



AJAX PROJECT
Environmental Assessment Certificate
Application / Environmental Impact
Statement for a Comprehensive Study

EIS SUMMARY
December 2015



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Environmental Assessment Certificate Application / Environmental Impact Statement for a Comprehensive Study

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EXECUTIVE SUMMARY

ES 1. INTRODUCTION

KGHM Ajax Mining Inc. (KAM; the proponent) is proposing to develop, construct, operate, close, decommission, and reclaim the proposed Ajax Project (the Project). The Project is a nominal 65,000 tonne per day (tpd) open pit copper/gold mine, with an estimated 23-year mine life producing copper/gold concentrate that will be transported to the Port of Vancouver for shipment to overseas smelters.

The Project is located in the South-Central Interior of British Columbia (BC), south of the city of Kamloops, within the Thompson-Nicola Regional District (TNRD; Figure 1). The Project lies within the traditional territory of the Secwépemc Nation. The Project also lies within the Nlaka'pamux traditional territory.

The Project area consists of rolling grasslands, and timber at the higher elevations. Elevations range from 800 to 1,100 m above sea level. Sugarloaf Hill is the prominent landform in the area with an elevation of 1,130 m. At lower elevations, the vegetation typically comprises bunchgrass, sagebrush, and prickly pear cacti. Higher elevations commonly sustain growths of Lodge pole Pine, Douglas Fir, and Ponderosa Pine. The Ajax area has a semi-arid climate with a long-term average annual temperature of 6.4°C, with average monthly temperatures ranging from -4.9°C in January to 18.7°C in July. Mean annual precipitation for the Project area is estimated to be 336 millimetres (mm), with 70% falling as rain (217 mm) and 30% falling as snow (93 mm).

The Project Site has been subject to many anthropogenic disturbances for decades, including historic mineral exploration and mining and active ranching. KAM has acquired surface rights to the lands on which the primary mine infrastructure will be located.

The Project consists of an open pit mine, on-site ore processing facilities, a tailings storage facility (TSF), mine rock storage facilities (MRSFs), water management facilities, including seepage collection ponds, and a diversion system to convey water from Jacko Lake around the site and back to a new Peterson Creek Downstream Pond, low-grade and medium-grade ore and overburden stockpiles, ancillary facilities, mine haul roads, sewage and waste management facilities, a 4-km access road between the Project and Highway 5, a 15-km pipeline for water supply connecting to the existing New Afton facilities, a 5.3-km natural gas pipeline connecting to the Fortis system near Knutsford, and a 10-km power line connecting the Project Site to the BC Hydro transmission line corridor. The Project infrastructure is shown in Figure 2. Ore will be processed on site through a conventional crushing, grinding, and flotation process to produce a copper/gold concentrate. The concentrate will be transported via truck using the existing highway network to the existing storage, handling, and loading facilities located at Port Metro Vancouver for shipment to overseas smelters.

This Application for an Environmental Assessment Certificate / Environmental Impact Statement (Application/EIS) is intended to demonstrate that the Project will be undertaken in an environmentally acceptable manner that will provide social and economic benefits. The Project will

promote economic prosperity throughout BC, particularly in the Thompson-Nicola area of BC. The Project will provide employment and commercial opportunities, while generating local, provincial, and federal tax revenues. The Project can be implemented without lasting significant adverse local or regional environmental or economic effects, and without undermining family or community well-being, public health or established and asserted Aboriginal rights and interests. Responsible mining practices, in compliance with the principles of sustainable development, will guide the implementation of the Project.

ES 1.1 Purpose of Application / Environmental Impact Statement

The Project is subject to review under the British Columbia *Environmental Assessment Act* (BC EAA; 2002). The proposed mine facility constitutes a reviewable project pursuant to Part 3 of the Reviewable Projects Regulation (BC Reg. 370/2002). The Project is also subject to review under the transitional provisions of the *Canadian Environmental Assessment Act* (CEAA; 2012) as a comprehensive study.

The information, analyses, and findings within this Application/EIS are intended to satisfy both the provincial and federal requirements such that the Project can be reviewed by a technical working group of government agencies and First Nations, as well as the public, leading toward environmental assessment (EA) approvals that are required to allow KAM to develop the Project.

ES 1.2 Organization of Application / Environmental Impact Statement

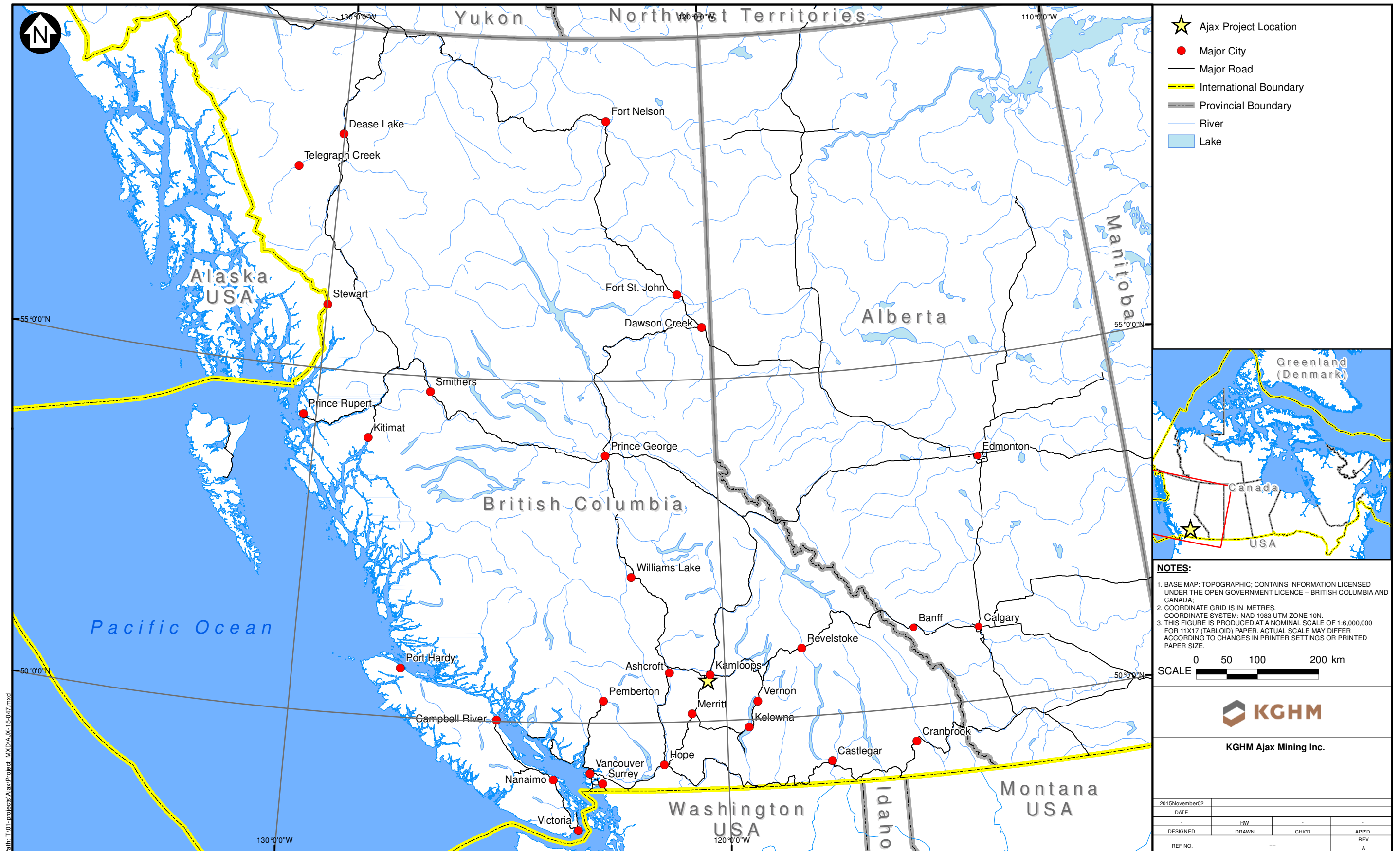
The Application/EIS has been developed in accordance with the Application Information Requirements (AIR)/EIS Guidelines, jointly issued by the BC Environmental Assessment Office and the CEA Agency (BC EAO 2015) as follows:

Front Matter – This part of the Application/EIS comprises the Preface, the Table of Concordance, the Executive Summary, the Acknowledgements, the Table of Contents, the list of Acronyms and Abbreviations, and the Glossary.

Part A Introduction and Background – Chapters 1 to 4 describe the purpose of the application, overview of the Project, a detailed Project description, a description of closure and reclamation, explain the environmental assessment process, and the engagement and consultation that KAM has undertaken to date (pre-Application), and plans to continue through the remainder of the environmental assessment process.

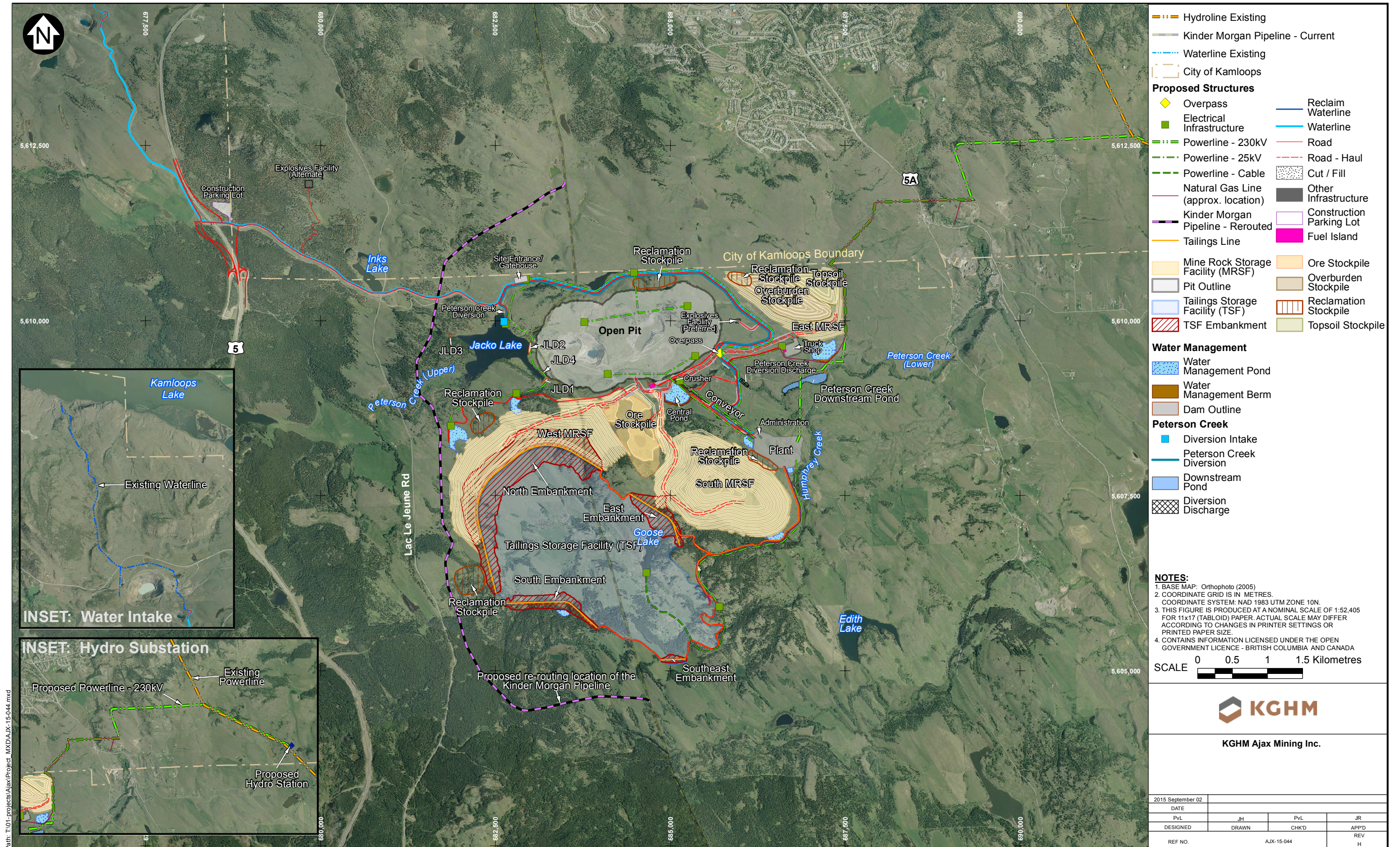
Part B Assessment of Potential Effects, Mitigation, Residual Effects Significance – Chapter 5 outlines the effects assessment methodology, while Chapters 6 through 10 identify the Valued Components (VCs) as derived from baseline data collection and stakeholder engagement, and describe the existing biophysical, economic, social, heritage, and health environments for each VC. Within each chapter, the potential effects of the Project are assessed and significance of potential residual effects is evaluated. Chapter 11 outlines the proponent's Environmental Management System and the Environmental Management Plans (EMPs), which describe the means and methods that KAM will employ to manage environmental risks and effects.

Figure 1
Ajax Project Map



Path: T:\01-projects\Ajax\Project_MXD\AJX-15-047.mxd

Figure 2
Ajax Project General Arrangement



Part C Aboriginal Rights and Interests – Chapters 12 to 16 assess the effects of the Project on Aboriginal rights and related interests in addition to providing a summary of all pre-Application and proposed Application/EIS review stage consultation and engagement activities.

Part D Federal Information Requirements – Chapter 17 summarizes the environmental effects, mitigations, residual effects, assessment of significance and cumulative effects assessments presented in Part B and the Aboriginal engagement presented in Part C. It also outlines Federal requirements including the potential effects of the Project on the capacity of renewable resources, potential environmental effects of accidents and malfunctions, and potential effects of the environment on the Project.

Part E Conclusions – Chapter 18 presents a summary of the residual environmental effects, the key overarching commitments made by KAM with respect to development of the Project, and the conclusions for the Application/EIS detailing the proponent’s understanding of the EA process to minimize environmental, economic, social, heritage, and health effects and effects on Aboriginal rights, title and interests while striving to promote employment and sustainable resource development.

Appendices are included to provide the supporting studies and other pertinent documentation relevant to the review of the Application/EIS document.

ES 2. PROJECT BACKGROUND AND OVERVIEW

ES 2.1 The Proponent

KGHM Ajax Mining Inc. (KAM) is a joint venture company between KGHM Polska Miedź S.A. and Abacus Mining and Exploration Corp. (AME). KGHM Polska Miedź S.A. is a Polish copper mining and smelting company that formed in 1961, and is the world’s ninth largest copper producer. Since 1997, the company has traded publically on the Warsaw Stock Exchange under the symbol “KGHM.” KGHM currently employs over 18,000 people in three mines, two copper smelters, a wire rod plant, and various auxiliary business units. KGHM International Ltd. is a wholly owned subsidiary of KGHM Polska Miedź S.A., and is the operator of mines in the United States (Carlotta Mine, Robinson Mine), Canada (Morrison Mine, McCreedy Mine) and Chile (Franke Mine) and recently commenced operation of the Sierra Gorda copper-molybdenum project in Chile. In Canada, KGHM International is progressing the Victoria Project in the Sudbury Basin of Ontario and the Ajax Project in BC. AME is a BC-registered company, incorporated on October 17, 1983. AME has engaged in mineral exploration in the Province, with its primary focus being the deposits associated with the Project. Abacus Mining and Exploration Corp. is a company a Tier One issuer that trades on the Toronto Stock Exchange Venture Exchange under the symbol “AME”.

The primary representatives for the project are:

Ms. Nicola Banton, KGHM Ajax Mining, Inc.
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ES 2.2 Purpose of the Project

The natural resource development objectives outlined in the Government of Canada's (2012) Economic Action Plan, and BC's Mineral Exploration and Mining Strategy (BC MEM 2012) support the need for and purpose of the Project. The purpose of the Project is to mine and process ore from the Ajax East and Ajax West deposits and transport copper/gold concentrate to world markets so there is an economic return on investment while protecting the environment and maximizing the socio-economic benefits to the region.

The need for this Project is to:

- provide a return on investment to the Company's shareholders;
- supply copper and gold to the international marketplace, where KAM believes reasonably foreseeable international demand is favourable for an operating mine at the Ajax Project;
- support local land use plans that are based on economic diversity for the Regional area and British Columbia;
- contribute to the development of infrastructure, skills training, employment, and business opportunities in the TNRD and British Columbia. This will help build healthy communities and strengthen partnerships between KAM, stakeholders and institutions; and
- contribute to sustainable development with the overall net benefit of the Project.

ES 2.3 Project Location and History

The Project is located in the South-Central Interior of BC, south of the city of Kamloops, in the Thompson-Nicola Regional District (TNRD). The primary components are adjacent to, but outside, Kamloops city limits with the closest facility being the East Mine Rock Storage Facility, approximately 1.4 kilometres (km) from the Knutsford community, and approximately 1.7 km from the Kamloops neighbourhood of Aberdeen. The Project lies in an area identified as part of traditional territories of the Secwepemc Nation. The traditional territories of the Nlaka'pamux and Métis Nations also overlap with the Project.

ES 2.3.1 Oral History

Through the course of consultation and engagement related to the Project, a number of important geographic regions have been identified. The Jacko Lake area, also known as Pípsell, is considered an important cultural landscape and place with spiritual and cultural value for the Stk'emlupsemc te Secwépemc Nation (SSN).

The oral history surrounding this area is said to be connected to the epistemological underpinning for Secwepemc *stsq'ey* (which means indigenous law) that explains the reciprocal and mutually

accountable relationships between human beings and the environment (e.g., fish, birds, animals, the atmosphere and the water cycle). This relationship is illustrated in a story called the *The Trout Children*, part of the oral tradition of this area. The story explains the relations between humans and the trout people who are said to live in and under the lake. It explains how water-beings (*xqelmecwetkwe*) active underneath the lake are also connected to Kamloops Lake, Adams Lake, Shuswap Lake and the North Thompson River. The story is also connected to rituals and ceremonies by way of a song called Chickadee (*tsqiqse7*) which is also connected to Pípsell. The story was also connected to a Prayer Tree (which no longer exists) at the entrance to the Peterson Creek/Jacko Lake area in what is now known as Knutsford. The tree, since destroyed by development of a road decades ago, served as a medium for human communication with the sky (atmosphere) world. It was important to communicate and show respect for the land and creatures in this area. The SSN identify this area as having spiritual, cultural and ceremonial values through oral traditions, an offering tree, spiritual connections and prayers with water beings. Some cultural and ceremonial uses still occur today; however, the Secwepemc people including the SSN have been largely alienated from these lands from various agricultural and industrial activities since the 1860s. Another prayer tree is said to exist in the vicinity of Jacko Lake.

ES 2.3.2 *Mining History*

Exploration and production for copper, gold, and iron in the Project area can be traced back over 100 years, with exploration in the area beginning in the 1880s and continuing intermittently until the 1980s. In the 1980s, Afton Operating Company (owned in majority by Teck Cominco) defined the Ajax mineral resource with mining operations initiated by Afton in 1989 on the Ajax East and Ajax West claims. These operations were suspended in 1991 because of depressed metal prices. Production began again in 1994 and lasted until 1997. During these periods of production, it is estimated that 17 million tonnes (Mt) of ore were mined and 13 Mt were milled from five open pits. The tailings storage facility and project components were decommissioned by Afton in accordance with their closure plan, which includes maintenance requirements for dams, hydraulic structures, and appurtenances to ensure that they are safe and stable. The historic Afton mine site, including the mill building and deactivated and decommissioned tailings storage facility, is situated 10 km west of the Project.

KAM was established in June 2010 following KGHM SA's acquisition of a 51% ownership stake in the Ajax Project. In April 2012, KGHM SA exercised their option to increase ownership in the Project to 80%. The Project is located on the footprint of the previous Ajax East and Ajax West open pits and associated access and haul roads and reclaimed mine rock stockpiles.

ES 2.4 **Project Tenure**

KAM currently controls land in the Project area, with ownership of 61 mineral claims and 31 Crown-granted mineral claims. Of these claims, 48 of the mineral claims and 28 of the Crown Grants are contiguous with the Ajax area. The remaining claims are near the Project but are not contiguous. In 2012, KAM purchased the Sugarloaf Ranch lands, as well as adjacent land parcels held by Teck Resources. KAM, in conjunction with the Sugarloaf Ranch, now holds the majority of lands within the Project footprint.

The Project is located in an area that contains a mix of rural agricultural lands, small acreage holdings, and Crown forest lands. KAM has negotiated Purchase Agreements, Option Agreements, and Right-of-Way agreements with a number of local landowners in order to acquire surface rights to certain lands on which mine infrastructure such as mine rock storage facilities and power lines planned to be located. KAM also holds authorizations and permits that are in place for the mineral exploration activities and baseline data collection activities that are occurring on the Property and associated activities and infrastructure in the area.

ES 2.5 Project Schedule

Construction, from commencement to plant commissioning, is expected to last approximately two and a half (2.5) years. Activities during this period include the main access road upgrades, site road construction, process facility construction, site infrastructure construction, pipeline construction, mine development, tailings and water management facilities construction, followed by commissioning of the plant.

The Project's anticipated operational phase is approximately twenty-three (23) years, which is contingent on material changes that could arise during the continued exploration work, process refinement, or throughput modifications and is subject to commodity price and cost fluctuations.

Decommissioning and Closure activities are expected to take approximately five (5) years, followed by a Post-Closure monitoring phase to confirm that all mitigation and closure facilities and structures are functioning properly. The length, location, and frequency of required monitoring will be based on the requirements of relevant government agencies and reflected in associated permits. Progressive closure and reclamation activities are planned to occur throughout the Project life where feasible.

ES 2.6 Project Benefits

KAM believes that the Project will make a substantial positive contribution to social and economic conditions in the Kamloops area and the TNRD, as well as within the Province of British Columbia (BC) and Canada.

Mining has historically been, and continues to be, an important sector within the TNRD. The Project's location and geographic proximity to Kamloops are beneficial to the Project as the region has a knowledgeable and experienced local workforce, businesses and available infrastructure and services. Kamloops and surrounding area also stand to benefit as much of the direct and indirect hiring and spending will take place locally, contributing to the community both economically and socially. Aboriginal Groups in the vicinity of the Project, including the SSN, also stand to benefit from employment, training, contracting, and other economic aspects of the Project. KAM is committed to negotiating with Aboriginal Groups to establish impact benefit agreements where project-specific concerns will be addressed and benefits enhanced.

For the Construction phase, key economic benefits of the Project include the following:

- total employment (direct, indirect, and induced) of approximately 9,725 person-years for BC, and 3,715 person-years for the rest of Canada;

- total gross domestic product (GDP) (direct, indirect, and induced) contributions of approximately \$873 million in BC and \$409 million in the rest of Canada; and
- total tax revenue (federal, provincial, and local) contributions of approximately \$354 million.

For the Operation phase, key economic benefits of the Project include the following:

- total employment (direct, indirect, and induced) of approximately 33,400 person-years for BC, and 12,400 person-years for the rest of Canada;
- total GDP (direct, indirect, and induced) contributions of approximately \$5.1 billion in BC and \$1.5 billion in the rest of Canada; and
- total tax revenue (federal, provincial, and local) contributions of approximately \$1.9 billion.

ES 3. ASSESSMENT PROCESS

Proposed mine projects that meet a certain annual or daily throughput threshold must undergo an EA in accordance with provincial and federal legislation. Provincial assessments for metal mines are triggered at a throughput of 75,000 tonnes per annum of mineral ore; federal assessments for metal mines at a throughput of 3,000 tonnes per day. The Project exceeds both thresholds at 65,000 tonnes per day. Chapter 4 outlines the provincial and federal assessment processes for the Ajax Project.

The *Canadian Environmental Assessment Act, 2012* (CEAA 2012) came into force on July 6, 2012. As the Project was already underway when the new legislation came into force, the Project is subject to the transition provisions as set out in CEAA 2012. These transition provisions require that, as the Project is a comprehensive study that commenced since July 2010, it will continue to be assessed under the former *Canadian Environmental Assessment Act* (former CEAA) as if the former CEAA had not been repealed. The federal environmental assessment will continue to follow the requirements of the former CEAA with the Canadian Environmental Assessment Agency (CEA Agency) exercising the powers and performing the duties and function of the responsible authority.

The Project is subject to a coordinated provincial-federal EA process conducted under the principles of the now-expired Canada-British Columbia Agreement for Environmental Assessment Cooperation (the Agreement; CEA Agency 2014). The Agreement aligns key aspects of the assessment process to minimize duplication and improve efficiency (e.g., conducting joint public comment periods, coordinating Aboriginal consultation, using common documents that meet the requirements of both governments, and establishing common working groups to facilitate the review process). The BC EAO and the CEA Agency established the EA Working Group and began holding Project-related meetings on April 27, 2011. The purpose of the Working Group is to review and comment on key EA documents, including the AIR/EIS Guidelines, the Application/EIS, and the BC EAO Assessment Report and CEA Agency Comprehensive Study Report.

ES 3.1 Provincial and Federal Environmental Assessment Requirements

ES 3.1.1 Provincial EA Process

The provincial EA process has three stages: Pre-Application, Application Review, and Decision. KAM entered the Pre-Application stage of the provincial process with the submission of a Project

Description (PD) on December 6, 2010 to the BC EAO. A revised PD was submitted on February 8, 2011, to address comments from the BC EAO. After reviewing the revised PD, an Order under section 10(1)(c) of the BC EAA (2002) was issued by the BC EAO on February 25, 2011 indicating the Ajax Project was reviewable. On January 11, 2012 the BC EAO issued an order pursuant to section 11 of the BC EAA (2002), which prescribed the scope, procedures, and methods to undertake the provincial EA, including public, government agency, and First Nations consultation requirements. This was amended via an order pursuant to section 13 of the BC EAA on July 23, 2015.

The AIR (formerly referred to as a Terms of Reference) identifies the information required to be submitted in the Application. In line with the federal-provincial coordination process, the provincial AIR document and the federal EIS Guidelines were prepared as one document for the Project and are referred to as the AIR/EIS Guidelines throughout this Application/EIS. The proponent prepared a draft AIR (dAIR) for the Project, and submitted it to the BC EAO for review on April 18, 2011. The dAIR was then revised to address EAO's preliminary comments and submitted on June 15, 2011. The dAIR was then revised a second time and re-submitted on August 11, 2011 based on feedback received from the first public consultation period, which included adding valued components to the scope of the assessment. A third revision was made to the dAIR on January 6, 2012 to address Working Group comments and the dAIR was posted to the EAO's electronic Project Information Center (e-PIC) website on January 11, 2012 for public comments. At that time (February 2012) a multi-stakeholder Community Advisory Group (CAG) was established to provide a forum for dialogue and input on the EA process, review information regarding the proposed Project, and provide input into and promote effective communication and engagement between government and specific interest groups and the general public. A 75-day public comment period on the dAIR/EIS Guidelines ran from January 11 to March 27, 2012.

A final AIR incorporating comments received from the public, First Nations, Working Group, Community Advisory Group (CAG), federal, provincial, and local government agencies was submitted to the BC EAO on June 13, 2013, and posted on the e-PIC website on June 25, 2013.

On November 10, 2014 due to Project design changes, a revised AIR was posted to e-PIC to reflect the new Ajax South General Arrangement, which presents the optimized Project design intended to address concerns raised in earlier consultation processes. Key changes included moving major components further away from the city of Kamloops and a change in tailings storage technology. These updates were reviewed and modified based on feedback from the Project Working Group. A 30-day public consultation period on the revised AIR was held from November 18 to December 18, 2014.

A revised and final AIR was posted to the e-PIC website on July 23, 2015, taking into account issues raised during the consultation period.

The formal submission of the Application/EIS will trigger a 30-day screening period, during which the BC EAO (with feedback from the EA Working Group) will determine whether the submission meets the requirements outlined in the AIR. If the Application/EIS is determined to be sufficient, it will enter the Application review stage, comprising a 180-day review, which will involve the EA Working Group, Aboriginal groups, local government, and the public. These groups will have

opportunities to provide comments on the Application/EIS; KAM is required to track and respond to all of the comments.

During the Application Review stage, the BC EAO will prepare an Assessment Report, which summarizes the results of the assessment. At the end of the Application Review stage, the BC EAO will refer this report, and its recommendation and the draft EA certificate (which includes a Certified Project Description and conditions that must be met by KAM if a certificate is issued), to the Minister of the Environment and the Minister of Energy and Mines. The Ministers' decision will be made within 45 days of a referral and is posted to the BC EAO's e-PIC website, along with the corresponding EA Certificate. If issued, the EA Certificate is a legally binding document granting conditional approval for the Project to proceed following acquisition of applicable permits.

ES 3.1.2 Federal EA Process

The federal EA process for the Project was initiated in 2011, under the former *Canadian Environmental Assessment Act* (1992; amended in July 2011 by the *Jobs and Economic Growth Act* [2010]), as a comprehensive study. The federal EA process commenced with the submission of a Project Description (PD) on December 6, 2010. A revised PD was submitted on February 8, 2011, to address comments from the CEA Agency. Based on early feedback, Aboriginal and public concerns, and continuing refinements to the project design, a revised version of the Project Description was submitted on May 17, 2011. The Ajax Project Description was screened and accepted for a 90-day review period by the CEA Agency for the purposes of determining whether a federal EA was required for the Project. A final PD was submitted on July 6, 2011.

