditions, as well as dynamics and trends, that have been observed in the provincial, regional, and local study communities. While the Application provides details on all of the above-noted regions and communities, its primary focus is on the Village of Granisle and the nearby Lake Babine Nation communities, which are likely to experience the most social and economic change if the proposed Project moves forward.

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<sup>18</sup> The Application contained two sections that examined potential social impacts to Lake Babine Nation. The first was the *Cultural identity and sustainability* VC located in the socio-economic effects assessment. The second was located in the Land and Resource Use effects assessment. In that section, the effects on Lake Babine Nation land use were compared against the *Access; Quality of Experience; Quality of Resources; Cultural Value of Land; and Land Management Objectives* Valued Components. For the purposes of this report, these sections are combined into "Socio-cultural activities of Lake Babine Nation".

The Application states that Granisle currently has very little in the way of services, although it still has the primary infrastructure from when it serviced a community of 2,000 people. There is no grocery store or any other general hardware or supply store, and locals are obliged to shop in either Houston or Burns Lake for many basic supplies. The community is home to Babine Elementary and Secondary School, built to accommodate 500 students, but currently only has 46 registered students.

The Granisle Health Centre offers services to Granisle, Topley Landing, Tachet, residents along Babine Lake, RV and camping parks, and visitors to the area. Apart from the Granisle Health Centre, the next closest health services are 100 km away in Houston.

### *7.1.2 Project Issues and Effects Identified in the Application*

#### **Employment**

The Application contains details on both the positive and negative effects of increased employment on the community. Some of the effects described in the Application include barriers to employment such as education and training that could reduce the ability of some groups to benefit; the community becoming increasingly dependent on mining, thereby narrowing the economic diversity of communities; and the impacts arising from the loss of jobs at the end of mine life.

#### **Education, Skills and Training**

The Application notes that demand for programs that address the training needs of the local communities are anticipated to increase, as well as the overall level of skills, training, and educational qualifications of residents of the study communities. It also notes that there would be increased incentive for skilled persons to be attracted to the area, and that those skills are expected to be particularly beneficial to Lake Babine Nation communities. It also notes high paying jobs can decrease the motivation for local community residents to either continue or complete their education.

#### **Population and Demographics**

The Application notes that the population and demographic structure of the study communities, and in particular the primary study communities, may be altered by the proposed Project's various phases. It notes that an increase in population can provide impetus to improve existing infrastructure and services and increase property values, and can restore community pride by reversing population declines observed across the wider region. It says the proposed Project could cause the population in the local primary and secondary study communities to increase by a total of 747 persons during the construction phase and 638 persons during the operations phase. It notes that, even



though this maximum scenario is highly unlikely, in-migrants would likely be spread throughout the communities, minimizing the effects in specific communities.

The Application says that there is potential for the age, gender, and cultural structure of the study communities to change. In particular, a significant degree of demographic change is expected in Granisle, where the present population is mostly retirement age.

### **Services and Infrastructure**

The Application notes that increased population can increase strain on some community resources; put stress on the natural environment; and increase competition and cost of basic goods and services. Post closure, population declines can also lead to a gradual deterioration of infrastructure and service provision over the long term as well as reduced potential for economic growth and lower property values. However, the Application notes that the proposed Project is located within an area (Granisle) previously designed and built to meet the infrastructure needs of two previous mining operations, as well as continued forestry and silviculture operations.

The Application also notes that a change in population size, diversity, and demographics would create a need for improved communications infrastructure (e.g. cellular phone network) as well as other services (e.g. banking, grocery store) to meet the needs of this new community profile. It also notes that increased property value and housing demand may trigger an upward surge in the market value of residential and commercial properties and the need for housing in the surrounding communities.

### **Socio-cultural Activities of Lake Babine Nation<sup>19</sup>**

The Application notes that the area around the proposed Project is valued and used by members of Lake Babine Nation, especially the communities of Old Fort and Fort Babine. Some of the potential effects on cultural land values outlined in the Application include increased capability to engage in traditional land uses because of additional resources provided from relatively high paying mine-related jobs; decreased time to engage in traditional land-based activities; loss of Traditional Ecological Knowledge (TEK) caused by inaccessibility to the mine footprint; and loss of traditional skills and expertise caused by both mine employment by its membership, and a direct loss of land areas overlapping with the mine footprint. Some other specific effects on Lake Babine Nation members include:

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<sup>19</sup> EAO's full assessment of Lake Babine Nation's potential rights and title are included in Section C of this Report – this section should be read only as a summary of the Proponent's Application.

- increased road hazards from industrial traffic and decreased access during construction and maintenance;
- reduced wilderness experience due to mine-related noise and activities, dust and visual quality;
- potential for increased use of the area, and its resources, around the proposed Project by third parties;
- some impacts on moose populations both by human presence and noise and impacts from mine-related activities around the mine itself and the access road;
- permanent vegetation loss – 831 ha of vegetation would be permanently removed for construction of the proposed Project site; and,
- degraded vegetation – 807 ha of vegetation would be degraded, primarily along the access road, which is generally the focus of the harvesting and gathering of vegetation.

### *7.1.3 Project Issues, Effects and Mitigation Identified during Application Review*

During the review of the Application, additional issues were raised by members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Project Description and Table of Conditions (Appendix 2) commits to specific mitigation measures for each VC. Examples of some of the issues and commitments for the education, skills, and training; population and demographics; services and infrastructure; and, community well-being VC's include:

The Village of Granisle noted a number of concerns with the proposed Project, including:

- Concerns about potential effects that the mine may have on the community. In particular, they note that population increase and demographic changes are identified which could cause an increased demand on infrastructure and services required, but that no identified solutions or remedies are offered by the company. They sought reassurance that the Proponent would seek to maximize benefits and opportunities to the local community.
  - In response to this and other concerns from the community, the Proponent did the following:
    - signed an MOU with the Village of Granisle to discuss ongoing community issues;
    - committed to the creation of a Community Sustainability Advisory Committee to help diversify the economy of the local communities and address a range of other social issues;

- committed to partnering with local education institutions to develop and deliver general and industry-specific training, sponsoring scholarships and provide apprenticeship programs;
- committed to, on closure, providing programs to facilitate skills transferability between industries;
- committed to hiring residents from the primary and secondary communities in order to facilitate a controlled pace and moderate overall population increase, indirectly reduce the demand for housing, and thus the potential for price fluctuations in the real estate market; and,
- committed to hiring a Human Resources Manager to assist new employees transitioning into new residences in communities close to the mine. This is expected to streamline demand and moderate property value and housing demand.

#### *7.1.4 Residual Effects and Cumulative Effects*

In consideration of EAO's assessment of the Application, supplementary reports, and comments from the Working Group and First Nations, EAO finds that there may be adverse residual effects on education, skills, and training; population and demographics; services and infrastructure; and, community well-being as a result of the proposed Project due to the influx of new potential employees to the area and potential demographic and population changes on local communities during both construction and operations.

EAO's analysis of the significance of potential residual effects on population is as follows:

<b>Factor</b>	<b>Rationale</b>
<b>Context</b>	The Village of Granisle is well positioned to adapt to the influx of new residents, as the infrastructure, including roads and other services, was originally developed for two previous copper-gold mines.
<b>Probability</b>	The probability of potential population effects from the proposed Project is moderate to high, depending on the proportion of local hiring.
<b>Magnitude</b>	The magnitude of the effects is moderate because the affected communities are small with primarily residential and retirement populations, but have a mining history and infrastructure developed to support a 2,000 person mining town.
<b>Geographic</b>	The impact on population from the proposed Project would likely be distributed among the primary study areas of Granisle, Topley, and Lake

<b>Extent</b>	Babine Nation communities. It also depends on the ability of workers to commute long distances to the proposed Project.
<b>Duration and Frequency</b>	The <u>duration</u> of effects on population from the proposed Project can be described as beginning during the construction phase, continuing through the operations phase, and diminishing during the decommissioning phase. The <u>frequency</u> of effects on population from the proposed Project would be constant throughout all phases.
<b>Reversibility</b>	The impacts of the proposed Project on population are reversible after the end of the mine life, although many of the effects on services and infrastructure may linger over time. It is also somewhat dependent upon the development of other mines in the area and their operational timespans.

#### *7.1.5 Conclusion*

While there is a moderate to high probability of moderate social effects occurring for the duration of the proposed Project, these effects would be limited to small local communities that are well positioned to adapt to the influx of new residents. Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project would not have significant residual adverse social effects with the successful implementation of mitigation measures and conditions.

## **8 Assessment of Potential Heritage Effects**

### **8.1 Archaeology and Heritage Resources**

#### *8.1.1 Background Information*

The Application contains details of the archaeology and heritage study completed by the Proponent. The study consists of background research, an archaeological overview assessment (AOA), and an archaeological impact assessment (AIA).

The AOA, which was conducted between 2006 and 2007, involved research on the natural setting (paleo-environmental conditions and biogeoclimatic setting), ethnographic background, historical background (including past mining and logging activities), and known archaeological resources. The background research showed that most recorded archaeological sites in the region included habitation sites, cultural depression and cache pit sites, culturally modified trees (CMTs), trails, and historic

sites. The majority of recorded sites in the area tended to cluster along the shorelines of lakes. The AOA recommended that a detailed AIA be completed.

The AIA, which was conducted under a permit issued by the Archaeology Branch, was undertaken during the 2008 and 2009 field seasons and involved a field examination of the proposed Project footprint to identify and record possible archaeological sites. The AIA was informed by other AIAs which had been conducted in the area, notably those undertaken by Canfor for timber harvesting areas in the immediate vicinity of the proposed Project as well as archaeological shoreline investigations completed along the Morrison Arm of Babine Lake in the 1970s.

Four archaeological sites have been recorded in the proposed Project footprint. Three of these are CMTs in poor condition and in various states of decay. One is a pre-contact period site, with an overall moderate significance, characterized by lithic materials made of sedimentary rock. A total of 12 other archaeological sites are within 2.5 km of the proposed Project footprint, with most of those occurring near the transmission line corridor.

#### *8.1.2 Project Issues and Effects Identified in the Application*

##### **Archaeological and Heritage Resource eEffects**

The Application outlined a number of potential impacts to archaeological resources. The largest concern related to the potential loss of information from archaeological sites as a result of direct effects from development activities. Direct effects in the area of the proposed Project include clearing and grading during road construction and maintenance, land clearing and excavation for foundations/footings for on-site structures, drilling, blasting, exploration activities, utility installation, and flooding the TSF.

Potential indirect effects to archaeological and heritage resources could occur as a result of increased human presence during the life of the proposed Project and more sites are within walking distance from facilities or access corridors. The Application also contained a number of mitigation measures for the affected sites, primarily focused on systematic data recovery and an Archaeological Chance Find Procedure.

**Table 12: Identified archaeological and heritage sites**

<b>Arch<sup>20</sup> Site</b>	<b>Where</b>	<b>Type of site</b>	<b>Effect</b>	<b>Protected by HCA<sup>21</sup></b>
GhSn-3	Open pit	CMT	Directly affected	No
GhSn-4	Mine infrastructure	CMT	Likely directly affected	No
GhSn-5	Transmission line corridor	CMT	Potential indirect effect	No
GhSn-7	TSF	Lithic scatter	Directly affected	Yes
GgSn-7	Near transmission line corridor	10 cultural depressions/ cache pits	Unlikely indirect effect	Yes
GgSn-39	Near transmission line corridor	Cultural depression/ cache pit	Unlikely indirect effect	Yes
GgSn-40	Near transmission line corridor	Cultural depression/ cache pit	Unlikely indirect effect	Yes
GgSn-42	Near transmission line corridor	Cultural depression/ cache pit	Unlikely indirect effect	Yes
GgSn-44	Near transmission line corridor	CMT	Unlikely indirect effect	No
GgSn-45	Near transmission line corridor	CMT	Unlikely indirect effect	No
GgSn-46	Near transmission	CMT	Unlikely indirect	No

<sup>20</sup> Archaeological<sup>21</sup> *Heritage Conservation Act*

	line corridor		effect	
GgSn-54	Near transmission line corridor	Cultural depression	Unlikely indirect effect	Yes
GgSn-55	Near transmission line corridor	Cultural depression/ cache pit	Unlikely indirect effect	Yes
GgSn-56	Near transmission line corridor	4 Cultural depressions	Unlikely indirect effect	Yes
Gg-Sn-57	Near transmission line corridor	Cultural depression	Unlikely indirect effect	Yes
GgSn-58	Near transmission line corridor	~ 600 m trail	Unlikely indirect effect	Maybe

### 8.1.3 Project Issues, Effects and Mitigation Identified during Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues and the Proponent response are detailed in Appendix 1. Key issues and responses include the following:

Key issues raised by Lake Babine Nation include:

- Identification of the “old person’s trail” that traversed up Morrison Arm, through Morrison Point and northwards. Morrison Point has been identified as a resting area along the trail and a very important spiritual area with potential burial areas, although no specific sites have been identified.
  - The Proponent proposed a suite of changes to the design and location of a number of proposed Project components and infrastructure to address the significant concerns around Morrison Point raised by Lake Babine Nation. These include:
    - relocation of the overburden stock pile from Morrison Point to a site away from the area;
    - a commitment to make no physical impacts or use of Morrison Point and to retain all vegetation; and,

- a commitment to make Morrison Point a “no go” area for mine employees.

#### *8.1.4 Residual Effects and Cumulative Effects*

Having regard to the mitigation measures proposed to protect heritage resources, EAO has concluded that the proposed Project is not expected to result in residual adverse effects to heritage resources.

#### *8.1.5 Conclusion*

Having regard to the Proponent’s commitments (which would become legally binding as a condition of an EA certificate), EAO is satisfied that the proposed Project would not have residual adverse effects on heritage resources with the successful implementation of mitigation measures and conditions.

## **9 Assessment of Potential Health Effects**

### **9.1 Air Quality**

#### *9.1.1 Background Information*

This section addresses meteorological conditions as they affect human health components of air quality, in particular those related to airborne contaminants and dustfall directly affecting humans and those foods consumed by humans. Aesthetic aspects of air quality are discussed in section 7 and data on meteorology and climate are described in section 5.9 of this report.

The Application notes that there are no current industrial activities in the area and baseline ambient air quality is significantly under all relevant air quality objectives. As a result, the Application assessment focused on the principal human receptors, namely guests of Tukii Camp, residents of Ookpik Wilderness Lodge, and individuals who may stay at the Houston Forest Products Camp.

The Application evaluated carbon monoxide (CO), sulphur dioxide (SO<sup>2</sup>), nitrogen dioxide (NO<sup>2</sup>), and particulate matter (PM<sup>10</sup> and PM<sup>2.5</sup>). Combustion sources (e.g. diesel particulate matter) are of particular concern because of their association with respiratory illness. The air quality assessment boundaries covered the mine footprint and access routes, and the Application evaluated changes from baseline conditions that might cause adverse human health effects.



### *9.1.2 Project Issues and Effects Identified in the Application*

The Proponent conducted air quality modelling to assess the proposed Project's effects on ambient air quality relative to the national and provincial air quality standards, objectives, and guidelines. Effects were defined as estimated risks to human health.

The Application noted that effects could result from activities associated with different proposed Project components (mine site, plant site, access road and TSF) during the construction and operations phases. Effects were highest during the construction phase. Key parameters of interest were SO<sup>2</sup>, NO<sup>2</sup>, CO and PM<sup>10</sup> and PM<sup>2.5</sup>.

Additionally, mine-related traffic along paved and unpaved roads and mine blasting would produce fugitive dust, which also increases PM concentrations.

The Application modelled air concentrations in the proposed Project area using conservative assessment scenarios that assumed year-round occupancy. It concludes that concentrations would be well under applicable air quality guidelines for SO<sup>2</sup>, NO<sup>2</sup>, CO and PM, and would have negligible effects on the increased risk of death per person per year and number of deaths per year.

The Application evaluated the proposed Project -related diesel particulate matter for potential effects on human health. The predictions showed that concentrations would exceed Health Canada guidelines for exposure for incremental lifetime cancer risks, and it may result in significant adverse human health effects at Tukii Hunting Camp. Effects and mitigations for Tukii Hunting Camp are addressed in section 7.

### *9.1.3 Project Issues and Effects and Mitigation Identified during Application Review*

No issues related to air quality were raised during the Application Review and no mitigation measures specific to human health impacts were proposed. The Proponent and owners of Tukii Lodge signed an agreement that would see the relocation of the hunting camp away from Morrison Lake to a different location within the guide outfitter's territory.

### *9.1.4 Residual Effects and Cumulative Effects*

There are negligible effects on human health from air pollutants generated by the mine on all sensitive receptors, except for Diesel PM concentrations that would have a significant adverse effect at Tukii Morrison Hunting Camp in its current location.

With the agreement between the Proponent and the guide outfitter to relocate the camp, there are no residual human health effects from the proposed Project.

### *9.1.5 Conclusion*

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA certificate), EAO is satisfied that

the proposed Project would not have significant residual adverse effects on air quality with the successful implementation of mitigation measures and conditions.

## 9.2 Drinking Water

### 9.2.1 *Background Information*

The Application notes that Morrison Lake is known to be used as a drinking water source near the proposed Project area by land users, particularly the Tukii hunting camp. Downstream of the proposed Project, in Morrison Arm of Babine Lake, some residents also source their drinking water from Babine Lake.

The Proponent's effects assessment considered only effects directly resulting from mine-related activities that could make surface water unsafe to drink. This report describes effects relative to the Canadian Drinking Water Quality Guidelines, which are the guidelines used by BC.

### 9.2.2 *Project Issues and Effects Identified in the Application*

Effects to drinking water are similar to effects to surface water quality. As those effects are assessed in section 5.4 (Water Quality), this section deals only with any resulting effects on drinking water quality on human receptors.

The spatial study area boundary includes the proposed mine site area, Morrison Lake and Morrison River and downstream on the eastern shore of Babine Lake as far as the Bell power sub-station. The time period considered was from the proposed construction phase through to post-closure.

The proposed Project could affect drinking water in the following ways:

- discharge of Booker Lake and Ore Pond into Morrison Lake;
- surface runoff and siltation and contaminant loading during construction and operations;
- fecal coliform contamination from sewage treatment;
- leaching of nitrogen residues from blasting during all phases;
- ML and ARD from the waste rock dump and ore stockpile, contamination of ground- and surface water during all phases;
- discharges and spills and associated water chemistry effects during all phases; and,
- effluent discharge into Morrison Lake in the post-closure phase.

The Application predicts that water quality in Morrison Lake would meet BCWQG outside the dilution mixing zone of the effluent diffuser, and that further dilution would occur as Morrison River enters Babine Lake. The Application notes that there are no

seasonal or permanent residences on Morrison Lake that would withdraw water for drinking.

### *9.2.3 Project Issues, Effects and Mitigation Identified during Application Review*

During the review of the Application, additional issues were raised by members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Project Description and Table of Conditions (Appendix 2) commits to specific mitigation measures. Examples of some of the issues and commitments include:

The proposed Project would likely have some effect on the drinking water for Tukki Hunting Camp. In response, the Proponent signed an agreement with the owner that would see the hunting camp on Morrison Lake moved to another location for the duration of the proposed Project.

The owners of Ookpik Wilderness Lodge, located about 10 km south of the proposed Project site, expressed concern about deleterious effects of the proposed Project on their drinking water. Mitigation and management measures are listed in section 5.4. The measures include:

- An erosion and sedimentation control management plan to prevent or reduce run-off from adversely affecting water quality.
- Locating the sewage outfall line, during construction, at least 100 m away from existing waterbodies, and monitoring those waterbodies for fecal coliforms.
- Dust suppression measures to reduce nitrogen residues contaminating the on-site surface water bodies. The off-site surface waterbodies that the public may access would be monitored for nitrogen residue concentrations.
- Posting signs around the pit and the TSF indicating that the water is not potable and public access is not permitted. The pit lake would be 10 to 100 m below the pit rim and therefore not easily accessible.
- Potential water quality management strategies include: measures to reduce seepage from the TSF into the groundwater which ultimately reports to Morrison Lake; groundwater monitoring for seepage water quality; and implementing measures to capture contaminated groundwater should it exceed the rates predicted in the Application effects assessment.

### *9.2.4 Residual Effects and Cumulative Effects*

Having regard to the mitigation measures proposed to protect drinking water quality, and the measures also described in section 5.4 regarding surface and groundwater quality, EAO has concluded that the proposed Project is unlikely to result in residual adverse effects to human health due to changes in drinking water quality.

### 9.2.5 Conclusion

Having regard to the Proponent's commitments (which would become legally binding as a condition of an EA certificate), EAO is satisfied that the proposed Project would not have residual adverse effects on drinking water with the successful implementation of mitigation measures and conditions.

## 9.3 Cultural Foods

### 9.3.1 Background Information

The Application uses the term "country foods". As per the suggestion of Lake Babine Nation, this has been changed to "cultural foods" for this report.

The Application defines cultural foods as animals, plants and fungi harvested for consumption as medicine or food. The use of cultural foods in a community is influenced by resource availability and food preference. Large game, fish and berries are examples of cultural foods that typically compose a substantial portion of the diets consumed in aboriginal communities and portions of rural non-aboriginal communities.

The study area for cultural foods encompasses the proposed Project footprint plus a zone approximately 2 to 3 km wide around the proposed footprint. The Proponent assessed cultural food usage by carrying out interviews with First Nation community members, guide outfitters, trappers and recreational users in four communities in the region: Fort Babine, Tachet, Smithers Landing and Burns Lake. Interviews indicated there is limited harvesting in the proposed Project area with the exception of Tukii Hunting Camp which guides hunting trips on a regular basis in the proposed Project area. However, the Application reports the interview sample size was too small to confidently estimate the amount of harvesting occurring in the proposed Project area.

Specific cultural foods identified in the Application are moose, grouse, lake trout, black huckleberry, raspberry, blueberry, highbush-cranberry and soapberry. Moose are a particularly important food source for First Nations and non-aboriginal hunters in the region. Black huckleberry and highbush-cranberry are reported to be the most abundant country food berry species in the proposed Project area.

