KSM Mine Project

Environmental Effects Summary

prepared by:

Seabridge Gold Inc.

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1.0 INTRODUCTION AND PROJECT REVIEW STATUS

The purpose of this Environmental Effects Summary (EES) is to support public participation in the environmental assessment (EA) of the proposed KSM Mine Project (the Project) under the *Canadian Environmental Assessment Act* (1992; the Act). In accordance with the Act's requirements, Seabridge Gold Inc. (Seabridge), the Project's Proponent, has submitted an Environmental Impact Statement (EIS) for the Project, presenting the findings of its assessment of the Project's potential effects. The same document has been submitted to the Province of British Columbia (BC) as an Application for an EA Certificate for the Project under Section 16 of the BC *Environmental Assessment Act* (2002; BC EAA). More information on the federal EA of the Project can be found on the Canadian Environmental Assessment Registry at www.ceaa-acee.gc.ca under reference number 09-03-49262.

The public is invited to provide comments on the EES, which summarizes key information from the EIS, including details of the Project, public participation, and the findings of Seabridge's environmental effects assessments. The deadline for submission of public comments to the Canadian Environmental Assessment Agency (the Agency) is October 23, 2013.

Following receipt and consideration of public comments on the EIS, the Agency will prepare a Comprehensive Study Report (CSR) that will describe the Project, identify potential environmental effects and measures proposed to mitigate those effects, and discuss the significance of any residual environmental effects (i.e., those that cannot be completely avoided or mitigated), taking into account the proposed mitigation measures. The public will be invited to provide comments on the CSR before it is submitted to the Minister of the Environment for a final EA decision on the Project.

1.1 Project Background and Overview

Seabridge proposes a gold/copper/silver/molybdenum mine located in the coastal mountains of northwestern BC, approximately 950 km northwest of Vancouver, 65 km northwest of Stewart (Figure 1). Mining will take place 24 hours per day, 365 days per year, with an ore processing rate of approximately 130,000 tonnes per day (tpd). Copper/gold concentrate will be produced at an average rate of 800 to 1,000 tpd, and will be trucked to the deep-sea port in Stewart.

The Project will be developed in two geographical areas: the Mine Site and the Processing and Tailing Management Area (PTMA). Ore will be mined by a combination of open pit mining and underground block cave mining from four mineral deposits in the Mitchell Creek and Sulphurets Creek valleys: the Mitchell, Sulphurets, Kerr, and Iron Cap deposits. Mined waste rock will be stored in rock storage facilities (RFSs) in the Mitchell and McTagg creek valleys and placed as backfill in the mined-out Sulphurets Pit.

Non-contact water at the Mine Site will be diverted around disturbed areas. Contact water will be channelled by diversion tunnels and ditches to the Water Storage Facility (WSF), treated in the Water Treatment Plant (WTP), and will be discharged to the receiving environment once it meets applicable water quality objectives. The Mine Site drains into Sulphurets Creek which reports to the Unuk River, which flows into Alaska and the Pacific Ocean.

Figure 1

Location of the KSM Project

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Ore from the Mine Site will be crushed and conveyed through one of two parallel 23-km tunnels, the Mitchell-Treaty Twinned Tunnels (MTT), to the PTMA for processing. This tunnel will also route electrical power lines from the PTMA to the Mine Site. The other tunnel will be used to transport personnel and bulk materials between the PTMA and the Mine Site.

The PTMA is located near the upper tributaries of Teigen and Treaty creeks, in the Bell-Irving River watershed, about 19 km southwest of Bell II on Highway 37. The Bell-Irving River discharges into the Nass River, approximately 70 km downstream of the PTMA. Key Project components at the PTMA include ore milling and crushing facilities, the Treaty Process Plant and Carbon-in-Leach (CIL) Plant, and the Tailing Management Facility (TMF). Tailing from the Treaty Process Plant will be pumped to the TMF for storage.

The Project site is currently only accessible by helicopter, so two new access roads will be constructed. The Coulter Creek access road (CCAR) will access the Mine Site from the existing Eskay Creek Mine road. The Treaty Creek access road (TCAR) will access the PTMA from Highway 37. Most of the Project's electrical supply will be provided from BC Hydro's Northwest Transmission Line, via a spur transmission line constructed parallel to TCAR. A small quantity of supplementary power will be generated on-site from local hydro-electric power projects.

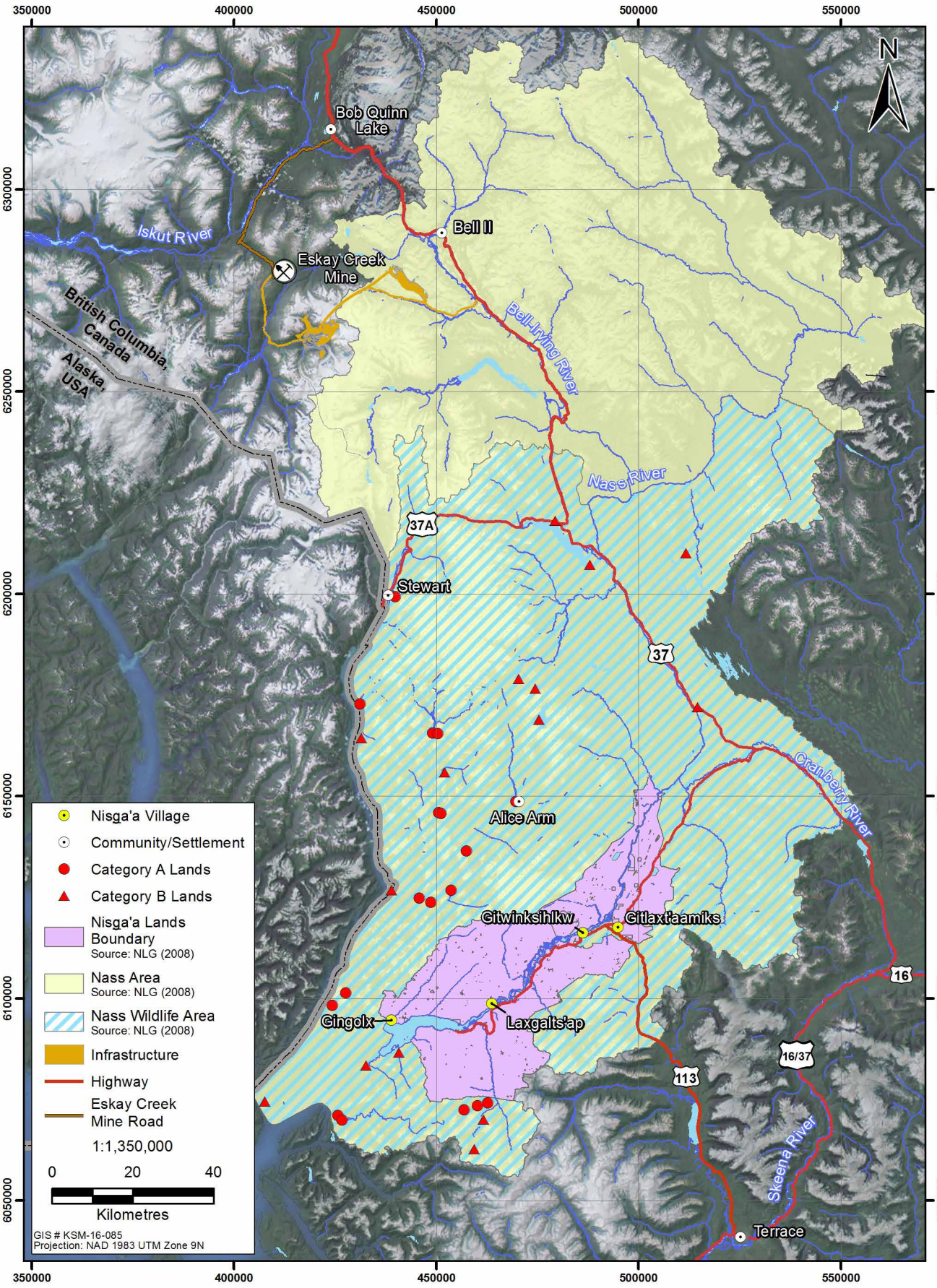
The Project and related activities will be carried out over four development phases: construction, operation, closure, and post-closure. During the construction phase, 10 temporary camps will be established with a lifespan of one to five years. Temporary initial winter construction access to the Mitchell Valley will be obtained via the Temporary Frank Mackie Glacier access route. During the operation phase, two large camps, one at the Mine Site and the other at the PTMA, will provide employee accommodation.

Reclamation will be ongoing over the life of the mine, with most occurring during the closure phase. Facilities such as the WSF and WTP in the Mitchell Valley will continue to operate into the post-closure phase and beyond, until water quality is acceptable for discharge without treatment. Diversion structures, hydroelectric plants, and infrastructure such as the TCAR, MTT, transmission line, and camps will also be maintained as long as required.

1.2 Nisg̲a'a Nation Rights and Interests

Portions of the Project's layout fall within lands that are subject to the Nisg̲a'a Final Agreement (NFA), a treaty concluded under the *Constitution Act* between Nisg̲a'a Nation, the Government of Canada, and the Government of BC. The treaty came into effect in 2000. The NFA defines three land areas with differing Nisg̲a'a rights and interests attached to them: Nisg̲a'a Lands, the Nass Wildlife Area (NWA), and the Nass Area (Figure 2).

The Project's PTMA, TCAR, and the eastern section of the MTT are located within the Nass Area. The closest straight line distance from the PTMA south to the NWA is 31 km, and the PTMA is located approximately 200 km upstream of Nisg̲a'a Lands, where the four main Nisg̲a'a villages (Gitlaxt'aamiks [New Aiyansh], Gitwinksihlkw [Canyon City], Laxgalts'ap [Greenville], and Gingolx [Kincolith]) are located.



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Location of KSM Project in relation to Nisga'a Lands, Nass Wildlife Area and Nass Area as defined by the Nisga'a Final Agreement, 2000

Figure 2

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The NFA sets out the terms of ownership, use, and management of lands and resources in the Nass River drainage, an area that historically has been occupied and used by Nisga'a people. Nisga'a Nation has constitutionally protected rights to fish, trap, hunt, and harvest a variety of aquatic and terrestrial flora and fauna for cultural, economic, and sustenance purposes, including annual harvesting allocations for moose, grizzly bears, mountain goats, salmon, and steelhead. The NFA also defines Nisga'a Nation's rights to self-government, including governance structures and processes, as well as its jurisdiction over health, social, educational, and cultural services and programs.

Chapter 10 of the NFA stipulates that Nisga'a Nation may require an EA to examine the potential adverse environmental effects of a proposed project on residents of Nisga'a Lands, Nisga'a Lands or Nisga'a interests as defined in the NFA. To meet this provision, the Government of Canada and the Government of BC must assess the effects of projects on the existing and future economic, social, and cultural well-being of potentially affected Nisga'a citizens. Seabridge's findings with respect to potential Project effects on Nisga'a rights and interests are summarized in Section 3.4.7 of this document.

1.3 Potentially Affected Aboriginal Groups

Several other Aboriginal groups may be potentially affected by the Project (Figure 3). The Tahltan First Nation (as represented by the Tahltan Central Council) asserts a claim over part of the Project footprint. The Skii km Lax Ha asserts a claim over the Mine Site and PTMA.

Aboriginal groups have also identified potentially affected interests downstream of the PTMA and along the Project's transportation routes (highways 37 and 37A). These include the Gitanyow First Nation (notably wilp Wiiltsx-Txawokw), and the Gitxsan Nation (as identified by the Gitxsan Hereditary Chiefs Office).

Members of the Métis Nation of BC may have wildlife, fish, and plant harvesting interests in the vicinity of the Project.