A Notice of Commencement (NoC) was issued by the CEA Agency on May 31, 2011, and later updated on January 10, 2012, and posted to the Canadian Environmental Assessment Registry Internet Site (CEARIS) stating that a federal EA of the Ajax Project was required. The NoC initiated the beginning of a 365-calendar day government time limit; under the Establishing Timelines Regulation, the "clock" can be stopped at the request of the proponent or the CEA Agency if it is deemed there is insufficient information for the EA process to proceed. Since the NoC was posted, 145 days of government time have elapsed with 220 days remaining at the start of the EIS review phase.

Under the *Jobs and Economic Growth Act* (2010) amendments to CEAA (1992), a Background Information scoping document was posted to the Canadian Environmental Assessment Registry on August 26, 2011. The Background Information document identifies the scope of the assessment, factors to be considered, and information related to public participation and Aboriginal consultation to be included in the EIS. The Background Information document also provides the public with an opportunity to comment on the conduct of the comprehensive study. Similar to the provincial process, the CEA Agency prepares a comprehensive study report (CSR), which summarizes the key findings, mitigation, and consultation issues related to the EA process for the Project. The CSR is subject to a third and final public comment period prior to being submitted to the federal Minister of the Environment for their review and decision.

After taking into consideration the EIS, public comments, and the adequacy of consultation activities conducted with Aboriginal Groups by the CEA Agency, the Minister of the Environment is required to issue an EA Decision Statement under section 23(1) of CEAA (1992) for the Project. If the Project is

approved, the Minister will issue an EA Decision Statement that describes the mitigation and follow-up conditions that the proponent must comply with. The Minister will then refer the project back to the responsible authorities to take their course of action decisions under section 37 of CEAA (1992).

ES 3.2 Information Distribution and Consultation

ES 3.2.1 Approach to Consultation and Engagement

KAM recognizes that long-lasting, productive relationships with communities and Aboriginal Groups are created through meaningful communication and consultation. The relationships that form as people engage with corporations proposing large-scale projects, such as the Ajax Project, are critical to the development of social licence.

Consultation is important throughout all stages of the Project and includes the provision of information and gathering of input, as well as the identification of interests that may interact with the Project. KAM has implemented a comprehensive consultation, engagement and communication process with both Kamloops-area residents, Aboriginal communities, and relevant government stakeholders. The approach is designed to provide interested parties with opportunities to become informed and express their views about the Project, including asking questions and seeking answers. The input provided by the community and Aboriginal Groups throughout this process has proved valuable to KAM in the planning of the environmental assessment, proposed mine operations and mine design.

KAM is committed to open and transparent communication as it develops the Project and will continue to actively seek feedback and input on Project performance. Effective and engaging consultation helps communities and companies learn about each other's needs and aspirations, and ultimately, reach mutually beneficial levels of understanding.

ES 3.2.2 Aboriginal Information Distribution and Consultation

The Project lies within the traditional territory of the SSN. The section 11 Order (issued by the BC EAO on January 11, 2012) identifies the SSN as the Project "First Nations" whom KAM is required to consult regarding potential Project effects on their Aboriginal interests. The Project also lies within the Nlaka'pamux traditional territory and the section 11 Order identifies Lower Nicola Indian Band (LNIB) and Ashcroft Indian Band (AIB) as "Working Group First Nations" and directs KAM to provide information to them regarding the Project, specifically the Application/EIS. On July 23, 2015, the BC EAO issued a section 13 Order identifying Whispering Pines/Clinton Indian Band (WP/CIB) as a "Notification First Nation" and directed KAM to provide information to the WP/CIB regarding the Project. In addition to the Aboriginal Groups identified above, the CEA Agency identifies the Métis Nation of BC (MNBC) as potentially affected by the Project.

KAM is committed to meaningful consideration of the comments and concerns expressed by Aboriginal Groups. Pre-Application activities and traditional knowledge/use studies have aimed to identify issues, rights, and interests that are of importance and to understand Aboriginal perspectives on how the Project may interact with those interests. Furthermore, consultation has sought to identify potential mitigation, accommodation or amelioration measures to address

potential effects on Aboriginal interests. The available information has been incorporated into the Application/EIS and KAM remains committed to incorporation of any future input into project development planning.

Pre-Application Stage

During the pre-Application stage, KAM engaged in the following activities to share information and consult with Aboriginal Groups:

- early notification about the Project to Aboriginal leadership;
- meetings with Aboriginal leadership;
- site tours;
- stakeholder issues and information management system;
- Project website and blog;
- Project office;
- Project materials; and
- creation of an external affairs team that includes an Aboriginal Group liason.

Aboriginal Groups were notified of the Project through BC EAO/CEAA notifications, as well as through correspondence from KAM in 2011 and 2012. The SSN, AIB, and LNIB participated in a number of Working Group meetings held between 2011 and 2015. Through the Working Group, the SSN, AIB, and LNIB were provided with opportunities to review and comment (verbal and written) on the selection of Valued Components for the effects assessment, design of the baseline study programs, environmental and socio-economic studies, and any issues and information requirements related to EA. Comments provided were considered in the development of the VCs, the AIR/EIS Guidelines, and other aspects of the Application/EIS.

BC EAO provided Aboriginal Groups with opportunities to review and comment on drafts of the AIR/EIS Guidelines. Comments received from Aboriginal Groups were considered and, where appropriate, incorporated. KAM provided Aboriginal Groups with opportunity to review and comment on relevant draft sections of the Application/EIS.

Stk'emlupsemc te Secwépmc Nation

Consultation activities with the SSN during Pre-Application included EA funding, capacity building, a Traditional Knowledge/Traditional Land Use (TK/TLU) study, community meetings, site tours, and meetings with SSN representatives. KAM developed a First Nations Consultation Plan (FNCP) for the Pre-Application and Application review periods. Meetings were held regarding SSN's preferred consultation approaches, during which SSN identified a framework for consultation. A revised FNCP was sent to the SSN on June 24, 2015. KAM has implemented, and to the extent possible, completed all consultation described in the FNCP for the Pre-Application phase.

KAM provided a range of funding to the SSN to facilitate their involvement in the EA process and to obtain an accurate understanding of SSN's Aboriginal Interests. Funding included a negotiation agreement, a memorandum of understanding, a capacity funding agreement, and funding for a

TK/TLU study. The SSN continues to express an interest in capacity building. To support these requests, KAM has made available a number of contracting, employment, and training opportunities. Between July 2013 and March 2015, SSN companies were awarded over \$3.5 million in related contracting opportunities.

KAM held four community meetings with the SSN in 2015 to deliver presentations on project overviews, changes to the mine design and arrangement of facilities, and the project development schedule. KAM facilitated one site tour prior to 2011 and five site tours from 2011 to date for the SSN. KAM and the SSN participated in over 60 recorded meetings (primarily in-person) between January 1, 2011 and July 31, 2015.

Other Aboriginal Groups

Consultation activities undertaken with the AIB and LNIB during the Pre-Application period includes EA funding, capacity building, meetings, site tours, and information sharing.

Activities undertaken with WP/CIB and MNBC during the Pre-Application period and includes EA funding, meetings, site tours, and information sharing.

Issues Raised

KAM has tracked the issues, concerns, and interests identified by Aboriginal Groups throughout the consultation process. The Application/EIS includes a tracking table that provides a detailed list of the input provided by Aboriginal Groups and KAM's responses to this input. Items raised by Aboriginal Groups are wide ranging, and include (but are not limited to):

- potential loss of traditional territory, including loss of land to support cultural activities and harvesting by community members;
- changes to rights and title in relation to Jacko Lake, Goose Lake, and Kamloops Lake;
- potential effects on cultural/ceremonial sites, particularly Jacko Lake and surrounding areas (also known as Pípsell), including Jacko Lake, Goose Lake, Jacko Creek (upper Peterson Creek) and the Hunting Blind Complex;
- potential effects on water quality and quantity in the Peterson Creek watershed, Jacko Lake, Kamloops Lake, Cherry Creek, and the Thompson River including effects from dust and/or seepage from the mine site;
- potential effects on fish, including habitat, movement and availability;
- potential effects on wildlife and wildlife habitat, including effects on non-migratory game birds, displacement of ungulates as a result of disruption in movement, and effects on other small mammals in the Project vicinity;
- destruction of grasslands which also support biodiversity;
- changes in access to and use of preferred harvesting locations (e.g., Jacko Lake, Goose Lake, Peterson Creek);
- potential effects on berry and wild root vegetation, as well as other medicinal and food plant gathering sites (in the vicinity of the Project and around Jacko Lake);

- potential effects on human health, as a result of contamination of country foods, or domestic drinking water, air quality changes (e.g., dust) as well as effects from noise and vibration (e.g., blasting);
- potential negative effects on social conditions such as increased pressure on health services, and additional social problems from increases in disposable income due to population increases;
- interest in support for economic opportunities, such as training and skills development for members and employment and contracting opportunities;
- accidents and malfunctions including potential failure of the TSF;
- potential contamination during the Post-Closure phase (i.e., adequate reclamation);
- cumulative effects on traditional land use resulting from interactions with other industries and developments in the Project area; and
- consultation concerns such as a lack of capacity funding and participation in the environmental assessment process.

Application/EIS Review Stage

KAM will continue to work with Aboriginal Groups to understand potential Project effects, optimize potential mitigation measures, and respond to information requests. Planned activities include sharing copies of the Application/EIS, a dedicated web platform for the contents of the Application/EIS, summaries for the public of the Application/EIS in plain language, feedback from Aboriginal Groups, community information sessions, site tours, and public announcements regarding regulators' decisions regarding the Application/EIS.

KAM will endeavour to resolve any outstanding issues through continued dialogue with Aboriginal Groups using the consultation activities.

In parallel with the procedural aspects of engagement associated with Application/EIS review, KAM will continue to negotiate with Aboriginal Groups to establish impact benefit agreements where Project-specific concerns will be addressed and shared benefits enhanced.

Post-Application/EIS Review Stage

Should the Project be approved by the environmental assessment process and move into permitting and operational phases, KAM will continue to engage with Aboriginal Groups to promote positive and constructive long-term relationships. Continued dialogue will enable benefits to Aboriginal Groups to be enhanced and that issues that may arise during construction or operation to be addressed.

ES 3.2.3 Public and Government Agency Information Distribution and Consultation

Pre-Application Stage

KAM recognizes the interest of the community in the Project and is committed to developing transparent, respectful, and mutually beneficial partnerships with community members and with the region as a whole. Consultation activities have generally involved providing project information,

soliciting input on the project, and providing timely responses to comments. KAM recognizes that consultation with a diverse community such as Kamloops requires communication through varied channels. KAM has, and will continue to, employ a range of consultation and information distribution methods and tools, such as community information sessions, small group meetings, site tours, and project websites to reach large groups as well as individuals.

Additionally, specific efforts have been undertaken by KAM to ensure appropriate levels of government and regulatory engagement, information sharing and consultation; these concerted efforts been applied at all four relevant jurisdictional levels.

In 2012, the BC EAO established a community advisory group (CAG) for the Project, comprising groups having interests in the City of Kamloops and the Project. Meetings were held with the EAO to develop and finalize the terms of reference and operating procedures for the CAG and to review and finalize input from the CAG on the draft AIR/EIS Guidelines. Various members of the government agencies, in addition to Aboriginal groups, also participated in the Project's Working Group, which was established in 2011. KAM submitted a public consultation plan to the BC EAO in May 2012, as well as an updated version in April 2015. Activities specified in the plan include community information sessions, small-group meetings, meetings with special interest groups, one-on-one meetings, site tours, a Project website, creation of 3D and digital models, use of traditional and social media, a community relations centre, mailouts, responses to public comments, and community donations.

The Working Group met regularly during the Pre-Application phase, with engagement intensifying in 2014 through a technical engagement program designed to ensure that key components of the Application/EIS were being evaluated, assessed, and reported in accordance with Working Group preferences. Special topics for working group meetings included fish and aquatics, water, air quality, human health, traffic, noise/vibration, socioeconomic impacts, and visual impacts.

Issues Raised

The majority of the input from the public and stakeholders in the pre-Application/EIS consultation phase are associated with the Health, Economic and Environment Assessment Categories but span a wide range of VCs, including Air Quality, Water Quality, Human Health, Community Wellbeing, Noise and Vibration, and Labour Force and Training. The proximity of the Project to the city of Kamloops has raised concerns about mining, as did the August 4, 2014, failure of a tailings storage dam at Imperial Metals' Mount Polley copper mine.

KAM has worked to reply to comments specifically when possible, including those submitted in the course of BC EAO/CEA Agency public comment periods. Communications with the public are documented and summarized in the Application/EIS, as are the issues raised by local governments, tenure holders, stakeholders and the public, along with KAM's responses to these issues. Comments received during public comment periods on the draft AIR are also included in the Application/EIS.

In May 2014, KAM announced significant revisions to the proposed mine's general arrangement that involved movement of infrastructure farther from city neighbourhoods. The decision to redesign the mine plan was prompted by public and government concerns, including the location of the previously proposed TSF. KAM embarked on a new round of public consultation to ensure the

community and stakeholders were made aware of the new mine plan. The Project was further optimized based upon the feedback received during this consultation process; changes included a reduction in the size of the EMRSF and the addition of in-pit storage of mine rock.

Several adaptations to the Project followed meetings with government and the Working Group. For example, concerns expressed about possible impacts on the Coquihalla Highway and City traffic led to changes in site traffic routes and an upgraded Inks Lake interchange. Concerns about possible impacts on recreational fishing, fish and aquatics at Jacko and Inks lakes were addressed by proposals to augment Inks Lake to provide new aquatic habitat and sport fishing capacity.

Application/EIS Review Stage

KAM will support the Application/EIS review process by working with the BC EAO and the CEA Agency and providing material assistance, corporate engagement, or technical expertise as necessary or directed by regulatory entities. Planned activities include a press release, making copies of the Application/EIS available in digital and hard copies, providing community capacity funding for a City review of the Project, providing a dedicated web platform to contain the Application/EIS contents, translating the Application/EIS contents into plain language summaries, Working Group sessions, and participation in various public and other forums in which KAM can gather feedback from the public and other stakeholders. Site tours will also be available, as appropriate, and KAM will announce the outcome of the Application/EIS review. Interactions with the public and stakeholders will continue to be tracked internally, and a consultation report will be provided to the BC EAO and CEA Agency as directed.

Post-Application/EIS Review Stage

Should the Project be approved by the environmental assessment process and continue into permitting and operational phases, KAM will continue to engage with the community and stakeholders to promote positive and constructive long-term relationships. Continued dialogue through multiple venues will ensure issues that may arise during construction or operation are addressed.

ES 4. SUMMARY OF PROJECT DESCRIPTION

Engineering design of the Project is currently on-going with a basic engineering study underway. Details of the design are subject to change as work continues; however, the primary components and activities of the Project are well developed, and the Project, as described in the following sections, represents the design basis for the purposes of the environmental assessment carried out within the Application/EIS.

The Project is located in the South-Central Interior of British Columbia, southeast of the junction of the Trans-Canada Highway No. 1 and the Coquihalla Highway (No. 5), within the TNRD. The coordinates for the centre of the Project area are approximately 50°36' N latitude and 120°24' W longitude.

The primary components of the mine include: mine rock storage facilities (MRSFs); processing facility and truck shop; process water intake and pipeline; and tailings storage facility (TSF). These primary components will be located outside of the Kamloops city limits, largely on private land

owned by KAM, with some utilisation of Crown land. Some ancillary facilities, including the exploration facilities, natural gas pipeline, and explosives storage, may be located just within the city boundaries. Access to the mine site will be via the modified Inks Lake Interchange off Highway 5 and then along service roads to the plant main access road (historic haul road from old Afton Mine).

ES 4.1 Alternatives Assessment

“Alternative means” are the various options of developing the Project that KAM has evaluated, including facility locations and methods for constructing, operating or closing the major components and activities of the Project. Throughout development planning, KAM has made numerous decisions and taken steps to improve the Project’s performance based on economic, technical, environmental, and social criteria. The concerns and preferences of Aboriginal Groups and the local community have been solicited and addressed to the extent possible. The approach used in this assessment is based on an initial screening of the alternatives for technical and economic feasibility. Where there is more than one feasible alternative, assessment of the potential environmental effects, including the human and natural environment, were used to select a preferred option.

In total, 17 different alternative assessments are evaluated in the Application/EIS, ranging from mining method and production rate, to power supply and road access. In particular, the key alternatives that have substantially influenced the Project design include:

“Ajax South” General Arrangement (GA) - The initial concept for the Project was based on the “Ajax North” GA. Following a period of public engagement, evaluation and review, in July 2014, KAM announced the “Ajax South” GA. Key aspects of “Ajax South” include moving major components further south, away from Kamloops; and reducing the overall footprint, concentrating all Project components within the Peterson Creek watershed;

TSF best available technology (BAT) - Part of the change to Ajax South GA included a change in TSF technology (and location) from a modified dry stack technology sited adjacent to Highway 5, to conventional slurried tailings in a facility located south of the open pit. As part of continued engineering evaluation, and also in response to the Independent Expert Engineering Investigation and Review Panel report on the Mount Polley tailings incident, KAM undertook a detailed trade-off study to evaluate best available technology (BAT) for tailings management at the “Ajax South” location. This included an evaluation of a range of deposition methods, which is primarily driven by the moisture content (expressed as % solids) of the tailings. Unthickened tailings (35% solids) represent the simplest processing option, while thickened (60% solids), paste (75% solids) and filtered (“dry stack”; 85% solids) represent the range of technologies considered. The assessment of these alternatives focussed on appropriate technical, economic, environmental, and social screening criteria, consistent with guidance from the Review Panel report, and the BC EAO. As described in the Application/EIS, the BAT identified through this study is deposition of thickened tailings (60% solids) within a tailing storage facility utilizing buttressed embankments constructed using the downstream embankment construction method.

TSF Closure - Recognizing the importance of a closure plan that will provide long term stability and achieve end land use objectives of returning the land to agricultural/ranching use, KAM evaluated a number of alternatives for TSF closure cover design, and means of routing runoff away

from the facility. The preferred alternative identified is to establish a dry closure cover that minimizes infiltration to the tailings, and drains (no permanent pond) from the south of the TSF.

Jacko Lake and Peterson Creek – KAM evaluated various Open Pit limits to balance environmental considerations with economic opportunity costs associated with extraction of the in-situ resource. The Project’s pit limits have been adjusted to minimize interaction with Jacko Lake, while maintaining feasible and safe open pit operation. KAM also evaluated a number of means of storing storm water runoff in Jacko Lake, and maintaining downstream water supply to lower Peterson Creek. Both free-draining and pumped systems were evaluated. Ultimately it was determined that a pumped system and pipeline will be required during Operation with the pipeline route following the road around the north rim of the Open Pit with discharge downstream of the mine infrastructure into Peterson Creek. KAM proposes to re-establish a free-draining Peterson Creek channel from Jacko Lake upon closure.

ES 4.2 Project Design Considerations and Project Components

In addition to technical and economic considerations, responsible development, operation, and closure of the Ajax Project is based on KAM commitments made through corporate policies, as well as environment setting and impacts and community values. The following list highlights a number of the key aspects of planning/design that are integral to KAM’s approach to developing the Project:

- An important consideration for the Project is the location of Jacko Lake relative to the Open Pit. KAM is committed to developing, operating and closing the Project in recognition of the many environmental, social, and cultural values associated with Jacko Lake. As such, KAM has undertaken detailed investigations to understand current hydrogeological and geotechnical conditions between the lake and the proposed pit, and as detailed geotechnical monitoring plans continue to be refined, they will be focused on maintaining a stable pit wall, and tracking groundwater inflow rates to the open pit.
- The In-Pit Mine Rock Storage Facility (IPMRSF) will maximize backfill to the Open Pit later in the mine life, and will help improve the long-term stability of the west pit wall into Post-Closure.
- The Peterson Creek Diversion system will include redundancy (e.g., back-up pumps and generator) and a new Peterson Creek Downstream Pond to ensure consistent operability. The system is designed to ensure that water supply to existing water licence holders downstream on Peterson Creek is maintained.
- The Project has a negative water balance and there will be no surface discharge to the receiving environment during Operation. There will be a need for make-up water to be drawn from Kamloops Lake. The Water Management Plan includes measures to maximize the capture and re-use of site contact water. This, combined with recovery of process water from the tailings thickener and recycle of water from the TSF, will minimize the requirement for make-up water to be drawn from Kamloops Lake.
- An important feature of the tailings storage facility (TSF) design philosophy is the strategic use of the MRSFs. The TSF embankments will be designed and operated in accordance with best practices and will meet design standards consistent with Canadian Dam Association

guidance. To provide additional risk mitigation, the West Mine Rock Storage Facility (WMRSF) will buttress the North Embankment and the South Mine Rock Storage Facility (SMRSF) will buttress the East Embankment. The MRSF structures are planned to match TSF embankment sequencing, and enhance the overall stability and performance of the TSF.

- The EMRSF has a lower height than the other MRSFs to manage visual quality and the footprint has been optimized to increase setback from the Peterson Creek aquifer. Only non-potentially acid generating (NPAG) material will be stored in the EMRSF, and closure prescriptions include a low permeability till layer overlain with topsoil to reduce infiltration and maximize evapotranspiration and runoff.
- Progressive reclamation is planned through the mine life, with soil salvage and placement incorporated in the MRSF development schedule.
- Closure of the TSF includes a dry closure cover. There will be no ultimate closure pond on the surface of the TSF and after reclamation, excess surface water will shed via a channel connecting the TSF to Humphrey Creek (in the Post-Closure phase).

ES 4.3 Project Summary and Activities

The proposed mine plan for the Project predicts an operation based on a nominal mill throughput of 65,000 tonnes of ore per day. Total material movement from the pit is estimated at approximately 90 Mt on an average annual basis. Average annual production of the mine is estimated at 140 million pounds of copper and up to 130,000 ounces of gold in concentrate, based on a conceptual mine plan supplying up to 24 million tonnes of ore per year to the mill. For the purpose of the environmental assessment, these rates have been assumed for a mine life of 23 years.

Mine rock will be blasted to produce a suitable particle size distribution for loading and transportation in haul trucks. Mineralized material will be blasted to comply with fragmentation requirements and a specified particle distribution for crushing. Primary loading of mine rock and ore on the full 15 m benches will be accomplished by electric rope and/or-hydraulic shovels.

The ore will be delivered from the mine by haul trucks to an ex-pit primary crusher. Ore will be crushed to the size which meets process requirements and will be transferred to the covered coarse ore stockpile by belt conveyors. Mine rock will be transported by haul trucks to the TSF embankment and mine rock storage facilities.

The processing facility will consist of stage-wise crushing and grinding, followed by a flotation circuit to recover and upgrade copper from the feed material. A gravity circuit will be included within the flotation circuit to enhance gold recovery with a gravity gold concentrate being filtered and shipped or the gravity gold concentrate may be combined with the copper concentrate. The flotation concentrate will be thickened and filtered and sent to the concentrate stockpile for subsequent shipping by truck to the Port of Vancouver.

The TSF will be located approximately 1 km south west of the open pit and east of Lac Le Jeune Road. The TSF will consist of four embankments ranging in height from 10 m to 130 m. Collection ditches along the embankments will direct surface run-off along the downstream face of the

embankments to the seepage collection ponds for use as process makeup water. The tailings embankments will use approximately 230 Mt of mine rock material for construction.

Mine rock will be transported by haul trucks to the TSF for embankment construction and MRSFs for permanent storage. Four mine rock storage facilities are planned within the Project footprint: the South Mine Rock Storage Facility (SMRSF), East Mine Rock Storage Facility (EMRSF), West Mine Rock Storage Facility (WMRSF), and In-Pit Mine Rock Storage Facility (IPMRSF). Overburden and topsoil will primarily be stored within the footprint of the EMRSF.

It is estimated that approximately 500 personnel will be employed during any typical Operation phase year.

ES 4.3.1 Geology and Geochemistry

The regional geology of the Project area is dominated by the Upper Triassic Iron Mask batholith, which lies in the southern part of the Quesnel trough, also known as the Nicola belt. The Iron Mask batholith is approximately 5 km wide and 20 km in length and trends northwest through the region. The Iron Mask batholith is classified as an alkaline porphyry, and is a multi-unit intrusive body composed of Pothook, Iron Mask Hybrid, Cherry Creek and Sugarloaf units. The rocks vary from fine-grained and porphyritic to coarse-grained and are silica poor, ranging from gabbro to syenite with diorite-monzodiorite-monzonite compositions predominating. Stratigraphically above are a series of serpentized picrite basalts that occur as wedges or slivers caught up in major fault-related northwest trending, northeast dipping structural corridors within the batholith. The youngest rocks in the region are a tertiary sequence of tuffaceous sandstone, siltstone, and shale with minor flows and agglomerates of basalt and andesite belonging to the Kamloops Group.

Major systems of northwesterly and northeasterly-trending fractures or faults controlled the emplacement of the various units.

The mineralization in the Project area is associated with structural corridors of highly fractured sections of Sugarloaf and Sugarloaf Hybrid phases of the Iron Mask batholith. Chalcopyrite is the dominant copper mineral and occurs as veins, veinlets, fracture fillings, disseminations, and isolated blebs in the host rock. Concentrations of chalcopyrite rarely exceed 5%. Accessory sulphide minerals include pyrite and molybdenite. Bornite and tetrahedrite have also been observed in trace amounts.

Extensive testing and analysis has been conducted on the deposit and surrounding mine rock. In general, mine rock is expected to be predominantly non potentially acid generating and low in metals content. Mine rock is characterized by relatively low sulphur content and high neutralization potential (NP), resulting in approximately 88% of the material being classified as not potentially acid generating (NPAG) based on a carbonate net potential ratio (CaNPR) screening value of 2.0. Similar ML/ARD characteristics are found within mineralized material except that there is an increase in copper sulphide minerals. On average, ore samples have increasing sulphide and carbonate content with increasing ore grade; however, total sulphur content is generally below 0.6%. Approximately 30% of the low and medium grade ore material was determined to be potentially acid-generating (PAG) using the CaNPR screening criteria. This relatively low percentage, with the presence of carbonate mineral in all the samples, suggests that net acid generation from the ore stockpile is not expected. Tailings are expected to have a low average sulphur content and are expected to be NPAG.

Metal leaching rates, derived from kinetic tests, are relatively low and similar between mine rock lithologies. The elements cadmium, copper, nickel, zinc, arsenic, molybdenum, selenium, vanadium are considered parameters of concern (POCs) based on leachate concentration from humidity cells and field barrels.

Tailings kinetic tests indicate that tailings are not expected to generate acid rock drainage. Possible POCs for tailings are molybdenum, copper, selenium and vanadium as characterized by testing with selenium and sulphate exceed BC water quality guidelines in testing. These parameters were included in the site the water quality predictions, and resulted in minimal exceedances of site specific Water Quality Benchmarks in receiving waterbodies with the exception of locations where the benchmarks are typically exceeded under baseline conditions.

ES 4.3.2 Resources and Reserves

The mineral resources of the Ajax deposit were classified in accordance with Canadian Institute of Mining, Metallurgy and Petroleum definition standards and best practices referred to in NI 43-101 which have a reasonable expectation of economic extraction (Wardrop 2012).

The mineralization of the Project satisfies criteria to be classified into Measured, Indicated, and Inferred mineral resource categories. The Measured and Indicated resource stated in the 2012 Feasibility Study totals 512 Mt at an average grade of 0.31% Cu and 0.19 g/t Au, with an additional 73.7 Mt of Inferred at 0.27% Cu and 0.17 g/t Au. The total proven and probable mineral reserves are 503 Mt containing approximately 2,960 Mlbs of copper and 2,750 Koz of gold.

These resources economically support copper and gold production for the proposed Project. Over the mine life the annual average production rate will be approximately 140 million pounds of copper and 130,000 ounces of gold.

ES 4.3.3 Construction Activities

The following activities will be undertaken during the two and a half (2.5) year Construction phase:

- main access road improvements including construction of Inks Lake Interchange and parking areas, haul road upgrades and construction of the Lac Le Jeune Road/Haul Road crossing;
- revising public access to Jacko Lake;
- transportation of workers and goods in and out of the mine site and associated parking areas;
- clearing, grubbing, and stockpiling of topsoil and salvage of seed stock;
- bulk earthworks (site clearing and pad construction - blasting, earth-moving, loading, hauling, pipeline trenching and placement);
- pre-stripping of the open pit, stockpiling of topsoil, and generation of construction crushed aggregate, mainly for tailings embankment construction. These activities will focus on the historic open pit areas;
- ore stockpiling;
- mine rock placed in MRSFs and used in TSF embankment construction;

- construction of the main substation at the plant site and a 9 km high voltage power line to the BC Hydro transmission line corridor. Power supply during construction provided by generators and/or temporary line power;
- construction of natural gas pipeline with connection to the Fortis pipeline near Knutsford;
- operation of an onsite concrete batch plant and/or delivery from offsite third party;
- supply and installation of crushing, grinding, flotation, regrind and concentrate dewatering circuits and associated conveying/piping systems;
- explosives storage installation and use;
- earthworks for the TSF North and East Embankments starter embankments;
- installation of a dyke (sheet pile and embankment) within Jacko Lake. The relocation of the Kinder Morgan pipeline is a separate project; however, this embankment will remain in place throughout mine life to provide a barrier and buffer between Jacko Lake and the open pit boundary and provide storage of a probable maximum precipitation (PMP) event within Jacko Lake; and
- diversion of Peterson Creek, including installation of new dams and a floating pump in Jacko Lake, pump house and pipeline to carry the excess Jacko Lake discharge along the north boundary of the open pit, and construction of a discharge area and dam on Peterson Creek.