### 9.3.2 Project Issues and Effects Identified in the Application

The effects assessment for cultural foods provides an evaluation of human health risks from exposure to metals in cultural foods. Other parts of the Application, including the ecosystems, water quality and fish effects assessments implicitly or explicitly address effects that are relevant to cultural foods such as habitat loss and direct mortality.

Based on assessments carried out for dust deposition and predicted metal concentrations in water, soil and vegetation, the Application reports that, during

operations the only potential sources of contaminant uptake into cultural foods would be from the predicted elevated metals in sediment and water in the TSF and soils at the low grade ore stockpile. Following mine closure, metal contaminants could potentially accumulate in cultural foods via water, sediments, wetlands and aquatic invertebrates in the TSF.

The Application reports moose and grouse are the only cultural foods that could cause health risks to people due to uptake of metals. The human health risk assessment predicts metal concentration in these foods during operations and post-closure would be very similar to baseline metal concentrations. Consequently, the Application suggests there would be no significant adverse effects to people from metals in cultural foods.

Other effects related to cultural food species are mentioned in the ecosystems, water quality and fish sections of the Application.

### *9.3.3 Project Issues, Effects and Mitigation Identified during Application Review*

Water quality effects could have a significant influence on cultural foods. In particular, uptake of metals in fish tissues from Morrison Lake and in wildlife species at the TSF are potential sources of adverse effects to cultural foods. The water quality effects assessment was refined substantially during the Application Review period and concluded that water quality effects would be within BCWQG. Consequently, adverse effects to edible fish from uptake of metals were considered to be minimal.

Aside from the issue of water quality and fish, additional issues were raised by members of the public and Working Group members during the review of the Application.

A number of these issues and mitigation measures are discussed and assessed in section 5.5 – Fish and Fish Habitat and section 5.5 – Ecosystems and Wetlands, which have a significant overlap with this valued component.

Additional issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 1. The Project Description and Table of Conditions (Appendix 2) commits to specific mitigation measures. Examples of some of the issues and commitments include:

Health Canada and the owners of Ookpik lodge raised the following issues relating to the cultural foods effects assessment submitted in the Application:

- Health Canada requested that the Proponent collect additional baseline data for metals in individual cultural foods – such as moose and grouse – that are consumed in high frequency and/or magnitude by local residents and First Nation populations to provide a more complete baseline reference against which to compare future data collected during the proposed Project life.

- The Proponent committed to developing a fish and wildlife tissue sampling program in conjunction with Lake Babine Nation.
- The owners of Ookpik Lodge asked the Proponent whether cultural foods would be contaminated by wind borne dust from the proposed Project.
  - The Proponent responded that the assessment of wind conditions, and a commitment to road watering for dust suppression, minimizes the potential effect.

#### *9.3.4 Residual Effects and Cumulative Effects*

Having regard to the mitigation measures proposed to protect cultural foods, EAO has concluded that the proposed Project is not expected to result in residual adverse effects to cultural foods.

#### *9.3.5 Conclusion*

Having regard to the Proponent's commitments (which would become legally binding as a condition of an EA certificate), EAO is satisfied that the proposed Project would not have residual adverse effects on cultural foods with the successful implementation of mitigation measures and conditions.

## **10 Environmental Management Plans**

A number of the Proponent's Commitments discussed above relate to the development of Environmental Management Plans (EMPs). These plans are important parts 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; they include the following plans (those plans marked with an asterisk are mandatory under permitting/licensing requirements):

- Greenhouse Gas and Fugitive Dust\*;
- Water Management;
- Surface Water Quality Management;
- Fish and Fish Habitat Management\*;
- Fish and Fish Habitat Compensation;

- Erosion and Sediment Control Management;
- Soils and Overburden Materials Management;
- Vegetation and Ecosystems Management\*;
- Wildlife Management\*;
- Archaeology and Heritage Resources Management;
- Social Management\*;
- Tailings and Waste Rock Management;
- Tailings Pipeline Management;
- Transmission Line Management;
- Transportation and Concentrate Haulage Management\*;
- ML/ARD Prediction and Prevention;
- Spill Contingency and Emergency Response; and,
- Materials and Industrial and Domestic Waste Management.

The Proponent must submit the EMPs to the appropriate environmental agencies for review and input before work commences. The EMPs are considered preliminary at this time and would be completed in greater detail by the Proponent during the detailed design stage of the proposed Project. Key components of several of the EMPs are included in the Project Description (Appendix 2).

## **PART C – FIRST NATIONS CONSULTATION**

### **First Nations Consultation Report**

#### **11 Lake Babine Nation**

The proposed Project is located within the traditional territory of Lake Babine Nation. This section of the consultation report relates to EAO's engagement, findings and conclusions with respect to Lake Babine Nation.

##### **11.1 Lake Babine Nation Occupation and Use of the Proposed Project area**

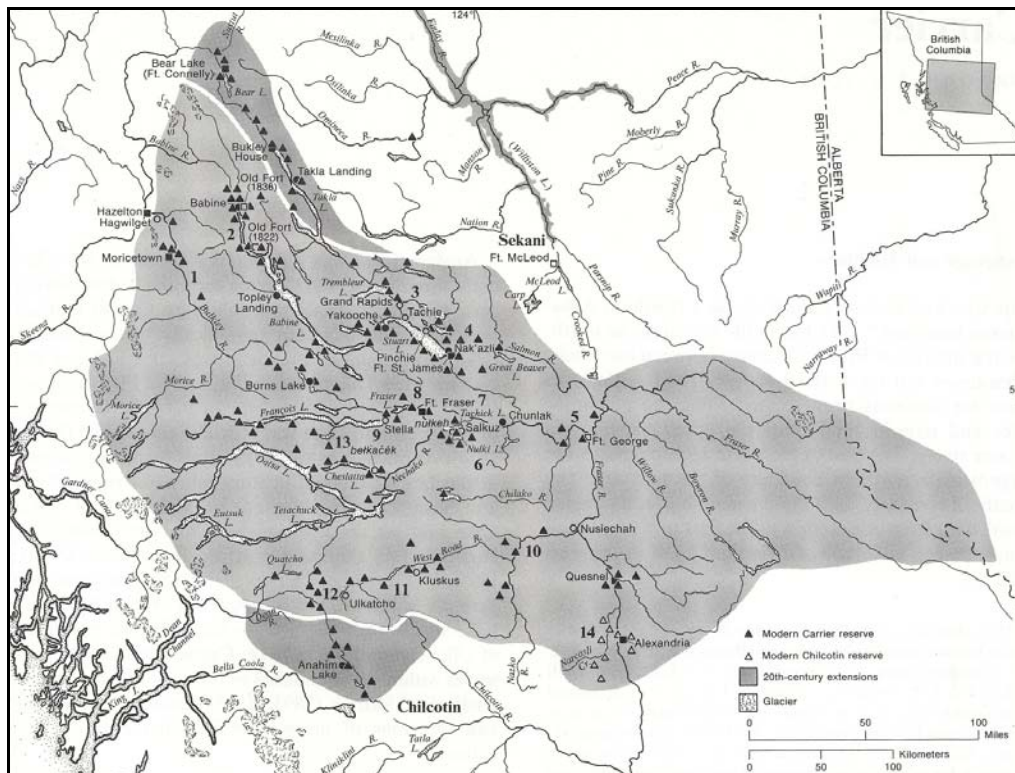
###### *11.1.1 Lake Babine Traditional Use of the Proposed Project Area*

Lake Babine First Nation belongs to a larger cultural group known as the Carrier, which designation refers to those persons speaking an Athapaskan language called Carrier. At the time of contact, the Carrier were an aboriginal people residing in the north-central interior of British Columbia, making use of a territory along the headwaters of the

Skeena and Fraser Rivers.

Together with Wetsuwet'en First Nation, their western neighbours on the Bulkley River, Lake Babine speak a distinct Northern Athapaskan dialect of Carrier known as Babine-Witsuwit'en. As a result of this linguistic affinity, Lake Babine and Wetsuwet'en are often more generally known as "Babine," or "Northern Carrier." In the early nineteenth century, fur traders referred to both groups as "Babines," describing Lake Babine as "Babines of the Lake," and Wetsuwet'en as "Babines of Simpson's River".

**Figure 15: Carrier Territory and Regional Subtribes in the Late 19<sup>th</sup> Century**



Lake Babine and Wetsuwet'en were unique amongst the Carrier in that they shared a common orientation towards Skeena River, which was both the source of the Bulkley and Babine salmon runs and an important interior-coastal trade route through which they obtained marine resources. The Northern Carrier further distinguished themselves from other Carrier divisions through close social, political, and economic connections with Gitksan, a Tsimshian tribe residing on the upper Skeena.

#### *First Contact with Lake Babine*

In the late eighteenth century, British Columbia's northwest coast residents participated in the maritime fur trade with many European merchants, who supplied manufactured



goods in exchange for sea otter pelts. As trade thrived, the sea otter population nearly vanished, increasing the demand for alternate varieties of fur, such as beaver and marten. Coastal peoples turned their attentions eastward, strengthening their connections with interior tribes in order to secure exclusive access to regular supplies of skins.

The first known encounter between non-natives and Lake Babine people took place in June 1811 when a large party of Nâte-ote-tains<sup>22</sup> appeared at Hudson's Bay Company (HBC) Fort St. James. In the Carrier language, Babine Lake was known as *Nata*, the Carrier people called themselves Nâte-ote-tains or "people of *Nata*."

Seven months after this initial meeting, representatives from HBC set out on a voyage of discovery to Babine Lake, becoming the first non-native to visit Lake Babine territory and settlements. They reported seeing a number of villages along Babine Lake with several thousand inhabitants who subsisted principally on salmon.

In order to access a potential new source of furs, in 1822, HBC erected a post on Babine Lake near the village of *Nah-tell-cuz* in Morrison Creek Arm and named it Fort Kilmaurs (it is now called Old Fort). Another motivation for instituting Fort Kilmaurs at Babine Lake was the reliability and size of the Babine River salmon runs, which HBC viewed as an essential source of nourishment for the company's expanding workforce.

From the outset, Lake Babine people supplied Fort Kilmaurs with an incredible variety and quantity of natural resources. HBC reported purchasing:

- fishing and hunting equipment (canoes, gum/sap/resin, nets made of willow twine, caribou and deer snares);
- tens of thousands of salmon (dried and fresh, as well as salmon oil);
- thousands of other fish (dried and fresh trout, whitefish, carp and carp roe);
- fruit (dried and fresh berries, berry cakes, blueberry cakes);
- fresh meat and prepared skins (muskrat, lynx, marten, mink, black bear, otter, fisher, fox, wolverine, caribou, rabbits, beaver, beaver castoreum, beaver robes);
- birds (partridges, bustards, ducks, swans); and,
- Other items, such as dogs (for both eating and packing) and wood products (logs for the fort's construction, willow bark, pine bark, and bundles of watape, a thread made from conifer roots).

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<sup>22</sup> Lake Babine have also been called Nataotin, Nat'oot'en, Ned'u'ten, Nitu'tinni, Nato'tenne, Uanwittenne, and naadottenne.

In 1836, HBC shut down Fort Kilmaurs and moved it to a site close to the outlet of Babine Lake to be closer to the main First Nation salmon fisheries. The new site became known as Fort Babine, and Fort Kilmaurs came to be called Old Fort. Unfortunately, there are no surviving journals from this new incarnation of the HBC post and few written observations of Lake Babine life after Brown's report of 1826.

### *The Annual Round – Use of Resources*<sup>23</sup>

The most important food staple for Carrier people was salmon, and their arrival in the fall was the most significant event in their annual round. Every summer, the Carrier harvested salmon from fishing stations at the outlets of lakes, rivers, and tributary streams. Carrier men captured them in weirs, with conical basketry traps, or using dip nets, and Carrier women processed, dried and stored the fish for future use. The occasional failure of an expected salmon run would have a devastating effect on a group's ability to survive through the colder months.

July and August brought salmon, first and foremost, but summer was a time of abundance with respect to plant-and berry-gathering, as well. The Carrier utilized several plant species, such as wild turnip roots, cambium (the inner bark of a pine), bulbs, lichen, onions, and other greens. In some regions, the Carrier collected the mountain potato; other places provided a large fern root called 'ah, which was eaten fresh or baked in fire-pits. Plants served medicinal purposes as well. The Carrier made tonics, salves, poultices, and other remedies from such things as fungus, spruce and aspen roots, juniper branches, the bark of raspberry bushes, willows, pines and wild roses, and Morice (an Anglican Priest in the 1800s who was the Ethnographer for the Carrier) documented the use of yarrow, sarsaparilla, spearmint, horse tails, Devil's club, and Labrador tea, among other things.

Berries constituted a crucial element of Carrier subsistence. Berry collecting and preserving was one of the most important industries for the Carrier. From summer through fall, women gathered berries in birch-bark baskets, which fruits were then boiled into a paste, formed into thin cakes, and dried for future consumption. The service-berry was particularly vital—so much so that it was called *mai*, or 'the fruit'—but the Carrier harvested many other varieties, such as soapberries, cranberries, viburnum berries, kinnikinnik berries, strawberries, black currants, and numerous species of blueberries.

Hunting was an essential component of Carrier survival. Hunters killed their prey with spears, bows and arrows, deadfall traps, snares, and nets, and often with the

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<sup>23</sup> Annual Round is a term used to describe the annual pattern where First Nations people travel throughout their territory to harvest food and resources at certain times of year and in specific areas.

assistance of dogs. Meat was preserved by drying and surplus fat was melted and stored to provide food for the winter.

Moose, caribou and deer were not abundant in Carrier territory, but mountain goats, mountain sheep, marmots, ground-hogs, rabbits, hares, beavers, and bears were more plentiful. The Carrier prized these animals not only for their flesh, but also for their parts. They made tools of bone, horn, teeth, and antler, and used all varieties of skin and fur for clothing, shoes, bags, blankets, and sinew. Caribou and moose hides, and beaver, lynx, marmot and muskrat skins, were especially valuable, though the Carrier used marten, fisher, otter, wolverine, fox, wolf, coyote, porcupine, ermine and mink, as well. In fall, the Carrier trapped migrating birds, such as geese, swans and ducks, with snares and nets.

When winter set in, most Carrier groups abandoned their villages, parted ways and moved off to temporary camps in their respective hunting territories. These encampments changed location from year to year. Site selection was based on ready access to dry firewood. As a source of both shelter and heat, it is clear that wood was crucial for winter survival, but it was equally important in other seasons, too. The Carrier constructed weapons of maple, juniper and willow and sustained themselves on the inner bark of the hemlock when food was scarce; they wove fishing nets of willow and alder bark, or nettle fibres, and built wooden weirs to trap salmon; and they used ropes of twisted roots. Most Carrier household utensils were composed of the bark and roots of birch and spruce, made into baskets, cooking vessels, water carriers, and baby cradles. Birch and spruce bark were also essential in the construction of canoes until the early 1800s, when the Carrier started using dugout canoes made of poplar and cottonwood.

In March and April numerous hunting excursions by Lake Babine Carrier, as small parties—often just pairs of men—ventured up into the mountains to hunt deer and caribou, sometimes returning with large quantities of fresh meat, as well as fresh fish on occasion.

### *Lake Babine Territory, Villages, and Resource Areas*

In the 1820s, Lake Babine people resided in villages on the northern half of Babine Lake: *Tachet* (near current day Topley Landing), *Nah-tell-cuz* (now called Old Fort), and *Nass-chick* (current day Fort Babine). Their salmon fisheries were centered at Nilkitkwa Lake, which was just north of the mouth of Babine River as it leaves Babine Lake, though salmon of a lesser quality were also taken in Babine Lake tributaries such as Fulton River and Morrison Creek. The islands of Babine Lake supported seasonal camps for berry gathering and fishing.

### *Nass-chick* (Fort Babine)

At the time of contact, the area around the outlet of Babine Lake to the outlet of Nilkitkwa Lake supported a robust annual salmon fishery. Salmon were not only a major food source for Lake Babine people, but in surplus years they attained value as an article of trade. Every summer, residents of all three principal Lake Babine villages moved to Fort Babine to catch and process salmon from weirs, barricading the river at its narrowest points.

The Northern Arm of Babine Lake features dozens of archaeological sites. Archaeologists have found the remains of six villages, three habitation sites, and numerous cache pits concentrated around Smithers Landing, McKendrick Island and Old Fort portions of the Main Arm. More recently, Lake Babine elders have reported a number of traditional use sites in the same vicinity, and present day archaeological digs sponsored by Lake Babine Nation continue to illustrate the size and importance of that area.

### *Nah-tell-cuz* (Old Fort or Nedo'ats)

This report has already discussed some details about the establishment of Fort Kilmaurs near the Lake Babine village of *Nah-tell-cuz* (or Old Fort). The Skeena River salmon that managed to make it to Morrison Creek Arm would have been inferior to those caught at *Nass-chick* and Nilkitkwa Lake, because the fish were at the end of a long journey from the sea. However, the proximity of the salmon resource made Morrison Creek Arm an ideal location for the establishment of a primary settlement. The Morrison Creek run extended the late-summer fishing season and also provided an alternate salmon-harvesting location to those groups who may not have had access to the weirs at Fort Babine.

### *Tachet* (Fulton River)

When HBC officer William Brown visited Tachet in 1823, he noted that Tachet was an ideal site for capturing large quantities of salmon with relative ease, yet because the fish were at the end of a the journey from the sea, their quality was inferior to those which were caught at the lake mouth below. Still, imperfect as the salmon may have been, the HBC post was willing to purchase them for provisions.

### *Babine Lake Islands*

At the time of contact, Lake Babine made regular use of the Babine Lake islands, not only as fall-winter fishing and fish-processing stations, but also as summer berry-picking grounds. In late September, after the salmon fishery had ceased, Lake Babine left their weirs at the lake mouth and dispersed themselves along the shoreline of the lake and

on the islands, where the women caught whitefish and trout and preserved them while the men trapped the various fur-bearing animals.

### *Trails*

Extensive regional trail networks linked Carrier settlements to each other and to various resource-gathering sites, and a number of them traversed portions of the study area. Lake Babine travelled extensively in search of game, to berrying places, freshwater lakes, and salmon fisheries, to nearby villages on the Bulkley, Skeena and lower Babine Rivers, and to visit neighbours in other districts. Concentrations of trails were found at portages between lake and river systems, along streams, and over mountain passes.

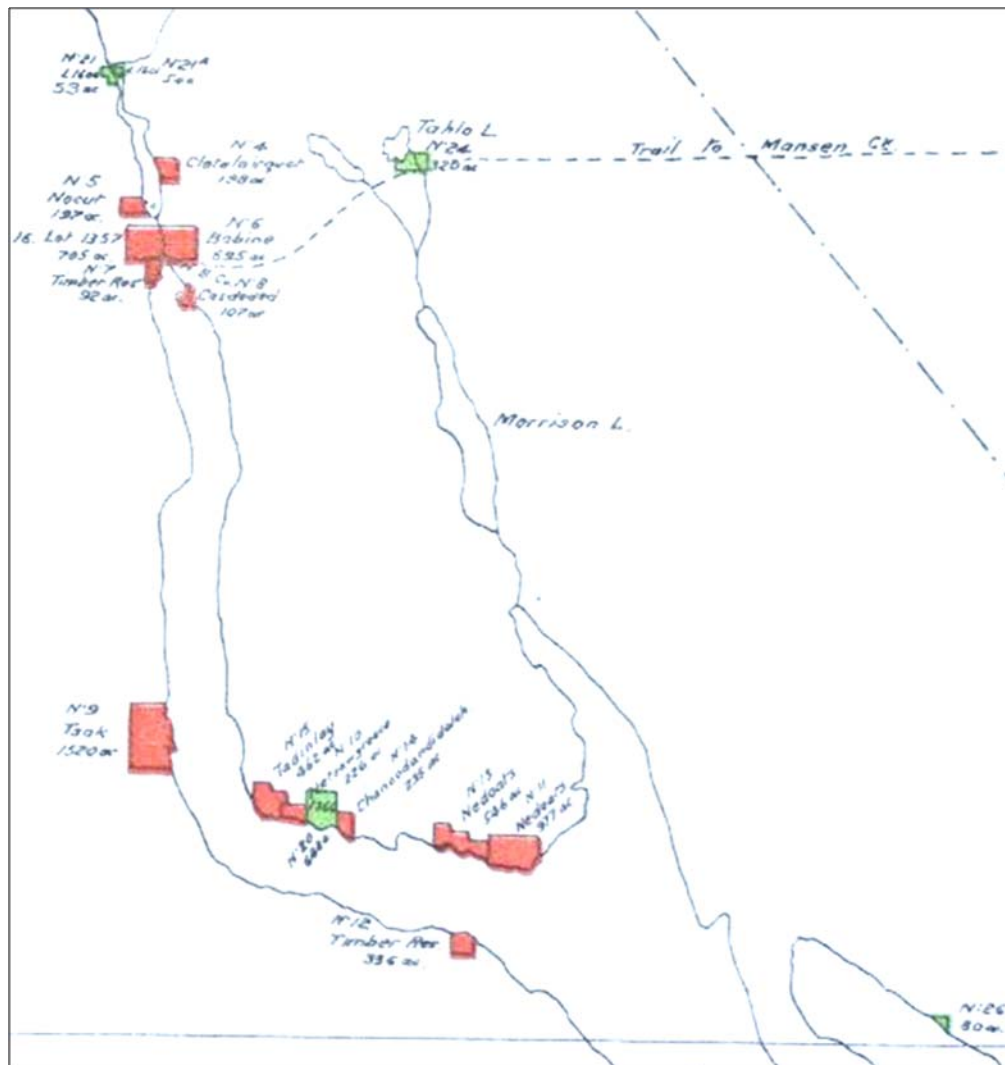
### *Indian Reserves*

Reserves for Lake Babine Nation were set aside at a number of different times. The first four reserves (three near Fort Babine and one near Old Fort) were surveyed just after British Columbia joined confederation in 1871 and new reserves were added along Babine Lake and around Old Fort in 1891.

