EXECUTIVE SUMMARY

INTRODUCTION

AuRico Metals Inc. (AuRico) is proposing to develop the Kemess Underground Project (the Project), located approximately 250 km north of Smithers in a mountainous area of north-central British Columbia (BC). The proposed Project is an underground copper-gold mine which is designed to process an average of approximately 24,650 tonnes of ore per day (tpd) over a 13-year mine life. During the life of mine operations, the Project will produce an anticipated 1.3 million ounces of gold and 563 million pounds of copper.

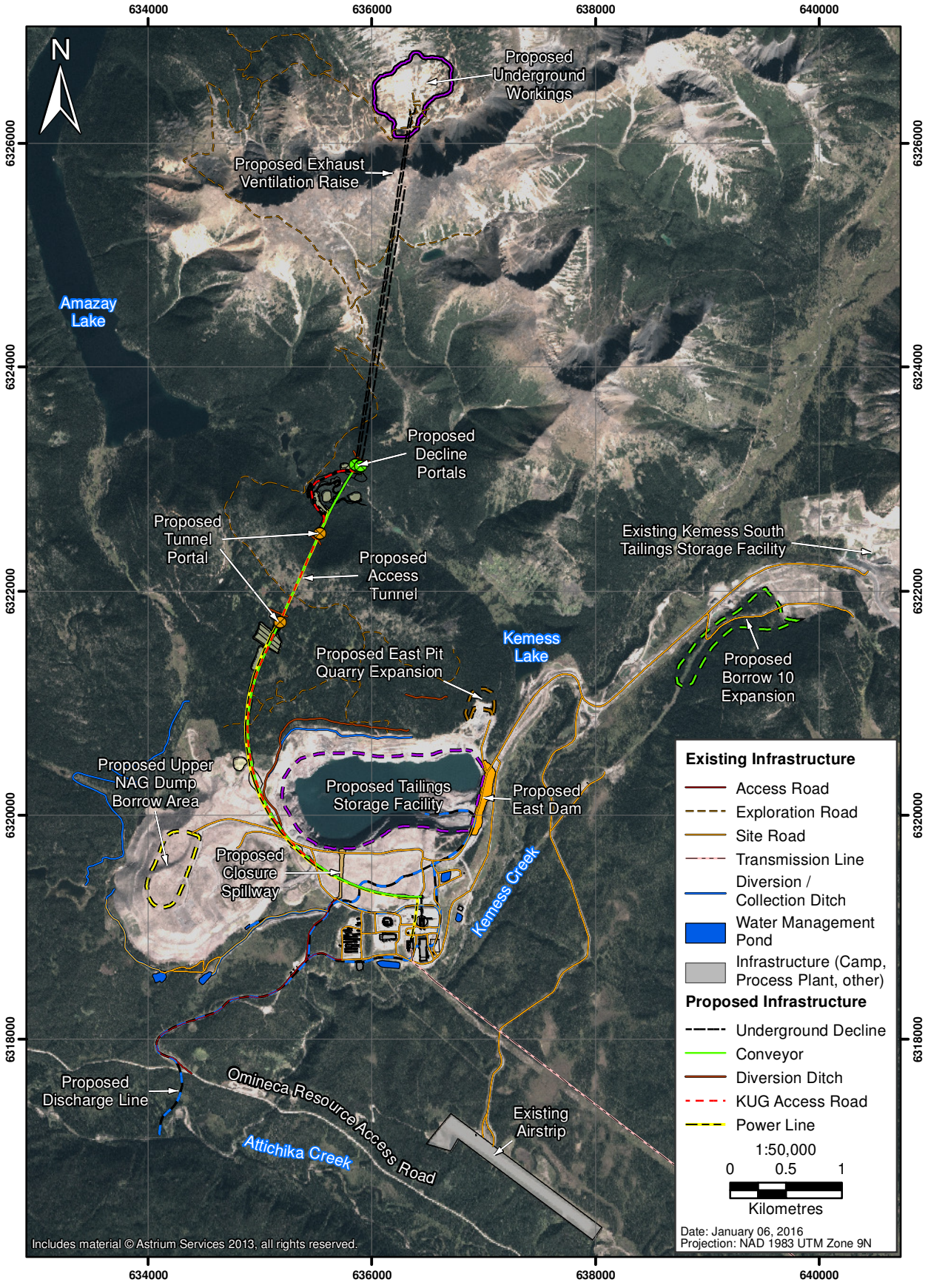
This document constitutes AuRico's Application for an Environmental Assessment Certificate (EAC) (Application) under the BC *Environmental Assessment Act* (BC EAA; 2002) and *Canadian Environmental Assessment Act, 2012* (CEAA 2012). This Application has been prepared in accordance with the Application Information Requirements (AIR; BC EAO 2016) issued by the BC Environmental Assessment Office (BC EAO) in January 2016. The purpose of the information, analyses, and findings of this Application is to satisfy both the provincial and federal requirements such that the necessary Environmental Assessment (EA) approvals are issued, allowing AuRico to develop the Project.

The Project is located on provincial Crown land in the Peace River Regional District and within the traditional territories of the Takla Lake First Nation (TLFN) and Tsay Keh Dene Nation (TKDN). The traditional territory of the Kwadacha Nation (KwN) is adjacent to and downstream from the Project. The TKDN, TLFN, and KwN have revived their historic and cultural connections to their Sekani ancestors who historically used and occupied the area in the region including the Project area. The three First Nations have formed an alliance known as the Tse Keh Nay (TKN). The Gitxsan Nation Wilp Nii Kyap traditional territory lies adjacent to the west of the Project area. There are Métis communities in the larger regional area. The Project is also located within the Treaty 8 disputed area.[1]

The Kemess Underground (KUG) deposit lies approximately 6.5 km north of the existing Kemess South (KS) Mine infrastructure. The KS Mine, a former open pit mine, was owned and operated by Northgate Minerals, and acquired by AuRico in 2011. The site is currently under care and maintenance. Most of the KS Mine infrastructure will be used for the proposed Project, including the processing plant, KS open pit (which has been designated as the tailings and waste rock storage facility for the Project), and administrative/service /accommodation complex. Minor upgrades to some of the KS Mine infrastructure will be required for the Project. The Project will use the existing airstrip and road access to the site, and power will be provided by an existing 230-kV transmission line. A general arrangement drawing, showing existing and planned infrastructure, is shown in Figure 1.

[1] The Canadian federal and BC governments dispute the western boundary of Treaty 8. Canada alleges the western boundary is the Arctic/Pacific watershed and BC takes the position that the western boundary is to the east, along the central range of the Rocky Mountains. This matter is before the BC Supreme Court.

Figure 1
Kemess Underground Project General Arrangement



Ore will be mined using panel caving. Panel caving is a mass mining method that allows for bulk extraction of large orebodies. It involves undercutting orebodies, causing the ore to break or cave under its own weight, potentially leading to surface subsidence. For the Project, it is expected that panel caving will result in an area of surface subsidence. The mine design comprises a network of underground tunnels on three main levels. These levels will be connected to the surface by three declines. Ore will be recovered using load-haul-dump machines and delivered to the underground crusher, located immediately south of the ore body. Once material is crushed, it will be placed on a conveyor belt which will rise through one of the dedicated declines and transfer the ore to a surface conveyor. This conveyor will transport the crushed material to the existing ore stockpile directly north of the existing KS processing plant.

The Project will generate approximately 100 Mt of tailings and 2 Mt of potentially acid generating (PAG) waste rock over the life of mine which will be deposited sub-aqueously in the former KS Mine open pit, which will be used as the KUG tailings and waste rock storage facility (KUG TSF). In order to create the required capacity for the Project operations, water will need to be discharged during the Construction phase. Discharge of treated effluent is also required during the Operations phase and treatment will continue through Closure and Reclamation until water quality improves and meets discharge criteria.

Although the formal regulatory EA process for the Project was initiated in 2014, environmental studies relevant to Project area have been completed by AuRico and previous owners of the Kemess property since the 1990s. AuRico has used the EA process as a planning tool to ensure that decisions regarding the Project have been considered in a careful and precautionary manner. This approach has minimized potentially adverse biophysical and human environment effects, including potential effects on established and asserted Aboriginal rights and interests.

This Application is intended to demonstrate that the Project will be undertaken in an environmentally acceptable manner that will provide social and economic benefits. The Project will promote economic prosperity throughout BC, particularly in the northern region. The Project will provide employment and commercial opportunities, while generating local, provincial, and federal tax revenues. The Project can be implemented without significant or lasting adverse local or regional environmental, social, economic, human health, or heritage effects, and without undermining established or asserted Aboriginal rights and interests. Responsible mining practices, in compliance with the principles of sustainable development, will guide the implementation of the Project.

PROJECT BACKGROUND AND OVERVIEW

The Proponent

Following the merger of AuRico Gold Inc. and Alamos Gold Inc. on June 2, 2015, the newly formed AuRico Metals Inc. (AuRico) became the sole owner of the Kemess Property. AuRico is a mineral exploration and mine development company. Aurico's principal assets are the Kemess property in northern BC and a suite of royalties on operating mines in Canada and Australia. AuRico's common shares are listed on the Toronto Stock Exchange (TSX:AMI).

AuRico leadership comprises:

- Chris Richter, Chief Executive Officer;
- John Fitzgerald, Chief Operating Officer;
- Rob Chausse, Chief Financial Officer;
- Chris Rockingham, Vice President, Development; and
- Harold Bent, Director, Environment.

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Purpose of the Project

The Project's purpose is to develop the KUG copper-gold deposit to help meet global demand for copper and gold in a manner benefitting Aboriginal groups; local communities; and federal, provincial, and local governments, without compromising the ability of future generations to meet their own needs. The Project is also expected to support industrial development needs and contribute to total provincial exports and economic growth.

Copper is mainly used in building wiring and plumbing, but also in other applications such as automotives and telecommunications. The demand for copper drives world mine production and usage, which increased by 16% in 2009 and 28% in 2014 (ICSG 2015). BC exports most of its gold production to other countries. India and China dominate the consumer market for gold, together accounting for 60% of the global jewellery sector and as much as half the total bar and coin demand.

Project Location, Access, and History

The Project is located on provincial Crown land at 57°0 north latitude by 126°45 west longitude, approximately 250 km north of Smithers and 430 km northwest of Prince George in the Peace River Regional District. Road access to the Project will be via the existing Omineca Resource Access Road (ORAR) from Mackenzie. The closest communities to the Project by air are Kwadacha (Fort Ware; 79 km away), Tsay Keh (111 km away), and Takla Landing (182 km away). The Project will use the

existing KS Mine airstrip to facilitate scheduled year round flights from regional centres including Prince George and Smithers. Concentrate will be transported by truck along the ORAR to the existing AuRico rail load-out facility on the CN Rail line at Mackenzie. A Project location map is provided in Figure 2.

General exploration in the Kemess area has occurred since 1889. Specific to the Kemess property, a gold and copper deposit known as Kemess North (KN) was first explored between 1966 and 1971 by Kennco Explorations (Canada) Ltd. and subsequently by Getty Mines Ltd. in the mid-1970s and by El Condor Resources from the late 1980s through early 1990s.

Royal Oak Mines acquired the property in 1996 and identified and pursued a proven exploitable deposit called Kemess South (KS) located 6.5 km south of KN. In 1996, the company received development approval and began construction. Actual mining of the KS deposit commenced as an open pit operation in 1998 and continued to 2011. In 2000, Northgate Minerals Exploration acquired the KS deposit and the associated KN property through bankruptcy of Royal Oak Mines. In the years leading up to depletion of the KS deposit, Northgate Minerals Corporation made plans to extend operations by developing the KN deposit. The proposed extension included development of a new open pit, a new tailings storage facility, and modification of the existing processing plant and related infrastructure. The proposed KN Project underwent a federal and provincial environmental assessment by panel review in 2007. The panel recommended that the project not be approved as proposed, and invited Northgate Minerals to submit an alternate project design for development of the KUG deposit. The currently proposed development of the KUG deposit by means of an underground mine with limited area of new surface disturbance substantially addresses the concerns raised during the KN panel review.

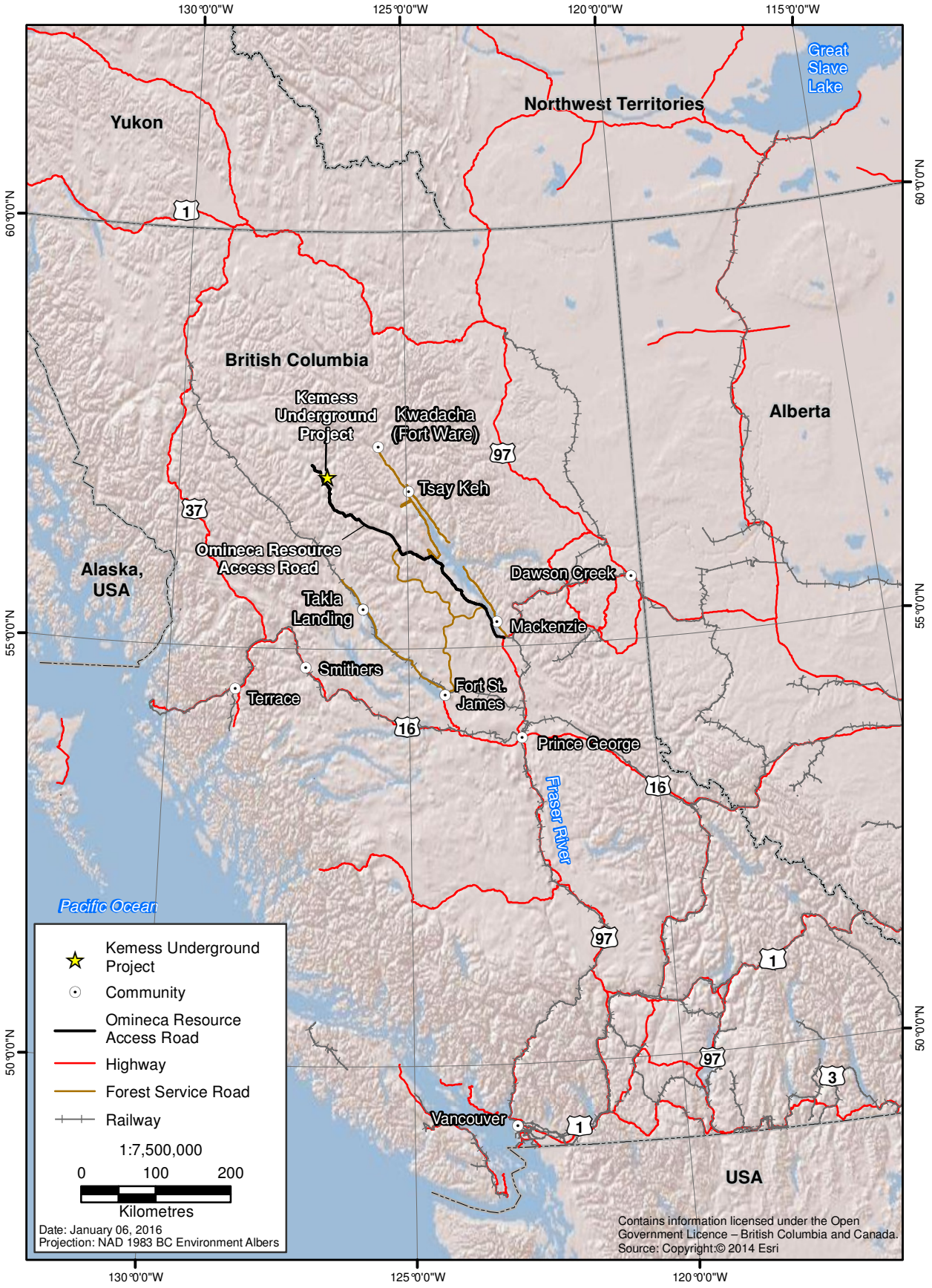
In 2011, the KS Mine and the associated KN tenures were acquired by AuRico Gold Inc. as the project entered the Closure phase. The Kemess assets became the property of the newly formed AuRico following the 2015 merger of AuRico Gold Inc. and Alamos Gold Inc. The KS Mine Site is currently under care and maintenance, following the closure and reclamation of the KS Mine.

Project Benefits

The regional economy is supported primarily by resource extraction industries, including mining, oil and gas, power, and forestry. The Project is expected to benefit the local and regional economy through job creation and procurement of goods and services. The Construction and Operations phases of the Project will be 5 and 13 years long, respectively (as discussed further under Project Schedule and Activities); however, construction and operating costs will extend over both phases. Total capital expenditures during Construction and Operations are estimated at $683.9 million, and operating expenditures at $1,408.1 million. Total labour costs are estimated at $580.7 million.

The Project and its on-site contractors will provide a number of employment opportunities. During the Construction phase, an estimated 593 jobs (613 full-time equivalents or FTEs) will be available at the Project directly, as well as 508 jobs (496 FTEs) with contractors. Operations will generate an estimated 4,737 direct Project jobs (4,896 FTEs) and 163 contractor jobs (159 FTEs), for a total of 4,900 jobs over the Operations phase. Employment for the anticipated six-year Closure phase is estimated at 642 jobs (an average of 107 jobs per year) including both AuRico staff and contractors.

Figure 2
Kemess Underground Project Location



The Project will also provide indirect and induced employment opportunities that will benefit the local, regional, and provincial economies. The majority of indirect and induced employment opportunities are expected to take place in BC, with some impacts in the rest of Canada. At a regional level, benefits are predicted for the Peace River Regional District, the Regional District of Fraser-Fort George, the Regional District of Kitimat-Stikine, as well as the Regional District of Bulkley-Nechako. During Construction, 4,256 jobs are expected to be created with Canadian suppliers; of that, 2,946 jobs (69.2%) are estimated to be in BC. Through the Operations phase, 12,256 jobs are expected to be created with suppliers, with 7,629 of those jobs (62.2%) estimated to be in BC. AuRico will aim to maximize employment benefits within local communities (including Tse Keh Nay communities), the region, and the province as a whole. At least half of the workforce is anticipated to be composed of residents of northern BC, and at least 10% will be Aboriginal.

The Project will also contribute to federal, provincial, and regional tax revenues. Over the Construction and Operations phases, property tax is estimated at $14.8 million (paid to the Peace River Regional District) and the BC Mineral Tax at $86.0 million. Provincial and federal corporate income taxes paid directly by the Project will be, respectively, $63.8 and $87.0 million. Direct Project spending will contribute $49.1 million to government revenue during Construction, and $138.2 million during Operations. Indirect and induced activity in supplier industries will add $57.8 and $176.5 million to government revenues during Construction and Operations, respectively.

