18. SUMMARY AND CONCLUSIONS

18.1 INTRODUCTION

This Application for an Environmental Assessment Certificate/Environmental Impact Statement (Application/EIS) for the proposed Ajax Project (the Project) represents the application made by the Proponent, KGHM Ajax Mining Inc. (KAM), under the British Columbia (BC) *Environmental Assessment Act* (2002) and the federal *Canadian Environmental Assessment Act, 2012* (2012) for approval to proceed to the permitting stage for the Project.

The Project, an open pit copper-gold mine at the historic Afton Mining Camp, is located in the South-Central Interior of BC, south of the city of Kamloops, within the Thompson Nicola Regional District. The coordinates for the centre of the proposed mine are approximately 50º36' N latitude and 120º24' W longitude. The Project lies within the traditional territory of the Secwépemc Nation. The section 11 Order (issued by the BC EAO on January 11, 2012) identifies the Stk'emlupsemc te Secwépemc Nation (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. In addition, 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 Canadian Environmental Assessment Agency (CEA Agency) identifies the MNBC as potentially affected by the Project.

The proposed mine plan for the Project predicts an operation based on a mill throughput of 65,000 tonnes of ore per day. Total material movement from the pit is estimated at approximately 90Mt 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.

The primary components of the mine include mine rock storage facilities (MRSFs), processing facility and truck shop, process water intake and line, 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 camp, administration building, and explosives storage, may be located just within the city boundaries. Access to the mine site will be via the Inks Lake Interchange off Highway 5 and then along service roads to the plant main access road.

Part A of the Application/EIS provides an introduction and background to the assessment which includes an overview and description of the Project and its design, as well as a description of the public accountability undertaken, and the assessment process and methodology applied. Parts B, C, and D contain the actual effects assessments pertaining to the biophysical and human environments,

Aboriginal groups, and federal requirements respectively. Part E rounds out the documentation by addressing residual effects, commitments, and conclusions respectively.

In this Application/EIS, KAM has reported the findings of the assessment with respect to the potential effects of the Project on the baseline environmental, economic, social, heritage and health setting. The assessments have been broadly scoped and are comprehensive, and have followed the effects assessment methodology detailed in Chapter 5. The effects assessment reflects the feedback provided during the pre-Application/EIS stage of the environmental assessment (EA) process by Aboriginal Groups, provincial and federal government agencies, and the public. KAM, in conducting the assessments, has been supported by technical specialists who have applied rigorous analytical procedures and expert professional judgement to the assessment analysis.

The EA process has been adopted by KAM as a means of planning the Project in a manner that has allowed refinement of the layout and design to be as environmentally acceptable as possible while also maximizing the potential benefits of the Project. Through an iterative process of interrogation and modification on the part of KAM, the EA Working Group[1] and other review participants, elements of the Project layout and design were revised and improved, as described in Sections 17.3 and 17.4 of Chapter 17.

By applying the assessment methodology described in Chapter 5, KAM and its team have systematically identified issues of concern; scoped potential sources of effects and effects mechanisms and evaluated their potential to affect environmental, social, heritage, and health Valued Components (VCs); and assessed the capacity of various mitigation measures to prevent effects or, where not possible, to reduce them to acceptable levels. With mitigation measures applied, KAM's team of experts has then determined the residual effects on the Project setting, and whether or not these residual effects are significant. Summaries of the effects assessments for environmental, social, health, and heritage VCs are provided in Chapters 6 through 10 of the Application/EIS.

KAM has been successful in either avoiding adverse effects entirely or reducing them to reasonable levels. For many potential effects, no residual effects are predicted once proposed mitigation measures are implemented. For other potential effects, although residual effects are predicted, these residual effects are rated as not significant, as illustrated by the summary of assessment findings presented in Tables 18.2-1 through 18.2-5.

18.2 SUMMARY OF RESIDUAL EFFECTS AND MITIGATION MEASURES

Tables 18.2-1 through 18.2-5 summarize all residual Project and cumulative effects, significance determinations, and mitigation measures for the environmental, economic, social, heritage, and health assessments respectively. Brief text summaries and conclusions for each discipline are provided in Sections 18.2.1 through 18.2.5 below.

[1] The EA Working Group is a forum for discussion and resolution of technical issues associated with the proposed Project, as well as providing technical advice to the BC EAO and CEA Agency, who remain ultimately responsible for determining significance. It comprises representatives of provincial, federal, and local government, and Aboriginal Groups.

Table 18.2-1. 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_2eq/yr during Construction and Operation due to Scope 1, 2 and 3 Emissions and Land Use Changes	Construction, Operation	Access and haul roads designed to minimize distances. Larger trucks for ore and waste transport to minimize number of trips. Consider energy conservation in equipment procurement and selection. Consider the use of alternate fuels. Select the best achievable technology. Maintain vehicles in good operating condition. Utilize buses/multi-passenger vehicles to transport crews. Train equipment and vehicle operators to reduce GHG emissions. Operate vehicles within the posted maximum speed limits and reduce idling. Land clearing will be minimized for the Project where practical and economically achievable. Progressively re-vegetate or re-vegetate disturbed areas prior to Closure.	Not Significant (Minor)	Not Significant (Minor)
VC: Geology, Landforms and Soils (Section 6.2)				
Alteration of Baseline Landforms	Construction, Operation, Decommissioning and Closure	Footprint minimization and re-contouring. Progressive reclamation.	Not Significant (Minor)	Not Significant (Minor)