In the early 1900s, the federal government passed laws preventing Lake Babine from practicing their traditional method of taking salmon by means of weirs, or “barricades”. The conflict arising from these regulations was addressed by Canada with the subsequent “Barricade Treaty” with the Lake Babine. Essentially, Canada purchased additional lands from the province in order to compensate Lake Babine for the loss of their weirs, and in 1909 four additional reserves were added to their 1892 reserve allotments.

Lake Babine Nation currently has 24 reserves on 3,093.9 hectares, most of which are located around Babine Lake. The exception is Woyenne at Burns Lake, which is outside what is normally considered Lake Babine Nation territory.

**Figure 16: 1916 Map from the Royal Commission Babine Agency map\***



\*(Green shows new reserves and red shows old reserves confirmed)

### 11.1.2 Lake Babine Nation Current Occupation and Use of the Proposed Project Area for Traditional Purposes

During the course of consultation on the EA, Lake Babine Nation provided very limited site specific information indicating present use of the area. This included several documents during the second screening of the Application and during Application Review. These documents indicated, at a broad level:

- cultural use and/or burial sites on Morrison Point;
- continued hunting through the project footprint, specifically of moose and bear;
- continued trapping use through the area, specifically by two Keyoh holders;

- trail through the proposed Project site, traversing Morrison point;
- use of the area for harvesting plants, berries and other resources;
- use of Morrison Lake and the small lake tributaries and creeks, specifically Morrison River, for harvesting fish; and,
- a significant dependence - physical, social and cultural - on the harvesting and utilization of salmon.

Lake Babine Nation indicated there was continued use of the proposed Project area for a range of activities and resource harvest that would be consistent with the Carrier annual round described earlier. This includes the assertion that the area is currently used for harvesting and gathering plants and berries and the use of a series of trails for hunting and trapping, as well as transportation corridors. It is also worth noting that Lake Babine Nation consistently indicated the importance of water as a resource use, and in particular water quality, as it affects anadromous and non anadromous fisheries.

In 2000, an archaeological inventory study completed for the Forest Service focused on a portion of the Main Arm of Babine Lake, from Old Fort to a point slightly north of Tsak IR 9 near Fort Babine. Interviews with Lake Babine elders, who reported a number of traditional use sites in this specific area, are consistent with the assertions made by Lake Babine Nation. These interviews indicated the areas for berry gathering, moose and bear hunting areas, fish traps, cache pits, sweat lodges, hayfields, trails, cabin sites, salt licks, culturally modified trees and numerous place names in the Carrier language. While certainly not conclusive, twentieth-century utilization of traditional places can represent a continuation of pre-contact practices, and provides insight about the manner in which these lands may have been used by Lake Babine ancestors.

## 11.2 Lake Babine Nation Aboriginal Rights (Including Title)

Taking into account all the information available to it, EAO understands that Lake Babine Nation would have used the lands and waters around the proposed Project in a manner that was consistent with the Carrier annual round described earlier in this report. Hunting and trapping of moose, deer, sheep, caribou, bear, muskrats, mink, rabbits, martens, beaver and birds would have occurred throughout the proposed Project site, as well as gathering plants, roots, berries and other resources typically found in the sub-boreal forests of the area. In particular, the records are clear that Lake Babine Nation relied heavily on the fish resources of the area, salmon in particular, but there are also numerous references to whitefish and other non anadromous fish in the literature.

It is evident to EAO that Lake Babine aboriginal rights are closely connected with the existence and use of fish, salmon in particular, for food, social and ceremonial purposes. Salmon, and the environment which sustains it, is synonymous with the

culture of Lake Babine Nation. Activities that significantly impact salmon are likely to significantly impact rights.

None of the ethnographic or historic sources indicate there were other strong competing claims from other First Nations to the northern end of Babine Lake including Morrison Lake and Morrison River in 1846, which is the relevant date associated with the legal test for aboriginal title. In fact, it is evident to EAO that Lake Babine would have resided around the northern end of Babine Lake in great numbers (HBC reports often make reference to 2,000 residents) and would have occupied the area to the exclusion of other First Nation groups.

It is EAO's assessment, based on current information available to it, that Morrison Lake, Morrison River, the Babine Archipelago and the lands surrounding this area were part of the broader territory used by Lake Babine Nation for traditional activities associated with the typical Carrier annual round, and that, consequently, there is a strong *prima facie* case in support of the assertion that aboriginal rights are exercisable in the proposed Project area. Moreover, it is EAO's assessment that there is a moderate to strong *prima facie* case in support of Lake Babine Nation's assertion of aboriginal title to the area in which the proposed Project is to be situated. It is important to note that this conclusion is a *prima facie* determination made in order to discharge EAO's *Haida* analysis and is focused on the site of the proposed Project. This analysis is not meant to apply to any other part of Lake Babine traditional territory; this assessment is only being made for the purpose of the proposed Project.

With regard to the *Haida* spectrum, EAO's preliminary assessment was that the required scope of consultation with Lake Babine Nation was on the deep end of the spectrum. This was originally communicated to Lake Babine Nation in December 2008. EAO has engaged with Lake Babine Nation in a manner which is consistent with this assessment.

### 11.3 Consultation with Lake Babine Nation

#### *11.3.1 Lake Babine Nation Involvement with EAO*

##### ***Early Engagement and Section 10 Order – 2003 to 2006***

On September 30, 2003, EAO accepted the proposed Project into the EA process by issuing a section 10(1)(c) Order. EAO wrote to Lake Babine Nation to inform them.

When the EA for the proposed Project commenced, there was a lack of clarity on which entity represented Lake Babine Nation in relation to asserted aboriginal rights. At the time, EAO understood there were five communities within Lake Babine Nation (Tachet, Woyenne, Fort Babine, Old Fort and Donnelly Landing), as well as a system of clan boundaries and several organizations which represented hereditary chiefs. Initially, EAO understood that Old Fort (also called Nedo'ats), Tachet and Fort Babine



communities were separate entities from Lake Babine Nation located in Burns Lake. EAO also understood that Old Fort was the closest geographic community to the proposed Project. EAO's approach to engagement with Lake Babine Nation started with this broad understanding. EAO sent letters communicating this understanding to the Lands Department of what was then called the "Old Fort Band" with a copy to the Chief and Council of the Land Babine Nation (formerly "Tachet Band"). These letters invited participation in the EA for the proposed Project, and specifically offered a role in the Working Group.

The Old Fort Band was invited to an initial working group meeting in Smithers and a site visit in October 2003. At that initial meeting, the Old Fort Band (Nedo'ats) indicated it had concerns regarding the proposed Project's water quality, wildlife travel routes, and alignment of the powerline and road.

On October 16, 2003, EAO received copies of a letter which was sent to a number of government agencies from Lake Babine Nation Chief Emma Palmantier. The letter stated that all agreements and correspondence should be channelled through the Nedo'ats (Old Fort) Band Office in Granisle and that the Nedo'ats "managed and controlled its own territory".

After the initial notification of the proposed Project, there was relatively little engagement between EAO and Lake Babine Nation through 2004 and 2005. However, in late 2005, discussions began again with EAO confirming with the Nedo'ats that the Nedo'ats Hereditary Chiefs (NHC) would be speaking for the Nedo'ats community, which EAO assumed to also mean the Nedo'ats Band Office, although the relationship between these entities was somewhat unclear. EAO also communicated an interest in meeting NHC and the Proponent together to discuss the proposed Project and consultation. EAO also began to discuss the resources needed to support participation of NHC in the EA.

At the beginning of 2006, EAO received communication from NHC which expressed increasing concerns that the Proponent had been meeting with the Lake Babine Nation Chief and Council. NHC considered this a violation of protocol, noting that the Proponent should only be meeting with full tribal and clan groups. They requested an in-depth environmental study be conducted by NHC.

On January 6, 2006, Lake Babine Nation Chief Emma Palmantier wrote to a number of government agencies, informing them that NHC did not represent the Nedo'ats community and that government agencies must consult with Lake Babine Nation elected Chief and Council. This appeared to be a reversal of the position Chief Palmantier took in her October 16, 2003 letter which directed agencies to engage

the Nedo'ats Band Office directly. EAO immediately wrote to Chief Palmantier to clarify how this affected consultation on the proposed Project.

Throughout January 2006, there were a series of discussions between NHC and EAO in which NHC refuted the January 6, 2006 position taken by Chief Palmantier. NHC stated that it had sole jurisdiction over the proposed Project area and consultation should happen only with it. EAO then provided \$10,000, which it had committed earlier in 2006, for NHC to facilitate a community meeting which would engage the Tachet and Fort Babine communities.

On April 11 and 12, 2006, NHC facilitated a two day community meeting in Granisle to explain the proposed Project and to gather community perspectives. EAO staff attended this meeting. A number of issues were raised, some of which include:

- concerns over long term rehabilitation of the Bell and Granisle mines;
- impacts to wildlife;
- long-term monitoring;
- water quality;
- concern for protection of spiritual and archaeological sites;
- incorporating traditional knowledge into studies and research; and,
- conflicts between elected and hereditary chiefs with respect to consultation.

In late April, EAO received a letter from Lake Babine Nation Chief Palmantier, reiterating that NHC was an independent society which did not represent Lake Babine Nation members. She indicated that all funding must go to elected Lake Babine Nation Chief and Council and wanted to know where monies had been disbursed to date.

In April, EAO was informed that a number of hereditary chiefs had resigned from NHC.

EAO called a Working Group meeting in May 2006 in Smithers to discuss the proposed Project, the EA process, and the draft Terms of Reference. A number of representatives from Lake Babine Nation, Tachet and Old Fort attended. The following concerns were raised:

- use of Bell and Granisle pits to accommodate Morrison tailings;
- monitoring of the mine once closed;
- uncertainty around the impact of the mine and whether it would go beyond the mine footprint (e.g. roads and transmission lines);
- consideration of opening the Forest Service Road from Fort Babine to Hazelton for Old Fort members;
- potential impacts to water quality, especially as they relate to Bell and Granisle mines;

- potential impacts to wildlife and fish, particularly in Morrison River; and,
- restricting the use of cyanide.

Given concerns expressed by Lake Babine Nation members regarding water quality, EAO convened a Water Quality Working Group meeting in June, 2006.

Lake Babine Nation representatives were invited, but did not attend.

In June 2006, there were a number of reports in the media regarding governance conflicts between Lake Babine Nation elected Chief and Council and NHC. Other government agencies, specifically FLNRO, took the position that it was an internal issue and that consultation would continue with Lake Babine Nation elected Chief and Council as previously done.

Following the April Open House in Granisle hosted by NHC, EAO made a number of attempts to continue that relationship. In July 2006, NHC indicated they would be submitting a funding proposal, in addition to the \$10,000 already supplied by EAO, in order to support their engagement in the process. A proposal was never received.

Lake Babine Nation elections were held in July 2006 and Betty Patrick was elected Chief.

On September 18, 2006, EAO staff met with the new Lake Babine Nation Chief, Betty Patrick, and Council. Chief Patrick reiterated earlier concerns from former Chief Palmantier that all capacity support funding must be supplied to Chief and Council and that all future correspondence with Lake Babine Nation must be through Chief and Council. Chief and Council requested that EAO inform NHC that EAO would be consulting with the elected Chief and Council. EAO was of the view that it was still open to hearing from NHC and therefore did not write a letter as requested by Chief Patrick. Lake Babine Nation expressed a number of concerns, many of which had been heard since EAO's engagement began in 2003. Some of these concerns included:

- potential impacts to surface and groundwater quality;
- potential impacts on fish and wildlife, specifically salmon, moose and furbearers;
- potential impacts on traditional uses such as berry picking;
- safety concerns associated with increased road traffic;
- cumulative impacts of the Bell and Granisle mines;
- impacts of sediment and dust;
- capacity support for Lake Babine Nation; and,

- how the consultation process with Lake Babine Nation communities should be carried out (e.g. via Chief and Council).

EAO met with Chief and Council on September 2, 2006, and again on September 22 with the Proponent present. Additional issues were raised, including:

- impacts on specific Lake Babine Nation trappers;
- concerns about the use of toxic chemicals, specifically cyanide;
- interest in long-term monitoring; and,
- concerns about elders eating country food contaminated by the proposed Project operations.

EAO planned a working group meeting to be held in October 2006 in Granisle with an invitation to Chief and Council on behalf of Lake Babine Nation. The meeting was cancelled due to challenges with working group members not being able to attend. However, at the request of Chief and Council, EAO began to plan a community meeting to inform Lake Babine Nation community members of the proposed Project. The meeting did not occur due to logistical challenges and EAO committed to reschedule another meeting in early 2007.

In October, 2006, EAO transmitted the first draft of the Terms of Reference to Chief Patrick and the four Lake Babine Nation working group members identified by Lake Babine Nation Chief and Council. EAO asked for comments and indicated that the Terms of Reference would be the subject of an upcoming working group meeting.

### ***Engagement on Terms of Reference and Section 11 Order: 2007-2008***

In early January 2007, EAO requested that another community meeting be held with Lake Babine Nation members. EAO and Chief Patrick agreed to a date in April, but the community meeting was postponed until June 2, 2007 due to a death in the community.

EAO requested another meeting with Lake Babine Nation Chief and Council to discuss their comments on the Terms of Reference, the draft section 11 Order, and potential capacity funding.

EAO scheduled a working group meeting on June 25, 2007 to discuss the draft Terms of Reference. Chief Patrick attended the meeting and restated that meeting with Chief and Council was the appropriate process for ensuring all of the affected Lake Babine Nation communities were included in the EA of the proposed Project. Chief Patrick raised a specific issue relating to the “4000 Road” running behind the communities of Fort Babine and Tachet and also reinforced concerns relating to water quality and land use.

A community meeting was held on June 27, 2007 in Burns Lake to discuss the proposed Project with Lake Babine Nation community members. At this meeting, a number of themes were raised by the Lake Babine Nation community:

- jobs and training for Lake Babine Nation members as well as revenue sharing options;
- water quality and a concern that increased rates of cancer were being caused by pollutants from the Bell and Granisle mines;
- suggestion that the Proponent use the existing pits at the Bell and Granisle mines for tailings and waste rock;
- use of alternative transportation routes due to safety concerns;
- potential impacts to fish and wildlife;
- preferred communication methods with hereditary chiefs and clans; and,
- impacts from climate change and cumulative effects.

In July, EAO supplied \$10,000 to Lake Babine Nation Chief and Council for participation in working group meetings, as well as the review of the draft Terms of Reference and draft section 11 Order. EAO asked for Lake Babine Nation comments on both of those documents. On August 1, 2007, Chief Patrick wrote to EAO, stating that Lake Babine Nation wanted to be involved in all aspects of the proposed Project, including a revenue sharing agreement and provision of jobs, and that all studies undertaken by the Proponent be halted until a protocol agreement between EAO, Lake Babine Nation and the Proponent was signed. It was also noted that each community should be consulted and additional funding should be provided to facilitate this engagement. Specific comments on the Terms of Reference were also provided and incorporated into EAO's tracking table.

In October 2007, EAO wrote to Lake Babine Nation thanking them for their comments on the draft Terms of Reference and asking for comment on the draft section 11 Order. EAO also requested that Lake Babine Nation participate in an upcoming working group meeting and encouraged Lake Babine Nation to inform the Proponent of its consultation requirements, including their preference for engaging the five Lake Babine Nation communities.

In September 2007, EAO became aware that Lake Babine Nation Chief and Council were becoming increasingly frustrated that the Proponent was engaging individual Lake Babine Nation community members without prior approval of Chief and Council. EAO requested a meeting with Chief and Council to discuss this issue, comments on the Terms of Reference, and funding concerns.

In December 2007, EAO wrote to Chief and Council and included a new tracking table illustrating how Lake Babine Nation comments on the Terms of Reference were addressed. EAO also offered to facilitate a meeting between the Proponent and Chief and Council around the issue of information collection and development of a protocol between Lake Babine Nation and the Proponent. EAO was becoming increasingly concerned that the proposed Project was continuing without substantive information being supplied by Lake Babine Nation.

EAO approved the section 11 Order on January 18, 2008.

In a January 2008 letter, EAO asked Chief Patrick to organize a meeting to discuss an information protocol agreement which would enable the Proponent to meet Lake Babine Nation's consultation requirements. At the June 27, 2007 working group meeting, Chief Patrick said:

“...appropriate consultation would need to include discussions with, and direction from, Lake Babine Nation Chief and Council, Hereditary Chiefs, elders and various Lake Babine Nation communities. This could be achieved through meeting with Chief and Council as well as individual and community meetings with Lake Babine Nation communities.”

EAO met with Lake Babine Nation Chief and Council on February 1, 2008, and with Chief and Council and the Proponent on February 2, 2008. A number of issues were discussed, including the following concerns from Lake Babine Nation:

- request for involvement in ongoing studies being completed by the Proponent;
- request for input into the Terms of Reference;
- request for protocols for information sharing between Lake Babine Nation and the Proponent and that all studies conducted by the Proponent reflect Lake Babine Nation Traditional Ecological Knowledge (TEK) and perspectives;
- lingering concerns over Bell and Granisle mines, specifically water quality;
- expression of a strong desire for an Impact Benefit Agreement; and,
- request for resources to review all EA documents, in addition to support from mining engineers and legal advice.

On April 2, 2008, EAO met again with Lake Babine Nation Chief and Council, the Proponent and representatives of the Canadian Environmental Assessment (CEA) Agency. The focus of this meeting was on the process for the EA. Additional concerns were expressed by Lake Babine Nation Chief and Council, including the following recurring themes:

- interest in being involved in all environmental baselines, including the use of TEK;
- concerns about impacts of chemicals on fish and wildlife;
- request for resources for all communities to participate in the review;
- potential impacts on ground and surface water quality;
- cumulative effects, specifically impacts from the Bell and Granisle mines;
- concerns about community-specific or individual-specific agreements with the Proponent;
- design studies reflective of Lake Babine Nation perspectives;
- potential impacts on Lake Babine Nation trappers;
- concerns that the Proponent was moving too quickly without proper Lake Babine Nation involvement; and,
- request for a communication protocol or agreement between Lake Babine Nation and the Proponent.

In April 2008, Lake Babine Nation informed EAO that it identified an internal group of staff (“Lake Babine Nation Working Group”) to review all EAO materials.

Lake Babine Nation indicated it would provide EAO with comments on the draft Terms of Reference.

On June 11, 2008, EAO sent a letter to Chief Patrick which outlined EAO’s efforts to date to engage the Lake Babine Nation and to seek meaningful information and Lake Babine Nation perspectives. The letter repeated earlier requests for information on Lake Babine Nation’s aboriginal rights and specific views of the proposed Project’s impacts on those rights. The letter said that, in the absence of any specific information on rights provided by Lake Babine Nation, EAO would use any information available to it and proceed with the review. On June 25, 2008, EAO became aware that Lake Babine Nation retained the law firm of MacDonald and Company.

For approximately the next ten months, much of the correspondence between Lake Babine Nation and EAO came through Lake Babine Nation’s legal counsel.

On July 2, 2008, Lake Babine Nation’s legal counsel invited EAO to attend a meeting with Chief Patrick in Vancouver. EAO accepted the meeting and informed the new legal counsel of the extensive engagement to date. Lake Babine Nation’s legal counsel offered a lengthy agenda, much of which was directed towards developing a protocol agreement between EAO and Lake Babine Nation and revisiting the EA process. This included offering a number of proposed changes to the approved section 11 Order.

Also in July 2008, Lake Babine Nation legal counsel proposed to hold a one-day workshop in Burns Lake to discuss potential changes to the EA process. EAO declined the invitation to the meeting and outlined consultation work completed to date. A workshop was not held. EAO said it would be willing to look at comments on the approved section 11 Order.

On July 16, 2008, EAO offered Lake Babine Nation \$15,000 in capacity support.

Lake Babine Nation legal counsel took the position that EAO prejudged the outcome of consultations, and that a standard consultation process was not appropriate, saying there should be a “process to discuss the process”. Some of the specific comments Lake Babine Nation’s legal counsel made included:

- the Proponent must look at all transportation routes;
- the scope of assessment is too narrow and the review must consider cumulative effects;
- the review must consider if the proposed Project is even possible if mitigation is not possible;
- Lake Babine Nation must be involved with all studies and traditional use information;
- Lake Babine Nation’s input must be sought throughout the process; and,
- the section 11 Order must be amended to include a clause allowing Lake Babine Nation to participate in screening and to determine if sufficient Lake Babine Nation information was included in the Application.

In early September 2008, EAO became aware that Chief Patrick asked the Proponent to not speak with individual Lake Babine Nation members and that all communication should go through Chief and Council. Chief Patrick specifically asked the Proponent to return any information it obtained from Lake Babine Nation members.

On October 14, 2008, Chief Patrick wrote to Environment Minister Barry Penner informing him that the proposed Project would affect Lake Babine Nation’s rights and preferred use of land, and that the EA process must include Lake Babine Nation. Chief Patrick noted that the EA review was proceeding without the participation of Lake Babine Nation and that it was only since Lake Babine Nation had obtained legal counsel that the proposed Project could move forward with meaningful participation. Chief Patrick expressed concerns that EAO was not willing to make changes to the section 11 Order.

On October 17, 2008, EAO wrote to Chief Patrick asking for any additional comments on the draft Terms of Reference beyond those made in August 2007. EAO gave a deadline of November 30, 2008 to provide additional comments.



On November 12, 2008, Chief Patrick again wrote to Minister Barry Penner, saying that Lake Babine Nation required additional financial capacity and that any work done to date should not be considered consultation. Chief Patrick stated it was important for Lake Babine Nation to be engaged on the section 11 Order and the draft Terms of Reference.