2.0 ENVIRONMENTAL ASSESSMENT PROCESS

2.1 Federal Environmental Assessment Process

2.1.1 Applicability of the Act (1992)

Assessment of the Project under the Act (1992) is triggered by the need to acquire certain regulatory approvals listed in the Act's Law List Regulations, including:

- authorizations issued by Fisheries and Oceans Canada (DFO) under the federal *Fisheries Act* (1985) where the harmful alteration, disruption, or destruction (HADD) of fish habitat is anticipated;
- a dam licence issued by Environment Canada under the *International River Improvements Act* (1985) for development of a dam at the Mine Site that will discharge water, once treated, to the watershed of the Unuk River, which flows into Alaska;
- navigable waters permits issued by Transport Canada (TC) under the *Navigable Waters Protection Act* (1985); and

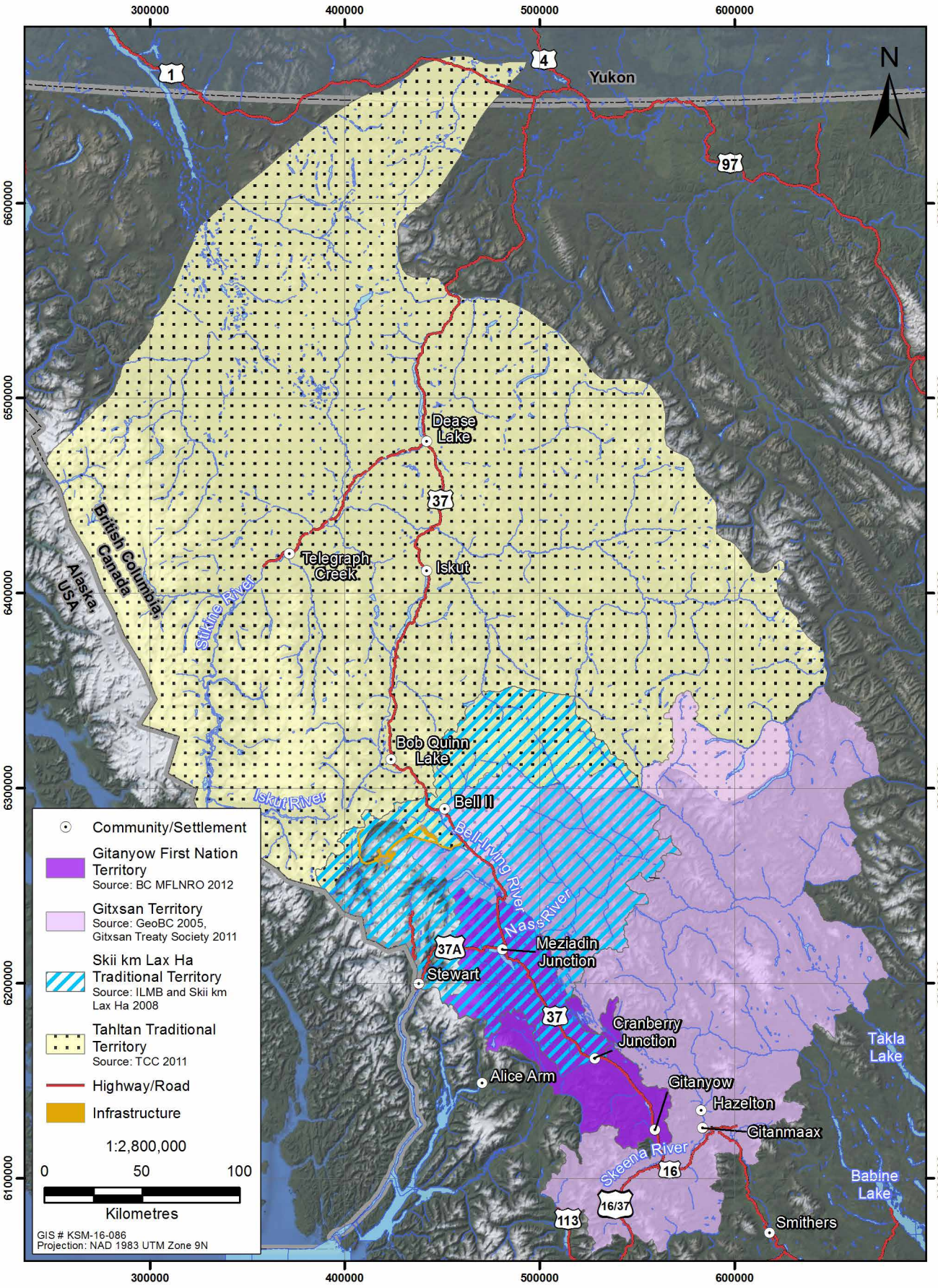

Figure 3

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Location of KSM Project in Relation to Traditional Territories of Aboriginal Groups

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- a licence for an on-site explosives factory and magazine, issued by Natural Resources Canada (NRCan) under the federal *Explosives Act* (1985).

In addition, under the Metal Mine Effluent Regulations (MMER; SOR/2002-222) of the *Fisheries Act* (1985), Environment Canada may need to consider an amendment of Schedule 2 of the MMER to allow deposition of a deleterious substance (tailing) within waters frequented by fish.

The Project is subject to a comprehensive study level of review under the Act's Comprehensive Study List Regulations (SOR/94-638), since it is a metal mine with an ore production level exceeding the threshold of 3,000 tonnes per day.

2.1.2 Joint Federal / Provincial Environmental Assessment Process

Since the Project is also being assessed under the BC EAA, the Project EA is being conducted jointly by the federal and provincial governments through a cooperative process, in accordance with the principles of the 2004 "Canada-BC Agreement for Environmental Assessment Cooperation."

The joint review is being led by a Working Group established by the BC Environmental Assessment Office (BC EAO) and the Agency, with representation from Nisga'a Nation; potentially affected Aboriginal groups; relevant federal and provincial government agencies, local governments; and United States and Alaska State agencies. The Working Group provides a forum for discussing issues raised during the EA, and advises on the progress and conduct of the EA.

2.1.3 Scope of the Project and Scope of the Assessment for Environmental Assessment Review Purposes

The federal scope of the Project includes all stages of the Project (i.e., construction, operation, closure, and post-closure) and all on-site and off-site facilities, systems, and activities, including all Project elements mentioned in Section 1.1 of this document (Project Background and Overview).

Section 16 of the Act (1992) lists the factors to be considered in the scope for federal EAs. These include potential environmental effects; accidents or malfunctions; cumulative environmental effects; the significance of any identified residual environmental effects; comments received from the public, First Nations, and Nisga'a Nation; technically and economically feasible impact management measures; and other matters considered relevant to the EA.

Comprehensive studies must also consider the purpose of the Project, technically and economically feasible alternative means of carrying out the Project and their environmental effects, the need for follow-up programs and monitoring, and the ongoing capacity of potentially affected renewable resources to meet present and future needs.

The scope of this assessment also includes consideration of the potential implications of Project development for Nisga'a Nation interests as defined under the NFA.

2.1.4 Federal Environmental Assessment Responsibilities

Pursuant to amendments to the 1992 version of the Act that came into force in July 2010, the Agency is responsible for the conduct of the comprehensive study until the CSR is submitted to the Minister of the Environment. The Agency is ensuring that federal authorities fulfill their obligations under the Act (1992) in a timely manner, and is coordinating the federal EA process with BC's EA requirements to the extent possible. DFO, Environment Canada, TC, and NRCan are providing

Responsible Authority (RA) advice in carrying out the comprehensive study. Health Canada and Aboriginal Affairs and Northern Development Canada are also providing expert advice to the Agency on the comprehensive study.

Following public comment on the Agency's CSR, the Minister of the Environment will consider the CSR and any public comments received before issuing an EA decision statement on whether the Project is, or is not, likely to cause significant adverse environmental effects, taking into account mitigation measures the Minister considers appropriate. At the same time the Minister makes a decision on the Project EA under Section 23 of the Act (1992), a federal NFA Project Recommendation will also be issued, which will take into account potential effects on Nisga'a rights and interests in considering whether the Project should proceed.

Once a decision is made under Section 23 of the Act (1992), the Minister will refer the Project back to the RAs to make their own decisions under Section 37 of the Act (1992). If the RAs consider that the Project is not likely to cause significant adverse environmental effects, they may exercise any power or perform any duty or function that would permit the Project to be carried out in whole or in part.

2.2 Consultation Activities

2.2.1 Government, Public and Stakeholder Engagement

To date, Seabridge's engagement with federal and provincial government agencies, and federal United States and Alaska State agencies, has focused on matters appropriate to each agency's interests and regulatory, policy, and technical requirements.

Seabridge has also met with local communities and elected local government representatives in the Project region to describe the Project and to discuss issues and concerns. In mid-2010, Seabridge participated in public open houses hosted by the BC EAO in the BC communities of Terrace, Smithers, Stewart, and Dease Lake to present Project details, answer questions, and gather initial views about the Project and the EA process. In October 2011, Seabridge hosted a public open house in Ketchikan, Alaska. In September/October 2011 and 2012, Seabridge hosted further public open houses in Smithers, Terrace, and Stewart.

Supplementing the public open houses, Seabridge has also provided online information through its dedicated Project website, delivered presentations, participated in conferences and panel discussions, conducted radio interviews, placed information articles and notices in newspapers, provided fact sheets and printed materials, and responded to queries and correspondence about the Project. Seabridge plans to continue consultations with the public and government agencies to address issues raised during the EA.

2.2.2 Nisga'a Nation

Seabridge's engagement with Nisga'a Nation has involved discussions about the potential effects of the Project on rights and interests defined in the NFA. Consultations have taken place through one-to-one meetings with Nisga'a representatives, community meetings held in each Nisga'a community (in June 2011 and June/July 2012), site visits, and Working Group discussions. Seabridge provided some funding to Nisga'a Nation for EA process participation purposes.

To assist Canada and BC to comply with the requirements of Chapter 10, paragraph 8(f) of the NFA, Seabridge has prepared an Economic, Social and Cultural Impact Assessment (ESCIA) report. The

ESCIA report has been filed separately with Nisga'a Lisims Government (NLG), the Agency, and the BC EAO, and Seabridge has used information from the ESCIA in assessing and reporting in the EIS on the economic, social, and cultural effects of the Project on the well-being of Nisga'a citizens (Section 3.4.7).

The Agency has provided funding to Nisga'a Nation to assist in the review of EA documents, and in providing input to the comprehensive study.

Further consultation with Nisga'a Nation will be coordinated by Seabridge, the BC EAO, and the Agency during completion of the comprehensive study, and upon release of the CSR.

2.2.3 Aboriginal Groups

Seabridge has met with Aboriginal group representatives to discuss the Project's potential effects on Aboriginal rights and interests, and on current use of lands and resources for traditional purposes. To date, consultation has occurred in Working Group sessions and through in-person meetings, site visits, circulation of Project-related materials, and written responses to questions and concerns. Seabridge has provided funding to Aboriginal groups for EA process participation purposes.

Aboriginal groups have raised concerns about the potential for downstream water quality effects and the health of nearby wetlands and downstream fisheries and aquatic systems; potential effects on the vulnerable regional moose population; possible increased wildlife mortality due to vehicle collisions, especially along highways 37 and 37A; the potential for spills and accidents near waterbodies; the potential for increased hunting and poaching pressures linked to improved mine access; loss of access to traditionally used lands and resources in the vicinity of the Project footprint; the protection of culturally important sites; and community health and safety.

Available Métis land use information indicates that Métis harvesters have hunted large game in the Unuk and Bell-Irving watersheds, and small game, birds, fish, and non-timber forest products in the Bell-Irving drainage, and that such land use activities could be affected.

Seabridge has proposed various measures to minimize the potential for such effects. Changes were made to Project layout and design in response to comments received from review participants, including First Nations, Nisga'a, government agencies, and the public. These include lining the centre cell of the TMF to prevent seepage, relocating the access road to the PTMA from the Teigen Creek Valley to the Treaty Creek Valley to reduce environmental effects, re-routing the TMF discharge to the Treaty Creek drainage from the Teigen Creek drainage, placement of most of the MTT infrastructure underground in the Mitchell-Treaty Saddle Area, and switching to underground mining for part of the Mitchell deposit and all of the Iron Cap deposit.

Seabridge also plans to prohibit hunting and fishing by employees and contractors while on-site; to restrict public access to the Project's two access roads to minimize unregulated hunting and angling activity; and to mitigate and monitor potential changes in soil, water, and air quality to ensure that country foods continue to be safe for human consumption. To address traffic-related concerns, Seabridge proposes to implement several Environmental Management Plans (EMPs), including a Traffic and Access Management Plan, a Dangerous Goods and Hazardous Materials Management Plan, an Emergency Response Plan, and a Spill Prevention and Emergency Response Plan.