Pre-stripping of the open pit utilizing the permanent mine production equipment will begin during the construction period to assist construction of the large earthwork structures like haul roads outside of the pit boundaries and the TSF embankments. Overburden and NPAG mine rock from the open pit will be used as much as possible during construction where it has been determined that sufficient material is available.

At least one of the shovels and one drill will operate under temporary power (portable generators or tie-in with existing BC Hydro power line along Lac Le Jeune Road), since the pending permanent BC Hydro transmission line connection that will provide the 230 kV to site will not be available until later in construction. All other mobile equipment (trucks, loaders, dozers, graders and water trucks) will be diesel-electric, diesel or gasoline engines.

The starter TSF embankment will be completed prior to process start-up. At this time, the TSF will have captured one full freshet and by including water pumped from Kamloops Lake, will have a pond capacity capable of sustaining the water requirements of the operating process plant. Additional water supply will also be available from treated water from the historic open pit and from Kamloops Lake once the water pipeline is available.

Construction manpower loading estimates a peak requirement for 1,800 construction workers on-site.

ES 4.3.4 Operation Activities

The following activities will be undertaken during the Operation phase:

- mining in the open pit and extraction of ore including drilling, blasting, loading, and hauling;

- operation of the MRSFs including loading and hauling from the open pit and stockpiling in the SMRSF, EMRSF, and WMRSF and, later in the mine life, placement of mine rock in the IPMRSF;
- crushing and stockpiling of ore;
- ore processing and recovery of gold and copper concentrate;
- transportation of concentrate to the Port of Vancouver;
- transportation of fuel gas via a natural gas pipeline;
- operation of the TSF including raising of embankment dams to increase capacity over mine life to contain and store the thickened tailings slurry and provide recycled reclaim water to the Process Plant;
- transportation of workers and goods in and out of the mine site;
- freshwater pumping and distribution including makeup water for the Process Plant, truck washing, dust management, and treatment for potable use;
- domestic wastewater treatment and management;
- site water management including diversion around operations, collection of contact water and open pit dewatering;
- collection, storage and transport of recyclable water, hazardous materials, construction waste, solid waste, fuel, explosives and non-hazardous materials;
- implementation and maintenance of site security and emergency services;
- ongoing surficial mapping and exploration diamond drilling; and
- environmental monitoring and progressive reclamation.

Operation at the Project (Year 1 to 23) focuses on the economic recovery of copper/gold concentrate and delivery to market with associated activities and components. Other activities during Operation will include ongoing exploration supported by the Project infrastructure and progressive reclamation.

Once the BC Hydro transmission line connection and associated pole line distribution is available, the stationary equipment will be installed and supplied via the distribution network. Mobile and mining equipment (trucks, loaders, dozers, grader, and water trucks) will typically have diesel engines with smaller trucks and personnel vehicles being gas-powered.

From the starter TSF embankment, over the 23 year operating mine life, the tailings embankment will be developed in approximately eight stages to the maximum height with a surficial area of approximately 6 km².

It is estimated that approximately 500 personnel will be employed during any typical Operation phase year.

ES 4.3.5 *Decommissioning and Closure and Post-Closure Activities*

The following activities will be undertaken during any temporary (care and maintenance) closure of the Project:

- access to the site will be controlled, all buildings and facilities will be secured and restricted to authorized personnel only;
- mechanical, hydraulic and electrical systems (not required during the temporary closure period) will be locked out and maintained in a secure state (i.e., in a no-load condition);
- mobile heavy equipment that is not required during temporary closure will be stored in appropriate areas in a no-load condition;
- warning signs will be posted around the open pit;
- routine site monitoring and inspections will be continued throughout the period of temporary closure. The TSF and associated infrastructure monitoring systems will be maintained during the temporary closure period with an emphasis on water balance;
- an inventory of hazardous materials will be completed, including process chemicals and reagents and petroleum products. Hazardous materials and other chemicals will be properly stored or removed from site;
- fluid levels in all fuel tanks will be recorded and routinely inspected for leaks or potential hazards;
- explosives will be relocated to the main magazine and secured, safely disposed of or removed from site;
- MRSFs and ore stockpiles will be maintained such that they are physically stable. Storage areas and stockpiles will be routinely inspected to ensure their stability or to implement any required contingency measures;
- surface water management measures will continue through temporary closure, and will be monitored to ensure proper operation. Surface water quality and quantity will be monitored to ensure that regulatory requirements are being met; and
- during Operation, a pond will be established within the TSF to allow recycling of the effluent to the process plant. In the event of temporary closure, this stored water will remain in the TSF pond and recycling to the process plant will stop and water levels in the TSF will be monitored to determine the net accumulation of water. If temporary closure is prolonged (i.e., more than a year) then it may be necessary to treat and decant the tailings supernatant to maintain safe water levels. The need for treating and decanting the tailings supernatant is a function of the duration of temporary closure as well as how much capacity remains in the TSF and will be addressed through the appropriate regulatory processes.

The following activities will be undertaken during the five (5) year Decommissioning and Closure phase:

- contouring of Mine Rock Storage Areas, capping, covering with topsoil and re-vegetating;

- the pipelines will be abandoned in place while the majority of project infrastructure such as buildings, equipment, fuel tanks, pads and foundations will be removed which will involve blasting, earth-moving, loading, hauling, and appropriate disposal;
- storage and transportation of hazardous and non-hazardous materials for disposal in an approved offsite facility;
- implementation and maintenance of site security and emergency services appropriate for closure activities;
- revise site water management system such that surface contact water and tailings effluent is pumped to the open pit and passive drainage for Peterson Creek is re-established;
- the TSF surface will be reclaimed with a cover system designed to minimize infiltration to underlying materials and provide a medium for establishing sustainable vegetation cover consistent with the final land use. There will be no ultimate closure pond and runoff from the reclaimed surface will shed to the environment (Humphrey Creek);
- transportation of workers and goods in and out of the mine site; and
- environmental monitoring and progressive reclamation.

The following activities will be undertaken during the Post-Closure phase and will continue as necessary based on monitoring results and regulatory requirements:

- surface contact water pumped to the open pit for continued pit lake filling until water quality standards are met at which point the water will be released as surface water runoff;
- restoration of reclaimed areas not meeting reclamation standards and/or objectives (re-vegetation and habitat re-construction);
- transportation of workers and goods in and out of the mine site; and
- environmental monitoring.

ES 5. EFFECTS ASSESSMENT METHODOLOGY

A standardized assessment methodology is used to evaluate the effects of the Project on environmental, social, economic, health, and heritage components. The methodology is consistent with provincial and federal guidance, and includes: issues scoping; description of baseline conditions; identification of potential effects; consideration of mitigation measures to reduce potential effects; identification of residual effects that remain after the application of mitigation measures; assessment of the significance of residual effects, and evaluation of cumulative effects.

Issues scoping is fundamental to focusing the Application/EIS on those issues where there is the greatest potential to cause significant adverse effects, and to focus the assessment on those aspects of the environment that are of greatest importance to society. Each assessment chapter of the Application/EIS includes a description of the issues scoping process used to identify potential effects, as well as the process used to select assessment boundaries and to determine the potential interaction or cause-effect pathways between Project activities and the Valued Components (VCs) selected for

assessment. VCs were scoped in consultation with key stakeholders, including Aboriginal Groups and the EA Working Group, or they may also have been scoped as a legislated requirement.

Assessment boundaries define the maximum limit within which the EA is conducted. Spatial boundaries are defined within a Regional Study Area (RSA) and a Local Study Area (LSA). Temporal boundaries are based on the various phases of Project development (Construction, Operation, Decommissioning and Closure, and Post-Closure). Together, the spatial and temporal boundaries encompass the areas within, and times during, which the Project is expected to interact with the identified VCs. As well, any administrative or technical boundaries that constrain the assessment are identified for each VC.

The baseline against which the EA was carried out is described, according to criteria related to regional and historical overviews that deal respectively with current environmental conditions and historical and current projects. The findings of site-specific baseline studies are presented for each subject area, the details of which are provided in appendices to this Application/EIS.

Regarding the effects assessment and mitigation measures, each assessment chapter provides a detailed discussion of the key potential effects arising from the Project components and activities, as well as discussion and evaluation of mitigation measures that will be taken to reduce the potential for significant adverse effects. Formulating mitigation measures to avoid, minimize, restore or offset adverse effects to VCs allows for specified Environmental Management Plans to be compiled. Where proposed mitigation measures are not sufficient to eliminate an effect, a residual effect is identified. Predicted residual effects are therefore the potential consequences of the Project on VCs; each assessment chapter of the Application/EIS describes direct, indirect, and induced residual effects of the Project as applicable.

To characterize the residual effects, and understand their likelihood, significance, and level of confidence in their assessment, a standard set of criteria (magnitude, geographic extent, duration, frequency, reversibility, and resiliency) are used to support a determination of significance. Likelihood of effects, and confidence and uncertainty in the outcomes or conclusions of the effects assessment are also evaluated. The assessment of residual effects and their significance are summarized for each VC using a standard tabular format.

The potential for cumulative effects arises when the residual effects of a project overlap or interact with the same resource or receptor that is affected by the residual effects of other historical, existing, or reasonably foreseeable future projects or activities. The cumulative effects assessment (CEA) considers the potential environmental, economic, health, social, and heritage cumulative effects of the Project according to the requirements of the AIR/EIS Guidelines, through well-understood cause-effect pathways. Past, present, and future projects and activities that may affect Project VCs are described, and such scoping then allows for assessment, mitigation formulation, and characterization of residual cumulative effects to be undertaken.

Cumulative residual effects are those adverse effects remaining after the implementation of all mitigation measures, and are therefore the expected consequences of the Project on the selected VCs. Each assessment chapter of the Application/EIS describes direct, indirect, and induced cumulative residual effects of the Project as applicable.

In the context of cumulative effects, it is important to note the location of the Project relative to numerous past and present activities, such as historical mining, ranching activity and urban development. The baseline condition is already influenced by these activities, and thus they are incorporated directly into the Project-specific assessment. For example, the Base Case model developed for air quality incorporates the air emissions from existing sources related to industrial activities, rail transportation emissions, on-road mobile emissions, heating emissions, paved roads, and disturbed lands. As discussed for many VCs, there are few reasonably foreseeable future projects that would further contribute to cumulative effects.

ES 6. ASSESSMENT OF EFFECTS

The assessment of effects is sub-divided into five sections, consistent with what the BC EAO refers to as “pillars”: environmental, economic, social, heritage, and health. Within these pillars, individual Valued Components are assessed. The following sections provide a high-level summary of existing condition (“setting”) and the findings of the assessment for each Valued Component.

ES 6.1 Assessment of Potential Environmental Effects

Environmental Valued Components span a range of topics, including physical components such as: greenhouse gas management; geology, landforms and soils; and water (surface water and groundwater, quality and quantity); as well as biological components such as: fish, plants and ecosystems, and wildlife.

ES 6.1.1 Greenhouse Gas Management

Setting

Greenhouse Gas (GHG) Management was identified as a potential VC because GHG emissions have been attributed to climate change. Assessing climate change considerations helps to determine if the Project is consistent with BC and Canada’s GHG emissions levels and targets.

The Project’s components and activities will directly contribute GHG emissions (referred to as Scope 1 emissions) and electricity, services, and products purchased from others will indirectly contribute GHG emissions (referred to as Scope 2 and 3 emissions). The Project will also affect existing carbon sinks through land clearing and alteration activities. Within the TNRD, total GHG emissions from transportation, buildings, and solid waste in 2010 was approximately 949,978 t of CO₂eq (TNRD 2014) with transportation sources accounting for the majority of emissions (or approximately 64%). Within the LSA, there are two existing reporting industrial facilities that emit 10 kt or more of CO₂eq/yr, these are New Afton Mine (13.2 kt CO₂eq/yr) and the Domtar Mill (1,772 kt CO₂eq/yr).

Assessment of Effects, Significance, and Mitigation Measures

The Project is anticipated to emit up to 82 kt CO₂eq/yr during the Construction phase and up to 123 kt CO₂eq/yr during the Operation phase from direct and indirect sources (Scope 1, 2, and 3 emissions) and land clearing activities. GHG emissions by the Project are anticipated to be negligible during the Decommissioning and Closure phase and Post-Closure phase. Mitigation measures to avoid and minimize potential GHG emissions have been incorporated into the Project design and

are consistent with guidance outlined by the provincial and federal governments. The Project has considered and incorporated design options related to transport distances, equipment procurement and selection, and alternative fuels. The Project will also comply with legislated provincial and national reporting and will assess and report on GHG emissions on an annual basis provincially under the BC Reporting Regulation and federally under the *Canadian Environmental Protection Act*.

The residual adverse effects of the Project on GHG Management are considered to be **Not Significant (Minor)** because of the negligible magnitude of the anticipated Project-related GHG emissions compared to provincial and national emissions and other comparable industrial facilities. Predicted emissions from the Project during the Operation phase will represent approximately 0.016% of the total national GHG emissions expected in 2020 or 0.048% of the total emissions reported for all reporting facilities in BC in 2013. In the context of provincial and federal emissions levels and targets, the residual adverse cumulative effects of the Project are considered to be negligible and **Not Significant (Minor)**.

ES 6.1.2 *Geology, Landforms, and Soils*

Setting

Geology, Landforms and Soils were selected as a VC is to meet provincial and federal information requirements. Terrain stability and geohazards are related to these landforms and also discussed. The Aberdeen Hills area of Kamloops was identified as having a history of terrain instability that pre-dates subdivision development and has been attributed to the combination of presence of Kamloops Group bedrock, gentle slope angles, and high groundwater pressure.

The Project lies within the Thompson Plateau physiographic region, which is a gently rolling upland between 1,200 m and 1,500 m in elevation. The plateau covers an area of approximately 28,500 km² and represents the late Tertiary erosion surface that has been dissected by three major rivers: the Thompson, Similkameen and Okanagan and their tributaries. The area is characterized by rolling grasslands with timber at higher elevations. Forested areas consist mainly of Douglas fir, lodgepole pine and Ponderosa pine. At lower elevations, vegetation typically consists of bunchgrass, sagebrush, and prickly pear cacti.

Assessment of Effects, Significance, and Mitigation Measures

The interactions of the Project with surficial geology and the topography and physiography are closely linked. The removal and re-distribution of surficial material (overburden) was identified as a potential effect. The Project components which will undergo the highest degree of alteration in landscape development are the Open Pit, TSF, and MRSFs.

Project interactions with surficial geology are expected to extend over the life of the Project but primarily during Construction. During Operation, the Open Pit, MRSFs, and TSF will continue to develop in size until specifications are met. Reclamation and closure planning is focused on measures to incorporate the re-distributed surficial materials into the closure landscape features.

Soil disturbance during Construction will involve the removal of surface soil for salvage, site grading, and stockpiling of salvaged materials within the Project footprint. During Operation, soil

disturbance is expected to be limited and intermittent. Salvaged material will be stockpiled in strategic locations to minimize disturbances to these stockpiles as described in the Soil Salvage and Handling Plan. The suitability of soils for reclamation purposes was assessed utilizing criteria consistent with the BC *Mines Act* permitting requirements.

Potential effects associated with terrain stability are vegetation clearing, overburden slope failure, berm/dyke/diversion channel slope failure road damage causing slope failure causing accelerated erosion. During baseline characterization, terrain stability ratings were determined. Within the Mine Site, water supply pipeline corridor and transmission line corridor, approximately 98% of the area is rated with Negligible to Low likelihood of landslide initiation, and is considered “stable.” Mitigation through engineering design for all of the man-made landforms is summarized in the Natural Hazards Management Plan.

The potential effects of production blasting vibrations on slope stability in the Aberdeen Hills area was identified as an issue of concern and was assessed. A stability model for the area was used to determine the sensitivity of the calculated Factor of Safety (FoS) values to possible increases in porewater pressure due to blasting at the Open Pit. Mitigation through engineering design for blasting activities is summarized in the Explosives Management Plan and the noise and vibration VC. The results of the assessment indicated that there is expected to be negligible effects of blasting vibrations on slope stability.

All residual effects on Geology, Landforms, and Soils are expected to be **Not Significant (minor)** after mitigation measures are applied. The residual effect of Alteration of Baseline Landforms was carried forward into the cumulative effects assessment to be examined together with other activities surrounding the Project (e.g., expansion of the Trans Mountain Pipeline). The cumulative effect after mitigation will result in a **Non-Significant (minor)** effect.

ES 6.1.3 *Surface Water Quality*

Setting

Surface Water Quality was identified by government agencies, stakeholders, and Aboriginal communities as a VC because of its importance to fish and aquatic resources, drinking water, wildlife, livestock, irrigation water, and for recreation. An understanding of the surface water runoff, groundwater characteristics, and overall water balance within and downstream of the Project area is critical to support an environmental effects assessment as well as to contribute to engineering analysis and the design of water management features.

The Project is located within the Peterson Creek Watershed, a tributary system of the Thompson River watershed. The largest water body in the Local Study Area is Jacko Lake, which is located immediately adjacent to the proposed Open Pit. Drainage of the region is disrupted, resulting in numerous shallow ponds, some of which are ephemeral and bordered with precipitate encrustations. Peterson Creek flows north from Chuwels Mountain to Jacko Lake, east through Knutsford, then north to the South Thompson River through downtown Kamloops. The creek has a mainstem length of 40 km and drains a watershed area of approximately 130 km². Tributaries of Peterson Creek are Jacko Creek, Keynes Creek, Humphrey Creek, and Davidson Brook.

All waterbodies sampled as part of baseline studies are neutral to basic, hard to very hard, and alkaline. Ion concentrations vary seasonally and are elevated (exceeding applicable guidelines in one or more sampling events) but generally decreased during freshet and increased during periods of lower surface runoff, which is consistent with a surface water flow system that is predominantly supported by local groundwater discharge. Sulphate concentrations were elevated in all surface water samples. Nutrient loading in streams is predominantly phosphorus-related; total phosphorus in the creeks varied on a seasonal basis, resulting in a range of trophic classifications from eutrophic to hyper-eutrophic. Seasonal trends were apparent for most metal and metalloid parameters. Parameters that were measured at higher concentrations in samples collected during spring freshet are primarily driven by runoff and sediment mobilization and parameters that were higher in samples collected during periods of lower flow are primarily associated with groundwater inflows. Metal and metalloid exceedances of the aquatic life, agricultural, wildlife, and drinking water guidelines were reported for some surface water samples. Total aluminum, total copper, and total iron sample concentrations frequently exceeded the aquatic life guidelines whereas dissolved exceedances were infrequent to rare, and manganese concentrations seasonally exceeded the guidelines for irrigation and/or livestock water uses and molybdenum concentrations seasonally exceeded the water quality guidelines for livestock and wildlife. Metal concentrations were low in Jacko Lake compared to the local creek sites and concentrations were typically below all compared guidelines. Isolated aquatic life guideline exceedances (i.e., fewer than 5% of samples) were observed for selenium (in deeper lake samples only), copper, and zinc, and manganese frequently exceeded the aesthetic objective for drinking water in the deep lake samples.

Assessment of Effects, Significance, and Mitigation Measures

The key potential effect assessed was a change in surface water quality parameter concentrations. A water quality model was developed to predict parameter concentrations at five sites: Jacko Lake, Peterson Creek Downstream Pond, two locations along Peterson Creek, and Humphrey Creek. The water quality model was run for a period of 123 years and included all mine phases (Construction, Operation, Decommissioning and Closure, and Post-Closure). “Base Case” model results were predicted using average monthly climate inputs in combination with median monthly baseline water quality inputs. “Sensitivity analyses” were conducted to assess the ranges of predicted water quality parameters resulting from changes to six main groupings of assumptions, in total 13 sensitivity cases were modelled. Sensitivity analyses represent extremes in model input assumptions and the resulting predicted concentrations are not representative of expected water quality. The model was used to assess mitigation options and to guide engineering design and water management strategy. The final results of the model are considered to represent the residual adverse effects of the Project on Surface Water Quality VC, after the application of mitigation measures.

For ease of discussion, parameters that were modelled were grouped into three categories based on their predicted potential for adverse effects. Category 1 parameters are defined as parameters for which BC water quality guideline exceedances were predicted at multiple nodes, during multiple phases, under the Base Case water quality model scenario. Category 1 parameters are sulphate, chloride, copper, molybdenum, and selenium. Category 2 parameters are those that are predicted to exceed an applicable BC water quality guideline in the Base Case at only one node and during a single mine phase, or those that are predicted to exceed a guideline under a sensitivity case but not

in the Base Case. Category 2 parameters are ammonia, nitrate, aluminum, antimony, arsenic, chromium, cobalt, iron, and uranium. Category 3 parameters either have no water quality guidelines or were not predicted to exceed any guidelines; Category 3 parameters were not carried forward in the effects assessment.

After mitigation through Project design and implementation of the water management strategies outlined in the Water Management Plan, the residual adverse effects and their significance were:

- Humphrey Creek, where changes in sulphate, copper, molybdenum, and selenium concentrations were assessed as **Not Significant (Moderate)**;
- Peterson Creek - PC02.3, where changes in sulphate concentrations were assessed as **Not Significant (Minor)**; and
- Peterson Creek - PC02, where changes in sulphate, chloride and selenium concentrations were assessed as **Not Significant (Moderate)**.

The baseline characterization and model for surface water quality includes the cumulative effects of loading from activities and natural sources within the Peterson Creek watershed down to the PC02 baseline monitoring location. The magnitude of predicted change in surface water quality attributed to the Project and the cumulative sources that were captured in the water quality model is anticipated to be below the limits of analytical detection in the Thompson River; therefore, the cumulative residual effect is considered **Not Significant (Minor)**.

ES 6.1.4 Surface Water Quantity

Setting

Surface Water Quantity was identified by government agencies, stakeholders, and Aboriginal communities as a VC because of its importance to fish and aquatic resources, drinking water, wildlife, livestock, irrigation water, and for recreation. An understanding of the surface water runoff, groundwater characteristics and overall water balance within and downstream of the Project area is critical to support an environmental effects assessment as well as to contribute to engineering analysis and the design of water management features.

Drainage of the region is disrupted, resulting in numerous shallow ponds, some of which are ephemeral and bordered with precipitate encrustations. The largest water body in the Local Study Area is Jacko Lake, which is located immediately adjacent to the proposed Open Pit. Peterson Creek flows north from Chuwels Mountain to Jacko Lake, east through Knutsford, then north to the South Thompson River through downtown Kamloops. The creek has a mainstem length of 40 km and drains a watershed area of approximately 130 km². Tributaries of Peterson Creek are Jacko Creek, Keynes Creek, Humphrey Creek, and Davidson Brook.

Jacko Lake has been modified since at least 1949 by the earthfill embankment that channels lake outflows into Peterson Creek. During periods of high flow, runoff discharges through a spillway, but a low level outlet also allows for lake outflows when lake levels fall below the spillway invert. This low level outlet is managed during the summer months to meet downstream water license requirements. Within the downtown core of Kamloops, the majority of Peterson Creek is contained

within culverts and channeled through concrete waterways to its confluence with the South Thompson River. The South Thompson River and North Thompson River converge at Kamloops to form the Thompson River, which is the largest tributary of the Fraser River. The Thompson River flows approximately 15 km westward from this confluence into Kamloops Lake (a locally enlarged reach of the river).

Assessment of Effects, Significance, and Mitigation Measures

Effects to surface water quantity could potentially occur during all phases of the Project. Construction and operation of mine infrastructure including the TSF, the Open Pit, the various MRSFs, and water management ponds, will affect surface water patterns and flow volumes in Peterson Creek. These effects are primarily related to a reduction in watershed area reporting to Peterson Creek. Kamloops Lake will also be potentially affected, as it is the proposed source of make-up water for the Project. Four potential effects of the Project on the surface water quantity VC are identified: annual flow volume, monthly flow distribution, peak flows, and low flows.

The Project has been designed to minimize adverse effects to surface water quantity and quality through the development and implementation of a Water Management Plan (WMP), whose provisions include diverting non-contact water, minimizing the amount of contact water generated, and collecting and reuse contact water in the Process Plant.

A combination of modelling techniques, which included a water balance model with a monthly time step and regional frequency analyses, were employed to assess potential effects. Residual effects on surface water quantity in Peterson Creek due to Project activities are predicted to be **Not Significant (moderate)** for all surface water quantity indices during Construction, Operation, and Decommissioning and Closure. This rating changes to **Not Significant (minor)** for annual streamflow volume, peak flows, and monthly flow distribution during Post-Closure.

Make-up water for the Project will be sourced from Kamloops Lake at a maximum rate of 1,505 cubic metres per hour (m³/h). This abstraction, plus reduced streamflows in Peterson Creek as a result of mining operations, constitutes a minor component of the average monthly flow through the lake (< 0.35%). Residual and cumulative effects on surface water quantity at Kamloops Lake due to Project activities are predicted to be **Not Significant (minor)** for all water quantity metrics.

ES 6.1.5 Groundwater Quality

Setting

Groundwater Quality was identified by government agencies, stakeholders, and Aboriginal communities as a VC because of its importance to fish and aquatic resources, drinking water, wildlife, livestock, irrigation water, and for recreation. An understanding of the groundwater characteristics and groundwater contribution to the overall water balance within and downstream of the Project area is critical to support an environmental effects assessment as well as to contribute to engineering analysis and the design of water management features.

Groundwater quality data was collected from 51 monitoring wells, in total, between 2007 and 2014 and were used to characterize the baseline groundwater quality conditions. In addition, the groundwater

quality VC was informed by a baseline hydrology assessment and testing conducted in support of development of a science based environmental benchmark for sulphate for the Project.

Baseline groundwater quality is reflective of the local geology. Water samples exceeded aquatic life, drinking water, and livestock water use guidelines for multiple parameters. The most common exceedances for freshwater aquatic life guidelines included fluoride, sulphate, and arsenic. Baseline groundwater quality commonly exceeded drinking water quality guidelines for pH, TDS, sulphate, fluoride, manganese, and sodium, and baseline groundwater quality exceedances for livestock water use guidelines were common for specific conductance, TDS, and molybdenum.

Assessment of Effects, Significance, and Mitigation Measures

The Project assessed the potential to change groundwater quality in close proximity to the Project as a result of uncaptured seepage (contact water) migrating into local groundwater. Changes in groundwater quality were predicted by developing analytical plume migration and particle tracking models to assess potential flow pathways for seepage losses from proposed mine facilities. The changes to groundwater quality parameters was calculated at the nearest residential water supply well (referenced as RES-2) located down-gradient of proposed mine facilities and interpreted to be installed within the Peterson Creek aquifer.

The Project is predicted to increase fluoride, sulphate, copper, iron, manganese, molybdenum, and zinc concentrations in the vicinity of RES-2. The magnitude of change for most parameters is considered medium, the geographic extent local, with a far future duration and a continuous frequency. Most adverse effects are partially reversible as a result of reclamation and no adverse effects are considered irreversible.

Mitigation measures for the protection of groundwater quality have been applied as part of mine design and the development of water management strategies. The surface water quality model, which was the primary chemistry input source for the groundwater plume models, was an iterative process and included mitigation measures that were developed through changes in mine design and water management strategies to avoid or minimize adverse effects on water quality. Key mitigation measures incorporated into the mine design included the addition of TSF seepage management features, reclamation of the MRSF with a low permeability layer, and reclamation of the TSF for a dry closure concept. In addition, water management will occur for the MSRF during all mine phases to maximize interception of seepage and runoff.

A Groundwater Quality Management and Monitoring Plan is the primary environmental management and monitoring plan for the Groundwater Quality VC, though additional measures to protect groundwater quality during the life of the Project are proposed as part of other environmental management and monitoring plans and as mitigation measures for potential adverse effects to aquatic resources, human health, wildlife, and other VCs.

Potential residual adverse effects of the Project on groundwater quality have been characterized for each parameter of concern, but the significance of adverse residual effects on potential groundwater quality uses were assigned as part of the assessment of the Human Health VC, Fish Populations and Fish Habitat VC, and wildlife-related VCs. The significance of the residual adverse effects on

groundwater quality is indirectly evaluated by the Surface Water Quality VC because seepage and groundwater discharge to surface water are accounted for in the predictions of the surface water quality model.

Cumulative residual effects on groundwater quality from other projects and activities are not expected because the spatial distribution of the seepage pathways for groundwater are limited to the LSA, with all seepage pathways surfacing in close proximity to the mine facilities. In addition, potential changes in groundwater quality as a result of the Project are directly attributed to seepage from mine facilities and all loading associated with these seepage pathways is understood to be intercepted in the surface water environment and have been captured within the surface water quality model domain and assessed as part of the surface water quality VC.

ES 6.1.6 Groundwater Quantity

Setting

Groundwater Quantity was identified by government agencies, stakeholders, and Aboriginal communities as a VC because of its importance to fish and aquatic resources, drinking water, wildlife, livestock, irrigation water, and for recreation. An understanding of the groundwater characteristics and groundwater contribution to the overall water balance within and downstream of the Project area is critical to support an environmental effects assessment as well as to contribute to engineering analysis and the design of water management features.

