PROSPERITY GOLD-COPPER PROJECT

ASSESSMENT REPORT

With Respect to

the Application by Taseko Mines Limited

for an Environmental Assessment Certificate

pursuant to the *Environmental Assessment Act,* S.B.C. 2002, c.43

Prepared by:

Environmental Assessment Office

December 17, 2009

BRITISH COLUMBIA
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PREFACE

The Environmental Assessment Office (EAO) manages the assessment of proposed major projects in British Columbia, as required by the *Environmental Assessment Act (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, EAO provides a comprehensive assessment report (Assessment Report or Report), and makes recommendations to the Minister of Environment and to the Minister responsible for the project sector. The Ministers may decide to certify a project, decline to certify a project, or require further assessment.

This Assessment Report considers the proposed Project's potential to cause significant adverse environmental, economic, social, heritage and health effects. It identifies measures to prevent or reduce adverse effects, and sets out EAOs analysis 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 environmental assessments is available on EAO's website at www.eao.gov.bc.ca. Questions or comments can be directed to:

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Acronyms Used in this Report

ABA:	Acid-based Accounting
AIA:	Archaeological Impact Assessment
ARD:	Acid Rock Drainage
BC:	British Columbia
CAC:	Criteria Air Contaminants
CCME:	Canadian Council of Ministers of the Environment
CEA Agency:	Canadian Environmental Assessment Agency
CWS:	Canadian Wildlife Service
DFO:	Fisheries and Oceans Canada
EA:	Environmental Assessment
EAO:	Environmental Assessment Office
EC:	Environment Canada
GDP:	Gross Domestic Product
GHG:	Greenhouse Gases
HQ:	Hazard Quotients
ITT:	Issue Tracking Tables
KI:	Key Indicator
LSA:	Local Study Area
MEMPR:	Ministry of Energy, Mines and Petroleum Resources
ML:	Metal Leaching
MOE:	Ministry of Environment
MPB:	Mountain Pine Beetle
MTCA:	Ministry of Tourism, Culture and the Arts
non-PAG:	non-potentially acid generating
NRCan:	Natural Resources Canada
PAG:	potentially acid generating
pH:	potential hydrogen
$PM_{2.5}$:	respirable particulate matter (less than 2.5 microns in diameter)
PM_{10}:	inhalable particulate matter (less than 10 microns in diameter)
ROW:	Right-of-Way
RSA:	Regional Study Area
SQG:	Sediment Quality Guidelines
TNG:	Tsilhqot’in National Government
TSF:	Tailings Storage Facility
TSP:	Total Suspended Particulates
UWR:	Ungulate Winter Range
WQG:	Water Quality Guidelines

PART A – INTRODUCTION AND BACKGROUND

1 Purpose of the Report

The purpose of this Report is to summarize the environmental assessment (EA) of the Application by Taseko Mines Limited (Proponent) for an EA Certificate for the proposed Prosperity Gold-Copper Project (proposed Project). The EAO is required to prepare this Report for provincial Ministers who are responsible for making a decision on the proposed Project under section 17 of the *Act*. For mine projects, the deciding Ministers are the Ministers of Environment and Energy, Mines and Petroleum Resources.

The Report:

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

2 Proposed Project Overview

2.1 Proponent Description

The Proponent for the proposed Project is Taseko Mines Limited, a BC-based mineral resource company headquartered in Vancouver, BC. The Proponent's key assets include the Gibraltar Mines Limited copper-molybdenum mine near Williams Lake, the proposed Project, the Harmony Gold prospect on the Haida Gwaii, and the Aley Niobium prospect near Williston Lake. The proposed Project is wholly owned by the Proponent.

2.1 Proposed Project Description and Scope

The Proponent proposes to develop a conventional open-pit mining project that would involve a large open pit mine development with a 20-year operating life. The mine would use typical large-scale open pit mining equipment and conventional flotation

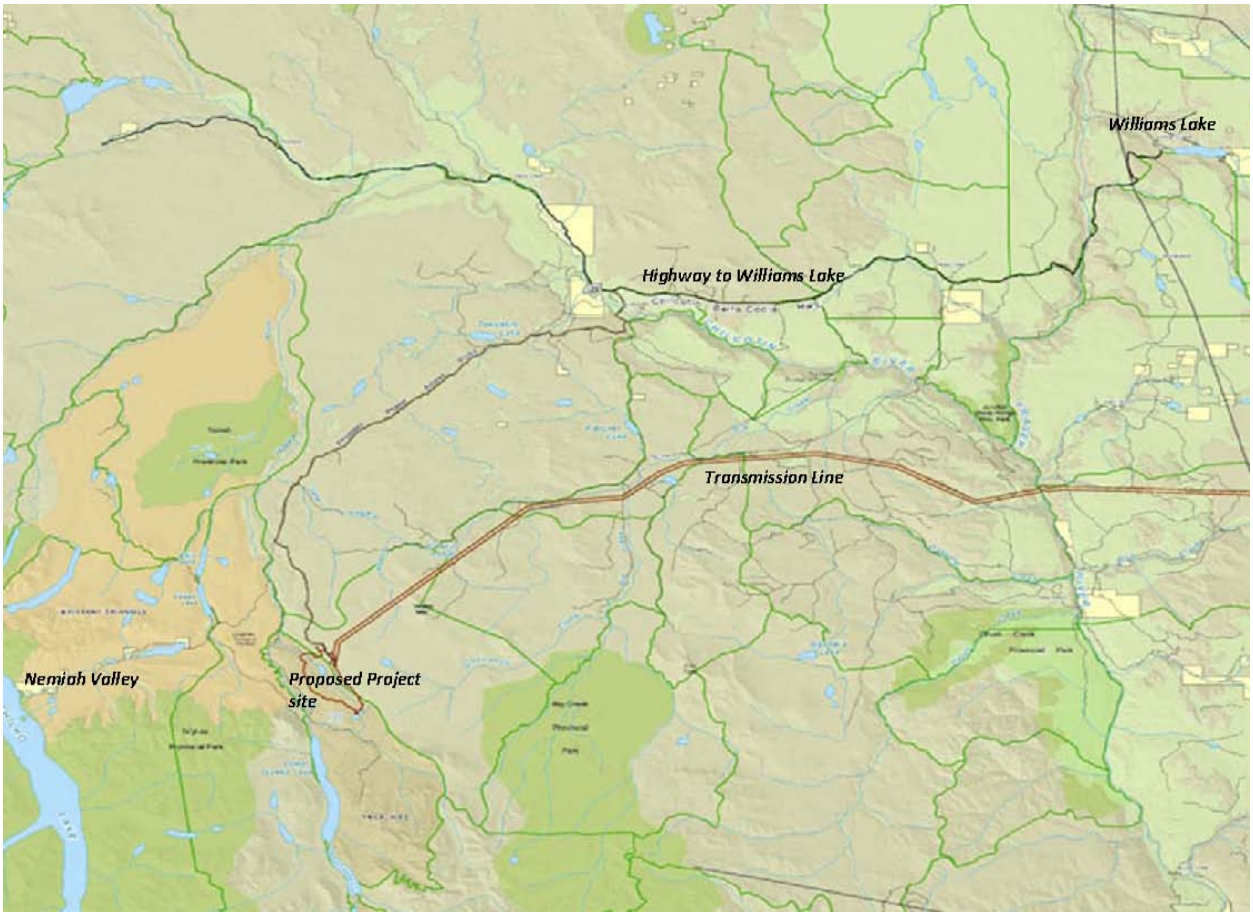


Figure 1: Location Map of the Proposed Project

processes[1]. In addition to the mine and associated tailings and waste rock areas, the proposed Project includes the development of an on-site mill and support infrastructure, a 125 km transmission line corridor, a 2.8 km mine access road to connect to existing logging roads and highways, fish compensation works, and the transport of concentrate to the existing Gibraltar Mine Concentrate Load-out Facility near Macalister, 54 km north of Williams Lake. Figure 1 is a location map for the proposed Project, which shows its proximity to Williams Lake and the Nemiah Valley.

The scope of the proposed Project consists of the following on-site and off-site components and activities associated with construction, operation/maintenance, closure (dismantling, reclamation and pit infilling) and post-closure phases. Figure 2 shows the proposed Project area at baseline conditions. Figure 3 shows the layout of the proposed Project components.

[1] Flotation is the principal process used to recover copper sulphide ores from porphyry ores, for subsequent smelting, roasting or hydrometallurgical treatment.

On-site components:

- approximately 70,000 tonne per day open pit mine, process plant, crusher and ore stockpile;
- mill tailing and waste rock storage facilities including containment dams and other associated structures;
- ore, non-acid generating material, and overburden stockpiles and overburden borrow pit;
- site drainage, clean water diversions and pollution control works;
- explosives factory and a magazine
- concentrate storage and loading facilities;
- substation; and,
- other mine infrastructure.

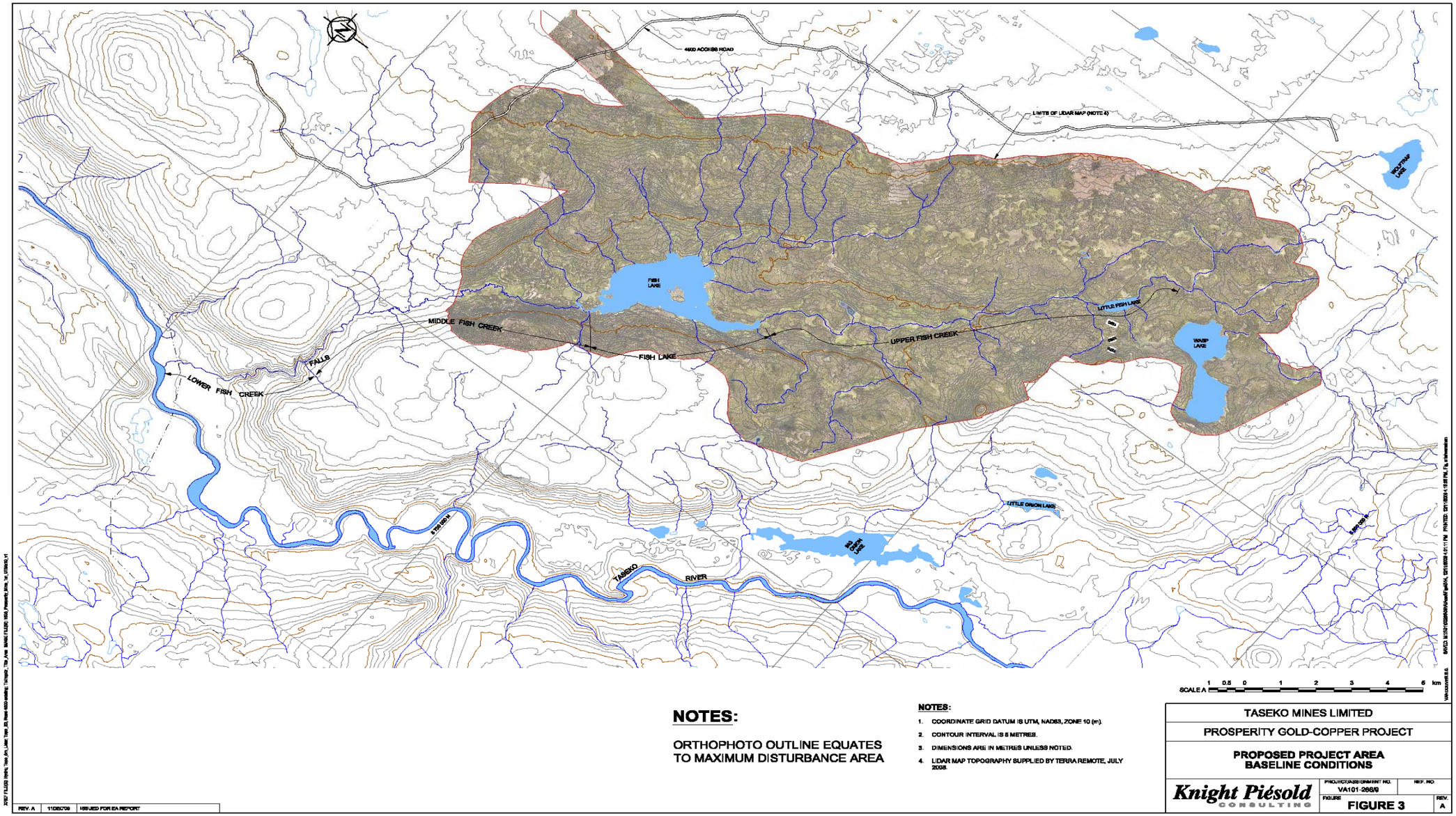
Off-site components:

- a 125 km transmission line including, if required, maintenance access routes extending from the mine-site, across the Fraser River and connecting to the British Columbia Transmission Corporation grid; and,
- any modifications to the existing concentrate transfer facilities at the Gibraltar Mine rail load-out facility near Macalister as a result of, or to accommodate, the proposed Project.

The proposed Project mine site is 125 km southwest of Williams Lake on the Fraser Plateau in South Central BC. The proposed Project deposit is located within the Fish Creek watershed 1 km north of Fish Lake and 10 km northeast of lower Taseko Lake (51.28'N, 123.37'W; NTS Sheet 92-O/5E)[2]. Topography is subdued with elevations ranging from 1450 to 1600 meters above sea level. Development of the mine site would occur within a 35 km^2 parcel of Provincial Crown land currently held in the form of 118 mineral claims by the Proponent. The proposed Project design is complex and involves the dewatering of a lake and the creation of a new one. Figures 4 through 8 show the different components of the proposed Project in each phase, from pre-construction to post-closure. Figure 4 shows the proposed Project site in the pre-construction phase. Figure 5 shows the proposed Project site in the construction phase. The processing plant would have been constructed and the open pit started. Both the open pit and Fish Lake would have been dewatered, with much of that water being stored in the

[2] Latitude and longitude coordinates, and National Topographical System mapsheet number.

Figure 2: Proposed Project Area at Baseline Conditions



NOTES:

ORTHOPHOTO OUTLINE EQUATES TO MAXIMUM DISTURBANCE AREA

NOTES:

1. COORDINATE GRID DATUM IS UTM, NAD83, ZONE 10 (m).
2. CONTOUR INTERVAL IS 5 METRES.
3. DIMENSIONS ARE IN METRES UNLESS NOTED.
4. LIDAR MAP TOPOGRAPHY SUPPLIED BY TERRA REMOTE, JULY 2008.

REV.		
A	11DE5709	ISSUED FOR EA REPORT

TASEKO MINES LIMITED

PROSPERITY GOLD-COPPER PROJECT

PROPOSED PROJECT AREA BASELINE CONDITIONS

Knight Piésold CONSULTING

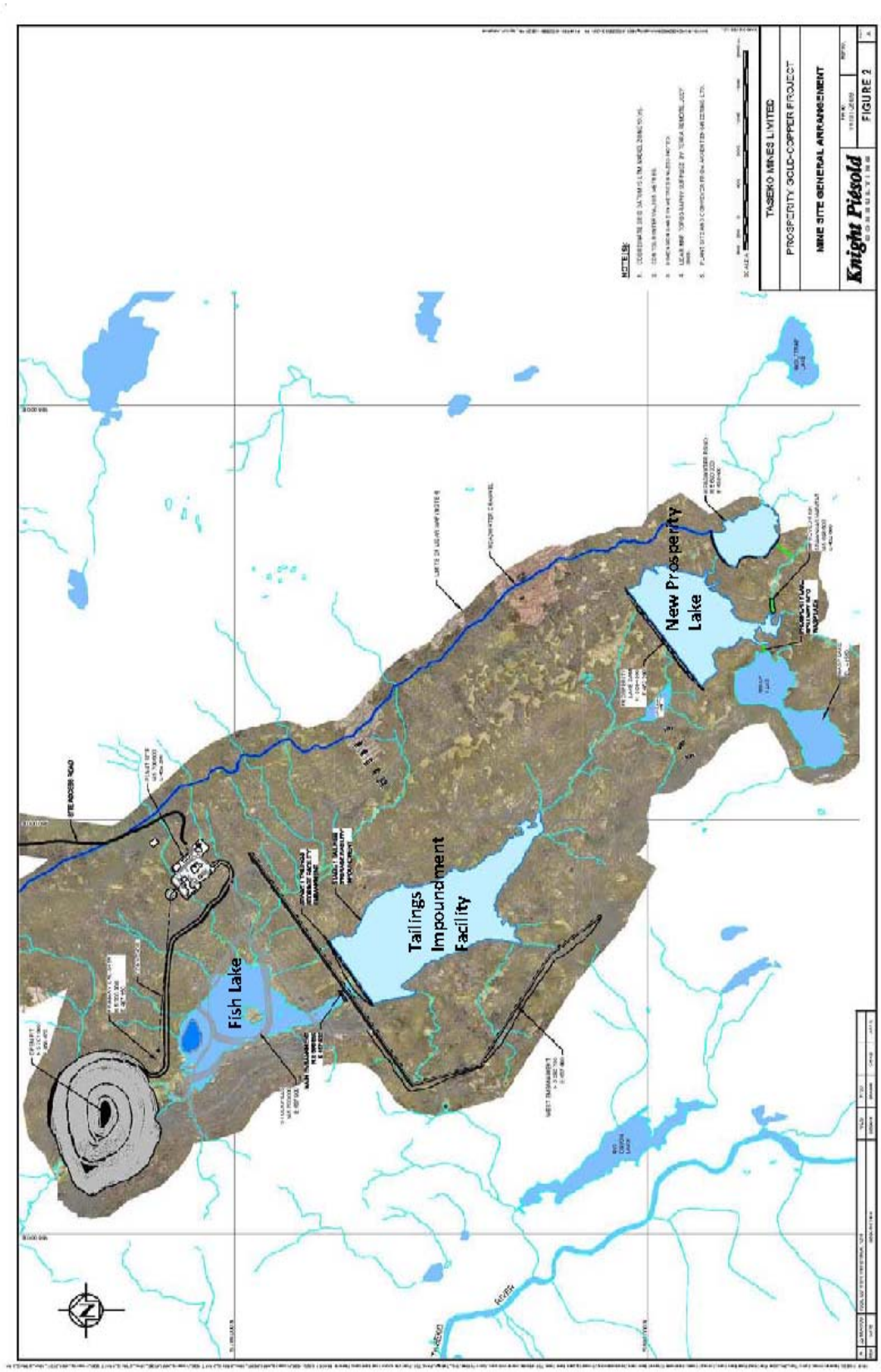
PROJECT/ASSIGNMENT NO. VA101-266/9

REF. NO.

FIGURE **FIGURE 3**

REV. A

Figure 3: Proposed Project Design



supernatant pond[3] at the future site of the tailings storage facility (TSF). All components of the Fisheries Compensation plan would have been completed in the early part of the construction phase, before operations. Figure 6 details the proposed Project in the operations phase. The TSF would have been created and waste rock storage established at the site of dewatered Fish Lake. A diversion channel, the headwater channel, along the eastern boundary of the proposed Project site would divert clean water from outside the mine site either north to lower Fish Creek or south to the headwater pond. Prosperity Lake (the proposed man-made lake) would have been created south of the TSF. Water from the headwater pond would flow into and fill Prosperity Lake. Tailings beaches would have been established along the western and main (northern) embankments.

Figure 7 shows the proposed Project in the closure phase. Water would still be diverted around the proposed Project site by way of the headwater channel to the headwater pond and Prosperity Lake. The open pit would slowly be allowed to fill with water.

Figure 8 shows the proposed Project in the reclamation and post-closure phase. The TSF and open pit would have been allowed to fill with water. Spawning channels would have been constructed south of Prosperity Lake. Clean water from Prosperity Lake would be allowed to flow into the TSF by way of a spillway. The TSF would be allowed to flow into and fill the open pit by way of another spillway. When water quality meets guidelines, the water from the open pit would be allowed to flow into lower Fish Creek by way of a spillway. The waste rock storage area and the tailings beaches in the TSF would be reclaimed by vegetation.

2.1 Proposed Project Benefits

The following data is derived from the Application, except where noted.

Labour

Current estimates for the two-year construction period indicate that the proposed Project would require an average of 375 person years annually. The estimate for the operations period (including contractors) is an average of 375 person years with a peak of 488 person years at year nine. During closure, direct labour demand would fall to 10 person years annually.

During operations, the proposed Project's annual payroll is expected to be approximately $32 million, with $29 million paid locally. The Proponent would implement local hiring policies, partnership training opportunities, local worker

[3] There are two areas in the TSF: the tailings beach (along the north and west embankments) and the supernatant pond. The pond is covered with water, while the beach is dry. Tailings are pumped into the pond, and solids settle out and pack into the TSF beach.

Figure 4: Stage 1a Pre-Construction Phase

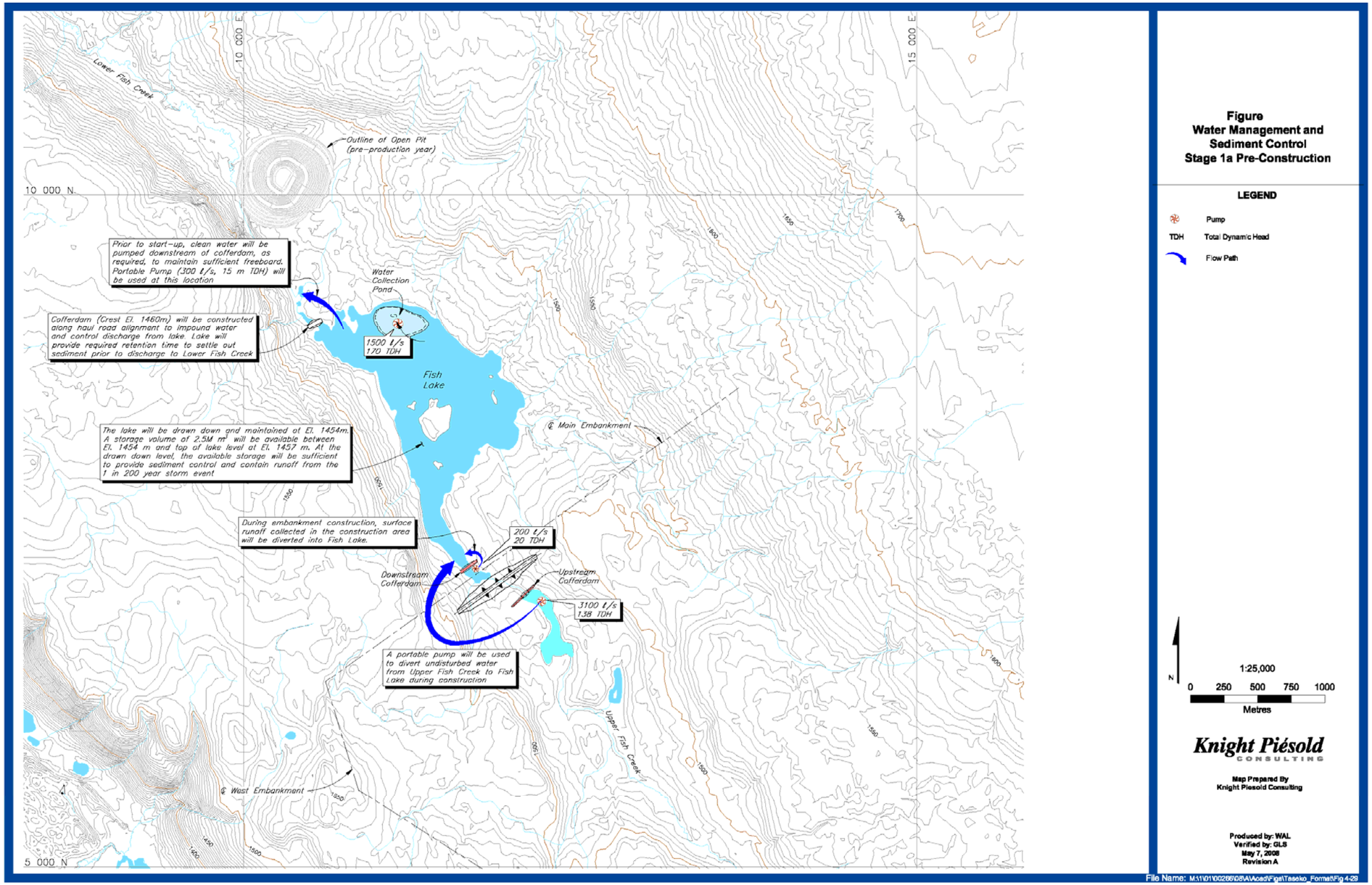


Figure 5: Stage 1b Construction Phase

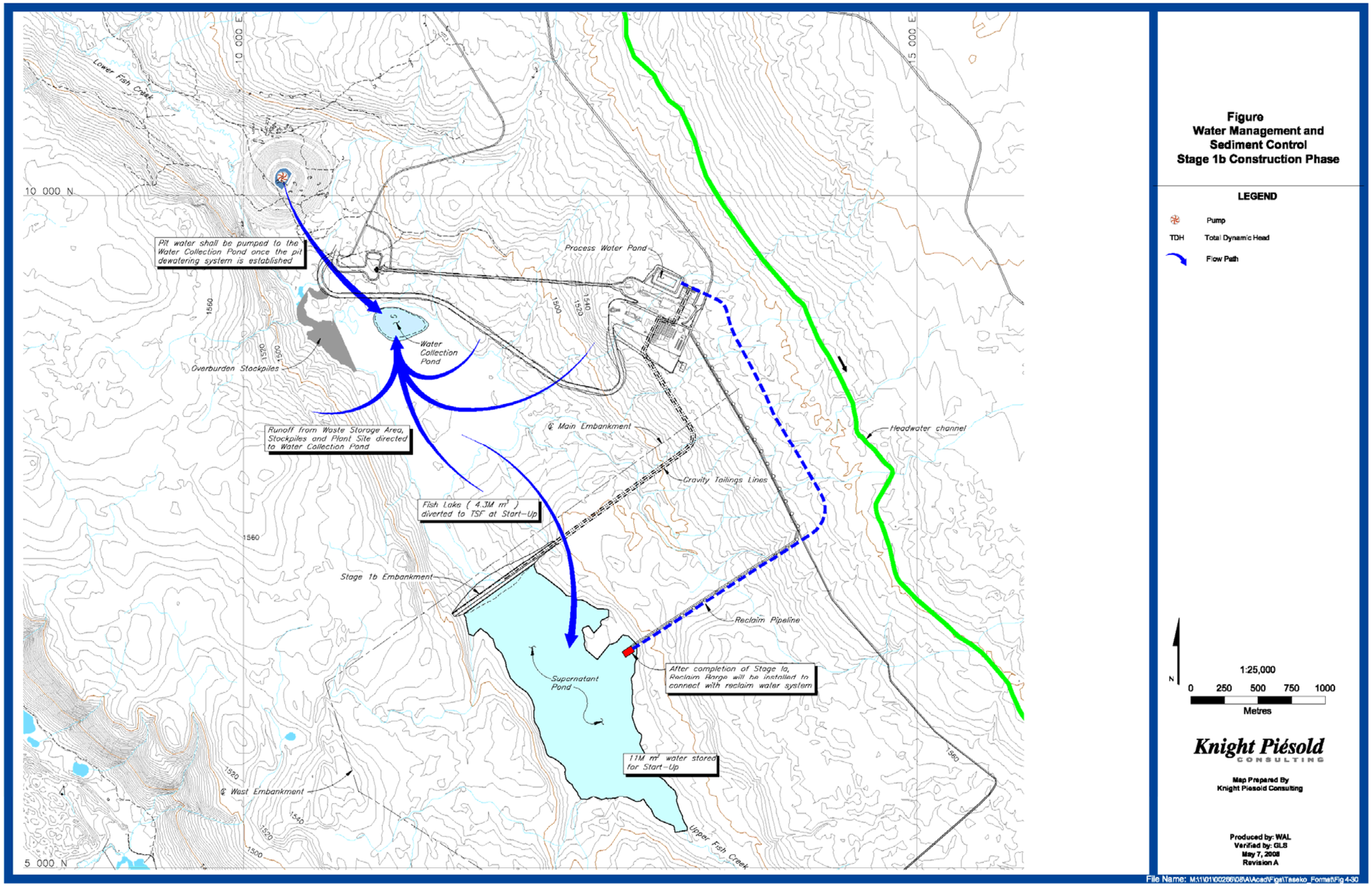


Figure 6: Operations Phase

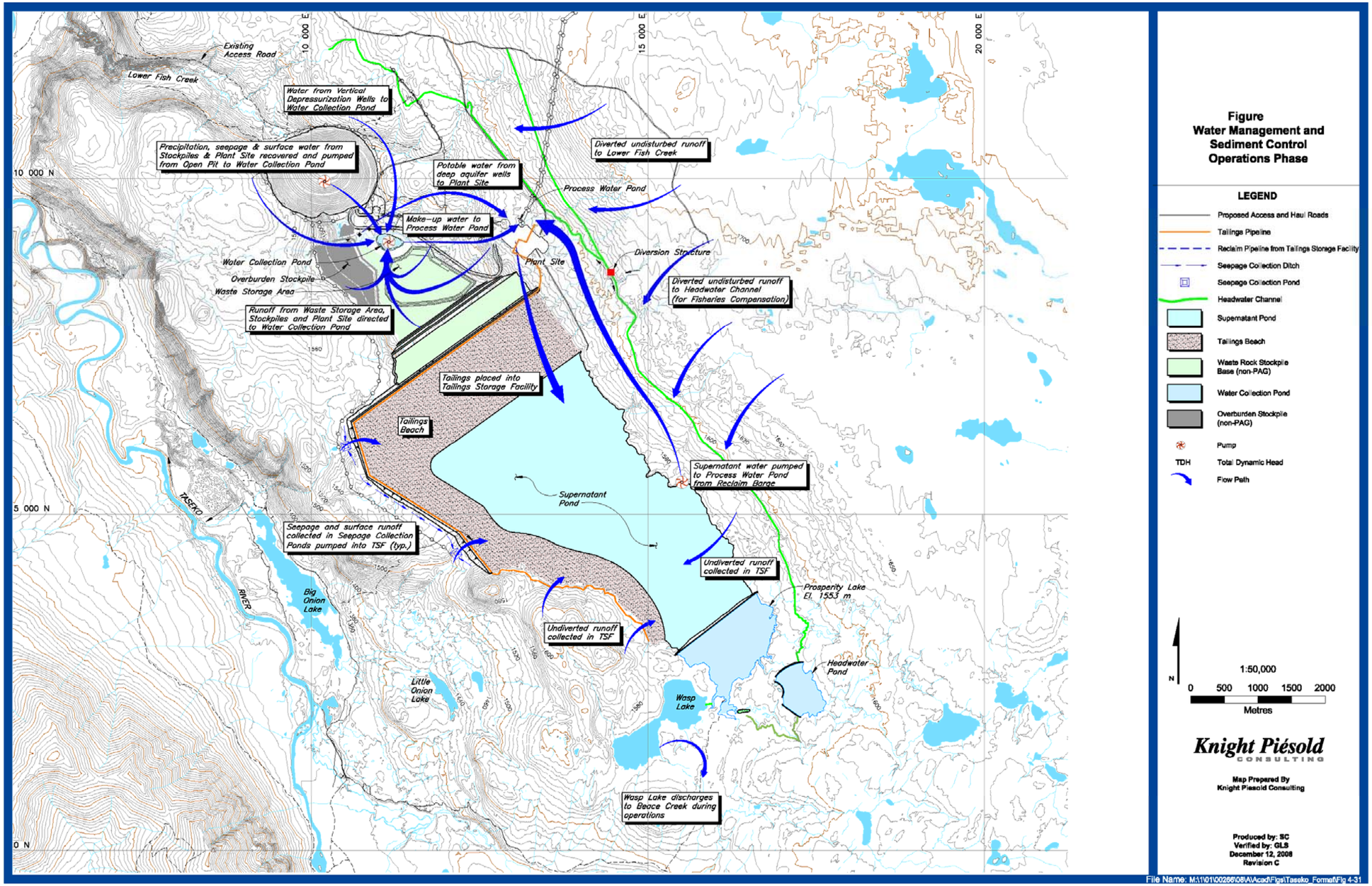


Figure 7: Closure Phase

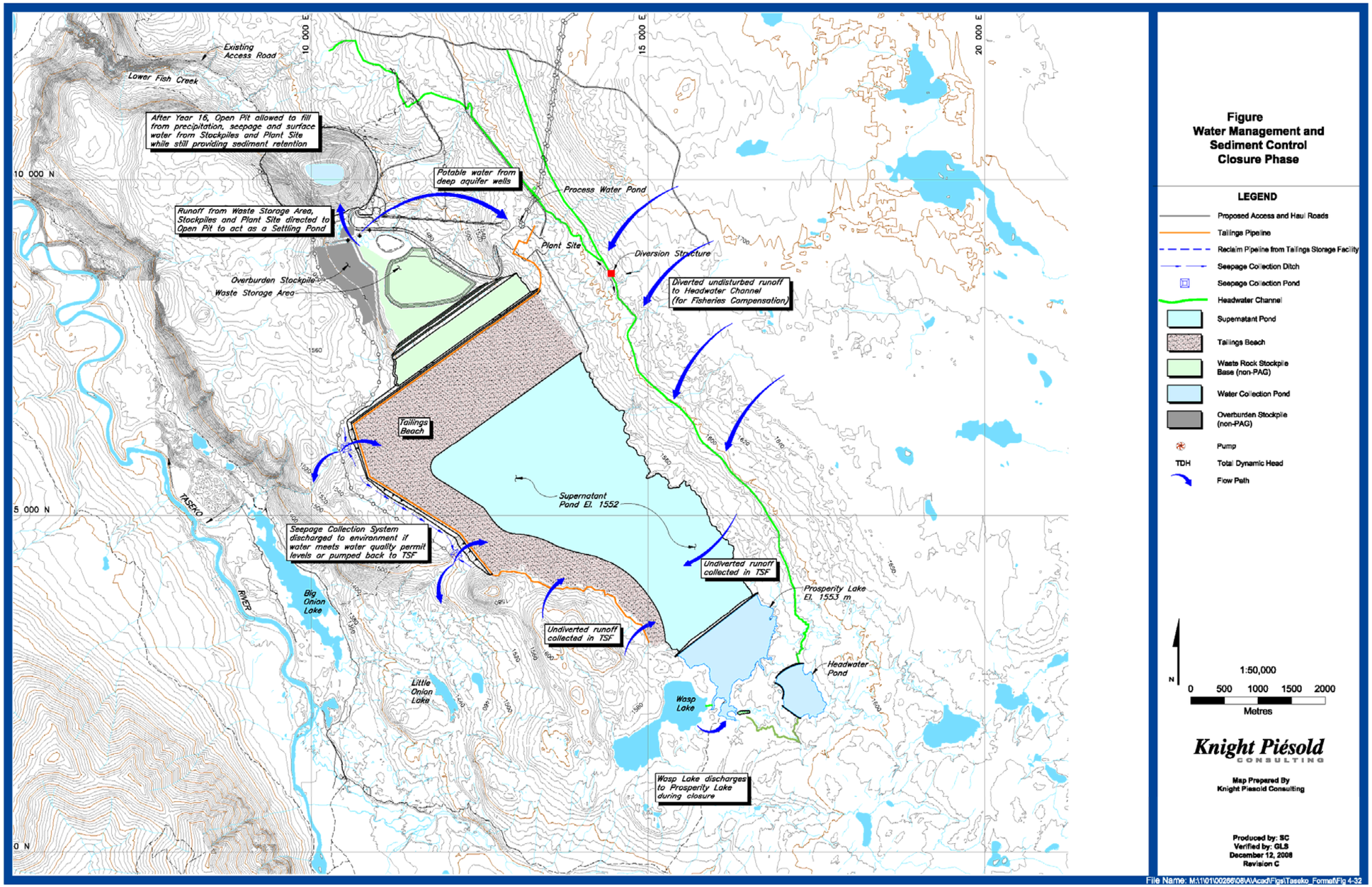
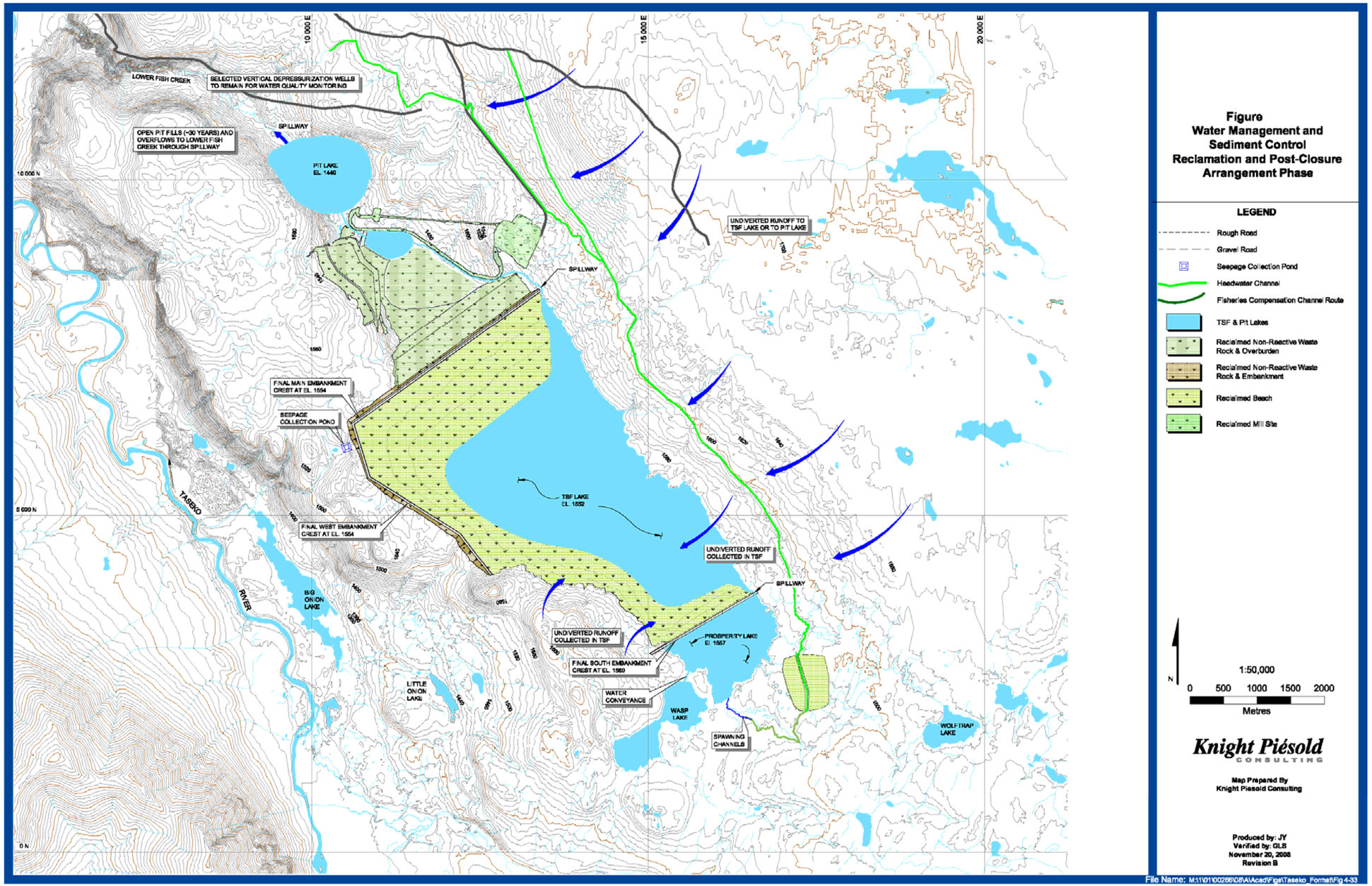


Figure 8: Reclamation and Closure Phase



recruitment and flexible employment policies to maximize local employment income from the proposed Project. Projections show that several events over the next 10 to 20 years are expected to increase labour and contractor availability:

- olympic-related construction is expected to be finished in 2009, thereby releasing construction workers to the job market;
- during the operating life of the proposed Project, Mt. Polley mine (located 100 km northeast of Williams Lake) is expected to close in 2015 and workers could be absorbed into the proposed Project's operations. Similarly, local businesses supplying Mt. Polley mine would be in a good position to supply the proposed Project; and,
- the Williams Lake and Quesnel areas are among the most forest-product dependent in the province. As the Mountain Pine Beetle (MPB) epidemic is expected to reduce the labour force that is directly or indirectly involved in timber harvesting and processing, workers may be forced to seek employment in other sectors of the economy.