Seabridge has responded to Aboriginal groups' concerns in writing, and proposes to continue its engagement efforts during the EIS review and following the EA process.

The Agency has provided funding to Aboriginal groups to support their participation in the EA.

3.0 ECONOMIC, SOCIAL, AND CULTURAL IMPACTS ON NISGA'A NATION

Potential economic, social, and cultural effects of the Project on the residents of Nisga'a Lands, Nisga'a Lands, and Nisga'a interests are considered in the EIS, as well as in a separately-filed ESCIA (Rescan 2012). Baseline data for these submissions were collected from household and business surveys, and focus groups held with residents of Nisga'a villages and Nisga'a Urban Locals.

Other than possible short-term pressures on housing in Nisga'a villages due to an influx of workers, no notable Nisga'a service delivery or infrastructure supply issues are identified. Increased income and Project work schedules are likely to have both positive and negative social effects that will be influenced by factors such as individual choices, the Proponent's policies and actions, and the level of response and support from NLG. Cultural effects related to shift work and increased income may be either positive or negative, and will depend on the number of Nisga'a workers who obtain mine employment, their ability to balance their current cultural activities and obligations, and the availability of family and community support.

Nisga'a access to traditional resources is not expected to be adversely effected to any significant degree. The part of the Project footprint that overlaps Nisga'a rights and interests in the Nass Area is small compared to the overall size of the Nass Area, and the Project area is not known to be intensively used by Nisga'a citizens. Potential effects on Nisga'a use of lands and resources are expected to be effectively minimized by Seabridge's Project layout and design, environmental protection, and other measures. Potential effects on surface water and groundwater, fish and aquatic resources, and wetlands will be addressed by the mitigation and monitoring provisions contained in a range of EMPs. Only minor residual effects are anticipated on Nisga'a access to, and harvesting of, resources, with the possible exception of moose (see Section 3.2.1).

The safety of country foods will be preserved through mitigation and monitoring of the uptake of contaminants of concern in air, soil, water, and fish. Effluent and emissions discharges to the receiving environment will have to meet federal and provincial waste discharge criteria. Few if any residual effects on the health of Nisga'a citizens are anticipated as a result of contamination of country foods, or contamination of the environment more generally.

Economic effects of the Project will be largely beneficial during construction and operation. The long-term increase in direct, indirect, and induced employment will provide a net economic benefit for Nisga'a citizens, businesses, and government, particularly when the cumulative effects of other projects are taken into account. Adverse closure-phase socio-economic effects should be mitigated by the fact that Nisga'a workers should have an enhanced skill-set as a result of Project-related employment, which will better enable them to obtain alternate employment or pursue other opportunities at closure.

Heritage effects are expected to be limited at most. Effects on archaeological sites, including chance finds, are expected to be limited to disturbance of a few small lithic scatters. Any such effects can be remedied through mitigation measures such as systematic data recovery, construction monitoring, and/or site capping. Treaty Rock, a key heritage site for both Nisga'a and Tahltan people, is too remote from the Project footprint (19 km southeast of the TCAR) to be affected.

The heritage/cultural value of the Nass Area where the PTMA is proposed may be affected by Project-related activities or components, linked to effects on the experience of Nisga'a members

while out on the land, and on their ability to pursue traditional/cultural practices and activities. Only minor effects are anticipated, given proposed mitigation measures, as well as the fact that the Project overlaps with a small portion of the Nass Area that is relatively remote from the primary areas of Nisga'a traditional resource use and activity.

Seabridge proposes various mitigation measures, commitments, and management plans to address Nisga'a-specific Project effects. Many of these measures will entail discussions and collaboration between the Proponent and Nisga'a Nation to address Nisga'a employment; business contracts; training; capacity building; and natural resources management, including development of a Labour Recruitment and Retention Strategy and Workforce Training Strategy, both of which will target regional workers, and will include programs specifically targeted at the training of Aboriginal workers.

Seabridge is committed to ongoing meaningful engagement with Nisga'a Nation throughout the review of the EIS and beyond, and believes the opportunity exists for Nisga'a members to benefit significantly from the employment, income, and business opportunities offered by the Project. The Proponent will put forth best efforts to reach a Benefits Agreement with the NLG that will provide a solid framework for Nisga'a participation in the Project.

4.0 ASSESSMENT OF THE POTENTIAL EFFECTS OF THE PROJECT

4.1 Scope of the Assessment

Seabridge assessed the potential effects of the Project on several environmental and socio-economic valued components (VCs). Key findings from these assessments are summarised below. Table 1 identifies all predicted Project residual effects, the mitigation measures proposed to manage them, and their significance with mitigation applied.

The environmental VCs considered in the EA include: air quality; climate change; noise; groundwater and surface water quantity and quality; fish species and aquatic habitat; soils; terrain; surficial geology; geohazards; terrestrial ecosystems; wetlands; and wildlife.

Socio-economic VCs were also considered in the EA, including: various land and resource use VCs (commercial recreation, guide-outfitting and trapping, recreational hunting and fishing, subsistence activities, and transportation and access); visual and aesthetic resources; heritage sites and the traditional or heritage value of land; and human health issues linked to water and air quality, the safety of country foods, and noise. The socio-economic VCs listed here are linked to elements of the natural environment that could potentially be affected by the Project.

4.2 Potential Environmental and Socio-economic Effects

Seabridge has assessed each potential Project effect on environmental elements of the Project setting based on the nature of the interaction between the elements and the Project, the likelihood of the effect occurring, the sensitivity of the environmental elements to that type of effect, proposed mitigation measures, and the magnitude, geographic extent, duration, frequency, reversibility and ecological context (resiliency) of any predicted residual effects, taking into account the implementation of mitigation measures.

Three environmental VC topics warranted particular focus: moose populations, surface water quality, and fish and aquatic habitat. One socio-economic VC warranted focus: potential effects on Stewart due to traffic from a number of proposed mining projects in northwestern BC.

4.2.1 Moose Population Effects

The Nass regional moose population has been declining in numbers in recent years. The NLG, working with Province, has implemented a management program to reverse this decline. The potential effects of the Project on moose were evaluated assuming two possible future scenarios in Chapter 18 of the EIS. First, the local-scale effects of the Project itself were evaluated within the wildlife and wildlife habitat Regional Study Area (RSA). Second, the cumulative effects of various proposed mine projects in and surrounding the RSA were evaluated within a cumulative effects assessment area for moose. This cumulative effects assessment included the potential effect of increased traffic-related mortality from multiple projects along Highways 37 and 37A - which includes the moose population within the Nass Wildlife Area.

The significance of direct Project-related residual effects (habitat loss, disruption of movement, direct mortality, indirect mortality, and risks from chemical hazards) on moose, considered collectively, was ranked not significant (moderate). Direct Project effects are predicted to cause local-scale population declines within the RSA that are measurable, but will not threaten the population as a whole in the RSA.

The overall cumulative effect (habitat loss and alteration, disruption of movement, direct mortality, and indirect mortality) on moose was assessed for two possible future scenarios, primarily driven by increased mortality from traffic collisions: 1) a 'likely development scenario', with one to three mine projects being concurrently in production, and 2) an 'unlikely development scenario' where all or most mine projects receive approvals and go ahead as planned. A population viability assessment using available data from the Nass moose population south of the Project concluded that Project traffic, by itself, would not cause the regional moose population to decline substantially, nor would traffic from the likely development scenario. However, the population modelling indicated that for the unlikely development scenario (with all or most projects proceeding), that the moose population along Highway 37 would experience significant declines. This result is subject to assumptions and caveats of the model used, described in detail in the moose modelling report, Moose and Highway 37/37A Traffic; a Population Viability Approach (Appendix D of Appendix 22-C).

Under the likely development scenario, a slight increase in traffic volume is predicted to lead to a not significant (moderate) cumulative effect, and under the unlikely development scenario—with higher development levels—the cumulative effect is predicted to be significant. The probability that this high development scenario will occur is low, so the significant effects from this scenario are unlikely are unlikely to manifest.

Seabridge's proposed mitigation measures include limiting use of Project access roads to authorized Project-related traffic, de-activating roads that are no longer required, and partial deactivation and re-vegetation of some of the other mine components during the post-closure phase. Bridges and roads will be designed to minimize obstruction of wildlife movement. Project staff and contractors will be prohibited from hunting wildlife while at the Project site. All vehicles will obey speed restrictions to reduce the risk of vehicle/moose collisions. Winter snowplowing of Project access roads will provide gaps in the snow banks to allow moose to escape from roadways. The Proponent will consider contributing to regionally-based monitoring initiatives where they replace proposed KSM Project-specific monitoring and are actively overseen by relevant provincial authorities.

4.2.2 Surface Water Quality Effects

The Project has the potential to degrade surface water quality near access corridors and downstream of discharges from both the Mine Site (into Sulphurets Creek and the Unuk River) and the TMF (into Treaty, North Treaty, South Teigen, and Teigen creeks; Chapter 14 of the EIS).

Metal leaching (ML) due to naturally-occurring acid rock drainage (ARD) has resulted in baseline total and dissolved metal concentrations in Mitchell and Sulphurets creeks that are often higher than BC water quality guidelines for the protection of freshwater aquatic life. Naturally high suspended sediment loads, low concentrations of bioavailable nutrients, and high concentrations of total and dissolved metals contribute to the low productive capacity of streams at the Mine Site (Mitchell and Sulphurets creeks) and further downstream (in the Unuk River). The lower suspended sediment loads, increased concentrations of bioavailable nutrients, and lower concentrations of total and dissolved metals identified in the Teigen, Treaty, Snowbank, and Bell-Irving watersheds contribute to the greater productive capacity of PTMA streams relative to Mine Site streams.

Project-related mining activity will increase the potential for ML/ARD at the Mine Site by exposing sulphide-rich, unweathered rock to oxidizing conditions. Seabridge's water management planning has emphasized management of both contact water and the naturally poor quality (low pH) seeps in the Mine Site.

The most notable water quality concern at the Mine Site is the prediction that concentrations of selenium (Se) in the receiving environment will exceed both baseline levels and water quality guidelines for the protection of freshwater aquatic life. During the operation, closure, and post-closure phases, elevated Se levels are predicted within a localized, non-fish bearing zone located immediately downstream of the Mine Site in Sulphurets Creek, and extending downstream into the Unuk River beyond the Sulphurets/Unuk confluence. Se concentrations in the Unuk River at the BC-Alaska border, 35 km downstream of the Mine Site, are predicted to meet provincial water quality guidelines.

An extensive water management system is planned to divert non-contact water away from the Mine Site and to store contact water in the WSF, from which it will be pumped to the high density sludge lime WTP for treatment, prior to discharge to Mitchell Creek. The discharge schedule is designed to mimic the natural hydrograph to minimize effects on water quality. Kerr Pit waste rock is predicted to be an important source of Se, and will be stored as covered backfill in the Sulphurets Pit. This use of a liner will reduce infiltration rates and make it technically feasible to reduce Se concentrations in runoff from the waste rock using best available technology. Drainage from the Sulphurets Pit will be treated in an ion-exchange Selenium Treatment Plant, with expected effluent concentrations of selenium of less than one part per billion. The Proponent's Aquatic Effects Monitoring Program, Metal Leaching / Acid Rock Drainage Management Plan, and Water Management Plan all provide for extensive effluent and performance monitoring of waste rock, pit walls, and tailing.

Surface water quality modeling results demonstrate that concentrations of MMER-regulated deleterious substances are predicted to be within authorized concentrations, and that for some parameters, an overall improvement in water quality is expected as a result of meeting the MMER regulatory limit of 15 mg/L for total suspended solids.

Taking into account Se levels, the significance of water quality effects in Sulphurets Creek and the Unuk River is ranked not significant (moderate). The significance of water quality effects downstream of the PTMA is ranked not significant (minor).

4.2.3 Fish and Aquatic Habitat Effects

The KSM Project may lead to potential residual effects on fish VCs associated with direct mortality, noise, erosion/sedimentation, and water quality degradation (discussed in Section 3.2.2). Residual Project effects on aquatic habitat include erosion/sedimentation, water quality degradation, and habitat loss and alteration as described in Chapter 15 of the EIS.