To maximize the benefits within the region, AuRico will encourage the involvement of interested local and regional businesses to directly and indirectly supply the Project. Every year during the Construction phase, $50 to $92 million in contracts is estimated to be awarded. During Operations, $52 to $77 million in contracts is estimated to be awarded to businesses at the local, provincial, and national level. Overall, direct, indirect and induced activities are estimated to contribute $396 million to BC's gross domestic product during Construction and $1,360 million during Operations.

ALTERNATIVE MEANS OF UNDERTAKING THE PROJECT

The assessment of alternative means of developing the Project outlines the main decisions that AuRico has made to construct and operate the Project in a manner that reduces adverse environmental, cultural, and socio-economic effects and enhances beneficial effects. Alternatives explore functionally different, but feasible, design specifications or component locations. The Project will be developed as a brownfield project using areas of existing disturbance and infrastructure associated with the KS Mine, now in a care and maintenance phase. The utilization of existing facilities at the former KS Mine site will contribute to a material reduction in the Project's potential environmental effects.

For the Project, assessment of alternatives focused on aspects of the Project that would require substantively new development or disturbance beyond the existing KS Mine infrastructure. Alternative means assessments were completed for tailings and waste rock management, water discharge, underground access (portal location and access corridor), rock haulage, and mining method. These specific assessments meet requirements identified in the AIR (BC EAO 2016).

The general alternatives assessment methodology followed was guided by the Cumulative Effects Assessment Operational Policy Statement (CEA Agency 2013), which allows pre-screening of non-feasible alternatives. The potential environmental effects of feasible alternatives and their technical and economic performance were rated qualitatively as *preferred*, *acceptable*, *challenging*, or *unacceptable*. The alternative with the most favourable overall rating was selected as the overall *preferred* alternative. Two key aspects of the project, tailings management and water discharge, duly received more detailed consideration and assessment.

The tailings alternative assessment followed a more quantitative methodology broadly following the process outlined in the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* (Environment Canada 2011). The methodology used an accounts analysis based on scoring technical performance for each alternative and its environmental, health, social, heritage and economic implications. Financial considerations and options to enhance dam safety were considered to select the Best Available Technology (BAT) for the Project. Use of an open pit, which is the preferred tailings disposal method, is recognized as BAT for mine waste management (IEEIRP 2015).

The water discharge alternatives assessment relied heavily on consultation with the Tsay Keh Nay. Potential effects to water quality from discharge to a lake, two creeks and a river under various discharge scenarios were modelled and presented. Once consensus on the preferred option was achieved, the focus was to optimize the water treatment and timing of discharge to meet downstream water quality objectives.

AuRico has used the EA outcomes from Kemess North and the current EA to identify design changes in response to environmental constraints present in the Project area, First Nations concerns, and potential environmental effects. These design changes are summarized as follows:

- design of the Project to mine an ore body by using underground mining techniques that minimizes production of potentially acid generating waste rock, substantially reduces surface disturbance, and reduces safety concerns working in an area of high avalanche risk;
- eliminate the need to use Amazay Lake for waste storage by using the open pit from the Kemess South Mine for subaqueous waste rock and tailings storage;
- selection of an access route to the KUG deposit in consultation with First Nations groups, avoiding forested areas of relatively high habitat value and forest fire risk and water bodies;
- tunnelling through the ridgeline between the existing KS Mine site and the underground portal area to reduce landslide, avalanche and extreme weather risks to the Project;
- removal of proposed surface explosive magazines from the portal area to reduce the overall project footprint and avoid potential landslide/avalanche risk; and
- selection of water management, treatment, discharge rates and location for discharge of water from the KUG TSF based on comprehensive engagement with the First Nations.

SUMMARY OF PROJECT DESCRIPTION

Overview of Project Description

The Project proposes to use existing facilities at the KS Mine wherever feasible, and to develop additional infrastructure to safely extract the ore from the KUG deposit with limited adverse environmental effects. Access to the underground deposit area will require development of the proposed access corridor, involving upgrading and extension of an existing road to a total length of 4.3 km, as well as the development of an 865-m-long access tunnel through a steep ridge northwest of the KS Mine site. The access corridor, including the tunnel, will also contain a dewatering pipeline, transmission line, and surface conveyor connecting the KS Mine site and the underground deposit. The access corridor will provide access to the portals of three declines, one each for underground access (personnel, equipment, and materials), an ore conveyor and a ventilation intake airway, each of which will descend approximately 260 m vertically to the panel cave and underground operations. Mining will take place on a single extraction level over a footprint approximately 540 m long and 150 to 350 m wide. Load-haul-dump machines will recover the ore, which will then go through an underground gyratory crusher. The crushed ore will travel by conveyor to the surface, and then along a second conveyor in the access corridor to the ore stockpile ahead of the process plant.

Ore processing will occur using an existing semi-autogenous / ball mill circuit at the KS Mine site. The KS open pit will be used as a tailings and waste rock storage facility. Concentrate from the process plant will be trucked along the ORAR to the existing rail load-out facility in Mackenzie and shipped using the existing CN Rail network. Market conditions and supply will govern where the concentrate will be shipped and smelted. The Project will use the existing administration and accommodation facilities and 380-km-long, 230-kV transmission line constructed to service the KS Mine.

Surface disturbance from the Project will be relatively small. The disturbance footprint amounts to less than 100 ha, including the subsidence zone expected from the underground caving operation, the new KUG access road and conveyor corridor, and expansion of existing construction borrows. This is in contrast to the 1,900 ha of surface disturbance at the KS Mine, of which a substantial portion has since been reclaimed.

Geology

The KUG deposit is located in the Omineca Mining Division in north-central BC. The district comprises Early Jurassic Hazelton Group rocks represented by the Toodoggone Formation calc alkaline volcanics, as well as coeval plutonic and sub-volcanic intrusive rocks (Black Lake Intrusive Pluton). Toodoggone rocks unconformably overlie submarine sedimentary and igneous arc rocks of Permian age.

The Project property is predominantly underlain by a thick (greater than 1,000 m) succession of andesitic flows known as the Takla Group, which host a significant portion of the copper-gold mineralization and display phyllic alteration. A distinct feature of the Takla Group is the presence of a Bladed Feldspar Porphyry unit. Mantling the northern and eastern limits of the Kemess Underground area is the Hazelton Group-Toodoggone Formation. The structurally controlled phyllic sections of this polylithic fragmental dacite in the southeastern area of the deposit can carry

anomalous gold concentrations. The intrusive and volcanic rocks beneath the east cirque host the bulk of the copper-gold mineralization associated with the Project.

Mineralization

The KUG deposit is a copper-gold porphyry deposit and is typical of calc alkaline porphyry copper-gold deposits in the western cordillera. The deposit has a low-grade ore zone at a depth of 150 m below the surface on its western flank and a higher-grade zone 300 to 550 m below surface on the eastern side, which forms the Project ore deposit. The deposit is hosted by potassic altered Takla Group volcanic rocks and Black Lake plutonic rocks. The deposit centres on a mineralized porphyritic monzodiorite/diorite pluton and associated trending dykes, which extend to the southwest. Higher-grade copper-gold mineralization is characterized by secondary biotite alteration in volcanic and the eastern plutonic host rocks.

Porphyry style copper-gold mineralization occurs within the Takla volcanic rocks and intermediate intrusive rocks associated with weak to pervasive propyllitic, phyllic, and potassic (biotitic) alteration assemblages. The latter is associated with better gold and copper grades. Alteration of Toodoggone assemblages ranges from fresh to weak propyllitic alteration and is generally barren of significant sulphides and ore-grade mineralization.

The Gossan Zone of the Project area extends to a depth of approximately 80 m from the surface, extending to the depth of the Broken Zone. The Gossan Zone is characterized by its highly weathered nature and low paste pH. Carbonate minerals are not present, indicating that acid buffering does not occur in this unit.

The Takla Group consists of varied mineralogical forms because of the highly altered nature of the rock unit. In general, the Takla Group exhibits trace amounts to 10% pyrite with rare occurrences to 3% chalcopyrite. Both sulphide minerals play a major role in acid generation given exposure of the material to weathering processes. The Takla Group material within the Project area typically exhibit not-present, to trace amounts of calcium carbonate minerals. Therefore, Takla Group mineralogy indicates that, should acidic conditions occur, there will be limited to no buffering capacity.

The Toodoggone Formation exhibits less variable mineralogy than observed for the Takla Group. Pyrite is typically present in trace amounts to 1% with rare occurrences of chalcopyrite. The presence of pyrite in the formation indicates that it has some acid potential and must be handled accordingly.

The Hypogene unit has a varying sulphides range across the unit, with the typical chalcopyrite modal abundance as high as 3% and pyrite abundance as high as 2%. The relatively high sulphide mineral content and rare carbonate content of the Hypogene unit indicate the propensity of this unit to develop acidic drainage. The low-carbonate mineral content indicates limited buffering capacity.

The Gossan Zone, Toodoggone Formation, and Hypogene unit all have nutrient potential ratios of less than 2.0, and are therefore classified as potentially acid generating. The Takla Group is regarded as potentially acid generating, due to its low nutrient potential and high sulphide content.

Mineral Resources

AuRico holds 57 mineral claims totalling 29,285 ha and four mining leases totalling 3,483 ha near the Project.

The minable reserves are shown in Table 1 for the KUG deposit and are based on the indicated mineral resources prepared by AuRico. These resource and reserve estimates may be updated as the Project progresses.

Table 1. Mineral Reserve Statement, Kemess Underground Project, December 31, 2012

Reserve Category	Tonnes (000s)	Cu Grade (%)	Au Grade (g/t)	Ag Grade (g/t)	Contained Metal		
					Cu (000s lb)	Au (000s oz)	Ag (000s oz)
Proven	0	0.00	0.00	0.00	0	0	0
Probable	100,373	0.28	0.56	2.05	619,151	1,805	6,608
Proven and Probable	100,373	0.28	0.56	2.05	619,151	1,805	6,608

Notes:
Estimated at US$3.00/lb Cu, US$1,300/oz Au and $23.00/oz Ag, using a cut-off NSR (net smelting return) value of CDN$15.3/t.
Metallurgical recoveries were estimated at 91% for Cu, 72% for Au, and 65% for Ag.
Mineral reserve tonnage and recovered metal have been rounded to reflect the accuracy of the estimate, and numbers may not add due to rounding.

The Kemess Underground mineral resource estimate for the KUG deposit is shown in Table 2. The mineral resources are all contained within a portion of the resource block model judged to be potentially minable by panel caving.

Table 2. Mineral Resource Statement, Kemess Underground Project, December 31, 2012

Resource Category	Tonnes (000s)	Cu Grade (%)	Au Grade (g/t)	Ag Grade (g/t)	Contained Metal		
					Cu (000s lbs)	Au (000s oz)	Ag (000s oz)
Measured	0	0.00	0.00	0.00	0	0	0
Indicated	65,432	0.24	0.41	1.81	346,546	854	3,811
Measured + Indicated	65,432	0.24	0.41	1.81	346,546	854	3,811
Inferred	9,969	0.21	0.39	1.57	46,101	125	503

Notes:
Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the Mineral Resources estimated will be converted into Mineral Reserves.
Resources stated as contained within a potentially economically mineable solid above 15.00/t NSR cut-off. A variable specific gravity value was assigned by lithology domains for all model blocks.
NSR calculation is based on assumed copper, gold, and silver prices of US$ 2.80/lb, US$1,100/oz and US$20.00/oz, respectively.
Mineral resource tonnage and contained metal have been rounded to reflect the accuracy of the estimate; numbers may not add due to rounding.
Mineral resources are exclusive of mineral reserves.
Source: SRK (2015).

The mineral resources have been classified in conformity with the generally accepted Canadian Institute of Mining's *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines* (2010) and are reported in accordance with the Canadian Securities Administrators' National Instrument 43-101.

Project Schedule and Activities

The Project will have four phases, as listed in Table 3 below. The Construction phase is targeted to commence in late 2016 (referenced below as Year -5).

Table 3. Project Phases

Phase	Project Year	Length of Phase
Construction	-5 to -1	5 years
Operations	1 to 13	13 years
Closure	14 to 19	6 years
Post-Closure	20 to 59	40 years

Construction Phase

Priorities during Construction will be the development of the proposed access road and tunnel, three declines (access, conveyor, and ventilation intake declines), and underground workings. Decline portal area facilities, including construction offices, workshop, stores, laydown areas, electrical substation, intake ventilation fans and heaters (and associated propane tanks), and water handling infrastructure will be established. Areas will be cleared and levelled for temporary ore and waste rock stockpiles, and organics stockpiles. Water management infrastructure, including a selenium treatment plant, will be constructed and water discharge from the KS open pit (KUG TSF) will commence. Underground infrastructure will include three declines, lateral development, and underground dewatering. Undercutting of the ore body will commence to establish the panel cave layout in preparation for Operations. Some ore will be crushed and transported to surface stockpiles. In the final year of Construction, the existing process plant will be recommissioned.

Operations Phase

Operations will comprise underground panel caving mining, crushing, and conveying ore to the surface for processing. Production levels will ramp up to the projected 9 Mt by year three of Operations. Waste rock from the mine and tailings from the processing plant will be trucked and pumped, respectively, to the KUG TSF for subaqueous disposal. Throughout Operations, discharge of treated water from the KUG TSF to the receiving environment will be required on a seasonal basis. In approximately year 6 of Operations, construction of a tailings dam at the east end of the KUG TSF will commence to provide additional storage.

<u>Underground Design and Operation</u>

The Project will be mined using the panel caving method. This is a mass mining method that allows for bulk extraction of large ore bodies. Panel caving is a type of cave mining in which the caving

advances progressively through the sequential extraction of the orebody rather than by the up-front, development-intensive block caving method. Panel caving involves undercutting the orebody, causing the ore to break or cave under its own weight, potentially leading to surface subsidence. For the Project, underground mining is expected to result in a zone of surface subsidence approximately 35 ha in area. The essential components of the panel caving operation involve a network of underground tunnels on three levels:

- the **extraction level**, on which draw points are located, where overlying rock, broken by gravity, flows to the draw point and is gathered and transported for processing;
- the **undercut level**, at a slightly higher elevation than the extraction level, where drilling and blasting is used to break an initial slice of rock and allow it to start caving; and
- the **ventilation level**, where fresh air is distributed in vertical raises connecting to the upper levels and exhaust/return air is collected for discharge to surface.

The three levels will connect to the surface via three declines, one each to house the ore conveyor, an access for personnel, vehicles and equipment, and a ventilation air intake. In addition, a separate vertical raise to surface will exhaust ventilation air. The ventilation system for the Project will comprise two separate primary systems. One will ventilate the access and conveyor declines and workshop, the other will ventilate the undercut and extraction levels.

The Project will have a single primary crusher, located underground. Primary crusher tip points on the extraction level will allow tipping by load-haul-dump vehicles bringing ore directly from drawpoints. Average throughput will be 27,000 tonnes per day or 1,500 tonnes per hour (tph), producing a nominal –150 mm crushed ore product. The crusher will operate 333 days per year.

The conveying system will consist of an underground conveyor fed from the crusher, a transfer station adjacent to the conveyor decline portal, and a surface conveyor that discharges onto the crushed ore stockpile ahead of the process plant. The conveyor will only transport ore; waste rock will be transported to surface by truck. The conveying system is designed to have a peak capacity of 1,627 tph and a nominal capacity of 1,425 tph, averaging 1,500 tph.

A belt feeder will discharge ore from the crusher onto the underground conveyor, housed within the conveyor decline. Service pipelines for fuel, process water, and pump discharge will be installed in this decline, as well as one of the two electric power cables for underground operations. The other electric power cable will be installed in the access decline. The back-mounted underground conveyor will follow a straight uphill alignment from below the belt feeder, gaining approximately 230 m elevation overall (with the final surface portion being downhill). This conveyor is designed as an elevated trestle-mounted section from the conveyor decline portal face to the transfer tower at surface.

Surface Portal Area

The location of the portals for the three declines was chosen with TKN input to minimize the overall environmental impact and avoid areas of geotechnical and avalanche risk.

During the Construction phase, the mine development-construction contractor will establish an operations base in the portal area and an area adjacent to the access decline portal has been designated for temporary storage of development ore and waste rock prior to surface transport to the process plant and open pit, respectively. Stockpiles will be created in the portal area to store soil and overburden salvaged during the Construction phase, and laydown areas and propane storage tanks will be provided.

Water handling facilities at the portals will include a 200-mm dewatering pipeline from underground (which will follow the conveyor decline to the surface), sedimentation pond, dewatering water transfer pond and pump house (for discharge of underground water to the KUG TSF), runoff collection and diversion ditches above the portal cuts, and road culverts.

In addition to the intake ventilation decline, ventilation of the underground workings will include a ventilation exhaust raise accessed by an existing exploration access road.

Access Corridor

The access corridor will provide ground access for transportation of personnel, equipment and materials between the portals to the underground workings and the existing KS Mine infrastructure, and for the transport of approximately 2.3 Mt of waste rock from underground development to the waste rock disposal area in KUG TSF. The access corridor will also accommodate the ore conveyor, dewatering pipeline and transmission line, and will include an approximately 865-m-long tunnel.

The access road will provide for two-way traffic between the existing KS Mine infrastructure and the Project's decline portals. The access road alignment will follow the existing KS Mine main haul road where it parallels the west side of the existing KS Mine open pit, then go northwards to the access tunnel through the ridge between the existing KS Mine infrastructure and the Kemess Lake Valley (i.e. declines portal area).

Ore from the underground conveyor will discharge at a transfer tower located near the conveyor decline portal to an approximately 5 km long overland conveyor that will transport the ore to the live ore storage stockpile located adjacent to the processing plant. A 200-mm dewatering pipeline will be fixed to the conveyor support frame over much of the alignment to transport underground mine drainage water from a transfer pond in the portal area to the KUG TSF.

The transmission line to supply electrical power to the underground mine will follow the access corridor as an overhead line from the KS Mine site to the access tunnel south portal where it will transition to an armoured cable attached to the conveyor structure, as it passes through the access tunnel. Between the KS Mine Site and the south portal of the access tunnel the line will carry 25 kV. A substation to be located near the south access tunnel portal will convert the power to 6 kV to support tunnel development. Upon completion of the tunnel, the 25-kV line will be extended through the tunnel to a permanent substation located in the Kemess Lake Valley, which will support underground development and operations.