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

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)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
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 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.	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).
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)
Section 6.6 (*continued*) 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)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
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
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)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
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)
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				

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
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)
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				

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
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)
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)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
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 18.2-2. 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 Force, Employment, and Training **(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)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
Section 7.4 (*continued*) 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).
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 18.2-3. 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)				
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.	Construction	Completing and implementing a Project Recruitment Strategy to maximize local hires and reduce the number of non-local workers. Forming an advisory committee comprised of relevant representatives from the City, the TNRD, Tourism Kamloops to discuss potential issues and solutions. Ongoing dialogue with the City and Tourism Kamloops to inform them of workforce requirements. 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.	Not Significant (Minor)	Not Significant (Moderate)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
Section 8.1 (*continued*) 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.	Construction	Completing and implementing a Project Recruitment Strategy to maximize local hires and reduce the number of non-local workers. Forming an advisory committee comprised of relevant representatives from the City, the TNRD, Tourism Kamloops to discuss potential issues and solutions. Ongoing dialogue with the City and service organizations to inform them of workforce requirements. 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	Not Significant (Minor)	Not Significant (Moderate)
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	Completing and implementing a Project Recruitment Strategy to maximize local hires and reduce the number of non-local workers. Forming an advisory committee comprised of relevant representatives from the City, the TNRD, services, and organizations to discuss potential issues and solutions. Ongoing dialogue with service organizations (e.g., RCMP) to inform them of workforce requirements. Development of Code of Conduct for direct and contractor employees KAM will facilitate recreational opportunities in Kamloops for direct and contract employees	Not Significant (Minor)	Not significant (Minor)

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
Section 8.1 (*continued*) 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	Implementing carpooling incentives during construction and operations. Providing workforce personnel shuttles from key locations within the City to the Mine Site during construction. Staggering shifts during the construction phase and, to a lesser extent, during the operations phase. Improved signage for Lac le Jeune Rd. Proportionate road infrastructure improvements to Lac le Jeune Rd.	Not Significant (Minor)	Not Significant (Moderate)
Large municipal and regional district projects may be deferred due to inadequate supply of skilled labour.	Construction, Operations	Forming an advisory committee comprised of relevant representatives from the City, the TNRD, services, and organizations to discuss potential issues and solutions. Ongoing dialogue with the City and TNRD to inform them of workforce requirement.	Not Significant (Minor)	No residual cumulative effect
VC: Dark Sky (Section 8.2)				
Sky Glow	Construction; Operation	Limiting lighting to areas of activity; Illumination management (e.g., shielding, timers, dimmers) Spectral control (e.g., bulb selection)	Not significant (Moderate).	Not significant (Moderate).
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).

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
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
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
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

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
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	nplementation of Project design and best management practices for air quality, noise and vibration, visual impacts and aesthetic features; daptive 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 18.2-4. 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	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 18.2-5. 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	Minimize material drop heights Watering road surfaces prone to generating fugitive dust, proper road maintenance, wheel cleaning, where necessary, to prevent "track-out" minimize area of exposed rock and soil, reduce vehicle idling and rapid starts and stops, use multi-passenger vehicles to transport crews, operate vehicles within posted maximum speed limits, maintain vehicles in good operating condition,	Not Significant (moderate).	Not Significant (moderate).
Change in CAC concentrations.	Operation	In addition to those listed above, Arch cover over conveyor from crusher to plant, Cover over the coarse ore and fine ore stockpiles, Partially enclose the primary crusher, use covered and well sealed concentrate transport trucks, use large trucks for ore and mine rock transport to minimize the number of trips, Select best achievable technology for the mine fleet, Adhere to all permits, authorizations and approvals related to air quality.	Not Significant (moderate).	Not Significant (moderate).

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	Mitigations from Surface Water Quality and Groundwater Quality: 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 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.	Residual effects assessed in Human Health VC (Section 10.4)	No residual cumulative 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 cumulative effect

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative 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	Mitigation measures specific to human health have not been recommended. 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.	Not Significant (minor).	No residual cumulative effect
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 cumulative 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).

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
Section 10.5 *(continued)* 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 cumulative effect
VC: Healthy Living and Health Education (Section 10.6)				
No 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).

Residual Effect	Project Phase	Mitigation	Significance of Project Residual Effect	Significance of Cumulative Residual Effect
Section 10.7 *(continued)* 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

18.2.1 Assessment of Potential Environmental Effects: Summaries and Conclusions

18.2.1.1 Greenhouse Gas Management

The Ajax Project is anticipated to emit up to 123 kt CO2eq/yr during the Operation phase and up to 82 kt CO2eq/yr during the Construction phase. The effects assessment compared the Project-related GHG emissions to provincial and national reported emissions and with comparable proposed and operating mining projects in BC to determine the significance of the residual effect and significance of the residual cumulative effect. The Project will increase atmospheric GHG emission even after the application of mitigation measures, though the predicted residual GHG emissions are considered to be negligible and assessed as not significant (minor). In the context of provincial emissions levels and targets, the residual cumulative effects of the Project are considered to be negligible and determined to be not significant (minor).