The Proponent has identified general hiring and procurement policies in the commitments listed in the section 20-1 of volume 1 of the Application to encourage construction contractors to hire local residents to the extent practical, and to recruit mine operations employees from the Cariboo-Chilcotin region. Local and regional suppliers would be used when they can provide goods and services competitively. The Proponent would also commit to hiring First Nation employees during construction and operations. The Proponent indicates in their Application that they would ensure that motivated individuals have the opportunity for further training and career advancement through their education and training initiative, *Mining: Your Future*. This program is designed to identify people who desire a career in the mining industry and assist them in gaining the skills and education needed to meet both their ambitions and the needs of the company.

Local Economy

The average annual total income (including direct, indirect and induced income as a result of the proposed Project) would be $41.9 M in the construction phase and $52.7 M in the operations phase. Initial capital investment expenditures would be $800 M, much of which would be sourced locally. The Proponent expects purchases from suppliers and businesses in the region to total $20 to $22 M. Total annual operating expenditures are estimated to be $200 M. As the service center for the Cariboo, Williams Lake is likely to be the major beneficiary as its supplier and contractor base is equipped to serve the proposed Project. Companies in the South Cariboo and Quesnel areas would have equal opportunities to provide contract services.

Government Revenue

Total average annual government revenues from the proposed Project would be $26.2 M in the construction phase, $48.4 M in the operations phase, and $0.3 M in the closure phase. The proposed Project is anticipated to generate $340 M in Gross Domestic Product (GDP) annually. The Application notes that this is larger than the province's film and television industry and three times larger than the entire output of the fishing industry. Table 1 below summarizes local, provincial, and federal revenues anticipated from the proposed Project.

Table 1: Government Revenues as a result of the Proposed Project

Project Phase	Local ($M)	Provincial ($M)	Federal ($M)	Total ($M)
Construction	0.56	9.71	15.99	26.27
Operations	2.05	18.75	27.60	48.41
Closure	0.03	0.09	0.19	0.33
Total Life of Mine[4]	43.18	397.36	589.88	1030.42

2.2 Proposed Project Land Use

The proposed Project is located in the Cariboo-Chilcotin District, an area that contains a mix of rural and agricultural lands, small acreages holdings and Crown forest lands. The Cariboo-Chilcotin Land Use Plan provides broad direction for sustainable use of Crown land and resources in the region. The proposed Project development area is located within an Integrated Resource Management Zone. The mine site and vicinity is currently zoned RR-1 (Rural 1) under the Cariboo Regional District's Bylaw 1000. A zoning amendment would be required for the plant site to allow further processing of ore and camp accommodations for mine staff, who would work on rotation schedules.

There are 10 water licences in the proposed Project area, however, all are within the access road buffer and would not be affected by the proposed Project.

All mineral tenures in the mine site are wholly owned by the Proponent.

The transmission line Right-of-Way (ROW) crosses two area-based forest tenures: a woodlot held by an individual, and a community forest held by the Esketemc First Nation. Much of the land in the area of the transmission line ROW has been previously logged and shows signs of previous human disturbance.

[4] Life of Mine calculations assume a 2-year construction phase, a 20-year operations phase, and a 30-year closure phase.

While the Proponent considered potential impacts on non-timber forest products, the Chilcotin Forest District Office was not aware of any harvesting of pine mushrooms around the mine site.

The proposed Project components intersect a total of 32 grazing tenures, however, the licence area overlapped by mine components is negligible for the majority of tenures. The transmission line would cross several large ranch operations, including one of the province's largest ranches, the Gang Ranch. The proposed mine site (the Bullion Range Unit) is presently used by a Nemiah Valley rancher and a licensee as range.

The proposed Project would impact public use of the Fish Lake recreation site and recreational and aboriginal use of the Fish Lake fishery. Fish Lake ranked 55 out of 116 Cariboo-Chilcotin fishing lakes in terms of annual angling effort during the late 1980s and early 1990s. During this time period, the lake supported an average of 424 angler days, compared to a regional lake average of 904.

The Fish Lake recreation site was cleared in 1992 and opened in 1998. In the general area of the proposed Project, a total of seven recreation sites (including Fish Lake) with 23 campsites are available for public use. The Ministry of Tourism, Culture and the Arts (MTCA) currently manages approximately 39 recreation sites with over 1,740 campsites in the region, 24 of which have boat launches. The Fish Lake site is no longer managed by any government agency, likely due to resource limitations and difficulties accessing the site.

There are two tourism facilities in proximity to the proposed Project.

Thirteen commercial recreation tenures would be partially affected by the proposed Project. Three of these would lose part of their tenure within the proposed mine site footprint – the loss of land would represent between one and three percent of total licensee operating areas. Four licensees would be affected by the transmission line. While portions of these four tenures would be affected by this line, no tenure area would be lost.

The proposed Project area is also used for hunting. The number of non-resident hunters and their harvests rose substantially between 1996 and 2005, while resident hunter figures declined. Moose and black bear account for most non-resident hunter effort. There are 45 registered guide outfitters licensed to operate in the region. While the proposed Project would overlap with eight registered guide outfitter territories, only three outfitters would lose access to a portion of their territory at the mine site due to the Proponent's proposed no hunting ban. This loss is estimated to be less than one percent of their tenure area.

Eleven registered traplines would be affected: two by the mine site footprint, two by the proposed mine site buffer and the remainder by the road buffer and transmission line buffer.

3 Assessment Process

3.1 Provincial Review

The proposed Project was determined to be reviewable under the *Act* pursuant to Part 3 of the Reviewable Project Regulations (B.C. Reg. 370/02), because the proposed Project is a new mine facility that would have a production capacity of greater than 75,000 tonnes per year of mineral ore.

The proposed Project entered the provincial EA process in 1995 and the assessment process was initiated under the former Act. During the 1990s, EAO convened technical meetings of a Project Committee to discuss the information needs of government agencies and First Nations to develop Project Report Specifications.

The proposed Project was transitioned into the present Act on December 30, 2002.

On February 19, 2007, Fisheries and Oceans Canada (DFO) referred the proposed Project to the Minister of Environment for referral to a Federal Panel (see section 2.6 below).

The EAO, the Canadian Environmental Assessment Agency (CEA Agency), and First Nations worked to develop a process to conduct a joint panel review of the proposed Project. Despite over a year of consultation and discussion of joint panel agreement models by EAO and CEA Agency, it was not possible to develop a joint panel agreement that was acceptable to the federal and provincial governments, First Nations and the Proponent.

On June 22, 2008, the provincial Minister of Environment issued an Order pursuant to section 14 of the Act ordering that the provincial EA be undertaken by EAO.

3.1.1 Pre-Application Stage

Before this Application was accepted for the review, the following steps occurred:

1. The EAO established a working group (Working Group) comprised of local, provincial and federal government agencies and First Nations representatives to participate in the EA of the proposed Project (see Appendix A for a list of Working Group members). The purpose of the Working Group is to provide

technical and First Nations' input throughout the review process, and to comment on documentation prepared by EAO and the Proponent.

2. On October 17, 2008, EAO issued a procedural Order pursuant to section 14 of the *Act*, defining the scope of the proposed Project, and the procedures and methods for conducting the review. The Order recognised the previously developed Project Report Specifications and instructed the Proponent to update the document to form the draft "Terms of Reference" which set out the information to be gathered and studies to be completed before the EA Application could be submitted.
3. Copies of the draft Terms of Reference were posted on EAO's website and placed at the Cariboo Regional District Library and Williams Lake City Hall. To seek input on the draft Terms of Reference, EAO held a public comment period between November 3, 2008 and December 3, 2008. In November 2008, joint EAO-CEA Agency open houses were held. The first 2 open houses were held in Williams Lake on November 7 and 8, 2008. The third open house was held in Alexis Creek on November 8, 2008. Approximately 310 people attended the open houses. The EAO also sought comments on the draft Terms of Reference from the Working Group and First Nations.
4. The EAO approved final Terms of Reference on January 9, 2009.
5. On January 26, 2009 the Proponent submitted an Application to EAO.
6. The EAO, with input from the Working Group and First Nations, evaluated the Application against the Terms of Reference and identified a list of deficiencies. On February 25, 2009, EAO advised the Proponent that EAO did not accept the Application for formal review and requested the Proponent submit a revised Application for re-evaluation of the relevant sections once they had addressed the deficiencies.
7. The Proponent submitted a revised Application on March 6, 2009. The EAO evaluated the revised Application against the Terms of Reference and concluded, on March 11, 2009, that the revised Application provided the required information. (The Application consists of 16,816 pages of information and is posted on EAO's website.)
8. The EAO assessed the Proponent's First Nations and public consultation activities during the Pre-application stage, and activities proposed during the Application review stage, and determined that they were adequate and allowed sufficient opportunities for the public and First Nations to review and comment on the proposed Project; the Proponent was notified of this on March 11, 2009.

3.1.2 Application Review Stage

The review of the Application was initiated on March 16, 2009 and the Application was posted to EAO's electronic Project Information Centre on that day. The Application was also made available on the Proponent's website, in regional public libraries in 100 Mile House and Williams Lake, and at Williams Lake City Hall. In addition, copies were delivered to the following First Nations' communities: Xeni Gwet'in (Nemiah), Yunesit'in (Stone), Tl'etinqox-t'in Government Office (Anaham), Alexis Creek, ?Esdilagh (Alexandria), Ulkatcho, High Bar, Xatsull, Stswecem'c/Xgat'tem (Canoe Creek), T'exelcemc (Williams Lake) and Esketemc (Alkali).

A 60-day public comment period on the Application was held from March 26, 2009, to May 25, 2009. The public comment period and open houses were advertised in the *Williams Lake Tribune*, the *100 Mile House*, and the *Quesnel Cariboo Observer* March 19, 20 and 22 respectively. A total of 1,218 comments were received on the Application; 938 comments were of general support and 204 comments were of general opposition. The other 76 related to various specific issues of interest or concern. The Proponent's Public Comment Period Summary Report, dated June 15, 2009, can be found on the EAO website.

In addition, Working Group members submitted 878 issues during Application Review. These comments were broken into the following subject categories: Aboriginal Interest; Air Quality; Alternatives Assessment; Archaeology; Engineering; Fish and Fish Habitat; Human Health and Ecological Risk Assessment (HHERA); Other general; Socio-economic; Soils and Terrain; Vegetation; Water Quality/Metal Leaching (ML)/Acid Rock Drainage (ARD); and, Wildlife.

Open houses were held in 100 Mile House and Williams Lake on March 30 and April 1, 2009. A third public open house planned for April 2, 2009 in Alexis Creek was cancelled on the advice of the RCMP due to protest by First Nations at the venue. Discussion occurred in the parking lot, and people were encouraged to write to EAO. A further advertisement was placed in the *Cariboo Advisor* on April 29, 2009 following the cancelled open house to remind the public that EAO was seeking written submissions by May 25 and that, in addition to the viewing locations previously identified, the Application was available at the Ministry of Forests and Range office in Alexis Creek.

The open houses provided information about the proposed Project and allowed the public an opportunity to ask questions and express support for or concerns about the proposed Project. Representatives of EAO and the Proponent made presentations at these open houses. Approximately 600 people attended the open houses and over 260 people met with the Proponent during interest group meetings.

Three public technical workshops were held by the Proponent in Williams Lake on April 3 and 4, 2009 on Fish, Fish Habitat and Compensation; Hydrology, Hydrogeology, Water Quality and Aquatic Biology; and Terrestrial Ecosystems. The Proponent also consulted with and gave presentations to local government officials, regional community representatives and other stakeholders on a number of occasions.

From April to July, 12 Working Group subcommittee meetings were held. On July 8, 2009, EAO suspended the review as it required the Proponent to provide additional information regarding: the alternatives assessment, analysis of wildlife in a local context, a sensitivity analysis for the water balance of Prosperity Lake and the TSF, and the First Nations Consultation Report and identification of issues.

On October 2, 2009, EAO determined that adequate information had been provided in order to continue the process.

Following a news release issued by the Proponent on November 2, 2009, that the life of the mine would be extended from 20 to 33 years, EAO suspended the review pending information regarding any potential changes to the proposed mine plan as set out in the Application. The Proponent responded, indicating that they were not proposing changes to the mine plan as set out in the Application, and further, that they understand that should an EA Certificate be issued it would be for the project as proposed in the Application. The Proponent indicated they issued the news release as part of their required disclosures as a public company and indicated it was not intended to suggest that their mine plan was changing at this time. After considering the information provided in the letter, EAO restarted the 180 day timeline on November 16, 2009.

Any change to any approved mine plan would be considered according to the relevant policy and legislation at that time. The EAO does not consider the potential extension to be sufficiently certain to proceed to require further assessment at this time as part of the EA of the proposed Project. More specifically, the Proponent does not meet EAO's test for consideration as part of the cumulative impacts analysis, given that any such extension is not sufficiently certain to proceed. The EAO recognizes that mining projections are highly dependent on future commodity prices, and other contingencies, and that other mines in BC have been reviewed by both the federal and provincial governments based on the proposal put forward by the Proponent.[5]

[5] This includes the recent example of the Mt. Milligan Copper-Gold Project which received a provincial EA Certificate in March 2009 based on a 15 year mine plan as presented in the Application. A potential mine-life extension of seven years was announced by Terrane Metals Corp. in October 2009. The federal Minister of the Environment approved the project, as originally proposed, in December 2009. Federal Responsible Authorities explained that: "The possible change in the period of mine production has no implications for the conclusions of the responsible authorities (RAs) in the comprehensive study report (CSR) which is based on the Environmental Impact Statement (EIS)/EA Application for a project with a

3.2 Federal Review

An EA of a proposed project is required under the *Canadian Environmental Assessment Act*, as amended, if a federal authority would be required to exercise certain powers or perform certain duties or functions in respect of a project for the purposes of enabling the proposed project to be carried out, in whole or in part. The proposed Project would require authorizations by DFO under the *Fisheries Act*, by Natural Resources Canada under the *Explosives Act*, and by Transport Canada under the *Navigable Waters Protection Act*.

On January 19, 2009, the federal Minister of the Environment announced that the proposed Project would undergo an environmental assessment by a Federal Panel. At the same time, the federal Minister established a three-member panel, and issued the Panel's Terms of Reference and the Environmental Impact Statement Guidelines to the Proponent. The Environmental Impact Statement Guidelines is the same document approved by EAO on January 9, 2009 (and referred to for provincial purposes as the Application Terms of Reference).

Early in the provincial EA process, EAO and the CEA Agency agreed to coordinate the EA process to the extent possible to provide a single window for public participation and to minimize the potential for duplicate activity. The provincial and federal processes were coordinated for the review of the Terms of Reference and submission of the Application and joint public comment periods were held at both stages.

At the time this Assessment Report is referred to the provincial Ministers for a decision on a BC EA Certificate, the federal review process is ongoing. The Federal Panel will submit its own report to the federal Minister of Environment and the Responsible Authorities which will set out the conclusions and recommendations of the Federal Panel.

3.3 First Nations Consultation

The proposed Project lies within the traditional territory of the Tsilhqot'in and Secwepemc Nations. The communities of the Tsilhqot'in people are Nemiah (Xeni Gwet'in), Stone (Yunesit'in), Toosey (Tl'esqox), Alexis Creek (Tsi Del Del), Anaham (Tl'etinqox T'in) and Alexandria (?Esdilagh) as well as Tsilhqot'in people who are members of the Ulkatcho Band. The EAO took note of *Tsilhqot'in Nation v. British Columbia* (commonly known as the *William* decision). As detailed in Part C of this

15-year mine life. Should the proponent propose revisions to the current project the federal authorities will assess possible regulatory or environmental assessment requirements at that time."

Report, based on the reasons of Mr. Justice Vickers in the *William* decision, EAO understands that:

- the Tsilhqot'in people have an aboriginal right to hunt and trap birds and animals throughout the "Claim Area" defined in the *William* decision, and the proposed mine site is located in the "Claim Area", and
- the court declined to find that the Tsilhqot'in people have aboriginal title to any portion of the "Eastern Trapline Territory" as defined in the *William* decision, and the proposed mine site is located in the "Eastern Trapline Territory".

The proposed Project transmission line crosses the traditional territory claimed by the Secwepemc communities of Canoe Creek (Stswecem'c/Xgat'tem), Williams Lake (T'exelc), High Bar (Llenlleney'ten) and Alkali (Esketemc), as well as the traditional territory claimed by the Tsilhqot'in people.

All 12 First Nations were invited to participate in the Working Group, were kept fully informed of progress of the EA, and were provided with all the information that was sent to the Working Group. The EAO met with the Tsilhqot'in National Government (TNG),[6] Esketemc First Nation, Williams Lake Indian Band, and the Canoe Creek Indian Band, and offered to meet with all others. The EAO provided funding for First Nations' participation with over $42,000 to the TNG, $60,000 to the Esketemc, $165,000 to Canoe Creek, and $25,000 to the Williams Lake Band between 2007 and 2009. The EAO also shared information, views and positions on matters relating to asserted or established aboriginal rights and the potential for impacts on those by the proposed Project and sought feedback from First Nations.

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

[6] The Xeni Gwet'in, Stone, Alexis Creek and Alexandria are, to the best of EAO's knowledge, represented by the Tsilhqot'in National Government (TNG).

PART B – REVIEW OF THE APPLICATION

4 General

4.1 Assessment Methodology

4.1.1 Assessing whether there are likely to be significant adverse effects

In undertaking this evaluation, EAO assessed whether the proposed Project would have significant adverse environmental, social, economic, heritage and health effects 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.

More specifically, for each issue under consideration in this part, this Report will:

- set out a summary relevant of background information (which is complemented in considerably more detail in the Application);
- discuss the potential for residual adverse effects having regard to mitigation measures proposed in the Application or developed subsequently as a result of public consultations, input from the Working Group and consultations with First Nations; and,
- assess, with input from the Working Group and First Nations, whether any residual adverse effects would be significant.

In addressing what may constitute a "significant" adverse effect, EAO considers the following factors[7]:

- **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.

[7] 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".

- **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.
- **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 effect would occur in circumstances where it is not certain that the effect would materialize.

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. In the case of the proposed Project, the Proponent has made 103 commitments which are set out in detail in Appendix C. Key commitments will be discussed in the following sections of this Report but for a full explanation of commitments readers are advised to consult Appendix C.

4.1.2 Determining whether significant adverse effects (if any) are justified

As a result of the commitments and mitigation measures that are typically made through the EA process, significant adverse effects are usually avoided. If, however, EAO concludes that a proposed project is likely to cause significant adverse effects, EAO then assesses whether the proposed Project should be justified. To assist Ministers in deciding whether a proposed project, which is likely to cause significant adverse effects, would be justified, EAO considers all relevant factors, including:

- the number, type and extent of significant adverse effects that are expected;
- the economic benefits that would be provided by the proposed Project (including taxes, jobs and infrastructure development), and the degree to which those who would otherwise be adversely effected by the proposed Project would benefit;
- the degree to which the proposed Project would contribute to community development;
- the allocation of costs and benefits of the proposed Project between present and future generations; and,
- whether, or to what extent, alternatives exist that would not result in significant adverse effects.

4.1.3 Ensuring the Crown's duties to consult and accommodate First Nations are met

The EAO is required to ensure that the Honour of the Crown is discharged by providing appropriate consultation and accommodation of First Nation interests in respect of the decision by Ministers as to whether to issue an EA certificate. There is often considerable overlap between the interests of First Nations and the assessment of environmental, social, economic, heritage and health effects. Further and more specific consideration is given to the Crown's duty to consult and accommodate First Nation interests in Part C of this Report.

4.2 Spatial Boundaries

Spatial boundaries were primarily established based on the zone of proposed Project influence, beyond which the potential environmental, cultural and socio-economic effects of the proposed Project are expected to be non-detectable. They include a LSA (Local Study Area) for project-specific effects and a RSA (Regional Study Area) for cumulative impacts. For most biophysical components of the EA, the LSA consists of the physical footprint of the proposed Project. For some assessment components, LSA and RSA were defined for the mine site, transmission line, and the access road. Some assessment components also define a study area for the load-out facility.

A LSA was defined for each assessment component as the area that would be directly affected by the activities associated with the proposed mine site

The RSA for cumulative impacts assessments are defined by the furthest extent that measurable or demonstrable proposed Project-specific effects may act in combination with similar effects from other projects on Valued Ecosystem Components.

Table 2 below describes the LSA and RSA for each assessment component:

Table 2: Local Study Areas and Regional Study Areas for Assessment Components

Assessment Component	Local Study Area (LSA)	Regional Study Area (RSA)
Hydrology, hydrogeology, water quality and aquatic studies	Fish Creek watershed; portions of the Wasp, Big Onion Lakes, and Beece Creek watersheds; and a 500 m stretch of the Taseko River upstream and downstream of the confluences with Fish and Beece Creeks.	Taseko River and Big Creek watersheds.
Fish and Fish habitat	Fish Creek watershed including Fish Lake, Little Fish Lake and all habitats down to and including the confluence of Fish Creek with the Taseko River; Taseko River in the vicinity of Fish Creek	All water bodies and watersheds within the boundary of the MOE Management Unit 5-4.

	confluence; lower Beece Creek drainage; and, Taseko River in the vicinity of the confluence of Beece Creek.	
Vegetation	Mine Site: a buffer of 500 m on the proposed mine footprint, including the section of new road required at the north end of the mine footprint (total area: 4,812.2 ha). Transmission corridor: a buffer of 250 m on either side of the centerline for the planned transmission line ROW running from the Dog Creek switching station west to the mine site (total area: 6,263.9 ha).	Mine site: most of the Fish Creek watershed, extending to the top of the bluffs on the east side of the Taseko Valley (total area: 18,266.9 ha). Transmission corridor: a buffer of 1.5 km on either side of the planned transmission line (total area: 38,221.9 ha). Access road: a buffer of 1 km on either side of the access road running south from Hanceville to the mine site (total area: 17,348.7 ha).
Terrain and Soils	Mine site: the physical footprint of the mine site and incorporates 2.8 km of new access road (total area: 4,407 ha). Transmission line: a 250 m buffer on either side of the center line of an estimated 30-80 m wide ROW (total area: 6,264 ha). Access road: a 200m buffer on either side of the access road center line, from Hanceville to the mine site. This includes 68 km of Taseko Lake Road and 19 km of the 4500 Road (total area: 3,495 ha).	The Terrestrial Ecosystem Mapping extent defined in the 1998 Project Report Specifications. It encompasses the LSA and expands to encompass most of the Fish Creek watershed and incorporates the bluffs on the east side of the Taseko Valley (total area: 18,267 ha).
Wildlife	Mine site: a 400 to 800 m buffer around the maximum disturbance area including the 3.3 km section of new access road (total area: 6,086 ha). Transmission line: a 250 m buffer on either side of the entire length of the transmission line alignment (total area: 6,264 ha). Access road: 232 km long, extending from the load-out facility at Gibraltar to the mine site. The vast majority of this is along existing roads.	Takes into account distribution, habitat requirements and home range size of the species identified as KI (Key Indicators). The most commonly used mine site RSA is defined as the extent of the Terrestrial Ecosystem Mapping area around the mine footprint (total area: 18,267 ha).
Economic Effects	Includes the area from Williams Lake to the mine site, the rural areas and communities near the mine site (Alexis Creek, Big Creek, Hanceville, and Riske Creek) and the 11 First Nations communities of the Tsilhqot'in Nation	The entire Cariboo Regional District, as well as the rural portions of Quesnel and 100 Mile House.

	and Northern Secwepemc. The political boundaries include the City of Williams Lake and areas J, K, D, E, and F of the Cariboo Regional District.	
Social Effects	The area from Williams Lake and surrounding rural areas to the mine site, as well as the rural areas and communities near the mine site (Alexis Creek, Big Creek, Hanceville, and Riske Creek).	The entire Cariboo Regional District, as well as the rural portions of Quesnel and 100 Mile House.
Heritage Effects	The proposed maximum disturbance area of the mine site, or roughly the Fish Lake catchment area.	The Chilcotin Forest District.
Human Health and Ecological Risk Assessment	Includes the mine site property and the LSA boundaries for the water quality assessment.	From the mine site to the closest community in the Nemiah Valley (located 20 km northwest of the proposed Project area). This is the furthest receptor for atmospheric effects. In addition, mixing point "D" in the Taseko River, 3.5 km downstream of the pit discharge was used as the extent of the RSA for determining potential metal effects on drinking water and fish tissue concentrations.

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, including the periods when the valued components would be affected by the proposed Project. Functionally, the construction, operations and closure/decommissioning phases would phase into each other and overlap throughout the life of the proposed Project.

The periods when valued components are assessed were as follow:

Baseline – describes existing ecological, physical and human-related characteristics of the environment, based on studies conducted from 1993 to present (1993, 1995-1998 and 2006-2008).

Construction and Commissioning – describes activities for the two year period following the start of construction:

- development and upgrading of access and infrastructure roads;
- clearing to allow pit pre-production, site infrastructure development, tailings dam construction, headwater channel construction, stockpile development,

construction of the south dam for the creation of Prosperity Lake fish compensation works, stripping of the Prosperity Lake basin, and area to be used for tailings storage;

- priority site infrastructure development to establish drainage and foundation preparation for the camp and other infrastructure;
- structures and systems for the lowering of Fish Lake water level, the relocation of fish and initial pre-pit production activities, concurrent with bulk earthworks at the site and primary crusher;
- development of initial pit benches in the starter pit, tailings dam haulage road, ore and waste haulage roads, overburden and waste rock stockpile dumps;
- establishment of the pit dewatering system and installation of the pit power distribution system once the fish have been removed from Fish Lake;
- transmission line ROW clearing and transmission line construction.

Operations – describes activities for the 20 years following construction:

- ongoing mining and progressive pit development;
- progressive development of the TSF;
- construction of the main and west embankments;
- processing of ore and the introduction of stockpiled lower grade ore;
- transporting concentrate to the load-out facility;
- operation of water management facilities;
- progressive reclamation; and,
- transport of supplies and personnel.

Decommissioning and closure – describes site activities for the 25 to 30 years following operations, or until the open pit begins to discharge water to lower Fish Creek:

- establishing tailings beaches with a growth media and a vegetative cover;
- establish an engineered spillway to direct water from Prosperity Lake into the TSF into which would be submerged potentially acid generating (PAG)[8] waste materials; and,

[8] Potentially acid-generating (PAG) rock is rock that contains sulphides which may produce acid through the process of oxidation (known as acid rock drainage). This can be avoided by the submergence of PAG rock underwater. Non-potentially acid generating (non-PAG) rock does not have these characteristics and thus does not have risk of creating acid rock drainage. Further discussion of this process can be found in the following chapter on metal leaching and acid rock drainage.

- flooding the open pit.

Features evident at closure include the non-potentially acid generating (non-PAG) waste rock dump, low grade stockpile area, overburden dump and the tailings storage facility.

Post-closure – refers to conditions that would exist on the site after final decommissioning and closure activities are complete and vegetation is established in accordance with the reclamation end land use objectives. This phase would begin when the open pit would have filled with water and would begin to discharge to Fish Creek and is characterized by on-going long term monitoring and maintenance requirements (i.e. tailings dam). This period would continue until all conditions of the *Mines Act*, Reclamation Code, and permits have been fulfilled. Monitoring would be carried out as per the specific environmental management plans.

4.4 Cumulative Impacts

Cumulative impacts are changes caused by activities associated with a proposed project in combination with other past, current and reasonably foreseeable activities.

The EAO considers cumulative impacts during its assessment of projects through various means, including the following:

- consideration of approved land use plans that designate the most appropriate activities on the land base;
- comprehensive baseline studies which set out the current conditions and thereby factor in effects of prior development;
- consideration of potential overlapping impacts that may be occurring due to other developments, even if not directly related to the proposed project; and,
- consideration of future developments that are reasonably foreseeable and sufficiently certain to proceed.

In addition, cumulative impacts assessments were completed following CEA Agency methods.

5 Environmental Effects

5.1 Metal Leaching/Acid Rock Drainage

5.1.1 Background Information

Metal Leaching (ML) and Acid Rock Drainage (ARD) are naturally occurring processes that are caused when minerals containing metals and sulphur (called sulphides) come into contact with both air and water. When sulphides are exposed to water and oxygen from air, they rust or oxidize. This oxidizing of sulphides can also produce acid. If this acid is carried by streams it is called ARD. The acid in ARD can leach metals, such as copper, zinc and lead, called metal leaching. ARD results when naturally acid consuming minerals (such as carbonates) are not present in sufficient quantities to offset the acid produced by weathering of sulphide minerals. Pyrite and chalcopyrite are the principal sulphide minerals in the Prosperity deposit. Many potential inorganic contaminants become highly soluble under acid conditions, although significant metal leaching can also occur in neutral or alkaline conditions. Dissolved elements such as copper, zinc, cadmium and selenium can be toxic to fish and animals and can adversely affect water quality and ecosystem health. Metals can also be absorbed and accumulate in plant and animal tissue.

Testing of the chemistry of the rocks before they are mined can predict whether ML/ARD will be an issue that needs to be prevented or managed. If the potential for leaching acid and metals is identified through testwork, there are a number of strategies that the Proponent could utilize to prevent and manage ML/ARD, and these strategies can be applied to the proposed Project. Both the historic and current characterization programs included numerous tests to examine metal release from different materials at the Prosperity site. The Proponent performed metallurgical testing beginning in 1992 and continuing through 2000.

The proposed Project would produce three types of waste material that have the potential to be sources of ARD and ML:

- overburden: soils overlying the ore deposit and stripped prior to mining;
- waste rock: non ore-bearing rock removed during the mining process; and,
- tailings: sulphide waste material removed during the ore concentration process.

Overburden

The results of the metallurgic testing reported in the Application indicate that the majority of the overburden material is generally non-PAG, but there are discrete sources of overburden that would need to be managed as PAG waste. The total waste materials are expected to be 12 Mt of PAG overburden, 60 Mt of non-PAG overburden.

Waste rock

The Proponent's geochemical assessment work indicates that a significant portion of the waste rock has the potential to generate ARD. The total waste materials are estimated to be 225 Mt of PAG waste and 102 Mt of non-PAG waste, therefore the total waste rock and overburden which may have potential for acid generation is 237 Mt. Continuous sampling of core from 10 holes indicates that potential for ARD typically varies over the scale of tens of meters with local zones of smaller scale variation between PAG and non-PAG rock. This indicates that waste management by segregation of PAG and non-PAG rock is a practical approach for the proposed Project, and that operational controls and confirmation monitoring would be important for appropriate waste classification and effective segregation.

Kinetic test results showed that there would be a long delay (decades to centuries) before the majority of the PAG waste rock transitions from neutral to acid weathering conditions. Since the Proponent plans to flood PAG waste rock within two years of placement, ARD would be prevented from occurring.

Tailings

Tailings are not expected to be acid generating. The total tailings material is estimated to be 480 Mt. Tailings acid-based accounting (ABA)[9] characteristics demonstrate that they are unlikely to develop acidic weathering conditions. Operational monitoring would be necessary to verify that the operational tailings product would have ABA characteristics similar to those sampled for the Application. Tailings disposed of underwater would leach very low concentrations of metals to the water column, since oxidation rates underwater are extremely low.

Table 3: Summary of PAG and non-PAG Materials

	PAG	**Non-PAG**	**Total**
Overburden	12 Mt	60 Mt	72 Mt
Waste Rock	225 Mt	102 Mt	327 Mt
Tailings	0	480 Mt	480 Mt
Total	237 Mt	642 Mt	879 Mt

[9] Acid-based accounting (ABA) is a way of measuring the potential of rock to develop acid rock drainage. The potential of the rock to neutralize acid is balanced with its potential to create acid and the rock is assigned a ratio based on this. This ratio is a screening process – rock is placed into categories of risk based on this assessment.

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

The Proponent plans to place bulk tailings in a purpose-built impoundment in the upper Fish Creek valley (TSF). The TSF has been designed to provide an environmentally secure storage for the co-disposal of approximately 480 Mt of tailings and 237 Mt of PAG waste materials, and would have the potential for increased storage capacity.

The Proponent plans to flood PAG material within two years of its placement in the PAG waste storage facility to ensure that PAG rock would not become acidic.

The low grade ore stockpile is expected to remain pH neutral over the 19 year period of operations. Blasted ore would be exposed in the pit and stockpiled for approximately one month prior to milling. The ABA results show that there is sufficient neutralization potential in the ore and low grade ore to maintain pH neutral drainage conditions over this period.

Summary of Mitigation in the Application

PAG waste rock and PAG overburden would be segregated and placed in a PAG disposal facility within the TSF, and would be covered with tailings over the life of the mine such that at the end of operations, the PAG disposal facility would be enclosed with saturated tailings.