Mineral Processing

Ore will be processed in the existing KS Mine process plant, which will be modified to suit the type and volume of anticipated ore. The targeted process plant throughput for the Project is an average 24,650 tpd. A copper flotation concentrate containing the gold and silver values will be produced and transported to smelters for further processing. Tailings will be discharged to the KUG TSF. Process reclaim water from the KUG TSF will be pumped to the KS Mine process plant facility.

Water Management

Underground Water Management

Dewatering of the underground facilities will be initiated during the Construction phase and continue throughout the Operations phase. Pumps in a chamber at the lowest point of the underground workings will deliver contact water through a pipe located in the conveyor decline to the transfer pond at the portal area. Settled water will then be transported to the KUG TSF via a 200-mm pipeline that will follow the access corridor.

Non-contact Water Diversions

The portal diversion ditches are designed to handle a 1:200 year, 24-hour event from the catchment area above the portals. The diversion ditches will convey contact water laterally to connect with existing drainages that gravity feed to a sedimentation pond that will collect non-contact runoff from the portal area infrastructure. This pond will act to clarify suspended sediment prior to discharge to the environment.

Similarly, the management of non-contact water at the mine site will make use of an extensive existing highwall runoff diversion ditch above the KUG TSF, together with a diversion ditch to the west of the existing KS waste rock dump and other structures around the process plant facility. By applying purpose-designed drainage management in this way, surface runoff can be kept out of contact with contaminants from mining activities.

Contact Water Management

Contact water from underground dewatering, and from mine site and portal area water management infrastructure, will be predominantly directed to the KUG TSF prior to discharge to the receiving environment.

Throughout the Project phases, all the potentially geochemically-loaded contact water will be directed to the proposed KUG TSF, including loadings from dewatering the underground, process water from the process plant, and contact water from the portal area. During Operations, water from the KUG TSF will undergo water treatment (see below "Mine Water Treatment" section) prior to discharge to the receiving environment in Attichika Creek.

KUG TSF Water Balance

The Project is located in a net-positive water balance environment. Consequently, during the Operations and Closure phases, excess water from the KUG TSF will be treated and discharged to

the nearby Attichika Creek. During Construction, the KS open pit (which will form the KUG TSF) will initially be dewatered to reduce discharge requirements through the Operations phase. During the Post-Closure phase, KUG TSF water will spill to Waste Rock Creek via a constructed spillway without treatment, when the water is proven acceptable for discharge without active treatment which is anticipated to occur by the end of the six-year Closure phase.

Use of the existing KS open pit as the KUG TSF for the proposed Project will reduce the potential impact on surface water quantity and quality by negating the need for a new purpose-built tailings impoundment. A highwall diversion ditch is already in place, and flow alterations resulting from the operation of the proposed KUG TSF are expected to be minimal when compared to the current situation. Process water for the process plant operation will be reclaimed from the KUG TSF to eliminate the need for makeup water from a local waterbody.

Mine Water Treatment

Water management requirements on surface will be focused on the KUG TSF. The existing KS Mine open pit currently contains more water than is needed for ore processing and will need to be partially dewatered to provide storage volume for the life of mine tailings production and waste rock.

Discharge of water from the KUG TSF will begin during the Construction phase. To reduce selenium loadings to the KUG TSF during Construction, a selenium treatment plant will be installed to treat runoff collected in an existing collection pond associated with a portion of the KS waste rock dump. During mine operations, following commencement of ore processing, water discharged from the KUG TSF will receive metals and selenium treatment prior to discharge. The sequence of treatment and discharge associated with the KUG TSF will be as follows:

- A selenium treatment plant of 50 L/s capacity located in the process plant building will be constructed and begin initial operation in Year -4. The treated water from the existing waste rock dump selenium collection pond will be sent to the KUG TSF from initial operation through to Year -1. A total of 23 Mm^3 of water will be discharged from the KUG TSF to Attichika Creek during Years -3 to -1. During the Operations phase, water from the selenium collection pond will be discharged into the KUG TSF without treatment. However, up to 50 L/s of the water being discharged from the KUG TSF into Attichika Creek will be treated in the selenium treatment plant. During the Closure phase, water from the designated selenium pond is expected to meet discharge criteria without treatment and will be discharged directly to Waste Rock Creek. Also during the Closure phase, the selenium treatment plant will treat up to 50 L/s of the KUG TSF effluent.
- A dissolved metals treatment plant of 120 L/s capacity located in the process plant building will be commissioned for the Operations phase. The water treated for dissolved metals from the KUG TSF will also pass through the selenium treatment plant before being discharged into Attichika Creek. During Year 1, 6 Mm^3 of water from the KUG TSF will be discharged and approximately 1.9 Mm^3 of this total will be treated. For all subsequent operating years, the total annual discharge will be 1.9 Mm^3 and this total volume will receive treatment. Similarly, a maximum of 1.9 Mm^3 will be treated each year during the six-year Closure phase.

- During the Post-Closure phase, the KUG TSF overflow is expected to meet discharge criteria without treatment and will discharge via a spillway to Waste Rock Creek.
- Two 26-inch pipelines will discharge water from the KUG TSF to Attichika Creek, installed on the surface along the route between the KUG TSF and the discharge point on Attichika Creek. A subsurface diffuser will be required at the termination of the pipelines within Attichika Creek.

Tailings and Waste Rock Management

Throughout its life, the Project is expected to produce approximately 102 Mt of tailings and 2.3 Mt of PAG waste rock. The tailings and waste rock will be stored in the KUG TSF. The capacity of the KUG TSF will be expanded above the geometric limits of the open pit via construction of the East Dam that will have an ultimate height of approximately 25 m. For the purposes of waste rock disposal in the KUG TSF, all waste rock is assumed to be PAG. Waste rock found to be non-PAG will be used in the construction of the KUG TSF.

Tailings and waste rock management can be described in five phases. The majority of the waste rock will be produced during initial mine development from the access tunnel, three decline tunnels, underground workings and initial cave development, and will be used to construct a rockfill causeway to elevation 1,235 m (using 2.0 Mt of waste rock) dividing the KUG TSF into two cells (Phase 1). The causeway will aid in initial tailings deposition management by allowing tailings to be deposited into one cell while process water is reclaimed from the other. The causeway will become completely covered by tailings by the end of mine operations.

Tailings from the process plant will be in the form of slurry at a density of about 35% solids by weight. The slurry will be pumped from the process plant to the KUG TSF through the existing tailings distribution system that was used during the previous KS mining operations. A single point discharge system is anticipated for initial disposal (Phases 2 and 3) with the implementation of a spigotting system from the upstream crest of the East Dam later in the mine life (Phase 4) to control beach development. Tailings deposition will increase the stability of the deposited waste rock as well as reduce seepage at the East Dam. Phase 5 will comprise the final dam and closure spillway construction.

Ancillary Infrastructure

The Project will use much of the existing KS Mine infrastructure in addition to the process plant and KUG TSF (KS open pit), such as the accommodation camp, electric power supply, administration offices, service complex, airstrip, potable water and sewage treatment facilities, process water pipeline, and surface explosives and cap magazines.

As far as new infrastructure at the KS Mine site is concerned, a concrete batch plant to provide for construction needs is planned for a location in the northeast area of the process plant precinct.

Closure Phase

During the six-year Closure phase, all surface and underground mobile equipment will be taken off-site for disposal. The diversion ditches that are no longer required will be backfilled. Diversion of contact water will be directed to the KUG TSF. The site roads and laydown areas that have compacted surfaces will be ripped prior to site reclamation. Soil stockpiled during the Construction phase will be spread on the disturbed surfaces. The soil-covered areas will be reclaimed with native species.

The portal facilities, process plant, accommodation camp, electric power supply transmission line to the underground, substation and distribution infrastructure, administration offices, service complex, airstrip, potable water and sewage treatment facilities, process water pipeline, and surface explosives magazines will all be decommissioned when no longer required. All machinery and equipment will be removed from the site. Buildings will be dismantled and components of value will be removed from the site. Concrete foundations will be broken up and buried on site.

At closure, the underground mine will be flooded and water-retaining bulkheads will be established within the declines. The underground workings are estimated to flood in approximately 40 years and will ultimately discharge to East Cirque Creek, the area overlying the cave subsidence zone. Seepage from the declines will discharge to the Kemess Lake Valley watershed and is expected to meet discharge criteria. The water treatment plants will continue to treat water from the supernatant pond of the KUG TSF for discharge to Attichika Creek until treatment is no longer required. After ore processing and tailings deposition ceases, and with underground mine water no longer entering the KUG TSF, water quality in the KUG TSF is expected to improve to a point that active water treatment is no longer required after approximately 6 years.

To ensure proper function and mitigation of environmental effects, monitoring and maintenance of all closed facilities and structures will continue into the Post-Closure phase.

Post-Closure Phase

Following closure and reclamation, the underground mine will continue to flood for an estimated 36 years during the Post-Closure phase until the local water table rebounds to stable elevation. Once the groundwater table has returned to equilibrium conditions, water in contact with the underground workings will seep towards East Cirque Creek. Water quality and other environmental monitoring will continue until water quality within the receiving environment is stable at acceptable levels. Reclaimed areas will be monitored to assess the effectiveness of the reclamation for controlling erosion and sedimentation, and (where appropriate) for re-vegetation success. Once Post-Closure monitoring demonstrates that objectives have been met and discharges meet guidelines, further decommissioning of the water treatment plant and associated site infrastructure will occur.

ENVIRONMENTAL ASSESSMENT PROCESS

Provincial and Federal Environmental Assessment Requirements

Proposed mine projects that exceed thresholds defined in provincial and federal legislation must undergo EAs. The BC EAA (2002) requires that new projects and modifications to existing projects which exceed thresholds defined in the Reviewable Projects Regulation (BC Reg. 370/2002) must undergo an EA and obtain an Environmental Assessment Certificate (EAC) before a project can proceed. As modification to an existing facility will result in less than 750 ha of additional land disturbance and less than 50% increase in previous disturbance, the proposed Project does not trigger an EA under the BC EAA (2002). However, AuRico requested the Project be designated as a reviewable project pursuant to Section 7(3) of the BC EAA and an Order was issued by the Executive Director of the BC EAO on February 7, 2014 designating the Project as a reviewable project.

The Project is a "designated project" pursuant to Section 16(c) of the Regulations Designating Physical Activities (SOR/2012-147) under the CEAA 2012 as the production rate will exceed the threshold for a gold mine of 600 tpd. The CEA Agency commenced an EA and granted substitution of the federal EA to BC on April 8, 2014.

The substituted review of the Project is being undertaken pursuant to the BC EAO (2013) *Memorandum between the Canadian Environmental Assessment Agency and the BC Environmental Assessment Office on Substitution of Environmental Assessments (2013)*. The BC EAO is conducting the procedural aspects of Aboriginal consultation, and providing funding to Aboriginal groups (including CEA Agency contributions) to facilitate their participation in the EA process. At the end of the EA, the BC EAO will provide an assessment report, which will include the EA findings and conclusions, to the CEA Agency within a time frame that will enable the federal Minister to reach a decision within the time limits set out in CEAA 2012.

Provincial Environmental Assessment Process

The provincial EA process, under the BC EAA (2002), has two stages: the pre-Application and Application review stages. The pre-Application stage formally began in February 2014, with the submission of a Project Description by AuRico to the BC EAO. On February 18, 2014, the BC EAO issued a Section 10 order indicating the project was reviewable, and on May 14, 2014, issued a Section 11 order describing the scope, procedures, and methods for conducting the provincial EA process.

AuRico then prepared a Valued Component Scoping Summary identifying the aspects of the natural and human environment for which the effects assessment would need to consider. The BC EAO held a public comment period on the Valued Component Scoping Summary between November 26, 2014 and January 5, 2015, and also sought comments from the EA Working Group established by the BC EAO to participate in the EA process. No public comments were received on the November 2014 draft document, which the BC EAO subsequently approved. A draft AIR for the Project was prepared by AuRico in October 2014, which outlined the information that must be included in the Application, including the methods to be used to conduct the effects assessment. AuRico revised the AIR to incorporate comments received from the EAO and working group, and the BC EAO issued an approved AIR in January 2016.

The formal submission of the Application will trigger a 30-day screening period, during which the BC EAO (with feedback from the EA Working Group) will determine whether the submission meets the requirements outlined in the AIR (BC EAO 2016). If the Application is determined to be sufficient, it will enter the Application review stage, comprising a 180-day review, which will involve the EA Working Group, Aboriginal groups, local government, and the public. These groups will have opportunities to provide comments on the Application; AuRico is required to track and respond to all of the comments.

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

Federal Environmental Assessment Process

The federal EA process began with the submission of a Project Description by AuRico to the CEA Agency in February 2014. The Project Description was screened and accepted for a 45-day review period by the CEA Agency for the purposes of determining whether a federal EA was required for the Project. The CEA Agency held a 20-day public comment period commencing February 21, 2014 on the Project Description and the request for substitution from the BC EAO to seek comments on the Project and its potential effects on the environment. On April 8, 2014, the CEA Agency issued the Notice of Commencement which stated that a federal EA is required, and granted substitution of the EA to BC.

The federal decision to approve or reject the EA for designated projects is made by the federal Minister of the Environment. In making a ministerial decision for substituted projects, the information presented in BC EAO's final Assessment Report and the implementation of mitigation measures are considered with respect to the potential for the designated project to cause significant adverse environmental effects.

Information Distribution and Consultation

Aboriginal Information Distribution and Consultation

The Section 11 Order (May 14, 2014) and the Section 13 Order (November 19, 2014) issued by the BC EAO set out the information distribution and consultation requirements for the Project. Federal guidance also informed AuRico's consultation activities. Schedules B and C of the Section 11 Order identify Aboriginal groups to be consulted. Schedule B includes TLFN, TKDN, and KwN. TKN jointly represents the TKDN, TLFN, and KwN. Aboriginal groups listed on Schedule C include Gitxsan (Wilp Nii Kyap), the Treaty 8 First Nations[2], and the Métis Nation of BC (MNBC).

[2] Blueberry River First Nation, Doig River First Nation, Fort Nelson First Nation, Halfway River First Nation, McLeod Lake Indian Band, Prophet River First Nation, Saulteau First Nations, and West Moberly First Nations.

In accordance with the Section 11 Order, AuRico prepared an Aboriginal Consultation Plan that guides consultation with TKN First Nations during the pre-Application phase and during the Application review phase. The final plan incorporates TKN feedback received from their review of a draft version.

The BC EAO established an EA Working Group in May 2014, including representatives from the TKN. A total of fifteen Working Group meetings were held between June 2014 and December 2015. Through the Working Group, the TKN had an opportunity to comment on the draft Valued Components Scoping Summary and the draft AIR. AuRico discussed these documents with TKN and revised the draft versions of these documents based on the comments received.

AuRico has established several agreements with TKN including an Interim Measures Agreement (IMA)(June 2012), Exploration Agreements (2013 to 2014 and 2015 to 2016), Joint Communication Plan (March 2015), Environmental Assessment Conduct Agreement (June 2014), and Employment and Contract Opportunity Framework (March 2015). AuRico and TKN have begun to negotiate the terms of an Impact Benefits Agreement for the Project. In accordance with the IMA, TKN and AuRico established the Senior Implementation Committee (SIC) to address topics of environmental management, employment, and business opportunities and the Environmental Management Committee (EMC), which addresses environmental studies and provides Project updates to the TKN First Nations. The SIC and the EMC have been meeting on a monthly and bi-weekly basis respectively since May 2013.

Starting in December 2014, AuRico engaged TKN in the assessment of various water discharge alternatives and involved TKN in decision-making to ensure that TKN values and information were represented in the selection of the water discharge location. The water discharge alternatives were presented to TKN communities in July 2015 to solicit input. Based on the outcomes of the alternatives assessment process and further analysis, AuRico selected Attichika Creek (TKN's preferred alternative) as the discharge location.

Since 2011, AuRico has hosted community meetings in TKN communities to share information about the Project. At each community meeting, non-technical language information sheets and posters were used to present information about the Project and the EA process, as well as about jobs, training and business opportunities.

AuRico's approach to engaging with the Schedule C Aboriginal groups included sharing summary reports (based on publicly available information regarding health and socio-economic conditions, current use of lands and resources for traditional purposes, and cultural heritage), as well as providing summaries of the assessment results. In each instance, AuRico reiterated the company's commitment to engage with each group and to consider and incorporate relevant information into the Application.

AuRico has tracked and documented all communications and has responded to comments received from Aboriginal groups throughout the consultation activities. The issues and AuRico's responses are documented in the Application, along with consultation summary tables. A Pre-Application Interim Aboriginal Consultation Report was developed and shared with TKN for review and comment, and the report was modified accordingly.

AuRico will continue to consult with Aboriginal groups during the Application review stage, according to the Aboriginal Consultation Plan, and will provide Aboriginal groups with copies of the Application and written responses to their comments, and will attend the EA Working Group meetings to address questions and present Project information. AuRico will notify Aboriginal groups about the public comment period on the Application. Comments from Aboriginal groups, AuRico's responses to the comments, and consultations undertaken with Aboriginal groups on the Application, will be summarized in the forthcoming Aboriginal Consultation Reports.

Government Agency and Local Government Information Distribution

AuRico has consulted with government agencies, primarily through the EA Working Group, but has also met individually with provincial and federal regulatory agencies. Through their participation in the Working Group, federal and provincial agencies provided comments on the draft Valued Component Scoping Summary and draft AIR, and the AIR was revised to address the comments. AuRico has also met with federal and provincial agencies to discuss the water discharge alternatives and other Project-related topics. Several government agencies participated in the EA Working Group site visit in 2014.

Comments from government agencies and AuRico's responses are included in the Application. AuRico will continue to consult with government agencies during the Application review stage, including providing the EA Working Group with copies of the Application, providing written responses to agency comments, and attending EA Working Group meetings to address questions and present Project information.

Public and Stakeholder Information Distribution and Consultation

Since March 2011, AuRico has consulted with the public, including residents of Mackenzie, Smithers, Terrace, Prince George, interest groups, non-governmental organizations, and licence and tenure holders.

AuRico developed a Public Consultation Plan in accordance with the Section 11 Order, which guides consultation with the public during the pre-Application and Application review stages of the EA process. AuRico has provided Project overviews to local governments and hosted community meetings in four communities in northern BC. AuRico also presented the Project to the public and other stakeholders at meetings, conferences and through panel discussions.

The BC EAO held a public comment period on the draft Valued Component Scoping Summary and no comments were received.