A comprehensive baseline groundwater hydrology assessment was completed to provide a baseline against which any predicted effects to groundwater quantity could be compared. The baseline groundwater hydrology assessment was based on a review and compilation of existing site investigation data and results from geological, hydrogeological, geotechnical and groundwater quality field programs carried out as part of various engineering and permitting phases for the Project. Publicly available hydrogeologic data for the region and from hydrogeological assessments to support historical mining operations were also compiled and considered in the study. The baseline groundwater hydrology assessment provides the conceptual basis for the development of the numerical groundwater flow model developed to support the Groundwater Quantity effects assessment.

Assessment of Effects, Significance, and Mitigation Measures

The key potential effects to Groundwater Quantity assessed were changes to groundwater balance within the LSA; changes to groundwater elevations within the LSA; changes to piezometric elevations in the Aberdeen area; and changes to the groundwater balance of Jacko Lake, Upper Peterson Creek, and Lower Peterson Creek. A 3D numerical groundwater flow model (the groundwater model) was developed as the primary tool to evaluate Project interactions with Groundwater Quantity.

Changes to groundwater elevations and groundwater recharge and discharge are expected to occur. Groundwater elevations are expected to be more than 100 m lower near the pit Post-Closure compared to existing conditions. Groundwater elevations are expected to be more than 100 m higher under the TSF Post-Closure compared to existing conditions. The changes in groundwater elevations

are associated with changes in groundwater flow rates and groundwater flow directions within approximately 2 km of Project facilities.

The City of Kamloops operates measures to reduce piezometric elevations in the Aberdeen area due to stability concerns (Golder 2008). Groundwater model results indicate that no changes to piezometric elevations are anticipated at Aberdeen due to the Project.

Groundwater elevation changes may result in reductions in well productivity for wells installed within 2 km of the mine pit. Four registered wells are reported to be within approximately 2 km of the mine pit. Some of these wells may need to be relocated or deepened.

The Project has been designed to minimize adverse effects to groundwater quantity and quality through the development and implementation of a Water Management Plan (WMP). The WMP will include a monitoring program designed, in part, to detect changes to groundwater elevations and baseflow contributions to streams near the Project, and will focus on the spatial extent within approximately 2 km of mining facilities. The monitoring network will be designed to allow an assessment of the zone of anticipated groundwater quantity effects. Monitoring results will be used to compare actual conditions to predictions and to provide input to adaptive management plans, if needed.

Residual Project effects on Groundwater Quantity include increases and decreases to groundwater recharge and groundwater discharge within up to 2 km from the mine facilities; and increases and decreases to groundwater elevations within up to 2 km from the mine facilities.

After mitigation, the residual effects on Groundwater Quantity are predicted to be **Not Significant (Moderate)**.

Cumulative effects to Groundwater Quantity from existing activities, and Project activities combined with future ranching, agriculture, and domestic water use within 2 km of the Mine Site would not be significantly different from the anticipated effects from existing activities and Project activities. Therefore, the residual effects to Groundwater Quantity due to cumulative effects are predicted to be **Not Significant (Moderate)**.

ES 6.1.7 *Fish Populations and Fish Habitat*

Setting

Fish and Fish Habitat was selected as a VC due to concerns about the use of fish as a result of the Project. Baseline fish and aquatic data were gathered between 2007 and 2014 at potential impact and reference locations within the Peterson Creek, Cherry Creek, and Anderson Creek watersheds. Rainbow trout is the only fish species present in Peterson Creek and Jacko Lake; the rainbow trout population currently in Jacko Lake was originally introduced in 1954 and is sustained by annual stocking to support the recreational and Aboriginal fishery. Rainbow trout are found in Peterson Creek downstream of Jacko Lake during spring and early summer when the Jacko Lake spillway is flowing and providing access between the creek and the lake. Once the Jacko Lake spillway ceases flowing, rainbow trout are stranded in Peterson Creek downstream of the lake and succumb to water temperatures and dissolved oxygen concentrations that are outside of optimal ranges to

support aquatic life. The only other waterbodies within in proximity to the mine footprint are Goose Lake, Keynes Creek, and Humphrey Creek; there is no current or historic evidence of fish in these waterbodies.

Assessment of Effects, Significance, and Mitigation Measures

Potential effects of the Project on Fish and Fish Habitat that were assessed include: direct habitat loss in Peterson Creek, Jacko Lake, Goose Lake, and Kamloops Lake; indirect habitat loss through flow reductions in Peterson Creek and Kamloops Lake; fish mortality from increased fishing pressure, blasting, instream works, entrainment and impingement, and fish stranding and isolation; and sub-lethal effects and behavioural changes associated with altered water quality (metals, nutrients), altered sediment quality (metals, gradient size), noise, and light.

The Project was designed to minimize direct effects on fish and fish habitat wherever possible (avoidance). Mitigation measures to address potential effects include: implementation of monitoring and management plans; and operating in accordance with provincial, federal, and international recommendations, criteria, and guidelines as applicable. Habitat offsetting is proposed to address direct habitat losses.

Following the application of mitigation measures, the anticipated residual effects and significance ratings were: direct loss of habitat in the northeast arm of Jacko Lake and Peterson Creek from Open Pit development were rated as **Not Significant (Minor)**; indirect habitat loss in Peterson Creek downstream of the Project area from flow reductions was rated as **Not Significant (Moderate)**; fish mortality in Jacko Lake associated with changes in pressure from installation of the sheet pile dam was rated as **Not Significant (Minor)**; and sub-lethal effects on fish populations in Peterson Creek downstream of the Project area associated with changes in primary productivity from reduced flows was rated as **Not Significant (Minor)**.

The cumulative effects assessment included agriculture and ranching as other activities likely to interact with Fish and Fish Habitat within the spatial and temporal boundary; the cumulative effect was rated as **Not Significant (Minor)**.

ES 6.1.8 Rare Plants

Setting

The VC “Rare Plants” was selected as there is an expected interaction between rare plants and the Project. Vegetation clearing for Project footprints will potentially remove rare plant populations or result in loss of microhabitats that could support them. Vascular plants, mosses and lichens are considered rare if listed provincially. Based on the biogeoclimatic zones present, up to 211 listed species may be present in the area. There are 21 plants listed federally under COSEWIC and/or SARA also potentially occurring in the area. First Nations groups expressed concerns regarding traditionally collected plants. The general public and the Kamloops Naturalist Club also expressed concerns about potential effects of the Project on rare plants.

The preservation of rare species is vital to the conservation of biological diversity. All species contribute to the richness and the complex balance of the ecosystem they inhabit. Rare plants may

be valuable indicators of environmental changes, and give helpful insights into the health of ecosystems.

Baseline data and field studies were conducted between 2007 and 2014. The LSA was surveyed using an intuitive meander search pattern, focussing on habitats with the highest potential for rare plants. Results found occurrences of 16 rare taxa including six vascular plants, three mosses, and seven lichens. Sparsely vegetated, non-forested habitats that permanently inhibit dense tree and shrub growth (various non-forested wetlands and shorelines, grassland, shrub steppe, scree, and rock outcrops) are vital habitats for most of the rare native plants of British Columbia, as well as many of the mosses and lichens. A number of vegetative macrohabitats were identified in the Project area. These included: sagebrush steppe, grasslands, wetlands (saline wetlands, creek shores, marshes), aspen groves, shrub copses, sparsely vegetated outcrops and cliffs, forested outcrops, talus, fine scree, dry gullies, close-canopy Douglas-fir forests, open-canopy Douglas-fir forest, and human disturbed sites.

Assessment of Effects, Significance, and Mitigation Measures

The potential effects assessed for the Rare Plants VC included habitat loss and alteration. Predicted impacts to rare plants in the LSA include the loss of 38% of rare plant sub-populations due to Project Infrastructure. Another 26% have the potential to experience alteration effects.

Mitigation measures to reduce the impact of habitat loss are to minimize Project footprints, protect existing occurrences by avoidance or exclusion zones, support regional surveys, and translocation of species unique to the region. Habitat alteration effects from invasive species, dust and water quality will be mitigated with associated management plans.

The loss of rare plant occurrences due to the Project is assessed to be **Not Significant (Moderate)**. Rare Plants will not be completely mitigated; however, protection of unaffected plants and potential translocations of regionally rare species will reduce the effect. There is limited information on rare plants in the region due to private land ownership. KAM will contribute to further regional inventory.

The residual effects on Rare Plants were carried forward into cumulative effects assessment to be examined together with other activities surrounding the Project (e.g., expansion of the Trans Mountain Pipeline, agriculture, ranching, forestry and the expansion of the city of Kamloops). The cumulative effect after mitigation will result in a **Not Significant (Moderate)** effect.

ES 6.1.9 Rare and Sensitive Ecological Communities

Settings

The VC “Rare and Sensitive Ecological Communities” (RSEC) was selected based on anticipated interactions with the Project. RSEC are defined by the plant association present at a site and loss or degradation of plant species can affect the ecological integrity of the community. Vegetation clearing for Project footprints will likely damage/remove RSEC and habitat alteration resulting from spread of invasive species could alter the plant composition. Rare ecological communities are based on provincial and federal listing of plant associations associated with site series. Concerns from First

Nations regarding traditionally collected plants and from the Kamloops Naturalist Club also informed scoping of this VC.

The Interior Douglas-fir Zone is characterized by warm, dry summers and cool winters, and is located along most of the major valleys and side drainages within the region. Some parts, such as the Kamloops area, are very dry. This is reflected in the native vegetation, which includes plants such as Pinegrass that survive with only minimal moisture during the growing season. This zone is the second largest in the region, and includes some of the most settled areas.

Forests in this zone are dominated by Douglas-fir with a grassy understorey, usually of Pinegrass. In hotter and drier areas, Ponderosa Pine dominates, while Lodgepole Pine occurs at higher elevations. In this dry zone, low-intensity wildfires would have occurred naturally every 10–20 years and would have removed the understorey and young trees and allowed mature Douglas-firs to survive.

Wetlands also occur in this zone. They are found in depressions, and open water is typically surrounded by cattails, sedges, and bulrushes. Shrubby species such as Red-osier Dogwood occur along riparian areas. Wetlands are especially important for wildlife survival in this dry zone.

Terrestrial Ecosystem Mapping (TEM) was completed for an area extending from Highway 1 south and west to Edith Hill and was used to assess ecosystem diversity. The TEM methodology was standard and included both aerial photo interpretation and field-truthing. Field-truthing took place in 2007, 2010 and 2014 and resulted in 493 habitat plots. Ecosystem mapping delineated forested site series, grasslands, wetlands and other non-vegetated sites. Assessment of rare and sensitive ecological communities and habitats was done by theming the ecosystem map to identify polygons where any of the site series correlated with those habitats were mapped. There were 10 listed forested communities and three listed wetland communities mapped in the LSA.

Assessment of Effects, Significance, and Mitigation Measures

The primary effect of the Project on ecological communities at risk will be habitat loss. Limited amounts of rock outcrop habitats or old-growth forests will be lost as a result of Project Construction. The effect to these two sensitive ecosystems is considered a negligible effect.

Regionally, forest removal has altered habitat that could support Red- and Blue-listed communities and has directly removed ecological communities at risk. Past activities have contributed to the current distribution of Red- and Blue-listed communities. Similarly, grazing within the RSA and trampling of wetland edge habitat by cattle directly impacts wetland Red- and Blue-listed communities and have likely played a part in the current quality of wetlands. It is difficult to determine the cumulative effect of this Project in combination with others. The greatest potential loss of Red- and Blue-listed communities as a result of the Project is in the IDFxh2 subzone, where 4 % of the at-risk communities found within the RSA will be lost as a result of Project Construction. This is considered a **Not Significant (Minor)** effect.

Loss of wetlands is a concern to both provincial and federal governments. Environment Canada has identified the goal of maintaining wetland functions and values through a policy of wetland conservation. Loss of wetlands within the LSA as a result of Project Construction is considered a

residual effect. Reclamation may reduce the total wetlands lost, but will not be able to mitigate habitat loss of wetlands completely and therefore a compensation plan will be developed. Within the RSA less than 0.4% of wetlands will be impacted as a result of Project Construction. This is considered a **Not Significant (Minor)** effect.

ES 6.1.10 Grasslands

Settings

Grasslands has been chosen as a VC based on concerns expressed from the public during Project-related consultation. Numerous stakeholders including the Grasslands Conservation Council, Kamloops Stockman's Association, Kamloops Naturalists Club, and Kamloops and District Fish and Game Club identified grasslands as a concern. Grasslands cover less than 1% of the Province and are one of Canada's most endangered ecosystems. Grasslands are a prominent feature in the area, and are dominated by Bluebunch Wheatgrass, Junegrass, and fescues.

Grasslands in the Thompson region are important for a variety of reasons. They make up 13% of all of BC's grasslands, supplying valuable grazing opportunities for livestock as well as foraging opportunities for wildlife. Grasslands provide habitat for over 30% of BC's species at risk, and they are used by Aboriginal Groups for both food and medicinal plants (BC Ministry of Water, Land and Air Protection and Grasslands Conservation Council of BC 2004).

Ecosystem mapping delineated grassland habitats within the bunchgrass, ponderosa pine and interior Douglas fir subzones. Assessment of grasslands including rare communities was done by theming the ecosystem map to identify polygons where any of the grassland site series correlated with those habitats. There were four grassland communities mapped and five communities at risk associated with the grasslands mapped in the LSA. An evaluation of grassland condition was carried out in 2010, 2011, and 2014, concentrating on Project footprint areas.

Much of the LSA has been included in priority grasslands conservation areas delineated by the Grasslands Conservation Council of BC. Spatial boundaries of the proposed priority grasslands areas were used to quantify the amount of priority grasslands within spatial boundaries.

Assessment of Effects, Significance, and Mitigation Measures

Grasslands were assessed as a VC to determine likely interactions with specific Project activities, and how these interactions could result in an adverse effect. Habitat loss and habitat alteration arising from each Project activity were identified and evaluated.

Project footprints were minimized in order to mitigate for residual effects to grasslands. Loss of 23% of grassland habitat in the LSA is considered **Not Significant (Minor)** for Project-related residual effects. Closure planning for the Project includes objectives of re-establishing grassland communities on reclaimed area, and implementing progressive reclamation through Operation. As outlined in the Closure and Reclamation Plan, it is anticipated that the total area of grassland loss can be fully restored. Regionally, habitat loss is considered **Not Significant (Minor)** for cumulative residual effects, as less than 3% of the priority grassland areas within the RSA will be lost, and suitable habitat still exists within the region.

ES 6.1.11 *Terrestrial Invertebrates*

Settings

“Terrestrial Invertebrates” has been chosen as a VC based on concerns from the public and the Kamloops Naturalist Club. Although a wide variety of Terrestrial Invertebrates are present in the Project area, only butterflies, dragonflies and damselflies were considered as the biology of other invertebrate taxa is poorly known. One Red-listed dragonfly and four Blue-listed butterflies are potentially present in the Project area, while the Monarch butterfly is also federally listed under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC)/ *Species at Risk Act* (SARA).

Terrestrial invertebrates offer the potential for short and long term monitoring of the impact of development, changing land use practices and climate for the region’s aquatic and terrestrial ecosystems. Damselflies and dragonflies can be sensitive indicators of water quality, aquatic plant and shoreline habitat health, perturbations in upland terrestrial habitats, and climate change. Similarly, butterflies offer great potential as indicator organisms to facilitate monitoring potential impacts of land use and/or climate change on both wetland and upland habitats. Invertebrates are also a food source for other species (fish, amphibians, birds, or bats).

Surveys for invertebrates were carried out using Provincial Resources Information Standards Committee (RISC) standards. Surveys for the five listed species were conducted over three years. Surveys concentrated on suitable habitats within the LSA where the potential for finding the species was the greatest. Hand-netting surveys resulted in seventy-seven invertebrate taxa being identified, including 21 dragonfly/damselfly taxa and 56 butterflies. All of the identified species are Yellow-listed and considered secure and widespread.

Assessment of Effects, Significance, and Mitigation Measures

Potential effects assessed for the Terrestrial Invertebrates VC included habitat loss, habitat alteration, sensory disturbance, direct mortality, wildlife attractants, and chemical hazards.

Dragonfly and damselfly were associated with lake and wetland habitats while butterflies were associated with grasslands. Mitigation for habitat loss includes maintaining suitable habitat, including food/host plants, and reclamation. Mitigation for habitat alteration includes various management plans (invasive plants, dust control, surface water quality). For example, use of pesticides will be minimized, and speed limits along roads will be implemented to reduce mortality.

No residual adverse effects are anticipated as a result of the Project. No observations of the listed indicator species were recorded in the Local Study Area, despite extensive survey effort by a species expert. Potential effects to observed yellow-listed species are expected to be **Negligible** with mitigation and not anticipated to have an adverse residual effect.

ES 6.1.12 *Amphibians*

Settings

Amphibians were chosen as a VC based on concerns from the public and the Kamloops Naturalist Club. Provincially and federally there are two listed species potentially present in the Project area,

the Great Basin Spadefoot and Western Toad. Two other frogs – the Columbia spotted frog and the northern Pacific treefrog – were also selected as indicators as they are species of regional concern.

The Region supports a diversity of amphibian species. Most amphibians are of management concern and several are at risk, including the Great Basin Spadefoot.

Nocturnal auditory surveys for calling amphibians and daytime searches for egg masses and tadpoles were completed. Driving (road) surveys were used to search for adults moving to breeding habitat. Surveys for amphibians were carried out according to methods described in RISC. Field surveys confirmed the presence of all indicator species within the LSA and confirmed breeding populations of Blue-listed Great Basin spadefoots and western toads in the LSA. Nine mapped wetlands were confirmed as amphibian breeding habitat in the LSA, including alkaline ponds, open water, ponds, alkali meadows, swamps, marshes, and lakes. A number of unmapped, ephemeral wetlands were also observed as amphibian breeding habitat.

Assessment of Effects, Significance, and Mitigation Measures

Amphibians were assessed to determine likely interactions with specific Project activities and how these interactions would affect group. All potential effects (habitat loss, habitat alteration, sensory disturbance, disruption of movement, direct mortality, indirect mortality, wildlife attractants and chemical hazards) arising from each Project activity were identified and evaluated. After the implementation of mitigation measures, three Project-related residual effects and three residual cumulative effects were determined for amphibians as a result of this Project in combination with other projects/activities, past, present, and future, occurring within the region.

The loss of suitable breeding habitat may result in a negative impact to various species. Two Blue-listed amphibians, Great Basin spadefoot and western toad, are known to reside in the area, and a reduction in habitat may impact these species locally and regionally.

It is estimated that 48% of potentially suitable breeding habitat in the LSA will be removed. This residual effect is considered **Not Significant (Moderate)**. Habitat loss is considered **Not Significant (Minor)** for residual cumulative effects as 2% of potentially suitable habitat available in the region will be removed.

Direct mortality of amphibians may result in decreased gene flow amongst populations, and possible decreased reproductive success for this species group. Direct mortality is considered **Not Significant (Moderate)** for Project-related residual effects, as 29% of terrestrial habitat in the LSA may be lost due to the Project. Direct mortality is considered **Not Significant (Minor)** for this species group for residual cumulative effects as 5% of terrestrial habitat may be lost due to the Project.

Chemical hazards have the potential to negatively affect amphibian populations, both in increasing mortality, as well as decreasing reproductive success of adults and development of tadpoles. With proper mitigation procedures, chemical hazards are considered **Not Significant (Minor)** for both Project-related effects as well as residual cumulative effects on amphibians.

ES 6.1.13 *Reptiles*

Setting

Reptiles have been chosen as a VC based on concerns from the public and the Kamloops Naturalist Club during Project-related consultation. There are three blue-listed snakes potentially present in the area and an additional four *Species at Risk Act* (SARA) schedule 1 listed species present in the region. Four snake species – the rubber boa, great basin gophersnake, racer, and rattlesnake – are used as indicators for the reptile VC.

There are significant reptile populations in the Southern Interior, where the warm dry valleys are contiguous with the reptile-rich desert of the western United States. Because of their protective scales and their reproductive strategies of laying shelled eggs or bearing live young, reptiles are generally less dependent upon moisture and water, which has allowed them to exploit more arid environments.

Rocky slopes and crevices provide important hibernacula habitat for reptiles in the region. All reptile species may be found on rock outcrops, along talus slopes, in small mammal burrows, or in coarse woody debris. In most cases critical habitats such as hibernacula have not been identified, making population monitoring difficult for snake species.

Baseline studies were conducted for reptiles in 2008, 2010, and 2014. Hibernaculum surveys were completed in an effort to determine species presence and abundance. Any reptile observed incidentally at any time during the course of field work was also recorded. Field studies were able to confirm the presence of gartersnake dens in the LSA.

Assessment of Effects, Significance, and Mitigation Measures

Reptiles were assessed as a VC to determine likely interactions with specific Project activities and how these interactions would affect this species group. No observations of listed snake species were recorded in the LSA. All potential effects (habitat loss, sensory disturbance, disruption of movement, direct mortality, wildlife attractants and chemical hazards) arising from each Project activity were identified and evaluated. After the implementation of mitigation measures, there are no anticipated Project-related residual effects for reptiles.

ES 6.1.14 *Migratory Birds*

Setting

The VC “Migratory Birds” was selected as there is an expected interaction between migratory birds and the Project. Some species are habitat specialists, requiring discrete habitats for successful nesting (e.g., wetlands); this makes these species vulnerable to loss or degradation of this habitat type. Indicators included within the Migratory Bird VC are: American Bittern, Barn Swallow, Common Nighthawk, Great Blue Heron, Lewis’s Woodpecker, Long-billed Curlew, Olive-sided Flycatcher, Sandhill Crane, Williamson’s Sapsucker and waterfowl. There are 15 listed species, six SARA species, and eight identified wildlife species potentially present in the Project area.

The Douglas Lake Plateau has been designated as an Important Bird Area in the Thompson-Okanagan region. Important Bird Areas support various species at risk such as Sage Thrasher, Lewis's Woodpecker, Yellow-breasted Chat, Long-billed Curlew, White-headed Woodpecker and other regionally significant species.

Under the *Migratory Birds Convention Act, 1994*, all breeding birds are protected from being killed, captured, injured, or taken, and all bird nests are protected from being disturbed, damaged, destroyed, or removed, unless a permit to undertake such activities is granted. Under the *BC Wildlife Act* (Government of British Columbia 1996), birds, eggs, and occupied nests may not be taken, injured, molested or destroyed. Unoccupied heron nest are also protected under the *BC Wildlife Act*.

In order to survey the variety of bird species, numerous RISC surveys were conducted. These included breeding bird surveys and migration surveys, waterfowl surveys, woodpecker surveys, habitat suitability mapping and call-playback surveys. Baseline studies took place between 2007 and 2014. Baseline surveys confirmed the presence of: Barn Swallow, Common Nighthawk, Great Blue Heron, Lewis's Woodpecker, Sandhill Crane, Olive-sided Flycatcher, Williamson's Sapsucker and Waterfowl in the LSA. Long-billed Curlew is believed to be present in the LSA, but baseline surveys were unable to visually confirm two potential observations.

Assessment of Effects, Significance, and Mitigation Measures

Migratory birds were assessed as a VC to determine likely interactions with specific Project activities, and how these interactions would affect this species group. Potential effects (habitat loss, habitat alteration, sensory disturbance, disruption of movement, direct mortality, indirect mortality, wildlife attractants and chemical hazards) arising from each Project activity were identified and evaluated. After the implementation of mitigation measures, two Project-related residual effects and two residual cumulative effects were determined for migratory birds as a result of this Project, as well as in combination with other projects/activities, past, present, and future, occurring within the region.

The loss of suitable migratory bird habitat, particularly wetlands (for waterfowl, Great Blue Herons, and Sandhill Cranes), and grasslands (for Long-billed Curlews and Common Nighthawks) could impact populations locally, but is not expected to impact populations regionally. Habitat loss was considered **Not Significant (Moderate)** because of the loss of wetland habitat expected to occur during Project Construction. Mitigation to reduce impacts included maintaining remaining sites and a wetland compensation plan. Several other human activities in the RSA have and could contribute to wetland loss within the RSA. However, the relative amount of wetlands within the RSA lost as a result of the project is less than 0.4%. This is a **Not Significant (Minor)** residual cumulative effect.

After the implementation of mitigation measures chemical hazards are expected to have a **Not Significant (Minor)** residual effects and cumulative effects on waterfowl. Only a small fraction of the population occurring in the area is anticipated to breed in areas where water quality exceeds wildlife guidelines. Waterfowl or shorebirds use of the TSF and other waterbodies that exceed aquatic and wildlife water quality guidelines is likely to occur during migration, therefore exposure will be limited.

ES 6.1.15 *Raptors*

Setting

Raptors are recognized as an integral part of B.C.'s ecosystems and are legally protected. Focal species were chosen on the basis of the presence of species and/or suitable habitat, potential interactions with the project, and knowledge to produce a meaningful assessment. Indicator species for the raptor VC include: Bald Eagle, Burrowing Owl, Flammulated Owl, Peregrine Falcon, Prairie Falcon, Great Gray Owl, Rough-legged Hawk, Short-eared Owl and Swainson's Hawk, based on their inclusion on provincial lists, federal lists or regional priorities lists. Numerous stakeholders including members of the public and the Kamloops Naturalists Club identified raptors as a concern. Raptors also play a significant role for many Aboriginal Groups.

The varied habitats of the Thompson region including arid grassland, shrub lands, open forests, cliffs, lakes and riparian areas support a particularly diverse raptor fauna. The Burrowing Owl, Western Screech-Owl (*macfarlanei*), Flammulated Owl, Swainson's Hawk, and Prairie Falcon are unique to the region or occur only occasionally elsewhere in the province.

Raptors, nests and eggs are protected from direct persecution by the provincial *Wildlife Act*. Raptors have relatively large home ranges and require suitable nesting sites.

Field methods for raptors followed RISC standards and included call-playback surveys, encounter transects and habitat suitability mapping. Surveys were conducted between 2007 and 2014. Six of the nine indicator species were confirmed in the LSA. Active nests for Bald Eagle and Swainson's Hawk were also identified.

Assessment of Effects, Significance, and Mitigation Measures

Habitat loss and sensory disturbance are both Project-related and cumulative residual effects. The magnitude and geographic extent of these effects differs as the scale at which they were assessed was much smaller for the Project-related residual effects than for cumulative residual effects (i.e., LSA vs. RSA). Duration of sensory disturbance differs as Project related noise will stop upon closure of the mine, but anthropogenic noise across the region will continue. Due to these differences, the likelihood and confidence, as well as the significance of the residual effects, also differs between assessments.

The effect of habitat loss will be mitigated by maintaining representative habitats in the LSA, clearing outside the breeding period or pre-clearing surveys, and progressive reclamation which will include artificial nesting structures.

Habitat loss is considered **Not Significant (Minor)** for Great Gray Owl, Rough-legged Hawk, Short-eared Owl, and Swainson's Hawk habitat for Project-related residual effects as a relatively small amount of suitable forested area will be removed (< 90 ha) as a result of Project activities, and the grassland habitat that will be removed is currently heavily disturbed, and not highly suitable for any raptor species. Habitat loss is considered **Not Significant (Minor)** for cumulative residual effects as large, undisturbed patches of suitable habitat still exists within the region, and that habitat has very little current or anticipated disturbances (projects/activities).

Sensory disturbance near raptor nests may result in abandonment of these sites. Noise management and monitoring will mitigate for sensory disturbance. This effect is considered **Not Significant (Minor)** for both Project-related and cumulative residual effects as the effect is easily reversible in the short-term and all species that may be affected were observed across the landscape in the LSA, an area already subject to a number of anthropogenic disturbances, indicating some resistance to this disturbance. Also, additional nesting habitat exists throughout the region, and that habitat has very little current or anticipated disturbances (projects/activities).

ES 6.1.16 *Non-migratory Gamebirds*

Setting

Numerous stakeholders, including members of the public and the Kamloops Naturalists Club, identified gamebirds as a concern. Grouse are a traditional food source for Aboriginal Groups. The indicator species used for the gamebirds VC are Columbian Sharp-tailed Grouse and Ruffed Grouse. The Sharp-tailed Grouse is Blue-listed and is also identified wildlife under the *Forest and Range Practices Act* (FRPA).

The Ruffed Grouse is most common in early successional forests dominated by aspen and poplar species. The Ruffed Grouse nests on the ground in forested habitat, usually with a deciduous component, and usually near water.

Grouse, nests and eggs are protected from direct persecution by the provincial *Wildlife Act*. The ruffed grouse is the most popularly hunted game bird in British Columbia and is hunted in the management units that overlap the Project (3-18 and 3-19).

Field surveys to confirm use at known lek sites, and to identify any additional lek sites, were conducted following methods described in RISC at the present/not detected survey level. Habitat suitability mapping for Columbian Sharp-tailed Grouse was also done using the TEM. Field surveys between 2007 and 2014 were able to confirm the presence of both indicator species within the LSA, confirm the activity status of lek locations, and confirm the presence of suitable habitat for all life requirements for both species of grouse.

Assessment of Effects, Significance, and Mitigation Measures

Potential effects (habitat loss, habitat alteration, sensory disturbance, disruption of movement, direct mortality, indirect mortality, wildlife attractants and chemical hazards) arising from each Project activity were identified and evaluated. After the implementation of mitigation measures, two Project-related residual effects and two residual cumulative effects were determined for non-migratory gamebirds as a result of this Project, as well as in combination with other projects/activities, past, present, and future, occurring within the region.