An ML/ARD Prediction and Prevention Plan is a requirement of the *Mines Act*. This Plan recognizes that ML/ARD assessments would need to be continued for mine construction and operations to confirm the findings presented in the Application, calibrate the test work results to site conditions, and ensure ongoing monitoring to direct waste management activities.

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

During the review of the Application, additional issues were raised by Environment Canada (EC), Ministry of Environment (MOE), Ministry of Energy, Mines and Petroleum Resources (MEMPR), Natural Resources Canada (NRCan), and First Nations. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix B. Key issues and responses include the following:

Potential for ML/ARD and modelling predictions

The MEMPR, EC and NRCan evaluated the ML/ARD section of the Proponent's Application. The MEMPR has confidence in the Proponent's ML/ARD estimates and modelling predictions, neither does NRCan have undue concerns regarding the issues.

The EC does not have confidence in the Proponent's ML/ARD estimates and modelling predictions.

The MEMPR indicated that:

- the Proponent's approach to geochemical modelling has taken an appropriately conservative approach;
- source terms presented in the Application have been developed with due care and provide a reasonable and conservative estimate of geochemical loading to the downstream receiving environment; and,
- the modelling is appropriate for assessing downstream water quality effects of the proposed Project.

EC identified two concerns:

- the Proponent has not provided an adequate evaluation of the potential for neutral pH ML from waste rock; and,
- the degree of representativeness of samples used to characterize PAG waste rock. The EC has requested the Proponent provide further information and more precise data. The Proponent commented in the Issue Tracking Tables (ITT) that EC reviewers had not yet made full use of the information provided in the Application (ITT #3, 5, 6, 11, 12). Supplemental information was requested by EC and provided by the Proponent, but EC has not yet provided a further opinion.

The NRCan requested the Proponent provide more information on ML of fresh rock under reducing conditions, such as when submerged underwater (ITT #177, 179). This concern was regarding the mobility of trace elements stored in the rock and potential effects on water quality. This information was provided by the Proponent and NRCan indicated that they were satisfied with respect to these issues in October 2009.

The EAO determined MEMPR's analysis of the issues, and satisfaction with the resolutions and commitments, is comprehensive and sound and it is can be relied upon for the purposes of this assessment.

<u>Contingency plan in the event of additional PAG</u>

As indicated above, MEMPR and EC both raised the issue as to whether the volume of PAG rock projected in the Application might be underestimated. The related issues are whether the TSF could accommodate such an increase in volume and whether this would have an impact on the site water balance (ITT #168). The Proponent undertook a sensitivity analysis of PAG estimates by evaluating the effect of treating a majority of non-PAG rock as if it were PAG. This worst case scenario would result in an additional

70 Mt of waste being stored as PAG in the TSF. The Proponent indicated that accommodating such an increase would require raising the height of the dam by 2 m (to 98 m) and that this would be within the design flexibility of the proposed Project.

In a supplemental report on hydrology, the Proponent indicated that storage of 70 Mt of additional PAG would require approximately 8 Mm^3 of water over a 16 year period (the length of time PAG waste rock is to be removed in active mining). In order to accommodate this, an additional 0.5 Mm^3 of TSF capacity would be used each year for PAG storage instead of tailings storage. The storage of the PAG would increase the need for additional water sources to maintain the targeted 3 Mm^3 in the TSF, requiring a slight raise in the height of the dam, and a corresponding raise in the level of Prosperity Lake, to maintain the hydraulic gradient. These additional water sources were identified by the Proponent to be: water flowing from the north-flowing head water channel to fish Creek (1.2 Mm^3); water flowing from proposed Prosperity Lake to Wasp Lake (1.6 Mm^3); or pumping from deep groundwater aquifers.

Contingency plans for ML/ARD in the event of early closure

The MEMPR identified the risk of additional ML/ARD with respect to the contingency plan for low grade ore stockpiles in the event of early closure (ITT #134). If these piles are not processed, there may be a risk of additional ML/ARD which could affect pit water and downstream water quality. The Proponent presented two possible measures to address this concern: an extension of stockpiling time due to temporary closure, or backfilling to the pit in the event of early closure. An extension of stockpiling time is not anticipated to discharge additional metals to the environment as the timeframe for the onset of acid conditions is decades to centuries. This option would be used in the event of temporary shutdown, and on-site monitoring would continue. In the event of early mine closure, additional low grade ore could be stored in the flooded pit. While changes in pit water quality have not been calculated for this event, pit water would undergo regular testing and, when necessary, treatment, before its discharge to Fish Creek. To avoid unpredicted effects on water quality, MEMPR requested a commitment to backfill this low grade ore into the flooded pit in the event it would not be processed, with bonding to cover the liability of such long term storage. The Proponent clarified that there would be little grade difference between the low grade ore and the regular ore stockpile, thus there would be very little risk that this material would not be milled at final closure. MEMPR accepts and agrees that the risk of this material not being milled appears to be low, and when combined with the commitment to treat if necessary (commitment 8.7), this addresses MEMPR's concerns at the EA stage. The EAO is also satisfied that the *Mines Act* permitting process (should an EA Certificate be issued) provides an effective mechanism for resolution of a concern in the unlikely event that issues would arise related to the low grade ore stockpile during operations.

5.1.4 Conclusion

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 in respect of ML/ARD.

5.2 Hydrology and Hydrogeology

5.2.1 Background Information

Hydrology is the study of the movement and distribution of water on the surface of the earth, and thus addresses water resources and their availability and patterns of flow. Hydrogeology is the study of water as groundwater below the surface of the earth, and thus addresses the unseen movement and availability of subsurface water resources.

The Local Study Area (LSA) boundaries of the assessment for the hydrology, hydrogeology and water quality studies (discussed in the next chapter) include the Fish Creek watershed and portions of adjacent watersheds. This area is outlined in Table 2. The proposed open pit, waste storage area and TSF are all situated within the Fish Creek watershed. Fish Creek drains into the Taseko River, a tributary of the Chilcotin River, which in turn flows to the Fraser River.

In addition to Fish, Little Fish and Wolftrap Lakes, the Fish Creek watershed contains several smaller unnamed lakes, swamps and creeks. Upper Fish Creek flows to the northwest and discharges into the southern arm of Fish Lake. Fish Lake drains into lower Fish Creek. Wasp Lake, located at the southern boundary of the Fish Creek watershed and draining into the Beece Creek system, could potentially be influenced by the proposed Project. The Fish Creek watershed area is approximately 94 km^2 measured from the confluence with the Taseko River.

The streams in the area are generally characterized by high flows in the spring, due to snowmelt and rainfall combined with snowmelt, and low flows in the late summer/early fall and winter. This produces an annual hydrograph with one high flow season with the hydrograph peak generally occurring in April / May. However in some years, a second hydrograph peak can occur in August/September as a result of rainfall. All creeks are affected by ice formation during the winter.

Hydrology

Baseline surface water hydrological conditions of the Fish Creek watershed were based on historical streamflow data collected at 17 manual staff gauge measurements and automated depth recording locations within and around the proposed Project area between 1992 and 2000. Data collection recommenced in 2006 and was confined to the Fish Creek watershed, guided by the current mine plan.

The Regional Study Area (RSA) includes the Taseko and Big Creek watersheds. This area is outlined in Table 2. These watersheds provide the basis for long term flow estimates for LSA watersheds. The Proponent obtained regional hydrological data from the Water Survey of Canada. The Proponent combined site streamflow data with regional streamflow and precipitation records to generate estimates of mean annual and monthly runoff for the proposed Project area. The Proponent compared areas based on basin size, elevation, surface cover, flow regulation and proximity to the site to use data from similar sites to refine estimates about water flow and availability in the proposed Project area.

Hydrogeology

The Proponent completed detailed hydrogeological and geotechnical investigations in 1992, 1993, 1994, 1996 and 1998 to sample groundwater quality and measure groundwater levels. The Proponent took additional groundwater level measurements from existing monitoring wells during 2006 and 2007 to confirm earlier findings.

The Proponent developed a conceptual model of the groundwater regime based on the available data. The model was calibrated to baseline conditions and used to predict the effects of the proposed Project on groundwater.

The proposed Project area contains three main hydrogeologic units: glacial till that blankets the majority of the site, fluvial deposits present along Beece Creek and the Taseko River, and a bedrock unit consisting of basalt, buried overburden, volcanics and sedimentary rock. In general, groundwater flow in the Fish Creek valley is driven by rain and snowmelt in upland areas that flows into the network of streams and lakes that occupy the valley floor. The water table is near or above ground surface in low lying areas and is found at greater depths below ground surface along the ridge tops of the western edge of the Fish Creek watershed. A groundwater divide is present along the ridge top of the western edge of the Fish Creek watershed. This divide separates the Fish Creek watershed from the Taseko River upstream of the point where Fish Creek joins the Taseko River.

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

Currently, water flows from uplands in the valley to Little Fish Lake and northwest to upper Fish Creek, Fish Lake, lower Fish Creek, and then into the Taseko River. This is shown in Figure 4. Figure 6 illustrates the proposed headwater channel along the eastern boundary of the proposed Project site. Diversion of clean water around the proposed disturbed Project area during construction and operations would permanently alter the baseline flow regime for the Fish Creek watershed. The diversion for the proposed Project would result in a reduction of Fish Creek catchment area by

72 percent and annual flow volume by 65 percent in lower Fish Creek from pre-construction to closure. However, the reclamation of the TSF and open pit to natural flow paths post-closure would lead to the re-establishment of near baseline flows in lower Fish Creek. This is shown in Figure 8 as water from the open pit would flow by spillway to lower Fish Creek.

For Wasp Lake and Beece Creek, the proposed Project would result in an increase in flow volume during operations and a small decrease to surface water streamflow in post-closure. Again, this is due to the rerouting of water during construction and operations via the diversion channel to the south to the headwater pond, which would spill into Wasp Lake and Beece Creek. The magnitude of increased flows in Beece Creek would likely be similar to that experienced during a normal freshet period, to which organisms are already adapted. The decrease in surface water streamflow during closure and post-closure is irreversible, although the change is minor compared to the mean annual runoff for Beece Creek. Given that only clean water would be diverted around the proposed Project site into Wasp Lake and Beece Creek during construction through operations, any residual effects are expected to be low in magnitude.

Flows in Fish Creek downstream of the pit would be substantially reduced during operations and until the pit starts discharging to lower Fish Creek at year 44 of mine life (during post-closure). This change would affect Fish Creek habitat (discussed in section 5.4.3) but is not expected to adversely affect Taseko River flows. Under baseline conditions, Fish Creek contributes one percent of the mean annual flow to the Taseko River. During operations this would be reduced to approximately 0.4 percent of Taseko River flows, with an additional 0.24 percent flowing into the Taseko River through Beece Creek as a result of the water diversions. Thus the difference in flow to the Taseko River is a reduction of 0.36 percent.

A man-made lake (Prosperity Lake) would be constructed at the southern end of the Fish Creek Valley and receive runoff from the eastern side of the Fish Creek Valley. Prosperity Lake is shown in Figure 6. During construction and operations, the headwater channel (mentioned above) would divert runoff from a large undisturbed portion of the catchment and direct water either north into lower Fish Creek, or south into the headwater pond and then to Prosperity or Wasp lakes.

The drawdown of Fish Lake would occur by discharging 2.5 Mm^3 into lower Fish Creek and 4.3 Mm^3 into the supernatant pond at the site of the TSF. Figure 5 shows the dewatering of Fish Lake and the creation of the supernatant pond in the construction phase. During the operations phase, Little Fish Lake would be covered by the TSF. From the construction phase on, the mine site would be a closed water system and isolated from lower Fish Creek. Clean surface runoff water outside of the proposed

Project footprint would be diverted via the headwater channels around the site. All on-site runoff would be captured in a sediment pond at the downstream end of the former lake and would either be recycled to the plant site process water pond, or pumped directly into the TSF supernatant pond.

Summary of Effects on Hydrology and Hydrogeology

Predicted effects of the proposed Project on hydrology are as follows:

- Dewatering of Fish Lake and flooding of Little Fish Lake by the TSF.
- Changes in the flow regime for lower Fish Creek and Beece Creek.

A number of proposed Project facilities, such as the open pit and TSF, would interact with the groundwater system. The Proponent conducted an assessment of groundwater interactions by simulating the effects of major mine facilities on groundwater elevations using a flow model. Predicted proposed Project effects on groundwater quantity before mitigation are summarized as follows:

- a temporary reversible decline in groundwater elevation around the open pit of approximately 500 m by the end of active pit development (year 16);
- a permanent irreversible rise in groundwater elevations in proximity to the TSF;
- a permanent irreversible loss of the groundwater divide separating the Fish Creek and the Taseko River valleys along the majority of the length of the western embankment of the TSF and corresponding potential for migration of seepage from the TSF towards the Big Onion Lake catchment; and,
- increases and/or decreases in average annual groundwater discharges to the Taseko River, lower Fish Creek, Big Onion, Little Onion, and Wasp lakes.

Discussion of the effects of potential seepage from the west embankment and proposed mitigation to address effects can be found in the water quality and aquatic ecology section (5.3) of this Report. Discussion of the loss of Fish Lake and Little Fish Lake can be found in the fish and fish habitat section (5.4) of this Report.

Summary of Hydrology and Hydrogeology Mitigation Proposed in the Application

The Proponent proposed the following mitigation measures to minimize the proposed Project effects on surface water streamflow:

- Diversion of a portion of the undisturbed Fish Creek watershed (east of the proposed Project) to lower Fish Creek to the north of the open pit and to a man-made lake at the south of the TSF. This headwater channel is shown in Figures

5 and 6. The diversion channel would help to minimize the reduced flow to lower Fish Creek by diverting approximately 1.25 Mm3 of water annually;

- construction of a spillway in the Main Embankment crest of the TSF to allow the TSF to overflow and contribute to the surface water runoff to lower Fish Creek via the open pit, in post-closure. This spillway is shown in Figure 8; and,
- once the pit would have been filled at closure, all Fish Creek drainage would be directed north to Fish Creek thus restoring the natural flow regime in the watershed.

The following mitigation measure is proposed to minimize the proposed Project effects on groundwater elevations and quantity:

- Diverting surface water to fill the pit would restore groundwater levels to near baseline conditions post-closure in the pit vicinity.

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

During the review of the Application, additional issues were raised by MOE, EC and Working Group members. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix B. Key issues and responses include the following:

Source and Amount of Water required for the proposed Project

The MOE and EC had concerns about the ability of the hydrometerological data to adequately predict the amount of water available to meet the needs of the proposed Project. In a August 2, 2009 report, the Proponent indicated that in the event that there is insufficient water to maintain the volume of water in the TSF and Prosperity Lake due to drought conditions, mine production would have to be slowed or water would have to be obtained from alternate sources, such as redirection of flows from Fish Creek, Prosperity Lake outflows and pumping from deep groundwater aquifers.

Effects of climate change on the proposed Project

The MOE cited concerns regarding the potential impact of climate change in reducing glacial run-off to the Taseko River, and how this could influence flow and predicted dilution rates post-closure. The MOE requested the Proponent commit to additional baseline sampling on Taseko River flows at least five years prior to the predicted timing of discharge to Fish Creek to validate predictions of flow reduction due to glacier melt. The Proponent has considered this request, and EAO is satisfied that additional sampling would be a requirement of the permitting process.

5.2.4 Conclusion

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 hydrology and hydrogeology.

5.3 Water Quality and Aquatic Ecology

5.3.1 Background Information

Maintenance of acceptable water quality is critical for wildlife and aquatic organisms, important for human health, and a high priority for communities and all levels of government. Aquatic sediments form a link between the non-biological and biological environment. Aquatic organisms, other than fish, are discussed in this section as a key part of the biological component. The proposed Project could potentially affect water, sediment quality, and aquatic ecology. Predictions of potential effects on water and sediment quality are required to develop appropriate mitigation.

Water and Sediment Quality

Measureable parameters for water and sediment quality were selected based on potential for interaction with proposed Project activities including metals, suspended sediment, nutrients and sulphates. Water quality guidelines (WQG) that protect aquatic life were used, where appropriate, as these are typically the most sensitive uses of water. Standards for assessing water quality include those from MOE and Canadian Council of Ministers of Environment (CCME). These generic guidelines do not take into consideration site-specific conditions, such as the naturally high sediment loads found in the glacier-fed Taseko River and elevated baseline metals typical of mineralized areas. Site specific water quality objectives may need to be developed in these situations at permitting.

Aquatic Ecology

Aquatic ecology describes the ecosystem located in a body of water. Changes in abundance, diversity and community composition are linked to water or habitat quality. These are important indicators to the productive capacity of fish or to potential issues of toxicity or the bioaccumulation[10] of metals. The Proponent investigated the effects of the proposed Project on stream and lake productivity. The Proponent used periphyton,

[10] Bioaccumulation refers to the accumulation of substances, such as pesticides, or other organic chemicals in an organism at a rate greater than that at which the substance is lost.

algae that grow attached to substrates, and benthic[11] invertebrates as indicators of water quality for streams. Phytoplankton, algae that grow in lakes; zooplankton, an important lake component that generally feed on phytoplankton and are important for fish production; and benthic communities, also important for fish food, were studied to determine changes in lakes.

Water quality, sediment, periphyton, and benthic invertebrate characteristics of Fish Creek and other streams, as well as plankton communities of lakes, have been studied by the Proponent from 1992 to 1998. In 2006, a gap analysis was conducted to assess completeness of the data set, and relevance to present conditions a decade after the 1992 data collection. The gap analysis identified the considerable amount of baseline water quality, sediment and aquatic community data already obtained for Fish Creek and surrounding water bodies, most of which was relevant to current standards. Additional studies were conducted in 2006 and 2008 to better define baseline conditions.

Baseline metal levels in all streams studied by the Proponent and levels were generally within BC and CCME WQG, with few or no exceedances. Exceedances were found in Fish Creek (iron, total aluminum), Taseko River (total and dissolved aluminum, iron and total copper), Beece Creek (total and dissolved aluminum) and Groundhog Creek (iron). Baseline cadmium levels could not be evaluated, as historic method detection levels were already above the WQG.

Nutrient levels and aquatic productivity tended to be higher in Fish Creek, reflecting low stream gradients and lower in Taseko River influenced by glacial melt.

Metal levels in the sediment of Fish Creek and in regional streams were generally within provincial Sediment Quality Guidelines (SQG). A few metals such as arsenic, chromium, iron, nickel antimony and manganese trended higher.

Fish, Little Fish and Wasp lakes were also sampled for sediment metals. Antimony, chromium, copper, and nickel exceeded SQG in all three lakes, and iron levels exceeded SQG for Wasp Lake. Silver levels were close to the SQG. Arsenic, cadmium, lead, manganese, mercury, selenium and zinc levels in these lakes were lower than the SQG.

Modelling was done to predict levels of metals, such as mercury, in fish post-closure. Baseline levels for mercury currently exceed tissue guidelines for human consumption for trout in Fish Lake and selenium in rainbow trout in the Taseko River. Predictions for post-closure conditions indicate that there would likely be no change in levels of

[11] The benthic zone is the zone at the bottom of the water column. These species often live in lower light or oxygen levels and survive on organic material that floats to the bottom. This makes them good indicators of water quality and contents.

mercury in fish tissue. Some metal levels would increase but within applicable BC guidelines.

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

A summary of mine facilities and activities based on each stage and timing of mine development is presented in section 2.2. Water quality and aquatic ecology can be directly affected by mine construction activities in or near aquatic environments, and directly or indirectly affected by various mine discharges.

The proposed Project would avoid construction-related impacts to water quality by employing standard best management practices for sediment and erosion control, using clean water diversions around disturbed areas, and constructing holding ponds to collect runoff from disturbed areas. Large, temporary sediment ponds are expected to be established until such time as the TSF or the water collection pond is operational. Surface water collected in the pit would be pumped to the mill or the water collection pond. Drainage ditches would capture and control runoff within the proposed Project site, diverting this water to the TSF or the water collection pond. All water collected would be contained within the proposed Project site and used in mill processing, dust control or other uses. During operations there would be no discharge of surface water from disturbed areas within the proposed Project and consequently, impacts to water quality are not predicted.

During post-closure, at year 44 from the start of operations, the pit is forecast to overflow and discharge to Fish Creek. At this time there would also be discharge from the west embankment. Provided that this does not result in exceedences of WQG or site-specific WQG, it would be discharges to the Taseko River. If the discharge is not at acceptable water quality, it would be pumped back to the TSF or treated. The Proponent noted in the Application that the predicted pit water quality would exceed WQG for several parameters in Fish Creek, with the highest magnitude exceedances predicted for sulphate, cadmium and selenium. With only a small amount of dilution available between the pit and the waterfall on Fish Creek, there is potential for high magnitude effects on water quality. However, the Proponent submitted that actual metal levels in pit water are likely to be considerably lower than predicted as these are very conservative estimates. Additionally, there would be 27 years to evaluate feasible treatment options to reduce metal levels, should water in the filled pit need treatment before any discharge would occur. Natural attenuation processes in the pit not accounted for in the modelling, such as precipitation of metals, would be expected to reduce levels below that predicted in the model. The Proponent has committed (commitment 8.7) to treatment indicating that technologies currently available would be able to meet existing provincial and federal WQG should water quality monitoring

indicate the need for treatment. The Chief Inspector of Mines also has the authority to require the Proponent to deposit security for mine reclamation and protection of watercourses as per the BC *Mines Act* and the *Health, Safety and Reclamation Code for Mines in BC*, as a condition of issuing a permit.

Groundwater is forecast to seep from the main and west embankments of the TSF and dam starting in year eight of operations. This groundwater seepage would have the potential to affect surface water quality where groundwater discharges to the surface. It is anticipated that groundwater seepage from the west embankment would have reached a creek/gully that intersects the water table to the northeast of Big Onion Lake by year 30.

Seepage through the main embankment would follow the natural topography and flow to the collection pond, which would intercept seepage that might otherwise migrate down gradient to lower Fish Creek. At post-closure, seepage through the main embankment would flow to the pit; this is accounted for in the prediction of pit water quality at post-closure.

With the rise of the TSF above the level of the west embankment, groundwater flow from the TSF to Big Onion Lake becomes likely. No substantial changes in groundwater inflow rates to Big Onion Lake are anticipated during operations, closure or post-closure, but changes to groundwater flow patterns are predicted. This alteration in groundwater flow direction becomes possible in about year eight of operations and in the absence of mitigation, groundwater containing diluted concentrations of seepage is predicted to begin reaching Big Onion Lake by about year 80. A conservative modelling estimate of concentrations of metals and other contaminants derived from the TSF that could reach Big Onion Lake in the absence of mitigation was made by the Proponent. At year 80, groundwater affected by the TSF seepage would be predicted to discharge to Big Onion Lake, and at year 100 hardness, sulphate, chloride, copper, iron, molybdenum and nickel concentrations in groundwater would be predicted to increase by more than 20 percent as a result of seepage from the TSF. These are both worst-case scenarios considered in the absence of mitigation.

The changes in groundwater quality are predicted to result in a gradual increase in the concentrations of the levels of several metals in Big Onion Lake over time, but are not expected to result in any metals exceeding WQG. The extent to which Big Onion Lake water quality would change is a function of several factors which are difficult to model without actual data. The worst case scenario modelled with higher groundwater contributions and higher input concentrations predicts that only cadmium would exceed WQG in Big Onion Lake although other parameters would range above baseline. The best case scenario indicates that all parameters would be below WQG with many parameters showing no measureable differences from baseline. The Proponent

maintains that with the small volumes of seepage predicted in groundwater, the modeled groundwater contribution to Big Onion Lake, the one exceedance of WQG for post-closure groundwater, and resulting prediction of measurable but small changes in Big Onion Lake, any effect would be of low magnitude.

The following mitigation measures proposed by the Proponent are expected to minimize the potential for TSF seepage and surface water effects:

- incorporating primary seepage control measures in the design of the west embankment of the TSF (e.g. using low permeability soils and planning to capture seepage in seepage collection ponds); and,
- deposition of tailings to create a beach along the west embankment that would build a larger barrier on the west side and force the supernatant pond and TSF away from the embankment crest to mitigate seepage through the west embankment.

Activities related to the construction and maintenance of the 125 km long, 30-80 m wide 230 kV transmission line ROW have the potential to alter riparian vegetation at stream crossings, altering drainage flows and creating erosion risks of releasing sediments into streams. The Proponent is determining the routing of the transmission line in a manner that avoids working in sensitive habitat, such as wetland or unstable terrain. Also, there is an extensive network of existing roads in the area from forestry operations that would reduce the need for new access road construction. Where work in sensitive areas is unavoidable, the Proponent would restrict the timing of work to less sensitive periods, such as nesting seasons, and use helicopters to place poles. The Proponent would also follow surface erosion prevention and sediment control practices of the Water Management Plan in the Environmental Management Program and Best Management Practices.

Construction of the access road and upgrades to the 4500 Road have the potential to affect water quality. These effects would be mitigated or avoided through implementation of surface erosion and sediment control measures in the Water Management Plan. The haul road would cross the diversion channel but would not cross any major streams. Concentrate trucks would be washed and covered for transport, reducing the potential for concentrate deposition and dust along the transport corridor.

The Proponent’s Concentrate Load-Out Management Plan would include measures to address dust control, groundwater impacts, and surface runoff at the existing Gibraltar Mine Concentrate Load-Out Facility.

With respect to other activities in the area that could interact to produce water quality effects, intensive salvage logging of timber killed by the mountain pine beetle is taking place in the area and will continue for another decade. Activities associated with the timber harvest include development of logging roads, placement of culverts and land clearing, which have the potential to affect water quality and aquatic ecology. The Proponent has stated that since forestry operations are guided by legislation that require the use of vegetated buffers around water bodies and require the use of properly constructed roads and culverts to protect water bodies from sediment, it believes there would be no cumulative impacts from interactions with logging.

Summary of Mitigation Proposed in the Application

Implementation of activities in the Environmental Management Plan would provide routine sediment and erosion control methods. While the proposed Project design contains all mine waters on site during the operations period, there would be both proposed and anticipated discharges after that time. The Proponent would employ several design aspects and measures to reduce the potential effects to water quality and aquatic ecology, including:

- encouraging slope stability and minimizing soil quality degradation and water contamination from surface runoff through grass reseeding and slope revegetation. All plants and seeds used for revegetation would be appropriate for use in the Chilcotin district;
- managing potential surface water contamination by aligning and containing all mine site works and facilities within a single drainage with the pit serving as the downstream catchment basin;
- potential contamination discharge effects from the pit waters would be reduced by diluting the TSF water with clean runoff water from the watershed, prior to discharge to the pit;
- reclamation planning and the development of Prosperity Lake that manages vegetation of features planned to be flooded, thus avoiding build up of organic matters and concerns about methylation of mercury[12];
- a seepage control system for the west embankment, consisting of seepage collection ditches and ponds, groundwater monitoring and recovery wells and a seepage pump back assembly; and,

[12] A build up of organic matters later submerged in water may contribute to the formation of methylmercury. Anaerobic organisms that live in aquatic systems create methylmercury from the inorganic mercury found in mercury-bearing rocks. This is a poison that accumulates in the food chain beginning with plankton.

- use of TSF and pit as depositional area to reduce sediment and metal loading to surface waters. If particulate levels and dissolved metals are too high post-closure for the water to be released to lower Fish Creek (following up to 27 years of settling) measures would be taken to clean the water, such as liming or construction of a treatment plant.

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

During the review of the Application, additional issues were raised by MOE, DFO, Working group members, and First Nations. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix B. Key issues and responses include the following:

Presence of a groundwater divide between Fish Creek and Onion Lake

The MOE has suggested that there may not be a groundwater divide between the Fish Creek watershed and the Big Onion watershed, contrary to the Proponent's field work to date (ITT #65A). The MOE is concerned that subsurface flows are connected through fractured bedrock and faults, and there would be a danger of greater losses of seepage than has been predicted. The MOE contends that in a worst case scenario, in the absence of effective mitigation, sulphate, aluminum, arsenic, cadmium, chromium, copper, iron, mercury, selenium, and tin would likely exceed BC WQG in Big Onion Lake.

The MOE is concerned that mitigation, such as pumping from recovery wells, would not be able to manage seepage collection and treatment because of the uncertainty created by not having sufficient hydrogeological information. The MOE pointed out that there is evidence of unconsolidated material reported in the drill logs in the Application (Appendix 3.6-0) which states that the recovery well system may prove to be relatively inefficient unless individual wells are located in higher permeability fracture zones or alluvial materials. The complex geology of the ridge would make it difficult to locate recovery wells in optimum locations.

The MOE requests: mapping of groundwater aquifers, including confined and unconfined aquifers, to the east of Taseko River, including Taseko River bank, Big Onion Lake and Fish Creek watersheds; determination of the source or recharge areas of Big Onion Lake water; and determination of flow patterns for subsurface flows from Fish Creek watershed. The MOE states that without this information there is significant uncertainty about the proposed TSF design and seepage mitigation options may not effectively address the risk of future groundwater contamination of Big Onion Lake and Taseko River. The MOE would prefer that this work be completed prior to certification,

or if completed post-certification, that approval be conditional on plan modification if necessary to address this matter.

In the Application, the Proponent reported through a course of drilling that the Fish Creek watershed was isolated and not connected through subsurface flows. As the level of the TSF rises through the operational phase of the proposed Project, the Proponent anticipates a breach of the Fish Creek/Big Onion divide in year eight. In a memo of July 2009 to MOE, the Proponent described the testing they would initiate at permitting, if there was a decision to approve the proposed Project, which includes pumping tests in the west ridge, gathering surface and groundwater data in the Big Onion Lake catchment, and completing baseline chemical characterization of groundwater and surface water in the Big Onion Lake system. Proposed timelines for this additional testing vary, but roughly coincide with the start of the construction phase (years -2 and -1) in order to have the required data by the end of year one of operations at the latest. The Proponent believes that this additional understanding of the relationships between the two watersheds would direct the seepage mitigation program and minimize contamination.

On August 24, 2009 the Proponent prepared a further submission on the groundwater issue. The submission indicates there is no evidence to suggest highly permeable features are present in the West ridge or within the Fish Creek drainage and that vertical pumping wells are an appropriate mitigation method in this situation. The Proponent also submits that the proposed Project design incorporates the fact that the low permeability rock mass of the Fish Creek Valley would keep seepage from migrating.

In October 2009, MOE submitted questions on the proposed mitigation to the Proponent. The Proponent provided written responses to MOE and a Working Group conference call was held on October 23 to discuss potential mitigation measures and the timing of additional geologic testing. To date, MOE is not in agreement with the timing of this further investigation proposed in the Proponent's mitigation plan and the reliance on mitigation to offset any effects.

In a November 5, 2009 memo to the EAO, MEMPR assessed the risk of seepage from the TSF to Big Onion Lake as low but indicated that there is some uncertainty with respect to unknown geological conditions. MEMPR states that there are several contingency mitigation strategies proposed by the Proponent that are proven technologies in the mining industry for managing seepage. MEMPR indicated satisfaction with the resolution of the seepage issues for the purposes of EA if commitments to further assessment and resolution of contingency planning at the *Mines Act* permitting stage are made a commitment. Commitment 8.6 to develop and implement a hydrologic and hydrogeologic data collection and monitoring program

consistent with the Proponent's July 9 memo would address this need. The NRCan also had concerns about the hydrogeology regarding the incorporation of the gypsum line into the numerical groundwater flow model and the Proponent's seepage estimates for the closure period. The Proponent has addressed these concerns to NRCan's satisfaction.

The MEMPR has confidence in the Proponent's plans to mitigate seepage while MOE would prefer that more studies be done now to predict potential seepage zones and plan for effective mitigation. The EAO believes sufficient information has been provided to assess the potential for significant adverse effects and the results of further testing can be incorporated into detailed design and review through the permitting process under the *Mines Act.*

Reduction of flows in Fish Creek, increase in flows in Beece Creek

The MOE indicated concerns regarding the implications of a reduction of flows in Fish Creek and a corresponding increase of flows in Beece Creek during the operational phase (Hydrology ITT #25). This is important as lower Fish Creek is described as having minimal flow currently, and there are users along Beece Creek who could be affected by an increase in flow causing changes in channel morphology. The Proponent responded in the ITT that the change in flow to Beece Creek is estimated to be four percent, which would not be great enough to cause changes to Beece Creek channel morphology.

Post-closure discharge and monitoring

The MOE has concerns about the uncertainties regarding the modelling and predicted water quality of the pit which will require more precise predictions based on actual data as the pit fills. The MOE and other members of the Working Group expressed concern that there may not be sufficient monitoring beyond the life of the proposed Project, and wished to see bonding that would commit the Proponent to continue to monitor environmental conditions until water quality is within WQG and can be discharged into Fish Creek. The Proponent noted in their recent supplemental report on alternatives that as per the BC *Mines Act* and the *Health, Safety and Reclamation Code for Mines in BC*, the Chief Inspector of Mines has the authority to require the owner, as a condition of issuing a permit, to deposit security for mine reclamation and protection of watercourses. The level of reclamation security required is generally a function of extent and type of planned disturbance, planned concurrent reclamation, extent of facilities and activities required post-closure, and environmental risk perceived by MEMPR (e.g. probability of water treatment). With commitment 8.7, the Proponent commits to meet any generic or site-specific WQG that may be developed during permitting through a combination of natural attenuation processes in the pit and

treatment, if required, as detailed in volume 5, section 2 of the Application. MEMPR is satisfied with the commitment made and technologies identified.

5.3.4 Conclusion

Residual effects on water quality from mining activities were predicted to be negligible because receiving water sites during all phases of mining were predicted to meet WQG, except where they currently naturally exceed WQG. The proposed Project has been designed to completely contain contaminants and water in contact with disturbed areas, other than a relatively small amount of seepage which is reduced at source by TSF mitigation measures and further addressed by a seepage collection and monitoring system. In addition, the Proponent has committed to monitor and treat pit water if necessary (commitment 8.7).

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 water quality and aquatic ecology.

5.4 Fish and Fish Habitat

5.4.1 Background Information

The majority of the Local Study Area (LSA) is comprised of the Fish Creek watershed, which contains a population of monoculture rainbow trout with about 85,000 residing in Fish Lake and 5,000 in Little Fish Lake. These fish utilize a total of 117.6 ha of lake habitat, of which 904,203 m^2 is shoal area (<6m deep), and approximately 6.4 km of associated inlet and outlet streams for spawning and juvenile seasonal rearing. Fish Lake hosts up to 653 recreational angling days with up to 4,900 fish caught annually. Rainbow trout, Chinook salmon, bull trout and mountain whitefish intermittently utilize the lower Fish Creek drainage near the confluence with the Taseko River. While Beece Creek and Big Onion Lake once supported a rainbow trout fishery, the introduction of course fish (sucker fish) has decreased this opportunity.

The Regional Study Area (RSA) includes all water bodies and watersheds within the boundary of the MOE Management Unit 5-4. Management Unit 5-4 contains a large number of large and small lakes with both self sustaining monoculture rainbow trout and multi-species populations, and hatchery-released rainbow trout.

The Proponent chose rainbow trout in middle and upper Fish Creek and salmonids in lower Fish Creek as the two Key Indicators (KI), or species chosen for analysis because they are representative of the environment, for the assessment. While both KI were chosen for their susceptibility to proposed Project environmental effects, rainbow trout in

upper Fish Creek are geographically isolated from fish in the lower portions of the watershed and both KI have different habitat requirements. The salmonid KI includes rainbow trout (steelhead[13]), bull trout and Chinook salmon. Chinook and steelhead are important to recreational, aboriginal and commercial fisheries. Bull trout are a blue-listed species[14].

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

Key potential issues for middle and upper Fish Creek are:

- loss/alteration of in-stream habitat quality or quantity as a result of pit dewatering, infrastructure development, and water sourcing and diversion activities;
- potentially elevated suspended solids as a result of erosion and runoff from disturbed areas at the mine site during construction;
- loss/alteration of lake habitat quality and quantity as a result of Fish Lake and mine site dewatering, infrastructure development, and water sourcing and diversion activities; and,
- loss/alteration of fish populations and angling opportunities in the Fish Creek drainage.

Summary of Effects on Fish and Fish Habitat

The removal of water from Fish Lake, construction of dams at the south end of Fish Lake and the north side of the proposed TSF, and water diversion around the proposed Project site would affect fish habitat through the loss of Fish Lake and Little Fish Lake, reduction of downstream flows to Fish Creek rainbow trout populations, and loss of mainstream, tributary, and riparian habitats. Figure 4 shows the construction of the dams and the beginning of the construction of the main embankment. Figure 5 shows further development of the main embankment, the headwater diversion channel, the dewatering of Fish Lake, and the supernatant pond. Prior to the dewatering of Fish Lake and disturbance of the mine site area, fish would be salvaged and mitigation and compensation plan elements implemented.