18.2.1.2 Geology, Landforms and Soils

Altered baseline landforms are the potential residual effects expected to be caused by the Project. The Project will affect slope gradients and topographic function of the landscape, although the development of a compact Project footprint and the eventual reclamation of the site would reduce the overall effect. The original distribution of baseline topographic conditions would not be re-established; however, upon reclamation, a fully functional landscape would be developed to support the reclamation goals. Following implementation of mitigation measures, residual effects, in the form of new topographic features and improved or enhanced aquatic habitat, are expected to remain for the alteration of landforms indicator. 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.

18.2.1.3 Surface Water Quality

The Project has the potential to affect surface water quality as a result of dustfall deposition and the migration of uncaptured seepage and runoff (contact water) into nearby surface water bodies. A predictive water quality model was developed for the Project to estimate parameter concentrations within the various mine water management ponds and in the downstream surface water features (Jacko Lake, Peterson Creek, and Humphrey Creek) over time. The model is fully integrated with the outputs from the groundwater flow model and the water balance model. Mitigation measures to reduce dustfall, seepage and runoff loading to surface water have been implemented into the development, operation, and reclamation of key mine components. Residual effects on surface water quality were identified in Humphrey and Peterson Creeks for parameters including chloride, sulphate, copper, molybdenum, and selenium. Residual effects are considered not significant (minor to moderate) and the magnitude of the predicted change attributed to the Project indicates that there are no residual cumulative effects on surface water quality.

18.2.1.4 Surface Water Quantity

A combination of modelling techniques, which included a water balance model were employed to assess the potential effects of the Project on surface water quantity. A number of surface water quantity indices were selected for evaluation, with a primary focus on lower Peterson Creek and Kamloops Lake streamflows. Annual streamflow volumes in lower Peterson Creek will be reduced in the order of 9% under average precipitation conditions. Residual effects on surface water quantity due to Project activities are predicted to be not significant (moderate) for annual flow volumes and low flows, and not significant (minor) for monthly flow distribution and peak flows. 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.

18.2.1.5 Groundwater Quality

There is the potential to affect groundwater quality in in close proximity to the Project as a result of uncaptured seepage (contact water) migrating into local groundwater. Changes in groundwater quality were assessed by modelling the change in parameter concentrations to the nearest down-gradient residential water supply well, and increases in groundwater fluoride, sulphate, copper, iron, manganese, molybdenum, and zinc concentrations were predicted in this vicinity. Mitigation measures to reduce seepage loading to groundwater have been implemented into the development, operation, and reclamation of key mine components. The significance of the residual effects on groundwater quality are assessed in terms of the cumulative effect on the Human Health VC (Section 10.4) with the groundwater quality model results used as inputs to the contributing Domestic Water and Country Foods VCs, as components of the Human Health VC. Significance is also determined indirectly through the Surface Water Quality VC (Section 6.3) as seepage and groundwater discharge to surface water are accounted for in the predictions for that VC.

18.2.1.6 Groundwater Quantity

Groundwater quantity was selected as a VC for its importance to humans for drinking water, livestock and irrigation water, and for its importance for ecological and aquatic habitats. The baseline groundwater hydrology assessment identified 13 mapped aquifers and 495 registered water wells in the region. Based on the results of a detailed groundwater flow model, the Project is expected to alter groundwater elevations, patterns of groundwater recharge and discharge, and patterns of groundwater flow within approximately 2 km of the Mine Site. However, the residual effects to groundwater quantity are predicted to be not significant (moderate). Cumulative effects to groundwater quantity from existing activities, 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).

18.2.1.7 Fish Populations and Fish Habitat

The Project has the potential to affect fisheries and fish habitat due to the proximity of Project components to Jacko Lake and Peterson Creek, and the location of the water intake pipe on

Kamloops Lake. The likely mechanisms or pathways through which interactions occur between the Project and the fish and fish habitat VC were identified. Mitigation measures were then identified, including design changes, implementing industry best management practices, and providing restoration or offsetting. The proposed offsetting plan accounts for loss of habitat in Jacko Lake (northeast arm) and the diverted section of Peterson Creek. Assessment of the remaining residual effects (direct and indirect habitat loss, fish mortality, and water quality and quantity) showed these effects to be not significant (minor to moderate) at both the Project and cumulative levels.

18.2.1.8 Rare Plants

Rare plants were addressed as a VC to determine if an interaction with Project activities could result in adverse residual effects. Potential effects of habitat loss and habitat alteration were identified and evaluated in relation to anticipated Project activities. Several of the rare plants recorded in the study are the only known occurrences in the region. Protection of unaffected plants and potential translocations of regionally rare species will reduce the effect; however the effect will not be mitigated completely. There is limited information on the abundance and distribution of these rare plants in the province and KAM has committed to supporting additional regional surveys for rare plants. The loss of rare plant occurrences due to the Project is assessed to be not significant (moderate). 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.

18.2.1.9 Rare and Sensitive Ecological Communities

Rare and sensitive ecological communities and habitats are defined as wetlands, alkali ponds, old-growth forests, rock outcrops, and ecological communities at risk. The effects on rare and sensitive ecological communities is largely related to disturbances to soil moisture and nutrient regimes from Project activities. Mitigation and reclamation to reduce the impact of the Project on rare and sensitive ecological communities cannot fully mitigate for the loss of habitat during the Construction phase of the Project (i.e. clearing, grubbing and earthworks) and a residual effect of habitat loss is anticipated. A program of wetland compensation is proposed to address unavoidable loss to wetlands. Implementing management plans that address fugitive dust, invasive species, and hydrological changes is anticipated to mitigate the adverse effects associated with habitat alteration. With the application of mitigation measures, at both the Project and cumulative levels, habitat loss of rare and sensitive ecological communities is considered to be a not significant (moderate and minor respectively) effect.