The loss of suitable Sharp-tailed Grouse habitat, and specifically the removal of one known active lek and the effective loss of another due to sensory disturbance, may result in a negative impact to this species. As the Columbian subspecies of Sharp-tailed Grouse present in the area are Blue-listed (special concern) in BC, the loss of sensitive sites could impact populations both locally, and regionally. To mitigate the habitat loss effects, known inactive leks will be enhanced and new lek

sites will be created. Noise disturbance will be reduced through a Noise Management Plan and Transportation Management Plan. Habitat loss is considered **Not Significant (Moderate)** for this species for Project-related residual effects as 25% of known active leks sites in the LSA will be removed. Habitat loss is considered **Not Significant (Minor)** for residual cumulative effects as suitable habitat still exists within the region, and that habitat has very little current or anticipated disturbances (projects/activities).

Sensory disturbance at lek sites may result in a reduction of use of these sites (Baydack & Hein 1987). Frequency of Greater Sage-grouse at active leks has been observed to decrease when industrial activity is occurring in proximity (Holloran 2005; Naugle et al. 2011; Blickley et al. 2012; Patricelli et al. 2013). While it is acknowledged that different species have different life requisites and behaviours, the common activity of lek usage allowed for this species to be used as a proxy. Sensory disturbance at lek sites is considered **Not Significant (Moderate)** for this species for Project-related residual effects as the effect is easily reversible in the short-term and a reduction in lek usage does not equate to lek abandonment (i.e., leks may become less desirable, but they will likely still be used). Sensory disturbance at lek sites is considered **Not Significant (Minor)** for this species for residual cumulative effects as additional leks exist within the region (Howie 2005), and that habitat has very little current or anticipated disturbances (projects/activities).

ES 6.1.17 Mammals

Setting

The VC “Mammals” was selected as there is an expected interaction between mammals and the Project. Indicator species for the mammals VC include Great Basin pocket mouse, badger, mule deer, moose, fringed myotis, spotted bat, western small-footed myotis, and Townsend’s big-eared bat. Red-listed species include the American badger and Great Basin pocket mouse. The fringed myotis, spotted bat, Townsend’s big-eared bat, and western small-footed myotis are Blue-listed. Three SARA schedule 1 species (American badger, little brown myotis, and spotted bat) may be present in the Project area. American badger is a species of regional concern. The fringed bat, spotted bat and badger are also identified wildlife under the *Forest and Range Practices Act* (FRPA). Numerous stakeholders including members of the public, Kamloops and District Fish and Game, Kamloops Naturalists Club, Grasslands Conservation Council, and the Thompson Watershed Coalition identified mammals as a concern. Moose and deer are a traditional food source for Aboriginal peoples and the badger was identified as culturally important.

The Southern Interior provides a vital link for grassland species, such as badger, from the deserts and grasslands of the Great Basin and Columbia Plateau of Nevada, Oregon, and Washington, northward to the grasslands of southern and central British Columbia. Canada’s only population of Great Basin Pocket-mice are found in these grasslands habitats as well.

The montane forests provide habitat for Mule Deer, White-Tailed Deer, and Moose. Mule Deer are the most abundant large ungulate in this Ecoprovince, although White-Tailed Deer have been extending their range westward from the Okanagan. Characteristic small mammals include spotted bats, and Great Basin pocket mice.

In order to survey the variety of mammal species, numerous RISC surveys were conducted. Small mammal live-trapping for Great Basin pocket mouse, badger burrow investigations and hair-snagging, habitat suitability mapping, winter encounter transects and acoustic surveys for bats. Field surveys were able to confirm the presence of six of the nine indicator species within the LSA, the presence of suitable habitat for American badger, and the scarcity of suitable Great Basin pocket mouse habitat within the LSA.

Assessment of Effects, Significance, and Mitigation Measures

Wildlife species (i.e., Great Basin pocket mouse, badger, mule deer, moose, bats) and their respective habitats were assessed as indicators for a number of potential Project-related residual effects.

Badger (habitat loss, sensory disturbance, and disruption of movement), mule deer (habitat loss), and bats (habitat loss and chemical hazards) were assessed for residual effects due to the Project.

The loss of American badger habitat may result in a negative impact to this species. As badgers are Red-listed (extirpated, endangered, or threatened) in BC, the loss of suitable habitat could impact populations locally and regionally. Habitat loss is considered **Not Significant (Moderate)** for this species for Project-related residual effects as about 28% of suitable habitat in the LSA will be removed. The majority of this habitat will be reclaimed but there is a temporal loss of habitat during Operation. Habitat loss is considered **Not Significant (Minor)** for cumulative residual effects as suitable habitat still exists within the region, and that habitat has very little current or anticipated disturbances (projects/activities).

The loss of bat habitat will likely have a low impact effect on bats in the area, both locally and regionally. Habitat loss is considered **Not Significant (Minor)** for bats for Project-related residual effects as an estimated 15% of identified habitat associated with bat roosting in the LSA to be removed by the Project. Limiting habitat features (hibernacula) were not identified in the LSA, but these features may be present at Sugarloaf Hill, an area outside of the LSA but located in in close proximity to the Project. Bat boxes will be installed to provide roosting sites for bats during Operation. Habitat loss was screened out of the cumulative effects assessment as only 0.8% of roosting habitat associations in the RSA may be removed as a result of the Project.

The loss of critical deer winter range (DWR) will not have a noticeable effect on deer populations in the area, either locally and regionally. Habitat loss is considered Not Significant (minor) for deer for Project-related residual effects, as 4% of identified DWR in the LSA may be removed by the Project, with the majority of this limiting habitat type remaining unaltered. Habitat loss was screened out of the cumulative effects assessment as only 0.4% of critical DWR in the RSA may be removed as a result of the Project.

Sensory disturbance may result in a reduction of use of digs by badgers. Increased stress levels and/or decreased foraging efficiency may result from Project related noise and vibration. Sensory disturbance is considered **Not Significant (Minor)** for this species for Project-related residual effects as the effect is easily reversible in the short-term, and a reduction in habitat use does not necessarily mean the habitat will be abandoned long-term. Cumulative effect of disturbance is also **Not Significant (Minor)** as other projects in the area will not produce blasting noise.

Disruption of badger movement may result in increased energy expenditures and decreased reproductive success for this species. Disruption of movement is considered **Not Significant (Moderate)** for Project-related residual effects as fragmented habitats may decrease badger populations, but individuals may shift home ranges in response to a disturbance. Disruption of movement is considered **Not Significant (Minor)** for this species for cumulative residual effects as an abundance of unfragmented grassland habitat exists southeast of the Project, and that habitat does not have any anticipated projects/activities.

Chemical hazards present on the landscape (tailings, water management ponds and pit lake) may have a negative effect on various bat species. An increase of toxins in the system of bats may reduce overall health. Exposure would be limited as there numerous other safe water sources and bats hibernate. Adaptive management of the sites from would further reduce exposure. Chemical hazards are considered **Not Significant (Moderate)** for Project-related residual effects as repeated exposure to high concentrations of metals and other toxins may reduce the ability for this species group to persist on the landscape, but the long-term effects are not well understood. Chemical hazards were considered **Not Significant (Minor)** for this species group for cumulative effects as minor amounts of contaminated water exist throughout the RSA, and the few projects/activities planned would not change this.

ES 6.2 Assessment of Potential Economic Effects

From an economic perspective, the Project is associated with substantial benefits. Mining is an important sector in the regional economy of Kamloops, which contributes to the diversity of the economy. In the Thompson Okanagan Development Region, the number of individuals employed in the mining and oil and gas extraction sector has grown at a faster rate than all industries between 1997 and 2013 (Venture Kamloops 2014). Employment and associated local and regional expenditures are expected to make a substantive contribution to the local, provincial, and national economies. This includes total gross domestic product (GDP; direct, indirect, and induced) contributions of approximately \$873 million in BC and \$409 million in the rest of Canada during Construction, and approximately \$5.1 billion in BC and \$1.5 billion in the rest of Canada during Operation.

In the context of the environmental assessment process, the focus is on identifying potential adverse effects, and establishing appropriate mitigation measures to avoid or minimize their occurrence. Adverse economic effects are generally associated with the closure of the Project, which is an inevitable component of any project. It is important not to lose sight of the substantial positive contributions associated with the Project, which will provide a net benefit (including employment, income, business opportunities, and tax revenue, as summarized in Section ES 2.6), and which will build capacity and provide sustainable benefits that last beyond the Project.

ES 6.2.1 *Setting*

The economic RSA is the TNRD, including three Aboriginal Groups: LNIB, AIB, and WP/CIB. The LSA is the city of Kamloops (Kamloops), the TNRD-J Copper Desert Country Census subdivision, and the populated reserve parcels for which Statistics Canada provides data for the Tk'emlúps te Secwépemc (TteS; Kamloops 1 Indian Reserve [IR]), and the Skeetchestn Indian Band (SIB; Skeetchestn IR). Together the TteS and SIB form the Stk'emlupsemc te Secwépemc Nation (SSN).

Much of the economy of the RSA is based on public services, including health care and education. Tourism is a small but increasingly important contributor of the regional economy. Forestry has traditionally been an important economic driver but developments in the sector (e.g., pine beetle infestation) have reduced its importance. Mining has historically been (and continues to be) important: two active mines (Highland Valley Copper [HVC] and New Afton) and at least three proposed mines (the Project, Harper Creek, and Ruddock Creek) are in the RSA.

The approach to understanding baseline conditions focused primarily on a review of secondary data, including data from Statistics Canada, BC Stats, municipal documentation, publicly available literature, and related sources. Information was also gathered via discussions and interviews with individuals who have knowledge regarding general economic circumstances in the LSA and RSA to help inform the baseline discussion.

Economic VCs of “Economic Growth”, “Labour Force, Employment, and Training”, “Income”, “Business”, “Property Values”, and “Economic Diversification” were chosen based on specific concerns from stakeholders and the public, Aboriginal Groups, as well as through discussions with the BC EAO and other government agencies.

ES 6.2.2 Assessment of Effects, Significance, and Mitigation Measures

Economic Growth

The Project will largely have positive effects on Economic Growth in the LSA and RSA. During the Construction and Operation phases, the Project will create employment in the LSA and RSA, both directly (through direct hires), indirectly (through expenditures on goods and services to support the Project), and through induced economic effects. Employment and income related to the Project will contribute to Economic Growth. In total between 1,510 and 1,850 total local positions (i.e., direct, indirect, and induced) are expected to be supported by the Project during the peak of the Construction phase, and an annual average of 933 total positions will be generated over the 23-year Operation phase.

As the Project moves into the Decommissioning and Closure phase, employment, and expenditures are expected to decrease. Accordingly, the Project’s contribution to economic growth will also decrease. To mitigate the influence of this effect on workers and communities in the LSA and RSA, the Project will devise a communications strategy, and transition programming to support workers as jobs come to an end.

The residual effect of decreased Economic Growth (as the Project transitions from the Operation phase into the Decommissioning and Closure phase) is expected to be **Not Significant (Minor)**. Although effects may be experienced throughout the RSA, they will be minor due to a regional economy that is diverse, has historical economic experience with the mining sector, and offers new business and employment opportunities. No cumulative effects are anticipated.

Labour Force, Employment and Training

The Project is expected to have positive effects on Labour Force, Employment and Training opportunities in the LSA and RSA during all phases of the Project. Given the Project’s proximity to

Kamloops and the well-developed mining supply and service sector, it is expected that a large proportion of Project employment needs will be addressed within the LSA and RSA.

An average of 468 people are expected to be employed directly by the Project during the Operations phase, plus additional indirect and induced jobs. As the Project shifts from the Operation Phase into the Decommissioning and Closure Phase, there will be a reduction in the size of the Project's workforce and expenditures, and jobs will come to an end. Mitigation will include communication with employees and contractors and a workforce transition plan to maximize the likelihood of employees gaining employment elsewhere. The communication strategy will involve direct employees of the Project and contractors, both of which will be informed of upcoming changes in employment or business contracts in a manner that will allow them to find other employment and/or clients. The transition programming will provide support for education and training and career development. Where feasible, re-assignment will be considered.

After mitigation, the decrease in employment and training is expected to be **Not Significant (Moderate)**; the scale of this effect could be lower depending on the economic circumstances at the time of closure and the needs of other mining projects in the region. No cumulative effects are identified.

Income

The Project will generate substantial income benefits over the Construction and Operation phases. This includes \$1.2 billion in direct salaries through the employment of, on average, 468 people, plus \$23.8 million through indirect and \$38 million through induced employment. In total, direct, indirect, and induced employment is expected to contribute \$1.8 billion through salaries paid to residents of the LSA and RSA.

Project-related employment will generate incomes for workers. While this effect will be largely positive, there will be a loss of income-generating jobs at the end of the Operation phase.

To mitigate the effect of reduced income as the Project shifts from the Operation Phase into the Decommissioning and Closure Phase, the Project will devise a communication strategy and transition programming for workers.

Following mitigation, the effect is expected to be **Not Significant (Moderate)**. No cumulative effects are anticipated.

Business

The Project is expected to provide a large number of opportunities for businesses within the LSA and RSA, including Aboriginal businesses. For environmental assessment purposes, Construction phase expenditures are estimated at \$1.54 billion and Operation phase expenditures are estimated at \$299 million per year. Given the Project's proximity to Kamloops and the scope of mining-related business in the area, a large proportion of Project contracting needs are expected to be addressed by local or regional businesses. Wages from Project employment will benefit local businesses in the LSA and RSA.

Increased labour competition, particularly for small to medium-sized businesses, may result from increased costs associated with staff turnover and increased wages in order to compete with the Project for employees. Businesses in Kamloops and the surrounding area are already experiencing some degree of this change. KAM will engage industry and stakeholders through a Community Liaison Group to identify and mitigate potential concerns related to labour competition. The residual effect related to increased labour competition is expected to be **Not Significant (Minor)**.

There may be cumulative effects related to increased labour competition in the LSA resulting from the interaction with the proposed Harper Creek mine and the Trans Mountain pipeline expansion projects. The residual cumulative effect is expected to be **Not Significant (Minor)**.

Property Values

Baseline studies summarized the current conditions and trends in relation to property values in Kamloops and the surrounding area, including residential, commercial, industrial, and agricultural zonings. Potential effects on property values considered potential changes in air quality, noise and vibration, and visual quality. The results of the effects assessments for these VCs were used to inform the Property Values assessment.

The agricultural properties closest to the Project will experience the greatest degree of effects, as a result of changes in noise levels and air quality. Changes in air quality are localized, seasonal, and for a small percentage of each year and are not anticipated to change agricultural usage. Noise levels could change some usage of fields close to the Project but KAM is committed to working with local ranchers to continue agricultural activity around the Project.

Residential property values in Aberdeen, Knutsford, and the rural residences closest to the Mine Site perimeter may be influenced by real and perceived changes in air quality, noise levels, vibration levels, and visual impacts. Increase in population is also expected to influence demand, and thus residential property values. These factors could cause property values to increase or decrease, although broader market conditions also have a notable influence.

Mitigation measures identified for other VCs (i.e., air quality, noise and vibration, visual quality) will reduce the effects of environmental changes on property values. KAM's monitoring programs, engagement strategy, and robust reporting mechanisms will help the company be transparent about the environmental effects of the Project, and reduce the potential for concerns or perceived environmental effects to adversely influence residential property values. Monitoring and reporting will provide KAM an opportunity to share the accuracy of the predictions made in the Application/EIS and address issues through adaptive management. Project effects on agricultural property are expected to be the same, although population change and visual impacts are not expected to have an effect.

Property values are affected by a variety of factors and many preferences are highly personal, so determinations of significance for Project residual effects on both residential and agricultural property are conservative. Considering the range of influences, residential property values for those rural residences closest to the Mine Site could decrease due to real and perceived changes to air quality, noise levels, vibration levels, and visual impacts; residential property values in Aberdeen

and Knutsford may also be affected, though primarily as a result of perceived environmental changes. Overall, this effect is predicted to be **Not Significant (Moderate)**. The decrease of agricultural property values for those properties closest to the Mine Site perimeter due to real and perceived changes to grasslands vegetation, air quality, noise levels, and vibration levels is characterized as **Not Significant (Moderate)**.

The Project residual effect on agricultural property values may cumulatively interact with effects from the Trans Mountain Pipeline Expansion. The interaction is expected to be brief, localized, and temporary, and will only affect one privately held agricultural property adjacent to the Mine Site. Therefore, the determination of significance of **Not Significant (Moderate)** does not change for the cumulative effects assessment. No cumulative effects on residential property values are identified.

Economic Diversification

The Project is expected to diversify the economy in both the LSA and RSA during all Project phases. The generation of employment income from direct employment (i.e., basic income) is expected to contribute positively to economic diversity within the LSA. The increased basic income will also lead to an increase in non-basic income as the indirect and induced effects flow through the economy. As the Project transitions into Decommissioning and Closure, employment and Project-related expenditures will be substantially reduced but not below existing conditions. The Kamloops Local Area economy is already relatively diverse and does not have a dependence on any single economic sector, including mining.

The Project is expected to have a positive effect on economic diversification. The Project is not expected to produce any residual adverse economic diversification effects, and does not require mitigation or monitoring.

ES 6.3 Assessment of Potential Social Effects

ES 6.3.1 Setting

The TNRD includes both urban and rural landscapes. The LSA includes Kamloops; the Kamloops 1 IR, which is the primary reserve parcel for the TteS; the Skeetchestn IR, which is the primary reserve parcel for the SIB; and the TNRD-J. The TteS and SIB have formed SSN. The RSA is the TNRD and includes the LNIB, AIB, and WP/CIB.

Since Kamloops is the closest community to the Project and the largest community in the TNRD, Kamloops' infrastructure and services are more likely to experience direct and indirect Project effects than other communities in the LSA and RSA. Key topics for consideration include: population; housing (including rental and temporary/short-term accommodations); water, sewer and landfill; emergency services; health and social services; recreation services; education; and transportation infrastructure.

Social VCs of "Infrastructure, Public Facilities and Services", "Dark Sky", "Visual Impact and Aesthetic Features", "Land and Resource Use", "Cultural Use of Lands and Resources for Traditional Purposes", "Outdoor Recreation", and a supporting topic of "Jacko Lake" were chosen

based on standard environmental assessment practices, and concerns expressed by the BC EAO, CEA Agency, Aboriginal Groups, and the public.

ES 6.3.2 *Assessment of Effects, Significance, and Mitigation Measures*

Infrastructure, Public Facilities and Services

The Project workforce during peak Construction may increase hotel/motel occupancy rates and constrain tourism, including the ability of Kamloops to attract events, and the ability of independent tourists to access hotel/motel rooms in the city. Mitigation measures will include the development and implementation of a Project Recruitment Strategy to maximize local hires and reduce the number of non-local workers, thereby reducing the number of workers requiring accommodation. An advisory committee comprised of relevant representatives from the City, the TNRD, and Tourism Kamloops will discuss potential issues and solutions. In addition, KAM will engage in ongoing dialogue with the City and service organizations (e.g., Interior Community Services) to inform them of workforce requirements. Finally, KAM will work with construction contractors and relevant stakeholders (including the City, social service providers, business community, and other organizations) to identify needs and suitable options for workforce accommodation, and developing a Construction Phase Workforce Accommodation Plan in consultation with these parties. After mitigation, the effect is expected to be **Not Significant (Minor)**. A cumulative effect may occur if the Construction phase overlaps with the construction of the TMPL Expansion, which will also accommodate workers in Kamloops; the cumulative effect is predicted to be **Not Significant (Moderate)**.

Workforce accommodation demands during peak Construction could also result in increased rental prices, which could make it more challenging for vulnerable households to retain suitable accommodation. Mitigation measures will be the same as those identified above, in order to minimize demand and make appropriate plans for workforce housing in consultation with relevant stakeholders, including social services agencies. After mitigation, the effect is expected to be **Not Significant (Minor)**. A cumulative effect may occur if the Construction phase overlaps with the construction of the TMPL Expansion, which will also accommodate workers in Kamloops; the cumulative effect is predicted to be **Not Significant (Moderate)**.

If non-local construction workers behave poorly (e.g. excessive partying or other socially irresponsible activities), there may be an increased demand on the RCMP to respond to calls. The municipal RCMP detachment is currently short-staffed and its officers have a higher-than-average case load for communities of comparable size. However, the experiences of more rural projects are also expected to be mitigated by the diverse amenities available in Kamloops. In addition to the mitigation measures identified above, KAM will maintain ongoing dialogue with the RCMP, implement a Code of Conduct for direct and contractor employees, and facilitate recreational opportunities in Kamloops for direct and contract employees. After mitigation, the effect is expected to be **Not Significant (Minor)**. As for the other effects, a cumulative effect may occur with the construction of the TMPL Expansion; this effect is predicted to be **Not Significant (Minor)**.

During Construction, Project traffic may affect the flow of traffic at the Pacific Way/Hugh Allan Drive intersection (during early construction, in 2016) and at the Versatile Drive/Hugh Allan Drive roundabout (during peak construction, in 2018). Mitigation measures will focus on reducing traffic

volumes and include implementing carpooling incentives during the Construction and Operation phases, providing workforce personnel shuttles from key locations within Kamloops to the Mine Site during the Construction phase and staggering shifts. After mitigation, the effect is expected to be **Not Significant (Minor)**. A cumulative effect on traffic could occur as a result of construction traffic for the TMPL Expansion; the cumulative effect is predicted to be **Not Significant (Moderate)**.

Kamloops and the TNRD may need to defer larger projects due to inadequate labour supply during Construction and Operation phases. Mitigation will include the establishment of an advisory committee comprised of relevant representatives from the City and the TNRD, services and organizations to discuss potential issues and solutions regarding planning and coordination of construction/engineering projects. The effect of the Project is anticipated to be **Not Significant (Minor)** and no residual cumulative effects are anticipated.

Dark Sky

Dark Sky was chosen as a VC because Kamloops residents have expressed concerns about potential health issues related to the illumination of the sky at night, while the Kamloops Astronomical Society (KAS) has expressed concern about effects to scientific research and recreational sky gazing and astronomy.

The Dark Sky assessment has been divided into three potential effects – Glare, Light Spill, and Sky Glow – caused by Project activities. The highest potential for Spill Light or Glare during the Construction phase will be along the Coquihalla Highway, Lac Le Jeune Road, and at Jacko Lake. Construction activities may sometimes extend beyond nightfall when days are short or when continuation of construction is required. During Operation, the process plant will operate 24 hours per day, and buildings, access roads, haul roads, bridges, and other work areas will need lighting. Decommissioning and Closure will return the area toward baseline conditions.

With regards to Sky Glow, the Project-affected area extends up to 5 km from the Project Boundaries. The KAS observatory does not fall within this radius.

The Project will develop a lighting mitigation and management plan for the Operation phase. Lighting tools and techniques will limit the effects across all phases. Glare and Spill Light will be managed by controlling the period, timing, and intensity, and the shielding and directing of the light. All residual effects of Glare and Spill Light are expected to be **Not Significant (Minor)**.

Sky glow will not be completely mitigated. Illumination management, shielding and directed lighting and spectral control will reduce the effect. The residual effect of Sky Glow is expected to be **Not Significant (Minor)**. The residual effect of Sky Glow has been carried forward into the cumulative effects assessment, and after mitigation will result in a **Non-Significant (Moderate)** effect.

Visual Impact and Aesthetic Features

“Visual Impact/Aesthetic Features” were identified as a VC because the Project could have an effect on views and sight lines from residential, recreational, transport, and commercial locations. Changes in visual quality could also affect property values and tourism. The Project could be visible from Knutsford (2 km east of the Project) and Rose Hill (6 km northeast). Other Kamloops

neighbourhoods, including Aberdeen, are within the RSA; but not likely to see the Project. The Project could also potentially be visible from sections of Highway 5, Highway 5A, Lac Le Jeune Road, Goose Lake Road, and Edith Lake Road. The Project is not visible from Greenstone Mountain, but it may be visible from a significant portion of the Lac du Bois Grasslands Protected Area.

Two potential Project effects on the Visual Impact and Aesthetic Features of the surrounding landscape include visual quality and shading. Twenty-four of the 39 viewpoints evaluated had no view of any Project components, including those in neighbourhoods of south Kamloops such as Aberdeen and Sahali. The remaining 15 locations with a view of the Project were carried forward into a more detailed analysis, which showed that only one viewpoint would experience a substantial effect on the visual landscape. At sunset, the shadows for all Project components extend on to land owned by the Proponent and not accessible to the public.

The most effective mitigation measure is progressive re-vegetation of Project components that are no longer in use and other disturbed areas. Good visual design principles will be applied and will consider local and regional landscape patterns and geometry (e.g., slope) in order to meet the needs of the resource values of the surrounding area including economic, recreational and social values. Using non-reflective materials in the construction of buildings and other infrastructure will prevent them from standing out. Infrastructure will also be painted with natural colours that blend into the landscape, or screened with tall shrubs or trees. There are no mitigation strategies available for shading; however, no residual effects from shading are anticipated.

A substantial majority of the Kamloops area will have no view of the Project and those areas that have a view of the Project will largely be only moderately affected; therefore, the effect of the Project on visual quality will be **Not Significant (Moderate)** for the Operation phase and **Not Significant (Minor)** for the Post-Closure phase. The residual effect was carried forward into the cumulative effects assessment, wherein the effect of the Project on visual quality was examined in the context of activities in the surrounding area (e.g., Trans Mountain pipeline, future expansion of the City of Kamloops). The residual cumulative effect is predicted to be **Not Significant (Moderate)**. No residual effects for the 230 kV overhead power line or shading effects from Project components are expected.

Land and Resource Use

The Project is aligned with City of Kamloops' and the TNRD's existing land use plans, designations, and processes. However, real or perceived environmental effects of the Project and its activities may affect the ability of planning authorities to meet some objectives; in particular, the regional growth strategy developed by the City and TNRD identifies the southwest sector of Kamloops as priority area for development to accommodate population growth. If environmental effects of the Project (e.g. changes in air quality, noise, etc.) make this area less desirable for residential development, it could affect execution of the regional growth strategy. Measures to mitigate potential limitations on the ability of the City of Kamloops and the TNRD to meet their respective objectives of various land use planning initiatives include measures developed for the Air Quality, Noise and Vibration, Water Quality, and Infrastructure, Public Facilities and Services VCs. KAM is committed to dialogue with the City of Kamloops and the TNRD throughout the life of the Project. After mitigation the effect is expected to be **Not Significant (Moderate)**.

Ranching activities could be affected through changes in dust, noise and vibration, physical access to grazing fields, and access to sufficient water quantities to support ranching operations. KAM is committed to working with Sugarloaf Ranch and other potentially affected ranchers to encourage continued ranching activities in proximity to the Project, so long as the safety of mining activities and/or the safety of ranching activities are not compromised. Mitigation for effects on ranching will include agreements with potentially affected ranchers and development of an Access Management Plan which includes details around ongoing engagement with the ranching community. No residual effects on ranching are identified.

The Project, in conjunction with other project and activities active or being developed within the region, is not expected to result in cumulative effects on land and resource use.

Current Use of Lands and Resources for Traditional Purposes

The Project could affect Aboriginal peoples' current use of lands and resources for traditional purposes—including hunting, trapping, gathering, and ceremonial/cultural activities—through changes in the availability of harvested species, the quality of harvests (and potential implications for human health), ability to access harvesting areas, or through sensory disturbances (e.g., noise, visibility of the Project) that could affect the experience of these activities. The assessment of this VC is strongly tied to that of other VCs, including fish, wildlife, terrestrial ecology, noise, air quality, and human health.

Some use of Pipsell (Jacko Lake and the surrounding area) may be affected by access restrictions; particularly for the Hunting Blind Complex and Goose Lake, which will be lost to the development of the Project; Jacko Lake, which will be partially lost and restricted; and Peterson Creek, which will be diverted and restricted. For areas that remain accessible, the experience of using these areas may be altered by noises, visual disturbance, and dust.

Mitigation measures are largely developed and described in relation to other VCs, and include modifications to the Mine Site footprint in order to minimize effects on habitat loss or alteration, minimizing noise through optimal selection and use of equipment, traffic management, habitat protection and restoration, access management (including development of alternate road access to Jacko Lake), dust management, water quality management, various environmental monitoring programs, and ongoing communication with land users and Aboriginal Groups.

For all activities, the potential effect on the quality of resources—namely, the potential for human health to be affected through contamination through the food chain—mitigation measures to control air and dust emissions and to control surface water and groundwater discharges are considered to be effective in addressing the potential effects to country foods and will reduce Project effects to levels that are protective of human health.

Considering the mitigation measures that will be implemented to manage access, avoid or reduce effects on harvested species, control noise and dust emissions, and otherwise reduce potential effects on fishing, hunting, gathering, and ceremonial/cultural activities, the residual effects of the Project on the SSN are expected to be **Not Significant (Minor)** for fishing, and **Not Significant (Moderate)** for hunting, gathering, and ceremonial activities. In relation to other Aboriginal Groups, potential effects on the fishing, hunting and gathering activities of the LNIB, WP/CIB, and MNBC are

expected to be **Not Significant (Minor)**; while effects on the AIB are expected to be **Not Significant (Negligible)** as AIB representatives have indicated that current use of the local study area is limited. Potentially affected ceremonial sites or activities have not been identified for the LNIB, AIB, WP/CIB, or MNBC.

Cumulative effects are expected, and are largely related to the significant effects of past and present activities—including decades of ranching, mining, and private property—on Aboriginal peoples' ability to pursue traditional practices in the Peterson Creek watershed (RSA). Residual cumulative effects are assessed to be **Significant** for hunting, gathering, and SSN ceremonial sites, and **Not Significant (Moderate)** for fishing. However, considering these effects and the influence of past and present developments, the Project represents a minor contribution to the cumulative effects that are already present.