On December 12, 2008, EAO responded to the October 17 and November 12, 2008 letters to Minister Penner. EAO's letter made a number of points, including:

- an acknowledgement that Lake Babine Nation has a strong *prima facie* claim for aboriginal rights within its territory;
- an acknowledgement by EAO that the proposed Project may significantly affect Lake Babine Nation's asserted rights and recognition that the proposed Project would require deep consultation;
- a statement from EAO saying that, in its view, the EA process was deep consultation;
- a request for more detailed information on aboriginal rights and historical use of lands and resources;
- evidence that reasonable attempts had been made by EAO in seeking input from Lake Babine Nation, including the section 11 Order;
- identification of capacity support offered by EAO and the Proponent; and,
- evidence of EAO's strong record of meeting with Lake Babine Nation communities to date.

On December 19, 2008, Lake Babine Nation's legal counsel asked for an extension to the November 30, 2008 deadline to provide comments on the draft Terms of Reference. EAO agreed to this request.

### **Engagement During Litigation – Consultation and the Draft Terms of Reference: 2009-2010**

On December 30, 2008, the Proponent filed suit with the Supreme Court of British Columbia, claiming damages from Lake Babine Nation, and specifically, Chief Betty Patrick, in relation to a press release made by Chief Patrick in October 2008. EAO was not a party to any of the communication between the Proponent and Lake Babine Nation leading up to this suit. The suit influenced much of the discussion between the two parties during 2009 and 2010 and played a significant role in how EAO, the Proponent and Lake Babine Nation communicated and shared proposed Project-specific information.

On January 16, 2009, Lake Babine Nation's legal counsel provided comments on the draft Terms of Reference. Many of the comments related to potential changes to the EA

process, or designing a Lake Babine Nation specific EA process. As well, Lake Babine Nation suggested that the EA process be suspended while EAO conduct a cooperative strength of claim assessment with Lake Babine Nation, and provide the facts and documents upon which such an assessment would be made. Counsel also requested detailed reasons why Lake Babine Nation's suggestions with respect to changes to the approved section 11 Order were not made. EAO declined to conduct a cooperative strength of claim assessment, stating it had already provided Lake Babine Nation with an assessment that it held a strong *prima facie* claim for rights.

Lake Babine Nation confirmed it would attend a working group meeting on February 17, 2009; however it then sent regrets, requesting a government to government meeting instead. EAO agreed to a meeting, which was held on March 23, 2009.

On March 11, 2009, Lake Babine Nation filed a defence and counterclaim against the Proponent in the British Columbia Supreme Court.

Prior to the March 23, 2009 meeting, EAO requested information on Lake Babine Nation historical use of land and resources and its perspectives on how the proposed Project could affect aboriginal rights and how it wished to be consulted. Lake Babine Nation's legal counsel confirmed the meeting, but stated that attendance would be conditional on additional capacity funding. EAO then secured \$7,500 from the Proponent to support Lake Babine Nation's continued participation.

During the March 23, 2009 meeting with Lake Babine Nation legal counsel and Chief Patrick, the central theme of discussion was around consultation on the proposed Project in light of the fact that both the Proponent and Lake Babine Nation were suing each other. EAO committed to consider potential changes to the EA process to accommodate this unique situation. Lake Babine Nation also took the position that EAO must fully understand Lake Babine Nation rights and that a *prima facie* analysis was not sufficient. EAO maintained that a preliminary strength of claim had already been made and that the EA constituted "deep" consultation for the purposes of EAO's *Haida* consultation duties. EAO agreed to continue to discuss capacity funding, status updates on the EA review, and understanding of Lake Babine Nation aboriginal rights.

On March 31, 2009, EAO sent Lake Babine Nation a new tracking table showing how Lake Babine Nation comments were captured in the draft Terms of Reference and accommodated. EAO and Lake Babine Nation Chief and Council agreed to a meeting in Burns Lake in order to discuss Lake Babine Nation rights, as well as final comments on the draft Terms of Reference and consultation.

On April 3, 2009, EAO met with Chief and Council as well as Lake Babine Nation legal counsel in Burns Lake. Much of the conversation revolved around consultation while

litigation was ongoing. Lake Babine Nation sought a separate process that was unique to Lake Babine Nation which excluded the Proponent. Lake Babine Nation maintained it would not participate in any meetings where the Proponent was present. EAO took the position that the EA process was flexible enough to meet the needs of Lake Babine Nation without developing a different process unique to Lake Babine Nation. However, EAO committed to examining the EA process with respect to this unique situation and offered some modifications to meet the needs of Lake Babine Nation.

On April 6, 2009, Lake Babine Nation's legal counsel wrote to EAO requesting an additional \$20,000. It said EAO must understand Lake Babine Nation's rights, but that resources are required to do so. It expressed concern that its participation in the EA review may hurt Lake Babine Nation's position in litigation and that it would be difficult to fund both a defence in litigation and to participate in the EA simultaneously. Lake Babine Nation again reiterated its desire for an alternative, parallel process.

On April 21, 2009, EAO wrote to Lake Babine Nation, outlining proposed modifications to the EA process that would enable Lake Babine Nation to participate with EAO and other government members. EAO also took the position that it was reasonable for Lake Babine Nation to participate in EAO's Working Group meetings where the Proponent was not a member but an invited guest. EAO also extended the deadline for Lake Babine Nation to provide additional comments on the draft Terms of Reference.

On April 29, 2009, Lake Babine Nation's legal counsel wrote to EAO to request additional funds from EAO, reinforcing the fact that Lake Babine Nation and the Proponent could not communicate directly while litigation was still underway. It also stated that Lake Babine Nation would not attend any working group meetings where the Proponent was present. EAO responded, saying that the funding already supplied was adequate and that the proposed adjustments made to the process were reasonable.

On May 8, 2009, Lake Babine Nation provided additional comments on the draft Terms of Reference and tracking table. Many comments related to confidentiality of information on Lake Babine Nation rights and traditional uses. Since the Proponent and Lake Babine Nation had not agreed on a confidentiality agreement, Lake Babine Nation asked questions about how traditional knowledge would be reflected in the Application. Lake Babine Nation also reinforced their position that EAO must develop a full understanding of Lake Babine Nation's rights and that, until the litigation was resolved, Lake Babine Nation could not freely discuss past consultation efforts by the Proponent with EAO.

On May 11, 2009, EAO committed an additional \$5,000 to support Lake Babine Nation.

On May 13, 2009, Chief Patrick wrote to EAO expressing concerns about the Proponent sharing confidential documents with EAO. It was noted that Lake Babine Nation could not accept the \$7,500 offered by the Proponent in March 2009 due to “onerous conditions.” Chief Patrick requested another meeting to discuss the consultation process.

On May 13, 2009, EAO wrote jointly to Lake Babine Nation and the Proponent to inform them that, consistent with the principles of administrative fairness, EAO does not generally accept confidential documents and that the parties must resolve issues around funding and how they share confidential information between themselves. EAO reiterated that significant funding had been provided to Lake Babine Nation and that additional resources would be available during the Application Review stage. EAO then acknowledged the unique situation that existed between Lake Babine Nation and the Proponent and offered to play a central role in communication on issues.

A working group meeting was held on May 14 and 15, 2009 in Vancouver to discuss the draft Terms of Reference and proposed Project effects. Lake Babine Nation did not attend, but Chief Patrick asked that EAO read a letter to the group which stated that Lake Babine Nation could not participate in the EA due to legal proceedings and capacity issues; that an alternative process was required; and that the working group should not continue without their participation.

EAO issued the approved Terms of Reference to the Proponent on May 22, 2009.

On May 25, 2009, EAO wrote to Chief Patrick, seeking Lake Babine Nation’s perspectives around revisions to the EA consultation process that EAO proposed in its April 21, 2009 letter.

On July 14, 2009, a site visit to the proposed Project area was held with Working Group members. Lake Babine Nation was invited to the site visit and EAO also offered to meet with Chief and Council while EAO staff were in Burns Lake.

Lake Babine Nation elections were held in July 2009 and Wilf Adam was elected Chief.

On July 20, 2009, EAO wrote to the new Chief and Council to request a meeting and included attachments of past correspondence.

On August 10, 2009, EAO wrote to Lake Babine Nation legal counsel regarding outstanding action items. No further correspondence was received from MacDonald and Company.

EAO met with the new Lake Babine Nation Chief and Council on September 7, 2009 in Burns Lake to update the new Chief on the proposed Project and past consultation. Prior to the meeting, EAO sent all past documents, including the tracking table,

Terms of Reference and past correspondence. At the meeting, EAO and Lake Babine Nation discussed potential impacts to the proposed Project site, including:

- a burial site under the proposed overburden pile;
- Lake Babine Nation fishing use of Morrison Lake;
- moose use of the proposed site, specifically a potential salt lick under the Tailings Storage Facility (TSF);
- potential impacts to water quality and fish and wildlife in general (salmon, cod and sturgeon specifically); and,
- cumulative impacts, specifically the Bell and Granisle mines.

Much of the focus of the meeting was on the litigation between Lake Babine Nation and the Proponent. Lake Babine Nation reiterated that they were not willing to speak to the Proponent because of the litigation. EAO and Lake Babine Nation agreed to the following points:

- EAO would provide an additional \$10,000 to Lake Babine Nation once the Application was formally submitted;
- a site visit with Lake Babine Nation and EAO staff would be organized by Lake Babine Nation;
- Lake Babine Nation would provide specific information on Lake Babine Nation rights and title in the area;
- EAO would send the Proponent's consultation report to Lake Babine Nation for comment and Lake Babine Nation would commit to provide written comments; and,
- Lake Babine Nation confirmed its willingness to discuss the proposed Project but maintained it would not participate in working group meetings where the Proponent was present.

On September 14, 2009, EAO transmitted the Proponent's consultation report to Lake Babine Nation for comment. On September 29, 2009, the Proponent submitted their Application for an EA Certificate. EAO confirmed Lake Babine Nation had a copy of the Application for screening review and requested their participation in screening.

On October 22, 2009, the Proponent dropped the lawsuit against Lake Babine Nation and Chief Patrick.

On November 24, 2009, EAO wrote to Chief Adam, informing him that EAO did not receive any comments from Lake Babine Nation during the screening process and that Lake Babine Nation did not respond to EAO's offer of \$10,000 in capacity support. EAO also informed Chief Adam that EAO did not accept the Proponent's Application. The letter stated that EAO was aware the Proponent had dropped its lawsuit and that

Lake Babine Nation and the Proponent were in negotiations around appropriate communication. EAO offered to meet with Lake Babine Nation to talk about post-litigation consultation.

In January 2010, EAO followed up on action items from the September 7, 2009 meeting with Chief and Council and again offered to meet to discuss the proposed Project effects and impacts on Lake Babine Nation rights. Representatives from both CEA Agency and EAO met with Chief Adam and Councillor Powers in Victoria on February 25, 2010. Chief Adam informed EAO and CEA Agency that Lake Babine Nation offered four conditions to the Proponent. All four conditions needed to be met in order for Lake Babine Nation to speak with the Proponent again and to drop its countersuit. EAO and Lake Babine Nation agreed on conditions for Lake Babine Nation's participation in the working group, and discussed some site specific concerns with the proposed Project. EAO committed to transfer \$10,000 to Lake Babine Nation to support their participation in the EA review, as agreed to in the September 2009 meeting.

A working group meeting was held in Vancouver on April 14, 2010 to discuss gaps in the Application, and the type of information required to be included in an addendum to the Application. Lake Babine Nation attended this meeting.

On May 27, 2010, EAO wrote to Lake Babine Nation to determine if it had reviewed the Proponent's consultation report. EAO indicated that the Proponent was likely to be submitting a new Application shortly. EAO offered an additional \$10,000 to support Lake Babine Nation's participation in the screening and review of the Application and asked to meet with Chief and Council.

On May 28, 2010, the Proponent submitted an addendum to the Application and a 30-day screening period began. Lake Babine Nation also informed EAO that Chief Adam wished to speak with the full council before providing comments on the Proponent's consultation report, which was sent to Lake Babine Nation in September 2009.

On June 28, 2010, EAO accepted the Application. The 180-day review period started on July 12, 2010. Also on June 28, representatives from CEA Agency and EAO met with Chief and Council to discuss the status of the Application Review, funding, a workplan for review, and EAO and CEA Agency's information needs around Lake Babine Nation's aboriginal rights and title. EAO reiterated that it had not, to date, received any information on rights and title from Lake Babine Nation and again stated that this information was critical to the review.

### ***Application Review: 2010-2012***

During the screening of the Application in June 2010, Lake Babine Nation provided a document titled: “Lake Babine Nation Review and Response to Pacific Booker Mineral’s Proposed Morrison Copper/Gold Mine Environmental Assessment”. This document represented the most focused review of the proposed Project by Lake Babine Nation. For context, the report referenced a number of concerns Lake Babine Nation had around the now closed Bell and Granisle Mines on Babine Lake. These issues were consistently raised in the context of cumulative effects. Such issues included:

- uncertainty of the safety of the water quality in the open pit and tailings ponds (for both Noranda and Bell mines);
- reports of a “cyanide” pond (Bell mine);
- uncertainty of the security of the site (e.g. use of fencing);
- uncertainty around the amount of proper reclamation undertaken at Noranda; and,
- concerns around sedimentation at Noranda, including approximately 1km of the Babine Lake shoreline.

The conclusion in the report prepared by Lake Babine Nation stated:

*The Lake Babine Nation supports the development of the Morrison mine in principle; however there are some issues in this report that are not dealt with adequately enough to completely support the project at this time.*

The main concern outlined in the report was that the Application had not developed effective and feasible mitigation, enhancement, and/or management measures for identified effects.

Specific issues and recommendations in the report included:

- *Lake Babine Nation Consultation and Involvement* – due to the fall-out between the Proponent and Lake Babine Nation during the preliminary stages of consultation, Lake Babine Nation was of the view that there was incomplete accounting of existing and traditional values, as well as limited comments on the details of the Consultation, Cultural Heritage or TU/TEK sections.
- *Morrison Point* – Morrison Lake Point holds cultural heritage importance for Lake Babine Nation as cremations typically occur here. The area was also highlighted for having the highest wildlife values in the study area, including: moose and bear corridors, raptor nesting and marten and fisher habitat. The importance of the site was not adequately considered in the Application because Lake Babine Nation did not release site-specific TU/TEK reports and maps to EAO or the Proponent. The report recommended:

- Redesign of the proposed Morrison Point showing the proposed Reclamation Soils Stockpile area to reduce impacts;
- Inventory of the point for raptor nests, game trails and specific cultural heritage locations; and,
- Changes to plans for use of the area as a potential borrow area and avoidance of excavation to maintain cultural values.
- *Fish and Fish Habitat* – Lake Babine Nation did not support any loss of coho or sockeye habitat and felt that fish habitat had not been adequately inventoried or rated in the Application. According to Lake Babine Nation, Booker Lake (traditional name is Bin-duk-si, meaning “Lake above the lake”) was traditionally fish-bearing.
  - It was requested that the Proponent’s consultants provide theories as to when and why Booker Lake ceased to contain fish.
  - It was also recommended that all of the impacted streams include detailed habitat assessments and completion of productivity (population) estimates.
- *Loss of Trapping Opportunities* – There are 3 trapping territories that would be affected by the proposed mine, if approved: TR0608T049, TR0608T023 and TR0608T045. These areas all have multiple tenure holders and are all Lake Babine Nation members that have been using trap lines regularly.
  - Given it would take at least 100 years for this area to reach peak furbearer potential again, Lake Babine Nation recommended that trapline holders be compensated on a yearly or 5-year cycle.
- *Hunting Opportunity* - Volume I, section 7.18.4.2, “Land Use Activities”, (page 7-238 of the Application) states: “Prime moose for hunting has been identified by members of Lake Babine Nation as being north of Old Fort along the shores of Morrison Lake”. Lake Babine Nation noted that the proposed access roads and transmission line would cause increased hunting pressure on moose.
  - Lake Babine Nation recommended a no-hunting zone around the mine, as well as the access roads and transmission line.
- *Transmission Line* – Lake Babine Nation identified concerns around the transmission line and the potential for bird electrocutions. It also expressed concerns about the use of herbicides along the transmission route.
  - The “Option B” transmission line route was recommended since it is farthest from the lakeshore; “Option C” was also viewed as acceptable as it follows existing roads and does not require additional stream crossings.
- *Archaeological Resources* - No specific comments were made, other than a concern for the thoroughness of Archaeological Impact Assessments (AIA) being completed for the proposed Project.



Overall, the Lake Babine Nation report expressed concerns about that lack of adaptive management up to this stage, stating that the most effective way to manage the cultural and environmental values that may be lost due to the proposed Project is to avoid losing those values in the first place.

Lake Babine Nation stated that their support for the proposed Project was contingent on issues raised in the review being addressed.

In response to the report, EAO asked the Proponent to consider and address the issues raised by Lake Babine Nation. The Proponent responded by providing \$10,000 to have Lake Babine Nation find a new location for the overburden stockpile that did not impact Morrison Point. They also provided \$20,000 for a Lake Babine Nation-led survey of shoreline sockeye spawning areas and committed to winter moose surveys/over flights with Lake Babine Nation involvement.

On August 17-18, 2010, EAO staff went to Old Fort to meet with community elders and members to listen to their perspectives on the proposed Project.

In August, 2010, EAO received final confirmation that Lake Babine Nation did not want the Rescan Traditional Use Study (originally provided by the Proponent to Chief Patrick in 2008) to be used in the EA for the proposed Project. EAO understood that Lake Babine Nation Chief and Council had discussed this report and did not consider it to be accurate or reliable. EAO confirmed this view, and noted that EAO's assessment of rights and title would be based primarily on the ethnographic information generated by EAO. Following up on this confirmation, EAO wrote to Lake Babine Nation on August 25, 2010 to ask for details about any specific asserted aboriginal rights or information on aboriginal title to the area around the proposed Project. The letter stated that EAO had made a number of requests seeking information on rights and title and traditional use in the area of the proposed Project, but that EAO had received no information. The letter included a research report entitled: "*Lake Babine Nation – Review of Anthropological and Historical Sources*", which Lake Babine Nation were invited to comment on. The letter stated that, in the absence of any information from Lake Babine Nation, EAO would rely heavily on this report to inform decisions and conclusions with respect to Lake Babine Nation rights and title.

In September and October, 2010, EAO sent early drafts of this consultation report, specifically outlining EAO's consultation efforts and issues identified by Lake Babine Nation. EAO invited Lake Babine Nation to comment on those issues and consultation efforts to ensure an early and common understanding of the issues to be addressed.

On September 14, 2010, EAO and CEA Agency staff attended a community meeting in Fort Babine. The purpose of this meeting was to discuss the proposed Project and to answer questions about the proposed Project and the review process.

Lake Babine Nation members were encouraged to work with their Chief and Council to identify any specific concerns.

On September 30, 2010, Lake Babine Nation provided additional comments on the Application. Building on their June 2010 report, this new correspondence stated:

- Lake Babine Nation appreciated the Proponent's offer to include elders in moose studies via helicopter but noted that it continued to be concerned about elder's ability to access moose. Lake Babine Nation said it would wait to see Ministry of Environment's (MOE) comments on potential impacts to moose.
- Fish and water quality were viewed as the most critical issues for Lake Babine Nation and it was committed to continue to work with the Proponent, their own consultants and inventories as new information was provided. Lake Babine Nation highlighted its own inventory work and a willingness to present it to the Working Group once completed. Concerns were also raised regarding the potential under-valuing sockeye shore spawning. It was noted that a collapsed wooden culvert may have prevented fish from getting into Booker Lake (aka Duk-bin-skyh Lake) and that the lake should be considered fish bearing. Lastly, it was noted that Lake Babine Nation had been involved with some fish habitat compensation fieldwork and wanted to consider larger areas, specifically those on the Morrison Arm of Babine Lake.
- Trapping compensation had been discussed and further details would need to be worked out.
- Morrison Point overburden relocation was ongoing and results would be reviewed by Chief and Council and then sent to EAO.
- Employment and training agreements with the Proponent would be developed over the winter, along with profit and revenue sharing agreements with the Proponent and provincial government.
- Aboriginal rights and title – Lake Babine Nation noted they were reviewing the draft EAO Consultation Report and that reference to the "Old People's Trail" up Morrison River to Morrison Lake is missing. It was noted that this trail goes through the proposed open pit.

The letter ended with a clarification that no support had been offered at that time.

On October 4, 2010, Lake Babine Nation representatives attended a working group meeting in Vancouver to discuss the Application.

On October 28, 2010, EAO suspended the assessment of the proposed Project at the request of the Proponent, who required additional time to respond to issues raised by First Nations and members of the working group.

On January 11, 2011, EAO met with Chief and Council in Prince George to discuss the status of the Application and to discuss EAO's draft consultation report. EAO informed Lake Babine Nation that they had met with the Proponent on December 16, 2010, and

had strongly encouraged the Proponent to develop an improved relationship with Lake Babine Nation due to EAO's preliminary assessment of Lake Babine Nation's strong *prima facie* claim to the area of the proposed Project. During the meeting, Lake Babine Nation made a request for additional resources to support their work on the review of the Application, including consultation with community members, consideration of the environmental risks and benefits, participation in working groups, and commenting on consultation reports. EAO agreed to this request, and provided an additional \$15,000 in capacity funding.

Lake Babine Nation attended a working group meeting on January 25, 2011, the purpose of which was to review the Proponent's potential project design changes and the resulting changes to effects assessment. Much of the focus of this meeting was on water quality in Morrison Lake. Another water quality subcommittee meeting was held on February 21, 2011, which Lake Babine Nation was unable to attend.

On May 11, 2011, EAO facilitated a meeting between Chief Wilf Adam and William Deeks, Chair of the Board of Pacific Booker Minerals Inc. The purpose of the meeting was to discuss Lake Babine Nation concerns with the proposed Project and to facilitate a discussion regarding an improved relationship. The result of the meeting was Lake Babine Nation and the Proponent agreeing to meet to discuss a MOU, including the potential for an Impact Benefits Agreement. EAO, Lake Babine Nation, CEA Agency and the Proponent also agreed to a series of presentations in the Lake Babine Nation communities to explain the proposed Project and to listen to the views of Lake Babine Nation community members.