18.2.1.10 Grasslands

Grasslands were assessed as a VC to determine likely interactions with specific Project activities, and how these interactions could result in any adverse effects. Habitat loss and habitat alteration arising from each Project activity were identified and evaluated. Closure planning for the Project includes objectives of re-establishing grassland communities on reclaimed areas. After the implementation of mitigation measures, habitat loss was found to have a potential residual effect and was assessed for potential interactions with other past, present, and future projects and activities occurring within the

region. Habitat loss is considered not significant (moderate) for Project-related residual effects. Regionally, habitat loss is considered not significant (minor) for cumulative residual effects as less than 3% of the priority grassland areas within the Regional Study Area (RSA) will be lost, and suitable habitat still exists within the region.

18.2.1.11 Terrestrial Invertebrates

The terrestrial invertebrates VC was assessed to determine potential interactions between Project activities and indicator species. No residual adverse effects are anticipated as a result of the Project. No observations of the listed indicator species were recorded in the study area, despite extensive survey effort by a species expert. No population level effects to California hairstreak, common sootywing, monarch, Nevada skipper and olive clubtail populations are anticipated. Effects of the Project to these species are not anticipated to have an adverse residual effect on the VC. As no residual effects are anticipated, no cumulative effects were addressed.

18.2.1.12 Amphibians

Amphibians were assessed as a VC to determine likely interactions with specific Project activities and how these interactions would affect this species 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, in combination with other past, present, and future projects and activities occurring within the region.

The loss of suitable breeding habitat may result in a negative impact to various species. Two blue-listed (i.e. species of special concern) amphibians, namely the 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. Habitat loss is considered not significant (moderate) for this species group for Project-related residual effects as 48% of potentially suitable breeding habitat in the LSA will be removed. Habitat loss is considered not significant (minor) for residual cumulative effects as 2% of potentially suitable habitat available in the RSA 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 available in the RSA 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.

18.2.1.13 Reptiles

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 study area. 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. As there are no residual effects on reptiles as a result of the Project there is no contribution to cumulative effects.

18.2.1.14 Migratory Birds

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 well as in combination with other past, present, and future projects and activities occurring within the region.

Habitat loss and chemical hazards are both Project-related and residual cumulative effects. 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. Project-related habitat loss was considered not significant (moderate) although some loss of wetland habitat is expected to occur during the Construction phase. However, the relative amount of wetlands within the regional area 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 cumulative effect 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.

18.2.1.15 Raptors

Raptors were assessed as a VC to determine likely interactions with specific Project activities, and how these interactions would affect this species 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, two Project-related residual effects and two cumulative residual effects were determined for raptors, as well as in combination with other past, present, and future projects and activities occurring within the region.

The loss of suitable Great Gray Owl, Rough-legged Hawk, Short-eared Owl, and Swainson's Hawk habitat, and additionally, the loss of at least one known Swainson's Hawk nest, may result in an impact to these species. As two of these species are blue-listed (i.e. species of special concern) (Roughlegged Hawk, Short-eared Owl), and one is red-listed (i.e. extirpated, endangered, or

threatened species) in BC (Swainson's Hawk), the loss of sensitive sites could impact populations both locally, and regionally. Habitat loss is considered not significant (minor) for these species for Project-related residual effects as a relatively small amount of suitable forested area will be removed (< 90 ha), 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.

Although sensory disturbance near raptor nests may result in their abandonment, 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 the area is already subject to a number of anthropogenic disturbances. Also, additional nesting habitat exists throughout the region, and that habitat has very little current or anticipated disturbances.

18.2.1.16 Non-migratory Gamebirds

Non-migratory gamebirds 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 non-migratory gamebirds, as well as in combination with other past, present, and future projects and activities 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 (species of special concern) in BC, the loss of sensitive sites could impact populations both locally, and regionally. Habitat loss is considered not significant (moderate) for this species for Project-related residual effects as 25% of known active lek 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 RSA, and that habitat has very little current or anticipated disturbances.

Although sensory disturbance at Greater Sage-grouse lek sites may result in a reduction in use of these sites, such disturbance 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. Sensory disturbance at lek sites is considered not significant (minor) for this species for residual cumulative effects as additional leks exist within the region, and that habitat has very little current or anticipated disturbances.

Although sensory disturbance at nest sites of both Sharp-tailed and Ruffed Grouse may result in a reduction of use or abandonment of these sites, this effect is considered not significant (minor) for both Project-related and residual cumulative effects as the effect is easily reversible in the short-term and both species were observed across the landscape, an area already subject to a number of anthropogenic disturbances.

18.2.1.17 Mammals

Mammals were assessed as a VC to determine likely interactions with specific Project activities and how these interactions would affect this species 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, four Project-related residual effects and three cumulative residual effects were determined for mammals as a result of this Project, as well as in combination with other past, present, and future projects and activities occurring within the region.

The loss of American badger habitat may result in a negative impact to this species. As badgers are red-listed (extirpated, endangered, or threatened species) 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. 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.