Discharges from the WTP or the TMF may lead to increased uptake of some metals in fish populations. Mitchell and Sulphurets creeks immediately downstream of the WTP are not fish-bearing above a cascade that is located some 9.5 km downstream (500 m upstream of the Sulphurets/Unuk confluence). Dolly Varden was the only species found in Sulphurets Creek below the cascade during baseline studies. Dolly Varden, rainbow trout/steelhead, and Pacific salmon were all found in the Unuk River. Se levels are predicted to rise in these systems (see Section 3.2.2), although provincial water quality guidelines will be met at the BC-Alaska border. Increased Se concentrations relative to baseline conditions may lead to additional uptake of Se by organisms at lower trophic levels, potentially resulting in bioaccumulation of Se in fish via the food chain.

Prediction of the amount of metals uptake and the toxicological implications of potentially increased residues of Se and other metal residues in fish tissues is uncertain, as are the threshold concentrations necessary to trigger toxic effects. The Proponent's Aquatic Effects Monitoring Plan will address these uncertainties by providing for ongoing monitoring and adaptive management.

Two compensation plans will address fish habitat losses. Under a HADD Fish Habitat Compensation Plan, replacement habitat will be constructed for 5.37 ha of fish habitat lost beneath the TMF dams and TMF seepage collection dams, as well as losses at access road and transmission line crossings, and losses linked to water quantity reductions in North Treaty and South Teigen creeks downstream of the TMF. Under a MMER Fish Habitat Compensation Plan, replacement habitat will be constructed for 8.96 ha of fish habitat lost due to deposition of deleterious substances (tailing) into the TMF and seepage collection ponds. A total of 37.8 ha of habitat will be created to offset losses associated with Project development. Focus will be placed on creating rearing and overwintering habitat in new off-channel ponds and wetlands, as well as spawning habitat for coho salmon and Dolly Varden.

Other effects will be mitigated through the implementation of management plans, adherence to standards and best practices, and commitment to monitoring. The significance of most residual effects on fish VCs and all residual effects on aquatic habitat is ranked not significant (minor), since these effects are considered unlikely to affect fish population viability. The significance of residual effects on certain fish VCs (Dolly Varden, rainbow trout/steelhead, and Pacific salmon) associated with a potential increase in Se concentrations is ranked not significant (moderate). Any residual cumulative effects will be minor.

4.2.4 Community Well-being Effects

All of the residual effects on community well-being in the region of the Project (assessed in Chapter 22 of the EIS) are predicted to be not significant (minor) except for the potential cumulative effects of traffic through the town of Stewart. Similar to the assessment for moose (Section 3.2.1), to address the uncertainty of future traffic volume in the region, the significance of cumulative effects was determined for both the 'likely development scenario' and 'unlikely development scenario'.

Depending on the change in traffic volumes associated with the two scenarios, different levels of vehicular emissions (i.e., noise and dust), would ensue leading to nuisance effects on community well-being. Under the likely development scenario, a slight increase in traffic volume is predicted to lead to a not significant (moderate) cumulative effect, and under the unlikely development scenario—with higher development levels resulting in more nuisance issues—the cumulative effect is predicted to be significant. Related cumulative effects on community well-being for traffic accidents and safety in Stewart are predicted to be not significant (minor) under the likely development scenario, rising to not significant (moderate) under the unlikely development scenario.

To minimize the adverse residual effects on community well-being due to a change in traffic through Stewart, Project mitigation includes compliance with applicable municipal, provincial, and federal regulations, a community communication plan, and a Traffic and Access Management Plan. Due to mitigation, anticipated residual effects on traffic safety are anticipated to be less for both scenarios than for nuisance effects, as discussed in Chapter 22.

4.3 Specific Federal Environmental Assessment Information Requirements

4.3.1 Cumulative Environmental Effects

A cumulative environmental effects assessment (Chapter 37 of the EIS) was conducted for each environmental, land use and human health VC listed in Section 4.1, to determine how Project effects might combine with those of past, present, and reasonably foreseeable future projects and activities in the Project region. The result of these assessments is that all residual cumulative effects are determined to be not significant, except for two VCs that are contingent on an 'unlikely development scenario', as described below.

Due to the uncertainty of the level of future development in the Project region, two scenarios were considered for the effects determination associated with cumulative traffic levels on two VCs—moose populations located primarily along Highway 37 (Section 3.2.1), and community well-being in the town of Stewart (Section 3.2.4). For the 'likely development scenario', where one to three proposed mine projects go forward as planned, cumulative effects on these two VCs have been determined to be not significant (moderate). For the unlikely development scenario (where there are higher traffic levels due to the assumption that all or most of the currently proposed mine projects receive approvals and use the port of Stewart to ship ore concentrate), the overall cumulative effect on the regional moose population has been rated as significant, primarily linked to population declines from increased collision mortality along Highway 37, as predicted by moose population modelling[1]. Similarly, the determination of significant cumulative effects on community well-being in Stewart, primarily due to vehicle nuisance effects, is also dependent on the unlikely development scenario occurring.

4.3.2 Alternative Means of Undertaking the Project

The assessment of alternatives played a central role in Project design and layout planning. Seabridge has utilized a transparent and systematic process to make decisions using three decision making tools described in Chapter 33 of the EIS, and summarized below.

[1] This model is subject to the assumptions and caveats detailed in the moose modelling report (Appendix D of Appendix 22-C).

For Project tailing management, the site of the TMF and access to the PTMA from Highway 37 were selected using a rigorous seven-step multiple accounts analysis approach, following the method recommended in the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* (published by Environment Canada, 2011). The approach incorporated Working Group feedback on values as well as other technical, scientific and economic criteria. The Upper Teigen/Treaty TMF location was selected from 14 sites identified through a screening process. An access road to the PTMA along the Treaty Creek Valley (TCAR) was identified as environmentally preferable to access along the Teigen Creek Valley.

Seabridge also used performance objectives to assist in determining which alternative means of undertaking mining activities would minimize adverse environmental and social effects (and maximize beneficial effects where possible), while also remaining technically and economically feasible. Performance objectives were used to select preferred options from identified potentially feasible means for the following Project areas:

- Mining method – a combination of open pit and underground block cave mining was selected, substantially reducing waste rock produced and related potential adverse effects.
- Process plant location – the Treaty Process Plant location (adjacent to the TMF) was selected from five initially identified potentially feasible sites.
- Mine Site access route – from four initial options CCAR was chosen to provide Mine Site access until Project closure, and the Frank Mackie Glacier access route was selected to provide temporary access until the completion of CCAR construction.
- Ore handling system – a conveyor belt system was chosen over using an ore slurry pipeline.
- Ore concentrate transport system – truck transport of copper-gold concentrate to the Port of Stewart was chosen over truck and/or rail transport to Prince Rupert.
- Gold recovery method – cyanidation was chosen for extracting gold over using thiourea, thiosulphate, thiocyanate, bromine, or chlorine. A pre-assessment found gravity, pre-treatment and mercury methods to be unfeasible.
- Waste rock disposal sites – a pre-assessment was conducted on nine potential sites, from which five were found to be potentially feasible for use; of these five, the Mitchell and McTagg RSFs, plus backfilling of Kerr waste into Sulphurets Pit were selected.
- Ore comminution – high pressure grinding roll (HPGR) crushing, followed by ball mill grinding was chosen over semi-autogenous grinding (SAG) / mill-ball mill-pebble crushing (SABC).
- Water management - alternatives considered included:
    - TMF discharge direction – discharge south to Treaty Creek rather than north to Teigen Creek was chosen and scheduled to mimic the natural hydrograph.
    - Water storage dam type – asphalt core rockfill construction of the Mine Site Water Storage Dam (WSD) was chosen over roller compacted concrete.
    - Mine contact water treatment – high density sludge (HDS) lime treatment of Mine Site contact water in the WTP was selected over low density sludge (LDS) treatment.

- Selenium treatment – a pre-assessment narrowed down ten options to three potentially feasible alternatives, from which ion exchange selenium treatment was selected.

For mine production rates and Project scheduling, no alternatives were identified. Instead, a software assisted approach was used to define the optimum ore mill throughput rate (130,000 tpd) and schedule (5 years for construction and 51.5 years for mining). For closure and reclamation, employee schedules and living conditions, and power supply, best management practices were employed rather than alternatives considered.

4.3.3 Potential Effects on Species at Risk

No fish species listed in Schedule 1 of the federal *Species at Risk Act* (SARA; 2002) were identified during baseline studies conducted within the fish and aquatic habitat baseline study area. Similarly, no SARA-listed vegetation species were identified during baseline studies conducted within the terrestrial ecosystems baseline study area.

Five wildlife species listed in Schedule 1 of the SARA (2002) were either confirmed to be present in the baseline wildlife and wildlife habitat study area, or are thought likely to be present. Western toad, and olive-sided flycatcher were observed during baseline surveys, and rusty blackbird and common nighthawk likely occur. The northern goshawk *laingi* subspecies occurs in coastal BC, mainly on islands. Although northern goshawks were observed during baseline surveys, it is unknown whether they were the listed *laingi* subspecies, or the *atricapillus* subspecies, which is not considered at risk.

To minimize effects on raptors and forest and alpine birds, including northern goshawk, olive-sided flycatcher, rusty blackbird, and common nighthawk, site clearing will be conducted outside the breeding period, where possible. Where this is not possible, pre-clearing nest surveys will be conducted, so as to minimize potential interactions with birds that are breeding in and around the Project area. Through these measures, it is anticipated that any changes to SARA-listed bird species and their habitat will not be significant.

No western toad breeding sites were confirmed within the wildlife local study area (LSA) during baseline wildlife studies; however, because western toads may not breed every year, breeding ponds could occur in the LSA. Seabridge proposes to conduct pre-clearing amphibian surveys when site clearing occurs in suitable habitat during the breeding periods, to minimise any potential effects on the western toad. Where toad migration paths are identified near proposed road corridors, road construction will include provision for toad movements, such as culverts placed under the road. With these mitigation measures, it is anticipated that any changes to western toads and their habitat will not be significant.

4.3.4 Navigable Waters

The EIS navigable waters effects assessment in Chapter 31 of the EIS evaluates the indirect effects on navigation related to public safety and accessibility of navigable waters for Aboriginal, recreational and commercial users that will potentially result from the Project. The effects assessment is based on baseline surveys of 237 water bodies that were screened against the criteria from the *Minor Works and Waters Order* (MWWO, 2009) pursuant to the provisions of the *Navigable Waters Protection Act* (NWPA, 1985) to determine whether the affected streams are technically navigable. The screening process identified 41 waterways or stream reaches that are considered technically navigable and that have the potential to be affected by Project works (e.g.,

bridges, RSFs, pits, and the TMF). In addition to the technical determination of navigability under the MWWO, common law interpretation was used to assess whether the public right to navigation is affected.

The effects assessment identified two bridge crossing sites along the Bell-Irving and Unuk rivers that are considered navigable and where minor residual effects are anticipated as a result of the Project. If required by Transport Canada, mitigation measures (e.g., warning signage) will be implemented to minimize any minor or temporary potential effects on navigational safety.

4.3.5 Accidents and Malfunctions

Through Failure Modes Effects Analysis, Project-related risks were identified and rated in Chapter 35 of the EIS. Considering the implementation of mitigation measures, the highest identified risks were rated “moderately high”. No “high”, “very high”, or “critical” categories of risk were identified. Risks were identified with respect to such issues as inaccurate water quality predictions (e.g., for ML/ARD), leaching of Se from Kerr Pit waste rock, fires, traffic accidents (including wildlife/traffic interactions), inflows that exceed design flows for key water management structures, problems with the treatment technology selected for the WTPs, and snow or rock avalanching.

Many risk management and contingency planning strategies are incorporated into the Project layout and design, as well as into its numerous EMPs. These strategies are designed to minimise the risk of accidents and their consequences on people and the environment. They include personnel training, equipment maintenance, risk assessment during Project design, adaptive management to continually review potential risks and improve mitigation, and emergency response and contingency plans.

4.3.6 Follow-up Program and Monitoring

Chapter 38 of the EIS presents follow-up programs for several areas: geohazards, groundwater and surface water quantity and quality, fish and aquatic habitat (for protection of aquatic life in the Unuk River, Treaty Creek, and Teigen Creek), wetlands, and wildlife. They are designed to verify the accuracy of EA predictions, determine the effectiveness of mitigation measures, and guide adaptive management responses to unanticipated environmental effects.