Land users and tenure holders with interests in the Project area were contacted, and some provided information for the Application via interviews or questionnaires. AuRico has met with commercial tenure and trapline holders to provide information about the Project and to discuss agreements. AuRico had agreements with two licenced guide outfitters during the operation of the KS Mine. A new agreement was signed with one of the outfitters in 2011, and AuRico plans to re-negotiate the agreement for the other outfitter. AuRico also reached a compensation agreement (2001) with

trapline holders during the operation of the KS Mine. A second agreement with the trapline holders was reached in 2014.

AuRico will continue to consult with the public during the Application review stage, according to the Public Consultation Plan, and will make the Application publicly available at the start of the public comment period. AuRico will respond to public comments during the Application review phase. Communications with the public are documented and summarized in the Application, as are the issues raised by the public, along with AuRico's responses to these issues.

ASSESSMENT METHODOLOGY

The assessment methodology adopted for the Project is in accordance with the AIR (BC EAO 2016) and the Guideline for the Selection of Valued Components and Assessment of Potential Effects (BC EAO 2013). The assessment methodology moves through four stages, namely: (1) issues scoping, (2) establishing baseline conditions, (3) assessing potential effects, and (4) assessing cumulative effects.

Issues scoping is fundamental to focusing the Application on those issues where there is the greatest potential to cause significant adverse effects and those aspects of the environment that are of greatest importance to society. Each assessment chapter of the Application includes a description of the issues scoping process used to identify potential effects, as well as the process used to select assessment boundaries and to determine the potential interaction between Project activities and environmental, social, economic, health, and heritage components. Components were scoped in consultation with key stakeholders, including Aboriginal communities and the EA Working Group, or they may also have been scoped as part of a legislated requirement. During the pre-Application stage, a scoping exercise was conducted with technical experts to explore potential Project interactions with candidate components, and to identify the key potential adverse effects associated with that interaction. The Valued Component (VC) Scoping Summary was circulated for review and approval by the BC EAO, EA Working Group including the TKN, and the general public as described above. Feedback from that process has been integrated into the Application. The primary output from the scoping exercises was an impact scoping matrix that consists of a list of candidate components that could be affected by Project components and/or physical activities. Where an affected component is perceived as important by the public, scientists, government agencies, Aboriginal groups, or other stakeholders, these are referred to as VCs. A secondary outcome of the scoping workshops was the identification of predictive studies. These are specific attributes of the physical environment that may be altered by the Project and which may indirectly affect biological or human receptor VCs. For each of these parameters, supporting predictive studies are undertaken, which include a description of the possible pathways for effects to other VCs, the existing regulatory framework, baseline study methods and results, analytical modelling results (if applicable), mitigation and management measures, and characterization of predicted changes.

Assessment boundaries define the maximum limit within which the EA is conducted. They encompass the areas within, and times during, which the Project is expected to interact with the identified VCs. As far as the effects assessment and mitigation are concerned, each assessment chapter provides a detailed discussion of the key potential effects arising from the Project

components and activities, as well as discussion and evaluation of mitigation measures that may be taken to reduce the potential for significant adverse effects. Formulating mitigation measures to avoid, minimize, restore, or offset adverse effects to VCs allows for specified environmental management plans (EMPs) to be compiled. Where proposed mitigation measures are not sufficient to eliminate an effect, a residual effect is identified. Each assessment chapter of the Application describes potential residual effects of the Project on VCs, as applicable. To characterize the residual effects, and understand their likelihood, significance, and the confidence in the assessment, a standard set of criteria (magnitude, geographic extent, duration, frequency, reversibility, and context) are used to support a determination of significance. An assessment of probability of the residual effect occurring is also made but is not considered when evaluating the significance of an effect. Confidence in the outcomes or conclusions of the effects assessment is also evaluated. The assessment of residual effects and their significance are summarized for each subject area using a standard tabular format.

The potential for cumulative effects arises when the residual effects of a project overlap or interact with the same resource or receptor that is affected by the residual effects of other historical, existing, or reasonably foreseeable future projects or activities. The cumulative effects assessment considers the potential environmental, economic, health, social, and heritage cumulative effects of the Project according to the requirements of the EAO and CEA Agency, through cause-effect pathways. Cumulative residual effects are those adverse effects remaining after the implementation of all mitigation measures, and are therefore the expected consequences on the selected VCs. Each assessment chapter of the Application describes direct and indirect cumulative residual effects of the Project as applicable following a similar methodology of the project-specific residual effects assessment.

PREDICTIVE STUDIES

Air Quality

Air quality in the proposed Project area and elsewhere in the northern BC is mainly unaffected by anthropogenic sources, reflecting the region's remoteness and the localized nature and lack of sources of anthropogenic air emissions. A baseline meteorological program has been conducted at the Project area since 2004. The purpose of the meteorological study is to characterize the atmospheric environment in its current state and to develop an understanding of the potential impacts of the proposed Project by means of atmospheric dispersion modelling. Ambient air quality data, necessary to establish baseline conditions to which modelled impacts are added for determination of net air quality impacts, was obtained from publically available sources. Five monitoring stations were determined to be regionally representative for ambient levels of sulphur dioxide (SO_2; three stations), nitrogen dioxide (NO_2; two stations), carbon monoxide (CO; two stations), total suspended particulates (TSP; three stations), particulate matter up to 10 micrometres in size (PM_{10}; four stations), and particulate matter up to 2.5 micrometres in size ($PM_{2.5}$; three stations). Dustfall levels at five reasonably similar mine sites within a 245 km radius of the Project area and measured at various times between 2007 and 2014, were assumed to representative surrogates for dustfall levels expected at and near the Project.

For the purpose of air quality modelling a detailed air quality emissions inventory was created for all temporal phases of the Project.

Atmospheric dispersion modelling was then conducted, using the CALPUFF model. Maximum source impacts and net air quality impacts where produced and reported for each regulated pollutant and for the averaging times prescribed by regulatory requirements. Maximum 1-hour, 24-hour and annual average SO_2 and NO_2 concentrations were predicted to be well below the corresponding objectives at all locations modelled. Maximum 1-hour and 8-hour average CO concentrations were also predicted to be well below the corresponding objectives at all locations modelled. Predicted maximum 24-hour and annual average TSP and $PM_{2.5}$ concentrations were well below the objectives, and predicted maximum 24-hour PM_{10} concentrations were well below the objectives, at all locations modelled. Predicted maximum 30-day dust deposition concentrations were all well below the most stringent objective.

It is concluded that no violations of applicable air quality standards will occur because of the Project with the implementation of proposed mitigation measures.

Noise

Noise, generally defined as undesirable sound, has the potential to cause adverse effects to humans and wildlife. For example, noise may result in psychological and physiological effects, as well as changes to wildlife habitat quality. Baseline noise levels were not monitored in the area of the proposed Project; however, background noise levels in the remote location of the Project are assumed to be low, with the acoustic environment being dominated by natural sounds such as wind-blown vegetation, animal noises, and running water. Other sources of noise may also include intermittent or infrequent events such as passing aircraft. In addition, activity associated with the care and maintenance of the former KS Mine contributes to the current noise conditions of the Project area.

Due to potential impacts on humans and wildlife, noise has been selected as an indicator of Project effects through the scoping process. Sources of emissions were identified. Noise modelling was used to predict "worst-case" continuous noise levels during the Construction and Operations phases, and to predict sound emissions from discrete events, including vehicle drive-bys, equipment usage, and blasting. The main sources of continuous noise are expected to be Project activities occurring along the proposed conveyor line and at mine facilities near the administration complex. These sources of noise are predicted to contribute to elevated levels contained to within approximately 3 km from the sources during the Construction and Operations phases. Discrete noise events were evaluated separately from continuous noise, and will also contribute to increased noise levels during both the Construction and Operations phases.

The predicted noise levels for the Construction and Operations phases were compared to noise thresholds for potential human effects (sleep disturbance, speech interference, annoyance, and complaints) and wildlife effects (habitat loss/disturbance). These results, along with applicable mitigation measures, are discussed in relation to the summaries of potential effects on wildlife and human health.

Geochemistry

The Project will remove ore from depth, without limited waste rock production during mining. The dynamics of the mining process are such that the geochemical impact will be minimized by leaving potential waste units *in situ* to the maximum extent possible. Waste rock produced during construction of access, ventilation, and conveyor declines will be placed in the KUG TSF for subaqueous disposal to mitigate potential metal leach and or acid rock drainage (ML/ARD) concerns. The use of the existing KS pit as the KUG TSF will allow for minimizing the footprint of the infrastructure required while maintaining subaqueous disposal of produced waste, waste rock, and tailings.

The geochemical evaluation considers the water quality during all phases of the Project from Construction through Post-Closure. As part of the geochemical evaluation the units affected by the project have been geochemically characterized using mineralogy, static geochemical testing, and lab based and field based kinetic testing. A broad geochemical waste characterization study was completed to determine the geochemical nature of the rock units within the Project area in 2005 (Northgate, 2005). Further geochemical evaluation of the affected units was completed as part of this application.

The Project area hosts a copper-gold porphyry ore deposit associated with the intrusion of a quartz monzonite/quartz diorite unit into an andesitic Takla rock unit. The main (higher grade) ore zone is situated at a depth of approximately 400-500 m below surface. Approximately 102 Mt will be extracted as ore. The main rock groups (from oldest to youngest) associated with the Project include the Takla Group (Andesite Volcanics), Black Lake Intrusives - Hypogene (Quartz Monzonite/Quartz Diorite), Toodoggone Formation (Hazelton Group), the Asitka Group, and a Gossan Zone.

The results of the geochemical evaluation were utilized in guiding the development of geochemical source terms that were utilized in predicting the water quality from the Project area and within the KUG TSF. A source chemistry prediction of water quality from the underground, including contact water from the declines, cave gallery, and subsidence zone, was predicted for Construction, Operations, and Closure/Post-Closure phases. Predicted underground water quality was provided to the site surface water quality model for predictions of the site influence to surface water, groundwater, and other VCs. At closure, the cave area will be flooded. The closure subsidence zone drainage will report to East Cirque Creek. Drainage is predicted to be within the same geochemical magnitude as observed from the Gossan Zone to East Cirque that is observed in pre-mine conditions. Additional source chemistry was developed for the KUG TSF, including contact water for the highwall.

ML/ARD mitigation measures will include best management practices that will be employed during the Construction, Operations, Closure, and Post-Closure phases. During Construction, the development of the access tunnel and declines will produce approximately 2 million tonnes of waste rock. All waste rock from the decline development will be placed in the KUG TSF for subaqueous disposal to mitigate oxidation and weathering, and hence ML/ARD effects. Cave gallery development will produce ore that will be processed into concentrate and tailings. Contact water from the underground mine area during Construction and Operations will be collected and pumped to KUG TSF for treatment. At Closure, the proposed underground mine area will be plugged with

water-retaining bulkheads in each of the declines allowing the subsidence zone to be saturated and, hence, sequestering the mine affected units. The tailings and waste rock will remain in the KUG TSF under saturated conditions, therefore sequestering these materials from oxidative processes and mitigating potential acidic drainage and metal leaching.

ASSESSMENT OF POTENTIAL EFFECTS, MITIGATION MEASURES, AND SIGNIFICANCE OF RESIDUAL EFFECTS

Assessment of Potential Hydrogeology Effects

Setting

Baseline hydrogeological and geotechnical studies were first conducted at site in 2003 in support of the EA for the formerly proposed Kemess North project. In 2011, an additional joint hydrogeological-geotechnical field program focusing on the area of the underground mine was undertaken to address data gaps identified in relation to the current Project. The combined efforts of the 2003 and 2011 field programs produced a network of 22 monitoring wells, 14 piezometers and over 100 measurements of hydraulic conductivity in bedrock and overburden. Intensive hydrological and hydrogeological data collection occurred between October 2011 and August 2013 which included water level monitoring at 20 wells and piezometers. Groundwater samples were collected from 17 monitoring wells over this period, capturing different periods of the hydrologic cycle and augmenting an existing water quality data set for the monitoring wells established in 2003 and 2004. Over the 2011 to 2013 period, selected wells were also sampled for stable and radiogenic isotopes to provide estimates of groundwater age and provenance.

A desktop review of hydrogeological data collected in the area of the KS Mine site was undertaken to enable an effects assessment of use of the KS Mine open pit as the KUG TSF. Two combination hydrogeological/geotechnical investigations were conducted in 2001 and 2011 providing 75 measurements of bedrock and overburden permeability in the vicinity of the KUG TSF. Field investigations undertaken in 2002 and 2008 established monitoring wells in the area. These wells, in addition to three existing camp potable supply wells, have been sampled numerous times since initiation.

Assessment

The physical, chemical and isotopic hydrogeologic baseline data have been synthesized into conceptual groundwater models for the Project and have ultimately been used to inform the development of two numerical groundwater models. These numerical models form the basis of the groundwater effects assessment for the Project.

To determine effects on groundwater from the development of the underground, a 3-D, finite-element, numerical groundwater model was constructed in FEFLOW. To simulate baseline conditions, the model was run in steady-state mode and calibrated using (i) baseflow measurements at hydrometric stations on East Cirque Creek and Central Cirque Creek; (ii) 20 water level measurements taken during the low flow period of May 2013; and (iii) artesian flow rates measured at an exploration hole in East Cirque. These three metrics, in addition to a qualitative comparison to

a groundwater level map created from the May 2013 dataset, have provided the means of arriving at an acceptable baseline model calibration. To simulate mine development, operations and closure, hydraulic properties in the baseline model were modified to be temporally and geometrically consistent with the mine plan and a geo-mechanical model of the panel cave. This required the model be run in transient mode using 15 consecutively run models. Boundary conditions in the mine footprint were modified to simulate underground dewatering; recharge rates were also modified to reflect enhanced infiltration over the subsidence zone. A key groundwater mitigation measure incorporated into the groundwater model is the placement of water-retaining bulkheads along the declines to enable mine flooding upon completion of mining. The position of the bulkheads was optimized so that mine water contact water would report to East Cirque Creek catchment only.

The KUG groundwater model predicts maximum underground inflow rates (approaching 50 L/s on an annual average) occur once the cave zone and subsidence zone are fully developed. The capture of groundwater in the underground development means that less groundwater is available to report as baseflow to East Cirque Creek and Central Cirque Creek. The reduction in creek baseflow starts during construction of the declines and persists into closure as the water table recovers. At maximum impact, annual average groundwater discharge to East Cirque Creek is predicted to decline by 40% of its baseline value, while groundwater discharge to Central Cirque Creek is predicted to decline by over 50% of its baseline value. Late in closure, around project year 60, the water table recovers to the point where baseflow in East Cirque Creek starts to increase above its baseline value. Ultimately, groundwater discharge to East Cirque Creek is expected to stabilize at about 28% above its baseline value. Most mine contact water (estimated to be over 95%) is anticipated to report to East Cirque Creek within a couple hundred meters of the edge of the subsidence zone. This seepage is expected to follow shallow groundwater flowpaths associated with rapid travel times (less than two months). Groundwater discharge to Central Cirque Creek is predicted to remain depressed indefinitely, at a level 40% below the baseline value. The development of the underground is not predicted to have any impact on Amazay Lake aside from a minor reduction in surface water inputs from Central Cirque Creek.

Deeper groundwater quality is predicted to develop increased concentrations of sulphate, Cd, Cu, Mn, Ni, Se and Zn over baseline conditions as a result of the Project. The quality of shallow groundwater draining the gossan, which makes up the majority of the contact water, is not expected to change. Since East Cirque Creek is naturally affected by geochemical reactivity within the gossan, the groundwater draining the KUG deposit area is expected to have negligible impact on water quality in East Cirque Creek. Overall, residual effects on groundwater quantity and quality in the area of the underground mine are considered to have a high likelihood of occurring but are considered not significant due to their limited spatial effect. The confidence in the residual effects assessment is moderate to high.

Some amount of seepage from the KUG TSF is expected through the pit walls and East Dam. Residual effects on groundwater arising from the KUG TSF have been quantified with the aid of two 2-D numerical models. A 2-D seepage model developed for the East Dam predicts a seepage rate of 0.4 L/s through the dam and underlying foundation. A 2-D groundwater model was developed separately using FEFLOW to determine seepage through the pit walls. This model was informed by the baseline data outlined above and was run in steady-state mode with the tailings and pond level

at their maximum predicted extent. The groundwater model predicts the steady-state seepage through the pit walls at closure to be 1 L/s, for a total of 1.4 L/s of seepage from the facility. The estimated travel time for the pit wall seepage to reach Kemess Creek and downgradient supply wells is on the order of 5 years. Tailings discharge, high wall runoff and discharge of underground dewatering water will result in water quality within the KUG TSF that will contain contaminants of concern at concentrations higher than existing bedrock groundwater quality. KUG TSF seepage water quality is predicted to improve following the cessation of Operations and into Post-Closure. The residual effects on groundwater quality and quantity in the area of the KUG TSF have a high likelihood of occurrence and confidence in the assessment is moderate to high. Groundwater quantity and quality effects in the area of the KUG TSF are considered not significant. The potential effects of water seepage from the TSF to surface water quality in Waste Rock Creek and Kemess Creek have been assessed using the surface water quality model.

A groundwater monitoring plan has been developed to determine impacts from the project and verify modeling predictions. Due to the limited extent of groundwater quality and quantity residual effects, the only other activities that may confound Project residual groundwater effects are those related to existing infrastructure of the KS Mine. Residual groundwater effects are ultimately manifested as surface water effects, and as a result, effects of the KS Mine infrastructure have been incorporated into the Project mine plan though a water balance and water quality effects model.

Assessment of Potential Surface Hydrology Effects

Setting

Surface hydrology is a key component of the biophysical environment, and is linked to other VCs, including surface water quality, groundwater quantity and quality, and fish and aquatic habitat. The Project has the potential to alter streamflow timing and volumes during all four phases of mine life.

A baseline hydrometric program measured streamflow at 11 stations throughout the Project area from 2003 to the present. These data were used in conjunction with information recorded at three Project-specific climate stations, two local snow courses, and a suite of regional hydrometric and climate station records to extend the site hydro-meteorological context to a longer time period (30+ years). This allowed for a robust understanding of the temporal and spatial variation of streamflows and their climatic drivers, and this information was carried forward into the site-wide water balance model that was used to estimate the effects of the Project on streamflows.

Assessment

The following design features and mitigation measures limit the magnitude and extent of potential impacts to streamflows resulting from development of the Project:

- underground panel caving mining method substantially reduces the surface disturbance resulting from mining activities;
- use of the pre-existing KS open pit as the KUG TSF negates the need for a purpose-built tailings impoundment; and

- installation of water-retaining bulkheads in the underground declines at closure will ensure that underground contact water will only flow towards East Cirque Creek during (and after) the Post-Closure phase.