Once Prosperity Lake is filled, as shown in Figure 6, proposed Project activities would divert about 3 Mm^3 of the flow from non fish-bearing habitat in the upper Fish Creek

[13] Steelhead are a sea-going form of rainbow trout.

[14] A Ministry of Environment classification, blue-listed species include any ecological community, and indigenous species and subspecies considered to be of special concern (formerly vulnerable) in British Columbia. Elements are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed elements are at risk, but are not Extirpated, Endangered or Threatened.

watershed through Prosperity Lake and on to Beece Creek during the life of the mine. Table 4 below summarizes the area of fish-bearing stream habitat that would be altered by a reduction of flows during the life of the mine. At closure, this water would be re-directed from Prosperity Lake towards the TSF and after the pit is filled it would be discharged into lower Fish Creek, re-establishing baseline flows.

Table 4: Proposed Project Impacts on Total Fish-Bearing Stream Habitat in the Fish Creek Watershed

	Total Fish-Bearing Stream Habitat (m^2)	**Stream Habitat Remaining (m^2)**
Upper Fish Creek	47,646	12,829
Lower Fish Creek	16,371	16, 371
Total in Fish Creek Watershed	64, 107	29,290

Summary of Mitigation Proposed in the Application

The Proponent's Fisheries Compensation Plan is designed around the objectives of the MOE Benchmark Statement (August 2008) and the "No Net Loss" principle of DFO's Habitat Management Plan. The specific objectives of the Fisheries Compensation Plan are maintaining genetic integrity, maintaining the recreational and First Nations' fishery, and maintaining productive capacity.

In addition to minimizing the loss of fish and fish habitat through assessment of alternatives aimed at avoidance, key components of the Fisheries Compensation Plan are as follows:

- Construction of Prosperity Lake as compensation fish habitat, and a refuge for the Fish Lake rainbow trout genetic stock. Prosperity Lake is planned to be larger and slightly deeper than Fish Lake. The depth of Prosperity Lake has been chosen to reduce risk of winterkill. Construction of Prosperity Lake is estimated to be completed in the fall of 2011, with final filling with the freshet of 2012. There is anticipated to be a five to seven year window between the dewatering of Fish Lake and the availability of Prosperity Lake.

Table 5: Comparison of proposed Prosperity Lake and Fish Lake

	Prosperity Lake	**Fish Lake**
Volume	7 Mm^3	3.9 Mm^3
Mean Depth	6.2 m	3.7 m
Maximum Depth	17.4 m	13.0 m
Surface Area	113 ha	111 ha

- Retention of Little Fish Lake until the completion of construction of Prosperity Lake as a refuge for Fish Lake rainbow trout genetic stock. During this five to

seven year window, trout from Fish Lake would be held in Little Fish Lake to secure the maintenance of genetic integrity and provide a complete age-class structure of rainbow trout. After seven years, the TSF would encompass Little Fish Lake, removing the Lake from productive capability.

- Construction of channels and headwater retention pond at the Fish Creek headwaters to provide additional stream habitat, a spawning channel, and to enable fish passage upstream of Prosperity Lake. The headwater channel is designed to divert clean runoff from an undisturbed catchment area to the headwater retention pond, rather than the TSF facility. It would also supply clean water to Prosperity Lake. The headwater retention pond is designed to provide a controlled flow of water into Prosperity Lake via an enhanced fish habitat channel in an existing natural stream bed. This pond would store up to 1 Mm^3 of water to support fish rearing habitat during times of summer low flow.
- Outplanting of Fish Lake trout to a minimum of two regional priority lakes. Some trout would be moved from Fish Lake to a number of MOE-identified Chilcotin lakes until such time as monitoring concludes that the Prosperity Lake provides a trout fishery of at least a similar character to what is supported by Fish Lake under current conditions.
- Use of fish culture to maintain the Fish Lake rainbow trout genetic stock, for the eventual re-creation of the Fish Lake fishery in Prosperity Lake, and to increase the fishery on a number of small lakes in the vicinity of the mine.

Fish Lake currently supports an estimated 388 to 653 recreational days[15] catching about 4100 to 4900 trout annually. Fish Lake trout would be transferred to other Chilcotin lakes, such as Slim, Lake 6267, Koster, and Joyce Lakes, in order to supplement both recreational and aboriginal fishery opportunities. The recreational fisheries in these four lakes are estimated to account for 600 recreational angling days. Productive capacity of Prosperity Lake is expected to be slightly less than Fish Lake, though it has been designed to produce larger fish in order to offer a better angling experience and achieve regional objectives for fisheries enhancement. Access improvement and the construction of recreational facilities would likely be required to fully realize the recreational potential of lakes stocked with Fish Lake rainbow trout.

[15] 'Recreational days' refers to a count of the number of days that an angler caught or attempted to catch fish at Fish Lake. If five anglers were on the lake for the same day, the count would be five recreational days.

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

During the review of the Application, additional issues were raised by MOE, DFO, Working Group members, and First Nations. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix B. Key issues and responses include the following:

Loss of Fish Lake and Little Fish Lake

The loss of Fish Lake and Little Fish Lake would be a combined loss of 117.6 ha of lake habitat. Fish Lake currently supports a healthy population of 85,000 rainbow trout, which in turn supplies between 388 and 653 angling days per year. First Nations assert a Fish Lake trout fishery and that Fish Lake is a site of importance.

While the loss of Fish Lake would be multi-faceted, this section of the report addresses the loss to fish and fish habitat. Detail on the potential effects to recreational and aboriginal fisheries can be found in the social effects sections and in Section C of this Report.

The Proponent's Fisheries Compensation Plan, described above, is intended to address the loss of Fish Lake with the creation of Prosperity Lake, spawning channels and preservation of genetic stock at a hatchery. Prosperity Lake is intended to address the loss of lake habitat, the spawning channels would address the loss of lower Fish Creek spawning areas and the culture of Fish Lake trout at a hatchery would ensure continued stock in Prosperity Lake until such time as it is determined to be self-sustaining, i.e. six years or one generation. Outplanting of Fish Lake trout to regional lakes and the preservation of Little Fish Lake until proposed Project year seven would ensure that recreational and aboriginal fishery opportunities are not lost during this time.

Fisheries Compensation Plan

In May 2006, the MOE Deputy Minister wrote to the DFO Deputy Minister indicating that if a decision is made to proceed with the proposed Project, MOE would be seeking compensation from the Proponent for the loss of the Fish Lake ecosystem and all environmental values associated with it. Specifically, these values were identified as the fish population, fish habitat, the productive capacity of the lake, recreational values, wildlife, wildlife habitat, and the habitat of species at risk.

The Proponent is engaged with MOE to finalize components of their Fisheries Compensation Plan. In the summer of 2009, MOE identified several priority recipient lakes for outplanting based on their location to the proposed Project area and their winter oxygen profiles. The Proponent identified four preferred recipient lakes from a

list of potential options provided by MOE. Final selection would be dependent on the results of amphibian surveys as well as public and First Nations consultation. The Freshwater Fisheries Society of BC, an agency responsible for all fish aquaculture in the province, would oversee and likely undertake the aquaculture elements of the Fisheries Compensation Plan. To date, DFO has not engaged to the extent that MOE has on resolving this issue. The details of each agency's position are outlined below.

Given the potential negative competition for food effects of fish stocking on waterfowl, especially diving ducks, EC recommends that fish stocking not include any lakes which are currently devoid of fish.

Compensation requirements of MOE

The Proponent's Fisheries Compensation Plan proposal aligns with MOE's August 2008 Benchmark Statement in that provincial objectives are met by outplanting, hatchery work, and the creation of Prosperity Lake. The MOE's Benchmark Statement indicates that regional small lakes management initiatives for Fish and Little Fish Lakes and associated stream habitat should result in the following:

- maintenance of the genetic line exhibited in the trout population of the Fish Lake system;
- lake and stream environments of similar or better productive capacity for trout as provided by the Fish Lake system now;
- a healthy sustaining trout population; and,
- a trout fishery for First Nations and the public of at least similar character to what is supported by Fish Lake under current conditions.

Considering the biological and recreational values associated with Fish Lake and stream habitats, mitigation and compensation measures that would satisfy MOE's objectives are those that specifically address the loss of these habitats and the fishery. Specific attention is expected to be applied to the aforementioned aims of the regional small lakes management initiatives. As almost all the lake and stream habitat that is subject to proposed Project impacts is inhabited by non-anadromous salmonids (rainbow trout), the primary focus of mitigation and compensation initiatives should be these non-anadromous trout. The MOE outlined appropriate measures for mitigation and compensation in their Benchmark Statement, including but not limited to:

- An initiative to preserve the genetic attributes of Fish Lake rainbow trout.
- Re-establishing lake and stream ecosystems to replace the Fish Lake complex.
- A fund to support work with First Nations on non-anadromous fisheries projects including opportunities for food/ceremonial harvest and public recreation.

- Increasing opportunities for First Nations food/ceremonial fisheries and recreational angling/camping opportunities in the Taseko and Chilko watersheds.
- Establishing measures to deliver water quality parameters consistent with re-establishing fish stocks and recreational use of the lake area, and ensuring any discharges to the Taseko watershed pose no risk to fish and fish habitat.

In memos of September 8, 2009 and October 15, 2009 MOE proposed Performance Measures to ensure that provincial fisheries objectives would be met through the Fisheries Compensation Plan. The Proponent and MOE worked to refine these measures and agreement was reached in a memo of December 4. The measures in this memo would be used to aid in the assessment of whether the Fish and Fish Habitat Compensation Plan would meet each of the objectives (commitment 9.1).

This Proponent's proposed compensation plan is satisfactory to MOE.

Compensation requirements of DFO

The DFO is guided by their long-term Habitat Policy objective "to achieve an overall net gain of the productive capacity of fish habitats". To move towards this objective, three main goals are considered: conservation, restoration, and fish habitat development. Conservation of fish habitat is the first goal of the Habitat Policy which endeavours to "maintain the current productive capacity of fish habitats supporting Canada's fisheries resource, such that fish suitable for human consumption may be produced". Fish habitat conservation is preserved by using the guiding principle of "No Net Loss" of the productive capacity of habitats. This principle is fundamental to the habitat conservation goal whereby DFO strives to balance unavoidable habitat losses with habitat replacement on a project-by-project basis.

The DFO's preference under their Habitat Policy is to avoid the Harmful Alteration, Disruption, or Destruction of fish habitat. However, if efforts to redesign or relocate the proposed Project are duly considered and residual impacts remain despite mitigation, compensatory habitat is required. When a Harmful Alteration, Disruption, or Destruction of fish habitat is identified for a project, habitat compensation under Section 35(2) of the *Fisheries Act* would be required to achieve an overall net gain of the productive capacity of fish habitat. Compensation planning follows the DFO hierarchy of preferences to achieve "No Net Loss":

1. Create or increase the productive capacity of like-for-like habitat in the same ecological unit at or near the development site.
2. Create or increase the productive capacity of unlike habitat in the same ecological unit.

3. Create or increase the productive capacity of habitat in a different ecological unit.
4. As a last resort, use artificial production techniques to maintain a stock of fish, deferred compensation or restoration of chemically contaminated sites.

The DFO has not to date expressed satisfaction with the elements of the Proponent's Fisheries Compensation Plan nor has DFO commented on this Assessment Report. In July 2009, DFO outlined the basis with which it would assess the compensation proposed by the Proponent. DFO asked that MOE provide:

- greater precision with respect to how the provincial fisheries objectives are measured;
- the underlying principle behind the provincial fisheries objectives;
- the extent, and degree of certainty, that the proposed habitat compensation (the creation of new habitat) meets the fisheries objectives, and the science that supports this conclusion; and,
- if stocking is an essential element of the compensation plan, an indication of the degree of certainly that the stocking would be sustained.

On October 14, 2009, MOE provided the updated Performance Measures for Fisheries Compensation to DFO, which it believes addresses the issues identified above. DFO has not yet given an indication as to what it would consider appropriate as fisheries compensation.

Value of lower Fish Creek habitat

The MOE and DFO disagree as to the productive capacity of lower Fish Creek habitat and the species found there. For analysis purposes, MOE has divided lower Fish Creek into reaches, with reach one from the confluence with the Taseko River to the bridge, reach two from the bridge upstream to the canyon, and reach three from the canyon upstream to the falls. In July 2009, MOE characterized lower Fish Creek as habitat of minimal value as reach one was found to be dry and the only species present were rainbow trout. While there is suitable spawning and rearing habitat in reaches two and three, MOE outlined that further visits may be required to determine if these reaches contain enough water for overwintering. No evidence of spawning was found in lower Fish Creek. In contrast, DFO disagrees that this is habitat of minimal value and may require a direct compensation of lower Fish Creek habitat (ITT #27). To date, DFO has not made a direct request regarding habitat compensation.

The viability of Prosperity Lake as sustaining fish habitat

In May 2009, DFO indicated that the information provided in the Application did not adequately demonstrate that the proposed Prosperity Lake is likely to be technically and economically feasible. In addition to further information on the technical feasibility, DFO requested estimates on the costs of constructing, monitoring, operating, and maintaining this habitat, as well as what would be done by the Proponent to maintain the productive capacity of the proposed lake. The DFO did not provide criteria by which technical and economical feasibility could be measured so the Proponent, in consultation with MOE prepared a criteria report, detailing how the proposed Prosperity Lake would be technically feasible. This document has been provided to DFO and they have not responded.

In response to this request and to the Information Requirements of the Federal Panel, the Proponent provided a supplemental report on water balance and sensitivity analysis that projects water levels and interactions with the TSF in high and low precipitation years. This report concluded that Prosperity Lake would have overflow water during the freshet period which spills to Wasp Lake and could be captured and directed to the TSF if needed. In dry periods, both the TSF pond and Prosperity Lake could be expected to have low levels, and either water would have to be obtained from other sources or operations would have to be slowed to reduce the production of tailings. However, in the full range of climatic scenarios, the Prosperity Lake water level would remain 1 m above that of the TSF pond level, maintaining the predicted groundwater flow.

In the case that 70 M tonnes of additional PAG exists, this waste could be accommodated in the TSF with a raise in the height of the embankment, the addition of water to the TSF pond, and a corresponding raise in the level of Prosperity Lake to maintain the predicted groundwater flow. On August 12, 2009, the Federal Panel responded to this supplemental report with a request for further information on water captured east of the headwater channel and how it could be diverted to Prosperity Lake and the TSF. On August 14, 2009, the Proponent responded, stating that as the diversion channel is included within the potential mine disturbance area, all effects were considered in the Application and clarification to Panel questions could be found in the Application. Further, the Proponent continued that there were no effects anticipated to those areas of the Fish Creek watershed up-gradient from the diversion channel.

While this additional information on the technical feasibility of Prosperity Lake answered questions about maintenance of the water balance, EAO notes there is risk in establishing successful new habitat, even with the best plans.

Riparian and stream habitat along the transmission line

Members of the Working Group expressed concerns about construction of the transmission line through riparian and stream habitat. The Proponent has proposed a series of mitigation measures including avoidance where possible, timing construction seasonally, transmission line pole delivery by helicopter, minimizing the area of excavation, and minimizing the area of footprint of sidecast material (commitments 12.3 and 12.4) to avoid impacts.

5.4.4 Conclusion

The EAO's assessment of the potential for significant adverse effects as a result of the loss of the Fish Lake and Little Fish Lake by factor follows:

- **Magnitude –** The proposed Project would have severe effects to Fish Lake and Little Fish Lake. Fish Lake, which is a major producer of rainbow trout, would be dewatered. Little Fish Lake would be covered by the proposed TSF.
- **Geographic Extent –** In a local context, the proposed Project would encompass the entire geographic extent of the lakes and upper Fish Creek which flows between them.

  Fish Lake has regular but low use and is distinctive for its high elevation setting and remote location.
- **Duration and Frequency –** The losses of Fish Lake and Little Fish Lake occur once but would be immediate and permanent. Proposed Project effects would begin with the dewatering of Fish Lake in pre-construction and the filling of the Fish Lake cavity with non-PAG waste rock. Little Fish Lake would be inundated by the TSF as it expands.
- **Reversibility –** Should Fish Lake be dewatered and filled with waste rock, and Little Fish Lake covered by the TSF, these losses would be irreversible.
- **Context –** While the proposed Project site has been subject to drilling and exploration related to the proposed Project, Fish Lake and Little Fish Lake could be described as undisturbed.
- **Probability –** The losses of Fish Lake and Little Fish Lake are certain with the present mine plan, since the Proponent has determined that other options that would not affect the lakes are not feasible and/or raise environmental security and health concerns with mine construction and operation. Further discussion on mine plan alternatives can be found in the Alternatives Assessment section.

Based on the above analysis and having regard to the Proponent's commitments, EAO has concluded that the proposed Project plan to dewater Fish Lake would have

significant adverse effects with respect to fish and fish habitat. The Proponent has proposed compensation measures through the creation of Prosperity Lake, associated spawning channels and hatchery culture of Fish Lake rainbow trout for outplanting. These measures are discussed further in the Conclusion and Justification section, in relation to assessment of whether the conclusion of significant adverse effects to fish and fish habitat should be considered justified.

5.5 Air Quality

5.5.1 Background Information

Analysis of effects on atmosphere takes into consideration two KI: Criteria Air Contaminants (CAC) and Greenhouse Gases (GHG).

CAC (identified as nitrogen dioxide, carbon monoxide, sulphur dioxide and particulate matter) were chosen as KI as they are a primary indicator of air quality and are associated with human health impacts (primarily through inhalation) and environmental impacts, including aesthetic, visibility, depositional effects and formation of acid rain. Particulate matter (PM) is usually characterized by particle size or diameter. Larger particulates such as inhalable particulate matter less than 10 microns in diameter (PM_{10}) and Total Suspended Particulates (TSP) are more often associated with aesthetic concerns such as property 'soiling' and local visibility impairment (dust clouds). Deposition of larger particles (dustfall) can result in vegetation impacts such as the smothering of leaves and retardation of photosynthesis, increased sedimentation in water bodies, and changes to soil characteristics and metal concentrations. From a human health perspective, it is the smaller particulates such as respirable particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) that are of greatest concern. $PM_{2.5}$ can penetrate deep into respiratory systems and impair both cardio and respiratory health. $PM_{2.5}$ is also associated with larger scale visibility impairment or 'regional haze'. Project emissions of the PM categories (TSP, PM_{10} and $PM_{2.5}$), along with the gaseous CACs (nitrogen dioxide, carbon monoxide, sulphur dioxide, and lead) were all quantified and modelled.

GHG (identified as carbon dioxide, methane and nitrous oxide) were chosen as KI as emissions potentially contribute to climate change. GHG are any gas in the atmosphere that absorbs radiation, particularly outgoing terrestrial infrared radiation, contributing to global warming. Project emissions were quantified and assessed in the context of provincial and national GHG emission totals.

Dispersion modelling[16] was undertaken to assess effects of the proposed Project on air quality during the construction and operational phases. Ground level CAC concentrations were predicted across a 50 km by 50 km study area centered on the pit and the mill. The area within the mine disturbance boundary was excluded for assessment purposes as this area is restricted to the general public and subject to work place safety standards rather than ambient air quality thresholds.

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

As the proposed Project mine site is undeveloped, existing emissions are minimal in the 2500 km^2 study area, with few industrial emission sources (mainly related to forestry activities) and some local or recreational traffic. Aside from the occasional influence of wildfires or prescribed burning, baseline ambient CAC concentrations are expected to reflect typically low regional background values.

Emissions of $PM_{2.5}$, PM_{10}, TSP and carbon monoxide would be largely from land clearing and burning at the mine site, and along the transmission line ROW and access road corridors during the two year construction phase. The main operational activities contributing to particulate emissions ($PM_{2.5}$, PM_{10} and TSP) would be blasting, excavation, and movement of material with heavy equipment, and ore processing over the 20 year active life of the mine. Land clearing and brush burning would account for the majority of overall proposed Project emissions. On-site electrical generation using fossil fuels is the source of half of the proposed Project's emissions of nitrogen oxides, while emissions from the mine fleet are responsible for the remainder.

The majority of GHG would also be emitted through land clearing and burning. During the construction phase, a total of 29,754 tonnes are expected to be emitted annually from the burning of vegetative debris. The Application also anticipates that most of the carbon dioxide would be absorbed in the post-closure phase by vegetation. During the operational phase, the majority of GHG emissions are attributed to motor vehicles, construction and mining equipment, and heavy and light duty equipment.

Summary of Effects on Air Quality

For both the construction and operational phases of the proposed Project, the maximum ground-level concentrations of all CACs are predicted to occur at the northern boundary of mine disturbance. For nitrogen dioxide, carbon monoxide, sulphur dioxide, and lead, the maximum predicted ground-level concentrations would be less than the Canadian and British Columbia Ambient Air Quality Objectives. For $PM_{2.5}$, PM_{10}, TSP, and

[16] Dispersion modelling is a mathematical simulation used to predict how air pollutants disperse in the atmosphere and what downwind concentrations would likely be.

dustfall, the maximum predicted ground-level concentrations would exceed these objectives and standards. The Proponent noted in the Application that the area of exceedance that would lie outside the mine boundary area is small.

Dispersion modelling was not done for the closure phase, as it would contribute similar but less intense adverse effects than the construction phase.

Summary of Mitigation Proposed in the Application

Mitigation measures to counter the effects of CAC and reduce the emission of GHG would include:

- using Best Available Technology that is Economically Achievable measures and best practices to reduce CAC emissions and GHG wherever possible;
- meeting or exceeding relevant regulatory emissions standards for all mine equipment;
- installing covered conveyor belt ore transportation systems and housing of the rail loading facilities to minimize fugitive particulate emissions;
- installing cost-effective dust control measures at the primary crusher truck dump to control dust emissions;
- covering of trucks used to transport concentrate;
- ensuring application of surface-binding chemicals or water on site roads and exposed surfaces as appropriate;
- minimizing disturbances and managing all land clearing to minimize burning; and,
- maximizing revegetation in post-closure to actively sequester carbon.

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

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

Mitigation of GHG

Several agencies had concerns about mitigation for GHGs. The provincial government is addressing the need to reduce GHG in two ways. First, the provincial government imposed an escalating carbon tax to induce all stakeholders, including industry, to make economically sound choices in minimizing the use of fossil fuels and to explore alternate energy sources. In addition, the provincial government, in collaboration with partners

signatory to the Western Climate Initiative, is developing a cap-and-trade system that will apply to all industry, including mining.

Dust from the Tailings Beach

The MOE had concerns about the potential generation of dust from the tailings beach should the Proponent's proposed mitigation strategies prove ineffective. Excessive dust could result in potential impacts on human and environmental health off the mine site through particulate and associated metal deposition, with consequent effects on soils, water bodies and vegetation (i.e. wildlife forage, berries and other country foods). The Proponent has committed to design a dust management plan (commitment 17.3), including monitoring of dust from the tailings beach (commitment 17.5), and to minimize any impacts (commitment 17.4). This plan would be incorporated as part of the Air Quality and Emissions Monitoring and Management Plan (commitment 17.4).

The MOE also requested that the Proponent monitor environmental impact from dustfall by establishing a soil and vegetation sampling plan with a focus on country foods. As noted in the human health section of this Report, the Proponent would implement a monitoring plan for metal concentrations in soils, local surface water and vegetation throughout the proposed Project.

During the Application Review stage, the Proponent developed commitments 17.1 through 17.9, which focus on monitoring and reducing air emissions.

5.5.4 Conclusion

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 air quality.

5.6 Vegetation

5.6.1 Background Information

The Local Study Area (LSA) and Regional Study Area (RSA) for the mine site, transmission line corridor and access road are described in Table 2.

Vegetation KI include communities, species groups, or ecosystems that have intrinsic ecological or social value, are representative of the overall ecosystem condition, and are sensitive to proposed Project activities. Selection was based on the 1998 finalized Project Report Specifications and the Application guidelines, as well as an informed understanding of proposed Project-environment interactions. The seven KI chosen for vegetation studies were old forest, wetland ecosystems, riparian ecosystems, grassland

ecosystems, rare plants, ecological communities of conservation concern, and forest capability.

The Key Indicators

Old Forest

Old forest ecosystems are primarily pine-leading stands that are over 140 years old. Proposed Project related disturbance would reduce old forest representation (all species) by 23.6 percent in the mine site RSA. Non-pine old forest in the mine site RSA would be reduced by 31.5 percent. As the majority of old forest is pine, the effects of the MPB epidemic over the next 5 to 10 years should be anticipated.

Wetland

Key issues to wetlands are wetland loss and changes in wetland composition and structure. Wetlands in the mine RSA are dominated by fens and herbaceous meadows, which are home to the provincially blue-listed bird's foot buttercup. The combined effects of lake dewatering, clearing and grubbing would result in the loss of all wetlands in the mine footprint area for a total loss of 403.5 ha or 19.5 percent of all wetlands in the mine site RSA. This loss could not be reversible. On a broader scale, the Proponent noted in the Application that wetland habitats similar to those in the mine footprint are abundant in the surrounding area.

The effects of decreased flow during operations to wetlands and vegetation in lower Fish Creek were assessed in the Application. While flows in lower Fish Creek would be reduced from construction to closure, the Proponent maintains that with little change in groundwater flow and flows in lower Fish Creek and sources, lower Fish Creek would continue to be seasonal and effects would not be significant.

Riparian Ecosystems

Riparian areas are represented by transition zones adjacent to and within a 30 m buffer of mine site wetlands, as well as isolated streams and lakes. As with wetlands, the proposed Project would result in the permanent loss of all riparian areas within the mine footprint. Riparian losses at maximum footprint would be 31.8 percent. After reclamation, these losses would be reduced to 11.27 percent of the baseline area.

Grassland Ecosystems

While grasslands are common features in the proposed Project area, these areas typically have thin soils and are sensitive to disturbance. The most common grassland type and only ecosystem to be substantially disturbed would be the Juniper-Kinnikinnick. There would be a reduction of 9.4 ha in the mine site RSA, which would

be tempered by reclamation planting of 2.1 ha. However, this reduction would be permanent, as these areas would be flooded. While the widening of 4500 Road would have a minimal effect on grassland areas, the Proponent noted in the Application that Nuttall's alkaligrass-Foxtail barley is classified as rare and requires special attention due to its small size.

Rare Plants

Key issues of concern for rare plants include the specific habitat requirements and regional availability of each species. Clearing and grubbing of the mine site would result in the loss of eleven rare plant populations within or immediately adjacent to the mine footprint: six populations of *Drepanocladus longifolius* (blue-listed), seven populations of *Ranunculus pedatifidus* (blue-listed), and one population of *Schistidium heterophyllum* (red-listed). Both *Drepanocladus longifolius* and *Ranunculus pedatifidus* were found at three other locations outside of the mine footprint, so it is not expected that a loss within the mine site disturbance area would significantly affect the sustainability of the populations in the RSA. The red-listed moss *S. heterophyllum* would be adversely affected by the proposed Project, as no other populations or habitat conducive to supporting this species were found elsewhere in the RSA. Mitigation for this species includes movement of the boulders with the moss or transplantation.

Ecological Communities of Conservation Concern

A total of 32 Conservation Data Center-listed ecological communities have the potential to occur in the Taseko area and southern Chilcotin. Of these, 11 red-listed and 13 blue-listed have been mapped in one or more of the proposed Project vegetation RSA. In the mine site RSA, only Lodgepole pine-trapper's tea-crowberry unit would be subject to direct proposed Project environmental effects associated with the mine footprint. The 6.7 ha (1.96 percent) reduction of this community is due to the flooding of the TSF and recovery is not expected. This plant is of special importance to First Nations. The transmission corridor passes through 53 ha of red- and blue-listed ecological communities, including 15.3 ha of seven red-listed biogeoclimatic units. As the placement of the hydro poles is flexible, minimal effect is anticipated. Fifteen ecological communities of conservation occur in the access road RSA, for a combined total of 1560.3 ha. None of these, with the exception of Pine-trapper's tea, occur in the mine site RSA. As there is already disturbance along the road edge, proposed Project effects are expected to be minimal. It is expected that most adverse environmental effects can be avoided through refinement of ecosystem mapping, preconstruction field location and marking of sensitive ecosystems, and careful construction planning and implementation.

Forest Capability

The proposed Project would remove 1,502.1 ha (10.9 percent) of moderate productivity forest land from the forest landbase, after a post-closure reclamation of 2,450.8 ha. Reclamation would include replacement of the topsoil's and re-establishment of native cover.

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

Key issues for vegetation resources associated with the proposed Project include:

- loss of vegetation due to the direct environmental effects of clearing and the indirect environmental effects of proposed Project activities;
- changes in abiotic conditions necessary for vegetation development due to the direct environmental effects of ground disturbance and indirect environmental effects of changes to soil moisture or nutrient status; and,
- changes in the structure or composition of vegetation communities due to the direct environmental effect of clearing and a variety of indirect environmental effects occurring in edge areas adjacent to proposed Project disturbance and areas of activity.

Prior to mitigation, it is anticipated that there would be negative effects to the three key vegetation resource issues at the site of the following three proposed Project components:

Mine Site

Site clearing and grubbing, including the removal of all vegetation and active soil layers over the majority of the mine site, would result in vegetation loss for all KI and may also cause change in composition or change in abiotic community. Further, changes in drainage patterns, lake dewatering and the reclamation of waste rock stockpiles are anticipated to negatively affect the KI listed above.

Reclamation is expected to restore soil productivity and vegetation cover to the mine site area.

Transmission Line

Clearing and construction of the transmission line would involve the removal of mature trees and brush within a 30 to 80 m swath extending 125 km from Dog Creek to the mine site. This activity would change the structure and composition of the vegetation communities and may result in the loss of rare plant species and removal of old forest. As most of the access for the transmission line is via existing roads, the ROW is

expected to result in a four percent increase in linear feature[17] density in along the entire transmission line RSA.

Decommissioning of the line would initiate conditions that would facilitate the eventual recovery of natural vegetation communities.

Access Road

Clearing and ground disturbance along the 2.8 km new access road could potentially result in the loss of rare plants or vegetation communities, changes in structure or composition of vegetation communities, or changes in abiotic conditions necessary for wetlands or rare plant species. Vehicular traffic along the access road during construction and operations may also affect vegetation KI due to dust generation, however, this may be mitigated by dust control methods.

While, there would be no incremental disturbance of vegetation at the rail load-out site as all activities would occur within the current footprint, the Proponent would implement mitigation measures for dust control at the rail load-out site.

Summary of Effects on Vegetation

The most substantive and persistent environmental effects to vegetation KI would occur within the mine footprint, while most potential environmental effects in the transmission corridor and access road areas would be avoided through project design. Proposed Project effects occur primarily during the construction phase and are associated with clearing and grubbing. These proposed Project effects should be evaluated with consideration of the current MPB infestation, as most areas of mature and old forest in the proposed Project area may be targeted for salvage logging.

While effects are negative, in many instances they can be mitigated by implementing a decommissioning and mine reclamation plan.

Summary of Mitigation Proposed in the Application

Mitigation measures designed to avoid adverse effects on vegetation include:

- planning and implementing environmentally sensitive project design such as the pre-engineering environmental constraints mapping and the site specific rare plant and rare ecosystem surveys that are recommended to precede construction activities;
- design of proposed Project disturbance boundaries to minimize risk of windthrow;

[17] Linear features are geographic features that can be represented on a map by a line or set of lines, such as roads or electric or telecommunications networks.

- planning roads and watercourse crossings in a manner that maintains natural drainage patterns;
- collaboration with government agencies and forest licensees to minimize the removal of non-pine species of all ages;
- minimizing disturbance, especially within the 30 m buffer adjacent to wetland and riparian areas; and,
- avoiding vegetation loss through proper project design and mapping, such as avoiding construction activities on south-facing slopes over 15 percent and retaining humus layer and vegetation mat whenever possible.

Mitigation designed to minimize proposed Project environmental effects during operations include dust suppression, erosion control, and measures to control the introduction and dispersal of noxious weeds. An invasive plant management plan would be prepared to avoid establishment or dispersal of non-native invasive plant species within the proposed Project area and to monitor invasive species. This would include a weed management strategy for the maintenance of the transmission line developed in consultation with regulatory agencies, land owners, and First Nations (commitment 12.6).

Mitigation designed to restore pre-disturbance ecological values include planting appropriate mixes of deciduous and coniferous species to reforest cleared areas, and salvage, storage and replacement of fertile soil layers and vegetation mats.

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

During the review of the Application, additional issues and concerns were raised by MOE and First Nations. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix B. Key issues and responses include the following:

Rare Plant Communities

The MOE expressed concern that the proposed Project would extinguish several rare plant communities, including one species of moss, *S. heterophyllum*, which is not found elsewhere in the area (and in only eight other locations in the province). The Proponent would address this issue by physically moving the mossy rock to a new site with similar aspects to the east of its present location, under the guidance of a plant expert (Wildlife ITT #39).

Commitment 15.2 references Taseko's "Transmission Line Corridor Mitigation Strategies" which includes the Proponent's commitment to conduct pre-construction

surveys of the transmission line ROW for the occurrences of rare plants and rare ecosystems to avoid impacting these features.

Impacts along the Transmission Line

The MOE and other members of the Working Group expressed concerns about potential impacts to sensitive environments and wildlife habitat along the transmission line. With the refinement of the transmission corridor, the Proponent is able to provide more confidence that wetlands and riparian areas can be avoided. The Proponent has stated that the extent of recent disturbance not related to the proposed Project can be utilized to refine an alignment with minimum disturbance to sensitive plant communities.

Additionally, Esketemc First Nation members expressed concerns about the use of herbicides in management and maintenance of the transmission line. The Proponent responded that they would be developing an invasive plant management strategy that would use chemical, physical, or cultural/biological methods depending on the weed and location. Additionally, only native species would be used in the grasslands areas. The use of herbicides or pesticides must be in compliance with *British Columbia's Integrated Pest Management Act* (HHERA ITT #17).

Compensation

The MOE requested compensation for the permanent loss of 403.5 ha of wetland ecosystem (ITT #7). The Proponent has committed to develop and implement a plan for achieving compensation for adverse effects to wetland habitat, the productive capacity of the lake, recreation values, wildlife, wildlife habitat and the critical habitat of species at risk (commitment 11.1). Though outside of the mine development footprint, the Proponent has included any impacts to lower Fish Creek in this commitment.

Plants important to the Tsilhqot'in people

The TNG identified plants important to the Tsilhqot'in people that had not been previously identified for assessment (ITT #11). As a supplemental report the Proponent prepared an equivalency table that links these plant species with KI on the basis of their general ecological requirements. The table also indicates the general distribution of the species according to the biogeoclimatic variants present in the mine site RSA. Finally, the table assesses the significance prediction. No effects or no substantial residual effect was predicted for any of the 52 plant species as no effect or no substantial residual effects were identified for any of the vegetation KI.

5.6.4 Conclusion

Reclamation planting of grasslands and Proponent commitment to mitigation (11.1, 12.2, 12.3, and 12.4) designed to mitigate and compensate effects on wetlands would

be expected to offset the losses to these ecosystems. While rare plant communities would be extinguished in the mine footprint, mitigation would have been established to protect species with no other known occurrences. The Proponent would design the transmission line to avoid ecological communities of conservation concern.

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 vegetation.

5.7 Terrain and Soils

5.7.1 Background Information

The Local Study Area (LSA) and Regional Study Area (RSA) for the mine site, transmission line corridor and access road are described in Table 2.

Terrain

The key issue for terrain resources associated with the proposed Project is the potential for change or alteration of terrain stability resulting in increased incidence of mass wasting events (such as debris flow, slumps, earth flows, and other forms of slope instability) related to proposed Project activities such as site clearing and contouring, road construction, trenching and blasting, and the development of infrastructure components.

The proposed Project is situated in the Fraser Plateau Section of the Interior Plateau, an area characterized by undulating to rolling plateau dissected by a few valleys and associated rivers. Slopes ranging from 5 to 15 percent dominate both the LSA and the RSA of the mine site and the access road. Only one percent of all slopes in the LSA of the access road are over 50 percent, indicating that there would be very few potentially unstable slopes along this route. Well-drained glacial till is the most common surficial sediment in the mine site LSA, accounting for 78 percent of all deposits mapped within the mine site. Bogs and fens (organic accumulations) account for an additional 14 percent of materials in this area, but only in depressions and areas with poor drainage.

Almost all (99.6 percent) of the mine site LSA is characterized by low gradient (<60 percent) slopes that show no evidence of instability. Areas of instability are located around the northwest and southwest sides of Fish Lake and the north side of Little Fish Lake. Areas showing evidence of mass wasting along the access road are at the Chilcotin River and Tete Angela Creek crossings, and at a point 10 km north of the mine site LSA.