On July 5, 2011, EAO and CEA Agency attended a day-long community meeting in Burns Lake, where the proposed Project, along with the EA process, was discussed with the Lake Babine Nation community. At that meeting, it was agreed that further community meetings would be held in Lake Babine communities during the summer of 2011.

On August 29, 2011, Lake Babine Nation provided a third submission, outlining their outstanding issues with the proposed Project:

- additional information on molybdenum mining;
- pit wall width and stability;
- water quality sampling in the Old Fort area where Morrison River area interacts with Babine Lake;
- impacts of blasting on shoreline spawning salmon;
- a private discussion with Environment Canada staff;
- a concern over decreased water levels in Morrison Lake;
- additional Lake Babine Nation community consultation;

- a desire for increased capacity so Lake Babine Nation can benefit from the construction phase; and,
- an understanding of the relative size of the proposed Project in comparison to other mines in the region, such as Endako.

On September 19, 2011, EAO and CEA Agency staff met with Chief and Council in Burns Lake in order to seek comments and concerns on the draft Assessment Report and to explain the final steps involved in the EA before making a referral to Ministers. Council members communicated many of the same messages heard throughout the review, including:

- concerns about fish and water quality and potential impacts to wildlife;
- impacts to water quality from the location of the tailings facility;
- sensitivity of the Morrison Lake watershed and its importance to sockeye salmon;
- concerns about impacts from Bell and Granisle Mines; and,
- concerns about economic benefits from the proposed Project, if approved.

At the request of Chief and Council, EAO staff also attended community meetings in Tachet and Fort Babine on September 19 and 20, 2011. Similar issues were raised that were discussed throughout the review by Lake Babine Nation, including water quality, health, aboriginal rights, economic benefits and potential impacts from the Bell and Granisle Mines.

On September 30, 2012, EAO again suspended the review of the Application because it could not come to conclusions on the potential for significant adverse effects.

EAO shared the results of the third party reviews with Lake Babine Nation and sought input on the Proponent's proposed response. No comments were received from Lake Babine Nation.

On February 21, 2012, Lake Babine Nation transmitted a copy of a report entitled *Morrison Watershed Salmon Spawning Report 2011* to EAO. This document provided fieldwork information on spawning areas and winter lake behaviour. The report highlighted many of the concerns related to shoreline sockeye spawning and water quality, particularly as they related to potential impacts from the proposed TSF. Information from the report was incorporated into EAO's conclusions in this report.

- On June 22, 2012, EAO transmitted a number of reports, asking for comments to be received by EAO by July 18, 2012. In the letter, EAO informed Lake Babine Nation, that, should they disagree with any aspects of EAO's assessment or conclusions, they could provide a separate report to EAO, who would provide this report to ministers for their consideration when making a

decision on the proposed Project. The reports in the package from EAO included:

1. Pacific Booker Mineral's *3<sup>rd</sup> Party Review Response Report*
2. Pacific Booker Mineral's *3<sup>rd</sup> Party Review Response Report - Addendum 1*
3. *Technical review of the Morrison Lake Water Quality Model contained in Pacific Booker Minerals' (the proponent) Application for an Environmental Assessment Certificate for the proposed Morrison Copper/Gold Project.* By: Dr. Bernard Laval, PhD, PEng
4. *Comments on 3rd Party Review Response Report, Morrison Project.* By Dr. Christoph Wels and Robertson Geo consultants
5. Tracking Tables (All issues have now been considered and responses are satisfactory to EAO)
6. EAO's draft Assessment Report, First Nation Consultation Report and Certified Project Description (including draft Table of Conditions)

The LBN wrote to EAO on July 16, 2012 requesting:

- an extension and additional time to consider the reports due to the election of a new council;
- a deferral of the meeting between EAO and Chief and Council scheduled for July 23, 2012;
- additional resources; and,
- more opportunity to engage Lake Babine Nation members on the proposed Project, in particular the desire for door to door consultation with individual members

EAO wrote to LBN on July 20, 2012 to indicate that a ten day extension of comments would be granted and that the referral to ministers would be deferred from the original scheduled date of August 3 until EAO met with the new Chief and Council on August 2, 2012. However, EAO indicated that LBN had been provided with \$75,000 from EAO and \$70,000 from the CEA Agency and that, throughout the course of community meetings, EAO was confident it understood, and had communicated its understanding, of Lake Babine Nation aboriginal rights and title.

On July 26, 2012, the Chief of Lake Babine Nation wrote EAO indicating they strongly opposed the proposed Project and felt they had not been consulted and accommodated adequately. They said the proposed Project would significantly impact their aboriginal fishing and other rights, including aboriginal title.

EAO and CEA Agency staff met with Lake Babine Nation Chief and Council on August 2, 2012, in Burns Lake to discuss EAO's conclusions and CEA Agency's Draft

Comprehensive Study Report. Since a recent election had resulted in a primarily new council for Lake Babine Nation, EAO provided the following information at the meeting:

- a high level overview of the proposed Project (including design changes and supplemental information submitted by the Proponent);
- a history of key steps in the provincial EA and a discussion regarding next steps and timing;
- a description of the consultation undertaken by EAO with Lake Babine Nation throughout the provincial EA; and,
- key issues raised by Lake Babine Nation.

Lake Babine Nation reiterated their strong opposition to the proposed Project due to long-term uncertainties, and the scope and extent of potential impacts on asserted Aboriginal rights and title from the proposed Project.

#### **11.4 Lake Babine Nation Involvement with the Proponent**

This section summarizes consultation between Pacific Booker Minerals Inc. and Lake Babine Nation from 1992 to the present (June 2012).

##### ***Period Preceding the Section 10 Order: 1992 – Sept. 2003***

Upon acquiring the Morrison property and prior to entering the EA process, the Proponent informed Lake Babine Nation of their intentions to explore and develop the property, develop a good relationship, and to provide jobs and training to Lake Babine Nation members.

From 1992 to 2003, during the initial planning phase for the proposed Project, the Proponent had numerous discussions and visits with Lake Babine Nation with the goals of informally developing trust between the two parties, fostering mutual understanding of each party's interests, openly exchanging information about the proposed Project and its possible impacts on Lake Babine Nation, and identifying appropriate mitigation measures and economic opportunities for Lake Babine Nation.

##### ***Period Between Section 10 and Section 11 Orders: Sept. 2003 – 2007***

On October 16, 2003 - Lake Babine Nation Chief notified government, the Proponent and other businesses that Nedo'ats (Old Fort) Band would manage and control its own Traditional Territory in Nedo'ats (Old Fort).

In June 2004 - The Proponent supported in writing the Nedo'ats Band (Old Fort) application to the Department of Indian Affairs for funding of joint ventures, training and employment of First Nations members.

On July 5 and 6, 2004 - The Proponent held a site meeting and tour of the proposed Project area for Lake Babine Nation members including a Nedo'ats representative, and government agency representatives. The Proponent updated attendees on aspects of the mine design, including waste management alternatives, then provided ground and aerial tours to examine hydrological stations and view waste management options from the air.

On September 28, 2004 - The Proponent wrote to Nedo'ats (Old Fort) Band Resource Manager about the proposed Project and provided the Project Description.

In December 2004 - The Proponent wrote to Nedo'ats Band to share ideas for Community Training, including basic environmental and life skills classes and equipment operation for Lake Babine Nation students to provide them with transferable skills and the readiness to assume full time jobs at the mine or elsewhere.

In February 2005 - Lake Babine Nation wrote to the Proponent about the importance of hiring people with direct ties to Lake Babine Nation Traditional Territory, emphasizing that this approach will gain the respect and honour of the Nedo'ats Hereditary Chiefs, Elders and Traditional Territorial Owners, for whom job creation is a critical issue.

In March 2005 - The Proponent wrote to Lake Babine Nation about developing a fuel, oils and lubricants policy, possibly opening the road from the proposed Project site to Fort Babine which would ensure economic opportunities for that community. The letter identified other potential economic opportunities for Lake Babine Nation, such as potable water delivery, bus service, housekeeping services and trucking services.

On November 11, 2005 - Nedo'ats Hereditary Chiefs' wrote to the Proponent expressed dissatisfaction with the Proponent's current consultation efforts and requested a meeting between the Proponent and Nedo'ats Hereditary Chiefs and Elders. In response, the Proponent sponsored a meeting in Burns Lake on December 6, 2005. Topics included protocols for consultations with Lake Babine Nation and Nedo'ats, updates from the Proponent on the proposed Project and its associated environmental studies, as well as employment opportunities.

On February 27, 2006 - Lake Babine Nation Elected Council presented a draft MOU to the Proponent which established Lake Babine Nation Elected Council as the sole legal representative of Lake Babine Nation communities.

In April 2006 - The Proponent proposed a one-day community meeting in Granisle with the Nedo'ats Hereditary Chiefs and Lake Babine Nation Chief in Council. Due to scheduling conflicts the meeting was not held.

On May 11, 2006 - An MOU was signed by the Proponent and the Office of Nedo'ats Hereditary Chiefs regarding \$10,000 of capacity funding to cover venue, travel and translation costs for a community meeting in Granisle to discuss the proposed Project.

In January 2007 - The Proponent prepared and delivered to Lake Babine Nation communities a "Training & Development Plan" with 52 job descriptions, skills and knowledge requirements for future Project positions.

On March 3 – 8, 2007 - The Proponent paid for four Lake Babine Nation Councillors and members to attend the Prospectors and Developers Association Convention in Toronto, Ontario to participate in sessions on First Nations Mining Agreements and learn more about resource exploration and development.

On June 25, 2007 - A working group meeting was held on the draft Terms of Reference, attended by the Proponent and Lake Babine Nation. Chief Betty Patrick raised concerns about land use, roads, and water quality of Lake Babine, and stated the need for a formal consultation process that extended beyond Nedo'ats to include Lake Babine Nation communities of Fort Babine and Tachet. The Proponent requested the names of Lake Babine Nation trapline holders to interview for socio-cultural studies for the EA.

On June 27, 2007 - A Lake Babine Nation community meeting was held in Burns Lake. The Proponent discussed the proposed Project and potential economic and employment opportunities. Several Lake Babine Nation members contacted the Proponent after the meeting to express support and request additional meetings with the Proponent.

In August 2007 - The Proponent went to Lake Babine Nation communities and presented job descriptions and skills requirements for future jobs for the proposed Project. The Proponent also noted their desire to participate in the Aboriginal Skills Employment Partnership program providing institutional and apprenticeship training in mining trades for fifteen Lake Babine Nation members, and business related training for three Lake Babine Nation members. The Proponent requested a letter in support of the program from Lake Babine Nation.

September 25, 2007 - The Proponent scheduled a meeting in Burns Lake with the Lake Babine Nation Chief to discuss the Aboriginal Skills Employment Partnership program, the Proponent job description for a full-time Lake Babine Nation Liaison Officer, the consultation process and other agenda items.

October 22-27, 2007 - The Proponent sponsored nine Lake Babine Nation members to attend the Council for the Advancement of Native Officers conference held in Prince George. The conference helped support Lake Babine Nation economic development initiatives.

***Period Following Section 11 Order, January 2008 – July 11, 2010***

February 1, 2008 and April 1-2, 2008 - Lake Babine Nation community meetings were held in Burns Lake. Lake Babine Nation expressed the following concerns: consultation protocols and proposed Project impacts to wildlife, water quality and human health, as



well as the need for assistance in developing capacity to review the Terms of Reference and other EA studies. The Proponent committed to hiring Lake Babine Nation members to participate in studies and offered to provide capacity funding. The Proponent provided job descriptions for future mine positions and a Lake Babine Nation-Proponent liaison position. The Proponent also submitted a draft MOU on April 2, 2008 including suggestions of Lake Babine Nation Chief and Council dated February 27, 2006.

June 25, 2008 - The Proponent received a letter from Lake Babine Nation legal counsel requesting that they obtain the consent of Lake Babine Nation Chief and Council for all meetings and communications regarding the proposed Project. On July 3, 2008 the Proponent responded with a commitment to communicate solely with Lake Babine Nation Chief and Council. As well, the Proponent provided a description of their efforts to provide capacity funding and emphasized their desire to finalize the April 2, 2008 draft MOU.

Feb 1, 2008 and April 1-2, 2008 - Lake Babine Nation expressed a desire for a commitment that no cyanide be used in the proposed Project and additional concerns over other chemicals, requesting a list of potential reagents that may be used. In response, the Proponent committed that the proposed Project would not use cyanide and provided a list of reagents to the Lake Babine Nation Chief on June 2, 2009.

October 14, 2005 to 2009 - Lake Babine Nation Elected Council and their environmental consultants reviewed the Terms of Reference. The vast majority of Lake Babine Nation comments were incorporated into the Terms of Reference. Lake Babine Nation expressed a desire to be involved in the scoping and execution of various EA studies which resulted in additional meetings with Lake Babine Nation Council, and within Lake Babine Nation communities, to discuss environmental concerns. Lake Babine Nation input was critical in selecting the Valued Components (VC). Lake Babine Nation members participated as Field Assistants and provided input in the following baseline studies:

- TEK/TU;
- socio-economics;
- water quality;
- soils and terrain;
- land use;
- country foods;
- archaeology; and,
- aquatic biology and fisheries.

From June 30, 2008 to July 31, 2009 - The Proponent provided an additional \$80,000 to Lake Babine Nation for review of the Application and research of Aboriginal rights and title.

July to November 2008 - The Proponent and Lake Babine Nation communicated regarding development of an EA Process Funding Agreement and an MOU outlining communication protocols.

November 5, 2008 - The EA Process Funding Agreement was signed by both parties, the scope of which included negotiations towards a TEK confidentiality agreement and the provision of \$63,500 capacity funding to Lake Babine Nation.

March 30, 2009 - The Proponent sent a draft TEK Confidentiality Agreement to Lake Babine Nation Chief.

October 14, 2008 - The Proponent reported that the Lake Babine Nation Chief circulated a press release stating that talks had broken down between Lake Babine Nation and the Proponent. The Proponent filed a defamation lawsuit against the Chief. Lake Babine Nation then specified four conditions for further communications to occur between the Proponent and Lake Babine Nation. The lawsuit was rescinded by the Proponent in September 2009 to improve communications between the two parties and to demonstrate good faith to the newly elected Chief and Council.

***EAC Application Review Period: July 12, 2010 to Present (June 2012)***

In June 2010 - The Proponent received Lake Babine Nation's comments on the July 12, 2010 Application which indicated concerns regarding the proposed Project design and potential effects and Lake Babine Nation priorities, including:

- fish;
- wildlife; and,
- cultural heritage sites.

The Proponent reported that they responded to each of the issues raised by Lake Babine Nation. In several cases, the Proponent committed funds and other means of support to aid Lake Babine Nation in conducting surveys and inventories.

Four Open Houses were hosted by EAO and held in local communities:

- July 26, 2010, in Granisle, BC;
- September 13, 2010, in Burns Lake, BC;
- September 14, 2010, in Granisle, BC; and,
- September 15, 2010, in Smithers, BC.

Lake Babine Nation attended all of the above meetings. The Proponent reported that Lake Babine Nation concerns were discussed and that additional funding was committed to support Lake Babine Nation field studies and surveys for salmon spawning and the relocation of the overburden stockpile.

On September 30, 2010 - Lake Babine Nation submitted additional comments on the Application and on the Proponent's responses to Lake Babine Nation's June 2010 comments. Lake Babine Nation commented on a number of concerns and priorities including:

- fish;
- moose;
- avian wildlife;
- trap-lines; and,
- employment and training opportunities.

The Proponent responded to each issue raised by Lake Babine Nation. In several cases the Proponent committed funds and other means of support to aid Lake Babine Nation in conducting their own surveys and inventories.

Lake Babine Nation and the Proponent both participated in working group meetings chaired by EAO on July 26, 2010, October 4, 2010, and January 25, 2011. The Skeena Fisheries Commission (SFC), which represents Gitanyow and Gitxsan, participated in the working group meeting on October 4, 2010.

In April 2011 - Lake Babine Nation provided a list of comments, supplementary to the above-mentioned June and September 2010 comments.

In June 2011 - The Proponent sponsored three Lake Babine Nation Councillors to attend the International Indigenous Summit on Energy and Mining, from June 25 to 29, in Niagara Falls, ON. The purpose of the sessions was to provide an opportunity to Lake Babine Nation to participate in discussions around First Nations Mining Agreements and to learn more about resource exploration and development.

On July 5, 2011 - An all-day Lake Babine Nation community meeting in Burns Lake was attended by Chief and Council and 156 Lake Babine Nation members. The Proponent presented the results of their EA including environmental effects and mitigation. Lake Babine Nation expressed concerns about impacts to water quality, TEK security, impacts to fish and wildlife, and impacts on their way of life. Positive comments were made with respect to opportunities for training, education, employment and economic benefits.

July 13, 2011 - The Proponent submitted the Review Response Report to address Application Review comments and questions primarily related to: water quality, water

balance, and effects of the proposed Project on the receiving streams and Morrison Lake. It also provided design details of the proposed Project changes, including relocation of the overburden stockpile, as requested by Lake Babine Nation.

### **Memorandums of Understanding Discussions**

From January 13 to 17, 2007 - The Proponent met Lake Babine Nation Chief, Councillors, and various band office managers in Burns Lake, Tachet, and Fort Babine to discuss various issues including development of an MOU.

On April 1 and 2, 2008 - Meetings were held between the Proponent, EAO, government agencies and Lake Babine Nation in Burns Lake to follow up on topics and action items from the previous meeting (e.g. capacity funding, framework or MOU agreement, work plan for Lake Babine Nation involvement in EA process).

On October 14, 2008 - Lake Babine Nation wrote a letter to the Proponent (through legal representation) confirming Lake Babine Nation's interest in an MOU with the Proponent. October 21, 2008, the Proponent responded to Lake Babine Nation with an outline proposing EA capacity funding principles and implementation steps, a draft MOU, and confirming their participation in a proposed October 28 meeting.

In September 2009 - The Proponent documented, within the Application, the prior efforts to negotiate an MOU with Lake Babine Nation, and also the possibility of an Impact-Benefit Agreement (IBA).

On January 24, 2011 - The Proponent received a letter from Chief Wilf Adam acknowledging the receipt of a draft MOU, dated March 2008, and that Lake Babine Nation were prepared to enter negotiations to develop agreements related to mining and explorations projects. The Proponent met Lake Babine Nation Chief and Council to discuss an MOU and/or IBA.

On May 10, 2011 - Lake Babine Nation sent a draft MOU to the Proponent.

On May 11, 2011 - In a meeting between Lake Babine Nation, the Proponent and EAO, the draft MOU and a potential IBA were discussed.

On May 16, 2011 - The Proponent met with Lake Babine Nation Chief and Council to discuss the MOU. On May 18, 2011 the Proponent met with Lake Babine Nation Chief, Deputy Chief, Executive Director, six Councillors and Lake Babine Nation staff to review the draft MOU which included the framework for a future IBA.

On July 15, 2011 - The Proponent received an updated MOU from Lake Babine Nation, which was signed by the Proponent's Chairman and returned to Lake Babine Nation for signature. The MOU included the following:

- Communications Protocol;
- Conflict Resolution Protocol;

- Environmental Mitigation and Traditional Use Agreement;
- Impact Benefit Agreement – Construction Phase (Commitment to Develop);
- Impact Benefit Agreement – Operation Phase (Commitment to Develop); and,
- Successors and Assigns.

On March 4, 2012 - Lake Babine Nation and the Proponent signed the MOU. On July 23, 2012, the Proponent announced, through a Press Release, that the MOU was no longer confidential.

#### 11.5 Potential Impacts to Lake Babine Nation Asserted Aboriginal Rights and Measures to Mitigate or Otherwise Accommodate Impacts

Section 11.3 and 11.4 above describe EAO's understanding of the issues that have been identified by Lake Babine Nation during the EA for the proposed Project. Throughout the course of the EA, both the Proponent and EAO have engaged Lake Babine Nation with the goal of understanding the nature of Lake Babine Nation's asserted aboriginal rights, its perspectives on potential impacts of the proposed Project on those rights, and potential changes to the proposed Project that would minimize any potential impacts.

Responses to the full set of Lake Babine Nation concerns are described in the Issues Tracking Table. Further information on how Lake Babine Nation concerns have been addressed, including mitigation and Proponent commitments, is provided in the relevant sections of the Assessment Report. Many of Lake Babine Nation's issues relate to water quantity (section 5.2), water quality (section 5.3) and fish (section 5.5). 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.

#### ***Consultation***

- Lake Babine Nation expressed concerns about ensuring that all five communities were engaged on the proposed Project, and that the clan and tribe system of hereditary chiefs be acknowledged, as well as the proximity of the Old Fort (Nedo'ats) and Fort Babine Communities.
  - In response, EAO held a number of community meetings in Old Fort, Fort Babine, Tachet, and Woyenne so the Proponent could explain the proposed Project as well as providing an opportunity for EAO and CEA Agency staff to answer questions about the EA process. Several open houses were also held during Application review in the community of Granisle, which is close to the Tachet community. There was significant Lake Babine Nation attendance at the Granisle meetings.