The predicted residual effects for the 90th percentile of all model runs on the surface hydrology VC are as follows:

- seasonal flow increases of 5 to 7% in Attichika Creek due to dewatering of the KUG TSF during Construction and Operations;
- decreases in baseflow of up to 39% in East Cirque Creek and 43% Central Cirque Creek resulting from underground dewatering;
- increases in baseflow in East Cirque Creek of up to 28% during Post-Closure as a result of the underground workings and cave subsidence zone filling; and;
- flow decrease of -59% in Waste Rock Creek for Operations to a flow increase of 183% in Closure, and Post-Closure as a result of the KUG TSF operation and closure.

The residual effects assessment found that while some effects were high in magnitude, continuous and irreversible (e.g., impacts to baseflows in East Cirque Creek and Central Cirque Creek, and flow alterations in Waste Rock Creek), the impacts were localized and not measurable at downstream model nodes nor the local study area (LSA) boundary. No cumulative effects, beyond those from existing KS Mine which were fully incorporated into the project-specific residual effects assessment, were identified.

Prior to the Construction phase, a comprehensive site-wide Surface Water Management Plan will be developed and implemented. Collection of streamflow data will continue through all mine phases, allowing the water balance predictions to be verified, and management practices adjusted as necessary to ensure that residual effects on surface hydrology are limited to the extent possible.

Assessment of Potential Surface Water Quality Effects

Setting

Water quality is a critical component of the biological and physical environment and it is protected under provincial and federal legislation. Water quality constitutes the physical, chemical, biological, and aesthetic characteristics of water, which are determined by a variety of regional and local factors. Surface water quality data have been collected since 1996 in the KS Mine area and since 2002 in the proposed Project area. In the surface water quality regional study area (RSA), surface water quality monitoring studies have collected data for the Finlay River since 2003, and Thutade Lake since 2012. The surface water quality baseline program has allowed for the prediction, assessment, mitigation, and management of potential Project-related effects, and results have been incorporated into mine and mine waste management planning for the Project.

Baseline study area streams typically experience a low-flow period between November and April, and higher flows between May and October associated with freshet, and fall heavy-rain events. In Mine Site area streams, pH levels are circumneutral to slightly alkaline and concentrations of total

dissolved metals are generally low but exhibit seasonal variability, with higher concentrations during high-flow periods. Waste Rock Creek in the mine site area has been influenced by the operation and closure of the KS Mine, and, the expectation assumed in the effects assessment is that this tributary will remain modified under the Project. In Waste Rock Creek, several water quality parameters were measured at values greater than available guidelines for the protection of aquatic life, including total concentrations of aluminum, chromium, iron, nitrate, and selenium.

Study area streams in the underground mine area are influenced by the extensive natural mineralization in the deposit area and have naturally poor water quality, with existing concentrations of parameters above water quality guidelines, including sulphate, total aluminum, beryllium, cobalt, copper, lead, selenium and zinc. Waters are naturally acidic to circumneutral, with mean pH values of between 3.10 and 5.24 in East Cirque Creek and between 5.08 and 6.62 in Central Cirque Creek. Total suspended solids and turbidity levels are highest in the underground mine area, and exhibit seasonal variability.

Thutade Lake pH levels are circumneutral to slightly alkaline with low concentrations of nutrients, anions and total and dissolved metals; no guideline exceedances were observed for any parameters at any time of the year. Similarly, Finlay River pH levels are circumneutral to slightly alkaline, with low concentrations of nutrients, anions and total and dissolved metals; sporadic, infrequent concentrations of total aluminum, chromium, and selenium were greater than applicable water quality guidelines.

Assessment

Changes in surface water quality caused by Project activities have the potential to occur through various pathways during the life of the Project, many of which overlap in terms of definition and scope. Six potential pathways to effects on surface water quality were assessed: direct discharges to the receiving environment, groundwater interactions and seepage, ML/ARD, erosion and sedimentation, leaching of nitrogen residues generated from blasting, and atmospheric dust deposition.

The potential and likelihood for residual effects varies within the Project area; therefore potential residual effects on surface water quality were discussed and characterized separately for the surface water quality LSA (mine site area, underground mine area) and the surface water quality RSA (Thutade Lake and the Finlay River).

The surface water quality effects assessment was governed by two key assumptions:

- assessment and determination of any potential residual and cumulative effects assumed that guidelines, mitigation and management plans, best management practices, regulations, and operating standards designed to reduce effects on surface water quality and aquatic habitat are adhered to; and
- assessment and determination of potential effects on the downstream receiving environment related to discharges and groundwater seepage relies on the accuracy of water quality modelling data results.

Mine Site Area

Water treatment represents the primary surface water quality mitigation and management strategy for the Project and will be focused at the KUG TSF and related discharge. Direct discharge from the KUG TSF to Attichika Creek will occur during Construction, Operations, and Closure phases. Results of water quality predictions are inclusive of proposed management and mitigation measures; that is, model results represent potential residual effects to surface water quality.

No contaminants of potential concern (COPC) were predicted to occur during the Construction, Operations, Closure, and Post-Closure phases in base case modelling for Kemess and Attichika creeks. In water quality model sensitivity analyses, total cadmium was identified as a COPC in the sensitivity cases specific to 100-year dry conditions and the 95th percentile inputs for background water quality scenarios. These COPCs were restricted to these cases and the effect on water quality predicted to improve over time; i.e., no exceedances were predicted beyond Operations.

In Waste Rock Creek, concentrations of total aluminum, copper, molybdenum, selenium and nitrate were identified as COPCs in Closure and Post-Closure periods. However, predicted concentrations of COPCs were within the natural variation for these parameters in Waste Rock Creek. Further, a significant conservatism incorporated into predictive modelling was that all potential geochemical loadings from the former KS Mine do not further improve over the life of the Project. That is, it is assumed that mitigation achieved by the KS leach cap till cover (currently in place) is 100% ineffective at reducing loadings from the KS waste rock pile to Waste Rock Creek and the other existing collection ponds, and that all existing collection ponds, including the selenium collection pond will interact with Waste Rock Creek under currently existing water conditions. Nitrate, total aluminum and selenium COPCs are directly related to this marked model conservatism. No additional COPCs were identified in Waste Rock Creek in other sensitivity cases.

Effects on water quality in the mine site area are predicted to be restricted to the LSA, are generally predicted to be of short-term duration, reversible, sporadic to regular frequency, and are not expected to extend downstream of Attichika Creek. Based on the environmental effects assessment, the residual effect for the mine site area is assessed as not significant.

Recent past, current, and expected future effects to water quality in the mine site area related to the KS Mine have been integrated into the baseline water quality characterization, predictive water quality modelling, and residual effects assessment completed for the Project. As such, the residual effects for the mine site area are considered to be cumulative in nature. No other past, present, or reasonably foreseeable projects or activities are expected to interact with surface water quality in the mine site area. Consequently, no cumulative effects are identified.

Underground Mine Area

Potential effects of the Project to surface water quality at the underground mine area are restricted to the Closure and Post-Closure phases of the Project, when the underground mine is allowed to flood and water from the subsidence zone begins to interact with surface waters; hydrogeological modelling indicates that for the rest of life of mine, the underground cave zone acts as a sink and

does not contribute loadings to either East Cirque Creek or Central Cirque Creek, and by extension Amazay (Duncan) Lake and Attycelley Creek.

Base case and upper case predictive water quality modelling results indicate that in East Cirque Creek, concentrations of total cobalt, chromium, copper, iron, and zinc were identified as COPCs in the Post-Closure phase. However, predicted concentrations are within the range of natural variation. Similarly, in Central Cirque Creek, concentrations of total and dissolved aluminum and total iron were identified as COPCs in Post-Closure; however, predicted concentrations are within the range of natural variation. Predicted water quality of East and Central Cirque creeks was sensitive to imposed 100-year dry wet conditions, whereby sporadic, infrequent COPCs were identified in the Closure phase.

Predictive water quality modelling did not identify any COPCs in Amazay (Duncan) Lake or Attycelley Creek for any sensitivity case in Closure and Post-Closure phase.

Effects on water quality at the underground mine area are predicted to be of medium magnitude (as predicted concentrations are within the range of natural variation but approach the 95th percentile of existing conditions), are restricted to the LSA, occur at sporadic frequency, and are partially reversible to irreversible, as it is observed for several years near or at the end of Post-Closure. Based on the assessment, residual effects for the underground mine area are assessed as not significant.

No past, present, or reasonably foreseeable projects or activities are expected to interact with surface water quality in the underground mine area. Consequently, no cumulative effects are identified for this area.

No COPCs were identified in Thutade Lake or the Finlay River; consequently, no residual effects were identified for the RSA. Residual effects identified in the mine site area and the underground area due to predicted water quality and sedimentation effects were restricted to the LSA. Cumulative effects are not expected as there are no past, present, or reasonably foreseeable projects or activities that are expected to interact with surface water quality in the RSA.

The water quality monitoring program discussed in the Fish and Aquatic Effects Monitoring Plan will verify accuracy of the predictions of the EA, ensure detection of measurable alterations in surface water quality, allow for identification of potential causes, and include the provision of additional mitigation or adaptive management strategies.

Assessment of Potential Terrain and Soil Effects

Setting

The potential effects of the Project on terrain stability relate to potential changes in the incidence and magnitude of landslides and changes in the area of unstable terrain, which in turn may lead to ecosystem/wildlife habitat loss, changes in hillslope hydrology, sedimentation of streams and associated degradation of fish habitat. Increased geohazard risk can also increase the risk of damage to Project infrastructure, and increased risks to health and safety of Project personnel.

Data relating to surficial geology, terrain, and terrain stability was compiled from detailed terrain stability mapping, terrestrial ecosystem mapping, and from terrain inspections conducted in the Project footprint area during 2003, 2009, and 2013. Two hundred and fifteen terrain inspections and visual observations were carried out. Unstable terrain that was located adjacent to or within the proposed development was assessed.

Terrain currently classified as unstable or potentially unstable occurs over 882 ha (6%) of the LSA. Terrain classified as erodible due to a combination of specific soil texture and slope gradient ranges occurs over 1,947 ha (12%) of the LSA. Potentially unstable terrain was identified on slopes in the alpine sections of valley walls in the Project area and bedrock cliffs in the alpine cirque headwalls adjacent to the projected subsidence zone. Evidence of active slope instability included rock fall, debris slides and debris flows.

Development of industrial infrastructure in natural areas is commonly associated with loss of soil quantity resulting from landslides or from activities that include soil removal or burial during infrastructure development, road construction, overburden/soil storage, or abandonment of permanent structures after mine closure. Degradation of soil quality may result from soil compaction, contamination, erosion, or other changes in soil physical, chemical, or biological properties negatively affecting its fertility or other ecological functions.

The description and mapping of soils in the Project area was compiled from the existing soil data and mapping completed for Kemess North and KS Mine as well as recent soil data collected during 2013 and 2014 for the proposed Project infrastructure and subsidence areas. Soils data were collected during 259 field inspections (113 in 2003, 54 in 2009, 34 in 2013, and 48 in 2014) conducted in the LSA.

In general, soil in the region is relatively low quality for most land uses. Soil pH ranges between 4.2 and 8.2 with most soils moderately to weakly acidic. The level of available nitrogen ranges from very low to very high. Soil salinity is very low. Soils suitable for reclamation are found on 82% of the soil LSA (13,312 ha). Soil types that are vulnerable to erosion are found in approximately 12% of the LSA. Soil erodibility is high where slopes are steep and soils with silt loam, loam, or very fine sandy loam mineral textures and low coarse fragment volume are present.

Assessment

Residual effects to terrain stability during Construction and Operations are anticipated. However, due to the Project's remote location, limited spatial extent, and the existing restriction of hunting, trapping or fishing on AuRico mineral leases, the predicted decrease of terrain stability is not expected to have significant effect to any land resource management plan objectives or increase risk to the public. Thus, the effect of Project development on terrain stability is expected to be not significant**.** The residual cumulative effects on terrain stability in the RSA are also expected to be not significant.

Two general types of effects are expected as a result of interaction between the proposed Project components and activities with soil: changes in the quantity (area) of ecologically functional soil, and changes in soil quality (soil degradation).

Permanent soil loss is expected within the sections of the Project footprint that will not be reclaimed and in some areas within the subsidence zone. However, considering the small size and the relatively poor productivity of soils within the lost area, the effect associated with the proposed Project is expected to be not significant. The cumulative effect of soil loss under the footprints of the Project and other proposed projects in the region is also expected to be not significant.

Degradation of soil quality is expected to affect mainly stockpiled soils during Project life and the soils within 50- to 250-m buffers surrounding the Project footprint for as long as Project components remain active.. In consideration of relatively low capacity of local soils to support land uses, degradation of soil quality around the Project infrastructure is predicted to be not significant. The cumulative degradation of soil quality due to the combined effects of the Project and other proposed projects in the region is also expected to be not significant; while some land resource management plan management objectives may be impaired, most objectives will be met.

Assessment of Potential Terrestrial Ecology Effects

Setting

The VCs selected for the terrestrial ecology effects assessment included alpine and parkland ecosystems, forested ecosystems, wetland ecosystems, Red and Blue-Listed ecosystems, harvestable plants, and rare plants and lichens and associated habitat. Baseline studies were conducted to provide an overview of local ecological conditions to support the evaluation of potential Project effects on the ecosystems and vegetation. The Project has a long history of environmental studies related to the characterization of ecosystems and vegetation. Baseline studies were initiated in 1992 for the KS project and have continued to present day. The methods used to collect baseline information align with the provincial standards for mapping and data collection relevant to the time period within which they were conducted. The information collected during the baseline studies has served to inform and guide Project planning, management, and mitigation.

Assessment

Two types of effects are expected as a result of interactions between the proposed Project components and activities and terrestrial VCs: loss (area; or in the case of rare plants loss of individuals or populations) due to Project footprints or alteration (such as edge or dust effects) attributable to the Project.

Project activities and/or infrastructure are expected to cause loss or alteration of alpine and parkland ecosystems, forested ecosystems, wetland ecosystems, and harvestable plants. The Project is not expected to affect blue-listed ecosystems or rare plant or lichen populations identified within the LSA and the proposed management and mitigation measures are considered adequate to avoid residual effects to wetlands and harvestable plants.

Effects of Project-related residual loss and alteration on alpine and parkland ecosystems function and extent is expected to be not significant. The main effect to alpine and parkland ecosystems will be alteration due to cave subsidence, which will affect talus and scree slopes. Vegetation or lichens are expected to re-establish over time and will continue to provide ecological functions typical of

those within the Alpine Group. Residual loss and alteration of forested ecosystem function and extent due to clearing are also characterized as not significant. Disturbed forested ecosystems are expected to recover over the medium to long term and the viability of the resource will not be impacted at any scale. The Project's proposed management and mitigation measures are considered adequate to avoid residual effects to wetlands and harvestable plants.

Four cumulative effects were identified: nibbling loss (incremental loss and alteration of ecosystems); physical-chemical transport effects (due to invasive plant species); synergistic effects (edge effects); and growth inducing effects (primarily due to roads).

Residual cumulative effects are predicted for the loss and alteration of alpine and parkland ecosystems and forested ecosystems, which can be minimized by management plans but not avoided altogether. The residual effects to alpine and parkland ecosystems and forested ecosystems are considered not significant.

Assessment of Potential Fish and Aquatic Habitat Effects

Setting

The Project is located in two watersheds, Attichika and Attycelley, located in the Thutade Lake Watershed at the headwaters of the Finlay River. Fish and aquatic resources in these watersheds have been studied extensively for the past 22 years as part of the KS Mine development, with additional baseline studies conducted in 2014 and 2015 in support of the Project. The knowledge gained during these studies has provided a good understanding of critical fish and aquatic habitats in the Project area and has enabled the Project design to minimize impacts from the mine development on important fish and aquatic habitats.

Fish and aquatic studies indicate that significant populations of bull trout move up from Thutade Lake into Attichika Creek and its tributary Kemess Creek to spawn and for juvenile rearing. These studies also indicate that Dolly Varden are widespread throughout the watersheds, with core spawning areas located in headwater reaches well upstream from the Project area. Rainbow trout populations are mainly associated with lakes in the Project area including Kemess, Thutade, and Amazay lakes.

Aquatic habitat in the Project area varies from creeks with high benthic and algal species richness and diversity (i.e., Attycelley and Attichika creeks) to creeks with very low primary and secondary productivity (i.e., East and Central Cirque creeks).

Assessment

Potential effects to fish and aquatic habitat VCs that were considered in this assessment included direct mortality, sedimentation and erosion, changes in water quantity and quality, and habitat loss. These potential Project-related effects to fish and aquatic habitat will be eliminated or reduced through mitigation measures, management plans, and monitoring programs. The careful design of the Project has also considered potential fish and aquatic habitat effects through relocation of the

access road, conveyor, and KUG TSF discharge pipeline alignment in order to minimize stream crossings and Project infrastructure in higher-value fish habitats or sensitive areas.

Two residual effects were determined to constitute the primary pathways of interaction between the Project and fish and aquatic habitats in the Project area:

- Changes in water quantity due to the seasonally staged KUG TSF effluent discharge to Attichika Creek, base flow modifications to East and Central Cirque creeks from underground dewatering, and flow releases to Waste Rock Creek occurring at the Closure and Post-Closure phases of mine operation of the KUG TSF; and
- Changes in water quality due to the seasonally staged KUG TSF effluent discharge to Attichika Creek and subsequent flow releases to Waste Rock Creek occurring at the Closure and Post-Closure phases of mine operation of the KUG TSF. As well, water quality changes in East and Central Cirque creeks during Closure and Post-Closure when the underground mine is allowed to flood and water from the cave subsidence zone begins to interact with surface waters.

Based on evaluation of the mitigation measures incorporated into the Project, and the results of predictive hydrological and water quality modelling, there will be no significant Project-related residual effects on fish and aquatic habitat in the LSA or RSA. The Project will not result in fish habitat loss and no fisheries offsetting plan is required.

No past, present, or reasonably foreseeable projects are expected to interact cumulatively with Project-related residual effects for fish and aquatic habitat within the RSA. The existing KS Mine has already been accounted for in the proposed Project mine design and predictive models. A Fish and Aquatic Effects Monitoring Program will be designed to monitor assessment predictions for fish and aquatic habitat and will incorporate adaptive management responses if effects on aquatic life are identified.

Assessment of Potential Wildlife Effects

Settings

Field surveys were conducted from 2003 to 2015 for woodland caribou, moose, mountain goats, grizzly bears, furbearers, hoary marmots, bats, migratory waterbirds, migratory landbirds, raptors, and western toad.