Assuming effective implementation of adaptive Project design and supporting EMPs, follow-up programs are not considered necessary in situations where effects are well understood, standard mitigation and monitoring strategies are being implemented, and the potential for adverse effects is not a priority concern. For example, a follow-up program is not proposed for geotechnical stability of pit walls and waste, geochemical stability of waste rock, tailings and pit walls (ML/ARD monitoring), post-construction requirements, air quality, noise, glacier monitoring, vegetation, and heritage sites.

5.0 Conclusions and Commitments

Table 1 summarizes the EA findings for the KSM Project, listing residual environmental effects, the Project phase(s) during which effects would occur, the Project component(s) with which effects are associated, proposed mitigation measures, and the residual effects significance rankings.

Chapter 39 (Section 39.5) of the EIS lists Seabridge’s commitments (or suggested conditions) for managing potential Project residual effects. Notable conditions include:

- minimizing the Project footprint through careful layout planning;
- developing an Environmental Management System (EMS) comprising more than 30 issue-specific EMPs (e.g., for construction and operation of major Project facilities, management of air quality, ML/ARD, water quantity and quality, fish and wildlife, and Project traffic);
- implementing follow-up programs (outlined in Chapter 38 of the EIS) for geohazards, groundwater and surface water quantity and quality, fish and aquatic habitat, wetlands and wildlife;
- protecting water quality by diverting non-contact water around Project disturbances, increasing the Mine Site WTP's capacity, staging WTP and TMF discharges to mimic the natural hydrograph, increasing diversion channel efficiencies to reduce water losses, aligning diversion systems in the PTMA to protect the high fisheries values in Teigen Creek, and monitoring for, and adaptively managing, potentially problematic concentrations of contaminants identified in surface water and groundwater;
- meeting regulatory receiving water quality standards, and monitoring water quality as described in the Water Management Plan;
- adopting high density sludge (HDS) water treatment at the Mine Site WTP to protect the water quality of the Sulphurets and Unuk drainages;
- installing an ion-exchange Selenium Treatment Plant to treat drainage from the Kerr Pit waste rock, and monitoring and managing selenium levels as necessary;
- implementing Fish Habitat Compensation Plans to satisfy DFO HADD requirements under the *Fisheries Act* (1985), and for tailing disposal under the MMER (SOR/2002-222), and a Wetland Compensation Plan to offset losses of wetland extent and function at the TMF;
- implementing a Wildlife Management and Monitoring Plan to manage and monitor Project effects (e.g., on moose, mountain goats, grizzly bears, and migratory birds), including habitat loss and alteration, attractants, sensory disturbance, disruption to movement, and direct and indirect mortality;
- prohibiting fishing and hunting by Project employees and contractors within the Project footprint; and
- developing a Traffic and Access Management Plan to minimize traffic/wildlife conflicts on Project-related roads as well as minimize community well-being effects of traffic through Stewart.

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Greenhouse Gas Emissions (Climate Change; Chapter 6)				
Greenhouse gas (GHG) emissions: change in atmospheric GHG levels	construction, operation (Mine Site, PTMA, MTT Hwys 37/37a)	Project design changes to minimize power/energy use, minimizing Project fuel use (e.g., by equipment, vehicles, and generators) through operational fuel efficiency measures; minimizing Project energy use (e.g., by facility and electrical equipment) through operational energy efficiency measures; and minimizing planned land-use change burning and maximizing replanting where possible; and maximize carbon sequestration. Implementation of: • Greenhouse Gas Management and Mitigation Plan	**not significant (minor)**	n/a: cumulative effects assessment not possible due to due to global scale and complexity involved as per guidance documentation and usual EA practice
Air Quality (Chapter 7)				
Ambient air quality: Change in ambient air quality	construction, operation (Mine Site, PTMA, MTT, Hwy 37)	Unpaved access roads will be watered; crushers and MTT will be equipped with baghouses and/or wet scrubbers; equipment will be regularly maintained; ore stockpiles will be covered and processed ore stockpiles will be enclosed Implementation of: • Air Quality Management Plan	**not significant (moderate;** construction**)** **not significant (minor**; operation**)**	**not significant (moderate;** construction**)** **not significant (minor**; operation**)**
Ambient air quality: overall	construction, operation (Mine Site, PTMA, MTT, Hwy 37)	see above	**not significant (minor)**	**not significant (minor)**
Terrain, Surficial Geology and Soils (Chapter 8)				
Soil quantity: permanent loss of soil from component footprint (land surface area loss)	construction, post-closure (Mine Site, PTMA, TCAC, CCAC, and MTT)	Minimize Project footprint; apply BMP for soil salvage and erosion control; reclaim disturbed areas as soon as possible Implementation of: • Soil Salvage and Handling Plan • Erosion Control Plan	**not significant (minor);** **not significant (moderate;** TMF**)**	**not significant (moderate)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Terrain, Surficial Geology and Soils (Chapter 8)				
Soil quantity: permanent loss of soil from mass movement or bulk erosion	construction (Mine Site, PTMA, TCAC, CCAC, and MTT)	Minimize Project footprint; apply BMP for soils salvage and erosion control; reclaim disturbed areas as soon as possible Implementation of: • Soil Salvage and Handling Plan • Terrain, Surficial Geology and Soil Management and Monitoring Plan • Erosion Control Plan	**not significant (minor)**	**not significant (moderate)**
Soil quantity: overall	post-closure (all)	See above	**not significant (minor)**	**not significant (moderate)**
Soil quality: decreased soil fertility, compaction, or contamination in buffers surrounding components retained after closure	construction operation, post-closure (Mine Site, PTMA, TCAR, CCAC, and MTT)	Apply BMP for erosion/sediment control; establish soil monitoring program early; remediate and reclaim Implementation of: • Soil Contamination Prevention Plan • Soil Salvage and Handling Plan • Terrain, Surficial Geology and Soil Management and Monitoring Plan • Erosion Control Plan	**not significant (minor)**	**not significant (minor)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Geohazards (Chapter 9)				
Risk assessment rather than effects assessment for Project effects on **terrain stability** where components interact with existing geohazards	all phases (Mine Site, PTMA and CCAR)	Reduce risk associated with BGC identified geohazard scenarios that will reduce geohazard: probability of occurring, magnitude, intensity, spatial probability of impact, temporal probability of impact, and vulnerability. (Chapter 34 and Appendices 9-A to 9-E present mitigation for existing geohazards) Implementation of: • Soil Salvage and Handling Plan • Erosion Control Plan • Terrain, Surficial Geology and Soil Management and Monitoring Plan • Vegetation Clearing Management Plan Coulter Creek and Treaty Creek Access Road Construction Erosion and Sediment Control Plan	n/a	n/a
Geochemistry (Chapter 10)				
Cause-effect pathways to other VCs	n/a	n/a	n/a	n/a
Groundwater Quantity (Chapter 11)				
Groundwater quantity: Alteration of groundwater levels and flow patterns and directions due to mine dewatering and water level management	construction through post-closure (Mitchell Pit and Block Cave Mine, Sulphurets and Kerr Pits, subsequent pit lakes); operation (Iron Cap Block Cave Mine)	Cessation of dewatering Implementation of: • TMF Management and Monitoring and Plan Groundwater Monitoring Plan	**not significant (moderate); not significant (minor;** Iron Cap during operation**)**	**not significant (moderate)**
Groundwater quantity: Water level mounding in the Mitchell and McTagg RSFs	operation to post-closure (Mitchell and McTagg RSFs)	None	**not significant (minor)**	n/a: no interaction with other projects

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Groundwater Quantity (Chapter 11) (cont'd)				
Groundwater quantity: Alteration of groundwater levels and flow patterns due to artificial reservoirs and implementation of associated seepage control curtains	construction through post-closure (Water Storage Facility; WSF); operation (TMF)	Implementation of: • TMF Management and Monitoring Plan • Groundwater Monitoring Plan	**not significant (moderate)**	n/a: no interaction with other projects
Overall	post-closure (all)	See above	**not significant (moderate)**	**not significant (moderate)**
Groundwater Quality (Chapter 12)				
Groundwater quality: Degradation of groundwater quality due to seepage of contact water	construction (Mitchell and McTagg RSFs, WSF), operation (TMF), closure (Iron Cap Block Cave Mine)	Low-permeability liners for TMF centre cell and select sections of tunnels; mine dewatering and water level management; seepage control mechanisms for TMF and WSF Implementation of: • ML/ARD Management Plan • Water Storage Facility Management and Monitoring Plan • Groundwater Monitoring Plan • TMF Management and Monitoring Plan	**not significant (moderate)**	**not significant (moderate)**
Overall	post-closure (all)	See above	**not significant (moderate)**	**not significant (moderate)**
Surface Water Quantity (Chapter 13)				
Streamflows within the PTMA: Changes in: annual flow volumes; monthly flow distribution; in peak flows; and in low flows	All phases (diversions and tunnels, TMF, camps, access roads, laydown areas, OPCs, concentrate storage and loadout)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions and tunnels Implementation of: • Water Management Plan	**not significant (moderate)** for diversions and tunnels and TMF; **not significant (minor)** otherwise	**n/a**: effects confined to LSA; no interactions with other projects or activities
Streamflows within the PTMA: Overall effect on stream flows	post-closure (all)	see above	**not significant (moderate)**	**n/a**: see above

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Surface Water Quantity (Chapter 13) (cont'd)				
Streamflows within the Mine Site: Changes in annual flow volumes	All phases (diversions and tunnels, WSF, WTP, RSFs, pits, block cave mine, camps, access roads and laydown area, Sludge Management Facilities, Mine Site avalanche control, Explosive Manufacturing Facility and Truck Shop)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions, tunnels, WSF, WTP, RSFs, pits, and block cave mines Implementation of: • Water Management Plan	**not significant (moderate)** for diversions and tunnel, WSF, WTP, RSFs, pits, and block cave mines; **not significant (minor)** otherwise	**n/a**: potential interaction with Brucejack Mine but there is no flow data for this project, no CEA not possible
Streamflows within the Mine Site: Changes in: monthly flow distribution; and in peak flows	construction, operation, closure, post-closure (diversions and tunnels, WSF, WTP, RSFs, pits, block cave mine, camps, access roads and laydown area, Sludge Management Facilities, Mine Site avalanche Control, Explosive manufacturing Facility and Truck Shop)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions, tunnels, WSF, WTP, RSFs, pits, and block cave mines Implementation of: • Water Management Plan	**not significant (moderate)** for diversions and tunnel, WSF, WTP; **not significant (minor)** otherwise	**n/a**: potential interaction with Brucejack Mine but there is no flow data for this project, no CEA not possible
Streamflows within the Mine Site: Changes in low flows	All phases (diversions and tunnels, WSF, WTP, RSFs, pits, block cave mine, camps, access roads and laydown area, Sludge Management Facilities, Mine Site avalanche control, Explosive manufacturing Facility and Truck Shop)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions, tunnels, WSF, WTP, RSFs, pits, and block cave mines Implementation of: • Water Management Plan	**not significant (moderate)** for diversions and tunnel, WSF, WTP, RSFs, pits, and block cave mines; **not significant (minor)** otherwise	**n/a**: potential interaction with Brucejack Mine but there is no flow data for this project, no CEA not possible
Streamflows within the Mine Site: Overall effect on stream flows	post-closure (all)	see above	**not significant (moderate)**	**n/a:** see above