The loss of bat habitat will likely have a low impact effect 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 will be removed. Limiting habitat features (hibernacula) were not identified, but these features may be present at Sugarloaf Hill, an area outside of the Local Study Area (LSA) but located in in close proximity to the Project. Habitat loss was not considered for cumulative residual effects 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 will not have a noticeable effect on deer populations in the area, either locally or regionally. Habitat loss is considered not significant (minor) for deer for Project-related residual effects as between 4 and 18% of identified deer winter range in the LSA may be removed, with the majority of this limiting habitat type remaining unaltered. Habitat loss was not considered for cumulative residual effects as only 0.4% of critical deer winter range 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, e.g. increased stress levels and/or decreased foraging efficiency from Project-related noise. 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 in the long-term. 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.

Chemical hazards present in the landscape may have a negative effect on various bat species through an increase of toxins in their systems may reduce overall health. Chemical hazards are

considered not significant (moderate) for Project-related residual effects because, although repeated exposure to high concentrations of metals and other toxins may reduce the ability for this species group to persist in the landscape, the long-term effects are not well understood. Chemical hazards were considered not significant (minor) for this species group for cumulative residual effects as a large amount of non-contaminated water exists throughout the area, with few projects/activities planned that would change this.

18.2.2 Assessment of Potential Economic Effects: Summaries and Conclusions

18.2.2.1 Economic Growth

During the Construction and Operations phases, the Project will create employment in the LSA and RSA, both directly (through direct employment) and indirectly (through expenditures on goods and services to support the Project), and through induced economic effects. In total, between 1,510 and 1,850 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 positions during the Operations Phase. As the Operations Phase ends and the Project begins Decommissioning and Closure, there will be a reduction in employment and Project expenditures and economic growth at the end of the 23-year Operations Phase. 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.

While recognizing the potential challenges that may arise upon closure of the Project, substantial income benefits will be generated by the Project over the Construction and Operations phases. This includes $1.2 billion in direct salaries over 23 years, as well as $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.

The residual effect of decreased economic growth is expected to be not significant (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.

18.2.2.2 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. An average of 468 people are expected to be employed directly by the Project during the Operations phase, plus additional indirect and induced jobs. With respect to the decrease in employment and training that will accompany the Project shift from the Operations phase into Decommissioning and Closure, the effect is expected to be not significant (moderate) after mitigation. There will be a substantial decrease in the number of employees required on the Project, but after mitigation (through communication and transition programming) it is expected that many employees will gain opportunities elsewhere in the vicinity. 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 relative diversity of the LSA economy

and future anticipated mining projects will also help to off-set this boom-bust effect. No cumulative effects are anticipated.

18.2.2.3 Income

While the Project will largely have positive effects on income generation in the LSA and RSA, as the 23-year Operations Phase ends and the Project begins Decommissioning and Closure, there will be a loss of income-generating jobs. 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. Following mitigation, the effect is conservatively expected to be not significant (moderate). No cumulative effects are anticipated.

18.2.2.4 Business

The Project is expected to provide a large number of opportunities for businesses within the LSA and RSA, including Aboriginal businesses. The Project Construction phase expenditures are estimated at $1.54 billion and the Project Operations phase expenditures are estimated at $299 million per year (on average), or $6.9 billion, over the 23-year life of the mine. Given the Project's proximity to Kamloops and the scope of business currently engaged in the mining industry both directly and indirectly, it is expected that a large proportion of Project contracting needs will be addressed by local or regional businesses. During the Operations phase average annual local expenditures of between $75 and $105 million could occur in the Kamloops area alone.

The large workforce requirements during the Construction and Operations phases will provide opportunities for a broad range of occupations. It is expected that much of the anticipated workforce will be supplied from within the LSA and RSA. Some small to medium-sized business may experience challenges associated with labour competition as a result of the Project. These pressures currently exist in the local mining supply and service industry and most businesses will be adept in handling them. However, KAM proposes to proactively engage industry through a Community Liaison Group to identify and mitigate potential concerns related to labour competition. The residual effect is expected to be not significant (minor).

There exists the potential for cumulative interactions related to increased labour competition and construction activities as a result of the proposed Harper Creek mine and the Kinder Morgan Trans Mountain pipeline expansion projects in the same greater region. Construction activities for these projects could potentially take place during the same period of time as the Project and it is likely that the Operations phase will overlap that of Harper Creek. Industry engagement is identified as a tool to help offset potential challenges related to increased labour competition. This residual cumulative effect is expected to be not significant (minor).

18.2.2.5 Property Values

Stakeholders have expressed concern about a wide range of topics related to the Project and the probability of effects on residential and agricultural property values is recognized as one. It is assumed that mitigation measures recommended for air quality, noise and vibration, and visual impacts and aesthetic features will minimize potential Project effects on residential and agricultural

property values. 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) during the Construction and Operations phases. 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 could have a residual cumulative effect on agricultural property values as a result of combined effects related to the Trans Mountain Pipeline Expansion. However, with the implementation of Project design and best management practices for air quality, noise and vibration, visual impacts and aesthetic features, and by applying adaptive management, these effects are regarded as not significant (moderate) and will only affect one privately held agricultural property adjacent to the Mine Site. No cumulative effects on residential property values are identified.

18.2.2.6 Economic Diversification

The Project is expected to positively contribute to economic diversification in both the LSA and RSA throughout the Project's economic life. 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 933 total positions during the Operations phase. As the Project transitions into the Decommissioning and Closure phase, employment and project-related expenditures will be substantially reduced. Although this will result in much reduced Project-related spending, it will not reduce goods and services expenditures and contracting opportunities below existing conditions. The Project is expected to interact with economic diversification throughout the life of the mine and these interactions are expected to have a positive effect on economic diversification. As such, the Project is not expected to produce any residual adverse economic diversification effects.