Habitat suitability models were developed to provide a means of identifying the spatial extent and distribution of habitats across the landscape and were used to assess the potential effects of the proposed Project. These models were developed for woodland caribou, moose, mountain goat, grizzly bear, hoary marmot, and American marten within the LSA, in conjunction with ecosystem mapping studies. Suitable habitat was also identified for bats, raptors, migratory waterbirds, migratory landbirds, and western toad.

Alpine areas in the northern half of the LSA provide habitat for hoary marmot colonies, mountain goats (including kidding), and woodland caribou (including calving). Mountain goats have been

observed in one proposed polygon of mountain goat ungulate winter range in the LSA which is to the east of East Cirque Creek. Low elevation areas associated with Attycelley and Attichika creeks provide habitat for woodland caribou, moose, and grizzly bear. Forested areas have suitable habitat for American marten, bats, cavity-nesting migratory waterbirds, and migratory landbirds. Lake, wetland, and riverine areas provides habitat for migratory waterbirds and western toad.

Assessment

In order to mitigate for effects to wildlife and wildlife habitat from the Project, several management plans will be developed related to wildlife, camp waste, mine waste, surface water, and access. Residual effects from the Project construction, operation, infrastructure and use included habitat loss and alteration, sensory disturbance, mortality, and attractants. Actions and procedures to mitigate these effects are included in the Wildlife Management and Monitoring Plan and Waste Management Plan. Effects of chemical hazards will be monitored and mitigated by the Fish and Fish and Aquatic Effects Monitoring Plan and Surface Water Management Plan. Effects of indirect mortality will be mitigated by procedures in the Access Management Plan. With mitigation and monitoring, no significant Project-related residual effects are expected.

No residual cumulative effects were identified for wildlife. The analysis took into account road density in the relevant RSAs as well as habitat loss and alteration due to other projects and activities. It was also assumed that the proponents of other projects and activities within the RSAs implement mitigation and management plans similar to those identified for the Project.

Assessment of Potential Economics Effects

Setting

The Project is in the Peace River Regional District, a sparsely populated and relatively undeveloped region of BC. The economic RSA also includes the Regional District of Fraser-Fort George, Regional District of Bulkley Nechako and Regional District of Kitimat Stikine. The Potentially Affected Communities (PACs) considered for the Project include Aboriginal and non-Aboriginal (or mixed) communities: Takla Landing (for the TLFN), Tsay Keh (alternately known as Ingenika Point; for the TKDN), Kwadacha (alternately known as Fort Ware; for the KwN), and the municipalities of Mackenzie, Prince George, Smithers and Terrace. The Aboriginal PACs are generally small and far removed from major population and governance centres and from one another.

In 2011, the economic RSA had a population of about 229,000 with 17.2% of population being of Aboriginal descent. Of that, 125,500 were in the labour force with a participation rate of 69.2% and the unemployment rate of 9.5%. Similarly, the Aboriginal PACs had a population of 535 whereas the non-Aboriginal communities had a population of 92,371. The participation and the unemployment rates for the non-Aboriginal PACs were on par with those for the RSA; for the Aboriginal communities they were respectively 68.9% and 25.0%. In 2010, Peace River Regional District had the highest individual median and average incomes for both men and women ($50,117 and $58,304 respectively); a similar trend is reported for non-Aboriginal PACs. In Kwadacha, the only Aboriginal community for which income data is available, the median and average incomes were $11,394 and

$24,902 respectively. The median and average income of women is lower in comparison to men at the regional and local level.

Assessment

Through the provision of direct employment and expenditures, the Project is expected to have a beneficial impact on economic conditions in the RSA and the PACs. Specifically, the Project is expected to have an effect on the labour market, incomes, and government revenues as well as business activity. The Project's anticipated positive economic benefits are discussed under Project Benefits earlier in this chapter.

The assessment of potential adverse economic effects was primarily supported by secondary research that included compiling and assessing information from a number of sources including Statistics Canada (Census, National Household Survey), Aboriginal Affairs and Northern Development Canada, and BC Stats.

Scoping of potential effects determined that the Project has the potential to result in adverse effects on two VCs: the Aboriginal labour market conditions and the non-Aboriginal labour market conditions. Potential effects of the Project on Aboriginal and non-Aboriginal labour market conditions relate to the provision of Project employment and its effects on the local labour market demand and supply. As discussed under Project Benefits, direct and contract positions will be available during the Construction, Operations, and Closure phases of the Project. AuRico expects that a minimum of 10% of on-site jobs will be held by Aboriginal people. This indicates that a minimum of 110 jobs (or an average of 22 jobs per year) during the Construction phase, and minimum 490 jobs (or an average of 38 jobs per year) during the Operations phase will be held by Aboriginal people. Based on the size of the Aboriginal labour force in the RSA and the current unemployment rates, the number of unutilized Aboriginal workers exceeds the number of potential jobs available to Aboriginal people. However, Aboriginal workers may be hired from the Aboriginal PACs, the non-Aboriginal PACs, or the RSA. A higher number of workers hired from one Aboriginal PAC can have a considerable effect on the employment and income characteristics of that community; however, if Aboriginal workers are to come from a number of different PACs and the RSA, the effects on any one community may be less noticeable.

The two potential effects of the Project on the economic VCs (Aboriginal labour market conditions and the non-Aboriginal labour market conditions) include:

- **Change in Employment:** The Project has the potential to result in changes in employment, affecting Aboriginal and non-Aboriginal labour market conditions. Change in employment is expected to be beneficial during the Construction and Operations phases as the Project will generate jobs and hire workers from the PACs and RSA. As Operations comes to an end and the Project transitions to the Closure and Post-Closure phases, there will be a loss Project-related employment. The loss of jobs and associated income at Closure and Post-Closure is considered as a removal of the benefit and not as a direct adverse effect of the Project. The loss of jobs over the Closure phase does not negate the many years of employment benefits that will be generated over earlier phases. Nevertheless, the effect of the change in employment at Project Closure is considered with respect to the Aboriginal labour market conditions VC and

the non-Aboriginal labour market VC. This effect is not considered during Post-Closure as most jobs will be terminated by the end of the Closure phase.

- **Competition for Skilled Labour and Wage Inflation:** The Project has the potential to adversely affect Aboriginal labour market conditions and the non-Aboriginal labour market conditions during the Construction and Operations phases by increasing competition for skilled labour. Competition for skilled workers is mainly driven by a shortage of skilled workers, which can be exacerbated during times when these workers are in high demand. Factors contributing to the shortage of skilled workers in the mining industry include mismatched job vacancies with the skills of people who are seeking work and low levels of labour market participation among groups of potential workers. Labour shortages may also have inflationary implications for labour wages and a project's feasibility. If there are too few qualified workers, compensation levels increase for those with the required skills. However, the effect of potential competition for skilled labour is likely reduced as a result of the current economic slowdown, lower oil prices and reduced investment in exploration that have led to a loss of jobs in Alberta's oil and gas industry, construction and manufacturing. Despite the reduced magnitude, potential competition for labour is considered during the Construction and Operations phases. No effect is expected during the Closure or Post-Closure phases.

Mitigation measures for the change in employment during the Closure phase include a Workforce Transition Plan and communication with the workforce and PACs. Mitigation measures for the competition for skilled labour and wage inflation during the Construction and Operations phases include a training policy; supporting specialized skill training and on-the-job training; supporting apprenticeships at the Project; and hiring workers from TKN and northern BC communities as a priority. After the implementation of mitigation measures, residual effects were predicted to be not significant.

The assessment of cumulative effects on the competition for skilled labour and wage inflation on the Aboriginal labour market conditions VC and the non-Aboriginal labour market conditions VC concluded that, given the uncertainty surrounding the occurrence of future projects, the effects were not significant.

Assessment of Potential Social Effects

Setting

The Project is located within the Peace River Regional District, which has a population of approximately 58,000 people (26% of the RSA population) of which 14% were people of Aboriginal identity (as compared to 5% across BC).

Due to their proximity to the Project and the location of the major service centres of north-central BC, the Project expects to source labour, goods and services from communities within the Peace River Regional District, Regional District of Fraser-Fort George, Regional District of Bulkley Nechako, and Regional District of Kitimat Stikine; these regional districts form the Social RSA. The LSA includes seven PACs due to their proximity to the Project; their likelihood to provide workers,

goods, and services to the Project; and the extent of First Nations' traditional territories. The PACs are Kwadacha, Tsay Keh, Takla Landing, Mackenzie, Prince George, Smithers, and Terrace.

Kwadacha, Tsay Keh, and Takla Landing are accessible by air or forestry service roads, and have small populations (in the range of 200 to 300 people). Mackenzie is also a relatively small community (3,500 residents in 2011) that has been historically dependent on forestry. The other PACs—Prince George, Smithers, and Terrace—have larger populations and more diverse economies, although they also maintain strong links to forestry and mining.

Educational attainment levels vary between the PACs, with a notable difference in educational attainment between residents of the smaller and more rural Aboriginal communities, compared with the larger centres (Statistics Canada 2013d).

Northern Health is the principal health service provider within the RSA and reports that health services in the RSA are currently operating 'at capacity' and that ongoing challenges include great distances between communities and healthcare facilities (BC MOH 2014). The availability of health and social services varies across the RSA and communities. Hospitals and acute care services in the RSA include the Mackenzie & District Hospital, the Prince George Regional Hospital and the University Hospital of Northern BC, the Bulkley Valley District Hospital (in Smithers), and the Mills Memorial Hospital (in Terrace). The Aboriginal PACs of Kwadacha, Tsay Keh and Takla Landing do not have local hospitals, and have limited on-site medical staff (SNC Lavalin 2013).

Health conditions in the RSA, are below provincial averages for indicators such as life expectancy and self-reported health[3] (BC Stats 2012b). There is a discrepancy in health outcomes between Aboriginal and non-Aboriginal populations in BC and across Canada (Mikkonen 2010). Hospitalization and injury rates in the Northern Interior and Northwest health service delivery areas were comparably higher in comparison to provincial and national rates. Within the RSA, the average life expectancy at birth is approximately two to three years lower than the provincial average (BC Stats 2012b).

Aboriginal conceptions and definitions of well-being vary but often centre around the inclusion of physical, spiritual, emotional, and mental dimensions (NCCAH 2009, 2010). Community access to health, social, and emergency services varies by community. The Aboriginal PACs rely in part on scheduled visits from health care professionals and transport (as needed) to larger service centres such as Prince George. Local health and social wellness programs have been established within each of the Aboriginal communities.

Assessment

The assessment covered potential effects on Community Well-being and Aboriginal Community Well-being VCs. The assessment focused on the potential for social effects stemming from Project employment, including those related to income, work rotation, and other aspects of employment.

[3] On average, the regional districts in the RSA had higher rates of PYLL (spell out PYLL) due to natural or accidental causes, or suicide/homicide

Effects will be linked to the number of people from each PAC who are likely to be employed with the Project. Specific considerations related to Project employment and community well-being for all PACs, including Aboriginal communities, are relatively high incomes in the mining industry which may alter lifestyle choices, fly-in/fly-out rotations which lead to individuals being away from family and home communities, and potentially stressful work environment.

Associated with these considerations, two potential effects on community well-being for both Aboriginal and non-Aboriginal PACs were identified:

- **Changes to worker stress and lifestyle choices**: Stress on workers may be influenced by the nature of the work environment, travel to and from the Project, and time away from families while on fly in-fly out (FIFO) rotation. Higher incomes (as well as increased stress) may also lead some individuals to engage in high risk behaviours and make poor lifestyle choices. These stresses may be further exacerbated by reduced coping and support resources.
- **Changes to family dynamics and family/community stress**: Increased stress on workers may affect their families and the quality of time spent at home. Workers' absence from their families while on FIFO rotation may lead to family stress. Higher family incomes may also lead to increased participation in high risk behaviours and different lifestyle choices. At the community level, the cumulative effects on a number of individuals and families could strain local health and social services.

Mitigation includes developing a Health and Wellness Management Plan as part of the Project's occupational health and safety program, and an Employee and Family Assistance Program that provides direct access to financial management resources, personal counselling and other forms of personal assistance. Other mitigation includes worker orientation and training including for example, cultural awareness training.

AuRico will also employ an Aboriginal Liaison Officer to maximize the ability of the Project to recruit and retain Aboriginal employees, and will assist employees with access to various programs and supports on an as-needed basis. AuRico will also maintain communication and information sharing with health and social service providers in Aboriginal and non-Aboriginal PACs, and Northern Health to proactively identify and address issues and concerns related to community well-being and service provision. Finally, to minimize the effects of job losses on well-being once Project Operations are complete, AuRico will develop and implement a Workforce Transition Plan to assist employees in their preparation to identify and secure new employment.

Following the implementation of these mitigation measures, which are considered to be highly effective, residual effects are not anticipated. As no residual effects were identified, a cumulative effects assessment was not conducted.

Assessment of Potential Human Health Effects

Setting

A baseline human health risk assessment (HHRA) was conducted to determine what, if any, risk there is to humans exposed to noise or to contaminants in air, soil, drinking water, and country

foods collected and consumed from within the human health study areas of the Project under existing conditions. The approach for the baseline HHRA was based on Health Canada's guidance for HHRAs and for EAs (Health Canada 2010c, 2010a, 2010b).

Baseline studies reviewed the existing levels of contaminants and noise in the Human Health LSA, established a benchmark for evaluating the potential future effects of the Project, and characterized pre-disturbance conditions for the purpose of the closure and reclamation activities. As part of the baseline HHRA, data was reviewed for baseline noise, air quality, drinking water quality, and country foods quality.

Based on the multi-media baseline HHRA (Appendix 18-A), risk to human health was quantified with hazard quotients (HQs) for non-carcinogenic chemicals and with incremental lifetime cancer risks (ILCRs) for carcinogenic chemicals. The risk to human health from noise was determined by comparison to guidelines.

The HQs for aluminum, chromium, mercury, and methylmercury for toddlers, mercury for adults, and methylmercury for sensitive adults (i.e., women of child-bearing age) were all above 0.2. This suggests that there could be risk to human health due to non-carcinogens.

For carcinogenic metals via the inhalation route (i.e., arsenic, cadmium, chromium, and nickel), no risk to human health was noted. For arsenic, which is considered carcinogenic via ingestion, potential risks to human health were identified as the ILCR was slightly elevated (2.1×10^{-5}) above the acceptable benchmark (1.0×10^{-5}).

All ambient noise levels for rural areas that were used as a proxy for existing noise conditions in the Project area were below all noise guidelines; therefore, there is no risk to human health due to noise under existing conditions.

The baseline HHRA was conservative as it assumes that all of the air, drinking water, incidentally ingested soil, and country foods consumed by an individual would be from within the boundaries of the Human Health LSA. There are currently no known permanent, full-time residents within the LSA. Therefore, the baseline HHRA overestimates the risk to people who may periodically or transiently use the Human Health LSA for various purposes.

Assessment

Due to the remote location of the Project, the evaluation of Project-related health effects included only a single human receptor location within the Human Health LSA. This receptor location is the camp bunkhouses, and was selected for assessment because it is the only location within the Human Health LSA where people (i.e., off-duty Project workers) are expected to reside during the Construction and Operations phases of the Project. On-duty worker health and safety was not considered because AuRico must adhere to occupational health and safety requirements (BC Reg. 296/97) to ensure provision of a safe working environment. People using the land could also be present within the Human Health LSA. However, it was assumed in the Project-related HHRA that a human receptor would be present at the camp bunkhouse 24 hours a day, 365 days per year. This

is a conservative assumption since the camp bunkhouse will experience contaminant concentrations that are higher than at the Project "fence line" or beyond in the Human Health LSA.

Overall, it is concluded that during the Construction and Operations phases, several metals may affect human health (i.e., aluminum, chromium, mercury, and methylmercury for toddlers; aluminum and mercury for adults, and methylmercury for sensitive adults).

For carcinogenic metals via the inhalation route (i.e., arsenic, cadmium, chromium, and nickel), no elevated risk to human health during the Construction or Operations phases were noted. For arsenic, which is considered carcinogenic through ingestion, potential risks to human health were identified during the Construction and Operations phases because the summed incremental lifetime cancer risks were elevated above the threshold of 1×10^{-5} (2.19×10^{-5} and 2.18×10^{-5}, respectively). However, the risk to human health from these COPCs is the same or similar to the risk calculated in the baseline HHRA (Appendix 18-A). The incremental changes due to the Project are negligible and are not predicted to cause a change in human health. Therefore, based on the results of the baseline HHRA (Appendix 18-A) and the Project-related HHRA (Appendix 18-B), a Project-related change in human health would not be expected and no residual effects to human health are identified.

Assessment of Potential Heritage Resources Effects

Setting

The heritage resources RSA boundary was determined in consultation with TKN communities, while the LSA includes the Project infrastructure footprint plus a 150 m buffer. Within the heritage resources LSA, there is one known archaeological site that may be affected by the Project: site HgSq-15. This site is a small lithic scatter consisting of three basalt flakes located in the ditch of the existing exploration road. The basalt flakes may have been exposed during road grading. Shovel testing conducted during the 2014 archaeological impact assessment (AIA) did not locate any additional cultural material.

There are no known protected sites of historical or architectural significance or protected paleontological sites with the LSA. However, there are several areas that have not be previously subjected to an AIA including the Exhaust Ventilation Access Road, Borrow 10 expansion, East Pit Quarry expansion, diversion ditches, and Attichika Discharge Pipeline which will be assessed prior to construction.

Assessment

The heritage resources VCs included cultural heritage resources (physical and cultural heritage or on any structure, site or thing that is of historical, archaeological, or architectural significance), and paleontological resources. Heritage sites outside the LSA are more than 150 m from areas that will be impacted by the Project, and thus are not anticipated to be affected. The assessment includes mitigation measures for the management of both known and unknown heritage resources within the LSA.

Archaeological site HgSq-15 is located within an area that will be impacted by upgrades to the exploration road. This site has been previously disturbed by the construction and/or maintenance of the existing exploration road. Based on the results of the AIA no further work was recommended at this site (Crossroads 2015a; Appendix 19-2), however a permit will be required from the Archaeology Branch prior to the start of construction

Additional archaeological sites may be discovered during Construction, Operations and Closure and/or during archaeological studies to be undertaken for proposed Project components not previously assessed. Any newly discovered archaeological sites will be subject to management and mitigations measures determined through consultation with the Archaeology Branch and Aboriginal groups. Avoidance is always the preferred mitigation measure. If avoidance is not possible, infeasible additional mitigation measures may involve detailed mapping, photography, and systematic data recovery.