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Surface Water Quantity (Chapter 13) (cont'd)				
Streamflows within the Bell-Irving River: Changes in: annual flow volumes; monthly flow distribution; peak flows; and low flows	All phases (diversions and tunnels, TMF, camps, access roads, laydown areas, OPCs, concentrate storage and loadout)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions and tunnels Implementation of: • Water Management Plan	**not significant (minor)**	**n/a**: effects confined to LSA; no interactions with other projects or activities
Stream flows within the Bell-Irving River (RSA): Overall effect on streamflows	post-closure (all)	See above	**not significant (minor)**	**n/a:** see above
Streamflows within the Unuk River: Changes in annual flow volumes	All phases (diversions and tunnels, WSF, WTP, RSFs, pits, block cave mine, camps, access roads and laydown area, Sludge Management Facilities, Mine Site avalanche control, Explosive Manufacturing Facility and Truck Shop)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions, tunnels, WSF, WTP, RSFs, pits, and block cave mines Implementation of: • Water Management Plan	**not significant (moderate)** for diversions and tunnels, WSF and WTP at closure; **not significant (minor)** otherwise	**n/a**: effects confined to LSA; no interactions with other projects or activities
Streamflows within the Mine Site: Changes in: monthly flow distribution; and in peak flows	construction, operation, closure, post-closure (diversions and tunnels, WSF, WTP, RSFs, pits, block cave mine, camps, access roads and laydown area, Sludge Management Facilities, Mine Site avalanche Control, Explosive manufacturing Facility and Truck Shop)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions, tunnels, WSF, WTP, RSFs, pits, and block cave mines Implementation of: Water Management Plan	**not significant (moderate)** for diversions and tunnel, WSF, WTP; **not significant (minor)** otherwise	**n/a**: potential interaction with Brucejack Mine but there is no flow data for this project, no CEA not possible

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Surface Water Quantity (Chapter 13) (cont'd)				
Stream flows within the Unuk River: Changes in monthly flow distribution	All phases (diversions and tunnels, WSF, WTP, RSFs, pits, block cave mine, camps, access roads and laydown area, Sludge Management Facilities, Mine Site avalanche control, Explosive Manufacturing Facility and Truck Shop)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions, tunnels, WSF, WTP, RSFs, pits, and block cave mines Implementation of: • Water Management Plan	**not significant (minor)**	**n/a**: effects confined to LSA; no interactions with other projects or activities
Stream flows within the Unuk River: Changes in peak flows	All phases (diversions and tunnels, WSF, WTP, RSFs, pits, block cave mine, camps, access roads and laydown area, Sludge Management Facilities, Mine Site avalanche control, Explosive Manufacturing Facility and Truck Shop)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions, tunnels, WSF, WTP, RSFs, pits, and block cave mines Implementation of: • Water Management Plan	**not significant (moderate)** for diversions and tunnels, WSF and WTP at closure; **not significant (minor)** otherwise	**n/a**: effects confined to LSA; no interactions with other projects or activities
Stream flows within the Unuk River: Changes in in low flows	All phases (diversions and tunnels, WSF, WTP, RSFs, pits, block cave mine, camps, access roads and laydown area, Sludge Management Facilities, Mine Site avalanche control, Explosive Manufacturing Facility and Truck Shop)	Management Practices: considering flow pathways and following natural hydrologic regime in design and operation of diversions, tunnels, WSF, WTP, RSFs, pits, and block cave mines Implementation of: • Water Management Plan	**not significant (moderate)** for diversions and tunnels, WSF and WTP at closure; **not significant (minor)** otherwise	**n/a**: effects confined to LSA; no interactions with other projects or activities
Stream flows within the Unuk River (RSA): Overall effect on streamflows	post-closure (all)	see above	**not significant (minor)**	**n/a**: see above

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Surface Water Quality (Chapter 14)				
Surface water quality: Degradation of water quality due to sedimentation	construction, operation (all)	Implementation of: • Terrain, Surficial Geology, and Soil Management and Monitoring Plan	**not significant (minor)**	**n/a**
Surface water quality: Degradation of water quality due to TSS, ML/ARD, nitrogen loading	All phases (access corridors)	Implementation of: • Terrain, Surficial Geology, and Soil Management and Monitoring Plan • ML/ARD Management Plan • Spill Prevention and Emergency Response	**not significant (minor)**	**n/a**
Surface water quality: Degradation of water quality Sulphurets Creek due to elevated selenium	operation, closure, post-closure (Mine Site)	Effluent from the WSF will be treated at the WTP using the HDS process and discharge limits will be set during permitting. Drainage and run-off from the Sulphurets Pit Backfill will be treated at the Selenium Treatment Plant. Effluent discharge from the WSF will be staged to match the natural hydrograph. Seepage recovery ponds are designed to maximize capture of seepage through and below the WSD and recovered water will be pumped back to the WTP. Implementation of: • Water Management Plan • Fish and Aquatic Habitat Management Plan • ML/ARD Management Plan	**not significant (moderate)**	**n/a**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Surface Water Quality (Chapter 14) (cont'd)				
Surface water quality: Degradation of water quality in Unuk River at UR1 and UR2 due to elevated selenium	operation, closure, post-closure (Mine Site)	Effluent from the WSF will be treated at the WTP using the HDS process and discharge limits will be set during permitting. Drainage and run-off from the Sulphurets Pit Backfill will be treated at the Selenium Treatment Plant. Effluent discharge from the WSF will be staged to match the natural hydrograph. Seepage recovery ponds are designed to maximize capture of seepage through and below the WSD and recovered water will be pumped back to the WTP. Implementation of: • Water Management Plan • Fish and Aquatic Habitat Management Plan • ML/ARD Management Plan	**not significant (moderate)**	**n/a**
Surface water quality: Degradation of water quality in Treaty watershed (North Treaty and Treaty creeks) and in Teigen watershed (South Teigen and Teigen creeks) due to nitrogen loading	operation, closure, post-closure (TMF)	Seepage recovery ponds are designed to maximize capture of seepage through and below the North and South dams and recovered water will be pumped back to the TMF Implementation of: • Water Management Plan • Fish and Aquatic Habitat Management Plan • ML/ARD Management Plan	**not significant (minor)**	**n/a**
Surface water quality: overall	post-closure (all)	see above	**not significant (moderate)**	**n/a**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Fish and Aquatic Habitat (Chapter 15)				
Bull trout (PTMA only)**, Dolly Varden, rainbow trout/steelhead, and Pacific salmon**: direct mortality from blunt trauma and increased fishing pressures	construction, operation, closure (CCAC, TCAR, TMF)	Use of BMPs to minimize fish mortality with construction machinery; adhere to DFO's operational statements; adhere to appropriate construction operating window for instream work; site isolation; implementing no fishing policies for employees (construction and closure) Implementation of: • Fish and Aquatic Management Plan • Fish Salvage Plan	**not significant (minor)**	**not significant (minor)**
Bull trout (PTMA only)**, Dolly Varden, rainbow trout/steelhead, and Pacific salmon:** Noise causing sub-lethal effects, decreased feeding efficiency and habitat avoidance	construction, operation (CCAC, TCAR, TMF)	Use of BMPs to minimize noise effects; adhere to DFO's operational statements; setback distances Implementation of: • Fish and Aquatic Management Plan	**not significant (minor)**	**not significant (minor)**
Bull trout (PTMA only)**, Dolly Varden, rainbow trout/steelhead, Pacific salmon, and aquatic habitat**: Erosion and sedimentation causing smothering of eggs, decreased feeding efficiency, habitat avoidance, smothering of aquatic invertebrates and loss of productive habitat capacity	construction, operation, closure (CCAC, TCAR, TMF, East Catchment Diversion, Camps 11 and 12, Treaty Marshalling Yard, Hwy 37)	Use of BMPs to minimize sediment entry to waterbodies; adhere to DFO's operational statements; site isolation; water quality maintenance; equipment maintenance Implementation of: • Sediment and Erosion Control Plan • Terrain, Surficial Geology and Soil Management and Monitoring Plan • Fish and Aquatic Management Plan • Spill Prevention and Emergency Response Plan	**not significant (minor)**	**not significant (minor)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Fish and Aquatic Habitat (Chapter 15) (cont'd)				
Bull trout (PTMA only)**, Dolly Varden, rainbow trout/steelhead, Pacific salmon, and aquatic habitat**: sublethal toxicity due to metal exposure from non-point sources throughout the KSM Project LSA or metals or process chemicals downstream of TMF (water quality degradation)	All phases (TCAR, MTT, TMF, Treaty OPC, seepage collection ponds, concentrate storage and loadout)	Use of BMPs to minimize blast residue entry to waterbodies; water quality maintenance; use BMPs and industry water treatment standards to treat waste effluent and minimize residue entry to waterbodies Implementation of: • ML/ARD Management Plan • Fish and Aquatic Management Plan • Spill Prevention and Emergency Response Plan • Fish Salvage Plan	**not significant (minor)**	**n/a**
Dolly Varden, rainbow trout/steelhead, Pacific salmon, and aquatic habitat: toxicity due to metals or process chemical exposure downstream of the Mine Site WSF and WTP (water quality degradation)	operation, closure, post-closure (WSF, WSD, WTP, Water Treatment and Energy Recovery Area, McTagg RSF, Mitchell RSF, Mitchell OPC, Mitchell Pit, Sludge Management Facilities, Sulphurets laydown area, Sulphurets-Mitchell Conveyor Tunnel, Sulphurets Pit, Kerr Pit)	Water and sediment quality maintenance Implementation of: • ML/ARD Management Plan • Erosion Control Plan • Fish and Aquatic Habitat Management Plan	**not significant (moderate)** for fish species, **not significant (minor)** for aquatic habitat	**n/a**
Bull trout (PTMA only)**, Dolly Varden, rainbow trout/steelhead, Pacific salmon, and aquatic habitat:** toxicity due to petroleum products or nitrogenous compounds (water quality degradation)	construction, operation, closure (Camps 3 through 12; Mine Site; PTMA; McTagg Energy Recovery Facility; TCAR; CCAC; Hwy 37; MTT; construction Access Adit)	Use of BMPs to minimize spill entry to waterbodies; adhere to DFO's operational statements; spill kits, equipment maintenance; stream setback distances; water quality maintenance; adhere to appropriate construction operating window for instream work Implementation of: • Spill Prevention and Emergency Response Plan • Erosion Control Plan • Fish and Aquatic Habitat Management Plan	**not significant (minor)**	**n/a**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Fish and Aquatic Habitat (Chapter 15) (cont'd)				
Aquatic habitat: eutrophication due to input of nitrogenous compounds and phosphorus (water quality degradation)	construction, operation, closure (Camps 3 through 12; Mine Site; PTMA; McTagg Energy Recovery Facility; TCAR; CCAC; Hwy 37; MTT; construction Access Adit)	Adhere to DFO's operational statements; Use of BMPs to minimize blast residue entry to waterbodies; compliance with the Municipal Wastewater Regulation and the Sewerage System Regulation; use of BMPs and industry wastewater treatment standards to treat effluent and minimize effluent entry to waterbodies; site isolation; seepage collection pond collecting run-off; water quality maintenance Implementation of: • Erosion Control Plan • Fish and Aquatic Habitat Management Plan	**not significant (minor)**	**n/a**
Aquatic habitat: loss and degradation of instream and associated riparian habitat (habitat loss and alteration)	construction, operation, closure (all facilities)	Use of BMPs to minimize habitat loss; utilize DFO's operational statement for transmission lines Implementation of: • Fish Habitat Compensation Plan • Fish and Aquatic Habitat Management Plan	**not significant (minor)**	**not significant (minor)**
Overall residual effect	post-closure (all)	See above	**not significant (moderate)** for Dolly Varden, rainbow trout/steelhead, Pacific salmon; **not significant (minor)** for bull trout and aquatic habitat	**not significant (moderate)** for Dolly Varden, rainbow trout/steelhead, Pacific salmon; **not significant (minor)** for bull trout and aquatic habitat