Outdoor Recreation

Outdoor Recreation includes a variety of outdoor pursuits, such as fishing, hunting, hiking, biking, cross-country skiing, and other activities. Areas of particular interest include Jacko Lake, Inks Lake, Goose Lake, and Goose Lake Road.

The presence of the Project will remove certain areas and landscape features from public use and restrict access to other areas (temporarily or permanently) for safety or operational reasons. These changes may affect the ability of individuals to access certain sites and engage in outdoor recreational activities. This includes the removal of Goose Lake, the closure of a 6 km portion of Goose Lake Road, the removal of the northeast arm of Jacko Lake and temporary restrictions to the access of Jacko Lake during blasting. This effect will be managed by the implementation of an Access Management Plan (AMP), developed by KAM, which will address overall access to the site and ensure that safe access is facilitated where possible. KAM also intends, through both the AMP and Community Liaison Group, to work with local recreational and resource land users to identify areas where all forms of land and resource use can continue to be enjoyed in the Project area. After mitigation, the Project is expected to have a **Not Significant (Moderate)** effect related to removal or changes in access for recreational opportunities.

The quality of the outdoor recreation experience (i.e., how enjoyable or appealing activities are) may be influenced by environmental changes arising from the Project, such as air quality, noise and vibration, visual impacts and aesthetic features, dark sky, traffic, and over-utilization. Measures to mitigate these influences are largely contained within the mitigation measures developed for the air quality, noise and vibration, and visual impact VCs, but also include specific measures to consult with recreational users and address concerns. The Project is expected to have a **Not Significant (Moderate)** effect related to diminished recreational experience as a result of Project activities, following mitigation.

For recreational harvests, including fishing and hunting, changes to fish and wildlife resources both in terms of distribution and quality may affect the pursuit of these activities near the Project. For the purpose of the Outdoor Recreation VC, the primary interest is in understanding potential effects related to fish in recreational fishing lakes in the immediate vicinity of the Project, including Jacko Lake. Measures to mitigate potential changes to fish and fish habitat include continued monitoring of fish populations, contaminants, and nuisance factors. KAM will seek ongoing interaction with

anglers to help ensure issues are being addressed and intended mitigation outcomes are achieved. With respect to hunting, the assessment of the Wildlife VC concluded that there may be Not Significant (Moderate) effects on mule deer and game birds (e.g., ruffed grouse) in relation to habitat loss and sensory disturbance. The potential effect of the Project related to reduced opportunities resulting from reduced availability natural resources are anticipated to be **Not Significant (Minor)**.

The Project has potential overlap with the proposed TransMountain Pipeline Project; however, with the proposed mitigation, there are no expected residual cumulative effects.

Supporting Topic – Jacko Lake

Over the past number of years KAM has sought to engage with key stakeholders (community Aboriginal Groups and government) regarding the Project. Throughout this engagement process, a diverse group of individuals and organizations have expressed a range of concerns regarding potential Project effects on Jacko Lake. These concerns are particularly relevant given the importance of Jacko Lake and its location within the Project’s proposed footprint, adjacent the open pit. Individuals, organizations, and communities included:

- Aboriginal Groups for whom the lake is culturally important;
- ranchers who use the lake for watering cattle and/or hold water licences downstream;
- recreational resource users who value the lake for readily available angling opportunities;
- recreational users who value the lake for other interests and opportunities (e.g., birdwatching, hiking); and
- municipal, regional, provincial, and federal government departments that include the lake in their jurisdictions.

Given the location of the lake, its importance to stakeholders and regulators, and to ensure sound environmental assessment practice, a specific section related to Jacko Lake is included in the Application/EIS to integrate results from relevant VCs into a single place. Effects are considered from a variety of perspectives and disciplines.

KAM is committed to developing, operating and closing the Project in recognition of the many environmental, social, and cultural values associated with Jacko Lake. On the basis of the Project design and mitigation measures proposed, and the results of the effects assessments completed by KAM’s consulting team, KAM believes the Project can successfully achieve this commitment. KAM will continue to pursue means of improving the Project design and strengthening the mitigation measures as the Project continues to develop, and through the implementation of the Environmental Management System described in the Application/EIS.

ES 6.4 Assessment of Potential Heritage Effects

ES 6.4.1 Setting

Heritage VCs of “Archaeological Sites” and “Aboriginal and Non-Aboriginal Heritage Sites” were identified in response to relevant legislation; the potential for Project interactions; and interest in heritage from Aboriginal Groups, government, and the public.

The Project is situated within the traditional territories of multiple Aboriginal Groups, who used upland areas such as the Project site to hunt, as well as to trap, fish, and gather plants for food or medicine. European settlement began in the mid-1840s when gold was discovered in the Thompson River Valley. There is a long history of mineral exploration and mining within the RSA starting in the 1850s. In the late 1890s larger operations began to appear.

A review of published information was conducted prior to fieldwork, including ethnographic, historic, archaeological, environmental literature, and government databases. Aboriginal land use and knowledge reports were reviewed.

The entire Project area was subject to pedestrian survey. Examination consisted of a combination of systematic and/or judgmentally selected pedestrian survey traverses. Ground surfaces were visually examined for trails, structures, artifacts, depressions, and other evidence of past human settlement or land use. Artifacts identified on the surface during pedestrian surveys were recorded, photographed, and collected.

ES 6.4.2 *Assessment of Effects, Significance, and Mitigation Measures*

Archaeological Sites

Project effects on known archaeological sites and as-yet unknown archaeological sites may occur during Construction due to movement, excavation, or disturbance of soil, and clearing and grubbing of vegetation (direct effects). Twenty-five of the archaeological sites that will be directly affected by the Project are lithic scatters or single lithic finds with a low overall significance rating. During the Operation, Decommissioning and Closure, and Post-Closure phases there is a potential for effects to archaeological sites due to increased human presence (indirect effects). There are 18 known archaeological sites within the LSA where indirect effects could occur.

The archaeological sites with a higher significance include a lithic scatter that includes a Shuswap Horizon point with a moderate significance, a hunting blind complex with a significance rating of moderate-high; the location where the St. Peter's Anglican Church and cemetery were situated with a significance rating of high, and a modified ungulate tooth with a significance rating of moderate.

While avoidance is always preferred, KAM will work with the Archaeology Branch and Aboriginal Groups to determine mitigation measures for the 28 archaeological sites located in, or within 50 m of, Project developments, where avoidance is not feasible. The aim will be to reduce residual effects to **Not Significant (minor)**. It is anticipated that mitigation measures at these sites may include systematic data recovery or preservation through site capping. Additional mitigation measures and residual effects are anticipated at the Hunting Blind Complex and the St. Peter's Church location due to significance ratings at these two sites. The Hunting Blind Complex is within the mine pit, so avoidance is not feasible. A final mitigation strategy for this site will be determined through discussion between KAM, SSN, and the Archaeology Branch.

Mitigation measures for the former site of St. Peter's Anglican Church will be determined in consultation with the Archaeology Branch, the Anglican Church, and potentially other affected stakeholders (e.g., next of kin).

Any revisions to the Project footprint will be reviewed by a qualified professional archaeologist. The Chance Find Procedure will be used to provide a framework for avoiding or mitigating effects to archaeological sites, if present, that were not identified during previous studies. Mine employees and contractors will be educated about the Chance Find Procedure. Where avoidance is not possible, alterations to archaeological sites protected under the *Heritage Conservation Act* (HCA; 1996) will require a permit from the Archaeology Branch, and potentially additional mitigation measures determined in consultation with local First Nations and the Archaeology Branch.

Based on the mitigation measures provided above, the Project's effects will be reduced to **Not Significant**.

Aboriginal and Non-Aboriginal Heritage Sites

Aboriginal Heritage Sites

Jacko Lake has been identified as an important area for traditional and current practices of the Secwepmec people. It is within the Project Heritage LSA and adjacent to the proposed open pit. The *SSN Cultural Heritage Study* notes that Jacko Lake was fished for trout and the area was used to harvest roots and to hunt deer and elk.

There are currently six archaeological sites near Jacko Lake, all classified as lithic sites requiring additional mitigation prior to disturbance, four of which may be affected by the Project.

Indirect effects due to increased human presence are possible at one of the sites near the Jacko Lake shoreline; this area will be marked as a "No Work Zone" on development maps. An environmental staff member will be present during construction, and site boundaries will be flagged or fenced.

For the remaining archaeological sites, mitigation will be determined in consultation with the Archaeology Branch and Aboriginal Groups, and may include systematic data recovery, construction monitoring, and/or site capping. Any alteration to these sites will require a permit from the Archaeology Branch.

Rock piles to the north of the LSA have been identified by the SSN as having potential cultural significance; no impacts to these rock piles are anticipated.

Once mitigation and management measures have been implemented, potential residual effects on Aboriginal heritage resources will be reduced to minor and **Not Significant**.

Non-Aboriginal Heritage Sites

Fourteen sites were identified within the LSA suggesting structures related to early homesteading and settlement. Additionally, two historic hearth-campfire features associated with historic debris were located. These sites are not currently designated under the HCA (1996) or *Local Government Act* (1996) but may be of interest to the local community (St. Peter's Church site will be protected as an Archaeology site).

Avoidance is the preferred mitigation measure. KAM will arrange for site orientation and training of all employees and contractors on compliance with the HCA (1996) and the Project's Heritage Chance

Find Procedure. Training will focus on not disturbing known heritage sites; the procedure for responding to newly identified sites, as outlined in the Project's Heritage Chance Find Procedure; and how to report these sites or observed site impacts.

Before any identified built heritage sites are disturbed by Project activities (in or within 50 metres of the Project footprint), the Project will consult community stakeholders to determine significance and discuss additional mitigation measures.

Once mitigation and management measures have been implemented, potential residual effects on non-Aboriginal heritage resources will be reduced to minor and **Not Significant**.

ES 6.5 Assessment of Potential Health Effects

ES 6.5.1 Air Quality

Setting

Air quality has been chosen as a VC based on the potential risks to human health and specific concerns from the public during Project-related consultation. Kamloops residents and various other stakeholders have expressed concerns about potential health issues related to air quality.

The background air quality in the City of Kamloops and the outlying regions is well understood owing to an extensive historic record of air quality measurements. This includes continuous measurements of a suite of gasses and particulate matter, and intermittent monitoring of particulate matter and dustfall. These measurements, when compared to the applicable regulatory criteria, indicate that air quality in Kamloops is good. The term "good" is arguably a fair descriptor for a location where the measured Federal Air Quality Health Index (AQHI) is in the Low Health Risk category 94.1% of the time.

Measured background concentrations of sulphur dioxide, nitrogen dioxide, and carbon monoxide are low. They are always less than the applicable regulatory criteria. Particulate matter measurements (total, inhalable, and respirable) are generally low, but at times exceed the criteria. These exceedances are episodic, and often driven by external forces (e.g., forest fire). At times they are a consequence of local domestic/industrial emissions that accumulate under periods of poor dispersion to levels that are greater than the criteria.

Health Canada (1999) in their Addendum to the Science Assessment Document for the Particulate Matter National Ambient Air Quality Objectives (NAAQO) studied air quality in 18 Canadian cities. This work reveals that exposure to ambient respirable particulate matter (PM_{2.5}) in Kamloops is better than any of the 18 cities studied.

Assessment of Effects, Significance, and Mitigation Measures

The effect of the Project on air quality is determined, in part, by comparing predicted concentrations against the applicable ambient air quality objectives which have been established to protect human health and the environment. British Columbia uses a suite of ambient air quality criteria that have been developed provincially and nationally to inform decisions on the management of air emissions.

These include Provincial Air Quality Objectives (AQOs), the former Pollution Control Objectives (PCOs), National Ambient Air Quality Objectives (NAAQOs) and Canadian Ambient Air Quality Standards (CAAQS; BC MOE 2014). These collectively are referred to as “applicable regulatory criteria” or “regulatory criteria.”

The air quality for the Project’s RSA (a 70 km × 55 km area, positioned to the north of the Project, which includes Kamloops) was simulated using the CALPUFF air dispersion model. This assessment demonstrates that the CALPUFF model accurately reproduced the existing air quality in Kamloops, both in the predicted magnitudes and the geographic patterns. It also shows that the Project will have little effect on the overall air quality in Kamloops.

A City-wide analysis shows that the predicted average annual PM_{2.5} is 6.4 µg/m³, which can vary by ±14% annually. City-wide, the project is predicted to add 2.3% – one sixth of the normal year-to-year variation. Project Operation has a limited effect on air quality in Kamloops. Similarly, an analysis of the predicted change in the Federal Air Quality Health Index (AQHI) demonstrates that the Project has little effect on the overall air quality in Kamloops.

The assessment shows that air quality in upper Aberdeen is predicted to remain good. It is, and will remain better than in most other areas in the City of Kamloops. The Project’s predicted effects in upper Sahali, the Downtown core, and the North Shore are such that a discernable change in air quality will not be measurable due to the Project.

All residual effects for the change in criteria air contaminants (CAC) concentrations are expected to be **Not Significant (Moderate)** for Construction and Operation. Air emissions from the Project will not be completely mitigated; however, various mitigations and the application of best management practices will reduce the effect. The residual effect for a change in CAC concentrations has been carried forward into the cumulative effects assessment to be examined together with other activities surrounding the Project (e.g., expansion of the Highland Valley Copper Mine, expansion of the Tobiano Golf Course and the expansion of the city of Kamloops). The cumulative effect after mitigation will result in a **Non-Significant (Moderate)** effect. After Decommissioning and Closure, there will be minor sources of air emissions remaining at the site, bringing the ambient air quality back to baseline conditions.

ES 6.5.2 Domestic Water Quality

Setting

Domestic water quality has been chosen as a VC because it is a key resource for human life. Project activities may influence trace metal, nitrate and anion concentrations in domestic water through atmospheric, seepage, and effluent emissions. Domestic water refers to public (municipal) and private (onsite wells, and surface water) waters used for human domestic purposes (e.g., drinking water and other domestic uses), agriculture (i.e., irrigation and livestock) and recreational purposes. The provincial and federal governments have established water quality guidelines to protect water resources used for these purposes.

Baseline groundwater samples were collected periodically from 37 locations within, or in close proximity to, the Project tenure area, between 2007 and 2014 and from 6 residential wells in October

2014. Surface water samples were collected from 13 locations in the Peterson Creek watershed between 2007 and 2014. The locations sampled include Peterson Creek, Humphrey Creek, Keynes Creek, Jacko Lake, Edith Lake, and Goose Lake. Water quality data for the municipal water supply was provided by the City of Kamloops.

Assessment of Effects, Significance, and Mitigation Measures

Project activities and physical works may have the potential to change domestic water quality. The interaction pathways where Project activities could influence domestic water quality include: dust containing trace metals depositing into the South Thompson River used for municipal water and effluent discharge or seepage of water containing metals into surface water and groundwater in the Peterson Creek watershed.

Municipal drinking water is drawn from the South Thompson River by the Kamloops Water Treatment Centre and the Tk'emlúps Indian Band Water Treatment Plant and piped to the residents of Kamloops and Kamloops Indian Reserve #1, respectively. Dust deposition modelling shows that the magnitude of dustfall onto the South Thompson River would be too low to influence the water quality of a major river such as the South Thompson River. Further, treatment of the raw water by both water treatment facilities would remove suspended solids and further reduce the potential for Project-related metal-bearing dust to alter the quality of the Kamloops municipal water supply. The surface water quality effects assessment determined that the Project will not affect water quality in the South Thompson River. Therefore, the potential effect of the Project to municipal water quality is not evaluated further.

Project activities over the operational life of the mine through Post-Closure, may influence surface water in Peterson Creek and groundwater quality in the Peterson Creek aquifer. Effluent discharge and seepage may occur over time and eventually contact surface and groundwater supplies.

The domestic water quality effects assessment indicates that predicted future water quality is below the applicable health-based guidelines. There are no significant adverse health risks from trace metals, anions or nitrates to people drinking Knutsford groundwater. However, some aesthetic guidelines were exceeded, which influences the taste of the water and the potential for water to stain laundry and plumbing fixtures. These effects are already present under existing baseline conditions, and will continue to be present into Post-Closure. The assessment also indicates that predicted future water quality is above the applicable manganese guideline for irrigation water, which may affect crop productivity in acidic soils. For livestock water, predicted future sulphate concentrations are above the guideline although they may also be above the guideline during low flow periods in the existing Baseline Case. Higher concentrations of sulphate can be tolerated, but may result in a loss of productivity as high doses of sulphate may lead to deficiencies of essential trace elements such as copper, zinc, iron, and manganese in livestock.

The mitigation measures described in the Surface Water Quality and Groundwater Quality effects assessments will reduce the potential for changes to the quality of water in the Peterson Creek watershed, which is used as a source of domestic water in Knutsford. In particular, these mitigations will control the seepage of effluent containing trace metals into the environment and subsequent effects to surface and groundwater quality.

Exposure to trace metals through the consumption of domestic drinking water represents only one component of a person's total exposure to trace metals. Assessing the significance of residual effects on a single exposure pathway such as the consumption of domestic drinking water, will underestimate the change in potential health risk that would be associated with the combined exposures. Therefore, an assessment of the significance of residual effects associated with the changes in domestic water quality in isolation has not been undertaken and the determination of significance is made for the human health effects assessment as a whole - incorporating domestic water quality.

The cumulative effects assessment has determined that cumulative effects on domestic water quality will not occur because there are no spatial or temporal overlaps with other projects or activities. Therefore, mitigation measures to address residual cumulative effects on domestic water quality are not necessary.

ES 6.5.3 *Country Foods*

Setting

Country food has been chosen as a VC because Aboriginal Groups and the general public have expressed concern that Project activities could alter the quality of country foods harvested by Aboriginal and non-aboriginal members of the community and that a change in country food quality could result in a change in human health risk. Country foods refer to foods that are harvested locally through hunting, fishing, trapping, gathering, and growing activities (i.e., community and backyard gardens). For this assessment, country foods also include domestic cattle from local ranches in the Knutsford community that graze on local grasses. Country foods do not include other foods produced in commercial operations (e.g., commercial farms and greenhouses) or purchased foods.

The baseline data for the country foods effects assessment includes measured or modelled concentrations of trace metals in the tissues of wild meat (i.e., deer, snowshoe hare, grouse), rainbow trout, cattle, and garden produce (i.e., root vegetable, leafy vegetable, and fruits). Each species of country food evaluated in the assessment represents a food class that is typically harvested from the study area. Representative species for each food class are selected for the assessment of country foods. Samples of backyard garden produce (root, leaf, and fruit) were collected from five community gardens in Kamloops in 2012. In 2014, 20 rainbow trout were collected from Jacko Lake, Peterson Creek, and Edith Lake. In 2011 and 2012, 12 browse (leaves and twigs) and 12 forage (any edible part of the plant) were collected from the local assessment area to represent the country food plant species that Aboriginal groups may harvest and consume. In 2015, four samples of meat from locally raised domestic cattle were collected. Samples of wild meat (deer, snowshoe hare, grouse) and berries were not collected. Trace metal concentrations in these tissues were modelled using measured trace metal concentrations in soil, surface water, and vegetation.

Assessment of Effects, Significance, and Mitigation Measures

The quality of country foods may be affected by Project activities that influence the surrounding environment. The key effect on country foods is the change in trace metal concentrations in tissue, between Baseline Case and Future Case. The main pathways for changes to the quality of country food include: deposition of metals in mine dust onto the surrounding soil and surface water as a result of mining activities; and seepage of water containing metals may enter surface waters or

groundwater. Dust containing metals deposited onto soils or discharged into the water may be taken up directly by plants and retained in their tissues. Terrestrial animals may also ingest soil, water, and vegetation containing metals from dust and seepage, while fish may take up metals directly from the water. The uptake and retention of metals in the tissues of plants and animals constitutes a change in chemical quality that could alter the exposures experienced by people consuming country foods.

A determination of significance is made in the human health effects assessment, which incorporates the modelling results of country food quality. The exposure to trace metals through the consumption of country foods and backyard garden produce represents only one exposure pathway for a person's total exposure to trace metals. The human health effects assessment evaluates the health risk based on the total exposure to trace metals, including exposures from the consumption of country foods, drinking water, and direct skin contact or incidental ingestion of soil. The significance to human health is based on the total exposure to trace metals from these exposure pathways. Assessing the significance of residual effects on a single exposure pathway such as the consumption of country foods, will underestimate the change in potential health risk that would be associated with the combined exposures. Therefore, an assessment of the significance of residual effects associated with the changes in country food quality in isolation has not been undertaken and the determination of significance is made for the human health effects assessment as a whole – incorporating country food quality.

The mitigation measures described in the air quality, surface water quality and groundwater quality effects assessment will reduce the potential for changes to the atmospheric, terrestrial, and aquatic environment. The mitigation measures described in the air quality effects assessment will reduce the effects of the Project on country foods by reducing dust deposition, as well as reducing potential metal loading to streams and lakes. The mitigation measures described in the surface water quality effects assessment will reduce the potential for changes to surface water quality in the surrounding lakes, streams and rivers in the LSA that animals that may be harvested as country foods, could use as a source of drinking water. The mitigation measures described in the groundwater quality effects assessment will reduce the potential for changes to the quality of groundwater in Knutsford and thereby reduce the potential change in the quality of groundwater used for livestock watering.

The cumulative effects assessment has determined that cumulative effects on country food quality will not occur because there are no spatial or temporal overlaps with other projects or activities. Therefore, mitigation measures to address residual cumulative effects on country food quality are not necessary.

ES 6.5.4 Human Health

Setting

Human Health has been chosen as a VC because the general public and Aboriginal groups have expressed concern about potential health effects of mine air emissions (e.g., diesel emissions and fugitive dust from mine operations including blasting). Human health depends on the surrounding environment, particularly biophysical components such as air, soil, vegetation, water, fish, and wildlife. Project activities may release chemicals to the atmosphere or water thereby increasing human exposures to those chemicals, which could have implications for human health. The release of Project-related chemicals to the atmosphere may increase human health risks associated with inhalation

exposures to the chemicals in the air. In addition, the deposition of Project-related particulate-bound metals onto soils may alter trace metal concentrations in the soil. This change in metal concentrations in soil may, in turn, alter trace metal concentrations in country foods (i.e., wild meat, cattle, vegetation, and garden produce). This change in country food quality could, in turn, alter the human health risks associated with exposures to trace metals that occur from eating country foods.

Baseline data for the human health effects assessment includes the information from Air Quality, Domestic Water, and Country Foods VCs, described above.

Assessment of Effects, Significance, and Mitigation Measures

A change in human health may be caused by Project activities that could release or emit chemicals of potential concern to which human receptors may be exposed. Human health may be affected directly through changes to air quality and drinking water quality, and indirectly by consumption of country foods (e.g., vegetation, wild meat, fish) that have taken up Project-related chemicals. The dispersion of criteria air contaminants and metals from Project activities have the potential to affect air quality, potentially affecting human health. The deposition of particulate-bound metals on soil and surface water has the potential to affect soil and water quality and the quality of country foods (animal and plants) that take up metals from affected soil and surface water. Discharges and runoff from Project operations may release chemicals into groundwater or surface water, affecting water quality, and thereby potentially affect drinking water and country foods.

The mitigation measures described in the air quality, surface water quality and groundwater quality effects assessment will reduce the potential for changes to the atmospheric, terrestrial, and aquatic environment. The mitigation measures described in the air quality effects assessment will reduce the effects of the Project on human health by reducing dust deposition, as well as reducing potential metal loading to streams and lakes. The mitigation measures described in the surface water quality effects assessment and groundwater effects assessment will reduce the potential for changes to surface water quality in the surrounding lakes, streams, and rivers in the LSA and groundwater quality in the Peterson Creek aquifer, thereby reducing potential effects on human health.

Residual effects from the Project on human health are assessed to be **Not Significant (Minor)**. Project activities will result in negligible changes in air quality and in the levels of metals in the terrestrial environment (i.e., soil, vegetation, and terrestrial country foods). Project activities may result in changes to water quality; however, with the mitigation measures in place and the requirement to meet regulatory standards and/or site specific water quality benchmarks, changes to human health beyond what would already exist under baseline conditions would be negligible. As changes to air quality and water quality are expected to be not significant, changes to human health are also concluded to be not significant.

The projects and activities that could overlap with the Project were captured in the baseline air quality and water quality assessments. In addition, the Project and other projects would be required to meet regulatory acceptable standards for discharge to waterbodies or site specific water quality benchmarks that provide a similar level of protection. Beyond those already captured by the above analysis, there are no spatial or temporal overlaps with other projects or activities so there are no cumulative effects. Therefore, an evaluation of significance of human health residual cumulative effects is not required.

*ES 6.5.5 Noise and Vibration*Setting

“Noise and Vibration” has been chosen as a VC based on specific concerns from the public during Project-related consultation. Concerns were raised about the noise and vibration effect on the nearby community, ranchers, livestock, and wildlife. Specific concerns included blast-related vibration effects on structures, human health, aquatic life, and recreation activities at Jacko Lake. Aboriginal Groups identified noise and vibration effects as a cause for concern on their ability to enjoy land and to exercise their hunting and fishing rights.

Noise baseline studies include two multiday noise monitoring studies conducted at six monitoring locations in December 2012 and June 2014. There was no vibration baseline study in the assessment. Vibration level is typically assessed for events such as blasting without the consideration of a baseline level.

Assessment of Effects, Significance, and Mitigation Measures

The noise assessment was performed in accordance with the recommendations and requirements of provincial, federal, and international noise guidelines. The vibration assessment focused on the vibration effects on structural integrity, human annoyance, and protection of aquatic life. Provincial, federal, and international vibration guidelines were followed.

Noise effects were predicted within the 30 × 30 km RSA and 37 specific noise receptors during Project Construction and Operation phases. The Decommissioning and Closure phase was not included because the noise effect is expected to be less than the noise effect in the Construction phase. Perceptible noise effects are expected within the noise LSA during both Construction and Operation phases.

Noise effects from the Construction and Operation phases were predicted to comply with the applicable noise guideline threshold value (i.e., BC OGC, Health Canada, and WHO) at all receptors. The only exception is a location near the east end of Jacko Lake where piling activities (Construction phase) noise effects exceeded the Health Canada noise threshold. KAM will be completing this work outside of the spring fishing season and public access to this area is restricted during Construction.

Vibration effects were predicted within the 14 × 14 km RSA and 41 specific vibration receptors for blast activities during Project Operation phase. The results were compared to thresholds recommended by provincial, federal, and international vibration guidelines. The vibration effects at all receptors are below the structural damage threshold and the annoyance threshold. The only exception is Jacko Lake, where the predicted levels exceed the annoyance thresholds when blasting occurs near the western portion of the pit. Public access to this area is restricted during Operational blasting. The predicted vibration effects at Jacko Lake meet the aquatic life protection vibration thresholds.

Noise and vibration effects will be mitigated by Project design and best management practices during different Project phases. Noise mitigation by Project design will be achieved by reducing the noise emissions to receptors by increasing buffer distance, and the use of enclosures. Blasting vibration mitigation will be achieved by blast design (a part of the Project design). A Noise and

Vibration Management Plan will manage and mitigate the effect by implementing best practice procedures during different Project phases.

All residual effects of Noise and Vibration are expected to be **Not Significant (Minor)** for both Construction and Operation phases. The noise effects may be perceptible at some receptors but changes in noise levels are not expected to exceed noise thresholds established by BC OGC, Health Canada, and WHO. The only exception is near the east end of Jacko Lake during the short-term (less than two months) piling activities at the proposed dam. The vibration effects are not expected to exceed the structural damage vibration limit at all receptors. The effects may be perceptible at some receptors but the level will be below the annoyance threshold for all receptor, with the exception of the east end of Jacko Lake when blasting occurs near the western portion of the pit.

Cumulative noise effects from the Project are considered to be **Not Significant (Minor)** for both Construction and Operation phases. There is no cumulative vibration effect.

ES 6.5.6 Healthy Living and Health Education

Setting

“Healthy Living and Health Education” has been chosen as a VC based on specific concerns from the public during Project-related consultation. Kamloops residents have expressed concern about Project effects on pursuing a healthy lifestyle, as recreational opportunities are an important aspect of community image. In addition, assessing workplace wellness programs is standard practice in BC. The assessment of effects to Healthy Living and Health Education is largely related to Project effects assessed in other VCs, specifically Outdoor Recreation (including recreational activities such as biking, running, hiking, and fishing).

Baseline studies occurred from 2011 through 2015, and sought to understand local and regional health education programs, as well as local and regional health, recreation, and fitness levels and areas used for outdoor recreation and physical activities.

Assessment of Effects, Significance, and Mitigation Measures

The presence of the Project and activities during the Construction, Operation, and Decommissioning and Closure phases may affect the ability of people to pursue (or enjoy) outdoor physical activities in the vicinity of the Mine Site. Although this area has been subject to mining in the past, and is presently the location of ranching activities and a mixture of private properties and Crown land, the area is currently used for a variety of recreational activities. For example, Goose Lake Road is used for biking and running, Jacko Lake is a popular fishing destination, and there are biking and hiking trails around Coal Hill. The Project will require the closure of a portion of Goose Lake Road and the northeast arm of Jacko Lake. Areas close to the Mine Site (including Jacko Lake) will be subject to daily temporary (approximately two hours) closures for safety reasons during blasting events. In addition to these access constraints, the Project may also affect peoples’ enjoyment or experience of outdoor activities, due to increased noise and dust, views of the mine, increased traffic, and other changes. Finally, activities such as fishing and hunting could also be affected if effects to fish and wildlife populations are felt.