Potential effects of the Project on known archaeological sites will be mitigated and managed by avoiding sites where possible, educating Project personnel, and implementing a Heritage Management Plan. With the application of these mitigation and management measures prior to the development of Project components, no residual effects on known archaeological sites are anticipated. Implementation of additional archaeological inspection and/or investigation, if necessary, prior to Construction, and implementation of the Chance Find Procedure and Heritage Management Plan during Construction and Operations will help to identify as-yet undiscovered heritage resources. With the implementation of these measures prior to the development of Project components, no residual effects on as-yet undiscovered heritage resources are anticipated, and residual effects are not anticipated. As residual effects to protected heritage sites are not anticipated, no cumulative effects assessment was required.

Assessment of Potential Effects of Changes to the Environment on Aboriginal Peoples

Setting

The characterization of Aboriginal groups' current use of lands and resources for traditional purposes (CULRTP), health and socio-economic conditions, and physical and cultural heritage (including any structure, site or thing that is of historical, archaeological, paleontological or architectural significance) is undertaken in relation to an LSA and RSA. The LSA and RSA are based on the study areas defined for the assessment of potential effects on wildlife, as these areas represent the greatest spatial extent of environmental effects caused by the Project. The study areas for other environmental effects (e.g., air quality, water quality, noise) are contained within the RSA.

Current Use of Lands and Resources for Traditional Purposes

The TKN have identified fishing locations at Thutade Lake and Amazay Lake in the LSA, and Thorne Lake, Sturdee River, and the head of Ingenika River in the RSA. Hunting and trapping locations identified by the TKN include Thutade Lake, Amazay Lake, Kemess Creek, Attichika Creek, and Mount Forrest in the LSA, as well as Niven River, Moose Valley, Johanson Creek, and the confluence of the Finlay and Firesteel rivers, just outside of the LSA. Amazay Lake and Thutade Lake were identified by the TKN as places where they harvest berries and medicinal plants, as well

as the locations of burials, spirit questing places, and important events in their oral history. Amazay Lake and Moose Valley (in the RSA) were also identified by the TKN as the locations of annual social gatherings. Access to these locations is primarily via the ORAR, though traditional trails are also located along the Finlay River and Ingenika River.

The entire LSA is within trapline TR0739T006, which is registered to a family from TLFN. The trapline includes Thutade Lake and Amazay Lake (in the LSA), and extends north to the Firesteel/Finlay River confluence, east to Johanson Lake, west to the headwaters of Thutade River, and south to Moose Valley and the Sustut River. The RSA overlaps an additional 13 registered traplines, 12 of which are registered to individuals or families from TLFN, TKDN and KwN.

Available information indicates that members of Gitxsan Wilp Nii Kyap visit the Thutade Lake area to commemorate events in oral history, particularly the battle between the Gitxsan and Tse'khene ethnolinguistic groups at Thutade Lake and Cascadero Falls. MNBC has identified one recorded ptarmigan harvest in the vicinity of Toodoggone River (in the RSA), and may use the RSA for harvesting and other activities. No specific harvesting or other use locations in the vicinity of the Project have been identified by West Moberly First Nations (WMFN), although based on their asserted traditional territory they may also use the RSA.

No specific harvesting or other use locations in the vicinity of the Project have been identified by the Fort Nelson First Nation (FNFN), Doig River First Nation (DRFN), Blueberry River First Nations (BRFN), Halfway River First Nation (HRFN), McLeod Lake Indian Band (MLIB), Prophet River First Nation (PRFN), and Saulteau First Nations (SFN).

Health and Socio-economic Conditions

Country foods are nutritionally, culturally, and economically important to Aboriginal people. The dietary quality of Aboriginal people is much improved on days when traditional foods are consumed, as traditional foods are important contributors of protein, vitamins D and A, iron, zinc and several other nutrients. While Aboriginal groups in northern BC stress the importance of harvesting and consuming country foods, many also acknowledge that they do not undertake these activities as often as they would like. Current barriers to traditional harvesting include a reduced ability to spend time on the land due to wage employment and schooling, and the high price of contemporary hunting technologies such as guns, traps, 4x4 vehicles, boats, fuel, and related gear.

The TKN First Nations independently operate guide outfitting, eco-tourism and commercial angling and plant gathering businesses in the RSA. Trapping is still an important traditional activity among the TKN, although its importance as a source of household revenue has declined since the 1960s, due to the drop in fur prices and the rise of the wage labour economy.

Publicly available information and engagement efforts to date have not identified land-based businesses operated within the LSA or RSA by Gitxsan Wilp Nii Kyap, the Treaty 8 First Nations, or MNBC, or a reliance on the LSA or RSA for country foods harvests by these Aboriginal groups.

Physical and Cultural Heritage

Thutade Lake is reported to be the site of a historical territorial conflict between the Tse'khene and the Gitxsan. Associated locations along the lake include the place where the Tse'khene camped at the time of the battle, the location of the battle, and an associated burial. These places are important to both the TKN and Gitxsan Wilp Nii Kyap. The button blanket belonging to the Chief of Wilp Nii Kyap commemorates the peace settlement that was made following the battle.

Numerous TKN camps and cabins are located throughout the RSA, in particular around Thutade Lake. McConnell Creek (RSA), Black Lake (RSA), Aiken Lake (RSA), Cheni Mines (RSA), Grizzly Pass (RSA), Whistler Basin (outside the RSA), Shasta Mine (RSA), Sustut (outside the RSA), Thorne Lake (RSA), and Cascadero Falls (just outside the LSA) were recognized as places people have recently spent time in tents or cabins. Trails run along both sides of Thutade Lake and the west side of Amazay Lake. Trails also run from Moose Valley to Thorne Lake to Attichika Creek. One trail used by the Gitxsan, which runs overland from the upper Skeena River along Birdflat Creek and the Niven River to Thutade Lake, appears to be within the RSA.

The Treaty 8 First Nations and MNBC have not identified habitations, trails, or sacred sites in the LSA or RSA.

Harvesting activities, and the use of culturally important areas, play a central role in the perpetuation of Aboriginal culture. This includes the use of Aboriginal languages while harvesting and processing resources, transmitting knowledge of these activities from elders to youth, using Aboriginal place names to refer to places on the landscape, and hearing the stories associated with those places. These activities together contribute to having a First Nations identity.

Assessment

The VCs included in the assessment (i.e., CULRTP, health and socio-economic conditions, and physical and cultural heritage) were selected based on an understanding of Project activities and components, input from consultation, the requirements of the AIR and CEAA 2012, and professional judgement. The assessment draws upon conclusions reached in other sections of the Application, including those related to air quality, noise, surface water quality, terrestrial ecology, fish and aquatic habitat, wildlife, human health, and heritage resources.

Potential effects of changes to the environment on FNFN, DRFN, BRFN, HRFN, MLIB, PRFN, and SFN were screened out of the assessment. Based on publicly available information, which has been shared with each of these Aboriginal groups for review and comment along with the results of this assessment, no potential effects are identified. The traditional territories of these Aboriginal groups lie entirely outside of the RSA, and/or the available information does not indicate that members of these groups use the RSA for harvesting or other purposes. These conclusions were shared with these First Nations in writing in September 2015, with an opportunity to review and comment; no additional information was received. However, these groups are all members of Treaty 8 and have rights under the treaty to carry out their usual vocations of hunting, fishing, and trapping within the Treaty 8 area.

Current Use of Lands and Resources for Traditional Purposes

CULRTP could be affected by changes in access (and subsequent displacement of activities); changes to the quality of the land use experience; and changes to the availability of harvested species (i.e., fish, wildlife, plants). Potential effects of changes to the environment on CULRTP were evaluated for the TKN First Nations, Gitxsan Wilp Nii Kyap, WMFN, and MNBC.

For the TKN First Nations, a residual effect to CULRTP is identified due to a potential reduction of wildlife resources in the LSA (as assessed for the wildlife VCs). The effect is considered minor and localized in extent and rated as not significant. No potential effects on CULRTP are identified for Gitxsan Wilp Nii Kyap, WMFN, or MNBC. No specific management or monitoring plans will be developed to minimize effects to CULRTP due to changes to the environment. Management plans designed to address potential Project-related effects that may be relevant but not specific to CULRTP include the Fish and Aquatic Effects Monitoring Plan, the Ecosystem Management Plan, and the Wildlife Management and Monitoring Plan.

Since the only residual effect to CULRTP is due to changes to the availability of wildlife, and no cumulative residual effects to wildlife are predicted, no cumulative interaction between effects to CULRTP and other projects and activities is identified. Therefore, no additional mitigation is necessary, and this residual effect is not carried forward into the cumulative residual effects assessment.

Health and Socio-economic Conditions

Health and socio-economic conditions include sub-components related to physical health, diet, food security, and land-based businesses. There are no communities within the RSA, and therefore no communities will be affected by Project-related changes in air quality, noise, water quality, or other environmental changes. As such, the assessment of potential effects on Aboriginal peoples' health and socio-economic conditions focuses on potential effects associated with country foods harvests and/or land-based businesses (such as guide outfitting). These may be directly or indirectly affected by the Project: changes in country foods quality could directly affect human health ingestion, and could also affect health through changes in diet and/or the household economy through changes in spending (e.g., increased consumption of store-bought foods). Indirect effects could stem from changes to CULRTP, including potential effects on businesses that rely on traditional activities such as hunting and trapping.

Following the implementation of mitigation measures, no residual effects of environmental changes caused by the Project on Aboriginal peoples' health and socio-economic conditions are identified. No management or monitoring plans are proposed to specifically address potential effects to Aboriginal socio-economic and health conditions due to changes to the environment.

Physical and Cultural Heritage

Two types of potential effects to physical and cultural heritage are identified: one being a direct, physical effect to a place or thing, the other being a less tangible effect on a custom, attribute, or activity. The latter effect can be caused by former, as well as by the alteration of harvesting practices or changes to the consumption of country foods.

Following the implementation of mitigation measures and other agreements, no residual effects to physical or cultural heritage is predicted for TKN, Gitxsan Wilp Nii Kyap, WMFN, or MNBC. As discussed previously, a Heritage Chance Find Procedure and a Heritage Management Plan will be implemented prior to the Construction phase to address potential or unforeseen effects to physical heritage, which includes any structure, site or thing of archaeological, paleontological, historical or architectural importance. No management or monitoring plans are proposed to specifically address potential effects to intangible cultural heritage.

ACCIDENTS AND MALFUNCTIONS

Failure Modes Effects Analysis

A failure modes effect analysis (FMEA) was used to determine the level of risk to environmental VCs associated with the development of the Project. The level of risk considered the probability (or likelihood) and consequences of a risk event on environmental VCs. The probability of a risk event was categorized as rare to almost certain based on expert opinion. The consequence of each failure mode/ risk event was rated as negligible to severe based on the anticipated result of that failure mode/ risk event on environmental VCs.

The FMEA identified 167 potential risk events, each with a consequence rating related to environment, human health, and community reputation. Specific to environmental consequences, 160 events are predicted to result in low risk events (negligible to minor adverse effect with no further consideration warranted), five moderate risk events (a potential moderate adverse effect that warrants further consideration) and two high risk events (an interaction resulting in potential significant major adverse effect or significant concern and warrants further consideration). Low-risk events were excluded from further assessment and moderate and high risk events were carried through for further effects assessment.

The five moderate risk events occur in three failure modes: 1) leak/spill of hazardous substances stored on-site; 2) leak/spill during road, air, or water transport; and 3) fires or explosions (Table 4).

Table 4. Moderate and High Risk Failure Modes and Risk Events Considered in the Environmental Assessment

Risk Level	Failure Mode	Risk Event
Moderate Risk	Leak/spill of hazardous substances stored on-site	KUG discharge pipeline failure, water release
	Leak/spill during road, air, or water transport	Transport of process reagents, waste, or concentrate crash/collisions Transport of fuel/propane crash/collision
	Fires or explosions	Transport of process reagents, waste, or concentrate crash/collision Transport of fuel/propane crash/collision
High Risk	Breach/failure of tailings dam or other containment structure	KUG TSF East Dam failure KUG TSF East Dam or pit wall overtopping

One failure mode was identified as high environmental risk, being the breach/failure of tailings dam or other containment structures failure mode associated with two possible risk events: KUG TSF East Dam failure and KUG TSF East Dam or pit wall overtopping.

Assessment of Potential Environmental Effects

The failure modes associated with high and moderate environmental risk events were examined using an interaction matrix. Interactions between failure modes and risk events with VCs (hydrogeology, surface hydrology, surface water quality, terrain and soils, terrestrial ecology, fish and aquatic habitat, wildlife, economic, social, human health, heritage, and effects to Aboriginal peoples) were ranked as high, moderate, or low. Interactions rated as moderate or high were evaluated for their potential effects on environmental VCs and characterized in terms of magnitude, duration, geographic extent, reversibility, resiliency, context, and the significance of residual effects.

Moderate Risk Failure Events

Leak/Spill of Hazardous Substances Stored on Site

In the event of the failure of the underground dewatering pipeline, untreated water being pumped from the underground mine to the KUG TSF would be released from the pipeline on to land. Depending on the failure point, it could flow downslope of the access tunnel entrance into the upper reaches of Kemess Creek, or downslope to water management facilities in the KS Mine site area. This event could negatively affect terrestrial or aquatic environments adjacent to the pipeline. However, based on the assessment of potential residual effects, failure of the dewatering pipeline would not be significant.

Preventative, response, and contingency procedures to address any failures of the underground dewatering pipeline will include maintaining the specified operating procedures and initiating the Environmental Emergency, Spill and Hazardous Materials Plan, and the Emergency Response Plan, should a failure event occur. Regular inspections and monitoring of pipeline pressure will be carried out. The pipeline will be routed along the conveyor and protected by a safety berm.

Leaks and Spills during Transport

Two types of spill events during transport were examined: spills involving fuel or propane and spills of process reagent, waste, or concentrate. These events were identified as potentially interacting with hydrogeology, surface water quality, terrain and soils, terrestrial ecology (wetlands), and fish and aquatic habitat VCs depending on the location of the spill. Though residual, local- to landscape-scale residual effects would be expected, effects are expected to be not significant due to the relatively limited extent of effect from a potential spill and implementation of spill response measures.

Preventative, response, and contingency procedures to address any leaks or spills during transport will include the initiation of the Environmental Emergency, Spill and Hazardous Materials Plan, and the Emergency Response Plan. Suppliers' and contractors' management plans for off-site transport will be in place. Proper and secure containment will be specified and Material Safety Data Sheets and manifests will accompany the transportation. Preventative maintenance of vehicles, equipment

and storage containers will be undertaken and appropriate training will be a requirement of responsible personnel.

Fires or Explosions

Fires or explosions (not related to spilled liquids or materials) could result from transport of flammable material or a crash or collision. Specific to the effects of a fire or explosion, residual effects to environment would be most related to forested ecosystems. With the FMEA, the likelihood of an accident on the mine site was rated as unlikely as the lower traffic and greater regulations/restrictions reduce the likelihood and prompt initial attack on a fire would reduce the potential for further spread. Based on the assessment of residual effects, no significant effect on the environment would be expected.

Preventative, response, and contingency procedures to address any fire or explosion events will include the initiation of the Environmental Emergency, Spill and Hazardous Materials Plan, and the Emergency Response Plan (specifically Section 24.5.4.25, Fire Fighting), to ensure immediate action to minimize the environmental effects. Suppliers' and contractors' management plans for off-site transport will be in place. Firefighting equipment will be placed at strategic locations throughout the Project footprint where fire may endanger life or property. Non-compatible materials will be transported in separate shipments and explosives will be transported by qualified contractors following the strict federal requirements. Documented operational procedures and site-specific work instructions for tasks that have an identified risk, such as fuel handling and waste management, will be in place. Appropriate training will be a requirement of all personnel responsible for transporting or storing hydrocarbons or fuelling vehicles.

<u>High Risk Failure Events</u>

Breach or Failure of the Tailings Dam or Other Containment Structure

The East Dam failure scenario assumes that a catastrophic failure of the East Dam would cause a large volume of tailings and supernatant water to flow downstream, primarily into Kemess Creek. The likelihood of a breach/failure of the East Dam was identified as being rare, the lowest possible likelihood category, due to a conservative and robust design approach for the East Dam including large above-water beaches and compacted rockfill construction in the downstream direction with complete removal of weak glaciolacustrine foundation soils within the dam footprint.

Preventative measures to address the risk (i.e. likelihood) of failure of the East Dam include particularly robust dam design using Probable Maximum Flood and Maximum Credible Earthquake criteria, during construction, operation and closure of the tailings storage facility. The East Dam is designated with a "Very High" incremental consequence rating based on the Canadian Dam Association (CDA) 2007 Dam Safety Guidelines classification scheme. Therefore, the most stringent flood and earthquake criteria have been adopted for the design of the East Dam which satisfy even the "Extreme" CDA classification.

The high safety factor achieved by the robust design is supported by the use of compacted rock fill in the dam wall. The dam design includes abundant freeboard for the storage of maximum flood volumes, as illustrated by the current dam staging plan that provides an annual freeboard well in

excess of the minimums specified in the feasibility design report. The treatment of water and installation of a closure spillway will also result in a water balance deficit. As part of the monitoring program for the East Dam, instrumentation in the form of piezometers, survey monuments, and slope inclinometers will be installed as required. The Environmental Emergency, Spill and Hazardous Materials Plan, and the Emergency Response Plan, will be initiated in the event of failure of the East Dam or other containment structure.

A detailed dam breach and inundation study has not yet been completed for the KUG East Dam and will be completed to support AuRico's *Mines Act* permit application. Based on the assessment of residual effects completed for this Application, a breach or failure of the East Dam could lead to significant residual effects.

Conclusions

The residual effects of failure modes were assessed to be not significant except for the KUG TSF East Dam-failure event which would result in significant effects on environmental VCs. Failure of the dam would affect surface hydrology, surface water quality, wetlands, listed ecosystems, fish and aquatic habitat, western toad, and current use of lands for traditional purposes.

ABORIGINAL GROUPS INFORMATION REQUIREMENTS

Setting

The Project is located within the traditional territories of the TLFN and TKDN. The KwN's traditional territory is adjacent to and downstream of the Project. Gitxsan Nation asserts that the Project is located in Gitxsan Wilp Nii Kyap's (GWNK's) traditional territory. The western boundary of Treaty 8 (recognized by the federal government but disputed by the province) overlaps with the Project. Métis Nation BC (MNBC) chartered communities are located in the larger regional area around the Project.