18.2.3 Assessment of Potential Social Effects: Summaries and Conclusions

18.2.3.1 Infrastructure, Public Facilities and Services

There are five adverse residual effects identified for infrastructure, public facilities and services, namely: the Project workforce during peak construction could increase hotel/motel occupancy rates and constrain tourism; demand for accommodations during peak construction could increase rental prices and make it more challenging for vulnerable households to find and retain suitable accommodation; unprofessional behaviours by the construction workforce could increase demand for policing services; Project-related construction traffic may affect flow of traffic; and Kamloops and the TNRD may need to defer larger projects due to inadequate supply of skilled labour. The application of mitigation measures is expected to manage these effects and KAM will work with construction contractors and relevant stakeholders to identify needs and suitable options for workforce accommodation, and develop a Construction Phase Workforce Accommodation Plan in consultation with these parties. All of the residual effects have been determined as not significant (minor to moderate). These residual effects were carried through to the cumulative effects

assessment and those that overlap with other projects were found to be not significant (minor to moderate), given the mitigation measures recommended.

18.2.3.2 Dark Sky

During the Construction and Operations phases, lighting will have an effect in the areas surrounding the project. Glare (sharp nuisance light in contrast to surroundings) and spill light (falling outside area needing to be lit) will peak during the Construction phase when the construction activities will be most extensive. Appropriate planning, shielding and directing the light will be very effective measures to mitigate the effect and result in it being not significant (minor). However, sky glow (nighttime atmospheric dome of light seen from a distance) is expected to extend further beyond the project boundaries. Mitigation in the form of illumination management and spectral control will limit the effects but will not eliminate them completely. The resulting effect will lead to a not significant (moderate) effect. Cumulative effects from other lighting in the vicinity, namely from the Kinder Morgan Trans Mountain Pipeline, roads, and expansion of the city of Kamloops, were considered. Given the same mitigation measures recommended for Project-related lighting, the concluding effect from the combined project will result in a not significant (moderate) effect.

18.2.3.3 Visual Impact and Aesthetic Features

Visual impact and aesthetic features were considered as a VC as part of the assessment of the effects of Project activities. Two potential effects on the surrounding landscape arising from the Project, visual quality and shading, were identified and evaluated using on-site photographs, quantitative analyses and visual simulations. After considering mitigation strategies, it was determined that the Project would result in a residual effect, wherein the visual quality of the landscape would be reduced. The effect is predicted to be not significant (moderate) for the Operations phase and not significant (minor) for the Post Closure phase. No residual effects for the 230 kV overhead power line or shading effects from Project components are expected. The residual effect was carried forward into a cumulative assessment, wherein the effect of the Project on visual quality was examined in the context of activities in the surrounding area. The residual cumulative effect is predicted to be not significant (moderate).

18.2.3.4 Land and Resource Use

The presence of the Project may limit the ability of the City of Kamloops and the TNRD to meet the objectives of their various land use planning initiatives. However, mitigation measures in the form of design changes to the project location, use of formal processes to amend land designations, and ongoing engagement between KAM and the City of Kamloops and the TNRD to discuss potential areas of interaction between the Project and their planning, are expected to result in land and resource use effects being not significant (moderate). The potential for cumulative interactions between land use planning and the various other projects or activities in the area was assessed. With the exception of the Kinder Morgan Trans Mountain Pipeline, these all occurred within existing land use planning frameworks. KAM will continue to manage land use and activities around the construction of the Kinder Morgan Trans Mountain Pipeline if it is approved and constructed. 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.

18.2.3.5 Current Use of Land and Resources for Traditional Purposes

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.

18.2.3.6 Outdoor Recreation

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. The effect will be managed by the implementation of an Access Management Plan which will address overall access to the site and have the primary objective of maintaining public safety and worker safety, while allowing for continued use and enjoyment of areas in proximity to the Project. Changes in access for recreational opportunities, a diminished outdoor recreation experience, and reduced availability of natural resources will be mitigated by the Access Management Plan and appropriate Project design and best management practices. Their effects are regarded as not significant (moderate, moderate and minor respectively), and cumulative effects are not anticipated.

18.2.4 Assessment of Potential Heritage Effects: Summaries and Conclusions

18.2.4.1 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.

Archaeological sites with a higher significance include a lithic scatter that includes a Shusswap 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 was 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 metres 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 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.

18.2.4.2 Aboriginal and Non-Aboriginal Heritage Sites

Potential effects of the Project on known protected heritage resources will be managed through site avoidance or mitigation measures determined through consultation with the Archaeology Branch, Aboriginal Groups, and the local community. If heritage sites are determined to be protected under the Heritage Conservation Act then the prescribed mitigation measures will be applied. With the application of mitigation and management measures prior to Project impacts, residual effects on known heritage resources are not anticipated and as a result will be not significant. Similarly, implementation of the Project's Archaeology and Heritage Management Plan and Chance Find Procedure will facilitate the protection of any as-yet unknown heritage resources within the LSA, which may be identified during Construction. Therefore, as-yet undiscovered heritage resources will be avoided and/or properly mitigated and managed, and residual effects are not anticipated. Once mitigation and management measures have been implemented, potential residual effects on Aboriginal and non-aboriginal heritage resources will be reduced to not significant (minor). Cumulative effects to protected heritage sites are not anticipated.