- During the course of the EA, the Proponent held numerous meetings in Granisle and Burns Lake with representatives of Nedo'ats, including financially supporting a number of meetings. The Proponent also signed an MOU with the Nedo'ats Hereditary Chief's in 2006 to provide funding support.
- Lake Babine Nation reiterated that ultimate consultation and decision-making resided with the elected Chief and Council.
  - In response, EAO and the Proponent both acknowledged the jurisdiction of elected Chief and Council as the primary decision-making body for Lake Babine Nation. EAO offered to consult with other Lake Babine Nation communities through open houses and community meetings and attended community meetings in Fort Babine, Old Fort, Woyenne and Tachet.
- Lake Babine Nation expressed concern over the importance of communication protocols before work occurred in its traditional territory, and in particular protocols between Lake Babine Nation, EAO and the Proponent.
  - In response, EAO met with Chief and Council to discuss the proposed Project numerous times during pre-Application and Application review.
  - From 2007 to 2009, the Proponent was in discussions with Lake Babine Nation Chief and Council on a funding and communication MOU. Discussions continued until January 2011.
  - The Proponent and Lake Babine Nation signed an MOU regarding the proposed Project on March 4, 2012. The MOU includes a significant component on communications protocols.
- Lake Babine Nation requested assistance and resources to review the Terms of Reference and other technical documents.
  - EAO provided funding to Lake Babine Nation a number of times during both pre-Application and Application review, recognizing the technical nature of the documents. Funding from provincial sources totaled approximately \$75,000.
  - Capacity funding from Canada totaled approximately \$70,000.
  - Capacity funding from the Proponent totalled approximately \$150,000. The Proponent also provided resources for Lake Babine Nation Traditional Use and Ecological Knowledge Study, several salmon spawning habitat surveys, participation in the Fish Habitat Compensation Plan, the relocation of the Overburden Stockpile from Morrison Point, and Winter Moose Habitat and Mule Deer Surveys.
- Lake Babine Nation felt that the Crown cannot simply state Lake Babine Nation has a strong *prima facie* strength of claim; the Crown must make efforts to understand Lake Babine Nation aboriginal rights.
  - In its consultation report, EAO provided a detailed description of its understanding of Lake Babine Nation traditional and historical use of the

proposed Project area, as well as current use. This information was collected for the purpose of the EA and was shared with Lake Babine Nation for comment. EAO made a number of requests seeking information on aboriginal rights and title and traditional use in the area of the proposed Project, but received no information from Lake Babine Nation in return. In the absence of specific information, EAO relied upon a research report entitled "*Lake Babine Nation – Review of Anthropological and Historical Sources*". EAO provided Lake Babine Nation with an opportunity to comment on this report, which Lake Babine Nation declined.

- The Proponent collected information to support a Traditional Use Study (TUS) to be used in the EA for the proposed Project. EAO understood that Lake Babine Nation Chief and Council had discussed this report and did not consider it to be accurate or reliable. EAO informed Lake Babine Nation that, in the absence of permission from Lake Babine Nation to use the TUS, EAO's assessment of aboriginal rights would be based primarily on the ethnographic information generated by EAO.
- Lake Babine Nation wanted to screen the final Application to see if the appropriate Lake Babine Nation information was present.
  - In response, EAO provided opportunities for Lake Babine Nation to screen both the initial Application in September 2009 and the Addendum in June 2010. Lake Babine Nation has been provided opportunities to comment on all subsequent documents submitted by the Proponent. All comments have been reflected in this report.

## **Health**

- Lake Babine Nation expressed concerns over members eating fish and wildlife which may be contaminated by the proposed Project, if approved.
  - Detailed responses to this are provided in section 5.3 (Water Quality) which discusses long term water quality effects. Details are also provided in the fish and fish habitat (section 5.5) and wildlife and wildlife habitat (section 5.7) sections.
  - In its MOU with Lake Babine Nation, the Proponent committed to an ongoing monitoring program of bear, deer and moose tissues. The sampling program would be developed in conjunction with Lake Babine Nation and a component of the monitoring work would be completed by Lake Babine Nation members. This is captured in EAO's Table of Conditions.
  - In its Memorandum MOU with Lake Babine Nation, the Proponent committed to an ongoing tissue sampling of fish tissues. The sampling program would be developed in conjunction with Lake Babine Nation and a component of the monitoring work would be completed by Lake Babine Nation members. This is captured in EAO's Table of Conditions.

- Concerns over the increase in cancer rates and impacts on fisheries because of the Bell and Granisle Mines were raised by Lake Babine Nation.
  - The Proponent noted that the Bell and Granisle Mines are closed and are currently under the care of Xstrata Copper Canada.
  - EAO notes that the Bell Mine discharges meet provincial water quality guidelines and Granisle Mine does not have a water discharge at this time.
  - EAO is satisfied that there will be no potential adverse downstream effects of the proposed Project in Babine Lake, and that it would not interact cumulatively with the Bell and Granisle Mines.
- Very strong concerns regarding the use of cyanide and other toxic chemicals.
  - The Proponent committed to not use cyanide in its processing facilities. This is captured in EAO's Table of Conditions.

### **Water Quality**

- Lake Babine Nation had a number of high level questions regarding groundwater, surface water quality, streams, wetlands and lakes and how they would be affected by the proposed Project. They also had numerous concerns about shortfalls in baseline information on water quality. Most of these comments focused on the water quality in Morrison Lake and how that water quality would affect fish and fish habitat, in particular sockeye salmon.
  - For more details on EAO's assessment of effects on water quality, see sections 5.1, 5.2 and 5.3.
  - In response to the concerns noted above, the Proponent committed to replacing the proposed glacial till liner with a geomembrane liner of the TSF and placing all waste rock back into the open pit on closure. This is captured in EAO's Table of Conditions.
  - The Proponent also committed to implementing additional secondary water treatment in the proposed water treatment plant to further remove parameters of concern. The water treatment plant would be constructed as soon as required. This is captured in EAO's Table of Conditions.
  - In its MOU with Lake Babine Nation, the Proponent committed to an ongoing water quality monitoring program. The sampling program would be developed in conjunction with Lake Babine Nation and a component of the monitoring work would be completed by Lake Babine Nation members. This is captured in EAO's Table of Conditions.
  - Since the comments were originally made, the Proponent collected additional water quality baseline information and included it in their *Review Response Report Rev2* document.
  - The Proponent committed to collecting additional information on the physical behaviour of the lake, including water quality monitoring and



temperature, conductivity probes and understanding currents and flow regimes. This is captured in EAO's Table of Conditions.

- EAO engaged a third party lake behaviour specialist to review the Proponent's diffuser design, with a specific question on the efficacy of how it could affect lake mixing. These reviews indicated that the diffuser would likely operate as asserted by the Proponent, and would act to mix effluent in Morrison Lake. Further, the effluent diffuser would not be expected to change lake behaviour.
- EAO engaged a third party lake behaviour specialist to review issues related to "hotspots" and areas of higher effluent concentration. The review indicated that, in the absence of a geomembrane-lined TSF, seepage from the TSF would likely create "hotspots" and areas of higher effluent concentration. However, the Proponent's commitment to a geomembrane liner would effectively eliminate this concern.
- The Proponent committed to maintain the final level of the pit lake, on closure, to below the elevation of Morrison Lake, resulting in a groundwater gradient that would prevent water from the pit lake impacting Morrison Lake. This is captured in EAO's Table of Conditions.
- EAO commissioned a third party review of the Proponent's hydrogeology baseline and modelling. The initial third party review indicated some concerns about modelling and Upper Bound predictions, in particular groundwater flow to the open pit during operations. The Proponent addressed these outstanding concerns in their *Third Party Review Response Report* and provided new predictions. The third party reviewer confirmed that the new Proponent models represented a reasonable Upper Bound and groundwater flow predictions from Morrison Lake to the open pit during operations were reasonable. The third party reviewer also indicated that the Proponent's commitment to, on closure, keep the final pit lake below the elevation of Morrison Lake would prevent water in the open pit from impacting Morrison Lake. EAO is satisfied with the recommendations of the third party review.
- Considering the above third party reviews of lake behaviour, Proponent models of water quality effects, additional information to be collected at the detailed design stage, and the commitment to secondary water treatment and a geomembrane liner that would virtually eliminate seepage into Morrison Lake, EAO is satisfied that the proposed Project is not likely to have significant adverse effects on water quality.

## **Wildlife**

- Lake Babine Nation expressed concerns about moose and deer habitat in the proposed Project area, in particular the wetlands located in the area of the proposed TSF.

- The Proponent completed a winter moose and mule deer survey with the assistance and guidance of Lake Babine Nation in early 2011. The aerial survey determined baseline habitat use by moose and mule deer during typical winter activity over the TSF footprint, the entire proposed Project area, and the east side of Babine Lake from the proposed Project site to a position adjacent to the Bell mine-site.
- The Proponent committed to moose winter range compensation in its MOU with Lake Babine Nation equal to approximately six moose per year.
- Lake Babine Nation requested that waterfowl not be disturbed and that amphibians be relocated.
  - The Proponent committed to a Wildlife Management Plan which would include a Nest Avoidance Management Plan, a component of which would involve avoiding construction during nesting periods and a nest survey. This is captured in EAO's Table of Conditions.

### ***Trapping***

- Lake Babine Nation expressed concerns that several Lake Babine Nation traplines would be lost for at least 100 years.
  - In its MOU with Lake Babine Nation, the Proponent committed to compensate Lake Babine Nation trap-line holders for the time their trap-line would be unavailable due to project construction and operations, if the proposed Project were approved. This is captured in EAO's Table of Conditions.

### ***Aboriginal Rights***

- Lake Babine Nation suggested that the area of the proposed mine footprint is a spiritual site and berries are gathered within the area.
  - In its MOU with Lake Babine Nation, the Proponent committed to moving all mine infrastructure (e.g. overburden stockpile, water diversion structures, etc.) from Morrison Point and reserving the area from all mine-related activities. This is captured in EAO's Table of Conditions.
  - In its MOU with Lake Babine Nation, the Proponent committed to inventorying and assessing the "Old People's Trail" and developing any mitigation, as required.

### ***Benefits***

- Lake Babine Nation indicated that Lake Babine Nation members should benefit from the proposed Project, if approved, specifically with regards to construction jobs and local employment.
  - In its MOU with Lake Babine Nation, the Proponent committed to the development of a Governance and Management Advisory Board which

would be comprised of Lake Babine Nation and Proponent representatives. The duties and responsibilities of the Governance and Management Advisory Board would be to discuss the provision of jobs and employment for Lake Babine Nation members.

- Lake Babine Nation Chief and Council have identified the need for revenue sharing and an IBA.
  - In its MOU with Lake Babine Nation, the Proponent and Lake Babine Nation committed to the development of an IBA.

## ***Fish***

- Lake Babine Nation stressed the presence and importance of fish (anadromous and non-anadromous) in Morrison Lake, Morrison River and the streams within the footprint of the proposed Project. Specific concerns were noted on the impacts to shore spawning sockeye and other fish habitat in Morrison Lake and lack of sufficient inventories.
  - For more details on EAO's assessment of effects on fish and fish habitat, see section 5.1, 5.2, 5.3 and 5.4.
  - In response to Lake Babine Nation's concerns over salmon spawning activity in Morrison Lake being influenced by the proposed Project, Lake Babine Nation suggested that the Proponent support Lake Babine Nation in completing a Salmon Spawning Inventory of Morrison Lake and tributary streams in the proposed Project footprint. The Proponent funded this survey, which was completed by the Ned'u'ten Fisheries Commission. The results of the survey showed that the number of salmon observed was comparable to previously reported numbers. The report contains information that was used to inform the Proponent's Fish Habitat Compensation Plan.
  - The Proponent has committed to working with Lake Babine Nation, Department of Fisheries and Oceans (DFO) and the SFC in measuring annual fish escapement and advancing the knowledge of fish populations, behaviour and distribution in Morrison Lake. This is captured in EAO's Table of Conditions.
  - In its MOU with Lake Babine Nation, the Proponent committed to maintaining salmon stocks in Morrison system, as well as a number of monitoring programs developed in conjunction with Lake Babine Nation. This also includes a commitment to undertake additional spawning surveys, particularly in the area downstream of the TSF, along the shoreline and at depth to better quantify the spatial extent of spawning habitat. This is captured in EAO's Table of Conditions.
  - In its MOU with Lake Babine Nation, the Proponent committed to an adaptive management program which looks at the impacts of blasting on salmon spawning.

- The Proponent committed to spawning surveys in Morrison River to better quantify the potential effect of the reduction in flow due to the proposed mine. This would be combined with more accurate stream gauging stations to ensure that low flow measurements are captured and accurate. This is captured in EAO's Table of Conditions.
- The Proponent has committed to offset any reductions in flow to Morrison River with water from the clean water diversions or water from TSF which is treated via the water treatment plant. The requirement to develop an Instream Flow Requirement which is protective of salmon spawning habitat in Morrison River is captured in EAO's Table of Conditions.
- Concerns over direct loss of fish habitat resulting from reductions in stream flows on fish bearing reaches and placement of the effluent diffuser and water intake pipeline.
  - The Proponent involved Lake Babine Nation in 2010 and 2011 meetings, field work, helicopter fly-overs, review of its proposed Fish Habitat Compensation Plan compensation sites and options on how best to reduce potential harmful effects and enhance and/or increase fish habitat in the area.
  - The Proponent committed to compensate for loss of fish habitat by implementing a Fish Habitat Compensation Plan. The plan commits to compensating for loss of fish bearing habitat at a habitat area replacement ratio of 3:1 by creating 3,600 m<sup>2</sup> of stream habitat that would include rearing and spawning habitat features and be accessible to fish. To compensate for loss of approximately 275,000 m<sup>2</sup> of non-fish bearing aquatic habitat the plan commits to improving fish access from Morrison Lake to non-fish bearing waters in the Olympic Lake system approximately 7 km north of the proposed mine site. The Olympic Lake system constitutes approximately 170,000 m<sup>2</sup> of lake habitat and 2,400 m<sup>2</sup> of stream habitat; upgrading this system could increase its productive capacity. The Fish Habitat Compensation Plan proposes the construction of two off-lake channels at the south end of Morrison Lake to provide spawning and rearing habitat for salmonids.
  - The Proponent committed to working with DFO, MOE, Lake Babine Nation and SFC to finalize an agreed upon Fish Habitat Compensation Plan which would compensate for any proposed Project activities that result in the Harmful Alteration, Disruption, Destruction (HADD) of fish and fish habitat
  - Considering the technical work completed to date, the minimal direct impact on fish habitat, and comments from DFO, EAO is satisfied that there is a reasonable expectation that a Fish Habitat Compensation Plan can be developed to the satisfaction of DFO.
- Lake Babine Nation expressed concerns over the presence of fish in Booker Lake and impacts from draining that Lake.

- In response, the Proponent re-examined Booker Lake and again found no fish present.
- The Proponent committed to the draining of Booker Lake and Ore Pond to Morrison Lake in the six months prior to the winter so that soft lake bottom sediments could then freeze and be handled more easily with less sedimentation risk. Sediment and erosion prevention features that are included in the Proponents' environmental management plan are intended to limit the total suspended solids entering the aquatic environment.
- The Proponent has also committed to the preparation of a sediment testing and disposal plan for Booker Lake and Ore Pond sediments. Any unsuitable material (containing residual contaminants that cannot be released to the environment) would be placed within the TSF.
- Lake Babine Nation suggested that the Proponent examine fisheries compensation options in the Morrison Arm of Babine Lake.
  - EAO notes that DFO policy is that compensation options occur as close to the impact as possible.
- Concerns over potential cumulative impacts to Babine Lake.
  - EAO has concluded that the effects of the proposed Project would not interact cumulatively with other past projects or those reasonably foreseeable in the future.

## 11.6 Conclusions Regarding Lake Babine Nation

In view of the consultation that has taken place with Lake Babine Nation, EAO concludes that:

- the process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns expressed by Lake Babine Nation;
- the process of consultation was appropriate and reasonable in the circumstances; and,
- EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Lake Babine Nation asserted aboriginal rights (and by way of both draft and final copies of this report, it is communicating its findings to the Lake Babine Nation).

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Lake Babine Nation, EAO concludes that the risk of adverse effects to lands and resources associated with the exercise of Lake Babine Nation asserted aboriginal rights has been appropriately avoided or mitigated (with the successful implementation of mitigation measures and conditions ) to the extent necessary to maintain the honour of the Crown.

## 12 Gitanyow and Gitxsan Nations

### 12.1 Gitanyow and Gitxsan Nation Occupation and Use of Proposed Project Area

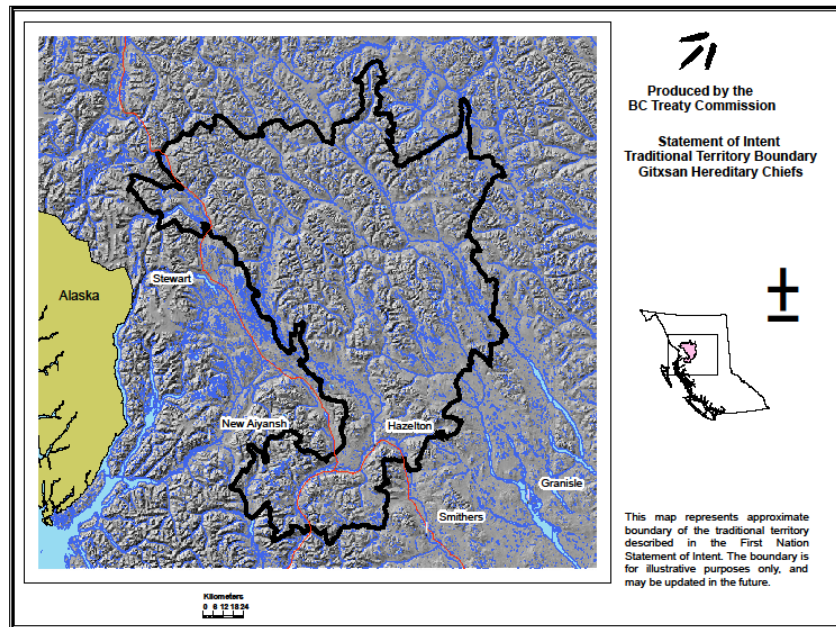
The Gitanyow and Gitxsan are part of the Gitksan subdivision of the Tsimshian language family. The term Gitxsan means “people of the Skeena River”. Their territories are in the Nass and Skeena River watersheds.

In the mid-19<sup>th</sup> century, Gitxsan consisted of seven “tribes” organized around winter villages, one of which was the Gitanyow winter village Kitwancool, located on an eulachon oil trading route connecting the Skeena with the Nass. Gitxsan and Gitanyow society is organized on a number of levels, including *wilps* (houses) *pdek* (clans) and villages. The *wilp* is the main unit of social organization and the principle holder of property rights in lands and resources.

For Gitxsan, there are about 45 to 65 *wilps*, with anywhere from 20 to 250 members. Each member belongs to one of the four clans: Lax Gibuu, Lax Skiik, Lax Seel/Ganeda, Giskaast (Wolf, Eagle, Frog, Fireweed). The Gitxsan Chiefs’ Office (GCO) is the body mandated by most of the *wilps* to negotiate on their behalf and promotes the involvement of the *wilps* in land management.

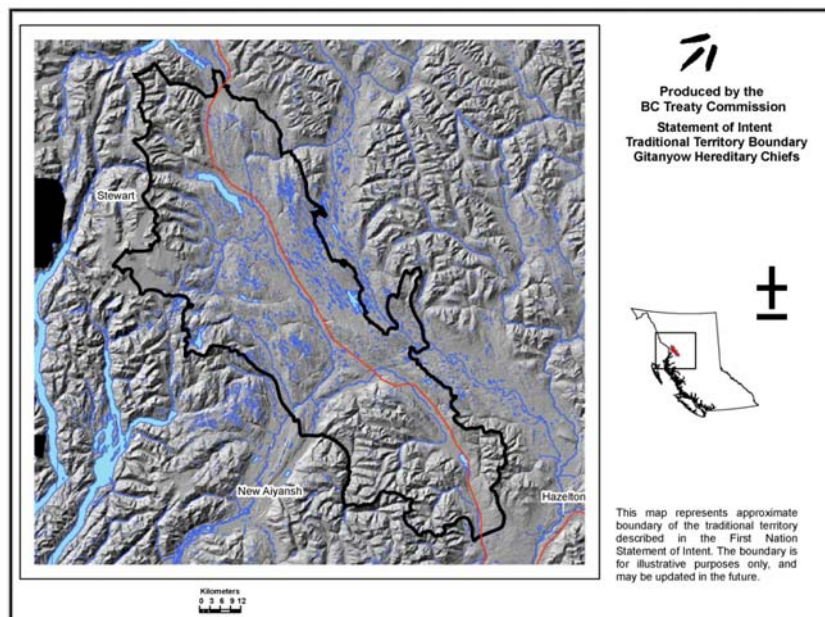
According to current Statement of Intent maps submitted to BC Treaty Commission, all Gitanyow and Gitxsan asserted territories lie well outside the area of the proposed Project.

**Figure 17 – Gitxsan Nation Asserted Traditional Territory**



Gitanyow are comprised of eight *wilps*, each of which holds its own territories, but all sharing the winter village at Kitwancool (now called Gitanyow). The Gitanyow Hereditary Chief's Office (GHCO) is the body mandated by most of the *wilps* to negotiate on their behalf. GHCO, like GCO, promotes the involvement of the *wilps* in land management.

**Figure 18 – Gitanyow Nation Asserted Traditional Territory**



## 12.2 Gitanyow and Gitxsan Nation Traditional Use of the Proposed Project Area

A review of the existing ethnographic research does not indicate any historical use or occupancy of the area of the proposed Project by Gitanyow or Gitxsan Nations. However, both Gitanyow and Gitxsan have stated to EAO that the area around Morrison Lake and Lake Babine comprise “sacred critical habitat” and support a significant amount of the salmon that Gitanyow and Gitxsan Nation rely upon for their fisheries.

## 12.3 Gitanyow and Gitxsan Nation Aboriginal Rights (Including Title)

It is EAO's assessment, based on current information available, and having regard to the applicable legal test, that there is a strong *prima facie* case in support of Gitanyow and Gitxsan aboriginal rights to fish within their traditional territories on Skeena River. These conclusions are a *prima facie* determination made in order to discharge EAO's *Haida* analysis and are focused on the site of the proposed Project. This analysis is not meant to apply to any other part of Gitanyow or Gitxsan Nation traditional territories, and this assessment is made only for purposes of this proposed Project.