Soils

Key issues for soil resources associated with the proposed Project are changes to soil physical properties and soil chemical properties, including soil contamination. KI for soil studies were reclamation suitability and agricultural soil capability (for lands located within the Agricultural Land Reserve which intersects with the transmission line LSA only). Reclamation suitability is defined as the ability of soil to be utilized as reclamation material enabling a site to return to its former or other productive uses following a disturbance and subsequent reclamation. Agricultural soil capability is defined as the suitability of land for sustained production of cultivated crops based on soil, climate and landscape characteristics. In terms of reclamation suitability, 54 percent of the soils in the mine site LSA were mapped as fair-poor and 24 percent were mapped as fair, due to high coarse fragment content. The mine site has low nutrient and carbon content, reflected in forest productivity which ranges from moderate to low. Most of the lands within the Agricultural Land Reserve along the transmission line are Class 4 lands, capable of a restricted range of crops but requiring special management considerations.

Mineral soils of the mine site are typically moderately well to well drained, with occurrence of organic soils concentrated in the southern region of the mine site LSA. Within the mine site, arsenic, copper, nickel, selenium, and zinc were found in topsoil and subsoil samples to exceed recommended guidelines, but as these metals were not reflected in vegetation samples, elevated metals in the soil do not appear to limit the reclamation suitability of the soil. Overburden material was deemed unsuitable for reclamation due to high pH (8.1 to 8.8) and mix of fine textures and course fragment content.

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

Terrain

The greatest likelihood of mass wasting due to blasting is during the initiation of the pit. As a mitigation measure, the proposed Project would likely adopt the blasting practices of Gibraltar Mine, which are based on the requirements of the *Health, Safety and Reclamation Code for Mines in BC*.

The dewatering of the pit and the filling of Prosperity Lake, the TSF and the pit would all affect groundwater hydrology and potentially affect terrain stability. While a reduction in water can affect sheer strength of the soil matrix and reduce vegetation diversity and composition, this effect is not expected due to the coarse nature of the till. Conversely, saturation of the sediment increases the weight of the mass, increasing sheer force and thus instability. The rise in the water table in post-closure in the pit and TSF areas would create areas of mass wasting hazard.

Soils

Physical properties of soil are affected by the following five conditions: soil improvement, compaction and rutting, erosion, soil loss, and moisture changes. Chemical properties of soil are affected by soil contamination and soil fertility.

Summary of Effects on Terrain and Soils

As much of the proposed Project area is characterized by subdued terrain, it is expected that proper design and engineering practices would eliminate any issues related to mass wasting. The only potential residual effect could result from increased water tables in areas that currently display evidence of mass wasting outside of the mine footprint. If water levels increase, pore space is reduced by saturation and the weight of the mass would increase.

Based on prescribed mitigation measures, no measurable detrimental soil mixing, compaction and rutting, and erosion are anticipated. Physical changes in soil loss and soil moisture, due to changes in soil drainage regime or water table depths, define the residual physical soil effects associated with the proposed Project.

Soil loss and terrestrial land base losses are estimated to be 28 percent and 23 percent of the mine site LSA respectively. The magnitude is considered to be high and irreversible; however, both of these losses are in part due to the creation of new fish habitat. Soil moisture effects are closely linked to alterations of the terrain and surficial geology; more specifically to the creation of the mining pit and filling of the pit and TSF at closure. While this change is reversible, changes of approximately 1 m in the water table for a 17 year time frame would cause significant changes to vegetation if the water table increases to reach the rooting zone.

Soil chemical changes from metal loading of soils are anticipated. While the Application notes that baseline levels of boron and cadmium are already at levels that exceed the CCME guidelines, it is expected that copper and molybdenum would exceed these guidelines in years 2.4 and 4.6 of operations, respectively.

The only anticipated residual effect of the proposed Project related to agricultural soil capability along the transmission line is the alienation of these lands due to the footprint of the transmission line. It is anticipated that the line would be decommissioned in year 20, making this land available again.

Summary of Mitigation Proposed in the Application

In order to avoid, eliminate, or reduce mass wasting, the following measures would be implemented:

- Installation of groundwater monitoring equipment to identify and measure subsurface water in areas of suspected or known slope instability.
- Stabilization, restoring, and re-vegetating banks and slopes to increase stability and minimize the rate of surface water run-off or groundwater infiltration.
- Minimize work during periods of heavy rainfall or snowmelt.
- Reduction of construction activity that undercuts or overloads dangerous slopes, or that redirects the flow of surface or groundwater.
- Rip-rapping and/or diversion of streams that undercut potentially unstable slopes.
- Increase holding strength of slope by pinning individual blocks, covering the slope in net or mesh, or installing rock anchors or rock bolts on dense spacing.
- Protect the site from failure by constructing catchment structures such as basins or protective structures such as walls and embankments.
- Reducing the weight of potential slide mass, flattening the surface slope angle through grading, preventing water infiltration by controlling surface drainage, or reducing the accumulation of subsurface water by installing sub-drains.
- Diverting the flow away from the proposed Project area using diversion barriers or channels, or providing catchment structures to contain the landslide material.
- Shoreline reinforcement at post-closure for the pit.

Mitigation for effects on soils would be implemented in conjunction with the Conceptual Reclamation Plan, including:

- salvaging soils within the mine disturbance area and stockpiling away from proposed Project activities associated with high metal deposition rates, such as the area surrounding the proposed open pit;
- re-establishment of drainages during re-contouring at closure to reduce erosion;
- site contours would be adjusted to prevent erosion from surface water run-off;
- areas where subsoil compaction would have occurred, such as roads or trails, should be ripped and loosened at closure so groundwater flow is not impeded, prior to topsoil replacement and revegetating; and,

- application of nitrogen-phosphorus-potassium fertilizer may be required after soil replacement to assist in revegetation efforts and improve soil nutrients, recognizing that self-sustaining vegetated cover is the end goal.

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

During Application Review, MOE, MEMPR and NRCan identified several issues regarding terrain and soils. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix B. The key issue and response was the following:

Pit Stability

The MEMPR requested a commitment to implement a plan to monitor and ensure open pit stability to protect worker safety. The Proponent added this as a commitment (22.5).

5.7.4 Conclusion

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 and soils.

5.8 Wildlife

5.8.1 Background Information

The Local Study Area (LSA) and Regional Study Area (RSA) of the mine site, transmission line and access road are described in Table 2.

The selection of wildlife using Key Indicators (KI) is a way of focussing on species of key concern with respect to the proposed Project. These KI represent the list of wildlife that were considered as part of the EA. The selection of KI began in 1998 in consultation with MOE and CWS. This wildlife list was approved at a Working Group meeting in 2006, with minor changes. The KI were selected based on strong regional interest and either their conservation status or socio-economic value as hunted and subsistence species. Table 6 describes wildlife species as determined from the KI analysis, as well as species of Provincial Concern, that were assessed in the Application.

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

The Application identified several potential issues for wildlife and wildlife habitat. These include:

- **Effects on habitat availability –** Resulting from direct habitat loss or alteration and/or indirect loss or alteration from sensory disturbance and reduction of habitat patch size.
- **Disruption of movement patterns –** Resulting from increased habitat/landscape fragmentation or higher road use levels limiting daily or seasonal wildlife travel.
- **Increase in direct mortality risk –** Resulting from site development, vehicle collisions, transmission line strikes, increased hunting or poaching, lethal control of problem wildlife, or reduction in secure habitat availability due to habitat fragmentation.
- **Reduction in animal health –** Resulting from contamination of air, soil, water, or food sources or changes in food source abundance or composition.

The proposed Project would result in permanent habitat losses at the mine site. The total wetland area within the mine site RSA is 2071.4 ha, making a loss of 403.5 ha a loss of 19.5 percent of wetlands within the mine site RSA. The total riparian habitat area within the mine site RSA is 3131.1 ha, making a loss of 352.7 ha a loss of 11.3 percent of riparian area within the mine site RSA. The water environments of the Fish Creek watershed (Fish Lake and Little Fish Lake) total another 117.6 ha. In addition, the Application specifies a permanent loss of 845 ha of upland to the creation of new water features. These losses should be considered permanent. Species that require these lost habitats would be displaced. Lower Fish Creek was considered in the Application as it is within the mine site RSA, yet with relatively no change in groundwater flows and with water flowing from the headwater channel, impacts to wildlife habitat in this portion of the stream are not anticipated to be significant by the Proponent.

Table 6 lists the KI species and species of provincial concern that were assessed in the Application. This table outlines baseline population conditions, anticipated proposed Project impacts, and mitigation and commitments proposed to address these impacts. Table 6 also lists, where available, the percentage or area of habitat predicted to be impacted, lost for the life of the proposed Project, or lost permanently as a result of the proposed Project. For example, moose and mule deer would lose 32 percent of winter habitat in their RSA for the life of the proposed Project, and 47 percent permanently. Likewise, Great Blue Heron and Sandhill crane would lose 57.4 ha of moderate value

Table 6: Key Indicators and species of Provincial Concern identified in the Application: Project Impacts, Mitigation and Commitments

Key Indicator	Baseline	Project Impacts (areas and percentages in relation to wildlife RSA)	Mitigation and Commitments
California Bighorn Sheep	2 herds within transmission line LSA totally 313 animals. Blue-listed.	• Indirect habitat loss through sensory disturbance	• Helicopter no fly zones for sensitive areas such as sheep winter escape terrain or lambing areas
Mule Deer	Widely distributed and relatively common species of local interest	• Indirect habitat loss through operational noise • 32% long-term loss of winter habitat • 47% permanent loss of winter habitat post-closure due to water features • Direct mortality risks through vehicular traffic and increased access of hunters and poachers	• ROW clearing for transmission line within Ungulate Winter Range would be minimized through project design, and avoided during the critical winter period to the extent practical
Moose	Moderate abundance with areas along Upper Fish Creek and the west side of Fish Lake rated as high quality habitat.	• Indirect habitat loss through operational noise • 32% long-term loss of winter habitat • 47% permanent loss of winter habitat post-closure due to water features • Direct mortality risks through vehicular traffic and increased access of hunters and poachers	• Taseko would suggest that roadside vegetation along the access road be managed to discourage moose foraging
Grizzly Bear	Classified as threatened in the South Chilcotin Range. Blue-listed and federal species of Special Concern.	• Long term loss of 423 to 3851 ha of feeding environment (depending on the season) • Permanent loss of 845 ha of upland habitat loss due to water features • Direct mortality risks through increased access of hunters and poachers	• **Commitment 10.3:** Commit to the strict and rigorous implementation of mitigation measures, in concert with the BC Ministry of Environment and other agencies as appropriate, to eliminate or severely minimize the risk of direct mortality to grizzly bear (from all sources, see also Sections 6.1.2.1 and 6.3.4.8) a) Taseko will work with the BC Ministry of Transportation to control mine related traffic speed along the section of Taseko Lake Road that is within known grizzly bear range
Black Bear	Moderate abundance.	• Up to 36% long term loss (1100 ha) of denning habitat • Permanent loss of 845 of upland habitat • Direct mortality risks through vehicular traffic and increased access of hunters and poachers	• Avoid site clearing of moderate or higher quality denning habitat in mid-winter to reduce the risk of destroying or disturbing active dens. If this must occur, conduct a pre-clearing den survey to identify bear dens within the proposed mine site. Identified dens would be marked with a 50 m setback and avoided until bears have left • **Commitment 10.5:** Implement the Vegetation and Wildlife Management Plan (Volume 3, Section 9 and mitigation measures Section 6.4.1) and Materials Handling and Waste Management Plan for dealing with potential human-bear conflicts
Fisher	Cariboo subpopulation is the third most abundant in the province. Blue-listed.	• Long term loss of up to 67 ha of natal denning habitat in the transmission line RSA • Permanent loss of 21 ha of natal denning habitat in the mine site RSA	• Moderate to high fisher natal denning habitat would be identified on construction alignment sheets for the transmission line and construction would be planned to avoid these habitat in the denning period (March to May)
American Badger	Occurring mostly on the east side of the Fraser. Red-listed and Endangered.	• Little effect as it is not anticipated that grassland habitats would require clearing along the transmission line RSA.	
Townsend's Big-eared Bat	Blue-listed.	• Long term loss of 214 ha of summer roosting habitat along the transmission line corridor • Continued direct mortality from vehicular collision along Highways 20 and 97	• **Commitment 14.4:** Identify and quantify project effects on wildlife and vegetation at a local level on a scale that would enable the identification of appropriate mitigation/compensation measures
Great Blue Heron	Occur during migration and in winter. Suitable habitat includes in Fish Lake, Little Fish Lake and the eastern half of Wasp Lake. Blue-listed.	• Indirect habitat loss due to sensory disturbance • 42% long term loss (57.4) of moderate value feeding habitat • Permanent loss of 23.2 ha, mainly due to the loss of Fish Lake • Direct mortality risk of line strikes	• **Commitment 10.1:** Implement the mitigation measures for wildlife for all aspects of the project as described in Volume 5, section 6.4.1 and Table 6-67 (Mine), 6-68 (Transmission Line), and 6-69 (Access road)
Mallards	Abundant in the Cariboo-Chilcotin region. Suitable habitat includes in Fish Lake, Little Fish Lake and Wasp Lake.	• 36% long term loss (59.7 ha) of moderate habitat • Permanent loss of 25.8 ha of moderate habitat • Direct mortality risks through increased access of hunters and poachers and line strikes	• **Commitment 10.2:** Implement additional wildlife protection measures to apply to Project personnel travelling to and from the Project on workdays i.e.: firearms are prohibited at all times except when specifically authorized (e.g., wildlife monitor); no littering, no feeding of wildlife, no harassment of wildlife, no hunting and fishing on the project site. Project-related traffic is restricted to designated access roads and trails (including all-terrain vehicles and snowmobiles)
Barrow's Goldeneye	Common through the Cariboo from mid-March to late November. Suitable habitat includes in Fish Lake, Little Fish Lake and other small area lakes.	• Up to 88% long-term loss (215 ha)of suitable nesting habitat at maximum disturbance in the mine site RSA • Large gain (318 ha) in potential nesting habitat at post-closure, assuming Prosperity Lake is used • Permanent loss of 845 ha of upland habitat • Direct mortality risks through increased access of hunters and poachers and line strikes	• Adherence to region-specific breeding bird timing windows for site clearing and vegetation management
Sandhill Crane	25,000 migrating through the Chilcotin Region annually. Blue-listed.	• Indirect habitat loss due to sensory disturbance • 42% long term loss (57.4) of moderate value feeding habitat • Permanent loss of 23.2 ha, mainly due to the loss of Fish Lake • Direct mortality risk of line strikes	
Long-billed Curlew	Highest concentration in the Cariboo-Chilcotin grasslands, where it is estimated there are 100 pairs. Blue-listed and federal species of Special Concern.	• Habitat disturbance is restricted to 29 ha as there is anticipated to be little need to clear grasslands • Direct mortality risk of line strikes and guy wire strikes	

Lewis's Woodpecker	Rare in the Cariboo from early May to mid September. Red-listed and federal species of Special Concern.	• Habitat disturbance is restricted to 12 ha due to ROW clearing • Reduced direct mortality risk of line strikes	• Moderate and highly suitable Lewis' woodpecker nesting habitat would be identified on transmission line construction sheets and avoided where possible
Yellow-breasted Chat	Rare in the Central Interior ecoprovince, there are estimated to be 12 breeding pairs provincially. Red-listed and Endangered.	• No net loss of critical nesting habitat.	
Sagebrush Brewer's Sparrow	Red-listed	• Habitat disturbance is restricted to 7.4 ha as there is anticipated to be little need to clear grasslands	
Sharp-tailed Grouse	4000 to 8200 individuals in the Central Interior; populations have declined by about 70% over the last 100 years. Blue-listed.	• Long term loss of 63.1 ha of feeding habitat and 31.4 ha of nesting habitat along ROW • Direct mortality risk of line strikes • Direct mortality risks through vehicular traffic and increased access of hunters and poachers	• Concern regarding increased access to poachers along the transmission line ROW could be addressed by the Province implementing a sharp-tailed grouse hunting closure area in Management Unit 5-4
Prairie Falcon	Historically low levels with only 12 to 20 breeding pairs in the province. Red-listed.	• Indirect habitat loss due to sensory disturbance	
Short-eared Owl	Blue-listed and federal species of Special Concern.	• Indirect habitat loss due to sensory disturbance • 51% long term loss (172.6 ha) and 44% permanent loss (146 ha) of moderate to high habitat in the mine site RSA • Direct mortality risks through vehicular traffic	• Site clearing would be minimized and would avoid non-pine forest wherever possible. • Retention of actual or potential wildlife trees.
Flammulated Owl	Blue-listed and federal species of Special Concern.	• While only 17.4 ha of moderate and high suitability habitat would be cleared within the ROW, this residual cumulative loss of habitat is likely to have an effect on population • Direct mortality risks through vehicular traffic	• Moderate and highly suitable flammulated owl nesting habitat would be identified on transmission line construction sheets and avoided where possible
Amphibians: Columbia spotted frog, Pacific chorus frog, wood frog, western toad, long-toed salamander, and Great Basin spadefoot toad.	The two toad species are SARA listed. The spadefoot toad is blue-listed provincially and Threatened nationally, and the western toad is listed nationally as Special Concern. The wetlands south of Fish Lake are high value habitat.	• Direct mortality is expected through contact with heavy machinery and through exposure and displacement • Direct mortality risks through vehicular traffic • Permanent losses of 403.5 ha of high value habitat in the mine site RSA and 46.6 ha of high value habitat along the transmission line corridor	• Transmission line construction in and around wetlands would occur in the winter and with low-load vehicles to minimize habitat loss and alteration and direct mortality for amphibians
Provincial Concern	**Baseline**	**Project Impacts**	**Mitigation**
Reptiles	N/A	• Loss of habitat due to creation of TSF and Pit Lakes • Direct mortality risks through vehicular traffic and along transmission line where predators may use poles as hunting perches	
Great Basin Gopher Snake	Listed on Schedule 1 SARA. Known in the Churn Creek area, south of transmission line LSA.	• Damage to den sites during the construction of the transmission line.	• An assessment of pole placement would identify and avoid any potential den sites while engineering constraints protect the steeper slopes along the Fraser River
Terrestrial Invertebrates	N/A	• Risk of habitat loss and alteration • Direct mortality if construction intersects seasonal population concentrations	
Small Mammals	N/A	• Loss of habitat due to creation of TSF and Pit Lakes • Direct mortality risks through vehicular traffic and along transmission line where predators may use poles as hunting perches • Destruction of burrow systems and nest sites	
Spotted Bat	Listed on Schedule 1 SARA. Unlikely to occur in the Fish Lake area.	• Indirect habitat loss through sensory disturbance	
Feral Horses	The Brittany Triangle, which intersects with the access road, holds the last major population of feral horse in the province.	• Direct mortality risks through vehicular traffic	• **Commitment 10.4:** Record all project-related wildlife-vehicle collisions or near misses as described in Volume 5b in section 6.4.3.1. Review regularly by qualified environmental staff person and take appropriate action if necessary. If a problem area is identified appropriate actions will be taken (e.g., warning signs, site-specific speed limits). In addition, Taseko Mines Ltd. will report any wildlife mortalities resulting from Project vehicles to the BC Ministry of Environment regional office and the BC Ministry of Transportation and Infrastructure.

feeding habitat in their RSA for the life of the proposed Project, and 23.2 ha permanently. Long term habitat losses that would be addressed at reclamation and as the forest regenerates were also discussed in the vegetation section of this Report.

The potential effects of the transmission line on the majority of species were concluded to be minimal. In grassland areas, there would not be a need for much clearing, so impacts of the transmission line would be limited to temporary noise during construction. For wetland areas, the Proponent is committed to minimizing excavation and footprint of side-cast material so as to minimize impacts (commitment 12.3). In areas where trees would need to be cleared, the Proponent emphasized that the transmission line is a temporary instalment and forest regeneration is expected once it is decommissioned. For species that are hunted and poached, the transmission line could increase access for hunters and poachers but the access that currently exists partially offsets the need for new roads. Line strikes are also an issue for larger less agile birds and this would be reviewed as part of monitoring. Generally, for species that are in a position to lose habitat due to the construction of the transmission line, the Application concludes that it is a marginal area loss compared to the size of the transmission line RSA and effects are reversible.

The Proponent concluded in the Application that the combined environmental effects of the proposed Project would not significantly impact the sustainability of wildlife regionally, with the implementation of the proposed mitigation measures.

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

Comments received during the Application review from MOE and the TNG indicated that additional assessment of proposed Project effects on wildlife was required to characterize effects at a sub regional scale to reflect more local effects. Working with MOE, the Proponent conducted additional assessments to address impacts at a sub regional scale.

While bald eagles were not originally listed as a KI species, they were later added to the list of KI assessed. This list of 22 KI (the 20 original KI species, the amphibian group and bald eagles) was identified by MOE and additional analysis addressed habitat loss and population density estimates. Local population effects were expressed in terms of number of individuals affected. The Proponent also used an equivalency matrix to demonstrate how impacts to additional species could be inferred based on the assessments undertaken for the KIs in the Application. The equivalency matrix listed 112 additional species, 23 of which were species mentioned in the *William* court case, 98 of which were species identified in MOE's Conservation Framework, and 52 of which were species of regional interest, as listed in MOE's Identified Wildlife Management

Strategy. With respect to the similarities of these additional species to the KI and based on the initial assessment of the KI analyzed in the Application, the Proponent determined in this review that there were no significant effects on the additional species. This equivalency matrix ("Prosperity Gold-Copper Project: Wildlife KI Equivalency Matrix – July 31, 2009") was created in response to provincial information request 10.0 and can be found on EAO's website.

Based on wildlife data available, MOE also requested that eight of the KI species receive a significance reassessment. The Proponent reduced the spatial scope as per MOE's suggestion (to sub-regional population units or management units) and completed the reassessment and concluded there was no significant effect on the species considered.

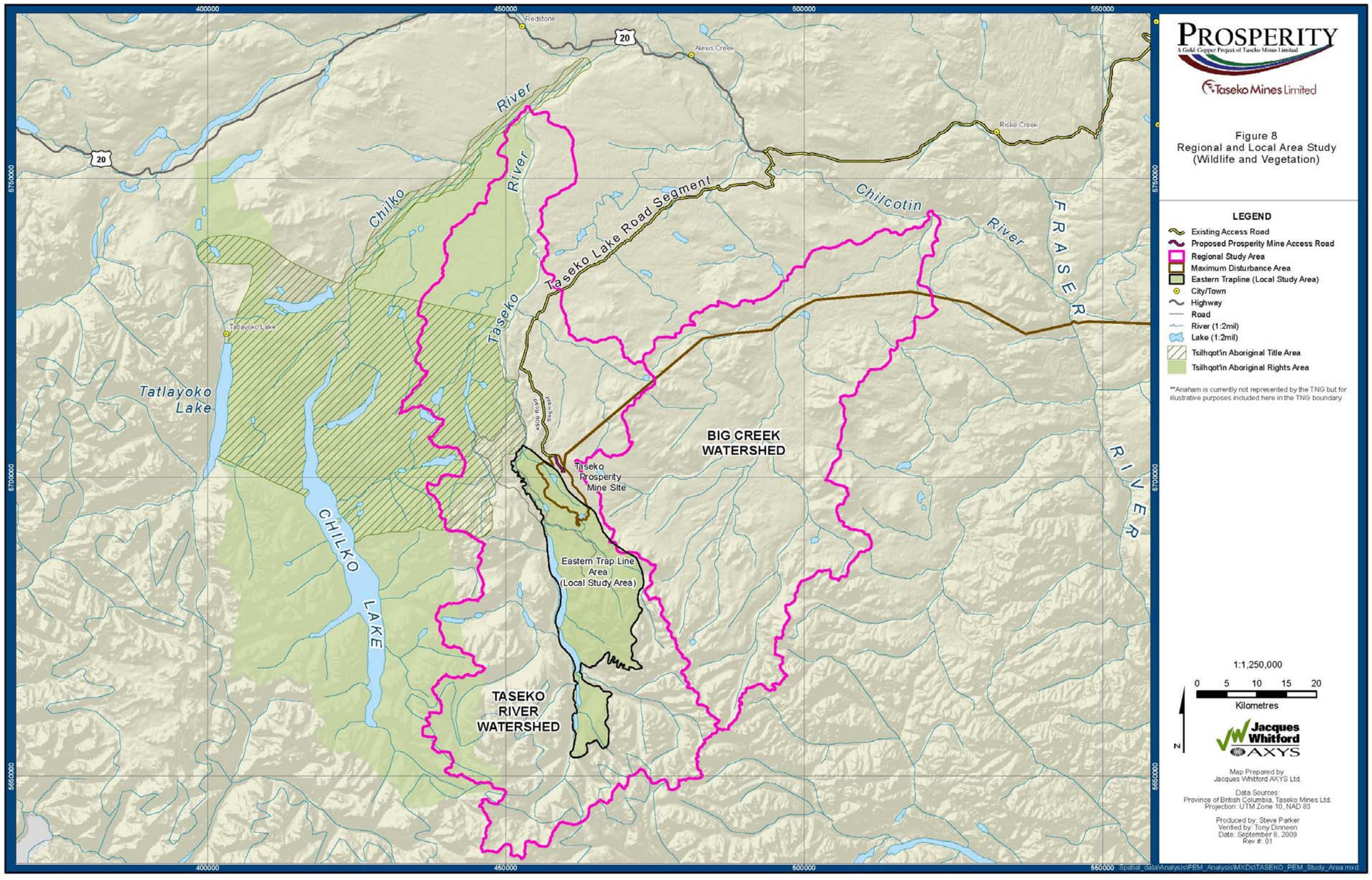
While agreeing to assist in the data recovery and model planning, MOE expressed dissatisfaction with the meaningfulness of the analysis produced. The Proponent submitted a supplemental report on October 2, 2009 ("Local and Regional Environmental Effects on Wildlife and Vegetation Resources of Importance to the Tsilhqot'in National Government at the Proposed Mine site" (October 4, 2009) in which they explained the reasons that lead to their conclusion that there would be no potential for significant effects for any of the species listed after mitigation. Part of the analysis contained in this report used Predictive Ecosystem Mapping to characterize effects on wildlife by looking at the direct potential area-based losses to biogeoclimatic zones[18]. This work was done on three scales: the Trapline East Study Area (which follows the administrative boundaries as defined in the *William* decision), a larger Rights and Title Study Area (the Claim Area defined in the *William* decision), and a regional watershed scale. Figure 9 illustrates these study areas.

This analysis compliments the findings by wildlife species of no significant adverse effects presented in the Application and further refined in the context of sustainability for moose, mule deer, fisher, black bear and grizzly bear populations also presented in the supplemental report.

The two biogeoclimatic zones examined (i.e. that occur in the mine footprint as well as in the larger Rights and Title Study Area) account for two to three percent of the relevant habitat in the Rights and Title Study Area. As much of the land in the Rights and Title Area is minimally disturbed or undisturbed, it was determined that the remaining 97 percent of same-type habitat in the Rights and Title Area Study Area

[18] Biogeoclimatic zones are the systems of ecological classification used for forest, range and wildlife management and for monitoring the impacts of climatic change in British Columbia. A biogeoclimatic zone is a geographical area with a relatively uniform macroclimate, characterized by a mosaic of vegetation, soils and, to a lesser extent, animal life reflecting that climate.

Figure 9: Regional and Local Area Study



would be sufficient to sustain the identified species. The results of this study are discussed in section 10.4.1 with respect to First Nations.

MOE requested that the Proponent explain its conclusions regarding impacts to wildlife resources and ecosystem values, the expected efficacy of applied mitigation, anticipated residual effects as well as commit to compensation for residual effects. The Proponent has, in EAO's opinion, explained its conclusions regarding impacts to wildlife and ecosystem values in the Application and the supplemental report; committed to mitigation to reduce the impacts to wildlife and wildlife habitat and committed to compensation to address adverse effects. Commitment 11.1 discussed below outlines a process to consider the effectiveness of mitigation in determining the need for compensation.

Impacts along the proposed transmission line corridor

The Esketemc First Nation was concerned about potential impacts to wildlife, specifically moose and deer, along the proposed transmission line corridor. The Proponent analyzed these species in the Application, using habitat availability analysis. The Proponent did further work (see local effects analysis in the preceding section) to refine this analysis with additional data from MOE. The Proponent noted that while no surveys were done for moose east of the Fraser River, habitat models were used to define population impacts with the resulting conclusion of no significant effect. The local population effects prediction presented in the October 2, 2009 supplemental report, completed with updated wildlife data from MOE, includes the proposed transmission line corridor.

MOE expressed the view that the potential effects of the construction of the transmission line on wildlife is not described and cited the example of loss of designated Ungulate Winter Range (UWR) as a focus of concern. The EAO reviewed the information provided in the Application with regard to the UWR with respect to mule deer. The potential loss of designated mule deer UWR within the ROW represents less than 1 percent of the winter range available in the transmission line RSA. Not all of this UWR is forested and therefore will be minimally affected by ROW clearing. Also, during construction there are opportunities to modify the actual alignment in certain areas such that lower value habitats (immature and non-forested habitats) can be utilized. Mitigation measures are already outlined in Section 6.3.2.4 page 6-59 of the Application. The Proponent has determined that effects of the transmission line are local, small in scale and reversible at decommissioning. Further, MOE may consider the adequacy of mitigation measures with respect to any exemptions from the UWR (*Government Actions Regulations*) and additional surveys as per the *Wildlife Act*.

Habitat Compensation

As indicated in the MOE Deputy Minister letter of 2006, MOE requested compensation for the fish population, fish habitat, the productive capacity of the lake (Fish Lake), recreational values, wildlife, wildlife habitat, and the habitat of species at risk that may be adversely affected should the proposed Project proceed as planned. Further, MOE indicated that the Proponent be responsible for designing a program of compensation that is adequate to fully offset the effects of mine development. The CWS expressed interest in habitat compensation for migratory birds, and submitted data to characterize local population effects for dabbling ducks and diving ducks in late October. With respect to wildlife, the Proponent has committed to develop and implement a plan for achieving compensation for adverse effects to wetland habitat, recreation values, wildlife, wildlife habitat and the critical habitat of species at risk taking into consideration the effectiveness of mitigation measures. The Proponent has confirmed that this commitment addresses all proposed Project impacts, including any impacts outside of the direct effects disturbance area, such as lower Fish Creek. The need for compensation would be determined on a case by case basis based on the appropriateness of each proposed compensation measure. The process by which a determination of impact is reached would be transparent, readily understood, and undertaken in consultation with MOE, CWS, and First Nations (commitment 11.1). Further, the Proponent would work with MOE officials in a timely manner to develop a "Reference Document" in which details concerning roles and responsibilities, timing and strategies for implementation of the plan outlined in 11.1 would be detailed (commitment 11.2).

MOE has expressed concern that a commitment to wildlife compensation should provide more certainty with respect to scheduling, planning and coordinating delivery of compensation measures. CWS has stated it requires further information in a commitment to set out the scope, goals and objectives; measures to identify impacts and potential compensation initiatives. EAO notes that commitment 11.1 reflects the requirements in the 2006 MOE Deputy Minister letter and that commitment 11.2 to develop a "reference document" would provide further information with respect to the agencies requirements.

5.8.4 Conclusion

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.

5.9 Environmental and Operational Management Plans

The Environmental Management Plans provide guidance on all environmental aspects during construction, operations and decommissioning phases. They convert the proposed environmental assessment mitigation measures into actions that are intended to minimize and, if possible, eliminate environmental impacts associated with the proposed Project.

The Proponent has committed to developing 15 Environmental Management Plans that would be developed in consultation with regulatory agencies and First Nations:

- Environmental Management Plan for Construction Phase
- Transportation and Access Management
- Mine Materials Management Plan
- Tailings Impoundment Operating Plan
- Geotechnical Stability Monitoring Plan
- Concentrate Load-out Facility Operating Plan
- Materials Handling and Waste Management Plan
- Emergency Response Plan
- Air Quality and Noise Management Plan
- Water Management Plan
- Erosion Control and Sediment Retention Plan
- Vegetation and Wildlife Management Plan
- Cultural and Heritage Protection Plan
- Occupational Health and Safety Plan
- Reclamation and Decommissioning Plan

6 Economic Effects

6.1 Economic Issues[19]

6.1.1 Background Information

The Local Study Area (LSA) and Regional Study Area (RSA) are described in Table 2.

Key economic issues concern employment, income, government finances and regional economic development. The proposed Project would be expected to result in economic effects at the local and regional scale during construction, operations and decommissioning. The EA also considers proposed Project effects on current economic drivers, such as tourism and non-resident hunting.

Economic conditions in the RSA are typical of the rural British Columbia economy with a heavy dependence on activities producing various resource related goods for employment, incomes, and overall community wealth and stability. More than one third of the RSA and LSA labour forces are engaged in primary or manufacturing activities, compared to 21 percent of the provincial labour force. The regional labour market revolves around these activities and is characterized by high levels of trade and technical workers and lower levels of "white collar" and service industry workers. Unemployment in the Cariboo region was 6.8 percent in 2008 compared to the provincial average of 4.6 percent. Data from BCStats for November 2009 indicates the unemployment rate increased to 12.0 percent, compared to the provincial average of 7.4 percent for the same month. Unemployment rates for First Nations' populations were three times the provincial average in 2007.

Overall, the region is highly dependent on the forest industry. This dependency extends not just to employment and incomes, but to all areas of the economy, including government finances. The Cariboo-Chilcotin Region is one of the most forest-dependent of the province and, while forestry is currently buoyed by increases in the Crown timber supply as a result of salvage and control logging due to the MPB epidemic, forestry's share of future employment and the region's economic base are expected to decline.

The provincial peak of MPB infestation was 2004, with the Quesnel and Williams Lake Forest Districts hardest hit. As of 2008, 46 percent of the merchantable pine volume in

[19] The EAO received a copy of the Stokes Report ("The Economic Impacts of the Prosperity Mine on British Columbia" dated April 2009) on July 21, 2009 with economic data for the proposed Project which differed from the information in the Application. Since this report was not received with the Application nor reviewed as part of the public comment period on the Application, the information in that report was not included herein. The EAO requested data from the Proponent to update the information in the Application and received information that was later recanted by the Proponent. Throughout the Report EAO has used economic data provided by the Proponent in the Application.

the province had already been killed. Projections indicate that 70 percent of this provincial pine volume will be killed by 2017[20]. Based on these projections, the forestry industry will be experiencing hardship and unemployment when the proposed Project would be in its first few years of operation, should the proposed Project receive approval. Federal and provincial governments have been investing in geosciences information to encourage mineral exploration and mining in the epidemic area[21]. While replanting is underway in affected regions, the forest benefit of these efforts will not be realized for several decades. If approved, the proposed Project could offer timely long-term (20 to 23 years) employment to displaced forestry workers in the region.

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

Labour Market

The proposed Project would require approximately 375 direct person years annually during the construction and operations phases To increase the labour market benefits to the local region for the proposed Project, the Proponent would look at the following: local hiring policies, providing education and training opportunities, local procurement policies, and working with First Nations. The proposed Project effect on direct and indirect employment would be positive and significant.

Employment Income

The proposed Project would result in an increase in local construction employment income within the LSA for the construction phase of 24 months. During operations the proposed Project's annual payroll is expected to be $32; $29 M of which would be paid locally. Spin-off income (indirect income) is expected as a result of local purchases for operational activities and spending associated with the mine workforce.

Wages during operations would be more than twice the average personal income in the RSA. Currently, the local average employment income is $37,500, compared to the average employment incomes for the proposed Project of $82,428 and $93,800[22] for

[20] Provincial-Level Projection of the Current Mountain Pine Beetle Outbreak: Update of the infestation projection based on the 2008 Provincial Aerial Overview of Forest Health and revisions to the "Model" (BCMPB.v6). May 26, 2009. BC Forest Service. http://www.for.gov.bc.ca/hre/bcmpb/BCMPB.v6.BeetleProjection.Update.pdf

[21] Mountain Pine Beetle: Sustaining Communities for the Future. September 2007. www.gov.bc.ca/pinebeetle

[22] These wage figures have been updated by the Proponent based upon "The Mining Industry in British Columbia in 2008, Appendix 17".

construction and operations incomes respectively, with an average of an additional $19,000 in benefits.

To maximize local employment income the Proponent would undertake partnership training opportunities, recruit local workers and provide flexible employment policies.

Government Revenues

During construction and operations, sales tax and consumption tax revenues would be generated by the workforce and by the Proponent. After the start of operations, government revenues would include property tax at the mine site, mining taxes and corporate business taxes. A portion of all of these revenues would flow back to the study area through government programs spending.