18.2.5 Assessment of Potential Health Effects: Summaries and Conclusions

18.2.5.1 Air Quality

Air quality was assessed by determining the change in ground-level concentrations of criteria air contaminants, after establishing the baseline, selecting modelling scenarios, applying the modelling, calculating air emissions inventories, interrogating the dispersion modelling results, and determining the significance of Project-related and cumulative effects of ground-level concentrations of criteria air contaminants. The change in ground level concentrations due to Project Construction and Operations phase emissions were evaluated after mitigation measures were incorporated and the assessed effect was considered not significant (moderate). The cumulative air quality effects assessment for future projects was completed and it was determined that there were no Project interactions with approved, announced or foreseeable future projects. The assessed residual cumulative effect on the criteria air contaminants concentrations for the Construction and Operations phases of the Project was considered not significant (moderate).

18.2.5.2 Domestic Water Quality

The assessment of domestic water quality indicates that there is no potential for the Project to influence municipal water supplies to residents in the City of Kamloops and the Kamloops Indian Reserve. When considering surface and groundwater quality in the Peterson Creek watershed that Knutsford residents may access for human drinking water and other domestic purposes, the assessment indicates that future water quality is below the applicable health-based guidelines. Some aesthetic guidelines were exceeded, which influences the taste of the water and the potential for water to stain laundry and plumbing fixtures. However, these effects are already be present under existing baseline conditions. The potential human health risks associated with exposures to trace metals from multiple sources are evaluated in detail in the human health and ecological risk assessment technical data report (Appendix 10.4-A) and the significance of these exposures is evaluated in the human health effects assessment (Section 10.4).

When applying surface and groundwater from the Peterson Creek watershed for agricultural use, the assessment indicates that future water quality is above the applicable manganese guidelines for irrigation water, which may affect crop productivity in acidic soils. Plants are more tolerant of high manganese concentrations in neutral soils. For livestock water, sulphate concentrations are above the guideline, although the concentrations may also be above the guideline during low flow periods in the existing baseline situation. Higher concentrations of suphate can be tolerated, but may result in a loss of productivity as high doses of sulphate may lead to deficiencies of essential trace elements in livestock. For the cumulative effects assessment, there were no interactions between residual effects from the Project and other nearby projects and activities.

18.2.5.3 Country Foods

Exposure to trace metals through the consumption of country foods represents one component of the overall exposure to trace metals from the Project. Increases in trace metals tissue concentrations between baseline and future conditions are noted for mule deer, snowshoe hare, ruffed grouse, and domestic cattle. Increases in trace metal tissue concentrations are also noted for rainbow trout. For

traditional plants and backyard garden produce, increases in trace metal concentrations between baseline and future conditions are smaller than those noted for animal and fish tissue and reflect the very small increases in metal concentrations in soil associated with the Project.

Baseline and future trace metal tissue concentrations are used in conjunction with estimated metal concentrations in other environmental media (e.g., drinking water) to estimate human exposures to trace metals from multiple sources for baseline and future conditions. The potential human health risks associated with exposures to trace metals from multiple sources are evaluated in detail in the Human Health and Ecological Risk Assessment Technical Data Report (Appendix 10.4-A) and the significance of these exposures is evaluated in the human health effects assessment (Section 10.4). There are no residual cumulative effects on country food quality.

18.2.5.4 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. There is no spatial or temporal overlap 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.

18.2.5.5 Noise and Vibration

Noise effects from the Construction and Operations phases of the Project are predicted to comply with the BC OGC noise guideline, WHO and Health Canada noise guidance. The only exception is in the area near the east end of Jacko Lake where noise effects from the daytime piling activities (less than two months) for the proposed dam construction is higher than the annoyance threshold recommended by Health Canada. Noise models were completed to quantify the noise effects. Residual effects will be reversible after the Closure and Reclamation phase. The significance of Project noise residual effects is expected to be not significant (minor). The cumulative noise effect assessment of other non-Project activities were captured in the baseline studies, which was considered in the assessment of Project residual effects. Therefore, the significance of change in cumulative noise residual effects is expected to be not significant (minor) during the Construction and Operations phases. The noise effects during the Closure and Reclamation phase is expected to be lower than that for the Construction phase.

The vibration effects at all receptors are below the structural damage limits established by the Ontario Ministry of Environment and Climate Change, an aquatic life vibration guideline, or the City of Toronto. Blast vibration effects during the Construction and Operations phases will be perceptible for some receptors. Residual effects will be reversible after the Closure and Reclamation phases. The significance of the Project vibration effect is expected to be not significant (minor) during the Construction and Operation phases. No cumulative vibration effects interaction is

expected from other non-Project activities. The vibration effect during the Closure and Reclamation phases is expected to be lower than that for the Construction phase.