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Wetlands (Chapter 16)				
Wetland extent: loss of wetland extent	construction, operation (Camps 3 and7, TCAR, Treaty OPC, TMF, Sulphurets Laydown Area, Kerr Pit, and CCAR)	Avoidance - Changes to Treaty OPC from 2010 Pre-feasibility study (PFS) to 2012 PFS to reduce affected wetland areas; new road alignment along Treaty Creek to reduce wetland areas crossed by access road;minimization - establishment of riparian area buffers around all wetlands Implementation of: • Wetland Management Plan • Wetland Compensation Plan	**not significant (moderate)** in the TMF; **not significant (minor)** otherwise	**not significant (minor)**
Wetland function: loss, alteration, or degradation of hydrological, ecological, habitat, and biochemical functions	construction, operation (Camps 3 and 7, TCAR, Treaty OPC, TMF, Sulphurets laydown area, Kerr Pit, and CCAR)	Avoidance - Changes to Treaty OPC from 2010 PFS to 2012 PFS to reduce affected wetland areas; new road alignment along Treaty Creek to reduce wetland areas crossed by access road;minimization - establishment of riparian area buffers around all wetlands; locate necessary construction on wetland margins to mitigate wetland fragmentation Implementation of: • Wetland Management Plan • Wetland Compensation Plan	**not significant (moderate)** in the TMF; **not significant (minor)** otherwise	**not significant (minor)**
Overall residual effect	post-closure	see above	**not significant (minor)**	**not significant (minor)**
Terrestrial Ecosystems (Chapter 17)				
Potential pine mushroom habitat, avalanche track ecosystems, listed ecosystems, riparian and floodplain ecosystems, alpine and parkland ecosystems, old forests and other terrestrial ecosystems: vegetation loss	construction (all)	Minimize clearing to the dimensions required; preferentially retain mature and old trees; pre-construction review of mapped avalanche polygons, and mapped /known listed ecosystems, riparian ecosystems, and alpine and parkland ecosystems to assess options to minimize effects; use of low disturbance clearing methods, where feasible Implementation of: • Terrestrial Ecosystems Management and Monitoring Plans • Vegetation Clearing Management Plan	**not significant (moderate)** for avalanche track ecosystems and old forests; **not significant (minor)** otherwise	**not significant (minor)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Terrestrial Ecosystems (Chapter 17) (cont'd)				
Potential pine mushroom habitat, avalanche track ecosystems, listed ecosystems, riparian and floodplain ecosystems, alpine and parkland ecosystems, old forests and other terrestrial ecosystems: vegetation degradation	construction (all)	Monitor re-vegetated areas to assess success of re-vegetation and minimize related degradation; management and monitoring plans for windthrow and invasive plant species; adopt low disturbance methods within identified sensitive areas and minimize disturbance to non-target vegetation; re-vegetate short-term disturbances and clearings as soon as possible / feasible; ensure all vehicles and equipment restrict travel to designated roads and surfaces Implementation of: • Fugitive Dust Emissions Management Plan • Erosion and Control Plan • Fish and Aquatic Habitat Management Plan • Wildlife Management and Monitoring Plan • Terrestrial Ecosystems Management and Monitoring Plans	**not significant (minor)**	**not significant (minor)**
Overall residual effects	post-closure	See above	**not significant (moderate)** for avalanche track and old forest ecosystems; **not significant (minor)** otherwise	**not significant (minor)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Wildlife and Wildlife Habitat (Chapter 18)				
moose, mountain goat, grizzly bear, black bear, American marten, hoary marmot, raptors, wetland birds, and forest and alpine birds: habitat loss and alteration	construction (hoary marmot, mountain goat – Mine Site; others - all)	Partial deactivation of some mine components and partial re-vegetation post-closure; majority of TMF will be reclaimed; however, during the early years of closure phase wildlife may need to be prevented from accessing the TMF until monitoring programs indicate water quality and associated vegetation are safe; in the Mine Site, rock storage suitable for reclamation post-closure; partial reclamation of CCAR; conduct clearing outside raptor sensitive periods where active raptor nests are present and establish and adhere to buffer zones and working procedures established for working around identified active raptor nests during raptor sensitive periods; Pre-clearing surveys to identify active and non-active raptor nests. If an active nest cannot be avoided or work must be undertaken within buffer areas, a nest monitoring program would be initiated. Inactive raptor nests or nests found outside of the breeding season would be maintained or relocated, in consultation with British Columbia Ministry of Forests, Lands and Natural Resources Operations (BC MFLNRO), or the appropriate agency; avoid active wetland/forest and alpine bird nests by conducting clearing outside breeding periods or through pre-clearing surveys for bird nests in suitable habitat when clearing is required within the breeding period; if nests are found, a buffer area, free of noise and construction activity, would be established and implemented around wetland bird nests for the duration of the breeding period. Implementation of: • Wildlife Management and Monitoring Plan	**not significant (moderate)** for mountain goat; **not significant (minor)** otherwise	**not significant (moderate)** for moose and mountain goat; **not significant (minor)** otherwise

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Wildlife and Wildlife Habitat (Chapter 18) (cont'd)				
moose, mountain goat, grizzly bear and black bear: disruption of movement due to Project infrastructure and activities	construction (moose: TMF, TCAR; mountain goats: Mine Site; others: all)	Partial re-vegetation post-closure, including development of movement corridor across the valley on TMF dams; design bridges over Unuk river crossings to allow animals to move under; refuge areas along access roads will be ploughed along the road during winter; gaps in snow on roads will be created at best spacing to allow an escape for moose; partial decommissioning of roads and linear corridors; implement speed limits; road signs in areas where road traverses suitable wildlife habitats; monitor saddle area for moose movement; implement helicopter flight plan to minimize disturbance. Partial reclamation of CCAR during closure phase. Implementation of: • Wildlife Management and Monitoring Plan	**not significant (minor)**	**not significant (moderate)** for grizzly bears **not significant (minor)** otherwise
moose, mountain goat, grizzly bear, black bear, American marten, hoary marmot, western toad: direct mortality	construction (mountain goat: controlled avalanche; Western toad and American marten: PTMA, CCAR, TCAR; hoary marmot: Mine Site; moose, black bear, and grizzly bear: TCAR, CCAR)	Prevent the seeding or planting of attractive vegetation near roads; maintain ROW clearing; speed limits implemented and monitored; road signs warning of moose along road; additional precautions taken during wildlife high activity hours; monitoring and adaptive management of wildlife-vehicle interactions; partial reclamation of CCAR post-closure; an avalanche hazard plan will be produced in consultation with the BC MFLNRO, or the applicable government agency, to minimize the effects of avalanche control on mountain goat; clearing outside of the denning or breeding period/season or if this is not possible, pre-clearing surveys of habitat; implementation of design features to reduce the risk of collisions and electrocutions with the transmission line, including increasing visibility of the line; prevent raptor nesting on posts; monitoring for effects and adaptive management where areas with a higher incidence of bird strikes are identified; during operation, appropriate protection for toads will be provided to minimize collisions with vehicles, which may include toad tunnels or other effective mitigation. Implementation of: • Wildlife Management and Monitoring Plan	**not significant (minor)**	**not significant (moderate)** for moose; **not significant (minor)** otherwise

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Wildlife and Wildlife Habitat (Chapter 18) (cont'd)				
black bear, grizzly bears: attraction to camps and processing facilities due to odours (black bear, grizzly bear) (attractants)	construction (camps, Project roads)	Minimize the use of roadside salts for winter road management; mitigation along KSM Project access roads will include creating breaks in snow banks along ploughed Project access roads; eliminate attractive odours by incinerating appropriate garbage items and properly storing items that cannot be incinerated; enforce proper waste disposal procedures for all employees and contractors. Implementation of: • Wildlife Management and Monitoring Plan	**not significant (minor)**	**not significant (minor)**
mountain goats: "functional habitat loss" from sensory disturbance, where noise and light sources would interrupt movements, habitat selection, and behaviour	construction (Mine Site)	Noise: Noise specifications will be considered when selecting equipment to purchase; vehicles will be maintained regularly; speed limits will be imposed; mufflers will be installed on vehicles and maintained; noise dampening measures will be applied where possible; helicopter flight paths will be followed to minimize disturbance; noise will be monitored periodically at various human and wildlife receptor locations; goat response to noise may be monitored if they occupy habitat near the Mine Site Lights: Use of directed/focused lighting rather than broad area lighting and by shielding lights to minimize stray light; lighting in non-essential areas will be regulated to permit use only when necessary Implementation of: • Wildlife Management and Monitoring Plan	**not significant (moderate)**	**not significant (moderate)**
moose, black bear, grizzly bear, mountain goat: indirect mortality from increased accessibility in inaccessible landscape increasing hunting pressure on moose population (moose, black bear, grizzly bear, mountain goat), and consequences of shifting home range (mountain goat)	construction (moose, black bear, grizzly bear: TCAR, CCAR) closure (mountain goat: project roads)	Controlled access (e.g., gated road); Project area designated as no hunting zone and no personal firearms permitted within project area; partial deactivation of CCAR post-closure Implementation of: • Wildlife Management and Monitoring Plan	**not significant (minor)**	**not significant (minor)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Wildlife and Wildlife Habitat (Chapter 18) (cont'd)				
moose, mountain goats, bats and wetland birds: chemical hazards	construction (mountain goat: Mine Site) operation (wetland birds: TMF, WSF, receiving waters of Unuk River and North Treaty Creek) closure (bats: TMF) post-closure (moose: TMF)	Water quality monitoring will be conducted in the TMF and WSF during all Project phases; wildlife will be prevented from accessing the TMF and the WSF until water meets water quality guidelines for all COPCs. Implementation of: • Wildlife Management and Monitoring Plan • Aquatic Effects Monitoring Plan • Fugitive Dust Emissions Management Plan • Water Management Plan	**not significant (moderate)** for wetland birds; **not significant (minor)** otherwise	**not significant (minor)**
moose, mountain goat, grizzly bear, black bear, American marten, hoary marmot, wetland birds: overall	All phases (mountain goat, black bear, grizzly bear, moose, American marten, wetland birds: all; hoary marmot: Mine Site)	See above	**not significant (moderate)** for moose, mountain goat, grizzly bear; **not significant (minor)** otherwise	**not significant (moderate)** for moose under likely development scenario (less traffic); **significant (major)** for moose under unlikely development scenario (high traffic); **not significant (moderate)** for mountain goat and grizzly bear; **not significant (minor)** - otherwise

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Noise (Chapter 19)				
Noise: Sleep disturbance	construction, operation (Mining Camp)	Maximize distances from major noise sources to sleeping quarters; improve building insulation so that predicted indoor Leq are 30 dBA or less; avoid the use of equipment that generates impulsive noise; minimize the need for reversing alarms; avoid dropping materials from a height; avoid metal-to-metal contact on equipment; if possible, schedule truck movements to avoid roads near mining camps; avoid mobile plant clustering near residences and other sensitive receptors Implementation of: • Noise Management Plan	**not significant (moderate)** for operation; **not significant (minor)** for construction	**not significant (moderate)** for operation; **not significant (minor)** for construction
Noise: Speech interference, complaints, high annoyance, noise induced rattling	construction, operation (Offsite Receivers)	Avoid the use of equipment that generates impulsive noise; minimize the need for reversing alarms; avoid dropping materials from a height; avoid metal-to-metal contact on equipment; if possible, schedule truck movements to avoid roads near mining camps; avoid mobile plant clustering near residences and other sensitive receptors. Implementation of: • Noise Management Plan	**not significant (minor)**	no residual cumulative effects
Noise: Loss of wildlife habitat	construction, operation (Local Wildlife Habitat)	Use blast mats to reduce noise levels; properly stagger delays for blast pattern to minimize the number of charges simultaneously being ignited; avoid the use of equipment that generates impulsive noise; minimize the need for reversing alarms; avoid dropping materials from a height; avoid metal-to-metal contact on equipment; if possible, schedule truck movements to avoid roads near mining camps; avoid mobile plant clustering near sensitive receptors. Implementation of: • Noise Management Plan	**not significant (moderate)** for operation; **not significant (minor)** for construction	**not significant (moderate)** for operation; **not significant (minor)** for construction
Noise: Overall residual effect	all	See above	**not significant (moderate)**	**not significant (moderate)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Economic (Chapter 20)				
Employment and income: The Project will have beneficial effects on direct, indirect and induced employment, including employment of LSA residents in Aboriginal and non-Aboriginal communities.	construction, operation (Employment; Procurement of Goods and Services)	Implementation of: • Labour Recruitment and Retention Strategy • Procurement Strategy • Workforce Training Strategy	**not significant (moderate)** beneficial	**significant (major)**- beneficial
Employment and income: The Project will have beneficial effects on direct, indirect and induced personal incomes, GDP, and government tax revenues, including income to LSA residents in Aboriginal and non-Aboriginal communities	construction, operation (Employment; Procurement of Goods and Services)	Implementation of: • Labour Recruitment and Retention Strategy • Procurement Strategy • Workforce Training Strategy	**not significant (moderate)** beneficial	**significant (major)** beneficial
Employment and income: Change in business activity is expected to alter the employment and income profile of the RSA and LSA communities.	construction, operation (Employment; Procurement of Goods and Services)	None	**not significant (moderate)** beneficial	**not significant (moderate)** beneficial
Employment and income: Overall	all	See above	**not significant (moderate)** beneficial	**significant (major)** beneficial
Business opportunities and economic development: The Project will have beneficial effects on businesses supplying the Project and selling goods and services to residents and businesses.	construction, operation (Employment; Procurement of Goods and Services)	Implementation of: • Procurement Strategy	**not significant (moderate) -** beneficial	**not significant (moderate) -** beneficial