The proposed Project is anticipated to generate $340 M in GDP annually. The Application notes that this is larger than the province's film and television industry and three times larger than the entire output of the fishing industry. Overall, the proposed Project would generate average annual government revenues of $26.2 M during construction and $48.4 M during operations.

As the proposed Project effects on government revenue would be significant and positive, no mitigation is required.

Regional Economic Development

The proposed Project would help diversify the economic base of the LSA and the RSA and create new opportunities for contractors and suppliers. As the service center for the Cariboo, Williams Lake is likely to be the major beneficiary. Initial capital investment expenditures would be $800 M. Companies in the RSA are expected to supply $32.7 M in goods and supplies, with another $21.8 M accruing to local labour in the construction phase of the proposed Project. Total purchases would be in the $100 to $112 M range annually. Of this total, 20 to $22 M of this investment would go to suppliers and businesses in the RSA. As proposed operations reach a peak, it is possible that other economic development benefits may arise through the placement of new infrastructure for other value-added services, such as improved roads.

To facilitate the participation of local businesses and individuals in contracting for the proposed Project, the Proponent commits in the Application to:

- consider local and regional capabilities when developing contract scope;
- include local suppliers and contractors in its corporate database;
- expect contractors and suppliers to invest in local community success through their purchasing, hiring, subcontracting, and support practices; and,

- work with local and regional economic development offices.

The proposed Project may partially offset lost contract and supply opportunities due to downturn in the economic activity resulting from MPB. The proposed Project would have a significant and positive effect on regional economic development.

Tourism

Tourism, described as commercial activities other than fishing or hunting purchased by non-residents, consists mostly of fresh water fishing, guide outfitting and adventure tourism in the Chilcotin area. The LSA has 18 accommodation providers and there are another 30 adventure tourism outfits in the RSA. Local wilderness lodges and other tourism businesses dominate the local economy and employment. Estimates for the economic effects of RSA tourism in 2005 include room revenues ($23.6 M), total visitor spending ($130 M), employment (2,345 person years), employment income ($56.9 M), and government revenues ($47.8 M).

While loss of tenure area, air quality effects, visual quality effects, and noise may result in reduced use, there is not expected to be an adverse effect on tourism in a regional context. Positive effects of the proposed Project would include road improvements and the potential for increased mine-related business that could result in increased revenues for operators in the LSA, particularly in the tourism off-season.

Proposed mitigation includes discussions with commercial recreation licensees and tourism operators to mitigate effects to noise, atmospheric environment and to proposed Project-related transportation effects. In terms of proposed Project benefits, procurement agreements would be considered with local area operators for accommodation, food and beverage.

Hunting

The proposed Project area is used increasingly for non-resident hunting, which can benefit the regional economy. While the proposed Project overlaps with eight registered guide outfitter tenures, tenure loss is estimated to be less than one percent. Proposed Project mitigation would include consultation and development of measures to minimize effects to outfitters and game.

Summary of Effects on Economic Issues

The proposed Project is expected to result in positive economic effects at the local, regional and national scales during construction, operations and closure owing to capital and operating expenditures on labour, materials, equipment, supplies, and services. The demand for labour would be substantial during construction and operations and increase employment and income in the local economy. Government revenues would

increase through income, consumption, and property taxes payable by the proposed Project and its employees. Benefits to suppliers and contractors would be expected as the mine purchases goods and services on an ongoing basis.

Based on existing economic data for the region, employment, employment income, government expenditures, and regional economic development over the next 30 years are not expected to be substantially changed by baseline resources such as ranching, tourism, trapping and gravel production. However, logging is expected to change substantially from current levels, due to the effects of the MPB infestation. As harvest levels are reduced below current levels, the labour market, incomes, government finances, and regional economic development will all be adversely affected. The proposed Project could potentially mitigate these existing economic projections by absorbing extra labour, increasing incomes, government revenues, and regional expenditures.

Summary of Mitigation Proposed in the Application

As the economic effects of the proposed Project would be beneficial at both the local, regional and national scales, the Proponent would implement policies to maximize the benefits to local labour and economic development. Maximizing local economic benefits would involve working with local economic development agencies, municipalities, First Nations' communities, and human resource organizations responsible for labour-related issues to ensure that hiring, training, procurement and business development policies give full opportunity and encouragement to the resident work force and business base.

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

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

Working Group member's comments included concerns about labour force participation, the contribution of traditional activities to employment income, and continued monitoring of economic issues.

6.1.4 Conclusion

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 local, regional, and provincial economies.

7 Social Effects

7.1 Social Issues

7.1.1 Background Information

The Local Study Area (LSA) and Regional Study Area (RSA) for social issues are described in Table 2.

For analysis of First Nations' issues, the LSA is the asserted traditional territories of the Tsilhqot'in Nation and the RSA incorporates the asserted traditional territories of the Upper Secwepemc Nation.

The Application addresses changes in population structure, workforce settlement and housing, transportation needs and traffic, and community services. The community services identified for consideration are commercial, retail and industrial services, recreation, basic infrastructure (water, sewer, and transportation), police, fire, justice, and education.

The economy in the LSA is heavily dependent on production of resource related goods. The seasonal and cyclical nature of these industries leads to fluctuating economic activity, population levels, and demand for social services. The RSA is largely rural, sparsely populated with several small settlements and has Williams Lake as the regional service center. The MPB epidemic is expected to shift the region's economic base and employment opportunities.

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

Population

Both the LSA and the RSA have experienced negative net migration over the past five years, returning population levels to those of 1986 and countering growth that occurred in the late 1990s. In 2006, the populations of the LSA and the RSA were 26,918 and 62,190 respectively. On-reserve population has declined from 2,971 in 2001 to 2,239 in 2006, while combined off-reserve and on-reserve aboriginal populations have increased to 5,761.

The proposed Project is expected to increase the population by 5.5 to 6 percent annually during years 3 to 14 of operations, returning population levels to those experienced in the early 2000s.

Workforce Settlement and Housing

Vacancy rates for rental accommodations in 2009 were 9.5%[23]. The proposed Project is anticipated to create demand for approximately 200 housing units in the construction phase, increasing to almost 500 in year one, maintaining over 600 units from years 5 to 10 and decreasing to 200 by year 20. Current data indicates that there are 800 rental housing units available[24]. The Application notes that it is difficult to predict supply potential as there are unknowns such as the capacity of the region's construction sector, the amount of housing accrued to on-reserve communities, and competition with the current rental market. To manage potential housing pressures the Proponent committed to the following in the Application:

- Working with the CRD, City of Williams Lake, local communities, and the local real estate industry to anticipate, quantify and monitor housing demand and potential supply.
- Alerting and informing landlords and other accommodation suppliers in local communities to anticipate demand for short-term rental units to facilitate settlement.
- Assisting in establishing a housing placement service for all new employees.

Transportation and Traffic

The total road distance from Williams Lake to the mine site is 194 km, which takes approximately three hours under present road conditions. The Proponent would widen 19.4 km of 4500 Road from 5 to 8 meters and add turnouts. An access road to the proposed Project would be built 2.8 km long and 5 m wide. Further, the concentrate load-out facility would be reconfigured within the same footprint to accommodate the additional 195 rail cars monthly.

On all other road networks, the projected traffic as a result of the proposed Project would be well under the carrying capacity of local road networks. Highway 97 from Cache Creek to Prince George is currently being upgraded by the Ministry of Transportation and Highways.

[23] These vacancy and rental unit figures have been updated by the Proponent based upon data provided by the Canadian Mortgage and Housing Corporation, December 2009

[24] Ibid.

Mitigation also includes design of a traffic management strategy which would include bussing employees, minimizing on-site parking, scheduling proposed Project traffic to avoid peak periods, ensuring proper signage, radio controlling trucks and buses, monitoring road conditions, providing regular reports to drivers, and ensuring truck drivers have safe driving records.

Community Services

Services such as police, fire, education, social services, recreation, infrastructure, justice, commercial, retail, and industrial services are expected to undergo increased demand with increased population. While in First Nations communities there are already stresses on community infrastructure, this growth would offset negative growth that has occurred between 2001 and 2007. This growth would also potentially buffer the effects of the MPB epidemic on the Williams Lake area. The proposed Project is expected to increase demand for services by approximately 3.5 percent during mine operations in years 3 to 10 and less in other years.

It is anticipated that there would be positive effects on community services, such as an increase in school-aged children to counter trends of decreasing enrolment. The Proponent would encourage employees to live in Williams Lake to minimize localized effects on small rural communities.

Community and Health Services

Hospital and medical, emergency, and social services would be affected by increased populations. In addition, proposed Project employment conditions such as high incomes and extended shift work may contribute to increased risk behaviour of workers. There are pressures on certain components of the health care system, such as drug and alcohol treatment and on-reserve addiction counsellors. These pressures are more deeply felt in rural areas as compared to Williams Lake. It is anticipated that the proposed Project-related increase in demand for services would coincide with the opposite effect due to closure of two mines and the loss of forest manufacturing capacity in Williams Lake.

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

During Application Review, Working Group members provided a series of comments regarding Social Effects, specifically relating to:

Use of Drugs and Alcohol in Communities

Esketemc First Nation members expressed concerns about an increase in drug and alcohol use in neighbouring communities. The proposed Project site would be a dry

camp (drug and alcohol free) and the Proponent has discussed working with Esketemc First Nation on programs that would minimize the use of drugs and alcohol in these communities.

Loss of Fish Creek Watershed Fishery

While there are no commercial recreation tenures at Fish Lake, the proposed Project would eliminate recreational and guided sports fishing at Fish Lake and the associated fishery.

Fish Lake ranked 55 out of 116 Cariboo-Chilcotin fishing lakes in terms of annual angling effort during the late 1980s and early 1990s. During this time period, the lake supported an estimated 388 to 653 angler days, compared to a regional lake average of 904. While Fish Lake has regular but low use, it is distinctive for its high elevation setting and remote location. The loss of Fish Lake, however, is not anticipated to have an effect on sport fishing overall in the RSA as the total fish effort and catch represented by Fish Lake is minor (0.4 percent of RSA angler effort) and displaced activity could be absorbed by other area lakes.

Proponent mitigation and compensation, which would include the creation of Prosperity Lake and associated stream habitat, should increase opportunities for First Nations' fisheries and anglers. However, there would be a time lag of between five to seven years until Prosperity Lake would be available to these users. During this time, the Proponent would transplant fish from Fish Lake to recipient lakes in the area to provide angling opportunities. Little Fish Lake would also be available for angling at this time. Stocking of the recipient lakes would continue until such time as Prosperity Lake provides a trout fishery of at least a similar character to what is supported by Fish Lake under current conditions, and as defined by the performance measures in the December 4, Fisheries Compensation Plan memo. Additionally, the Proponent would institute fishing and hunting bans for contractors and mine employees to protect stocks from over exploitation.

Loss of Fish Lake recreation site

Key issues for public recreation are the loss of Fish Lake and the adjoining recreation site, as well as changes in the quality of recreational activities as a result of the proposed Project. While this site would no longer be available, the proposed Project effects on recreation and tourism on a regional scale would be negligible in terms of land use due to the abundance of recreation sites and wilderness areas in the RSA. Analysis using Visual Quality Objectives determined that the TSF, the most visible feature of the mine site, would not be visible for the large majority of recreation use sites.

To mitigate the impacts on public recreation, the Proponent may include on-site housing and bus transportation for all employees to limit their motorized recreational activity in the LSA.

Trapping

While the economic value from trapping in the RSA and LSA is small, it is an important recreational activity for those involved. While the entire proposed Project footprint is covered by trapline tenures, the Proponent would not anticipate effects on furbearers in the LSA and RSA.

The Proponent would impose a hunting ban for mine employees and work with affected trappers on relocation of traplines or other management strategies.

7.1.4 Conclusion

While the loss of Fish Lake and associated recreation site would have adverse effects on a local scale, there are nearby areas to absorb that recreational activity.

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 social effects.

8 Heritage Effects

8.1 Archaeological and Heritage Resources

8.1.1 Background Information

The Local Study Area (LSA) is the proposed 3,476.5 ha maximum disturbance area of the mine site, or roughly the Fish Lake catchment area, as described in Table 2. Archaeological sites commonly found within the Montane Spruce and sub-Boreal Pine-Spruce Biogeoclimatic Zones reflect a nomadic, hunter-gatherer existence.

Two previous archaeological field studies, a data gap analysis and work plan, as well as a data gap review, have been carried out in support of the proposed Project. In 1993, 16 archaeological sites were documented within the mine site, and two were recorded at nearby Wasp Lake. In 1994, the Proponent produced a report detailing the ethnographic and ethnohistoric significance of Fish Lake. Further field work was done in 1998 in advance of the excavation of proposed test pit sites and geotechnical drill hole sites. At that time, the Archaeology Branch and EAO identified gaps in this work and devised a plan for further work. Three additional Archaeological Overview Assessment studies funded by the Ministry of Forests have included the mine

development area. In 2006, a second review of all related studies, documents and data gaps was commissioned by the Proponent. Previous to this study, 16 recorded sites were located within the mine development area and four recorded sites were known to be within the 500 m wide transmission line route.

The latest field work performed by Terra Archaeology in the summer and fall of 2006 and 2007 included surface examination, shovel tests, and the excavation of evaluation units. A total of 15,882 shovel tests and five evaluation units were excavated within the study area. This resulted in the identification of 69 newly identified pre-1846 archaeological sites, the reassessment of 10 previously recorded pre-1846 sites, identification of 34 post-1846 Culturally Modified Trees, and the identification of nine historic cabins, four historic corrals, and one historic fence. Of the 79 protected sites identified, a lithic component was found at 73 of the sites, subsistence or habitation features were identified at 21 of the sites, a faunal component was identified at 10 of the sites, and a single potential historic human burial was identified at one of the sites. Cross-dating and information provided by First Nations' communities suggest the continual use of the Fish Lake locality from approximately 5,500 BP[25] to present.

The RSA is the Chilcotin Forest District. In 1998, a report outlining the archaeological and ethnographical background of the area identified 811 sites in the RSA. By 2007, the Remote Access to Archaeological Data site inventory system listed 1,139 registered sites within the Chilcotin Forest District.

In 1993, nine sites were identified within the 3 km transmission line corridor. In 2006/07, a 250 m buffer was established on either side of an arbitrarily chosen center line, which defined the LSA. The four sites within this buffer were mapped and a preliminary center line was chosen so as to avoid all critical habitat features and known archaeological sites.

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

A scientific significance ranking system was developed for mitigating proposed Project impacts for archaeological effects. This system takes into account the projected subsurface density of lithics and the presence of archaeological features or artefact types. Thirty-nine (49 percent) of the sites identified were assessed as having low scientific value. This value is assigned to traits with an extremely small site area, lack of archaeological features, absent or negligible subsurface artefacts and/or an absence of diagnostic artefacts or formed tools. Twenty-nine (37 percent) of the pre-1846 archaeological sites were assessed as having moderate scientific significance. This

[25] Before Present (BP) years is a time scale used in archaeology, geology, and other scientific disciplines to specify when events in the past occurred. 5500 is roughly 3550 BC.

value is assigned to sites with a confirmed or expected presence of stratified cultural deposits or sites which include subsistence features and/or an artefact component in which diagnostic artefacts or formed tools have been identified. Eleven (14 percent) of the pre-1846 sites were assessed as having high scientific value. High significance rating was assigned to any site with a habitation feature, human remains, or a combination of multiple site components indicating varied or prolonged site usage and additional work may be considered appropriate.

Summary of Mitigation Proposed in the Application

Mitigation refers to the measures that reduce the deleterious effects of proposed Project construction, operation, and maintenance on archaeological values. Various options include avoidance through changes in proposed Project design, the implementation of site protections measures, and systematic data recovery.

No further study is proposed for the sites identified as having low scientific value. Of the 29 archaeological sites considered to have moderate scientific significance, 5 can be avoided. Small scale archaeological investigation is recommended for an additional 16 of these sites. No investigation is recommended for the remaining eight, based on detailed review of these sites.

Eleven archaeological sites were considered to have high archaeological significance. Seven of these eleven can be avoided. Additional study is recommended for the remaining four sites.

As part of final design and before the transmission line is built, the Proponent would undertake an Archaeological Investigation Assessment of a 30 to 80 m ROW along the preliminary center line of the transmission line. As part of the *Heritage Conservation Act* permit application, all sites within 1500 m of this ROW corridor were mapped. There are 31 previously recorded archaeological sites within 1500 m of the corridor and two that are within 250 m of the corridor. It is expected that during the final design phase, alignment and placement of the poles can be adjusted to avoid any conflict with identified and recorded archaeological sites.

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

During the review of the Application, additional issues were raised by the MTCA and First Nations. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix B. Key issues and responses include the following:

Compensation for the Loss or Disturbance of Archaeological Sites

The MTCA commented that compensation for the loss or disturbance of all 79 protected archaeological sites should include systematic excavation of 16 sites, a survey of drained Fish Lake basin for paleo-environmental data, and lithic sourcing (ITT #2). The Proponent responded to these concerns by adding commitments to excavate 16 of the 79 sites, complete a survey of the lake basin, investigate lithic sourcing (24.2), and to complete an Archaeological Impact Assessment (AIA) for the transmission line (24.3) and the new access road (24.4).

Impacts along the Transmission line

The MTCA requested that an AIA be completed for the transmission line corridor before its construction (ITT #10). The Proponent has committed to completing an AIA along the transmission line (commitment 24.3) and along the proposed 2.8 km of new road (commitment 24.4).

8.1.4 Conclusion

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 archaeological and heritage resources.

9 Health Effects

9.1 Human Health

9.1.1 Background Information

The KI considered in this assessment are chemical risks to human health and risks to ecological health. Wildlife and vegetation KI were chosen for assessment of ecological health on the basis of their importance as country foods to First Nations and local hunters and trappers.

Potential effects on human and ecological health specifically related to exposure to aerial emissions and water discharges from the proposed Project were examined. A considerable amount of baseline data on metal concentrations in soil, sediment, water and vegetation has been collected over the past decade at the mine site. All baseline soil, water and sediment concentrations of the inorganic elements were below their respective guidelines in the proposed Project area, with the exception of boron in soil. It is unlikely that human receptors would be in direct contact with these environmental

media in levels that exceed contaminated site guidelines. As a result, country foods were the focus of the human health assessment. Country foods selected for study included moose, muskrat, rainbow trout, bull trout, mountain whitefish, willow ptarmigan, and Labrador tea.

The Local Study Area (LSA) and the Regional Study Area (RSA) for the human health and ecological health assessments can be found in Table 2. For the ecological risk assessment, the RSA includes the home ranges of the key receptor species. Further details on these RSA can be found in the wildlife section.

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

There are three key issues associated with the proposed mine that have the potential to change the chemical environment and impact human health:

- Emissions of Criteria Air Contaminants (CAC) from proposed Project activities have the potential to affect human health.
- Deposition of inorganic elements on soil from releases from mining activity would have the potential to increase soil metal concentrations and affect country foods for human consumption and ecological health.
- Release, seepage or discharge of groundwater and surface water and associated metals to watershed post-closure have the potential to increase the metal body burden of fish tissue and thus potentially affect human health and ecological receptors through consumption.

Summary of Effects on Human Health

Air Quality

The operations of a diesel generator and heavy machinery both have the potential to affect air quality and subsequently human health throughout the life of the proposed Project. Pre-production site preparation, the clearing of overburden, and activities related to open pit mining (such as blasting, ore crushing, conveyance, processing, and stockpiling) all have the potential to increase dust load and soil metal concentrations.

Vehicular traffic on access roads would emit dust, particulates and other chemicals from combustion engines, but this effect would be expected to affect air quality only immediately adjacent to the roads.

Although levels of CAC would be expected to increase in the Nemiah Valley through the construction and operations phases of the proposed Project, these levels would remain

well below background concentrations. The Proponent submitted in the Application that emissions effects would be relatively minor.

Drinking Water

During post-closure, controlled discharge from the flooded pit to lower Fish Creek and the Taseko River would alter water chemistry and the tissue concentrations of fish in these water bodies and potentially affect receptors that consume these fish. Surface water concentrations would be expected to be below drinking water quality objectives, with the exception of antimony in lower Fish Creek. As local harvesters may use water bodies only occasionally for drinking water, it is anticipated that this would not have an effect on human health.

Country Foods

As mentioned above, several pre-production and operational activities have the potential to increase soil metal concentrations.

Metal loading was evaluated for arsenic, boron, chromium and copper for the consumption of vegetation, willow ptarmigan, muskrat, and moose. Although soil concentrations of boron and copper are expected to increase above soil quality guidelines, the predicted levels in country food species are anticipated to be below health guidelines for both baseline and operations phases of the proposed Project. Boron in vegetation currently exceeds guidelines under existing soil conditions in the LSA. Metal loadings during the operations phase are minor and would only slightly increase these levels. The Proponent determined in the Application that the potential risk to humans would be no greater than the baseline conditions.

Fish Tissue

Concentrations of metals in fish tissue would have the potential to increase at post-closure with the discharge of water from the pit to lower Fish Creek and to the Taseko River. Arsenic, chromium, copper and selenium concentrations would be anticipated in fish tissue. While there is little change between baseline risk from consumption of fish in the LSA and those caught in the Taseko River, it was determined that the consumption of fish from lower Fish Creek would result in a potential effect on human health. A significant adverse effect on human health is not expected as the increase in the concentrations of metals in fish tissue would be so minimal that a person would have to eat 40 meals of fish caught at this location per 60 day period to exceed health guidelines.

Summary of Mitigation Proposed in the Application

No health specific mitigation is proposed in the Application beyond that proposed in the air quality, water quality, and terrain and soils sections of the Application. The Proponent would implement a monitoring plan for metal concentrations in soils, local surface water and vegetation throughout the proposed Project.

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

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

Water quality effects on country foods

Health Canada commented that water quality at the TSF and flooded pit may be an issue as wildlife that may be drinking from these sources may be eaten as country foods. The Proponent responded that wildlife would likely not have an increased body burden of metals as these metals would not accumulate and there are many alternative water sources in the area, making it unlikely that wildlife would consume enough water to lead to these results (ITT #3).

First Nations' fish consumption

Health Canada questioned the quantity estimates used for fish that members of Xeni Gwet'in may be consuming. Health Canada remarked that as these numbers were based on Tahltan studies they may be too low. The Proponent responded that they found it unlikely that Xeni Gwet'in would consume the modelled amount of fish from the two mixing points in lower Fish Creek in one year (40 meals during a 60 day period for adults).

9.1.4 Conclusion

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 human health.

9.2 Healthy Living

9.2.1 Background Information

The Government of British Columbia has a goal of leading the way in North America in healthy living and fitness. There are many factors affecting healthy living and fitness,

however three key factors that are considered with respect to the proposed Project are environmental health, health education and sports/physical activity. Environmental health issues are addressed in Section 9 of this Report, therefore this section focuses on how the proposed Project would contribute to:

- enabling or enhancing physical activities and fitness; and,
- health education of people that would be employed at the proposed Project.

Of particular concern in connection with the proposed Project are the likely implications, if any, for the continuation and expansion of opportunities for physical activity and various recreational pursuits in the vicinity of the proposed Project. Such opportunities would apply to anyone using or visiting the area in general, as well as workers employed at the proposed Project.

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

The Application describes public use of the lands near to the site of the proposed Project as including recreational activities such as hunting, fishing, kayaking, canoeing, rafting, mountain biking, and backpacking. The Proponent considered the potential for impacts on these activities and found that although these activities would be curtailed at the mine site during operations and with the destruction of Fish Lake and the associated recreation site, there are many other well-used recreation areas in the Taseko River watershed.

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

The assessment process revealed that the impact on public use of the land for recreational activities would be high magnitude but with a small geographic extent.

Consideration was also given to whether there might be opportunities to promote the expansion of existing levels of activities in the region. The creation of Prosperity Lake as compensation for the loss of Fish Lake would create additional fishing opportunities in the area. Generally, the Proponent determined that an increase in recreational activities by employees might hamper First Nations' opportunities for fishing and hunting in the region.

In response to questions about how physical activity levels might be improved through design of the proposed Project, the Proponent discussed the potential creation of recreational facilities such as squash or tennis courts on-site. Additionally, the Proponent expressed a desire to create an opportunity for camp food services that serve healthy meals.

9.2.4 Conclusion

As the Proponent plans to operate a dry camp, and provide recreational facilities and healthy food options for employees, it is determined that the proposed Project would support healthy living and there would not be any significant adverse effects on healthy living.

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 healthy living.

PART C – First Nations Consultation Report

10 First Nations Consultation Report

10.1 First Nations' setting

The proposed Project is located within the asserted traditional territories of the following First Nations:

Secwepemc

- Soda Creek Indian Band
- Esketemc First Nation
- High Bar Indian Band
- Canoe Creek Indian Band
- Williams Lake Indian Bands

Tsilhqot'in

- Xeni Gwet'in First Nation
- Stone Indian Band
- Toosey Indian Band
- Alexis Creek Indian Band
- Anaham Indian Band
- Alexandria Indian Band (?Esdilagh)
- Tsilhqot'in people who are members of the Ulkatcho Indian Band

The Xeni Gwet'in, Stone, Alexis Creek and Alexandria are, to the best of EAO's knowledge, represented by the TNG.

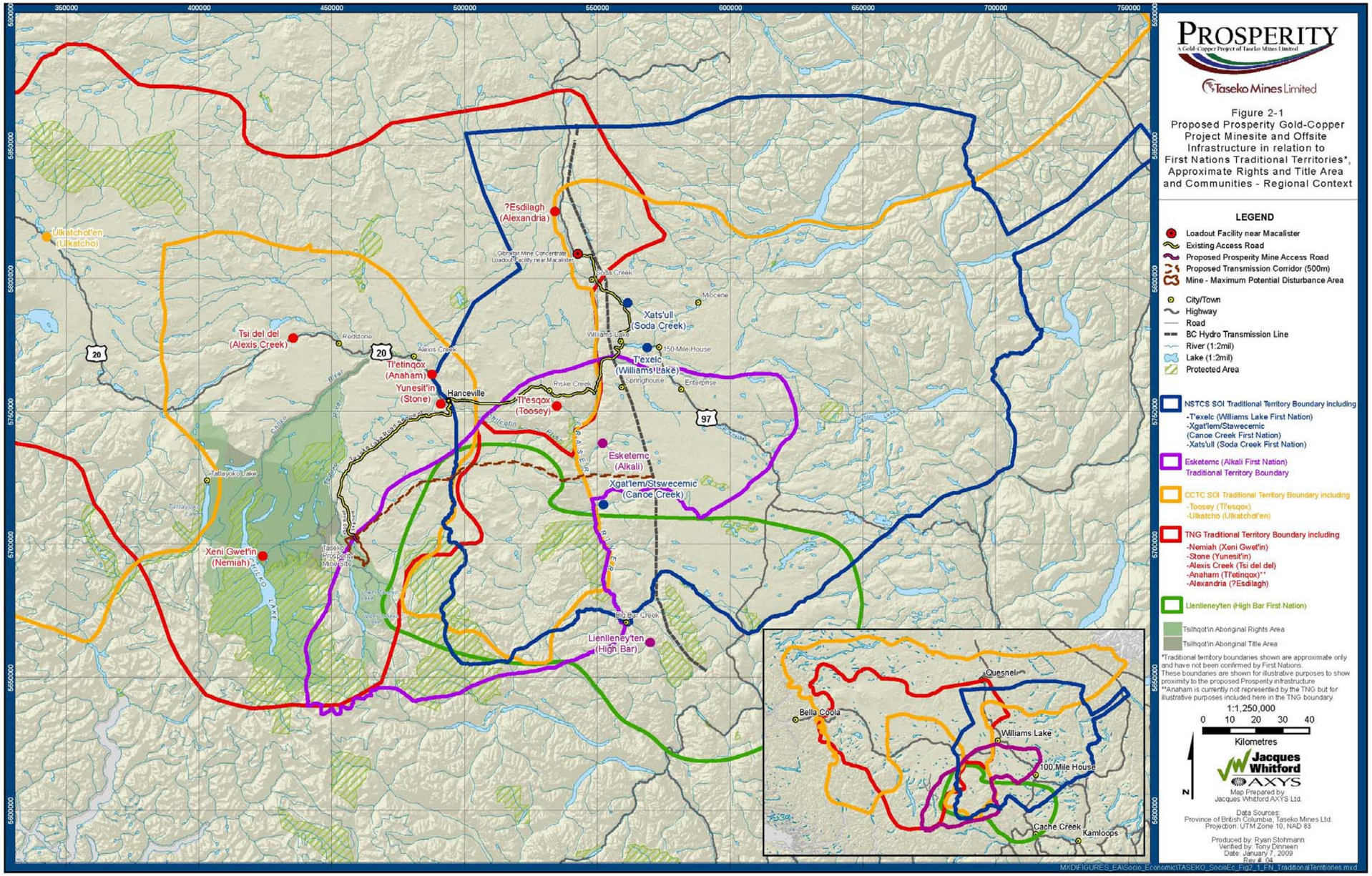
This report is structured in two parts to reflect the distinct ethnography of the Secwepemc and Tsilhqot'in Nations. The table below from the Proponent's Application for an EA Certificate identifies the proposed Project components and how they may or may not relate to potentially affected First Nations. This table is helpful in understanding the proximity of First Nation communities in relation to the main components of the proposed Project; however, EAO understands that the Tsilhqot'in

Table 7: Proposed Project Components and First Nations' Traditional Territories

First Nation	Mine Site	Transmission Line	Access Road & Transportation Corridor	Concentrate Loading Facility	Fish Compensation Works
Tsilhqot'in					
Xeni Gwet'in (Nemiah)	X	X	X		X
Yunesit'in (Stone)	X	X	X		X
Tsi Del Del (Alexis Creek)*					
Tl'etinqox-t'in (Anaham)			X		
?Esdilagh (Alexandria)			X	X	
Tl'esqox (Toosey)		X	X		
Ulkatcho*					
Secwepemc					
Xat'sull/Cmetem (Soda Creek)			X	X	
Esketemc (Alkali)	X	X	X		X
Llenlleney'ten (High Bar)		X			
Stswecem'c/Xgat'tem (Canoe Creek)		X			
T'exelcemc (Williams Lake)		X	X		

NOTE:
* The Traditional Territories of Tsi Del Del (Alexis Creek) and Ulkatcho are understood not to be geographically located within the Regional Study Area. However those communities include Tsilhqot'in persons who have aboriginal rights throughout the Tsilhqot'in Traditional Territory.

Figure 10: First Nations Traditional Areas Map for proposed Project



aboriginal rights are asserted and held at the Nation level and that, in the case of the Secwepemc First Nations, aboriginal rights may be asserted and held at the Nation level.

The five Secwepemc (Shuswap) communities with potential interest in the proposed Project are located east of the Fraser River both north and south of Williams Lake. Esketemc and Canoe Creek communities are located closest to the proposed transmission line route.

Tsilhqot'in communities are primarily located throughout the Chilcotin Plateau, west of the Fraser River, between Riske Creek (20 km west of Williams Lake) and the Coast

Mountains, except the Alexandria which is north of Williams Lake on the east side of the Fraser River. The closest Tsilhqot'in community to the proposed Project site is the Xeni Gwet'in. Approximately 200 Xeni Gwet'in members reside on reserves in the Nemiah Valley approximately 25 km from the proposed mine site (40 km by road).

Primary Information sources

Traditional knowledge and traditional use information contained within the Application was compiled primarily from two studies commissioned by the Proponent: the *Heritage Significance of the Fish Lake Study Area: Ethnography* (Xeni Gwet'in [Nemiah] and Yunesit'in [Stone]; 1994), and *An Overview of the Heritage Significance of the Proposed Power and Transportation Corridors Servicing the Fish Lake Project* (Stswecem'c [Canoe Creek/Dog Creek], Esketemc [Alkali Lake], and Yunesit'in [Stone]; 1995). These studies were designed in cooperation with the respective First Nation communities, and included participation from community members. The results of these studies, subsequent assessment, and consultation are contained in volume 8 of the Application and the Proponent's First Nations Consultation Report submitted to EAO on August 2, 2009.

The EAO took note of *Tsilhqot'in Nation v. British Columbia* (commonly known as the *William* decision) and reviewed the January 9, 2009 statement of claim in *Baptiste et al*. and subsequent July 14, 2009 reply. The parties to the *William* decision have filed notices of appeal at the British Columbia Court of Appeal.

The EAO was also guided by James Teit's comprehensive Shuswap ethnography published in 1908 which EAO understands to be the main source of information on pre- and early post contact Secwepemc.

The above records, plus information obtained during Working Group meetings, meetings directly with First Nations, comments submitted by First Nations, the

Proponent's responses, and subsequent information received during the Application review, were used in compiling this report.

10.2 Key issues and concerns identified by those First Nations that have asserted aboriginal rights (including title) to the area encompassed by the proposed Project

The Esketemc participated throughout the EA. Concerns raised relating generally to potential environmental, economic, health, heritage and social impacts are captured in the relevant chapters of the Assessment Report. A record of Esketemc concerns raised in the Application review, the Proponent's responses, and EAO's assessment of the adequacy of the responses is contained in the Issue Tracking Tables (Appendix B). Concerns raised during the review, or understood from available sources, regarding potential adverse impacts on asserted or proven aboriginal rights are addressed under section 10.3.1 below.

Key issues raised by Esketemc include:

- wildlife impacts along the transmission line, including habitat fragmentation;
- inadequate study of moose, bear, and wild horses on east side of Fraser River;
- increased access for hunters and poachers along the transmission line corridor;
- potential archaeological impacts along the transmission line;
- the quality and comprehensiveness of traditional use information used in the Application;
- inadequate cumulative effects assessment: logging, climate change and drought, risk to habitat in conjunction with the damage of the pine beetle;
- disturbance of sites of cultural and spiritual importance;
- potential increased pollution and contamination of waters and lands;
- potential impacts on the collection of plant food, berries and medicines;
- alternative transmission line routes;
- concern that bringing power to the region would result in increased development; and,
- concern that jobs from the proposed Project would not benefit First Nations.

The TNG provided a written submission to the Federal Panel on May 25, 2009 during the joint federal-provincial public comment period. The EAO has considered all concerns raised in that submission and has also reviewed subsequent correspondence from the TNG to the Federal Panel. Concerns raised relating generally to potential

environmental, economic, health, heritage and social impacts are captured in the relevant chapters of the Assessment Report. A record of Tsilhqot'in concerns raised in Application review, the Proponent's responses, and EAO's assessment of the adequacy of the responses is contained in the Issue Tracking Tables (Appendix B). Concerns raised during the review, or understood from available sources, regarding potential adverse impacts on asserted or proven aboriginal rights are addressed under section 10.4.1 below.

Key issues raised by the TNG include:

- the loss of Fish Lake (Teztan Biny);
  - Loss of the ability to fish at Fish Lake (Teztan Biny)
  - Fish Lake (Teztan Biny) is a sacred area for ceremonies
  - Potential loss of genetically unique species of rainbow trout
- potential impacts on fisheries throughout the Taseko, Chilko, Chilkotin and Fraser River watersheds (including impacts to salmon, steelhead and sturgeon);
- reliability of predictions of hydrology, hydrogeology and ML/ARD in the Application;
- potential impacts on water quality;
- potential contamination of plants and berries gathered by Tsilhqot'in people;
- lack of traditional use information in the Application and inadequate characterization of impacts on Tsilhqot'in people;
- increased access to the area (mine site, roads, and transmission corridor);
- long-term feasibility of mine;
- influx of money would have the potential to create issues of drugs and alcohol abuse;
- impacts to wildlife species of importance to the Tsilhqot'in due to habitat fragmentation, alienation of hunting grounds, and increased access of non-aboriginal hunters;
- bird mortality from collisions with the transmission line;
- concern that jobs from the proposed Project would not benefit First Nations; and,
- light and noise from the mine would impact residents of the Nemiah Valley.

No other First Nations chose to participate and/or submit comments for consideration in the Application review stage. Concerns raised by First Nations throughout the

Proponent's consultation are reflected in the Proponent's August 2, 2009 First Nations Consultation Report.

During the pre-Application stage of the EA, the Canoe Creek raised concerns including:

- increased access for hunters provided by the transmission corridor;
- limited archaeological work proposed along the transmission corridor;
- limited opportunities for Canoe Creek involvement in study design and execution;
- desire for a consultation protocol between EAO and Canoe Creek;
- the need for EAO to conduct a preliminary assessment of potential impacts to the exercise of rights; and,
- inconsistencies between the provincial Terms of Reference and federal EIS Guidelines.