18.2.5.6 Healthy Living and Health Education

During the Construction and Operations phases of the Project, there are expected to be reduced opportunities for engaging physical activities in the LSA. The reduced opportunities result from a variety of factors, such as changes to access, changes to quality of experience, and changes to resources. Mitigation measures for other VCs (e.g., air quality, noise and vibration, fish and fish habitat) are expected to reduce Project effects on the sites in the LSA where physical activity occurs, including Jacko Lake, Inks Lake, Edith Lake, and Coal Hill. In addition to minimizing Project effects for VCs that support the assessment on healthy living and health education, KAM commits to developing and implementing an Access Management Plan. This plan will implement safe and feasible methods for accessing the site for a variety of stakeholders (e.g., ranchers, Aboriginal groups, recreationalists). KAM also commits to supporting the development and/or enhancement of alternative sites where physical activity may occur, e.g. recreation sites such as Inks Lake. Efforts in connection with this will be developed in consultation with government representatives and representatives from recreational groups. KAM's approach to healthy living and health education for its workers will reinforce a culture of safety during all Project phases, with a goal of Zero Harm, and include a commitment to continual improvements related to health and safety performance. The mitigation measures in connection with the healthy living and health education VC are expected to result in no residual effects, therefore the residual effect of decreased opportunities for physical activity is not carried forward to the determination of significance or cumulative effects.

18.2.5.7 Community Health and Well-being

The residual effects on community health and well-being were subjected to an assessment of their significance. Residual effects related to increased traffic and potential for increased accidents and injuries are expected to be not significant (minor). Residual effects related to the concern that the Project workforce may stress the provision of community services are expected to be non-significant (moderate). Effects related to community image caused by concern that the Project will contribute to an industrial image of Kamloops and not a new vision of other economic activities based on sound environmental quality is expected to be not-significant (moderate) effect.

All residual effects other than concerns about community image have been carried forward into the cumulative effects assessment to be examined together with other activities surrounding the Project. The cumulative residual effect after mitigation results in a not significant (minor) effect for increased traffic, and a not significant (moderate) effect for concerns related to non-local workforce interactions.

18.3 SUMMARY OF PROPOSED ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS

The Project's management and monitoring plans, collectively referred to as Environmental Management Plans and presented in Chapter 11 of the Application/EIS, make up a fundamental component of the Environmental Management System and detail the environmental conservation

and protection measures to mitigate potential environmental effects. The Environmental Management Plans describe the environmental practices and procedures to be applied during the planning, Construction, Operation, Decommissioning and Closure and Post-Closure phases of the Project. The Environmental Management System will continue to be developed 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 monitoring and management plans included in the Application/EIS are listed below, according to the indicated categories:

- 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 (including liquid effluent disposal),
  - Explosives Management Plan,
  - Risk Management Plan (Accidents and Malfunctions; including potential effects on the Kinder Morgan Trans Mountain pipeline),
  - Natural Hazards Management Plan (e.g., landslides, floods),
  - 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 (including metal uptake by plants), and
- Reclamation and Closure 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).

18.4 COMMITMENTS

Table 18.4-1 identifies commitments that have been derived from the assessment of effects on environmental, economic, social, health, and heritage VCs, and from the formulation of mitigation measures relevant to Project components and activities.

Table 18.4-1. 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 Operations	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 Operations	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 Operations	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

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 Lake.	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

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

18.5 CONCLUSION

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. This response has resulted in changes to the engineering design of the Project, as described in Section 17.3, Need for, Purpose of, and Alternatives to the Project, and Section 17.4, Alternative Means of Carrying Out the Project. 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 City 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. 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 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.

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.

REFERENCES

1985. *Explosives Act,* RSC. C. E-17

1992. *Canadian Environmental Assessment Act*, SC. C. 37.

1996a. *Heritage Conservation Act*, RSBC. C. 187.

1996b. *Land Act,* RSBC. C. 245.

1996c. *Mines Act*, RSBC. C. 293.

1996d. *Water Act,* RSBC. C. 483.

1996e. *Weed Control Act,* RSBC. C. 487.

2002a. *Environmental Assessment Act*, SBC. C. 43.

2002b. Species at Risk Act, SC. C. 29.

2003. *Environmental Management Act,* SBC. C 53

2012. *Canadian Environmental Assessment Act,* 2012, SC. C. 19. s. 52.

Metal Mining Effluent Regulations, SOR/2002-222

Concurrent Approval Regulation, BC Reg. 371/2002.

Hazardous Waste Regulation, BC Reg 63/88.

Petroleum Storage and Distribution Facilities Storm Water Regulation, BC Reg 168/94.

Spill Reporting Regulation, BC Reg. 263/90.

Controlled Products Regulations, SOR/88-66.

Environmental Emergency Regulations, SOR/2003-307.

Transportation of Dangerous Goods Regulations, SOR/2001-286.

BC MEMPR. 2008. *Health, Safety and Reclamation Code for Mines in British Columbia*. Prepared by the Ministry of Energy, Mines and Petroleum Resources: Mining and Minerals Division: Victoria, BC.

BC MOE. 1979. *Pollution Control Objectives for the Mining, Smelting, and Related Industries of British Columbia.* British Columbia Ministry of Environment: Victoria, BC.

BC MOE. 2011. *One-Window Reporting - Reporting Regulation - The Greenhouse Gas Reduction (Cap and Trade) Act.* http://www.env.gov.bc.ca/cas/mitigation/ggrcta/reporting-regulation/one_window.html (accessed December 2012).

CEA Agency. 2003. *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*. Prepared by the Canadian Environmental Assessment Agency. http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=A41F45C5-1 (accessed July 2012).

CEA Agency. 2011. *Operational Policy Statement for Follow-Up Programs under the Canadian Environmental Assessment Act*. https://www.ceaa-acee.gc.ca/default.asp?lang=En&n=499F0D58-1 (accessed May 2014).