Mitigation measures described for other VCs are expected to reduce many of the Project's environmental effects that could influence outdoor physical activities. This will include measures to minimize noise, dust, and visual disruption, and mitigate effects on fish and wildlife. Of particular note, a fish habitat offsetting program will aim to establish a stocked fish population at a nearby lake such as Inks Lake (currently not fish-bearing) and provide an alternative fishing area close to Jacko Lake. KAM will establish an angling/recreation working group to ensure the continued identification and management of recreation and angling-related concerns, and the development of practicable solutions. KAM will also develop an Access Management Plan to ensure continued and safe access to Jacko Lake and surrounding areas.

KAM not only supports opportunities for physical activity for the public at large, but also for its workforce. KAM's approach to healthy living and health education for its workers will aim to strike a balance between investing in its employees and implementing appropriate systems and programs. On-site, KAM will reinforce a culture of safety during all Project phases with a goal of Zero Harm. KAM will also implement a Health and Well-Being Committee, support a fitness-oriented culture through sponsored events and incentives, and provide health-related education to employees via guest speakers and frequent discussion of health related topics at weekly "Round-up" meetings attended by all employees. KAM will further support its workforce in its pursuit of healthy lifestyle choices through a company-wide employee wellness program.

Based on the mitigation, offsetting, and health enhancement measures identified for this VC, the Project is not expected to result in an adverse residual effect on Healthy Living and Health Education. As a result, there are no anticipated cumulative effects.

ES 6.5.7 Community Health and Well-being

Setting

"Community Health and Well-being" has been chosen as a VC based on specific concerns from the public during Project-related consultation. Given the complex array of factors that can affect community health and well-being, this VC has linkages to other VCs, including Air Quality, Domestic Water Quality, Country Foods, and Noise and Vibration. This VC also has linkages to Healthy Living and Health Education.

Health goes beyond the simple absence of disease. A full understanding of community health also requires consideration of a community's social, physical, and economic environments, as well as individual factors that contribute to overall health. The Project may have an effect on Community Health and Well-being through the pathways of changes in the biophysical environment, noise and vibration, change in income, the presence of a temporary workforce, changes in the capacity of local healthcare services, perceived changes to community image and quality of life, and Project-related traffic.

The baseline understanding of Community Health and Well-being draws from available health status indicators for the population as a whole and with respect to the health of the Aboriginal population. Indicators of health service are examined as well. The baseline includes relevant socio-economic characteristics (e.g., income, community well-being) and perspectives about community

image, while also summarizing aspects of the biophysical environment, which represent potential pathways of effect from the Project to people (e.g., air, water, country foods and noise and vibration). In addition, the baseline characterizes road traffic, which also represents a potential pathway of effect from the Project to safety.

Assessment of Effects, Significance, and Mitigation Measures

Increases in traffic volume over the life of the Project, during the Construction and Operation phases, could affect road and traffic conditions and the safety of road users. Mitigation measures put in place for the Project, such as safe driving behaviours, bus staging, shift staggering and road safety improvements, as described in the Traffic Management Plan, are expected to reduce the potential for accidents and injury as a result of the Project-related traffic.

During Construction, the non-local construction workforce (housed in and near Kamloops) could increase demands on local health services, including family physicians and the emergency room at Royal Inland Hospital. Baseline studies identified a shortage of physicians in the community, as well as capacity constraints for the emergency room (which could be used by workers for non-urgent care in the absence of access to a family physician). Further, incoming non-local construction workers are likely to be predominantly male, with relatively high levels of disposable income and limited ties to the Kamloops community. This could lead to health issues such as alcohol and drug use and sexually transmitted infections, which could also increase demand for health services. During the Operation Phase, population growth associated in incoming workers (who are expected to settle in the community) will also increase demand for health services. Finally, residents have also indicated concerns that the presence of the Project, and its effects on the environment and community, could lead to the departure of physicians thus stressing the capacity of healthcare services to meet the needs of the community.

Key mitigation measures include contracting a general practitioner to be the designated medical resource for the construction workforce and forming an advisory committee comprised of the City, TNRD, and health and social service providers to discuss and address concerns. In addition, municipal and healthcare authorities will continue to recruit physicians to Kamloops, with or without the Project.

Residents have expressed concerns about the effect of the Project on the image of Kamloops, in particular the potential that the community will project an image as a resource-based industrial city with environmental quality issues, contrary to the vision of a city with sound environmental quality to support other economic activities and a positive quality of life. KAM intends to offer its participation and support for the next stage of community planning for the future of Kamloops and look for ways to support the future vision of the City through its Community Investment Program. KAM also intends to allay residents' concerns about environmental quality through careful monitoring of environmental effects of the Project and transparent communication of those monitoring results in a timely way to residents of the LSA. A Community Liaison Group will provide a venue for ongoing dialogue about monitoring results and environmental quality.

The residual effect of increased traffic during peak Construction and potential for increased incidence of road collisions are expected to be **Not Significant (Minor)** and localized to four

intersections. The residual effect related to increased demand for physicians and emerge services, and the capacity of these services, is expected to be **Non-Significant (Moderate)**. In terms of the Project's effect on the community image, the residual effect is expected to be a **Non-Significant (Moderate)**.

All residual effects were considered in terms of potential cumulative effects. Cumulative effects were identified assessed in relation to the Project's effects on traffic (and increased potential for road collisions at four intersections) and health services (and potential increased demand and reduced capacity of health services), which could be exacerbated during construction by the construction of the TMPL Expansion. The cumulative residual effects after mitigation were predicted to be **Not Significant (Minor)** for traffic, and **Not Significant (Moderate)** for the potential for reduced health care capacity.

ES 7. SUMMARY OF PROPOSED ENVIRONMENTAL AND OPERATIONAL MANAGEMENT PLANS

KAM strives to sustainably develop, operate, and close projects in accordance with five core values:

- *ZERO HARM – We are committed to Zero Harm for our employees, our communities and the environment. We believe that the best mines are the safest mines.*
- *RESULTS DRIVEN – We are Results Driven and accountable for our results. We are skilled at problem solving and ready to take on new challenges to grow our company.*
- *SUCCESS THROUGH TEAMWORK – We achieve Success Through Teamwork. We build trust, act with respect and welcome constructive debate. We promote a collaborative work environment where we continuously learn and adjust.*
- *COURAGEOUS – We are Courageous. We are decisive, innovative and forthright with one another.*
- *ACCOUNTABILITY – We take full responsibility for our actions and commitments. We keep our promises and establish long-term relationships with integrity. We build trust amongst our fellow employees, stakeholders and the communities in which we operate.*

These core values are used as the basis for management systems addressing quality, risk management, health and safety, community relations, and environmental management. The Environmental Management System (EMS) and the associated Environmental Management Plans (EMPs) for the Project are provided in the Application/EIS. This EMS will continue to be developed and detailed as the Project advances in a manner that is aligned with the internationally recognized ISO 14001 standard for environmental management, as well the Mining Association of Canada's *Towards Sustainable Mining* requirements. The overarching system and the associated actions and procedures will help to ensure that human and environmental health and safety is accounted for through all phases of the Project (Construction, Operation, Decommissioning and Closure, and Post-Closure). The EMPs that are provided in the Application/EIS include:

- Operational Management and Monitoring Plans:
 - Erosion and Sediment Control Plan;
 - Soil Salvage and Handling Plan;

- Construction Waste Management Plan;
 - Metal Leaching and Acid Rock Drainage Management Plan;
 - Air Quality Monitoring and Dust Control Plan;
 - Water Management and Hydrometric Monitoring Plan;
 - Contaminated Sites Management Plan;
 - Solid Waste Management Plan;
 - Hazardous Waste Management Plan;
 - Explosives Management Plan;
 - Risk Management Plan (Accidents and Malfunctions);
 - Natural Hazards Management Plan;
 - Emergency Response Plan;
 - Fire Hazard Abatement Plan;
 - Spill Contingency Plan;
 - Invasive Plant Management Plan;
 - Archaeological Sites Management Plan;
 - Dark Sky Management and Monitoring Plan;
 - Transportation Management Plan;
 - Access Management Plan; and
 - Noise Management Plan.
- Environmental Effects Monitoring Plans:
 - Surface Water Quality Management and Monitoring Plan; and
 - Groundwater Quality Management and Monitoring Plan.
 - Biodiversity Management Plans:
 - Fisheries and Aquatic Life Monitoring Plan;
 - Landscape Design and Restoration Plan;
 - Wildlife and Vegetation Monitoring Plan;
 - Reclamation and Closure Plan; and
 - Socio-economic Monitoring Plan.

Through the implementation of the EMS, KAM will initiate a program of monitoring and compliance reporting which will be carried out over the life of mine. Activities undertaken by KAM will be subject to various types of reporting that will address general legal requirements as prescribed under various statutes, and will also include more specific compliance reporting required under provincial permits and federal authorizations.

Subsequent to the environmental assessment process, the Project will need to secure additional statutory authorizations for the Project to proceed, in accordance with both federal and provincial regulatory obligations. Primary permits include those under the BC *Mines Act* and the *Environmental Management Act*. The Application/EIS outlines KAM's current understanding of the compliance

reporting that will be required. The final suite of reporting requirements will be formulated based on permit conditions and in consultation with the responsible regulatory agencies

KAM has also proposed some follow-up programs that will be used to support the federal EA Decision Statement. In CEA Agency policy, follow-up programs are used to verify the accuracy of the conclusions reached in the Application/EIS and/or to determine the effectiveness of any measures taken to mitigate the adverse effects of the Project. Follow-up programs have been proposed for groundwater quantity (related to the Edith Lake Fault Zone and the Peterson Creek Aquifer), surface water quality (related to Peterson Creek), rare plants (regional surveys), wetland compensation, fish habitat offsetting, and heritage sites (related to the Hunting Blind Complex).

ES 8. ASSESSMENT OF ABORIGINAL INTERESTS

ES 8.1 Setting

The Project lies within the Secwépemc traditional territory and in the Nlaka'pamux Nation traditional territory. The Secwépemc are comprised of seventeen First Nations covering a traditional territory that is approximately 180,000 km². This territory includes the Columbia River valley to the Fraser River, and south to the Arrow Lakes (Tk'emlúps Website 2014). The Secwépemc people speak Secwepemctsin and believe the language was given to the Secwépemc people by the Creator to allow them to communicate with each other as well as with nature (Tk'emlups te Secwepemc 2013). The Nlaka'pamux Nation is also comprised of seventeen First Nations over a large traditional territory that extends into the State of Washington, north towards Ashcroft, to the east near Douglas Lake and west to Lillooet. The Nlaka'pamux people are divided into Upper and Lower groups and the territory can also be divided into two areas; the upper area has dry grasslands along river valleys with higher elevations covered in fir and aspen and the lower area has a more coastal climate with forests of cedar and fir (Wyatt 1998).

The British Columbia Environmental Assessment Office (BC EAO) section 11 Order for the Project identified the following Aboriginal Groups that could potentially be affected by the Project:

- Tk'emlúps te Secwépemc (TteS) and Skeetchestn Indian Band (SIB), jointly known as the Stk'emlupsemc te Secwépemc Nation (SSN). The SSN represents the TteS and the SIB in all matters within the traditional territory. All matters on Indian Reserve lands are dealt with separately at the individual First Nation level. In 2007, the two groups formed the SSN to manage negotiations, conservation and resources for the New Afton open pit mine (BC Aboriginal Business and Investment Council, n.d.). However, historically the TteS and the SIB were considered by the Secwepemc to be one (SSN Affidavit 2011). The SSN aims to strengthen the economic and social conditions for its Nation members and works to capitalize on business opportunities arising from the resource sector. Both groups are members of the Secwépemc Nation;
- Lower Nicola Indian Band (LNIB) located nearby Merritt and a part of the Nlaka'pamux Nation;
- Ashcroft Indian Band (AIB) located close to the Town of Ashcroft and part of the Nlaka'pamux Nation; and

- the Whispering Pines/Clinton Indian Band (WP/CIB) located near Clinton and part of the Secwépemc Nation.

The Canadian Environmental Assessment Agency (CEA Agency) also directed KAM to engage with the Métis Nation British Columbia (MNBC).

To gain an understanding of the interests (including rights and title) with the potential to be affected by the Project, KAM provided funding to the SSN to develop a comprehensive TK/TLU study called the Cultural Heritage Study. It played a key role in the assessment of effects on Aboriginal Interests. KAM also provided capacity funding to the LNIB, AIB, and the WP/CIB that includes support to develop TK/TLU studies for the Project. At the time of writing, LNIB and WP/CIB were undertaking preparations to develop the studies. KAM also provided funding to MNBC to develop an interim project report that provided some preliminary information on TK/TLU as well as the results of consultation with MNBC harvester card holders in the region.

The SSN Cultural Heritage Study highlights the importance of the seasonal round and its relationship to harvesting and gathering interests. The CHS (2014) identifies five major seasons as part of the seasonal round: early spring (snow melting), mid-to-late spring (root gathering), summer (berry and high elevation root and medicinal plant gathering), late summer to early fall (salmon season) and mid to late fall (hunting season). Some of the areas around the Project were noted be used for harvesting during the seasonal round. The SSN note that the trout from Jacko Lake and the root plants from that area were available during a critical time in early to late spring when higher elevation plants were not in season yet and thus is said to have played a significant role in the food economy and seasonal round of Secwepemc people (pers. com. with SSN, 2015). The SSN assert Aboriginal rights and title in the areas surrounding the Project, noting that the Secwepemc people lived in, used and supported their way of life on the lands surrounding the Project (pers. com. with SSN, 2014).

Jacko Lake and its surroundings is referred to as Pipsell by the SSN. Jacko Lake was one of several locations in Secwepemc traditional territory used to perform *Etsxem* or ritual fasting and vision quests. Ignace (2014) notes the presence of culturally modified trees in the Jacko Lake area that support stories outlining the special significance of the area to SSN people.

The oral history surrounding this area is said to be connected to the underpinning for Secwepemc *stsq'ey* (which means indigenous law) that explains the relationships between human beings and the environment (e.g., fish, birds, animals, the atmosphere and the water cycle). This relationship is illustrated in a story called the *The Trout Children*, part of the oral tradition of this area. The story explains the relations between humans and the trout people who are said to live in and under the lake. It explains how water-beings (*xqelmecwetkwe*) active underneath the lake are also connected to Kamloops Lake, Adams Lake, Shuswap Lake and the North Thompson River. The story was also connected to a Prayer Tree (which no longer exists) at the entrance to the Peterson Creek /Jacko Lake area in what is now known as Knutsford. The tree, since destroyed by development of a road decades ago, served as a medium for human communication with the sky (atmosphere) world. The SSN identify this area as having spiritual, cultural and ceremonial values through oral traditions, an offering tree, spiritual connections and prayers with water beings. Some cultural and ceremonial uses still occur today; however, the Secwepemc people including the SSN have been largely

alienated from these lands from various agricultural and industrial activities since the 1860s. Another prayer tree is said to exist in the vicinity of Jacko Lake.

ES 8.2 Aboriginal Interests

Asserted Aboriginal interests in the Project area were identified through a variety of consultation activities including meetings with Aboriginal leadership, community meetings, written correspondence, traditional land use studies, and secondary information sources such as environmental assessments for other projects in British Columbia, ethnographic studies, legal cases, and other publicly available information.

The identification of asserted Aboriginal interests that could be affected by the Project is ongoing. As new information about Aboriginal interests is gathered, KAM will endeavour to work with Aboriginal Groups to determine whether the Project has the potential to affect these interests and, where appropriate, the additional information will be considered and incorporated in on-going Project planning.

The assessment of seriousness of impact to Aboriginal rights and title considers potential effects to: fishing, hunting, gathering, and ceremonial uses. Other Aboriginal interests are also considered with respect to potential social, economic, environmental, heritage, and health effects and measures to address those interests are described. The assessment of Aboriginal interests is holistic, and incorporates the analysis and results from all of the Valued Component assessments.

Key mitigation and accommodation measures that influence KAM's assessment include:

- KAM will maintain access to Jacko Lake through construction of an alternative access road to Jacko Lake south of the proposed main access to the Project. KAM will also construct an additional parking lot area to facilitate continued access to Jacko Lake.
- Jacko Creek will remain available as the Project is not anticipated to affect availability or access to this area for fishing.
- Mitigation measures to control air and dust emissions and to control surface water and groundwater discharges are considered to be effective in addressing the potential effects to country foods and will reduce Project effects to levels that are protective of human health.
- KAM will implement a Reclamation and Closure Plan that will aim to reverse habitat losses and re-establish the land to a similar condition to prior to Project development, where feasible. Post-Closure land use objectives include allowing access to the mine site consistent with current practice (e.g., by obtaining permission from land owner) for traditional purposes.
- KAM will continue to engage the SSN in identifying appropriate measures to mitigate for the losses of areas of ceremonial use (i.e., the Hunting Blind and Goose Lake). This may include relocating features of the Hunting Blind Complex to a suitable location identified by the SSN, documenting the Hunting Blind Complex using 3D imagery, preparation of a documentary or scaled 3D model of the Hunting Blind Complex for educational purposes, and funding for heritage education or other relevant programming.

- KAM will support SSN in documenting past, present, and future land uses in the areas surrounding the Project and in the larger traditional territory. This will aim to facilitate SSN involvement in future reclamation activities and may include identification of habitat offsetting locations for key species such as the deer, moose, American Badger, or sharp-tailed grouse. KAM will also work with the SSN to investigate the need for future studies on biodiversity and animal population trends in the region to determine the possible role of the Project or other industrial activities in future conditions as they relate to harvested species.
- KAM will establish a Socio-economic Monitoring Advisory Committee and implement a Socio-economic Monitoring Plan that will support adaptive management to enhance community benefits, and address concerns that may arise.

In parallel with the environmental assessment process, KAM will continue to negotiate with Aboriginal Groups to establish impact benefit agreements where Project-specific concerns will be addressed and shared benefits enhanced.

Based on the information available, and the mitigation and accommodation measures proposed, KAM's assessment findings are:

- The seriousness of the effects of the Project on SSN's practice of fishing hunting and trapping, and plant harvesting is considered to be minor. The seriousness of the effects on ceremonial and cultural practices is considered to be moderate.
- The seriousness of effects of the Project on AIB's practice of fishing, hunting and trapping and plant harvesting interests is considered to be negligible.
- The seriousness of the effects of the Project on LNIB's practice of fishing, hunting and trapping and plant harvesting interests is considered to be negligible.
- The seriousness of the effects of the Project on WP/CIB's practice of fishing, hunting and trapping and plant harvesting interests are considered to be negligible.
- The seriousness of the effects of the Project on MNBC practice of fishing, hunting and trapping and plant harvesting interests are considered to be negligible.

ES 9. ACCIDENTS AND MALFUNCTIONS

The management of risks and preparedness for unplanned events, such as accidents and malfunctions, are important to the success of the Project. KAM actively utilizes management systems to identify and assess risks, and establish the controls needed to effectively manage them. Identification of worst-case failure modes, characterization of their risk, and evaluation of the associated environmental effects and associated risk mitigation throughout the Project life may come in the form of engineering controls, training requirements, operating standards, contingency planning, monitoring programs, compliance evaluation and audit and inspection requirements.

In general, the accidents and malfunctions portion of the Application/EIS identifies unplanned events that could affect environmental VCs, assesses the likelihood that the events will occur and at what severity, and describes the preventative controls and mitigative response that KAM will have in place for each event.

The following types of scenarios are evaluated:

- fire;
- pit failure;
- contamination of soils and/or water due to spill, leaks, etc. (e.g., fuel spills, reagents);
- failure of Tailings Storage Facility, seepage collection and runoff ponds;
- leakage from Tailings Storage Facility, seepage collection and runoff ponds;
- failure of the waste rock storage facilities;
- natural gas pipeline leakage or failure;
- Kinder Morgan Pipeline leakage or failure;
- accidental leakage of effluent;
- power outages;
- flying rock from blasting;
- motor vehicle/transportation accidents;
- flooding, erosion and/or burial due to containment structure failures;
- ML/ARD;
- sediment transport into watercourses; and
- accidental explosion.

These scenarios have been considered through three means of evaluation:

1. a Failure Modes and Effects Analysis (FMEA) workshop;
2. a Potential Failure Modes Analysis (PFMA) for TSF embankment failure and a tailings breach and inundation study; and
3. an assessment of environmental effects of the identified TSF inundation.

The FMEA workshop evaluated 37 failure modes, while the PFMA study considered an additional 19 potential failure modes. In particular, scenarios related to connectivity between Jacko Lake and the Open Pit, and for TSF embankment failure have been identified as high consequence failure modes. Substantial engineering and planning effort has been expended to date to reduce potential risks associated with the Project. This work is on-going, and will be for the entire life of the Project. Risk is an inherent part of the development of any large mining project, and it is not possible to remove all risk. However, as part of a successful global mining company, KAM has the experience necessary to appropriately manage these risks. KAM will implement risk management systems that are consistent with its active mining operations globally and with industry standards. KAM is committed to active risk management through all phases of the Project to ensure that the Project is constructed and operated safely, and to consistently fulfill the company's commitment to the environment.

ES 10. PROPONENT CONCLUSIONS

Throughout the EA process, KAM has maintained a considered approach that is mindful of the precautionary principle in environmental decision-making. Continual consultation through accountable engagement with all participants in the EA process has underpinned the approach. This is evidenced by the manner in which potentially adverse environmental effects identified early in the EA process have been responded to. In particular, the change from “Ajax North” to “Ajax South” general arrangement resulted in the following key changes:

- relocating the Tailings Storage Facility more than five kilometers southeast, away from the Coquihalla Highway and farther from residential neighborhoods;
- relocating the north mine rock storage facility and temporary ore stockpiles, the two closest site structures to Kamloops, an additional 3.5 kilometres southeast from their previous locations; and
- re-designing the Project to avoid impacts to Inks Lake, initially proposed to be used as a TSF seepage pond. The lake, an important natural resource for recreational users as well as for wildlife, will no longer be impacted by mine operations (note that Inks Lake is part of the fisheries offsetting plan for the Project).

Detailed hydrogeologic and geotechnical investigations have been completed to develop a strong understanding of the conditions between Jacko Lake and the Open Pit; and the Best Available Technology study for tailings technology has improved the TSF design, both from the perspective of water management and geotechnical stability.

This Application/EIS is intended to provide sufficiently comprehensive information on the extent to which the Project as planned avoids, minimizes, or compensates for the effects that may be undesirable for the biophysical and human environments. The material conclusions of KAM’s assessments of the residual Project-related effects and cumulative effects related to the environmental assessment of the Ajax Project are summarized in Tables 1a to 1e.

By the same token, the Application/EIS also demonstrates how the biophysical and human environments may benefit from the proposed Project. KAM will maintain this precautionary, responsive, and collaborative approach as the EA process progresses through the review, permitting, and execution stages of the Project. In particular, KAM will continue to remain engaged with Aboriginal Groups and strive to incorporate community and traditional knowledge into deliberations about the Project, such that asserted Aboriginal rights and interests are appropriately factored into decision making.

The intention of this Application/EIS to demonstrate that the authorization of the Project will result in economic benefits at local, regional, provincial, and national levels, while being undertaken in an environmentally responsible and acceptable manner. It is certain that all regions of BC and southern BC in particular will benefit economically. Benefits will be derived from the generation of employment and commercial opportunities, with the resultant increment in the generation of local, provincial, and federal tax revenues.

Table 1a. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Environmental

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Green House Gases (Section 6.1)				
Increase in atmospheric GHG of up to 123 kt CO ₂ eq/yr during Construction and Operation due to Scope 1, 2 and 3 Emissions and Land Use Changes	Construction, Operation	<p>Access and haul roads designed to minimize distances.</p> <p>Larger trucks for ore and waste transport to minimize number of trips.</p> <p>Consider energy conservation in equipment procurement and selection.</p> <p>Consider the use of alternate fuels.</p> <p>Select the best achievable technology.</p> <p>Maintain vehicles in good operating condition.</p> <p>Utilize buses/multi-passenger vehicles to transport crews.</p> <p>Train equipment and vehicle operators to reduce GHG emissions.</p> <p>Operate vehicles within the posted maximum speed limits and reduce idling.</p> <p>Land clearing will be minimized for the Project where practical and economically achievable.</p> <p>Progressively re-vegetate or re-vegetate disturbed areas prior to Closure.</p>	Not Significant (Minor)	Not Significant (Minor)
VC: Geology, Landforms and Soils (Section 6.2)				
Alteration of Baseline Landforms	Construction, Operation, Decommissioning and Closure	<p>Footprint minimization and re-contouring.</p> <p>Progressive reclamation.</p>	Not Significant (Minor)	Not Significant (Minor)

(continued)

Table 1a. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Environmental (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Surface Water Quality (Section 6.3)				
Humphrey Creek change in sulphate, copper, molybdenum, and selenium concentrations	All phases	Water Management Plan. SMRSF Pond - manage seepage and runoff from the southern extent of the SMRSF. Reclamation on SMRSF in Decommissioning and Closure with a low permeability till layer overlain with topsoil to reduce infiltration and maximize evapotranspiration and runoff. Dry cover on TSF to reduce infiltration into the underlying tailings solids and increase non-contact runoff. Air Quality Management Plan to reduce dust.	Not Significant (Moderate)	No residual effect
Change in sulphate concentrations in Peterson Creek at PC02.3	All phases	Water Management Plan. Operations - interception of seepage from the EMRSF at EMRSF Pond, reclaimed to mill for Operations water demand. Reclamation of EMRSF in Decommissioning and Closure with a low permeability till layer overlain with topsoil to reduce infiltration and maximize evapotranspiration and runoff.	Not Significant (Minor)	No residual effect
Change in sulphate, chloride, and selenium concentrations in Peterson Creek at PC02	All phases	Water Management Plan. Operations - interception of seepage from the EMRSF, reclaimed for Operations water demand. Reclamation of EMRSF in Decommissioning and Closure with a low permeability till layer overlain with topsoil to reduce infiltration and maximize evapotranspiration and runoff.	Not Significant (Moderate)	No residual effect

(continued)

Table 1a. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Environmental (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Surface Water Quantity (Section 6.4)				
Change in surface water quantity (all metrics) in Kamloops Lake	All phases	Water Management Plan. Maximize capture and re-use of contact water.	Not Significant (Minor)	Not Significant (Minor)
Change in surface water quantity (all metrics) in Peterson Creek (Lower) at PC02	Construction, Operation, Decom. and Closure	Water Management Plan. Operation of Peterson Creek Diversion System.	Not Significant (Moderate)	Not Significant (Moderate)
Change in surface water quantity (low flow) in Peterson Creek (Lower) at PC02	Post-Closure	Water Management Plan. Re-establish Peterson Creek as natural draining.	Not Significant (Moderate)	Not Significant (Moderate)
Change in surface water quantity (annual flow volume, monthly flow distribution, peak flow) in Peterson Creek (Lower) at PC02	Post-Closure	Water Management Plan. Re-establish Peterson Creek as natural draining.	Not Significant (Minor)	Not Significant (Minor)
Change in surface water quantity (all metrics) in Jacko Lake	All phases	Water Management Plan. Operation of Peterson Creek Diversion System; Re-establish Peterson Creek as natural draining Post-Closure.	Not Significant (Minor)	Not Significant (Minor)
VC: Groundwater Quality (Section 6.5)				
Increases in Groundwater Fluoride, Sulphate, Copper, Iron, Manganese, Molybdenum, and Zinc Concentrations in RES-2 Well	Operation, Decommissioning and Closure, Post-Closure	Water Management Plan. TSF Design which includes an underdrain system in the embankment foundation, Liner system on the upstream face of the embankment overlying a low permeability glacial till basin liner. SMRSF Pond – manage seepage and runoff from the southern extent of the SMRSF. Reclamation of MRSFs in Decom. and Closure with a low permeability till layer overlain with topsoil to reduce infiltration and maximize evapotranspiration and runoff. Dry cover on TSF to reduce infiltration into the underlying tailings solids and increase non-contact runoff. Air Quality Management Plan to reduce dust.	Residual effects assessed in Human Health VC (Section 10.4) and Surface Water Quality VC (Section 6.3).	Residual effects assessed in Human Health VC (Section 10.4) and Surface Water Quality VC (Section 6.3).