With regard to the *Haida* spectrum, EAO initially determined that the scope of the duty to consult with Gitanyow and Gitxsan was low on the *Haida* spectrum. That initial determination was based on an understanding that, given the significant distance downstream, it was unlikely that any fishing rights could be affected by the proposed Project.

Since that original assessment, EAO met with GCO and GHCO and reviewed technical submissions from SFC. In particular, EAO found a report submitted to EAO by SFC entitled *The Sockeye Salmon of Morrison and Tahlo Lakes British Columbia, and Their Importance to the Salmon Fisheries of the Skeena Watershed* very instructive.

Since the initial assessment, EAO now understands that the shared Gitanyow/Gitxsan fishery takes in the order of 65,000 sockeye from Skeena River annually and that approximately 3.5 percent of those fish come from the Morrison watershed<sup>24</sup>. As a result of this new information, EAO now understands that Gitanyow and Gitxsan are concerned about impacts to the aboriginal right to fish because a portion of the fish caught on the Skeena and Babine Rivers come from Morrison Lake.

Based on this new information EAO changed its initial assessment of the scope of the duty on this proposed Project to consult from low to moderate. In EAO's view, the engagement process with Gitanyow and Gitxsan, through its designated representatives and directly, has been consistent with this assessment.

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<sup>24</sup> SFC asserts that the number could be as high as eight percent depending on the counting method.



## 12.4 Consultation with Gitanyow and Gitxsan Nations

### 12.4.1 *Gitanyow and Gitxsan Nation Involvement with EAO*

On September 20, 2010, GHCO and GCO wrote to the Minister of Environment regarding the proposed Project. The letter stressed the importance of Morrison Lake to the Skeena Watershed and highlighted the importance of the area for the production of sockeye salmon. GHCO and GCO noted that their areas of interest extend throughout the Skeena Watershed and that the fish they rely upon for sustenance spawn in the upper reaches of the watershed, including Morrison Lake. They stated that, due to this reliance on Skeena sockeye, they have “aboriginal rights to the Morrison Lake fishery and the clean water it provides.”

GHCO and GCO stated their concerns about the proposed Project and its potential impact on the water quality of Skeena River. They said the Crown was required to consult with them on the potential for impacts to their aboriginal rights. They asked for full access to proposed Project information and the time to review potential impacts on aboriginal rights. They also requested that a representative of SFC join the working group, noting that SFC represents the fisheries conservation and management interests of the five principal First Nations with traditional territories within the Skeena watershed, including Lake Babine Nation, Tsimshian, Gitanyow, Wet’suwet’en and the Gitxsan.

On October 12, 2010, EAO responded, saying that, while EAO understood Gitxsan and Gitanyow had an interest in the Morrison Lake fishery and surrounding habitat due to its connection with the Skeena River fishery, the proposed Project itself was well outside what EAO understood to be the area of interest of either Nation. However, EAO agreed on the potential for an adverse affect to Gitanyow and Gitxsan interests in the Skeena River fishery and acknowledged the duty to consult. EAO went on to say that the duty to consult fell on the lower end of the spectrum as set out by the Supreme Court of Canada in the *Haida* decision.

EAO proposed that, in order to reasonably meet the Province’s duty, the following actions be undertaken:

- EAO invite a representative of SFC to join the technical working group for the proposed Project;
- ensure that Gitanyow and Gitxsan were provided access to all the information associated with the Proponent’s Application through a link to EAO’s online electronic Project Information Center;
- offer to meet and discuss the Application;
- inform Gitanyow and Gitxsan of all major milestones with respect to the proposed Project, including an opportunity to comment on EAO’s draft Assessment Report; and,

- if Gitanyow or Gitxsan did not believe that its interests have been adequately accommodated in keeping with the Crown's legal duties, EAO would provide an opportunity for either Nation to submit its own report to Ministers to include their perspectives as part of the decision making process.

A representative of SFC was invited to the technical working group, and attended a working group meeting on October 4, 2010. The focus of initial SFC comments on the Application was on:

- concerns that SFC should have been invited to participate in the EA from its beginning;
- request that the Proponent move the physical location of the open pit at least a kilometer from the edge of Morrison Lake;
- concern about out-of-date fisheries stock data, specifically sockeye and coho;
- lack of the Proponent's understanding of the relationship between Morrison stocks and other stocks (e.g. Kitwanga and Babine);
- request to consider mitigation beyond Morrison Lake into other areas of the Skeena watershed;
- requirement for up-to-date shoreline spawning surveys;
- questions regarding subaqueous storage of waste rock as being the best practice for waste rock disposal;
- desire to see effects predicted for areas downstream of the proposed Project (e.g. Babine Lake, Babine River etc.);
- questions regarding the type and number of hydrogeology studies completed;
- concerns about the lack of complete water quality baselines for Morrison Lake; and,
- concerns about how effluent can meet BC Water Quality Guidelines.

On October 28, 2010, EAO suspended the EA at the Proponent's request so the Proponent could take more time to answer questions and respond to working group comments.

In January 2011, in response to serious concerns expressed by EAO and working group members, the Proponent significantly redesigned the waste and mine plans to address water quality and fisheries issues. SFC representatives attended the next technical working group meeting in Vancouver to discuss the Proponent's revised plan.

On March 4, 2011, EAO wrote to GHCO and GCO to inform them that EAO was considering a formal amendment to the section 11 Order clarifying how Gitanyow and Gitxsan would be consulted on the EA. The proposed amendment was consistent with the October 4, 2010 letter from EAO to GHCO and GCO. On March 11, 2011, GHCO

confirmed this change was acceptable and the Order was issued on March 16, 2011. No response was received from GCO.

On March 7, 2011, EAO and CEA Agency developed a list of eight information conditions necessary for the EA suspension to be lifted. This list was shared with the Working Group, including SFC. On July 11, 2011, EAO, having considered a new submission from the Proponent (called the *Review Response Report Rev 2*) against the March 7, 2011 information criteria, lifted the suspension and provided the *Review Response Report Rev 2* to the technical Working Group for their review. EAO wrote to GHCO and GCO to inform them of this milestone, consistent with the consultation obligations set out in the section 13 Order.

SFC provided comments on the new Proponent submission (*Review Response Report Rev 2*) which built on its previous comments. These included:

- concerns over fisheries inventory and current stock assessments;
- need for complete baseline water quality information;
- concerns over the validity of the effects assessment and the Proponent's ratings of significance;
- location of the overburden stockpile and potential impacts on Morrison Lake;
- concerns about draining Booker Lake and Ore Pond into Morrison Lake;
- concern about potential collapse of the pit wall and its potential impacts on Morrison Lake;
- a request for more information on the hydrogeological conductivity between Morrison Lake and the open pit;
- questions regarding the "zero surface water" discharge plan;
- costs of long term water treatment;
- concerns over the Fish Habitat Compensation Plan, specifically that it does not consider Morrison Lake as fish habitat;
- concerns over potential cumulative impacts to Babine Lake; and,
- questions on the effects of cadmium on fish.

On July 21, 2011, at the request of GHCO, EAO staff met with GHCO representatives to discuss the proposed Project. At the meeting, GHCO confirmed the role of SFC and reiterated the importance of the Morrison Lake fishery to Gitanyow.

On August 25, 2011, EAO wrote to GHCO to seek confirmation of the nature of the aboriginal rights being claimed by Gitanyow and to confirm consultation opportunities available to Gitanyow during the EA. GHCO confirmed the importance of the area to Gitanyow as "sacred critical habitat" and requested an additional meeting to discuss the proposed Project, affected aboriginal rights, and EAO's preliminary assessments.

On September 6, 2011, EAO sent a draft assessment report to GHCO and GCO. SFC provided comments on the draft assessment report. At a broad level, SFC stated:

- there are deficiencies in the HADD (harmful alteration destruction or disruption of fish habitat) assessment, as the Application did not include an assessment of all the relevant mine components, specifically fish habitat around the diffuser and pipeline;
- Morrison Lake is “sacred sockeye salmon habitat”, and Morrison sockeye should have been a VC;
- water quality effects on sockeye, especially juveniles, had not been adequately assessed;
- hydrogeology work is insufficient to demonstrate water quantity and related water quality effects can be managed within guidelines;
- an opinion that there is incomplete inventory of aquatic resources and fish populations/behaviour – this means that water quality effects on these components cannot be determined with any certainty;
- information on the abundance and importance of the Morrison/Tahlo sockeye run is outdated or incomplete in the report (an accurate picture of Morrison Lake fisheries and fish production is needed as part of the EA); and,
- any potential effects to the sockeye salmon resulting from water quality degradation (or a catastrophic mine failure such as a dam burst) is unacceptable to SFC/Gitxsan/Gitanyow because of the value of the wild stocks and their inherent value and food fishery value.

SFC also provided, for suggested inclusion, three commitments, which can be summarized as:

- partner with Lake Babine Nation for a long-term sockeye salmon habitat enhancement program in the proposed Project area;
- establish a counting weir near the mouth of Morrison River and collect four years of data on spawning and fish populations in the Lake; and,
- establish a long-term monitoring program for impacts to Morrison and the fisheries.

On September 30, 2011, EAO again suspended the review of the Application and indicated to the Proponent that EAO would be using a third party to review aspects of their Application. The focus of the third party review was the potential for impacts to water quality and fish. EAO wrote to GHCO and GCO to communicate the suspension and indicate that third party reviewers would be looking at information related to potential impacts to water quality and fish, specifically sockeye salmon, issues which had been raised by GHCO, GCO and SFC. In the letter, EAO also asked that GHCO

and GCO provide additional information on their assertion that 3.2 to 8 percent of the fish they harvest come from Morrison Lake.

On November 8, 2011, EAO staff met with representatives of GHCO, GCO and the SFC in Hazelton to discuss their concerns as well as to review the SFC report called *The Sockeye Salmon of Morrison and Tahlo Lakes British Columbia, and Their Importance to the Salmon Fisheries of the Skeena Watershed*.

As a result of the November 8, 2011 meeting, EAO wrote to GHCO and GCO informing them that EAO had updated its understanding of their aboriginal rights. EAO committed to updating the Assessment Report to reflect that understanding.

On December 12, 2011, SFC wrote to EAO reiterating their concerns about water quality in Morrison Lake, with a particular emphasis on cadmium. SFC indicated that they were undertaking toxicology research that would be available in March, 2012. That report was delivered to EAO in April 2012 and confirmed SFC's earlier concerns about cadmium impacts on sockeye salmon.

EAO shared the completed third party review reports and the Proponent's proposed Scope of Work with SFC in late December 2011. Comments received from SFC on January 27, 2012 indicated the following:

- general agreement with the findings on potential aquatic impacts and hydrogeology limitations;
- continued concerns that Morrison Lake would not completely mix, resulting in "hot spots" of elevated effluent concentrations or concentrations of effluent at the bottom of the lake;
- would have liked to see more focus on sockeye salmon and the entire Morrison watershed;
- support for physical limnologist to assess the extent and nature of mixing in Morrison Lake;
- concerns over the potential for low flows in Morrison River, particularly during salmon spawning in late summer/early fall; and,
- wanted to see an additional "round" of review by an independent reviewer.
- on April 23, 2012, SFC provided EAO with a report entitled "The potential effects of cadmium and other mixed metal mining effluent on fish species in Morrison Lake with a particular emphasis on sockeye salmon."

On June 22, 2012, EAO transmitted a number of reports, asking for comments to be received by EAO by July 18, 2012. In the letter, EAO informed Gitxsan and Gitanyow that, should they disagree with any aspects of EAO's assessment or conclusions, they could provide a separate report to EAO, who would provide this report to ministers for

their consideration when making a decision on the proposed Project. The reports in the package from EAO included:

1. Pacific Booker Mineral's *3<sup>rd</sup> Party Review Response Report*
2. Pacific Booker Mineral's *3<sup>rd</sup> Party Review Response Report - Addendum 1*
3. *Technical review of the Morrison Lake Water Quality Model contained in Pacific Booker Minerals' (the proponent) Application for an Environmental Assessment Certificate for the proposed Morrison Copper/Gold Project.* By: Dr. Bernard Laval, PhD, PEng
4. *Comments on 3rd Party Review Response Report, Morrison Project.* By Dr. Christoph Wels and Robertson Geo consultants
5. Tracking Tables (All issues have now been considered and responses are satisfactory to EAO).
6. EAO's draft Assessment Report, First Nation Consultation Report and Certified Project Description (including draft Table of Conditions)

Both Gitxsan and Gitanyow requested, and EAO granted, an extension for technical comments until July 27, 2012.

EAO and CEA Agency staff met with representatives of Gitxsan, Gitanyow and SFC in Hazelton on July 16, 2012 to discuss EAO's conclusions. Both Gitxsan and Gitanyow indicated their final comments would be submitted to EAO on July 27, 2012.

The comments provided on July 27, 2012 indicated the following:

- concern over the actual location of the proposed Project and its proximity to Morrison Lake;
- desire for an additional working group meeting to discuss the geomembrane liner proposed in the Proponent's *3<sup>rd</sup> Party Review Response Report - Addendum 1*, as well as EAO's third party review reports;
- a number of technical edits to the Draft Table of Conditions, focussed primarily on water quality and fish monitoring;
- some changes to the Draft First Nations Consultation Report.

EAO considered the technical comments and made appropriate changes to the Draft Table of Conditions and Draft First Nations Consultation Report.

On August 2, 2012, GHC provided a separate submission for EAO to include in the referral package to ministers. The separate submission outlined the reasons for which GHC do not support the proposed Project, with particular emphasis on potential impacts on their asserted aboriginal right to fish.

#### *12.4.2 Gitanyow Nation Involvement with Proponent*

As the proposed Project is not within the asserted traditional territories of the Gitanyow or Gitxsan Nations, the section 13 Order issued by EAO in March 2011 did not include

an obligation for the Proponent to directly consult with these two First Nations. The draft section 13 Order was provided to Gitxsan and Gitanyow Nations by EAO for review and no requests for direct consultation by the Proponent was received.

#### **12.5 Potential Impacts to Gitanyow Nation Interests and Measures to Mitigate or Accommodate Impacts**

Section 12.4 above describes EAO's understanding of the issues that have been identified by Gitanyow and Gitxsan Nations (collectively and through SFC) 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 this report. The majority of the Gitanyow and Gitxsan issues relate to water quantity (section 5.2), water quality (section 5.3), aquatic resources (section 5.4) and fish (section 5.5). 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.

#### **Consultation**

- Gitanyow and Gitxsan wrote to EAO in September 2010, asking to be consulted on the proposed Project, and requesting a representative of SFC to join the Working Group. EAO agreed to consult and agreed to the request for SFC to join the Working Group. Those changes were formalized through a section 13 Order in March 2011.
- Gitanyow and Gitxsan asked EAO staff to attend meetings in Gitanyow and Hazelton to discuss the proposed Project. EAO agreed and on July 21, 2011, Gitanyow and EAO staff met and had some discussion on the proposed Project, including the role of SFC and the importance of the Morrison Lake fishery to Gitanyow. EAO staff also attended a meeting in Hazelton on November 8, 2011 to discuss these issues in more depth.
- EAO changed its assessment of the duty to consult from low to moderate based on new information provided by Gitxsan, Gitanyow and SFC.
- EAO undertook a number of third party reviews (by a professional fisheries biologist, a professional geologist/hydrogeologist and a professional engineer/lake behaviour specialist) to examine in more details the issues raised by SFC.

#### **Water Quality**

- Gitxsan and Gitanyow expressed concerns that effluent from the TSF and the effluent diffuser would not fully mix with the lake, would change long term lake behaviour (i.e. stop it from turning over twice a year), or would concentrate on

the bottom of Morrison Lake, resulting in areas of poor water quality which could impact sockeye spawning and other fish habitat.

- In response to those concerns, the Proponent committed to replacing the proposed glacial till liner with a geomembrane liner which would vastly reduce potential seepage from the TSF. This is captured in EAO's Table of Conditions.
- The Proponent also committed to implementing additional secondary water treatment in the proposed water treatment plant to further remove parameters of concern. The water treatment plant would be constructed as soon as required by permitting agencies. This is captured in EAO's Table of Conditions.
- EAO engaged a third party lake behaviour specialist (a SFC recommendation) to review the Proponent's diffuser design, with a specific question on the efficacy of how it could affect lake mixing. These reviews indicated that the diffuser would likely operate as asserted by the Proponent, and would act to mix effluent in Morrison Lake. Further, the effluent diffuser would not be expected to change lake behaviour.
- EAO engaged a third party lake behaviour specialist (a SFC recommendation) to review issues related to "hotspots" and areas of higher effluent concentration. The review indicated that, in the absence of a geomembrane-lined TSF, seepage from the TSF would likely create "hotspots" and areas of higher effluent concentration. However, the Proponent's commitment to a geomembrane liner would effectively eliminate this concern.
- Considering the above third party reviews of lake behaviour, Proponent models of water quality effects, and the commitment to secondary water treatment and a geomembrane liner that will virtually eliminate seepage into Morrison Lake, EAO is satisfied that the proposed Project is not likely to have significant adverse effects on water quality.
- SFC expressed concerns over the need for additional water quality baseline information, in particular the gaps in knowledge of Morrison Lake and streams.
  - The Proponent collected additional water quality baseline information and included it in their *Review Response Report Rev2* document.
  - The Proponent committed to collecting additional information on the physical behaviour of the lake, including water quality monitoring and temperature, conductivity probes and understanding currents and flow regimes. This is captured in EAO's Table of Conditions.
- SFC expressed concerns over anoxic water from Booker Lake and Ore Pond being discharged to Morrison Lake and additional concerns sediment might have higher concentrations of metals.
  - In response, the Proponent committed to the draining of Booker Lake and Ore Pond to Morrison Lake in the six months prior to the winter so that soft lake bottom sediments could then freeze and be handled more easily with



- less sedimentation risk. Sediment and erosion prevention features that are included in the Proponent's environmental management plan are intended to limit the total suspended solids entering the aquatic environment.
- The Proponent has also committed to the preparation of a sediment testing and disposal plan for Booker Lake and Ore Pond sediments. Any unsuitable material (containing residual contaminants that cannot be released to the environment) would be placed within the TSF.
  - SFC expressed concerns that baseline information for hydrogeology was not sufficient and in particular, that Upper Bound "worst case" scenarios did not represent actual worst case scenarios.
    - EAO undertook a third party review of the Proponent's hydrogeology baseline and modelling. The initial third party review indicated some concerns about modelling and Upper Bound predictions. The Proponent addressed these outstanding concerns in their *Third Party Review Response Report* and provided new predictions. The third party reviewer confirmed that the new Proponent models represented a reasonable Upper Bound and that baseline information was sufficient for predictions. EAO is satisfied with the recommendations of the third party review.
  - SFC expressed concerns about the hydrogeological conductivity between Morrison Lake and the proposed open pit. They had two main concerns: water quality impacts to Morrison Lake from poor quality water in the proposed open pit; and, concern that the pit would significantly lower the level of Morrison Lake.
    - The Proponent committed to developing groundwater monitoring wells between the open pit and Morrison Lake to monitor groundwater quality;
    - The Proponent committed to maintain the final level of the pit lake, on closure, to below the elevation of Morrison Lake, resulting in a groundwater gradient that would prevent water from the pit lake impacting Morrison Lake, this is captured in EAO's Table of Conditions;
    - EAO undertook a third party review of the Proponent's hydrogeology baseline and modelling. The initial third party review indicated some concerns about modelling and Upper Bound predictions, in particular groundwater flow to the open pit during operations. The Proponent addressed these outstanding concerns in their *Third Party Review Response Report* and provided new predictions. The third party reviewer confirmed that the new Proponent models represented a reasonable Upper Bound and groundwater flow predictions from Morrison Lake to the open pit during operations were reasonable. The third party reviewer also indicated that the Proponent's commitment to, on closure, keep the final pit lake below the elevation of Morrison Lake would prevent water in the open pit from impacting Morrison Lake.

- SFC had concerns regarding the “zero surface water” discharge plan.
  - The Proponent committed to the construction of a water treatment plant during operations if a surplus water balance is developed during operations. This is captured in EAO’s Table of Conditions.

## Fish

- SFC expressed concerns over the lack of data on fish population, abundance, migration patterns, use and health in Morrison Lake, as well as concerns about habitat assessments in Morrison Lake and streams flowing into Morrison Lake. In particular, SFC notes there is limited information about sockeye spawning, both along the shoreline and at depth. They point out that these data limitations result in challenges to monitoring of project effects and the appropriateness of adaptive management. These concerns include understanding the dynamics of the distinct salmon runs in Morrison Lake (e.g. different habitat needs of those sockeye that spawn and rear in Tahlo Lake, Morrison Lake, Morrison River and Morrison Arm of Babine Lake) and spatial and temporal use of the lake by various fish stocks.
  - The Proponent undertook additional shoreline spawning work in cooperation with the Lake Babine Nation and fieldwork with Lake Babine Nation associated with the Fish Habitat Compensation Plan.
  - The Proponent has committed to working with Lake Babine Nation, DFO and SFC in measuring annual fish escapement into Morrison River and advancing the knowledge of the fish populations, behaviour and distribution in Morrison Lake. This is captured in EAO's Table of Conditions.
  - The Proponent committed to undertaking additional spawning surveys, particularly in the area downstream of the TSF, along the shoreline and at depth to better quantify the spatial extent of salmon spawning. This is captured in EAO's Table of Conditions.
- Concerns regarding potential for adverse effects to spawning in Morrison River as the result of reduced water volume in Morrison Lake, particularly during fall and winter low flows and during spawning season.
  - The Proponent committed to spawning surveys in Morrison River to better quantify the potential effect of the reduction in flow due to the proposed mine. This would be combined with more accurate stream gauging stations to ensure that low flow measurements are captured and accurate. This is captured in EAO's Table of Conditions.
  - The Proponent has committed to offset any reductions in flow to Morrison River with water from the clean water diversions or water from the TSF which is treated via the water treatment plant. The requirement to develop an Instream Flow Requirement which is protective of salmon spawning habitat in Morrison River is captured in EAO's Table of Conditions.
- Concerns over direct loss of fish habitat resulting from reductions in stream flows on fish bearing reaches and placement of the effluent diffuser and water intake pipeline.
  - The Proponent committed to compensate for loss of fish habitat by implementing a Fish Habitat Compensation Plan (FHCP). The plan commits

to compensating for loss of fish bearing habitat at a habitat area replacement ratio of 3:1 by creating 3,600 m<sup>2</sup> of stream habitat that would include rearing and spawning habitat features and be accessible to fish. To compensate for loss of approximately 275,000 m<sup>2</sup> of non-fish bearing aquatic habitat the plan commits to improving fish access from Morrison Lake to non-fish bearing waters in the Olympic Lake system approximately 7 km north of the proposed mine site. The Olympic Lake system constitutes approximately 170,000 m<sup>2</sup> of lake habitat and 2,400 m<sup>2</sup> of stream; upgrading this system could increase its productive capacity. The Fish Habitat Compensation Plan proposes the construction of two off-lake channels at the south end of Morrison Lake to provide spawning and rearing habitat for salmonids.