TLFN, TKDN, and KwN are jointly represented by the TKN based on their common history, culture and language, and social and political ties. The three TKN First Nations are listed on Schedule B of the Section 11 Order (as amended by the Section 13 Order). GWNK, Treaty 8 First Nation, and MNBC are listed on Schedule C of the Section 11 Order.

TKN nations primarily derive from Tse'khene (Sekani) ancestors, but also Dakelh (Carrier) and Kaska lineages. Tse'khene are Athapaskan peoples (Beaver-Sarcee-Sekani branch) who traditionally inhabited the mountainous areas drained by the Finlay and Parsnip branches of the Peace River. Tse'khene were organized into regional bands, broken down into local bands and task groups that carried out seasonal activities within general territorial ranges. The seasonal round generally consisted of hunting big game such as caribou and moose in the fall, winter trapping, summer plant gathering, fishing, and social gatherings (although hunting, trapping, fishing and gathering could take place at any time of the year). As they were pushed westward into the Rocky Mountains by the Dane-zaa and Cree, the Tse'khene began to intermarry and have close contact with the Gitxsan and Dakelh to the west.

TLFN is a member of the Carrier Sekani Tribal Council, which is currently negotiating a treaty with Canada and BC and is at Stage 4 of the six-stage process. TKDN entered the BC Treaty process in 1994 and is also currently at Stage 4 of the process. KwN is negotiating a treaty together with other First Nations represented by the Kaska Dena Council and is likewise at Stage 4. TKN nations have developed a number of collaborative and government-to-government agreements with the province in relation to forestry, mining, oil and gas, water, and environmental stewardship in their territories.

According to a Tse Key Nay statement on rights and interests in the Kemess area:

> *The Kemess area, including the site of the proposed Kemess Underground mine, is of major historical, economic and cultural importance to the Tse Keh Nay and extensive evidence of aboriginal rights and title exists. It is an area that was used, occupied and defended by the ancestors of the Tse Keh Nay before and after the arrival of Europeans. The significance of the Kemess area for Tse Keh Nay, including its use for traditional purposes, remains very high even today.*

Tse Key Nay has documented extensive current use of lands and resources for traditional purposes in the vicinity of the Project. AuRico assumes that TLFN's, TKDFN's, and KwN's Aboriginal rights near the Project include the rights to hunt, trap, fish, gather, engage in social and ceremonial practices, and exercise Aboriginal title.

Gitxsan peoples are part of the Tsimshianic language family and share cultural connections with other Tsimshian nations. The traditional territory of Gitxsan—whose name translates as "People of the Skeena River"—encompasses the Skeena River watershed as well as several adjacent watersheds that drain into the Pacific Ocean. The traditional economy of the Gitxsan focused on salmon harvested from the Skeena and its tributaries. Permanent village sites located on the Skeena River served as a winter base in the Gitxsan seasonal round, which generally focused on salmon harvesting in the summer, fall hunting (caribou, bear, moose, deer, goat, etc.), winter trapping (groundhog, beaver, marmot, rabbit, marten), and spring plant gathering (although hunting, trapping, fishing, and gathering took place in all seasons). *Simgigyat* (house chiefs) of *huwilp* (house groups) controlled management of resources, and permission to pass through or use a territory. The house territory of GWNK is most proximate to the Project.

Gitxsan peoples traded with coastal and inland groups, and with fur trade companies during the fur trade. The Project appears to be located in a frontier zone between Tse'khene and Gitxsan. Gitxsan and Tse'khene oral history documents a pre-contact battle between Tse'khene and Gitxsan around Thutade Lake and Cascadero Falls, as well as a subsequent peace treaty. In a submission to the Kemess North Joint Review Panel, Gitxsan noted that the Project is located in a *Gawa Gyaani* (peace treaty) area, where rights among neighbouring First Nations are shared. During the fur trade, Gitxsan peoples settled at Fort Connelly (Bear Lake), which subsequently became the Fort Connelly Band before it was disbanded and amalgamated with the North Takla Band.

GWNK has asserted that the Project is located in its traditional territory during meetings with AuRico. During the Kemess North review, GWNK asserted that Gitxsan holds Aboriginal title to lands containing the Kemess Underground deposit. A review of available materials and consultation efforts to date has not identified Gitxsan historic or current use in the immediate vicinity of the

Project. Gitxsan Nation is negotiating a Treaty with BC and Canada and is currently in Stage 4 of the process.

Treaty 8 signatories include Doig River First Nation (DRFN), Halfway River First Nation (HRFN), Prophet River First Nation (PRFN), Saulteau First Nations (SFN), West Moberly First Nations (WMFN), Fort Nelson First Nation (FNFN), Blueberry River First Nations (BRFN), and the McLeod Lake Indian Band (MLIB). Signatories have the treaty right to "pursue [their] usual vocations of hunting, trapping, and fishing throughout the tract surrendered." All Treaty 8 First Nations but MLIB are Dane-zaa (Beaver), an Athapaskan-speaking group traditionally inhabiting the Peace River Valley in northeastern BC and northwestern Alberta. The present-day communities of all Treaty 8 First Nations, except MLIB, are located to the east of the Rocky Mountains. MLIB is of Tse'khene descent, appearing to descend from the Tsekani regional band, which occupied an area from McLeod Lake south to the continental divide and east to the edge of the prairies.

WMFN, HRFN, SFN, PRFN, DRFN, and FNFN sought a court declaration regarding the interpretation of the western boundary. The case is ongoing and is being pleaded under *West Moberly First Nations v. British Columbia*. TLFN and TKDN have been granted intervenor status in proceedings. A review of available materials and consultation efforts to date has not identified Treaty 8 First Nations' historic or current use in the vicinity of the Project.

The *Métis Use and Occupancy Study of the AuRico Metals Kemess Project* identifies current Métis land and resource use as occurring primarily outside of the RSA. Areas of use are generally concentrated along main roads and highways, including Highway 37 (south of Bell II), and roads stemming from Highway 16. One ptarmigan harvest was documented in the RSA in the vicinity of Toodoggone River north of the Project. No current uses are documented in the LSA. Métis Nation BC asserts rights and traditional uses over the entire province of British Columbia.

Consultation

AuRico initiated consultation with Aboriginal groups with respect to the Project in 2010. Upon the commencement of the EA process in 2014, AuRico's consultation efforts have also been informed by requirements in the Section 11 orders, AuRico's Aboriginal Consultation Plan, and the Project AIR. AuRico consults with TLFN, TKDN, and KwN jointly through TKN. AuRico has also shared information with Aboriginal groups identified on Schedule C of the Section 11 Order.

An IMA (signed in June 2012 by AuRico and TKN) has guided AuRico's consultation with TKN. The IMA provides for the establishment of a SIC and EMC. The SIC is responsible for IMA implementation, environmental management provisions, employment, and business opportunities. The EMC identifies specific studies and issues related to the environment, and provides general project updates to the Chiefs and community members. The IMA also includes provisions regarding: establishment of a new agreement with TLFN trapline holders; provision of information related to the Kemess South Closure Plan; and negotiation of an Impact Benefits Agreement. Complementing the goals of the IMA, AuRico and TKN developed a Joint Communication Plan to foster a positive and respectful ongoing relationship.

AuRico provided funds for TKN to undertake the Tse Keh Nay Kemess Underground Project Traditional Knowledge and Land Use Study. AuRico has relied on the results of this study to inform all aspects of its Application, particularly the assessment of effects of environmental changes on Aboriginal peoples and the assessment of effects on Aboriginal rights and interests.

On the basis of a collaborative approach established between AuRico and TKN, AuRico shared the draft VC Scoping Summary and draft AIR with the TKN for their review and comment prior to submitting these documents to the BC EAO. AuRico revised both documents based on TKN's comments. In November 2014, AuRico discussed the VCs related to the Project and the status of the EA process at community meetings in Kwadacha (November 5), Tsay Keh (November 6), and Takla Landing (November 13). AuRico also provided the Application to TKN to allow for an extended period for screening and review of the Application prior to submission to the BC EAO.

Key issues raised by TKN include:

- potential impacts on water quality in Thutade Lake due to water discharge;
- potential impacts on wildlife resulting from habitat loss and disruption of animal migrations as a result of Project infrastructure;
- potential impacts on fish due to sedimentation affecting spawning areas;
- potential impacts on Amazay Lake;
- potential effects on graveyards and spiritual sites, and other cultural and archaeological sites;
- potential impacts on trails, camp sites, and traditional meeting grounds at the north end of Thutade Lake;
- potential impacts on current use of lands and resources for traditional purposes resulting from increased competition and hunting pressure, restricted access, First Nations' avoidance of industrial sites, and perceived risk of contamination; and
- decreased quality of furs trapped on traplines that might be affected by the Project and subsequent decreases in economic value of furs.

In response, AuRico has:

- selected the declines portal site to avoid interaction with Amazay Lake;
- relocated the access road and conveyor system to the decline portals away from higher value fish habitats in El Condor Creek and Kemess Lake;
- elevated the conveyor in the Kemess Lake Valley area and designed gravel ramps over the proposed discharge waterline to facilitate the passage of wildlife;
- engaged the TKN in the assessment of water discharge alternatives and selected TKN's preferred discharge alternative (Attichika Creek);
- relocated the alignment of the discharge outfall to avoid bull trout staging and spawning areas in Attichika Creek;

- undertaken to stage water discharges from the KUG TSF to the natural hydrograph of Attichika Creek, limit the discharge period to the open water season (May to October), and decrease the amount of water discharged during the final years of the Construction phase;
- undertaken a sampling program for Thutade Lake bull trout in response to the TKN request for increased sampling of adult bull trout in Thutade Lake who use Attichika Creek to assess bio-accumulation;
- committed to sharing the results of the proposed monitoring programs with the TKN over the life of the Project;
- provided funding to undertake reviews of the supporting KUG baseline studies;
- agreed to compensate the TLFN trapline holder for the portion of the trapline overlapping with the Project;
- committed to a full range of best practices and environmental management and monitoring programs to mitigate any environmental effects; and
- committed to assist TKN members to benefit from business and employment opportunities.

AuRico has also funded a number of studies requested by TKN but not required under the EA process, including:

- an archaeological overview assessment which included establishing a cultural database in each TKN FN community;
- supporting external reviewers for TKN to review the Kemess South Reclamation and Closure Plan, including a dam breach and inundation study related to KS;
- support for a caribou collar program;
- a socio-economic review of TKN communities;
- a performance review of socio-economic conditions related to KS EA certificate;
- a state of baseline data review;
- a fish passage/culvert assessment and monitoring program undertaken by TLFN;
- water monitoring and invasive plant species programs over several years undertaken by TKDN; and
- terrestrial monitoring programs over several years undertaken by TKDN.

AuRico initiated consultation with GWNK in 2011. AuRico met separately with GWNK, Gitxsan Chiefs Office, and Gitxsan Development Corporation in 2013 to discuss the Project, jobs, training, contract opportunities, and the EA process. In March 2014, AuRico met with the Chief of Wilp Nii Kyap to provide an overview of the Project Description and an update on the Project, including the 2014 field program. During each of these consultations, GWNK stated that the Project is within their asserted territory.

Based on guidance provided by the BC EAO and CEA Agency, AuRico provided Aboriginal groups listed on Schedule C with information about the Project, AuRico's proposed approach to assess

potential effects on each Schedule C Aboriginal group, and AuRico's plans for seeking each Schedule C Aboriginal group's input into the assessment. AuRico subsequently provided all Schedule C Aboriginal groups with a summary of publically available information about each Aboriginal group's health and socio-economic conditions, current use of lands and resources for traditional purposes, and physical and cultural heritage. In addition, AuRico described its understanding of each Aboriginal group's rights and interests as related to the Project. AuRico encouraged each Aboriginal group to review and comment on the information provided.

MNBC responded to AuRico's letters, stating that Métis Nation BC citizens from adjacent chartered communities and nearby smaller communities exercise their Aboriginal right to harvest around the proposed Project. The *Métis Use and Occupancy Study of the AuRico Metals Kemess Project* was based on the Métis database of Use and Occupancy Mapping. HRFN responded to AuRico's letters requesting a robust approach to tailings safety, in consideration of potential impacts to the Peace River Watershed in the case of a KUG TSF breach.

No other Schedule C Aboriginal group commented on AuRico's letters. To date, no issues have been raised by DRFN, PRFN, SFN, WMFN, FNFN, BFN, or MLIB regarding the Project. During the Application review process, AuRico will continue to compile, track, and, where possible, address issues raised by Aboriginal groups during engagement activities, and attempt to resolve any outstanding issues.

Assessment

AuRico identified Aboriginal customs, practices, and traditions that have the potential to interact with the Project, selecting cultural transmission, social and ceremonial practice, and resource harvesting as VCs for the assessment. In line with Canadian case law, the assessment conceptualizes adverse effects on Aboriginal and treaty rights in terms of *infringement* (i.e., with respect to limitations on, or diminution of, their meaningful exercise). Three types of limitations on Aboriginal and treaty rights are considered:

- limits on the spatial extent of Aboriginal peoples' customs, practices and traditions;
- limits on the utility of Aboriginal peoples' customs, practices and traditions; and
- limits on the continuity of Aboriginal peoples' customs, practices and traditions.

TKN identifies two special resources, one cultural resource, and four ceremonial sites that appear to be located such that the sites may be affected by visual effects related to the cave subsidence zone, facilities at the decline entrance in the Kemess Lake Valley area, and activities at other Project infrastructure. Noise may also be audible (although most Project activities will be underground and located approximately 3 km away). Sensory disturbance holds the potential to reduce the potency or spiritual value of ceremonial activities in the area of Amazay Lake. Sensory disturbance may also result in reduced sense of place. Users of ceremonial sites on the north side of the underground deposit may experience increased contact with mine personnel using the north access road. Such contact may reduce members' sense of place and feelings of connection with the land, spirit, and ancestors.

The utility of TKN nations' hunting efforts of moose and bear, and trapping of marten and wolverine, within the LSA could be reduced, as these animals might be displaced from the area. Linear components on the mine site, including access corridor and water discharge line, are anticipated to affect the movement of woodland caribou, moose, grizzly bear, American marten, and wolverine. Grizzly bear and wolverine that become habituated to the presence of attractants may be relocated or destroyed.. TKN nations will not be able to hunt for hoary marmot in the area of the underground deposit for the life of the mine due to safety considerations.

Should TKN nations fish in Amazay Lake, or gather plants around Amazay Lake, they may experience visual changes and noise from the Project. These sensory disturbances may reduce members' sense of place and their feeling of connection with the land, spirit, and ancestors.

The access corridor and the proposed decline could interfere with members' ability to gather berries and plants (including medicinal plants), should harvestable plants exist in these locations.

On the basis of the small scale and scope of the Project, proposed mitigation measures, the low magnitude and local extent of potential effects, and ongoing engagement with TKN, these effects are rated as not significant.

Effects of the Project on Treaty 8 signatories' treaty rights are considered to be negligible. All Treaty 8 First Nations, except for the MLIB are Dane-zaa, who traditionally occupied lands in the Peace River area to the east of the Rocky Mountains. According to the Supreme Court of Canada in Mikisew Cree First Nation v. Canada (Minister of Canadian Heritage), 2005 SCC 69, Treaty 8 First Nations' "meaningful right to hunt" is not ascertained on a treaty-wide basis "but in relation to the territories over which a First Nation traditionally hunted, fished and trapped, and continues to do so today." A review of available materials and consultation efforts to date has not identified historic or current use of the LSA or RSA by Treaty 8 First Nations.

No residual effects are anticipated on MNBC's Aboriginal rights. As noted previously, the *Métis Use and Occupancy Study of the AuRico Metals Kemess Project* identifies current Métis land and resource use as occurring primarily outside of the RSA, and no current uses are documented in the LSA.

PROPONENT CONCLUSIONS

The Project will be developed as a brownfield project using areas of existing disturbance and infrastructure associated with the KS Mine, now in a care and maintenance phase. The utilization of existing facilities at the former KS Mine site will contribute to a material reduction in the Project's array of potential environmental effects. The Project will have a surface footprint of less than 100 ha, which represents approximately 5% of the area previously disturbed for the KS Mine.

AuRico has a positive track record of conducting mine operations, reclamation and closure activities associated with the KS Mine, including receiving several citations by the BC Technical and Research Committee on Reclamation for outstanding achievement in reclamation at a metal mine. AuRico is dedicated to continuing to conduct its business in a sustainable manner that achieves a balance between the environment, society, and the economy which is consistent with the intention of the BC

EA process to promote sustainable development, while minimizing adverse environmental, economic, social, heritage, and health effects.

The Project will result in benefits to the region, province, and country through direct and indirect employment and business opportunities to supply goods and services directly and indirectly to the Project, as well as other spin-off economic benefits. In addition, the Project will contribute tax revenues to local, provincial, and federal governments.

The EA considered a comprehensive set of potential adverse effects, the majority of which are expected to be fully mitigated once proposed mitigation measures are implemented. Several residual effects were identified in relation to groundwater, surface hydrology and water quality, terrain and soils, terrestrial ecosystems, wildlife, socio-economic conditions, and current use of lands and resources for traditional purposes. However all were deemed to be not significant.

AuRico recognizes that the success of the Project is dependent on the establishment of positive and trusting relationships with Aboriginal groups, communities, stakeholders, and the public. To this end, AuRico re-engaged with the TKN in 2010, prior to the Project formally entering the EA process in February 2014. As part of the development of the Application, TKN have contributed by participating in EA Working Group meetings, reviewed and commented on baseline study reports, draft Valued Scoping Summary and draft AIR, and hosted multiple meetings in their communities. The TKN also contributed significantly to AuRico's evaluation of proposed discharge alternatives from the KUG TSF. The TKN managed a Traditional Land Use and Knowledge Study for the Project area. Information from this report has informed technical studies and has been incorporated throughout the Application. AuRico provided the Application to TKN in advance of its submission to the BC EAO for screening against the AIR, to provide TKN with additional review time.

AuRico will maintain a responsive and collaborative approach as the EA process progresses through the review, permitting, and execution stages of the Project. In particular, AuRico will continue to remain engaged with Aboriginal groups and strive to incorporate community and traditional knowledge into deliberations about the Project, such that asserted or established Aboriginal rights and interests are factored into decision making.

This EAC Application represents the application made by AuRico under the BC EAA (2002) and CEAA 2012. Subsequent to consideration of the content provided in the application, AuRico requests that the federal Minister of the Environment issue a decision statement under section 52 of CEAA 2012, and that the Province of BC issued an EA certificate for the Project to proceed. Successful completion of subsequent permitting processes is required prior to AuRico constructing, operating, and decommissioning the Project.

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