(continued)

Table 1a. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Environmental (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Groundwater Quantity (Section 6.6)				
Changes to magnitude or timing of groundwater recharge and discharge	Operation, Decommissioning and Closure, Post-Closure	Water Management Plan. Water management ponds to collect seepage. Reclamation of MRSFs and TSF in Decommissioning and Closure to minimize seepage.	Not Significant (Moderate)	Not Significant (Moderate)
Changes to groundwater elevations, flow rates, or flow directions	Operation, Decommissioning and Closure, Post-Closure	Water Management Plan. Water management ponds to collect seepage. Reclamation of MRSFs and TSF in Decommissioning and Closure to minimize seepage.	Not Significant (Moderate)	Not Significant (Moderate)
VC: Fish and Fish Habitat (Section 6.7)				
Direct loss of habitat in NE arm of Jacko Lake from Open Pit Development affecting the productivity of the fish population	Operation, Decommissioning and Closure, Post-Closure	Offsetting Measures (proposed at Inks Lake). Fisheries and Aquatic Life Monitoring Plan.	Not Significant (Minor)	Not Significant (Minor)
Direct loss of habitat in Peterson Creek from Open Pit Development affecting the productivity of the fish population	Operation	Offsetting Measures (proposed at Inks Lake). Fisheries and Aquatic Life Monitoring Plan.	Not Significant (Minor)	Not Significant (Minor)
Indirect habitat loss in Peterson Creek downstream of the Project area from flow reductions associated with Project Footprint and Contact Water	Operation, Decommissioning and Closure, Post-Closure	Water Management Plan. Fisheries and Aquatic Life Monitoring Plan. Surface Water Quality Management and Monitoring Plan.	Not Significant (Moderate)	No residual effect
Fish mortality in Jacko Lake associated with changes in pressure from blasting	Operation	Blast Design. Fish and Aquatic Life Management Plan.	Not Significant (Minor)	No residual effect

(continued)

Table 1a. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Environmental (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Fish and Fish Habitat (Section 6.7; continued)				
Fish mortality in Jacko Lake associated with changes in pressure from installation of the sheet pile dam for Open Pit Development	Construction	Design in accordance with National Oceanic and Atmospheric Administration interim criteria for the onset of physical injury to fish.	Not Significant (Minor)	No residual effect
Sub-lethal effects on fish populations in Peterson Creek downstream of the Project area associated with changes in primary productivity from reduced flows resulting from Project Footprint and Contact Water	All phases	Water Management Plan. Fisheries and Aquatic Life Monitoring Plan. Surface Water Quality Management and Monitoring Plan.	Not Significant (Minor)	Not Significant (Minor)
VC: Rare Plants (Section 6.8)				
Habitat loss	Construction	Avoidance through re-design where possible. Establish exclusion areas. Transplantation. Regional research on plant distribution. Invasive species management.	Not Significant (Moderate)	Not Significant (Moderate)
VC: Rare and Sensitive Ecosystems (Section 6.9)				
Habitat loss	Construction	Avoidance through re-design where possible. Establish exclusion areas. Erosion and sediment control. Avoid use of herbicides. Invasive species management. Wetland compensation/enhancement.	Not Significant (Moderate)	Not Significant (Minor)

(continued)

Table 1a. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Environmental (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Grasslands (Section 6.10)				
Habitat loss	Construction	Limit construction footprint. Establish exclusion areas. Use appropriate reclamation seed mixes. Invasive species management. Progressive reclamation.	Not Significant (Moderate)	Not Significant (Minor)
VC: Terrestrial Invertebrates (Section 6.11)				
No residual effects				
VC: Amphibians (Section 6.12)				
Habitat loss	Construction	Avoidance of breeding sites through re-design where possible. Establish exclusion areas. Erosion and sediment control. Avoid use of herbicides. Integration of amphibian habitat with wetland compensation efforts. Artificial diversion pools to attract amphibians away from the mine site infrastructure. Discuss creation of Wildlife Habitat Areas on KAM owned land with provincial government. Contribute to existing programs on spadefoots.	Not Significant (Moderate)	Not Significant (Minor)
Direct mortality	Construction, Operation	Translocation of individuals to areas of suitable habitat. Work with BC Frogwatch Program to increase education of regional amphibian conservation.	Not Significant (Minor)	Not Significant (Minor)

(continued)

Table 1a. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Environmental (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Amphibians (Section 6.12; continued)				
Chemical hazards	All Phases	Installation of artificial “diversion pools” to attract amphibians away from mine site infrastructure. Communicate water quality results with other projects in the RSA. Contribute to existing programs on spadefoots.	Not Significant (Minor)	Not Significant (Minor)
VC: Reptiles (Section 6.13)				
No residual effects				
VC: Migratory Birds (Section 6.14)				
Habitat loss	Construction	Avoidance of breeding sites through re-design where possible. Fish offsetting and wetland compensation programs will support bird habitat.	Not Significant (Moderate)	Not Significant (Minor)
Chemical hazards	All Phases	Removal of vegetation around TSF and MRSF that to discourage bird nesting. Make attractive bird habitat at fish offsetting and wetland compensation areas to encourage nesting.	Not Significant (Minor)	Not Significant (Minor)
VC: Raptors (Section 6.15)				
Habitat loss (Great Gray Owl, Rough-legged Hawk, Short-eared Owl, Swainson’s Hawk)	Construction	Avoidance of breeding sites through re-design where possible. Progressive reclamation/revegetation. Artificial nest creation.	Not Significant (Minor)	Not Significant (Minor)
Sensory disturbance (Bald Eagle, Great Gray Owl, Short-eared Owl, Swainson’s Hawk)	Construction, Operation	Limit noise to certain windows (outside of breeding season, if practical).	Not Significant (Minor)	Not Significant (Minor)

(continued)

Table 1a. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Environmental (completed)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Non-migratory Gamebirds (Section 6.16)				
Habitat loss (Sharp-tailed Grouse, ruffed Grouse)	Construction	Avoidance of breeding sites through re-design where possible. Progressive reclamation/revegetation. Off-site lek enhancement or artificial lek creation.	Not Significant (Moderate)	Not Significant (Minor)
Decreased lek usage, or abandonment of nests due to sensory disturbance (Sharp-tailed Grouse - lek; Sharp-tailed Grouse and Ruffed Grouse - nest)	Construction, Operation	Limit noise to certain windows (06:00 - 10:00, outside of breeding season, if practical).	Not Significant (Moderate)	Not Significant (Minor)
VC: Mammals (Section 6.17)				
Habitat loss (American Badger, Bats, Mule Deer)	Construction	Avoidance of breeding sites through re-design where possible. Progressive reclamation/revegetation.	Not Significant (Moderate)	Not Significant (Moderate)
Sensory disturbance (American Badger)	Construction, Operations	Limit noise to certain windows (avoid sunrise/sunset), where possible.	Not Significant (Minor)	Not Significant (Minor)
Disruption of movement (American Badger)	Construction, Operations	Wildlife Crossing Structures in sensitive travel areas, if determined to be beneficial for badger movement.	Not Significant (Moderate)	Not Significant (Minor)
Chemical hazards (Bats)	Construction, Operations, Decommissioning and Closure	Continued monitoring of water quality, netting/buoys/duckweed addition to TSF.	Not Significant (Minor)	Not Significant (Minor)

Table 1b. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Economic

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Economic Growth (Section 7.1)				
Benefit: Contribution to Economic Growth	Construction & Operations	Measures to maximize local employment and procurement.	Not Applicable (Benefit)	Not Applicable (Benefit)
Decrease in Economic Activity and Government Revenues	Decommissioning and Closure	Communication with employees to allow them to prepare for post-Project activities; transition planning (including workforce transition plan) to maximize likelihood of employees gaining employment elsewhere.	Not Significant (Minor)	Not Applicable
VC: Labour (Section 7.2)				
Benefit: Project Employment and Training Opportunities	Construction and Operations	Human resource development plan to maximize local employment with the Project.	Not Applicable (Benefit)	Not Applicable (Benefit)
Reduced employment and training opportunities due to reductions in workforce	Decommissioning and Closure	Communication with employees to allow them to prepare for post-Project activities; transition planning (including workforce transition plan) to maximize likelihood of employees gaining employment elsewhere.	Not Significant (Moderate)	No residual cumulative effect
VC: Income (Section 7.3)				
Benefit: Project-related Employment Income	Construction and Operations	Human resource development plan to maximize local employment with the Project.	Not Applicable (Benefit)	Not Applicable (Benefit)
Decreased income generation due to reductions in workforce and expenditures	Decommissioning and Closure	Communication and transition programming including a workforce transition plan.	Not Significant (Moderate)	No residual cumulative effect
VC: Business (Section 7.4)				
Benefit: Project Employment and Procurement	Construction and Operation	Employment and procurement of local business services.	Not Applicable (Benefit)	Not Applicable (Benefit)
Competition for labour could lead to increased costs associated with staff turnover and wage increases for local and regional businesses	Construction, Operation	Engagement with local business community and Community Liaison Group to jointly address potential challenges.	Not Significant (Minor)	Not Significant (Minor)

Table 1b. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Economic (completed)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Property Values (Section 7.5)				
Residential property values could decline for rural residences around the perimeter of the Project Site, and possibly in Knutsford or Aberdeen, due to real or perceived changes in air quality, noise and vibration, and visual impacts	Construction, Operation	Implementation of Project design and best management practices for air quality, noise and vibration, visual impacts and aesthetic features; adaptive management; Implementation of engagement and information sharing mechanism	Not Significant (Moderate)	No residual cumulative effect
Agricultural property values could decline for those properties on the perimeter of the Project Site due to real or perceived changes in air quality, noise and vibration, and vegetation	Construction, Operation	Implementation of Project design and best management practices for air quality, noise and vibration, visual impacts and aesthetic features; adaptive management; Implementation of engagement and information sharing mechanism	Not Significant (Moderate)	Not Significant (Moderate)

Table 1c. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Social

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Infrastructure, Public Facilities, and Services (Section 8.1)				
<p>During peak construction, accommodation of the workforce could increase hotel/motel occupancy rates and constrain tourism, including the ability of the City of Kamloops to attract events, and the ability of independent tourists to access hotels/motel rooms in the city.</p>	<p>Construction</p>	<p>Completing and implementing a Project Recruitment Strategy to maximize local hires and reduce the number of non-local workers.</p> <p>Forming an advisory committee comprised of relevant representatives from the City, the TNRD, Tourism Kamloops to discuss potential issues and solutions.</p> <p>Ongoing dialogue with the City and Tourism Kamloops to inform them of workforce requirements.</p> <p>Working with contractors and relevant stakeholders (including the City, social service providers, business community, and other organizations) to identify needs and suitable options for workforce accommodation, and developing a Construction Phase Workforce Accommodation Plan in consultation with these parties.</p>	<p>Not Significant (Minor)</p>	<p>Not Significant (Moderate)</p>
<p>During peak construction, Project demand for hotel/motel rooms and rental accommodations (including apartments) could increase rental prices and make it more challenging for vulnerable households to find and retain suitable accommodation.</p>	<p>Construction</p>	<p>Completing and implementing a Project Recruitment Strategy to maximize local hires and reduce the number of non-local workers.</p> <p>Forming an advisory committee comprised of relevant representatives from the City, the TNRD, Tourism Kamloops to discuss potential issues and solutions.</p> <p>Ongoing dialogue with the City and service organizations to inform them of workforce requirements.</p> <p>Working with contractors and relevant stakeholders (including the City, social service providers, business community, and other organizations) to identify needs and suitable options for workforce accommodation, and developing a Construction Phase Workforce Accommodation Plan in consultation with these parties.</p>	<p>Not Significant (Minor)</p>	<p>Not Significant (Moderate)</p>

(continued)

Table 1c. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Social (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Infrastructure, Public Facilities, and Services (Section 8.1; continued)				
Due to existing capacity constraints identified for the Kamloops RCMP detachment, there may be increased stress on policing services as a result of the non-local construction workforce if the RCMP needs to respond to calls regarding partying or other unprofessional behaviours.	Construction	<p>Completing and implementing a Project Recruitment Strategy to maximize local hires and reduce the number of non-local workers.</p> <p>Forming an advisory committee comprised of relevant representatives from the City, the TNRD, services, and organizations to discuss potential issues and solutions.</p> <p>Ongoing dialogue with service organizations (e.g., RCMP) to inform them of workforce requirements.</p> <p>Development of Code of Conduct for direct and contractor employees.</p> <p>KAM will facilitate recreational opportunities in Kamloops for direct and contract employees.</p>	Not Significant (Minor)	Not significant (Minor)
Project-related traffic may increase congestion and affect the flow of traffic during the Construction Phase, including at the Pacific Way/Hugh Allan Drive intersection in 2016 and at the Versatile Drive/Hugh Allan Drive roundabout in 2018.	Construction	<p>Implementing carpooling incentives during construction and operations.</p> <p>Providing workforce personnel shuttles from key locations within the City to the Mine Site during construction.</p> <p>Staggering shifts during the construction phase and, to a lesser extent, during the operations phase.</p> <p>Improved signage for Lac le Jeune Rd.</p> <p>Road infrastructure improvements to Lac le Jeune Rd.</p>	Not Significant (Minor)	Not Significant (Moderate)
Large municipal and regional district projects may be deferred due to inadequate supply of skilled labour.	Construction, Operation	<p>Forming an advisory committee comprised of relevant representatives from the City, the TNRD, services, and organizations to discuss potential issues and solutions.</p> <p>Ongoing dialogue with the City and TNRD to inform them of workforce requirement.</p>	Not Significant (Minor)	No residual cumulative effect
VC: Dark Sky (Section 8.2)				
Sky glow	Construction, Operation	<p>Limiting lighting to areas of activity.</p> <p>Illumination management (e.g., shielding, timers, dimmers).</p> <p>Spectral control (e.g., bulb selection).</p>	Not significant (Moderate)	Not significant (Moderate)

(continued)

Table 1c. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Social (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Visual Quality (Section 8.3)				
Reduction of visual quality	Construction, Operation, Decommissioning and Closure	Progressively re-vegetate disturbed areas that are no longer in use. Employ good visual design principles.	Not Significant (Moderate)	Not Significant (Moderate)
Reduction of visual quality	Post-Closure	Monitor vegetation cover on Project components. Ensure vegetation growth can attain desired re-vegetation.	Not significant (Minor)	Not significant (Minor)
VC: Land and Resource Use (Section 8.4)				
Presence of Project may limit the ability of City of Kamloops and TNRD to continue to pursue various land use planning initiatives related to population growth and residential development.	All phases	Design changes to project location, environmental mitigations, use of formal processes to amend land designations, ongoing engagement between KAM and City of Kamloops and TNRD to discuss potential areas of interaction between Project and planning.	Not Significant (Moderate)	No residual cumulative effect
Presence of Project may limit the ability of the TNRD to continue to pursue various land use planning initiatives to full capacity.	All phases	Design changes to project location, environmental mitigations, use of formal processes to amend land designations, ongoing engagement between KAM and City of Kamloops to discuss potential areas of interaction between Project and planning.	Not Significant (Moderate)	No residual effect
VC: Current Use of Land and Resources for Traditional Purposes (Section 8.5)				
Disruption of fishing use	All phases	Fish Habitat Mitigation and Offsetting Plan, No fishing policy, Transportation Management Plan.	Not Significant (Negligible to Minor)	Not Significant (Moderate)
Disruption of hunting use	All phases	Transportation Management Plan, Firearms and Hunting Policy, Closure and Reclamation Plan.	Not Significant (Negligible to Moderate)	Significant

(continued)

Table 1c. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Social (completed)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Current Use of Land and Resources for Traditional Purposes (Section 8.5; cont'd)				
Disruption of plant gathering	All phases	Closure and Reclamation Plan, Invasive Species Management Plan, No plant gathering policy, Transportation Management Plan.	Not Significant (Negligible to Moderate)	Significant
Disruption of ceremonial use (SSN only)	All phases	Closure and Reclamation Plan.	Not Significant (Moderate)	Significant
VC: Outdoor Recreation (Section 8.6)				
Changes in access to Jacko Lake, Goose Lake and Goose Lake Road	Construction, Operation, Decommissioning and Closure	Implementation of Project design and best management practices for air quality, noise and vibration, visual impacts and aesthetic features; adaptive management. Access Management Plan will include signage and communications regarding temporary closures of Jacko Lake. Angler/recreation working group, and potential development of new or improved fishing, biking, trails, and/or other recreation areas.	Not Significant (Moderate)	Not Applicable
Diminished quality of outdoor recreation experience	Construction, Operation, Decommissioning and Closure	Implementation of Project design and best management practices for air quality, noise and vibration, visual impacts and aesthetic features. Adaptive management. Angler/recreation user working group	Not Significant (Moderate)	Not Applicable
Reduced opportunities for fishing and hunting as a result of effects to fish and wildlife resources	Construction, Operation, Decommissioning and Closure	Implementation of Project design and best management practices for air quality, noise and vibration, visual impacts and aesthetic features; mitigation of fish and wildlife project effects. Adaptive management. Angler/recreation working group, and potential development of new or improved fishing areas	Not Significant (Minor)	Not Applicable

Table 1d. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Heritage

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Archaeological Sites (Section 9.1)				
Disturbance of Known Archaeological Sites	Construction	Avoidance or systematic data recovery approved by the Archaeology Branch and, if necessary, affected Aboriginal community(s).	Not Significant (minor)	No residual cumulative effect
Disturbance of Known Archaeological Site EdRc-25	Construction	Avoidance or mitigation measures approved by the Archaeology Branch and, if necessary affected Aboriginal community(s). Mitigation could involve reconstruction of the petroforms at another location.	Not Significant (moderate)	No residual cumulative effect
Disturbance of As-yet Unknown Archaeological Sites	All phases	Chance find procedure and avoidance or mitigation measures approved by the Archaeology Branch and, if necessary affected First Nations community(s).	Not Significant (minor)	No residual cumulative effect
VC: Heritage Sites (Section 9.2)				
Disturbance of Paleontological Sites	Construction	Chance find procedure and avoidance or mitigation measures if the paleontological material is found to be of significance.	Not Significant (minor)	No residual cumulative effect
Disturbance of Aboriginal Heritage Sites	Construction and Operation	Hunting Blind protected by the HCA and avoidance or mitigations approved by the Archaeology Branch and affected First Nations community(s) will be carried out.	Not Significant (minor)	No residual cumulative effect
Disturbance of Non-Aboriginal Heritage Sites	Construction and Operation	Consultation with community stakeholders to determine if additional mitigation measures and/or preservation of the site is desired. Should evidence of the Nicola Brigade Trail be discovered during construction, documentation and associated mitigation will be addressed under the Heritage Chance Find Procedure.	Not Significant (minor)	No residual cumulative effect

Table 1e. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Health

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Air Quality (Section 10.1)				
Change in CAC concentrations	Construction	<p>Minimize material drop heights.</p> <p>Watering road surfaces prone to generating fugitive dust, proper road maintenance</p> <p>Wheel cleaning, where necessary, to prevent “track-out”.</p> <p>Minimize area of exposed rock and soil, reduce vehicle idling and rapid starts and stops.</p> <p>Use multi-passenger vehicles to transport crews.</p> <p>Operate vehicles within posted maximum speed limits.</p> <p>Maintain vehicles in good operating condition.</p>	Not Significant (moderate)	Not Significant (moderate)
Change in CAC concentrations	Operation	<p>In addition to those listed above:</p> <p>Arch cover over conveyor from crusher to plant.</p> <p>Cover over the coarse ore and fine ore stockpiles.</p> <p>Partially enclose the primary crusher.</p> <p>Use covered and well-sealed concentrate transport trucks.</p> <p>Use large trucks for ore and mine rock transport to minimize the number of trips.</p> <p>Select best achievable technology for the mine fleet.</p> <p>Adhere to all permits, authorizations and approvals related to air quality.</p>	Not Significant (moderate)	Not Significant (moderate)

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Table 1e. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Health (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Domestic Water (Section 10.2)				
Change in Knutsford groundwater quality	Operation	<p>Mitigations from Surface Water Quality and Groundwater Quality: Water Management Plan.</p> <p>TSF Design which includes an underdrain system in the embankment foundation, Liner system on the upstream face of the embankment overlying a low permeability glacial till basin liner.</p> <p>SMRSF Pond - manage seepage and runoff from the southern extent of the SMRSF.</p> <p>Reclamation of MRSFs in Decommissioning and Closure with a low permeability till layer overlain with topsoil to reduce infiltration and maximize evapotranspiration and runoff.</p> <p>Dry cover on TSF to reduce infiltration into the underlying tailings solids and increase non-contact runoff.</p> <p>Air Quality Management Plan to reduce dust.</p>	Residual effects assessed in Human Health VC (Section 10.4)	No residual effect
VC: Country Foods (Section 10.3)				
Change in country foods quality	All phases	Mitigations applied in the assessment of air quality, surface water quality and groundwater quality also apply to the country foods VC.	Residual effects assessed in Human Health VC (Section 10.4)	No residual effect
VC: Human Health (Section 10.4)				
Change in air quality that could result in a change in human health risk associated with inhalation exposures to CACs and particulate-bound metals	Construction, Operation, Decommissioning and Closure	<p>Mitigation measures specific to human health have not been recommended.</p> <p>Mitigation measures to control air and dust emissions outlined in the Air Quality and the Dust Control Plan will reduce Project emissions to levels that are protective of human health.</p>	Not Significant (minor)	No residual effect

(continued)

Table 1e. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Health (continued)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Human Health (Section 10.4; continued)				
Changes in soil, surface water, groundwater, and country food quality could result in a change in human health risk associated with direct contact and ingestion exposures to metals	Post-Closure	Mitigation measures specific to human health have not been recommended. Mitigation measures to control air and dust emissions outlined in the Air Quality and Dust Control Plan will reduce Project emissions to levels that are protective of human health. Mitigation measures to control surface water discharges outlined in the Water Management Plan will reduce Project emissions to levels that are protective of human health.	Not Significant (minor)	No residual effect
VC: Noise (Section 10.5)				
Change in acoustic environment	Construction, Operation	Locate noise emission inside gallery, enclosure, or buildings. Reduce haul road distance. Use large haul truck for ore and mine rock transport. Mobile equipment fitted with exhaust mufflers. Locate plant facilities further from City of Kamloops boundary. Implement the Noise and Vibration Management Plan.	Not Significant (minor)	Not Significant (minor).
Change in vibration environment	Construction, Operation	Implement blast designs that were based on the damage threshold at the closest location (i.e., Jacko Lake). Implement the Noise and Vibration Management Plan.	Not Significant (minor)	No residual effect
VC: Healthy Living and Health Education (Section 10.6)				
No residual effect				

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Table 1e. Summary of Residual Project and Cumulative Effects and Mitigation Measures: Health (completed)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
VC: Community Health and Well-being (Section 10.7)				
During peak construction, increased traffic could result in increased incidence of road collisions at four intersections	Construction	Shuttles, shift staggering, and carpooling incentives to reduce traffic volumes. Improved road signage. Improvements to Lac le Jeune Road, Inks Lake Interchange. Transportation Management Plan. Transportation Management and Control Plan. Engagement with Kinder Morgan to identify and address potential cumulative effects on traffic and road safety.	Not Significant (minor)	Not Significant (minor)
Increased demand for physicians and emergency room could affect availability of community health services	Construction, Operation	Community Liaison Group. Socio-Economic Monitoring Plan including monitoring program for community health and well-being, to be developed in collaboration with Community Liaison Group and relevant service providers. Processes to monitor and address issues if they arise and to communicate Project information to service providers. Construction contractor will secure a dedicated general practitioner to provide healthcare services to workers. Thompson Region Division of Family Practice, IHA, Venture Kamloops, and others will continue to recruit physicians for Kamloops Engagement with Kinder Morgan to identify and manage potential cumulative effects on local health services.	Not Significant (moderate)	Not Significant (moderate)
Project could affect community image and quality of life perceptions for some residents	Construction, Operation	KAM participation in community planning and positive measures for community image. Community Investment program Monitoring of environmental changes; transparent and timely communication of monitoring results to residents of the LSA; and discussion of monitoring results within the Community Liaison Group.	Not Significant (moderate)	No residual effect

Table 2 identifies key commitments that have been derived from the assessment of effects on environmental, economic, social, health, and heritage VCs and Aboriginal interests, and from the formulation of mitigation measures relevant to Project components and activities.

While permits for the Project cannot be issued prior to receipt of environmental assessment approvals, KAM intends to continue planning for the Project by submitting applications for provincial permits and federal approvals during the EA review. KAM has initiated discussions with the BC Major Mines Permitting Office regarding permitting of the Project and the establishment of a Mine Review Committee. Once the Mine Review Committee is established, it will confirm the list of permitting requirements and develop a schedule for the submission, review, and issuance of permits in a manner that appropriately respects the EA process and adheres to any conditions that are associated with the Ministers' decision.

As the proponent of the Ajax Project, KAM is of the belief that the development can be undertaken in a manner that maintains social well-being at the family and community level, while respecting the rights and interests of Aboriginal Groups potentially affected by the Project, or inhibiting the level of public health in the area in any way. It is similarly believed that the biophysical environment affected by the proposed Project will not see unacceptable constraints placed on its ecological functionality, given the comprehensive mitigation measures prescribed in the Application/EIS and committed to by KAM. With sustainable development at the forefront of responsible mining practices, the Project will be implemented in accordance with the relevant and applicable environmental statutory regulations and industry performance standards, as described in the appropriate sections of the Application/EIS. KAM is thus of the opinion that the approval of the Application/EIS for the Project should receive due consideration on the part of the regulatory agencies.

Table 2. Table of Commitments

No.	Commitment	Timing	Application Section	Responsible Agency	Status
Consultation and Engagement					
1.	KAM will continue to consult and engage with Aboriginal Groups through the life of the Project.	All project phases	15; 17.11	EAO, CEAA, MEM	On-going
2.	KAM will continue to negotiate with Aboriginal Groups to establish impact benefit agreements where project-specific concerns will be addressed and shared benefits enhanced.	All project phases	15	n/a	On-going
3.	KAM will create a Community Liaison Group (CLG) to streamline the lines of communication between KAM, regulators, the city and local stakeholders related to monitoring activities, monitoring results, and addressing community concerns.	All project phases	4.6; 11.29	EAO, CEAA	To be established before start of Construction
Project Design					
4.	KAM will develop the Project in a manner consistent with what is described in the Application/EIS. However, the company will continue to pursue improvements and efficiencies as the Project advances to further mitigate potential environmental effects of the Project. Any material changes to Project design that result will be re-evaluated against the conclusions of the Application/EIS and communicated to BC EAO and the CEA Agency.	All project phases	3; 17	EAO, CEAA	On-going
5.	KAM will continue to advance design of the TSF with the principles of minimizing the amount of water stored in the TSF, and optimizing MRSF buttressing to increase the factor of safety. Subsequent phases of design, construction and operations will adhere to best practices, including the establishment of an Independent Engineering Review Board.	Construction, Operation	3.7; 17.6	MEM	On-going
6.	KAM will continue to develop the design of the Peterson Creek Diversion system in a manner that ensures water supply is reliably maintained for downstream license holders.	Construction, Operation	6.3; 6.4; 11.6; 11.23; 11.24	FLNRO	On-going
7.	KAM will develop the Project in a manner that will ensure opportunity for re-establishing Peterson Creek upon closure.	Construction, Operation	3.17; 17.4	MEM	On-going
8.	KAM will develop the TSF in a manner that will support a closure objective of a dry closure cover (e.g., no permanent standing water).	All project phases	3.7; 3.17; 17.4	MEM	On-going

(continued)

Table 2. Table of Commitments (continued)

No.	Commitment	Timing	Application Section	Responsible Agency	Status
Environmental Management System					
9.	KAM will implement an Environmental Management System for the Project that follows the framework outlined in the Application/EIS, including an array of Environmental Management Plans. This system will continue to be developed in a manner that is aligned with the internationally recognized ISO 14001 standard for environmental management, as well the Mining Association of Canada's Towards Sustainable Mining requirements.	All project phases	11.1	EAO	On-going
Jacko Lake and Open Pit					
10.	KAM is committed to developing, operating and closing the Project in recognition of the many environmental, social, and cultural values associated with Jacko.	All project phases	8.7	EAO, CEAA	On-going
11.	KAM will implement blasting measures to minimize effects to fish in Jacko Lake (vibration), and to users of the lake (blast timing, and safety measures).	Construction Operations	6.7; 11.11	MEM, DFO	On-going
12.	KAM will actively monitor geotechnical and hydrogeologic conditions between the open pit and Jacko Lake. Real-time monitoring results will support pro-active risk management to ensure pit-wall stability and limit groundwater inflow to the pit from the lake.	All project phases	6.2; 17.6	MEM	On-going
Fish and Fish Habitat					
13.	KAM will continue to develop and implement a fish habitat offsetting plan in relation to Fisheries Act requirements to offset serious harm. The offsetting plan will also address interests of recreational users, and Aboriginal Groups.	All project phases	6.7; 11.25	DFO	On-going
Wetland Compensation					
14.	KAM will further develop and implement a wetland compensation plan to address direct project-related effects and to achieve objectives of maintaining biodiversity.	All project phases	6.9; 11.27	EAO, FLNRO	On-going

(continued)

Table 2. Table of Commitments (completed)

No.	Commitment	Timing	Application Section	Responsible Agency	Status
Rare Plants					
15.	KAM will undertake additional rare plant surveys to better characterize the regional presence/distribution of species that were identified within the mine site footprint.	Pre-construction	6.8; 11.27	EAO, FLNRO	On-going
Current Use of Lands and Resources for Traditional Purposes					
16.	KAM will work with Aboriginal Groups to identify areas on KAM-owned lands, off the mine site, where access can be improved to support CULRTP.	All project phases	8.5	EAO, CEAA	On-going
Heritage Resources					
17.	KAM will continue to work with the Archaeology Branch and SSN to determine appropriate mitigation measures for the known archaeological sites, in particular those associated with Jacko Lake and the Hunting Blind Complex.	Construction	9.1; 9.2; 11.18	Archaeology Branch	On-going
18.	KAM will continue to work with the Archaeology Branch and the Anglican church to determine appropriate mitigation measures associated with the potential for a burial at the St. Peter's Church.	Construction	9.1; 9.2; 11.18	Archaeology Branch	On-going
Air Quality					
19.	KAM will support community initiatives and research on regional air quality, including providing modelling tools.	All project phases	10.1	MOE	On-going

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