10.3 Secwepemc

10.3.1 The specific identification of asserted aboriginal rights and the *prima facie* strength of those assertions, the degree of potential adverse impact on those rights, and EAO's view as to where on the *Haida* spectrum the proper consultative procedure should be located

The EAO sent letters to the Esketemc, Canoe Creek, Soda Creek, and Williams Lake bands (dated October 2008 to June 2009) outlining EAO's understanding of the asserted aboriginal rights that may be affected by the proposed Project. The EAO also set out its preliminary assessment in relation to these rights. The EAO requested clarification on whether and how Esketemc, Canoe Creek, Soda Creek, and Williams Lake members exercise Secwepemc asserted and established rights in the area that could be impacted by the proposed Project.

The EAO also requested that it be advised of:

- any additional aboriginal rights that might be affected by the proposed Project and that have not been described in the letters, or that were not properly described;
- any proposed Project-related areas that have particular significance with respect to the exercise of aboriginal rights; and,
- any areas that have a particular cultural, historical or spiritual significance, or any areas that EAO ought to be particularly mindful of, should the proposed Project proceed as presently planned.

No response was received from the Esketemc, Canoe Creek, Soda Creek, and Williams Lake bands clarifying or correcting EAO's understanding of the asserted aboriginal rights that may be affected by the proposed Project.

Despite uncertainty as to the nature and scope of claimed rights relative to the proposed Project area, EAO is of the view that in the case of all of the Secwepemc groups aside from Canoe Creek and Esketemc the required scope of the Province's duty to consult is at the lower end of the spectrum described in the Supreme Court of Canada's *Haida* decision; and that in the case of Canoe Creek and Esketemc the required scope is at a mid-point along that spectrum. The content of the consultation and accommodation that took place during the environmental assessment, when coupled with opportunities for government-to-government engagement on issues of aboriginal rights, far exceeded the required scope. Consultation and the accommodation measures that have been utilized or that are contemplated are detailed in section 10.3.2 below.

10.3.1.1 Canoe Creek

Hunting

The EAO acknowledges that the Shuswap people have an aboriginal right to hunt although the geographical extent of the area to which this right applies is unclear. It is not clear whether Canoe Creek members engage in this activity in the area that could be impacted by the proposed Project. In a letter dated October 6, 2008, EAO requested Canoe Creek's views in this respect but did not receive any clarification or details.

In any event, minimal impact on wildlife would be expected along the proposed Project transmission line. As further discussed in section 4.8.3 of this assessment report: the transmission line would cross large areas that have been previously disturbed; there would be minimal clearing needed in grasslands areas; flexibility in the placement of poles would be used to avoid sensitive wetland areas; and the Proponent has used information concerning where cut blocks and logging roads currently exist to guide the selection of the right-of-way such that it maximizes the use of existing disturbances and minimizes the need to construct new access or cut timber. Irrespective of EAO's conclusion of minimal potential effects to wildlife, specific accommodation measures including conducting additional pre-development wildlife surveys, avoidance of sensitive wildlife habitat, and wildlife habitat compensation are detailed in section 10.3.2 below. Consequently, no adverse impact on the ability of Canoe Creek members to hunt is anticipated.

Harvesting timber

Canoe Creek takes the position that it has a recognized right to harvest trees for domestic purposes. Whether the context is that of an asserted right or an established

right, it does not appear to EAO that the removal of timber as part of the construction of the transmission line right-of-way would have an adverse impact on timber harvesting activities in the Canoe Creek territory. In the letter dated October 6, 2008, EAO requested Canoe Creek's views in this respect but did not receive any clarification or details.

The Proponent has used information concerning where cut blocks and logging roads currently exist to guide the selection of the right-of-way such that it maximizes the use of existing disturbances and minimizes the need to construct new access or cut timber. Irrespective of EAO's conclusion of minimal potential effects to harvesting timber, specific accommodation measures including the use of previously disturbed areas, the avoidance of non-pine forests, and the use of existing access roads are detailed in section 10.3.2 below. Consequently, no adverse impact on the ability of Canoe Creek members to harvest trees is anticipated.

Fishing

The EAO acknowledges that Canoe Creek likely has a good to strong *prima facie* case in support of an aboriginal right to fish for food, social and ceremonial purposes, although the geographical extent of the area to which this right would apply is unclear.

The mine site and Fish Lake are located outside and west of what EAO understands to be Canoe Creek's asserted traditional territory. As outlined in section 5.4 of this assessment report, potential impacts to fish and fish habitat would be avoided along the proposed Project transmission line. Irrespective of EAO's conclusion of minimal potential effects to fish and fish habitat along the transmission line, specific accommodation measures including protecting vegetation within 30 meters of watercourses are detailed in section 10.3.2 below. Consequently, EAO does not anticipate that the proposed Project would have an adverse impact on fishing activities in the Canoe Creek territory.

Gathering Plants

No concerns were raised by Canoe Creek during the review regarding potential impacts on the ability to gather plants.

Minimal impact on vegetation is expected along the proposed Project transmission line. Potential impacts to vegetation are addressed in detail in section 4.6.3 of this Report; and potential effects of dust and contamination are addressed in sections 4.5.3 and 8.1.3 of this Report. Irrespective of EAO's conclusion of minimal potential effects to vegetation, specific accommodation measures including the maximizing the use of previously disturbed areas and developing a weed management strategy in consultation

with First Nations are discussed in section 10.3.2 below. Consequently, minimal impact on the ability to gather plants or on the availability of plants is anticipated.

Aboriginal title

The EAO understands that Canoe Creek asserts aboriginal title over much of the area encompassing the proposed Project transmission line. For purposes of the duties associated with the proposed Project, EAO acknowledges that a good to strong *prima facie* case exists in support of an aboriginal title claim to the general area of the Project transmission line's proposed crossing of the Fraser River. The EAO understands that the transmission line route as it runs east from the Fraser River is in an area that would, in the mid-1800s, have been associated with the Dog Creek band, the survivors of which merged with the Canoe Creek band. For purposes of the duties associated with the proposed Project, EAO therefore assumes that this area would also be one in which there exists a good to strong *prima facie* case in support of an aboriginal title claim. The EAO is not entirely clear as to the identity of the holder of any such aboriginal title and requested clarification from Canoe Creek but none was received.

In terms of the transmission line route west of the Fraser River, EAO accepts that prior to the middle of the nineteenth century the area as far west as Big Creek appears to have been within the traditional territory of the Secwepemc people. However, limited information is available in terms of the use and occupation of that area. For purposes of the duties associated with the Project, EAO accepts that there exists a *prima facie* case in support of an aboriginal title claim to the area (again, the holder of the right is not clear to EAO).

It is EAO's assessment that it is unlikely that the construction and operation of the transmission line would have any material adverse impact on Canoe Creek's aboriginal title to the area of the proposed Project or on the use of the area if aboriginal title were to be proven in the future. Further, the transmission line would be remediated and reclaimed at decommissioning so any impacts are reversible.

10.3.1.2 Esketemc

Hunting

The EAO acknowledges that the Shuswap people have an aboriginal right to hunt although the geographical extent of the area to which this right applies is unclear. Esketemc's June 29, 2009 submission to EAO indicates that Esketemc members hunt in the area potentially affected by the transmission line. Harvesting of moose and deer in the area east of the Fraser River is identified in the submission.

Minimal impact on wildlife would be expected along the proposed Project transmission line. As further discussed in section 4.8.3 of this assessment report: the transmission line would cross large areas that have been previously disturbed; there would be minimal clearing needed in grasslands areas; flexibility in the placement of poles would be used to avoid sensitive wetland areas; and the Proponent has used information concerning where cut blocks and logging roads currently exist to guide the selection of the right-of-way such that it maximizes the use of existing disturbances and minimizes the need to construct new access or cut timber. Irrespective of EAO's conclusion of minimal potential effects to wildlife, specific accommodation measures including conducting additional pre-development wildlife surveys, avoidance of sensitive wildlife habitat, and wildlife habitat compensation are detailed in section 10.3.2 below. Consequently, no adverse impact on the ability of Esketemc members to hunt is anticipated.

Harvesting timber

The EAO is not certain whether Esketemc asserts an aboriginal right to harvest timber in the area that could be impacted by the proposed Project, nor does EAO have information as to the purposes of such a right. In a letter dated November 24, 2008, EAO requested Esketemc's views on this but did not receive clarification. In any event it is not anticipated that the removal of timber as part of the construction of the transmission line right of way would have any adverse impact. Irrespective of EAO's conclusion of minimal potential effects to harvesting timber, specific accommodation measures including the use of previously disturbed areas, the avoidance of non-pine forests, and the use of existing access roads are detailed in section 10.3.2 below.

Fishing

The EAO is not certain whether Esketemc asserts an aboriginal right to fish in the area that could be impacted by the proposed Project. In a letter dated November 24, 2008, EAO requested Esketemc's views on this but did not receive clarification. In any event, EAO does not anticipate that the proposed Project would have an adverse impact on Esketemc fishing activities.

As outlined in section 5.4 of this assessment report potential impacts to fish and fish habitat would be avoided along the proposed Project transmission line. The mine site and Fish Lake are located on the western boundary of what EAO understands to be Esketemc's asserted traditional territory and any potential impacts at this site are unlikely to constitute an adverse impact on the right to fish, assuming that such right is asserted. Irrespective of EAO's conclusion of minimal potential effects to fish and fish habitat along the transmission line and the uncertainty regarding assertions with respect to the proposed mine site, specific accommodation measures including protecting

vegetation within 30 meters of watercourses along the transmission line, and comprehensive fisheries compensation measures for impacts at the proposed mine site are detailed in section 10.3.2 below.

Gathering Plants

Esketemc's June 29, 2009 submission to EAO indicates that Esketemc members use the area potentially affected by the transmission line for the collection of plant foods, berries and medicines. From discussion in the technical working group EAO understands that dust and potential contamination of these plants is of concern to Esketemc.

Potential impacts to vegetation are addressed in detail in section 4.6.3 of this Report. Irrespective of EAO's findings of minimal potential effects on vegetation, specific accommodation measures including the maximizing the use of previously disturbed areas, developing a weed management strategy in consultation with First Nations, and implementing an Air and Dust Management Plan are discussed in section 10.3.2 below. Consequently, minimal impact on the ability to gather plants or on the availability of plants is anticipated.

Aboriginal title

The EAO is aware of Esketemc's statement of intent map filed with the BC Treaty Commission and therefore understands that Esketemc asserts aboriginal title over much of the area encompassing the proposed Project transmission line. The EAO is also aware that James Teit listed the Alkali Lake people as a band belonging to the Fraser River Division of the Shuswap. He noted that some members of this band wintered on the Fraser River as far north as Chimney Creek "and others lived west of the Fraser, at the mouth of the Chilcoten River." These areas are relatively remote from the proposed Project area.

It is EAO's assessment that it is unlikely that the construction and operation of the transmission line would have any material adverse impact on the Esketemc claimed aboriginal title to the area of the proposed Project or on the use of the area if aboriginal title were to be proven in the future. Further, the transmission line would be remediated and reclaimed at decommissioning so any impacts are reversible.

10.3.1.3 Soda Creek

Hunting

The EAO acknowledges that the Shuswap people have an aboriginal right to hunt although the geographical extent of the area to which this right applies is unclear. It is not clear whether Soda Creek Band members engage in this activity in the area that

could be impacted by the proposed Project. In a letter dated June 22, 2009, EAO requested Soda Creek's views in this respect but did not receive any clarification or details.

Minimal impact on wildlife is expected along the proposed Project transmission line. As further discussed in section 4.8.3 of this assessment report: the transmission line would cross large areas that have been previously disturbed; there would be minimal clearing needed in grasslands areas; flexibility in the placement of poles would be used to avoid sensitive wetland areas; and the Proponent has used information concerning where cut blocks and logging roads currently exist to guide the selection of the right-of-way such that it maximizes the use of existing disturbances and minimizes the need to construct new access or cut timber. Irrespective of EAO's conclusion of minimal potential effects to wildlife, specific accommodation measures including conducting additional pre-development wildlife surveys, avoidance of sensitive wildlife habitat, and wildlife habitat compensation are detailed in section 10.3.2 below. Consequently, no adverse impact on the ability of Soda Creek members to hunt is anticipated.

Harvesting timber

The EAO is not certain whether Soda Creek Band asserts an aboriginal right to harvest timber in the area that could be impacted by the proposed Project, nor does EAO have information as to the purposes of such a right. In any case, EAO is not aware of any potential impact on timber supply or harvest as a result of the proposed use of the existing rail transfer facility near Macallister (Soda Creek's traditional territory appears to overlap with this facility). In a letter dated June 22, 2009, EAO requested Soda Creek's views in this respect but did not receive any clarification or details.

Fishing

The proposed mine site and Fish Lake are located a considerable distance southwest of what EAO understands to be Soda Creek's asserted traditional territory. The EAO does not anticipate that the proposed Project would have an adverse impact on fishing activities in the Soda Creek territory. Impacts to fish and fish habitat are not expected as a result of using the load out facility near Macalister. Irrespective of EAO's conclusion of minimal potential effects to fish and fish habitat along the transmission line, specific accommodation measures including protecting vegetation within 30 meters of watercourses are detailed in section 10.3.2 below.

Gathering Plants

No concerns were raised by Soda Creek during the review regarding potential impacts on the ability to gather plants.

Minimal impact on vegetation is expected along the proposed Project transmission line. Irrespective of EAO's findings of minimal potential effects on vegetation, specific accommodation measures including the maximizing the use of previously disturbed areas and developing a weed management strategy in consultation with First Nations are discussed in section 10.3.2 below. Consequently, minimal impact on the ability to gather plants or on the availability of plants is anticipated.

Aboriginal title

The EAO understands that the Soda Creek Band asserted traditional territory overlaps the existing rail transfer facility near Macallister. The EAO has included the incremental effects of the proposed Project on the rail transfer facility as part of the proposed Project scope of review and, in relation to this facility, does not anticipate that the proposed Project would have adverse impacts following mitigation.

10.3.1.4 Williams Lake

Hunting

The EAO acknowledges that the Shuswap people have an aboriginal right to hunt although the geographical extent of the area to which this right applies is unclear. It is not clear whether members of the Williams Lake Band engage in this activity in the area that could be impacted by the proposed Project. In a letter dated May 29, 2009, EAO requested Soda Creek's views in this respect but did not receive any clarification or details.

Minimal impact on wildlife is expected along the proposed Project transmission line. As further discussed in section 4.8.3 of this assessment report: the transmission line would cross large areas that have been previously disturbed; there would be minimal clearing needed in grasslands areas; flexibility in the placement of poles would be used to avoid sensitive wetland areas; and the Proponent has used information concerning where cut blocks and logging roads currently exist to guide the selection of the right-of-way such that it maximizes the use of existing disturbances and minimizes the need to construct new access or cut timber. Irrespective of EAO's conclusion of minimal potential effects to wildlife, specific accommodation measures including conducting additional pre-development wildlife surveys, avoidance of sensitive wildlife habitat, and wildlife habitat compensation are detailed in section 10.3.2 below. Consequently, no adverse impact on the ability of members of the Williams Lake Band to hunt is anticipated.

Harvesting timber

The EAO is not certain whether Williams Lake Band asserts an aboriginal right to harvest timber in the area that could be impacted by the proposed Project, nor does

EAO have information as to the purposes of such a right. In a letter dated May 29, 2009, EAO requested Williams Lake's views in this respect but did not receive any clarification or details. In any event it is not anticipated that the removal of timber as part of the construction of the transmission line right of way would have any adverse impact. Irrespective of EAO's conclusion of minimal potential effects to harvesting timber, specific accommodation measures including the use of previously disturbed areas, avoidance of non-pine forests, and the use of existing access roads are detailed in section 10.3.2 below.

Fishing

The EAO is not certain whether Williams Lake Band asserts an aboriginal right to fish in the area that could be impacted by the proposed Project. In a letter dated May 29, 2009, EAO requested Williams Lake's views in this respect but did not receive any clarification or details. In any event, EAO does not anticipate that the proposed Project would have an adverse impact on Williams Lake Band members fishing activities.

The proposed mine site and Fish Lake are located outside and west of what EAO understands to be Williams Lake's asserted traditional territory. Irrespective of EAO's conclusion of minimal potential effects to fish and fish habitat along the transmission line, specific accommodation measures including protecting vegetation within 30 meters of watercourses are detailed in section 10.3.2 below.

Gathering Plants

No concerns were raised by the Williams Lake Band during the review regarding potential impacts on the ability to gather plants.

Minimal impact on vegetation is expected along the proposed Project transmission line. Irrespective of EAO's findings of minimal potential effects on vegetation, specific accommodation measures including the maximizing the use of previously disturbed areas and developing a weed management strategy in consultation with First Nations are discussed in section 10.3.2 below. Consequently, minimal impact on the ability to gather plants or on the availability of plants is anticipated.

Aboriginal title

The EAO understands from discussions between the Proponent and the Williams Lake Band that the transmission line overlaps with a portion of the band's traditional territory. It is EAO's assessment that it is unlikely that the construction and operation of the transmission line would have any material adverse impact on the Williams Lake Band claimed aboriginal title to the area of the proposed Project or on the use of the area if

aboriginal title were to be proven in the future. Further, the transmission line would be remediated and reclaimed at decommissioning so any impacts are reversible.

10.3.1.5 High Bar

On March 11, 2008, EAO wrote to High Bar explaining that given that EAO had not received a reply to previous correspondence, it was EAO's understanding that High Bar do not have any concerns with the proposed Project or, alternatively, that the High Bar are satisfied that EAO's engagement with other First Nations will sufficiently deal with High Bar concerns; and that in either case High Bar do not wish to be consulted separately. If this was not the case EAO requested a response by April 7, 2008. The EAO did not receive a response.

The EAO's assessment is that there are unlikely to be any project-related impacts on High Bar's interests. Notwithstanding this conclusion, accommodation measures are discussed in section 10.3.2 below.

10.3.2 The process of consultation engaged in by Proponent, under the direction of EAO, and by the EAO itself, on behalf of the Province, both preceding and during the EA of the proposed Project, and the accommodation measures that have been utilized or that are contemplated

The Proponent began implementing their First Nation Engagement and Consultation Strategy in 1993, with the First Nation communities in closest proximity to the proposed Project mine site, access roads and transmission corridor. These First Nations included the Secwepemc communities of Esketemc and Canoe Creek. The Proponent summarized the results of consultation that occurred during the late 1990s and from 2004 to 2008 with Tsilhqot'in and Secwepemc communities in volume 8 of the Application. These included discussion of the proposed transmission line corridor and alternatives.

The EAO kept all five potentially affected Secwepemc First Nations fully informed of progress of the EA, both preceding and during the Application review, and they were provided with all information that was sent to the Working Group. The EAO also shared information and views or positions on matters relating to asserted or established aboriginal rights and the potential for impacts on those from the proposed Project and sought feedback from First Nations.

The five bands were invited to participate in the EA as members of the technical Working Group. No response was received from the High Bar Band. The Esketemc, Canoe Creek, Soda Creek and Williams Lake Bands participated to varying degrees.

The EAO provided the following funding to Secwepemc First Nations for capacity to participate in the EA, and in the case of Canoe Creek and Esketemc, in response to specific requests to provide traditional use information:

- $165,000 to Canoe Creek
- $60,000 to Esketemc
- $25,000 to the Williams Lake Band

The amounts provided to Canoe Creek and Esketemc were well above the $10-$20,000 EAO provides to participating First Nations for most EAs. The EAO provided this substantial capacity funding in response to requests from Canoe Creek and Esketemc for the purposes of completing and submitting traditional use studies. An interim traditional use research report was received from Esketemc on June 29, 2009. Traditional use information was not provided by Canoe Creek.

In response to concerns raised by Canoe Creek, EAO tabled a draft consultation protocol. Canoe Creek responded with their own consultation protocol. The EAO explained that it was not prepared to execute the Canoe Creek document. While the document identified studies and other sources of information that would be relevant to EAO, EAO stated that the studies and information can and should be undertaken as part of the EA process, accompanied, if desired, by government-to-government discussions as to aboriginal rights and impacts thereon.

The Terms of Reference were revised to address concerns raised by both Esketemc and Canoe Creek. These concerns primarily related to ensuring that potential impacts along the proposed transmission line, and any maintenance access routes, were considered in the EA. At the request of Canoe Creek the porcupine was also added as a species of concern for which potential impacts would be assessed.

The EAO circulated a draft of the section 14 procedural order, which establishes the scope, procedure and methods of the assessment, for review and comment on July 2, 2008. After issuing the order on October 17, 2008, EAO received comments from Canoe Creek. In response to the concerns raised by Canoe Creek, EAO amended the order on February 4, 2009 to clarify the information the Proponent was instructed to seek from First Nations.

The EAO directed the Proponent to consult and report back to EAO with the five potentially affected Secwepemc First Nations named in the section 14 Order. The Proponent's proposal for First Nation consultation during the Application review period was provided to First Nations for comment in January 2009 and EAO, having considered the limited feedback received from First Nations, and EAO's own analysis, accepted the proposal on March 11, 2009. The Application was distributed to First

Nations on or before March 16, 2009 and offers to meet and review First Nations' interests and concerns were made by the Proponent on a number of occasions through March and April 2009, including an offer to host community open houses. The Proponent's consultation activities completed after EAO acceptance of the Application are summarized in the Proponent's August 2, 2009 First Nations Consultation Report.

As discussed in chapter 5.8 of this Report, EAO is satisfied that the proposed Project is not likely to have significant adverse effects in respect of wildlife. Specifically, potential impacts of the transmission line were raised by Secwepemc bands.

The transmission line route crosses large areas that have been previously disturbed. The Proponent has used information concerning where cut blocks and logging roads currently exist to guide the selection of the right-of-way such that it maximizes the use of existing disturbances and minimizes the need to construct new access or cut timber. During the review the Proponent undertook a constraints analysis whereby sensitive wetland, riparian and wildlife habitat, and rare plants and ecosystems, were used to ensure that potential impacts would be minimized in selecting the final 50 to 80 m right-of-way from the 500 m route assessed in the Application.

Prior to the construction of the transmission line, should information become available from First Nations identifying habitat, vegetation, or features of importance not previously considered in the constraints analysis undertaken to select the centre-line, the Proponent has made a commitment (2.8) to make reasonable efforts to avoid or mitigate impacts to those features.

The Proponent has further committed to mitigation measures specific to minimizing impacts along the transmission line (commitment 15.2) during construction. These include:

- pre-construction surveys of the transmission line right-of-way for the occurrence of rare plants and rare ecosystems;
- avoiding impacts to sensitive wildlife habitat during denning or breeding windows;
- avoiding any identified wildlife habitat features wherever possible;
- adhering to timing windows for construction;
- protecting vegetation within 30 m of wetlands or riparian areas; and,
- avoiding non-pine forests of any age wherever possible.

The Proponent has committed to develop and implement a plan for achieving compensation for adverse impacts to wildlife, wildlife habitat and the critical habitat of species at risk (commitment 11.1). The Proponent has proposed a joint undertaking with

BC Ministry of Environment and Canadian Wildlife Service, with additional possible partners including First Nations.

The Proponent has proposed a fisheries compensation plan (discussed in section 4.4.3 of this Report) for impacts at the proposed mine site that includes a replacement lake, outplanting to other lakes in the region, and a hatchery to ensure maintenance of the genetic stock of rainbow trout currently in Fish Lake. The mine site and Fish Lake are located on the western boundary of what EAO understands to be Esketemc's asserted traditional territory and, considering the proposed compensation, any potential impacts at this site are unlikely to constitute an adverse impact on the claimed right to fish.

In response to Esketemc's concerns regarding noxious weeds along the corridor, the Proponent has committed to working with regulatory agencies, land owners, and First Nations to develop a weed management strategy (commitment 12.6). The Esketemc also raised concerns regarding potential impacts of dust on the collection of plant food, berries and medicines. The Proponent has committed (17.3 and 17.4) to develop an Air Quality and Emissions Management Plan which would include ensuring that dust from the tailings beach is monitored and minimized.

The Proponent has committed to conducting an Archaeological Impact Assessment of the transmission line to further assess the route for which an Archaeological Overview Assessment was completed and provided in the Application (commitment 24.3). The results of the Impact Assessment would be used to avoid or minimize impacts of the 50 to 80 m right-of-way.

The EAO sent the draft Assessment Report to First Nations for review and comment. In a December 14, 2009 letter to EAO, the Canoe Creek Band stated that they do not accept this report as a full and meaningful assessment of Canoe Creek interests; the potential adverse effects of the proposed Project or the sufficiency of accommodation.

10.3.3 Having regard to the overall consultation and accommodation process, EAO's conclusion as to the reasonableness of the process in the circumstances and EAO's conclusion as to whether the Crown's duties have been discharged

Having regard for all of the above, EAO concludes that the process of consultation has been appropriate and reasonable and has been carried out in good faith and with the intention of substantially addressing specific concerns expressed by the Soda Creek Indian Band, the Esketemc First Nation, the High Bar Indian Band, the Canoe Creek Indian Band, and the Williams Lake Indian Band. The EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the potential impacts the proposed Project may have on these Secwepemc bands and by way of both draft and final copies of this Report, it is communicating its findings to the First Nations.

Based on the EA for the proposed Project, including the consultation process described above and the mitigation measures that would be implemented to reduce the risk of direct and indirect impacts to fish, wildlife and other resources in the Project area, EAO believes that any residual effects of the proposed Project on the ability of Secwepemc bands to continue to practice aboriginal rights, whether asserted or proven, and to carry out traditional activities, are not significant. As well, it is EAO's assessment that it is unlikely that the construction and operation of the transmission line would have any adverse impact on aboriginal title to the area of the proposed Project or on the use of the area, were aboriginal title to be proven in the future.

In reaching these conclusions, EAO recognizes that if the proposed Project receives an EA Certificate, additional studies and programs are yet to be carried out and subsequent evaluations would be undertaken, notably prior to any permits being granted from provincial regulators and on an ongoing basis as monitoring programs to ensure the proposed Project is constructed, operated and decommissioned as proposed.

10.4 Tsilhqot'in

10.4.1 Aboriginal rights issues and context

Background

In a letter dated October 8, 2008, EAO wrote to representatives of the Tsilhqot'in Nation (TNG, Xeni Gwet'in, Toosey, Anaham, and Ulkatcho) in order to ensure that it had properly identified asserted and proven rights. The rights identified were based on the reasons of Mr. Justice Vickers in the *William* case, on information from consultation between the Tsilhqot'in bands and the Proponent during the approximately 15 years that the proposed Project has been under review, and on consultation between the Tsilhqot'in Nation and the Province. No response clarifying or correcting EAO's October 8, 2008, letter was received from any of the six bands or TNG.

The EAO understands the following from the *William* decision concerning proven aboriginal rights:

- There are six Tsilhqot'in bands (and one additional Tsilhqot'in community).
- The proper holder of the relevant aboriginal rights is the community of Tsilhqot'in people (*William*, para 470).
- The Tsilhqot'in people have an aboriginal right to hunt and trap birds and animals throughout the "Claim Area" defined in the *William* decision, for the purposes of securing animals for work and transportation, food, clothing, shelter, mats, blankets and crafts, as well as for spiritual, ceremonial and cultural uses. This

right is inclusive of a right to capture and use horses for transportation and work (*William*, pp. iv-v).

- The Tsilhqot'in people have a right to trade in skins and pelts as a means of securing a moderate livelihood (*William*, p. v).
- The Tsilhqot'in people do not have aboriginal title to any portion of the "Eastern Trapline Territory" as defined in the *William* decision, and the proposed mine site is located in the "Eastern Trapline Territory" (*William*, para 893, 898-900).

The parties to the *William* litigation have filed notices of appeal. Appellate proceedings are not yet underway.

The EAO acknowledges that the determination of aboriginal rights in the *William* case was not intended to be exhaustive of all aboriginal rights that the Tsilhqot'in people have in the Claim Area, and further acknowledges that the *William* decision did not address the extent of Tsilhqot'in aboriginal rights that may exist outside of the Claim Area.

On January 6, 2009, Chief Marilyn Baptiste filed a statement of claim on behalf of all members of the Xeni Gwet'in First Nations Government and all members of the Tsilhqot'in Nation in relation to the proposed Project (Baptiste *et al*.). The claim sets out additional asserted rights (see the following section) and identifies concerns regarding potential impacts to established rights.

Fishing

Baptiste *et al*. assert a site-specific aboriginal right to fish in Teztan Biny (Fish Lake) for food, social and ceremonial purposes. The statement of claim further asserts that, since the proposed Project would entail the loss of Fish Lake, development of the Project would constitute an extinguishment of the right.

As set out in the April 7, 2009 Statement of Defence, the province does not agree that members of the Tsilhqot'in Nation have a distinct and separate existing aboriginal fishing right specifically at Fish Lake (Teztan Biny). The province further denies that the destruction of fish habitat at Fish Lake, if it should occur, would amount to an extinguishment of aboriginal fishing rights.

In its Defence, the province admitted that members of the Tsilhqot'in Nation possess aboriginal fishing rights for food, social and ceremonial purposes. However, the province also pleaded that the right to fish for food, social and ceremonial purposes does not include:

- an attachment to lands and resources in Fish Lake;

- the protection and conservation of the cultural, ecological and spiritual integrity of the lands, waters and resources in Fish Lake; or,
- the right to a particular quantity and quality of fish and fish habitat at Fish Lake.

The EAO understands that Tsilhqot'in Nation members fish for salmon, steelhead, sturgeon and more in the Chilko (Tsilhqox) Lake, Taseko (Dasiqox) Lakes, and the rivers that flow from these lakes including, but not limited to, the Taseko River. The EAO further understands that there are more than 20 lakes bearing trout, salmon or other game fish within the Claim Area (not including Fish Lake and Little Fish Lake).

Based on the above, the proposed Project, through the destruction of Fish Lake, would interfere with admitted aboriginal fishing rights. However, given that this potential interference is minimal such that the rights are still meaningful notwithstanding the loss of Fish Lake; given the meaningful process of and opportunities for consultation and accommodation to date, including measures to mitigate the loss of the lake; and given the regional and provincial importance of the proposed Project (discussed in section 2.3 of this Report), the interference is considered justifiable.

Accommodation measures specific to fish compensation for the loss of Fish Lake are discussed in section 10.4.2 below.

<u>Hunting</u>

Baptiste *et al*. claim that the proposed Project would to some extent adversely affect the aboriginal hunting and trapping rights described in the *William* decision by:

- diminishing the overall quality and quantity of bird and wildlife habitat thus reducing the populations of birds and wildlife available for hunting and trapping;
- fragmenting wildlife habitat and disrupting the migration and residency patterns of birds and wildlife that are hunted and trapped by Tsilhqot'in members;
- increasing wildlife mortality from increased motor vehicle traffic and increased human activity;
- increasing bird mortality from collisions with the transmission line;
- negative impacts on water quality and quantity, with consequent impacts on the quality and quantity of birds and wildlife that are hunted and trapped by Tsilhqot'in members;
- loss of access for Tsilhqot'in members to traditional hunting and trapping grounds in and around the proposed Project lands;
- increasing the amount of human activity in the area and thus reducing the lands over which hunting and trapping can be safely carried out; and,

- increasing access for non-aboriginal hunters into the region, thus increasing competition for, and pressure on, bird and wildlife populations.

The impacts to wildlife were presented in the Application and no significant impacts were found at the scales presented. Further assessment was required by EAO – and a suspension of the time limit for the review – in order to gain a more fulsome understanding of potential impacts at a scale of particular relevance to the exercise of Tsilhqot'in hunting and trapping rights.

The EAO required the Proponent to conduct an analysis of the habitat types potentially affected by the proposed Project using biogeoclimatic units (further details of which are contained in section 4.8.3 of this Report). The Proponent submitted a supplemental report entitled Local and Regional Environmental Effects on Wildlife and Vegetation Resources of Importance to the TNG at the Proposed Mine Site on October 2, 2009. In the supplemental report the Proponent presented the findings that two biogeoclimatic units would be affected at the proposed mine site: Montane Spruce very dry very cold (MSxv) and Sub-Boreal Pine–Spruce very dry cold (SBPSxc).

The Proponent assessed the relevant abundance of each potentially affected habitat type in the Claim Area in order to understand the context and potential implications of this loss. In other words, what types of habitat are potentially affected and how much of that habitat remains outside of the area potentially affected by the proposed Project. The findings are summarized in the table below:

Table 8: Area of Biogeoclimatic Units in Study Area or Proposed Project Footprint

Biogeoclimatic Unit	Area (ha) in Maximum Disturbance (Footprint)	Area (ha) in Rights and Title Study Area	Percentage of Area in Maximum Disturbance (Footprint) as a Portion of the Rights and Title Study Area
SBPSxc	2,414	107,245	2.3
MSxv	705	26,189	2.7
Total	**3,119**	**133,434**	**2.3**

In interpreting this information, and the relatively small proportion of the two habitat types affected (less than 3 percent of that available in the Claim Area) it is relevant to consider the conditions in the area outside of the proposed Project area but within the Claim Area (i.e. the remaining 97 percent of these two habitat types). Biogeoclimatic units do not identify current conditions or distinguish between disturbed and undisturbed areas.

The EAO notes that portions of the Claim Area are protected by the Nuntsi and Ts'yl-os Provincial Parks. The EAO also notes that from a review of digital mapping provided by

the Proponent, available data through GeoBC and Google Earth satellite imagery, and advice of Ministry of Forests and Range there has been minimal recent industrial activity (including logging) in the Claim Area (with the exception of exploration for the proposed Project).[26]

This analysis complements the findings by wildlife species of no significant adverse effects presented in the Application and further refined in the local context of sustainability of the moose, mule deer, fisher, black bear and grizzly bear populations also presented in the supplemental report.

Consequently, no significant adverse impact on the right to hunt and trap is anticipated. As well, given EAO's assessment that the right would still be meaningful notwithstanding the loss of the proposed Project area and the impact of the proposed Project; given the meaningful process of and opportunities for consultation and accommodation to date; and given the regional and provincial importance of the proposed Project (discussed in section 2.3 of the Assessment Report), any potential interference with the right is considered justifiable.

Gathering plants

In their May 25, 2009 submission to the Federal Panel, the TNG provided a list of 52 plant species of importance to the TNG and requested that the effects of the proposed Project on these plant species be assessed. The Proponent developed a matrix to indicate linkages between the plant species of importance to the TNG and the vegetation Key Indicators (KIs) assessed in detail in the Application. Each plant species was linked to one or more vegetation KIs based on the species' general ecological requirements (e.g., a species that grows in bogs is linked to the wetlands KI). Having established linkages between each of the plant species and one or more vegetation KIs, the environmental effects on each species were inferred from the effects assessments for those KIs as presented in the Application. No significant residual effects were predicted for all of the vegetation species considered.

At the scale of the Claim Area, the analysis of biogeoclimatic units presented above with respect to wildlife can be used to understand effects to vegetation. As above, less than three percent of the relevant area available in the Claim Area would be potentially impacted by the proposed Project.

[26] The EAO is aware of the "Lava Canyon" fire in the summer of 2009 which affected the northeastern portion of the Claim Area, an area that is largely biogeoclimatic unit SBPSxc. In considering how this recent fire informs the analysis in the Application and presented above, EAO notes in particular that fire is part of the natural cycle of habitat regeneration and effects on species will vary with some benefiting from the vegetative regrowth and some will not compared to the original growth. Given the information available, the fire is not considered to have a definitive effect on the analysis presented above.

The EAO is satisfied that the proposed Project is not likely to have significant adverse effects in respect of vegetation. Consequently, no significant adverse impact on the activity of gathering plants is anticipated.

Harvesting timber

It does not appear to EAO that the removal of timber at the proposed mine site or as part of the construction of the transmission line right-of-way would result in any significant impact on timber harvesting activities. The Proponent has used information concerning where cut blocks and logging roads currently exist to guide the selection of the right-of-way such that it maximizes the use of existing disturbances and minimizes the need to construct new access or cut timber (mitigation measures are discussed below in section 9.3.2). As discussed above, the proposed mine site represents a small portion of the relevant biogeoclimatic zones in the Claim Area.

Title

In the *William* decision the court declined to find that the Tsilhqot'in people have aboriginal title to any portion of the Eastern Trapline Territory (as defined in the *William* decision). The proposed mine site is located in the Eastern Trapline Territory.

On the basis of a writ filed with the Supreme Court of British Columbia (the "Charleyboy Writ") EAO acknowledges that the Tsilhqot'in people claim aboriginal title to much of the area outside of the Eastern Trapline Territory that is to be utilized as part of the proposed Project, including some or all of the area proposed to be used for the transmission line. Much of this area is subject to aboriginal title claims by one or more Secwepemc communities.