- The Proponent committed to working with DFO, MOE, LBN and SFC to finalize an agreed upon FHCP which would compensate for any proposed Project activities that result in the HADD of fish and fish habitat
- Considering the technical work completed to date, the minimal direct impact on fish habitat, and comments from DFO, EAO is satisfied that there is a reasonable expectation that a FHCP can be developed to the satisfaction of DFO.
- SFC requested that the Proponent consider habitat compensation options outside the Morrison watershed.
  - EAO notes that DFO policy is that compensation options occur as close to the impact as possible.
- Concerns about the downstream effects of the proposed Project (e.g. Babine Lake and Skeena River).
  - EAO is satisfied there will be no potential adverse downstream effects of the proposed Project in Babine Lake.
- Concerns over potential cumulative impacts to Babine Lake.
  - EAO is satisfied that there will be no potential adverse downstream effects of the proposed Project on Babine Lake, therefore, that the proposed Project will not interact cumulatively with other past projects or those reasonably foreseeable in the future.
- A concern over impacts of cadmium to fish.
  - The Proponent committed to replacing the proposed glacial till liner with a geomembrane liner of the TSF.
  - The Proponent also committed to implementing additional secondary water treatment in the proposed water treatment plant to further remove parameters of concern. The water treatment plant would be constructed as soon as required.
  - The Proponent committed to operating a water treatment plant that reduces the amount of cadmium in the effluent and the models presented show that, outside a mixing zone, water can meet BC Water Quality Guidelines.

- EAO undertook a third party review of the Proponent's hydrogeology and water quality modelling. The initial third party review indicated some concerns about modelling and Upper Bound predictions. The Proponent addressed these outstanding concerns in their *3<sup>rd</sup> Party Review Response Report* and provided new predictions. The third party reviewer confirmed that the new Proponent models represented a reasonable approach to water quality predictions. EAO is satisfied with the recommendations of the third party review.
- Considering the above third party review of water quality modelling, Proponent models of water quality effects, and the commitment to secondary water treatment and a geomembrane liner that will virtually eliminate seepage into Morrison Lake, EAO is satisfied that there is a reasonable expectation that the issue of water quality objectives for cadmium can be addressed in permitting.

## **12.6 Conclusions Regarding Gitanyow and Gitxsan Nations**

In view of the consultation that has taken place with Gitanyow and Gitxsan Nations, EAO concludes that:

- the process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns expressed by Gitanyow and Gitxsan Nations;
- the process of consultation was appropriate and reasonable in the circumstances; and,
- EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Gitanyow and Gitxsan Nation asserted aboriginal rights (and by way of both draft and final copies of this report, it is communicating its findings to Gitanyow and Gitxsan Nations).

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Gitanyow and Gitxsan Nation, EAO concludes that the risk of adverse effects to lands and resources associated with the exercise of Gitanyow and Gitxsan Nation's asserted aboriginal rights has been appropriately avoided or mitigated (with the successful implementation of mitigation measures and conditions) to the extent necessary to maintain the honour of the Crown.

## **13 Yekooche First Nation**

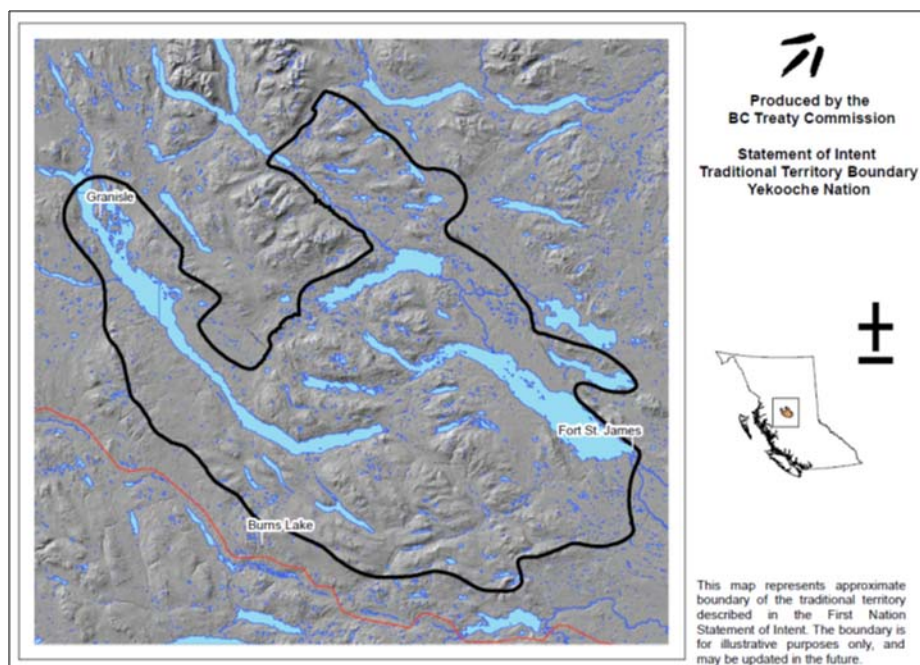
### **13.1 Yekooche First Nation Traditional Use of the Proposed Project Area**

At the time of contact, ancestors of the Yekooche First Nation inhabited a territory that centered around Cunningham Lake and the Babine Portage, a route which linked the southern end of Babine Lake with the northern end of Stuart Lake. HBC traders referred to these people as the "Indians of the Portage," who later came to be known as

*Yekooche.*

Ethnographers such as Morice considered the Yekooche people to be closely affiliated with local groups of Carrier residing around Stuart and Trembleur Lakes. In 1959, Canada amalgamated the separate Pinchi (*Pinchie*), Tache (*Tachie*), Grand Rapids (*Kuzche*), Trembleur/Middle River (*Dzitline-lee*), and Portage (*Yekooche*) bands into the Stuart-Trembleur Lakes Band. This name was changed to the Tl'azt'en Nation in 1987. In 1994, the Portage community left Tl'azt'en Nation and became known as Yekooche First Nation, a name that still exists today. The following map shows the asserted traditional territory of the Yekooche First Nation as registered with the British Columbia Treaty Commission.

**Figure 19 – Yekooche First Nation Asserted Traditional Territory**



In the early 1800s, the Babine Post journals sometimes referred to the “Portage Indians,” usually on those occasions when William Brown travelled from Fort Kilmaurs to Fort St. James. At these times, he enlisted their assistance in transporting supplies from one end of the trail to the other, stopping to observe their winter village at Cunningham Lake.

Though the “Portage Indians” were considered to be “attached” to Fort St. James, and were not permitted to trade at Fort Kilmaurs, the Babine Post journals show that the Portage people made occasional visits to Babine Lake. In January 1823, a few families from the Portage arrived at *Nah-tell-cuz* to spend the winter with relatives from

Lake Babine.

*In the Evening five Indians arrived with their families, had nothing. They came from the Portage, by the way of the Small Lakes, and fell upon this Lake nearly opposite [Tachet]. By their Report: 'There are a number of Indians Encamped at the small Lake of the Portage [Cunningham Lake] who having taken a great many fish in the small Lakes above [around Whitefish Lake (?)], hauled them there...' The above Indians [the visitors to Fort Kilmaurs] were starving and have come here to live.*

The Babine Post journals also suggested that "Portage Indians" may have used the north shore at the southern end of Babine Lake. In 1825, Charles Ross left Fort Kilmaurs "to visit the Indians along the North Side of the Lake towards the Portage" and obtain their furs before the "Indians of [Fort] St. James" could win them at gambling. It is not clear whether HBC traders felt that this "North Side" group comprised a division of the "Portage Indians," or whether they would have been viewed as belonging to the Lake Babine tribes, as it would have been considered "bad form" for a Fort Kilmaurs employee to acquire furs from anyone "attached" to Fort St. James.

This ethnographic information focuses on events and activities that occurred during the early 1800s. There are no readily available research materials, to EAO's knowledge, referring to the later use of areas adjacent to the southern end of Babine Lake, and nothing to clarify which places may have seen non-exclusive resource exploitation by either Lake Babine or Yekooche after that period.

### 13.2 Yekooche First Nation Current Occupation and Use of the Proposed Project Area for Traditional Purposes

The asserted territory of Yekooche First Nation only encompasses a small area of the proposed Project – approximately 5 km of the southern end of the proposed transmission line corridor. There is no information available to EAO that describes any specific current Yekooche First Nation use of the area, nor has Yekooche First Nation provided any information on current use for traditional purposes.

### 13.3 Yekooche First Nation Aboriginal Rights (Including Title)

It is reasonable to assume that members of Yekooche First Nation may still utilize resources in and around the Babine Archipelago for traditional uses. However, only about five kms of the proposed Project is within asserted Yekooche territory; only the proposed transmission line overlaps with the Yekooche claim.

All of the ethnographic and historic sources indicate that the proposed Project area falls within Lake Babine Nation's area of exclusive use (with the exception of the five kms of

transmission line route). It is EAO's assessment, based on current information, that the *prima facie* case in support of any Yekooche claim to site-specific aboriginal rights (including aboriginal title), in relation to the proposed Project area, is weak.

It is important to note this assessment is focused on the site of the proposed Project and is not meant to apply to any other part of Yekooche First Nation's asserted traditional territory and that the assessment is made only for the purposes of the proposed Project.

With regard to meeting its consultation obligations, EAO determined that the required scope of consultation with Yekooche is towards the lower end of the spectrum described by the Supreme Court of Canada in the *Haida* decision. EAO has consulted in a manner that is consistent with this assessment.

### 13.4 Issues and Concerns Raised by Yekooche First Nation

Yekooche First Nation provided very little feedback or concern about the proposed Project to EAO and the Proponent during the course of the EA. In the correspondence that was received, the Yekooche identified the following issues:

- employment and economic development;
- cumulative impacts, specifically as they relate to the Skeena watershed and wildlife corridors; and,
- receiving copies of baseline studies pertaining to cumulative effects, water quality, wildlife, fisheries and socio-economic impacts, particularly as they might affect Yekooche aboriginal rights.

### 13.5 Consultation with Yekooche First Nation

#### *13.5.1 Yekooche First Nation involvement with EAO*

In September 2003, EAO wrote to Yekooche First Nation to inform it that the EA for the proposed Project had begun, explaining the nature of the proposed Project and enquiring about Yekooche interests in the proposed Project. The letter noted that the proposed Project site fell to the north of the Statement of Intent (SOI) area of Yekooche First Nation, and that five kms of the proposed transmission line fell within the Yekooche SOI. The Yekooche was invited to the first working group meeting in October 2003 in Smithers, but did not attend.

Yekooche subsequently supplied EAO with a letter written to the Proponent, where it was noted that Yekooche had reviewed documents generated by the Proponent noting that:

...determined that PMB [Proponent] has met the Yekooche First Nation requirements for proper consultation. As such, at this point in time we do



not have any additional information to add to the process or to the Final Draft Report dated September, 2003. We would like to remain on your mailing list and would welcome the opportunity to review additional reports and conclusions as your project proceeds. Our interest is the protection of the Skeena watershed and wildlife corridors as they relate to traditional Yekooche activities. If, after reviewing future reports, we determine that our interests are being impacted we will notify you immediately.

EAO confirmed with Yekooche that:

- the proposed Project consultation meets Yekooche requirements;
- the proposed Project does not fall within land directly strategic to Yekooche First Nation, and the Yekooche will not participate in the proposed Project review at this time; and,
- Yekooche interest is the protection of the Skeena watershed and wildlife corridors as they relate to traditional activities.

EAO committed to supplying Yekooche First Nation with information regarding the proposed Project as it progressed and stated that, if the Yekooche noted any issues, the office would revisit involvement in the EA.

In early 2008, EAO again wrote to Yekooche to seek input on whether Yekooche wished to be involved in the next steps of the EA process. The letter reminded the Yekooche of the 2003 correspondence and attached additional information related to the pre-Application stage of the EA. The letter specifically asked if there were any specific aboriginal rights that Yekooche First Nation asserted in relation to this or other proposed Project components, and whether or not the Nation believes the proposed Project may have an effect on its interests.

EAO requested a meeting with Yekooche and the Proponent to discuss the proposed Project and any issues relating to it. A Yekooche First Nation staff member followed up by requesting additional mapping of the proposed Project, but did not respond to the offer of a meeting, nor did he/she supply any information on aboriginal rights.

In May, 2009, EAO again wrote to Yekooche First Nation, advising that, because the proposed Project was largely outside of Yekooche First Nation traditional territory, EAO was considering amending the section 11 Order so the Proponent would no longer be required to consult with Yekooche First Nation on Yekooche aboriginal interests as they related to the proposed Project. The letter noted that EAO had shared information about the proposed Project with Yekooche First Nation for review and had received no further indication that Yekooche First Nation is interested in participating in the EA. EAO asked

that Yekooche First Nation indicate if it had any concerns with EAO amending the section 11 Order.

Yekooche First Nation responded to EAO shortly afterwards, indicating that, while the proposed mine footprint was not located within Yekooche territory, it continued to have an interest on cumulative impacts associated with the mine development and operation and how they may affect Yekooche aboriginal rights. They requested that EAO not remove them from the section 11 Order and that the Proponent continue to consult with them, particularly regarding the baseline studies and the impact statements.

EAO acceded to the request and did not amend the section 11 Order.

Yekooche First Nation was informed when the Application was received in September 2009 and was given an opportunity to participate in the screening. EAO did not receive a response from Yekooche First Nation.

In January 2010, EAO wrote to Yekooche First Nation with an update on the EA and to inform it that the Application was not accepted for review. EAO also asked to confirm its understanding that Yekooche First Nation had chosen not to participate in the Working Group for the proposed Project but that it wished to receive copies of baseline studies pertaining to cumulative effects, water quality, wildlife, fisheries and socio-economic impacts. EAO indicated that, when a revised Application and addendum were submitted, EAO would require that the Proponent provide Yekooche First Nation with copies.

In July 2010, EAO wrote to Yekooche First Nation to inform them that the revised Application had been accepted for review. The letter reiterated EAO's understanding that Yekooche First Nation was not interested in participating in the review process but would like to receive copies of the baseline studies and impact assessments related to water quality, aquatic health, wildlife, fisheries and employment. EAO asked that, if Yekooche First Nation had any questions, or if EAO's understanding of Yekooche's interest in the proposed Project was incorrect, to contact the office immediately. No response was received.

When the Proponent submitted its revised Application on May 28, 2010 for screening, it was provided to Yekooche First Nation, who did not participate in the screening. EAO notified Yekooche First Nation when the Application was formally accepted for review on June 28, 2010.

EAO informed Yekooche First Nation that the review of the proposed Project was suspended on October 28, 2010, and informed them on July 11, 2011, that the suspension was lifted and the review had begun again. No response was received.

On September 6, 2011, EAO provided a draft Assessment Report to Yekooche First Nation and asked that any comments be submitted by September 16, 2011. No response was received.

In June 2012 this consultation report, along with a final draft of the Assessment Report, was provided to Yekooche First Nation.

No comments were received from Yekooche First Nation as of the date of this report.

#### *13.5.2 Yekooche First Nation Involvement with the Proponent*

In October 2003, Yekooche First Nation wrote to the Proponent, saying that:

“The First Nation consultation protocols are a very important component of any proposed project that may impact aboriginal interests. After reviewing your documents, I (as a Representative for Yekooche First Nation) have determined that PMB [Proponent] has met the Yekooche First Nation requirements for proper consultation. As such, at this point in time we do not have any additional information to add to the process or to the Final Draft Report dated September, 2003.

We would like to remain on your mailing list and would welcome the opportunity to review additional reports and conclusions as your project proceeds. Our interest is the protection of the Skeena watershed and wildlife corridors as they relate to traditional Yekooche activities. If, after reviewing future reports, we determine that our interests are being impacted we will notify you immediately.”

Since the original Application was submitted in September 2009, the Proponent has continued to supply copies of all Application materials (including baseline information) to Yekooche First Nation, at the direction of EAO and consistent with the section 11 Order. No comments were received throughout the course of the EA.

On July 6, 2009, the Proponent invited Yekooche First Nation Chief Partner Schielke and Robert Diaz to participate in a site visit to the proposed mine site. The purpose of the site visit was to provide working group members, regulators and First Nations an opportunity to view the proposed mine site. Chief Schielke and Robert Diaz did not attend.

The Proponent also sent letters of invitation to the Open Houses to Yekooche First Nation Chief and Council. Members from Yekooche First Nation did not attend any of the Open Houses.

### 13.6 Measures to Mitigate or Accommodate Potential for Impact of Rights of Yekooche First Nation

Sections 13.4 and 13.5 above describe EAO's understanding of the issues that have been identified by Yekooche First Nation during the EA for the proposed Project.

Responses to the full set of Yekooche First Nation concerns are described in the Issues Tracking Table. Further information on how Yekooche First Nation concerns have been addressed, including mitigation and Proponent commitments, is provided in the relevant sections of the Assessment Report. While Yekooche First Nation provided very little specific feedback or concerns, EAO has interpreted their concerns on "cumulative impacts" and the Skeena watershed to be primarily about water quality and fish, similar to other First Nations in the review. More details can be found on these topics in sections relating to water quantity (section 5.2), water quality (section 5.3) and fish (section 5.5). 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.

#### ***Cumulative Effects***

Yekooche First Nation noted a concern for cumulative effects from the proposed Project, although did not respond to questions around specific impacts.

- EAO's analysis and conclusions show that there are no cumulative effects arising from interactions between the proposed Project and other existing project or activities, or any other reasonably foreseeable projects within the Regional Study Area.

#### ***Protection of the Skeena Watershed***

Yekooche First Nation noted a concern for protection of the Skeena watershed. As noted above, water quality and quantity and fish were key topics addressed in the assessment.

- No specific mitigations or accommodations were developed to address Yekooche First Nation's general concerns, but EAO considers that commitments and proposed Project design changes to address impacts to fish habitat and water quality and quantity will address Yekooche First Nation concerns. More details on these commitments can be found in sections 5.2, 5.3, 5.4 and 5.5 of the assessment report.

#### ***Wildlife***

Yekooche First Nation expressed a general concern about wildlife corridors in the proposed Project area.

- No specific mitigations or accommodations were developed to address Yekooche First Nation's general concerns, but EAO considers that commitments related to wildlife management and monitoring will address Yekooche First Nation concerns. More details on these commitments can be found in section 5.7.

### **Benefits**

Yekooche First Nation expressed a desire to see economic benefits from the proposed Project.

- The Proponent has indicated a willingness to talk with Yekooche First Nation regarding employment and training opportunities with the proposed Project.

### **13.7 Conclusions Regarding Yekooche First Nation**

In view of the consultation that has taken place with Yekooche First Nation, EAO concludes that:

- the process of consultation has been carried out in good faith, with the intention of substantially addressing specific concerns expressed by Yekooche First Nation;
- the process of consultation was appropriate and reasonable in the circumstances; and,
- EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Yekooche First Nation asserted aboriginal rights (and by way of both draft and final copies of this report, it is communicating its findings to Yekooche First Nation).

Based on the EA of the proposed Project, and on a careful consideration of the record of consultation with Yekooche First Nation, EAO concludes that the risk of adverse effects to lands and resources associated with the exercise of Yekooche First Nation's asserted aboriginal rights has been appropriately avoided or mitigated (with the successful implementation of mitigation measures and conditions) to the extent necessary to maintain the honour of the Crown.

## **PART D – FEDERAL REQUIREMENTS**

The CEA Agency is preparing a separate Comprehensive Study Report that will address the requirements specific to the *Canadian Environmental Assessment Act*.

## PART E – CONCLUSIONS

Based on:

- information contained in the Application;
- the Proponent's efforts at consultation with First Nations, government agencies, including local governments, and the public, and its commitment to ongoing consultation;
- comments on the proposed Project made by participating First Nations and government agencies, including local governments, as members of EAO's Working Group, and the Proponent'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 participating First Nations regarding potential impacts of the proposed Project and the Proponent's responses and best efforts to address these issues; and
- commitments and mitigation measures to be undertaken by the Proponent during the construction, operation, and decommissioning of the proposed Project,

EAO is satisfied that:

- the environmental assessment 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;
- issues identified by First Nations, government agencies and the public, which were within the scope of the environmental assessment, 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 (with the successful implementation of mitigation measures and conditions);
- the potential for adverse effects on the Lake Babine Nation, Gitanyow and Gitksan Nations, and Yeckooche First Nation uses of the proposed Project area has been avoided or minimized to an acceptable level (with the successful implementation of mitigation measures and conditions); and
- the provincial Crown has fulfilled its obligations for consultation and accommodation to First Nations relating to the issuance of an Environmental Assessment Certificate for the proposed Project.

The provincial Minister of Environment and the Minister of Energy, Mines and Petroleum Resources will consider this Assessment Report and other accompanying materials in making their decision on the issuance of an environmental assessment certificate to the Proponent under the Act.