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Economic (Chapter 20) (cont'd)				
Business opportunities and economic development: The Project is expected to contribute to economic growth, investments, and the development of local businesses.	construction, operation (Employment; Procurement of Goods and Services)	Implementation of: Procurement Strategy	**not significant (moderate) -** beneficial	**not significant (moderate) -** beneficial
Business opportunities and economic development: The Project is expected to contribute to LSA and RSA development and broadening of the economic base.	construction, operation (Employment; Procurement of Goods and Services)	Implementation of: Labour Recruitment and Retention Strategy Procurement Strategy Workforce Training Strategy	**not significant (moderate) -** beneficial	**not significant (moderate) -** beneficial
Business opportunities and economic development: Overall	all	See above	**not significant (moderate) -** beneficial	**not significant (moderate) -** beneficial
Heritage (Chapter 21)				
Archaeological sites: Disturbance of both known and unknown archaeological sites	construction, operation (all Project components)	Avoidance; mitigation measures to be determined in consultation with the Archaeology Branch Implementation of: • Heritage Management and Monitoring Plan • Chance Find Procedure	**not significant (minor)**	no residual cumulative effects
Social (Chapter 22)				
Community demographics, infrastructure, and services: Altering of community demographics due to population growth (beneficial and/or adverse, depending on personal opinion)	operation (employment; procurement of goods and services)	Project updates to local communities	**not significant (minor)**	**not significant (minor)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Social (Chapter 22)				
Community demographics, infrastructure, and services: Demand on community infrastructure and services may outpace small LSA communities' capacity in the short-term due to population growth (adverse)	operation (employment; procurement of goods and services)	Project updates to local communities	**not significant (minor)**	**not significant (minor)**
Community demographics, infrastructure, and services: Increase in government revenues to fund infrastructure and services due to Increased tax base (beneficial)	operation (employment; procurement of goods and services)	None	**not significant (minor) -** beneficial	**not significant (minor) -** beneficial
Community demographics, infrastructure, and services: Overall	operation (employment; procurement of goods and services)	See above.	**not significant (minor)**	**not significant (minor)**
Education, skills, and training: Increase in the educational profile of the local, regional and provincial workforce due to employment-related training and work experience (beneficial)	construction, operation (employment; procurement of goods and services)	Implementation of: • Recruitment and Retention Strategy • Procurement Strategy • Workforce Training Strategy	**not significant (minor)** - beneficial	**not significant (minor) -** beneficial
Education, skills, and training: Improvement in the educational profile of LSA and RSA communities due to in-migration of skilled workers (beneficial)	operation (employment; procurement of goods and services)	Implementation of: • Recruitment and Retention Strategy • Procurement Strategy • Workforce Training Strategy	**not significant (minor)** - beneficial	**not significant (minor) -** beneficial

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Social (Chapter 22) (cont'd)				
Education, skills, and training: Improvement in the capacity of educational institutions due to population-fueled demand (beneficial)	operation (employment; procurement of goods and services)	Project updates to local communities • Implementation of: • Workforce Training Strategy	**not significant (minor)** - beneficial	**not significant (minor) -** beneficial
Education, skills, and training: Overall	construction, operation (employment; procurement of goods and services)	See above	**not significant (minor)** - beneficial	**not significant (minor) -** beneficial
Community well-being: Increase in individual esteem and community pride due to employment (beneficial)	construction, operation (employment; procurement of goods and services)	Implementation of: • Recruitment and Retention Strategy • Procurement Strategy • Workforce Training Strategy	**not significant (minor)** - beneficial	**not significant (minor) -** beneficial
Community well-being: Increase in stress on families due to employment rotation schedules (adverse), and increase in substance misuse due to employment-related stress (adverse)	operation (employment; procurement of goods and services)	Implementation or recruitment of: • Employee Assistance Plan	**not significant (minor)**	**not significant (minor)**
Community well-being: Increase in financial independence and access to goods and services due to increased income (beneficial)	operation (employment; procurement of goods and services)	Implementation of: • Financial management and general life skills development training program.	**not significant (minor)** - beneficial	**not significant (minor)** beneficial
Community well-being: Increase in substance misuse due to increase in income (adverse)	operation (employment; procurement of goods and services)	Implementation of: • Employee Assistance Program	**not significant (minor)**	**not significant (minor)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Social (Chapter 22) (cont'd)				
Community well-being: Increased community pride due to reversal in population decline (beneficial)	operation (employment; procurement of goods and services)	Implementation of: • Recruitment and Retention Strategy	**not significant (minor)** - beneficial	**not significant (minor)** beneficial
Community well-being: Increase in social, mental health, and community safety issues in the short term as community support capacity is outpaced by population change (adverse)	operation (employment; procurement of goods and services)	Project updates to local communities Implementation of: • Employee Assistance Program	**not significant (minor)**	**not significant (minor)**
Community well-being: Increase in emissions (i.e., noise, exhaust) due to increased traffic volume in Stewart which would vary depending on development level	operation (Highway 37 and 37A)	Voluntary compliance with BC Clean Air Plan; Company Safety Management System Project updates to local communities Implementation of: • Traffic and Access Management Plan	**not significant (minor)**	**significant (major)** for unlikely development scenario; **not significant (moderate)** for likely development scenario
Community well-being: Increase in vehicle accidents due to increased traffic volume in Stewart (adverse) which would vary depending on development level	operation (Highway 37 and 37A)	Voluntary compliance with BC Clean Air Plan; Company Safety Management System Project updates to local communities Implementation of: • Traffic and Access Management Plan	**not significant (minor)**	**Not significant (moderate)** for unlikely development scenario; **not significant (minor)** for likely development scenario
Community well-being: Overall	operation (Highway 37 and 37A; employment; procurement of goods and services)	See above	**not significant (minor)**	**not significant (minor)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Land Use (Chapter 23)				
Commercial recreation, guide outfitting, and trapping: restricted access to tenures in Project area	construction, operation and closure (all); post-closure (PTMA)	Implementation of: • Traffic and Access Management Plan • Monitoring and Adaptive Management	**not significant (minor)**	**not significant (minor)**
Commercial recreation, guide outfitting, and trapping: noise, traffic and visibility of project-related infrastructure in the landscape could alter areas and/or reduce economic opportunities for commercial licence holders due to a perceived reduction in the quality of the land user experience	construction, operation and closure (all); post-closure (TCAR)	Implementation of: • Traffic and Access Management Plan • Noise Management Plan • Visual Quality Management Plan	**not significant (minor)**	**not significant (minor)**
Commercial recreation, guide outfitting, and trapping: wildlife resources diminished for guide outfitters and trappers due to habitat loss	construction, operation and closure (all)	Implementation of: • Traffic and Access Management Plan • Noise Management Plan • Fish and Aquatic Habitat Management Plan • Terrestrial Ecosystems Management and Monitoring Plans • Wildlife Management and Monitoring Plan	**not significant (moderate)**	**not significant (moderate)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Land Use (Chapter 23) (cont'd)				
Recreational hunting and fishing: wildlife resources diminished for resident hunters due to habitat loss	Construction, operation, closure (all)	Implementation of: • Traffic Management Plan • Noise Management Plan • Fish and Aquatic Habitat Management Plan • Terrestrial Ecosystems Management and Monitoring Plans • Wildlife Management Plan	**not significant (moderate)**	**not significant (moderate)**
Subsistence: restricted access to subsistence areas, including trapline 617T015 and 617T011	Construction and operation (all); closure (PTMA and TCAR); TMF and TCAR at post-closure	Implementation of: • Access Management Plan	**not significant (minor)**	**not significant (minor)**
Subsistence: wildlife resources diminished for subsistence harvesters due to habitat loss and other pressures	construction, operation, closure (all)	Implementation of: • Traffic Management Plan • Noise Management Plan • Fish and Aquatic Habitat Management Plan • Terrestrial Ecosystems Management and Monitoring Plans • Wildlife Management and Monitoring Plan	**not significant (moderate)** for construction and operation; **not significant (minor)** at closure	**not significant (moderate)**
Navigable waters: effects to navigational safety and access assessed in Chapter 31. See end of table.				
Visual and Aesthetic Resources (Chapter 24)				
Alteration of visual quality for river rafting tours, heli-skiiers, guided backcountry expeditions, guided angling trips, visitors of Treaty Creek Site, and users of Highway 37	construction (CCAR, PTMA, pits, TCAR and transmission line, RSF, Hwy 37 construction camp)	Roads to mimic natural landscape as practical; leave tree buffers; re-vegetate roads at closure	**not significant (minor)**	**not significant (minor);** **n/a** for river rafting, visitors of Treaty Creek site, and Highway 37 users

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Human Health (Chapter 25)				
Health effects from surface water: human health effects due to ingestion of metals from untreated water from downstream of the TMF and the Mine Site	operation, closure and post-closure (TMF, Mine Site)	Project design; water treatment; water quality monitoring	**not significant (minor)**	n/a
Health effects from air quality: health effects from emissions of NO_2, SO_2, CO, TSP, $PM_{2.5}$, and PM_{10} related to Project rising above background, but below guidelines	operation (mining machinery, equipment and traffic emissions, blasting [operation only])	Project design; emission control systems; vehicle and equipment maintenance; dust management; monitoring	**not significant (minor)**	**not significant (minor)**
Health effects from air quality: increase in hazard quotient for metal inhalation	operation (mining machinery, equipment and traffic emissions, blasting [operation only])	Project design; emission control systems; vehicle and equipment maintenance; dust management; monitoring	**not significant (minor)**	**not significant (minor)**
Health effects from air quality: increase in ILCR due to an increase in concentration of metals and $PM_{2.5}$, and risk of excess mortality due in increase in concentrations of $PM_{2.5}$	construction, operation (mining machinery and equipment emitting combustion $PM_{2.5}$, especially near Mitchell and Treaty operating camps)	Project design; emission control systems; vehicle and equipment maintenance; dust management; monitoring	**not significant (minor)**	**not significant (moderate)**

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Human Health (Chapter 25) (cont'd)				
Health effects from the consumption of country foods: human health effects relating to metal toxicity from the ingestion of country foods	operation, closure, post-closure (water and sediment quality in TMF and creeks immediately downstream of TMF; water quality downstream of Mine Site); closure and post-closure only (vegetation quality in TMF and creeks immediately downstream of TMF)	Project design; dust management; water treatment; water and air quality monitoring; adaptive management	**not significant (minor)**	n/a
Health effects from noise: human health effects from sleep disturbance on site due to noise	Construction, (Camp 5); operation (Camp 6 and Treaty operating camp)	monitoring; adaptive management; regular maintenance of vehicles and machinery; speed control	**Not significant (minor)** during construction**; not significant (moderate)** during operation	**not significant (moderate)** for operation; **not significant (minor)** for construction
Overall residual effect on human health	all (post-closure)	See above	**not significant (minor)**	n/a

(continued)

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

Residual Effects	Project Phases and Components	Mitigation Measures	Significance of Residual Project Effects	Significance of Residual Cumulative Effects
Navigable Waters (Chapter 31)				
Navigable Waters: effects on navigational safety and access	All phases (Mine Site, PTMA, TCAR and CCAR components)	Avoidance; putting up signage and other measures to warn of any navigational hazards, implement measures per CSA , Transport Canada standards, and DFO operational statements on navigable waters Implementation of: • Construction Management Plan • Closure and Reclamation Plan • Fish and Aquatic Habitat Management Plant • Water Management Plan	**not significant (minor)**	no residual cumulative effects

Note: n/a = not applicable BMP=best management practice, MTT=Mitchell-Treaty Twinned Tunnels, PTMA=Processing and Tailing Management Area, TMF= tailing management facility, LSA= Local Study Area, RSA=regional study area, OPCs=Mitchell Ore Preparation Complex and Treaty Ore Processing Complex , VC=valued component, HDS=high density sludge, DFO=Fisheries and Oceans Canada, COPC=Contaminants of Potential Concern