It is EAO's assessment that it is unlikely that the construction and operation of the transmission line would have any material adverse impact on Tsilhqot'in Nation aboriginal title were aboriginal title to be proven in the future. Further, the transmission line would be remediated and reclaimed at decommissioning so any impacts are reversible.

The EAO is aware that the Fish Lake area in general is of importance to the Tsilhqot'in people. In particular, EAO has regard to the following statement in the TNG's May 25, 2009, submission to the Federal Panel:

"Tsilhqot'in Elders have taught stories and histories about Ceremonies at Teztan Biny, including how they got their Spiritual Powers by fasting on the Island of Teztan Biny. These Ceremonies have given people the Spiritual Power of the Wild Horse. This is one of many examples of Spiritual Powers that Tsilhqot'in received at Teztan Biny."

However, EAO has not received evidence which shows that the conduct of ceremonies on any specific tract of land associated with the proposed Project was an integral part of the distinctive culture of the Tsilhqot'in people prior to contact with Europeans. On the basis of available information provided through the EA process, the *William* case, or the ethnohistorical report cited earlier, EAO is not able to conclude that there is a *prima facie* case in support of such an aboriginal right, were it to be asserted.

10.4.2 The process of consultation engaged in by Proponent, under the direction of EAO, and by EAO itself, on behalf of the province, both preceding and during the EA of the proposed Project, and the accommodation measures that have been utilized or that are contemplated

Proponent consultation

The Proponent began implementing their First Nation Engagement and Consultation Strategy in 1993, with the First Nation communities in closest proximity to the proposed Project mine site, access roads and transmission corridor. These First Nations included the Tsilhqot'in communities of Xeni Gwet'in and Stone. The Proponent's summarized the results of consultation that occurred during the late 1990s and from 2004 to 2008 with Tsilhqot'in and Secwepemc communities in volume 8 of the Application.

According to the Proponent's Consultation Report, a Letter of Intent was developed between the Proponent and the TNG to set out the terms of their relationship during study and planning for the proposed Project. This was developed to ensure the TNG, which reserved judgment on the proposed Project but would participate in the EA process, had the ability to understand the proposed Project during the information gathering and pre-filing phase of the EA. The Letter of Intent was developed to assist with the following:

- Retention of an internal TNG member as a mining coordinator.
- Funding to the TNG for their Stewardship Council to review baseline studies.
- Retention of a socio-economic advisor.
- TNG participation in the comprehensive 2007 archaeological study in the mine site area.
- TNG participation in 2006 and 2008 biophysical field programs.
- TNG participation in the 2007 exploration and drilling program
- Provide for TNG legal counsel to ensure the protection of their rights and title.
- Financing community meetings and per diems for leadership attendance at meetings.

- Funding for TNG administrative costs.

The Letter of Intent, which was first agreed upon in 2006, entered into a second phase in 2007 and 2008 during the Pre-application stage. Although the Letter of Intent was never signed by the parties, the Proponent followed the Letter of Intent and provided capacity funding up until the TNG made statements that it would not participate in the provincial EA.

The Proponent states that it has provided the TNG with approximately $900,000 to assist in addressing issues of how the proposed Project might impact the Tsilhqot'in and to participate in the provincial EA process. The relationship between the Proponent and TNG has broken down since that time and there is some dispute over the amount of funding agreed to (see TNG letters dated January 26, 2009, July 17, 2009; Proponent letters February 6, 2009, July 31, 2009, August 11, 2009). The TNG do not dispute that the Proponent has provided the funding above.

Consultation on EA Process

The EAO was advised in January 2007 that DFO would be recommending a federal panel process (rather than self-assessment by "responsible authorities" under the *CEA Act*). Following that, EAO engaged in discussions with the federal government and other parties regarding the potential to use a joint federal/provincial panel process. To this end, the Executive Director referred the proposed Project to the Minister under section 14 of the *EA Act* to request that the Minister determine the appropriate procedures and methods for conducting the process. The Minister has the power under that section to specify how the process would be conducted. Specifically, section 14(3) sets out options that include, but are not limited to, the use of a hearing panel.

In December 2007, EAO and Agency provided the draft Joint Panel Agreement to First Nations and the Proponent for review and comment. Following over a year of consultation including a meeting on February 18, 2008, a second draft of the Joint Panel Agreement, and tabling a Consultation Protocol, the TNG expressed significant opposition to the proposal.

Despite over a year of consultation and discussion of joint panel agreement models by EAO and the Agency it was not possible to develop a joint panel agreement that was acceptable to First Nations, the Proponent, and both levels of government. In its May 13, 2008 letter to the TNG, EAO set out options for proceeding with the review. On May 27, 2008, the TNG wrote to EAO and Agency indicating that, in their view, the options proposed did not meet the legal requirements for a proper EA and meaningful consultation and accommodation.

On June 22, 2008, the Minister of Environment ordered that the provincial EA be undertaken by EAO. The EAO then circulated a draft of a procedural order, which establishes the scope, procedure and methods of the provincial assessment, for review and comment on July 2, 2008. Having received no comments from First Nations, EAO issued the order in October 2008. The order formally directed the Proponent to consult with the Xeni Gwet'in First Nation, Stone Indian Band, Toosey Indian Band, Alexis Creek Indian Band, Anaham Indian Band, Alexandria Indian Band, and the Tsilhqot'in people who are members of the Ulkatcho Indian Band, although as noted above, the Proponent had been consulting with some or all of these groups for many years. The order outlines that, to the best of knowledge, the Xeni, Stone, Alexis Creek and Alexandria are represented by the TNG.

The TNG have repeatedly stated that they believe the Minister's decision to not proceed with a joint panel was unfair, inappropriate and in bad faith. The EAO does not share this position. It notes that despite a willingness to explore the potential use of a panel process there was no obligation that the Minister choose to do so. The EAO notes that no order was ever made by the Minister to use a joint panel (as would be required to effect such a process) and that there is no requirement in the BC *EA Act* that the province use a panel process in cases where the federal government chooses to do so. To the contrary, EAs are typically undertaken under provincial law by EAO, which is a statutory entity continued under the BC *EA Act* specifically and solely for the purposes of EA responsibilities. To date, the province has used a joint panel process only one time (the Kemess North Copper-Gold Mine Project). There are presently two EAs being undertaken in BC where the federal government is using a panel process and BC is having the EA completed by EAO.

The EAO has made it clear to the TNG that it sees EAO as having strengths in relation to a panel hearing process in the areas of facilitation, dialogue and consensus building, as well as in respect of consultation with First Nations and the development of Proponent commitments to attempt to accommodate First Nations. It is EAO's view that the BC *EA Act* provides opportunities for First Nations engagement throughout the EA process, including:

- consulting on draft orders which outline the scope of review, process and consultation requirements;
- providing capacity funding for First Nation engagement in the EA process;
- exploring opportunities for First Nation input and participation in studies leading to an Application;
- inviting First Nations to participate throughout the review as part of the advisory working group on technical issues;

- incorporating First Nations traditional ecological knowledge and traditional use studies in the Application;
- engaging in Government-to-Government consultation, including specific discussions on First Nations views on potential impacts to aboriginal rights, including title, from a proposed project;
- pursuing accommodation options though proposed project design modifications to address First Nation concerns;
- soliciting First Nations input in legal commitments and conditions of a Certificate, should one be issued;
- providing opportunities for review and input in EAO assessment report to ministers ; and
- providing the opportunity to provide a separate First Nations' submission with the EAO's recommendations to ministers.

EAO Capacity Funding and TNG participation

As of September 2008, EAO had provided over $42,000 in funding to the TNG and its member bands. At a meeting on September 18, 2008 in Williams Lake, EAO proposed an additional $100,000 in capacity funding to assist the TNG in participating in the provincial EA process. Following statements that the TNG would not participate in the provincial EA, this offer was withdrawn (by letter dated November 25, 2008).

The TNG position to not participate in the provincial EA was reconfirmed in a letter to the Minister of Environment and the Minister of Energy, Mines and Petroleum resources dated June 2, 2009. The EAO responded, again encouraging the TNG to participate in the EA process and offering to meet on a separate government-to-government basis.

On February 20, 2009, the TNG wrote to EAO, the Canadian Environmental Assessment Agency and MEMPR outlining concerns with respect to several aspects of the EA. The Province responded in a joint letter dated March 31, 2009, from EAO, MEMPR, and First Nations Initiatives Division (FNID) on what it understood to be the five main concerns raised by the TNG:

- The consultation process for the proposed Project.
- Lead agencies with respect to consultation.
- Mandate for accommodation.
- Mandate for approval or rejection.
- Capacity funding.

The joint letter confirmed that that EAO is the lead provincial agency for carrying out consultation under the *EA Act.* It explained that a key objective of consultation is to determine what potential conditions or other accommodation measures may be appropriate given Tsilhqot'in Nation interests related to proven or asserted aboriginal rights and title.

The letter also explained that the FNID is offering a parallel process to develop a revenue-sharing agreement with the Tsilhqot'in Nation in relation to the proposed Project. The letter explained that the revenue-sharing discussion would be separate from the consultation being undertaken by EAO for the EA process or other provincial agencies and would have no direct influence on the outcome of those reviews.

The letter confirmed that the federal panel process and the provincial review are harmonized in numerous ways, such as having common public comment periods, common documents and opportunities for federal and provincial agencies and First Nations to participate through the EAO Working Group.

On July 14, 2009, EAO wrote to all First Nations explaining that in light of the provincial review timeline in accordance with the Prescribed Time Limits Regulation of the *EA Act*, it was anticipated that the Federal Panel would hold public hearings after the provincial referral to Ministers. The EAO confirmed that while the provincial and federal governments are working closely on the two reviews to maximize efficiency, EAO would not be in a position to consider submissions at the federal panel hearings in the assessment report and recommendations to Ministers. Conversely, all information and views provided to EAO would be shared with the Federal Panel. The TNG were again encouraged to participate in the provincial EA.

In letters to the Minister, the TNG have expressed dissatisfaction with the provincial process and argued that the provincial EA process should be suspended, and consultation with the Tsilhqot'in Nation deferred, until such time as the panel hearings are complete (June 2, 2009; September 28, 2009; October 15, 2009; December 7, 2009).

It is EAO's view that the provincial EA process provides meaningful opportunities for First Nations' engagement throughout the process. Furthermore, while the federal and provincial governments attempt to coordinate wherever practicable, EAO has been clear from the outset that, in the event the processes became decoupled (as occurs on various federal/provincial EAs where panels are not used) as a result of delays within either of them, the other process would not necessarily be suspended.

In a June 22, 2009, letter EAO conveyed its view that it is not correct that consultation between the TNG and province cannot meaningfully occur until after the federal panel review is completed. The EAO again offered to meet on a separate government-to-

government basis. On November 18, 2009, the Minister replied to the TNG confirming that the EA process would not be suspended pending any decisions of the Federal Panel.

Changes to the Terms of Reference in response to TNG concerns

The EAO and Agency received comments from the TNG on December 18, 2008 – three weeks past the deadline of December 3, 2008 for working group and First Nations' comments. Nonetheless, EAO and Agency reviewed the comments and made several changes to the document to address TNG concerns with respect to potential impacts on current aboriginal uses; the identification of asserted or established aboriginal rights; and clarifying the temporal boundaries of the EA.

Review timeline

The EAO suspended the 180 day timeline for the Prosperity EA on July 8, 2009 to allow time for the Proponent to provide further information needed by EAO to complete the review. The information required included two aspects that EAO understands to be of importance to the Tsilhqot'in Nation: an alternatives assessment that clearly articulates why the proposed Project would require the loss of Fish Lake, and further information relating to wildlife species identified in the *William* decision and the potential of the proposed Project to impact the exercise of Tsilhqot'in hunting rights.

Proposed Commitments

The following commitments would ensure potential impacts on Tsilhqot'in Nation asserted and established rights are avoided, mitigated or otherwise minimized to the extent possible.

The Proponent has proposed a fisheries compensation plan (discussed in section 4.4.3 of this Report) for impacts at the mine site that includes a replacement lake, outplanting to other lakes in the region, and a hatchery to ensure maintenance of the genetic stock of rainbow trout currently in Fish Lake.

The EAO is satisfied that commitments 9.1 to 9.3 would ensure that any impact on the admitted Tsilhqot'in Nation right to fish would be minimized. These commitments include but are not limited to:

- Fish Lake stock must be established in at least one recipient lake as well as present in a hatchery prior to drawdown of Fish Lake;
- the Proponent would be responsible for providing access to the recipient lakes (if not already present) as well as Prosperity Lake (the new lake proposed as compensation);

- during the life of the mine Prosperity Lake would be able to support a self sustaining minimum population of 20,000 rainbow trout ranging in size up to 1kg; and,
- all channels and diversions providing flow to the site would be re-engineered either back to the original drainage pattern or into viable rearing habitat at mine closure.

Priority for stocking recipient lakes would be based on geographic proximity to Fish Lake and consultation with the BC Ministry of Environment and First Nations.

The Proponent has committed to develop and implement a plan for achieving compensation for adverse impacts to wildlife, wildlife habitat and the critical habitat of species at risk (commitment 11.1). The Proponent has proposed a joint undertaking with BC Ministry of Environment and Canadian Wildlife Service, with additional possible partners including First Nations.

Prior to the construction of the transmission line, should information become available from First Nations identifying habitat, vegetation, or features of importance not previously considered in the constraints analysis undertaken to select the centre-line, the Proponent has made a commitment (2.8) to make reasonable efforts to avoid or mitigate impacts to those features.

The Proponent has further committed to mitigation measures specific to minimizing impacts along the transmission line (commitment 15.2) during construction. These include:

- pre-construction surveys of the transmission line right-of-way for the occurrence of rare plants and rare ecosystems;
- avoiding impacts to sensitive wildlife habitat during denning or breeding windows;
- avoiding any identified wildlife habitat features wherever possible;
- adhering to timing windows for construction;
- protecting vegetation within 30 m of wetlands or riparian areas; and,
- avoiding non-pine forests of any age wherever possible.

With respect to concerns of water quality (and the associated potential impacts to wildlife and fish) the Proponent has committed to operate a compact closed system that contains all mine waters on the Prosperity site until approximately 27 years after the cessation of pit operations when the pit is flooded, and directs any surface drainage, sewage treatment plant, sediment or metal-laden water to the Tailings Storage Facility during operations (commitment 8.2 and 8.3).

The Proponent has committed (17.3 and 17.4) to develop an Air Quality and Emissions Management Plan which would include ensuring that dust from the tailings beach is monitored and minimized.

The Proponent has committed to further archaeological work including further systematic excavation at the mine site, a survey of the Fish Lake basin after draining, and conducting an Archaeological Impact Assessment (AIA) of the transmission line to further assess the route for which an Archaeological Overview Assessment was completed and provided in the Application (commitments 24.2 and 24.3). The results of the AIA would be used to avoid or minimize impacts of the final 50 to 80 m right-of-way.

The TNG sent a letter to the Minister of Environment and EAO on December 7, 2009 regarding a number of issues that had been raised previously, such as capacity funding and timing of the EA with respect to the Panel review. The letter also referenced a hydrology report prepared for the TNG which had been sent to the Panel earlier. The EAO has reviewed this report and is satisfied that the issues raised have been considered in the EA.

10.4.3 Having regard to the overall consultation and accommodation process, EAO's conclusion as to the reasonableness of the process in the circumstances and EAO's conclusion as to whether the Crown's duties have been discharged.

Having regard for all of the above, including the conclusions made by EAO in relation to the Tsilhqot'in Nation's established, admitted and asserted aboriginal rights, EAO concludes that the process of consultation has been appropriate and reasonable, that it has been carried out in good faith and with the intention of substantially addressing concerns expressed by the Tsilhqot'in Nation or understood by EAO from available sources, and that any impacts on established and admitted rights are justifiable. The EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on the Tsilhqot'in Nation and by way of both draft and final copies of this Report, it is communicating its findings to the First Nations.

In balancing the potential impact of the proposed Project on asserted and established rights with other societal interests, EAO is particularly mindful that:

- by virtue of the location of the mineral resource, the proposed Project is not technically and economically viable without the loss of Fish Lake (as discussed in section 11 of this Report);
- the proposed Project is important to the regional and provincial economies (as discussed in section 2.3 of this Report) and is proposed in one of the most forest product dependent regions of the province where impacts of the mountain pine beetle have been severe;

- the proposed Project would provide approximately 375 person- years of employment annually during construction and operation; and
- considering the current high levels of on-reserve population unemployment, the proposed Project would potentially bring employment and training opportunities to First Nations' communities.

In reaching these conclusions, EAO recognizes that if the proposed Project receives an EA Certificate, additional studies and programs are yet to be carried out and subsequent evaluations would be undertaken, notably prior to any permits being granted from provincial regulators and on an ongoing basis as monitoring programs to ensure the proposed Project is constructed, operated and decommissioned as proposed.

PART D – ALTERNATIVES ASSESSMENT

11 Alternative Means of Undertaking the Proposed Project

The Alternatives assessment section of the Application provides a review of the alternatives to the proposed Project and the reasons for selecting the preferred alternative as well as an analysis of the alternative means of carrying out the proposed Project and the environmental effects of any such alternative means.

"Alternative means" of carrying out the proposed Project are defined as the various technically and economically feasible ways that the proposed Project can be implemented. For the proposed Project, alternative means concentrate on such issues as management of waste rock, tailing facilities location and design, metallurgical processes, and water supply location and design.

11.1.1 Background Information

Alternative Assessments were performed by the Proponent on three different occasions. The first was in 1993, as part of a Pre-Application for a Mine Development Certificate under the British Columbia Mine Development Assessment Process.

The second was when the proposed Project was transferred into the assessment process governed by the former Act. In 1995, DFO withdrew from the assessment process as the destruction of Fish Lake was not acceptable to their policy position. In 1997, DFO rejoined the process on the condition that the Proponent assess alternative options that would preserve much if not all of the fish habitat of Fish Lake. Over the next two years leading to March 1999, the Proponent consulted with public stakeholders and First Nations and worked with agencies to assess alternatives. The Proponent

determined that the original proposed Project option was still preferred. The DFO was not satisfied that the requirements of the assessment had been met, and an independent economic sub-group was formed to review the data. This group found no evidence to disagree with the Proponent's conclusions.

The EAO required the Proponent to include an Alternatives Assessment in the Application. The analysis as presented in the Application concluded that the original option of 1993 remained the preferred option.

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

In the analysis presented in the Application, three mine development plan options were refined by combining the highest ranking potential alternatives, taking into account physical or engineering constraints. Economic, engineering and environmental criteria were used in considering different locations for TSF sites, waste rock storage, mill, and access roads. Different methods of tailings and ARD management were discussed. The three mine development plan options were based on the degree of mitigation of the fish habitat values in the Fish Creek valley:

- option 1 – Maximize mitigation of the effects of mining on Fish Lake;
- option 2 – Provide a partial mitigation of these effects; or,
- option 3 – Use Fish Lake and Fish Creek for mine development.

Further analysis weighed the risk, or likelihood of occurrences of potential failure modes and their consequences on human life, water quality, fisheries, wildlife, bio-physical effects and operations. In this analysis, the Application concludes that option 3 offers the most environmental security. Further, option 3 performed highest in economic evaluations as the proximity of both the waste rock stockpile and the TSF to the pit reduces personnel and haul costs, and containing waste rock in the former lake reduces embankment and containment costs. The Application also notes that there is additional ore in the Fish Lake area that may be mined at a later date. Accessing this ore in the future would involve breaching, and thus destroying, the lake in any event.

Of the nine transmission line corridor options considered, option 6 was chosen because this route has smoother terrain, less private land, less land in the Agricultural Land Reserve, was shorter and had a sub-station that could accommodate the expansion required for the proposed Project, compared to the next best option. These factors also reduce both proposed Project construction and operating costs.

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

During Application Review, EC, MEMPR, DFO, TC, and First Nations provided comments regarding the Alternatives Assessment, specifically relating to the rationale for the proposed Project plans to store non-PAG waste rock in Fish Lake, resulting in the loss of Fish Lake. These issues, the Proponent responses and EAO's assessment of the adequacy of responses are detailed in Appendix B. Key issues and responses follow:

EC questioned the process for determining reasonable alternatives to identify potential achievable and preferred alternatives. Specifically, EC requested additional cost information be provided in order for them to make an independent assessment. Cost information requested was specific to slurry versus dry-stack tailings disposal options (ITT #3) and the social and environmental costs of the alternatives (ITT #16).

EC further commented that there were no TSF alternatives that did not involve destruction of a fish-bearing water body (ITT #14) and that fish habitat compensability was not ranked for the different options. The Proponent responded that all options would involve a degree of compensation due to unavoidable loss of fish habitat, thus there was no distinction between the alternatives on this front. DFO also requested that technical challenges and costs associated with fish habitat compensation be more fully considered and explained in the alternatives assessment (ITT #6).

In terms of evaluation of tailings disposal and waste rock storage options, EC noted that they require more detailed information regarding the environmental and technical aspects of the considered alternatives to be able to undertake an independent evaluation of the outcomes of the Proponent's risk assessment (ITT #2). Likewise, MEMPR requested further clarification as to whether it was the location of the TSF or the location of the non-PAG waste rock that made option 3 the Proponent's preferred option (ITT #5).

TC brought forward concerns about the social, environmental and cultural cost considerations of the assessment, noting that environmental valuation, a method used to monetize the negative and positive environmental effects of a proposed Project, was not employed (ITT #22).

On July 8, 2009, EAO suspended the timeline of the EA and required the Proponent to provide an alternatives analysis that clearly articulated why the proposed Project required the loss of Fish Lake. On August 17, 2009, the Proponent submitted a supplemental alternatives analysis. It states, in part:

> Throughout the more than 15 years that this project has been undergoing an environmental assessment significant First Nations and public interest in preserving Fish Lake has been expressed. Notwithstanding the inherent difficulties of trying to preserve a lake in the midst of a modern mining operation, immediately adjacent to support infrastructure, concentrator, and open pit, Taseko has left no stone unturned in trying to find a way to preserve Fish Lake and develop the Project. For regulatory reasons there is a requirement for Taseko to demonstrate that the use of natural fishbearing water bodies as a tailings impoundment area makes the most environmental sense when all factors, including long term risk are taken into account. For these reasons, as the next step in the alternatives assessment process, focus was placed on looking at ways to develop the mine while at the same time, avoid the loss of Fish Lake.

This document presents 15 potential tailings and PAG storage locations (the TSF). It also sets out four "fatal flaw" criteria to filter out clearly unacceptable alternatives. The four "fatal flaw" criteria used were:

- Total cost greater than $1billion over the life of the mine
- Methodology not proven effective for ML/ARD mitigation
- Uncertainty of self sustaining water cover at closure
- Unacceptable environmental liability

The application of fatal flaw criteria reduced the number of alternative tailings locations to three. These are the same proposed TSF locations as presented in the Application.

The Proponent combined the results of this analysis, with an examination of 10 non-PAG waste and low grade ore storage locations to develop three potential mine plans (the same plans as presented in the Application). Evaluation of a fourth option (outlined below – using the same TSF location but a different non-PAG waste rock location) was required by EAO and MEMPR. These four options are discussed below.

Option 1: Tete Angela

This option proposes the TSF be located in the Tete Angela Creek, approximately eight km north of the proposed pit. This option would avoid direct disturbance to Fish Lake, Little Fish Lake and Upper Fish Creek. In the Proponent's analysis the "fatal flaw" in pursuing this alternative would be an increase in cost of $440 million (compared to option 3 below - the Proponent's preferred mine plan) primarily as a result of increasing cost of transporting the PAG waste a greater distance to the TSF and the additional mitigation measures required to avoid downstream impacts from seepage (in comparison to option 3 which has the pit located downstream to act as ultimate collection point).

The Proponent states:

> ...with no ultimate cut-off infrastructure similar to the pit downstream, additional seepage mitigation measures will be warranted. The cost of these measures compounded by the additional haulage costs associated with the location impact the economics of this option to such

> an extent that the economic risk of this option is excessive.

The EAO also notes that option 1 raises an additional environmental consideration by introducing impacts into a second watershed. This is to be contrasted with options 2 and 3 which limit activities to the Fish Creek drainage.

Option 2: Fish Creek South

The TSF would be located several km upstream of Fish Lake. This option would impact fish habitat in Upper Fish Creek but would avoid direct disturbance to Fish Lake and Little Fish Lake. In the Proponent's analysis the "fatal flaw" in pursuing this alternative would be an increase in cost of $340 million primarily as a result of increasing cost of transporting the PAG waste a greater distance to the TSF and the additional mitigation measures required to minimize impacts to Fish Lake from seepage.

The Proponent states:

> The placement of the facility at this location cuts off part of the Fish Creek catchment upstream of Fish Lake, as well as some of the upstream fish habitat for Fish Lake. The additional effects on the water quality of Fish Lake, partly due to the decrease in surface flows but primarily related to the seepage from the tailings facility, must be considered.
>
> ...
>
> Seepage from the TSF could be mitigated through design modification such as grout curtains, foundation drains, face liners and ground water pump-back systems. There is sufficient distance between the downstream toe of the main embankment and the inlet to Fish Lake that would allow for the ground water well pump-back system to be effective in minimizing seepage. An assumption that some seepage from the TSF will still report to the lake is reasonable, but it would be less than expected from a T1 location. The resultant water quality of the lake would be expected to degrade, but with the greater flows and less seepage compared to T1, with the application of sufficient mitigation it may be possible to maintain the water quality of the lake sufficient for proper functioning.

Option 3: Fish Creek North

This is the proposed mine plan as described in section 2.1 which involves the dewatering of Fish Lake and the TSF located immediately upstream of what is presently the lake. Waste rock would be stored in the area that is presently Fish Lake.

The Proponent states:

> Of particular note is the environmental security associated with Option 3 afforded by a MDP that confines all disturbance to a single watershed upstream of the open pit, providing the option with the least environmental risk.

Option 3 would work with natural hydrology so that much of the anticipated seepage and contaminated surface water would report to the pit at mine closure. At this

contained collection point, water would be tested and water treatment decisions made prior to any discharge.

"Option 3(b)": Option 3 with non-PAG waste rock storage moved

At direction of EAO and MEMPR, the Proponent also evaluated the proposed mine plan but with the waste rock storage - the direct disturbance to Fish Lake - in an alternate location.

The result of this analysis was that moving the waste rock storage away from Fish Lake and maintaining the TSF in its current design location would not result in the preservation of Fish Lake. Such a design would not provide enough distance between the Lake and the TSF for effective mitigation. As a result, tailings seepage would be expected to deteriorate the water quality of Fish Lake to that of seepage pond water quality. Furthermore, the Proponent states:

> The cultural values of the lake, whether they be First Nations or others, would be altered significantly as well. A large open pit, with associated high walls would be visible several hundred metres to the north of the lake. A 100 metre high embankment to the south would also be visible, with the toe of the embankment at the southern end of the water interface. The proximity and size of these structures would presumably alter the future cultural attributes of the lake.

The Proponent then performed a Multiple Accounts Analysis (which is summarized in the table below). This analysis led the proponent to conclude that option 3 is the preferred option, having regard to all relevant factors.

Table 9: The Proponent's Multiple Accounts Analysis Summary

		Subaqueous PAG in slurry tailings in Tete Angela Drainage with non-PAG waste rock and lower grade ore storage north of the pit	Subaqueous PAG in slurry tailings in Upper (south) Fish Creek Drainage with non-PAG waste rock and lower grade ore storage north of the pit	Subaqueous PAG in slurry tailings in Fish Creek Drainage with non-PAG waste rock and lower grade ore storage in Fish Lake location
		1	2	3
		Tete Angela	Fish Creek South	Fish Creek North (proposed Project)
Potential Candidate				
Summary of Reasons for Exclusion				
Fatal Flaw Criteria		Excessive Economic Risk	Excessive Economic Risk	
Exclusionary Criteria	Technical issues			
	Physical			

	Environment			
	Effects on Terrestrial & Aquatic Life			
	Socio-Economic Issues			
	Economic Implications			

Table 9 summarizes the results of the Proponent's analysis with green considered to be a minimal effect, yellow moderate, orange a maximum/negative effect and red being a fatal flaw.

Discussion

The Proponent submits that, in its analysis, both options 1 and 2 are "fatally flawed" because they result in a project of excessive economic risk. In the Proponent's view excessive economic risk results from choosing an option that fails to provide a sufficient financial buffer to withstand potential downturns in commodity markets or in the economy generally. They say that choosing such an option jeopardizes the ability to operate the proposed Project continuously on a profitable basis. Also, the Proponent states that projects deemed to be of excessive economic risk are penalized in debt and equity capital markets by higher costs of capital or suffer due to an inability to raise capital at all.

In reaching this conclusion, the proponent does not specify how economic risk was determined to be a "fatal flaw" of options 1 and 2. More specifically, it does not appear that the four fatal flaw criteria that the proponent applied to screen from 15 potential tailing and PAG storage locations to three was applied at this stage. In this regard, EAO notes that in the initial screening analysis the proponent applied an economic "fatal flaw" threshold of $1 billion additional costs over the life of the mine, but no such specificity was articulated in the analysis identifying the preferred option. Rather the Proponent notes that additional costs of options 1 and 2 would be $440 and $340 million respectively, and these are in turn described as fatal flaws

Although lacking some degree of specificity in this regard, it should also be noted that the degree of informaiton and analysis supplied by the Proponent during the EA of this proposed Project exceeds that which is typically required or presented in the EA of mine projects. EAO also accepts that options 1 and 2 would have substantially greater costs than option three and notes that MEMPR found the mine development plan and alternatives assessment to be sound. (EC has not yet completed their analysis of the supplemental report. The DFO and TC have not commented on the supplemental report.)

Irrespective of financial considerations, there are environmental downsides to all options. Specifically:

- Irrespective of where tailings and PAG are stored, Fish Lake may be adversely affected by mining operations given the location of the ore body and the resulting fact that that the pit will be located approximately 500 m (potentially even less) from the lake;
- active mining activities such as blasting and trucking in such close proximity could impact the integrity of Fish Lake and would reasonably be expected to impact the use of Fish Lake by both people and wildlife; and,
- potential effects of rerouting outflow of Fish Lake (option 1) and both inflow and outflow (option 2) would reasonably be expected to have some impact on Fish Lake functioning.

Finally, the EAO notes that potential future expansion of the pit to access the full gold and copper resource would result in the loss of Fish Lake in any event as, at depth, the ore body runs toward the lake. This possibility is worth noting but should be given less relative weight as it is speculative and is not contemplated in the proposed 20 year mine life currently under review.

PART E – CONCLUSIONS

12 Factors Relevant to Justification Analysis

The EAO has made a determination that the proposed Project, after mitigation, would not result in significant adverse effects, with the exception of the loss of Fish Lake and Little Fish Lake, as described in section 4.4 of this Report[27]. The proposed Project would drain Fish Lake and fill it with waste rock, and the expansion of the TSF at approximately year seven would overcome Little Fish Lake.

A number of factors are set out below to assist Ministers in deciding whether or not to issue a Certificate in circumstances where a significant adverse effect is found. These relevant factors may aid the Ministers' assessment of whether the proposed Project should be considered justified despite the finding of a significant adverse effect:

[27] This determination does not include an assessment of issues raised by First Nations, including whether the Crown has fulfilled its obligations for consultation and accommodation, as these matters are discussed in EAO's First Nations Consultation Section of this Report.

Number, type, and extent of significant adverse effects

- The loss of Fish Lake and Little Fish Lake is a one-time, permanent event with a significant adverse effect on fish and fish habitat at that location.

Consideration of Alternatives

The Proponent presented three main alternative mine plans: Tete Angela (option 1), Fish Creek South (option 2), and Fish Creek North (option 3 – the proposed mine plan). The Proponent concluded, in both the Application and supplemental report on alternatives, that due to increased costs of options 1 and 2 ($440 and $340 M respectively) both alternatives were "fatally flawed", resulting in, in the Proponent's view, a project of excessive economic risk.

Irrespective of the financial considerations, EAO also noted that options 1 and 2 present some degree of environmental risk as well. Specifically, there is a reasonable likelihood that Fish Lake (and the recreational use of it) would be adversely affected by virtue of the pit being located approximately 500 m downstream.

The EAO also notes that option 1 raises an additional environmental consideration by introducing impacts into a second watershed. This is to be contrasted with option 3 (as reflected in the Proponent's mining plan) which limits activities to one watershed. It does this by working with natural hydrology so that much of the anticipated seepage and contaminated surface water would report to the pit at mine closure. At this contained collection point, water would be tested and water treatment decisions made prior to any discharge.

The additional alternative of moving the waste rock storage away from Fish Lake and maintaining the TSF in its current design location would not result in the preservation of Fish Lake. Such a design would not provide enough distance between the Lake and the TSF for effective mitigation. As a result, tailings seepage would be expected to deteriorate the water quality of Fish Lake to that of seepage pond water quality.

Economic Benefits

Economic benefits of the proposed Project would include the following:

- an average of approximately 375 person years of employment annually during construction (2 years) and operations (20 years);
- jobs provided by the Proponent would be high-paying, averaging over $90,000 per year plus benefits;

- during operations, the proposed Project's annual payroll is expected to be approximately $32 million, with $29 million paid locally;
- indirect employment and incomes increases as a result of the procurement of goods and services for the proposed Project from local and regional suppliers;
- total average annual government revenues from the proposed Project would be approximately $26 million in the construction phase, $48 million in the operations phase;
- the proposed Project is estimated to generate approximately $340 million in GDP annually; and,
- spending benefits over the life of the project.

Contribution to Community Development

This economic activity would benefit a region that has above-average unemployment relative to the rest of the province (as of November 2009 unemployment in the Cariboo-Chilcotin Region was 12% compared to 7.4% provincially). The Cariboo-Chilcotin Region is one of the most forest product dependent regions of the province and impacts of the mountain pine beetle have been severe. The proposed Project would help diversify the economic base and create new opportunities for contractors and suppliers, including a potential demand for new housing units and improved infrastructure (and associated construction opportunities). Both the City of Williams Lake and the Cariboo Regional District have expressed strong support for the proposed Project.

Value of Fish Habitat Compensation

A comprehensive Fisheries Compensation Plan has been proposed to offset the loss of Fish Lake and related habitat. While in EAO's view this does not negate the significance of the adverse effect on fish and fish habitat, the comprehensiveness of the proposed plan should be considered in assessing whether the proposed Project is justifiable.

The Proponent's Fisheries Compensation Plan includes a hatchery to maintain genetic integrity, outplanting to lakes in the region, and the creation of a new lake and spawning channels. MOE supports the proposed compensation plan and has indicated that it will adequately address the relevant policy goals (articulated in MOE's August 2008 Benchmark Statement) by ensuring:

- maintenance of the genetic line exhibited in the trout population of the Fish Lake system;
- lake and stream environments of similar or better productive capacity for trout as provided by the Fish Lake system now;

- a healthy sustaining trout population; and,
- a trout fishery for First Nations and the public of at least similar character to what is supported by Fish Lake under current conditions (in terms of number and size of fish, accessibility, and use).

Allocation of Costs and Benefits

The costs of the proposed Project would be borne both by the present and future generations with the loss of Fish Lake and Little Fish Lake. Should Prosperity Lake become successful viable fish habitat as anticipated, the relative costs to future generations would be reduced.

The economic and social benefits from the proposed Project are related to employment, contracting opportunities and to government financing and would accrue to the present and next generations. Presently, direct benefits would flow to different communities within the region and provincially for an anticipated 22 years. Benefits would also accrue to the future generation as a consequence of community development.

Therefore, there is no expected cost to future generations, except the loss of Fish Lake and Little Fish Lake. These may be offset, either wholly or partially, by the compensatory values of Prosperity Lake. Future generations, however, would bear the risk that Prosperity Lake does not provide successful viable fish habitat.

13 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 efforts to address these issues; and

- commitments and mitigation measures identified in Appendix C to be undertaken by the Proponent during the construction, operation, and decommissioning of the proposed Project,

EAO is satisfied that:

- the EA process has adequately identified and assessed the potential significant adverse environmental, economic, social, heritage and health effects of the proposed Project;
- consultation with First Nations, government agencies, and the public, and the distribution of information about the proposed Project have been adequately carried out by the Proponent and that efforts to consult with First Nations would continue on an ongoing basis; and
- the provincial Crown has fulfilled its obligations for consultation and accommodation to First Nations relating to the issuance of an EA Certificate for the proposed Project.

The provincial Minister of Environment and the Minister of Energy, Mines and Petroleum Resources would consider this Assessment Report and other accompanying materials, including the Recommendations of the Executive Director, in making their decision on the issuance of an EA certificate to the Proponent under the *Act*.